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

Dynamic content updated: 2020-11-18 03:36:22.
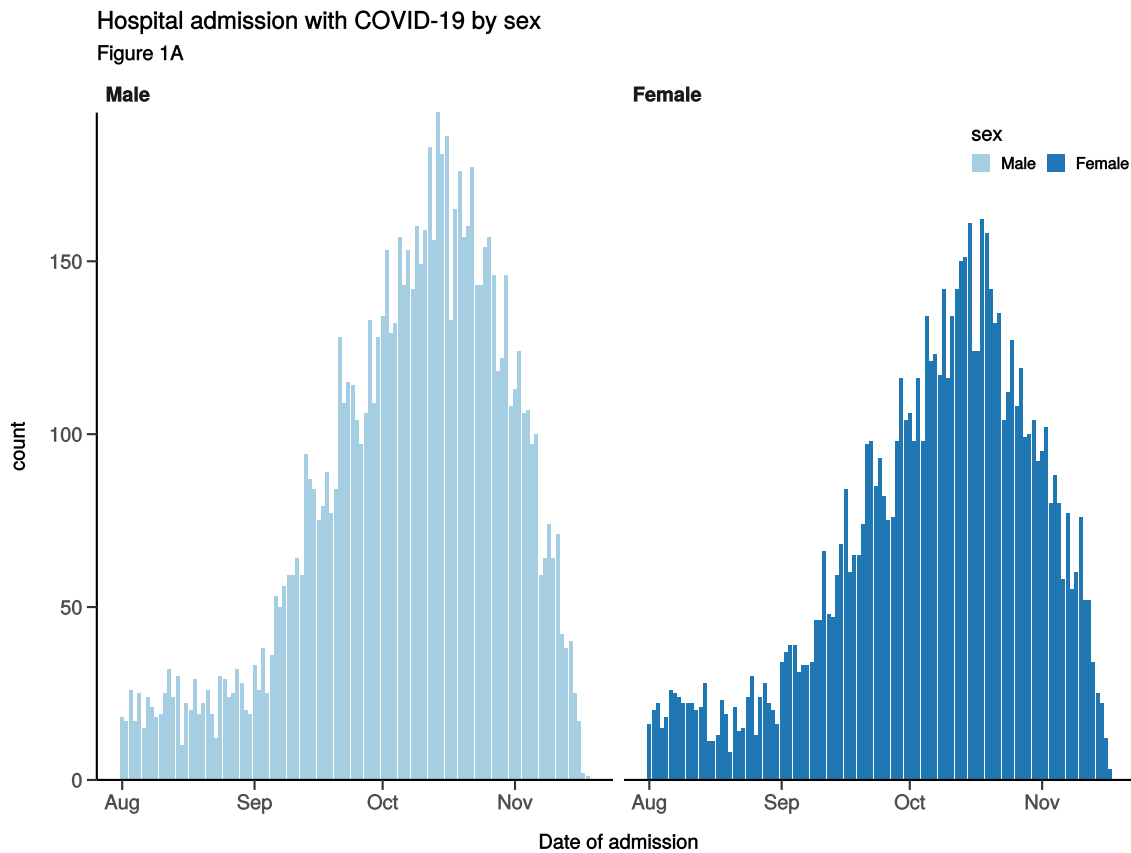
Executive summary

Includes patients admitted after 01 August 2020

There are 16342 patients included in CO-CIN. Of these, 2132 patient(s) have died and 2062 required ICU. 8437 have been discharged home.
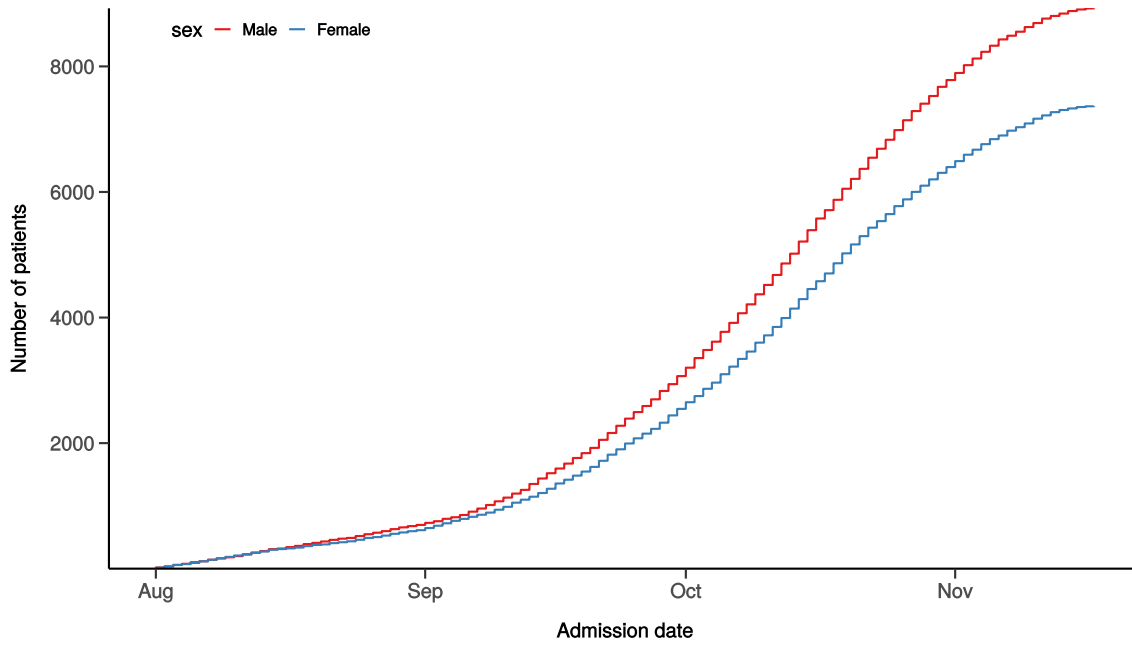
Admission

Figure 1

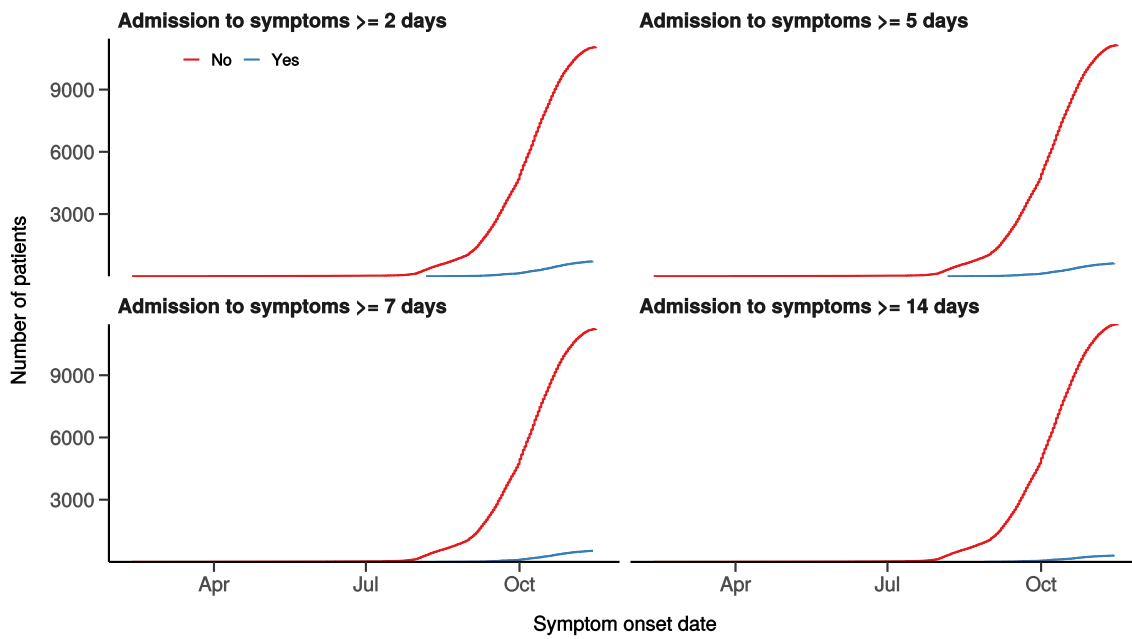Hospital admission with COVID-19 by sex
Figure 1A

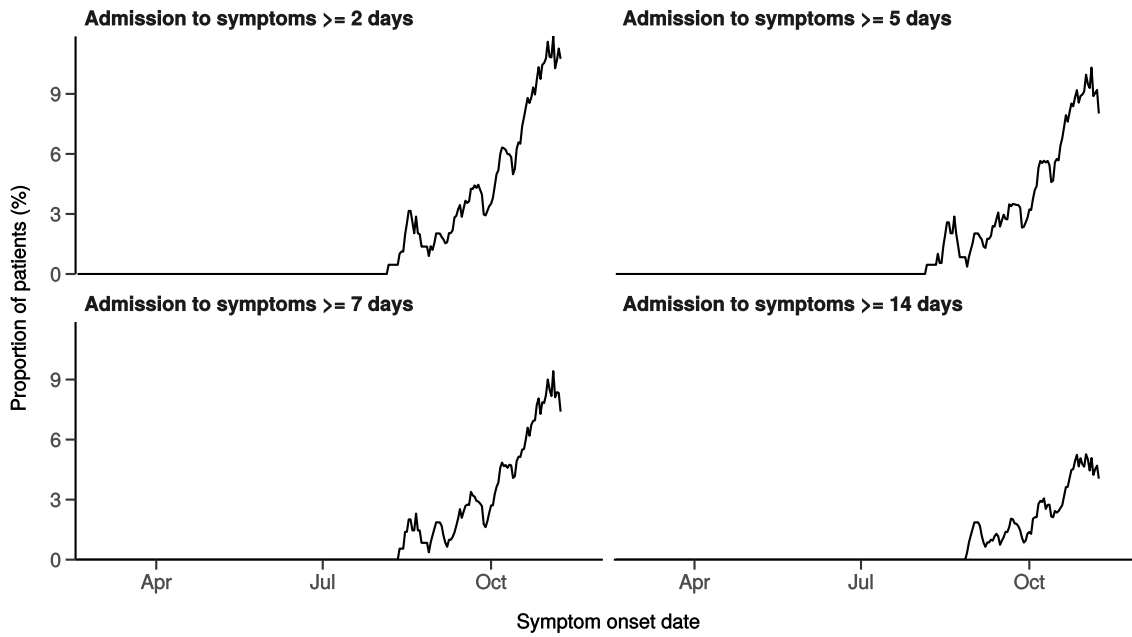## Hospital admission with COVID-19 by sex
Figure 1B

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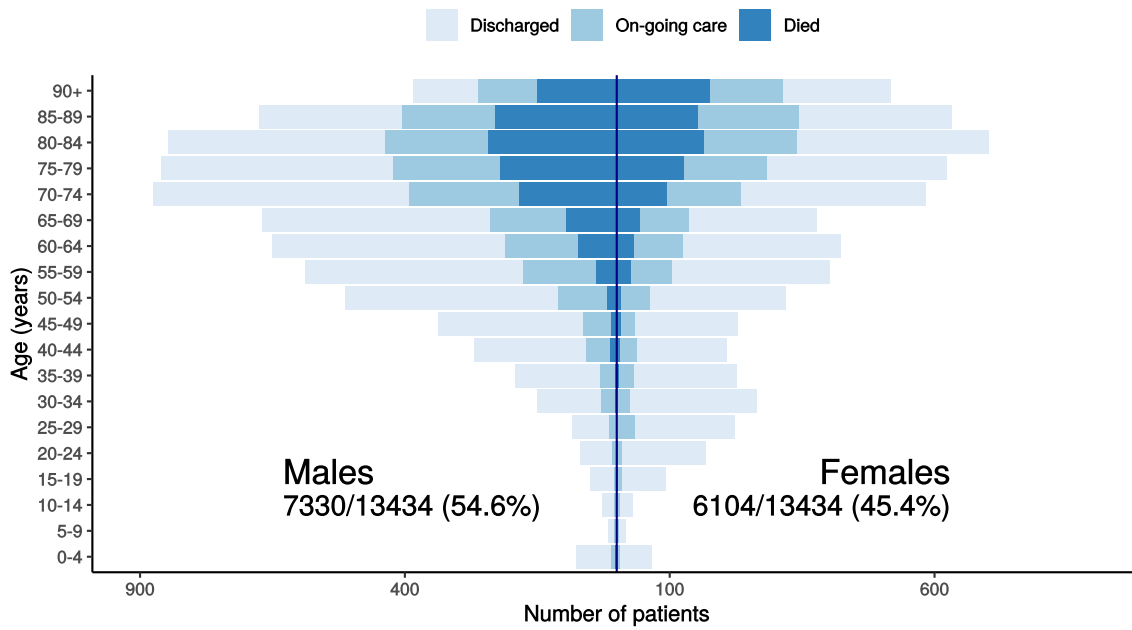Figure 1C

Proportion with symptom onset occuring after hospital admission

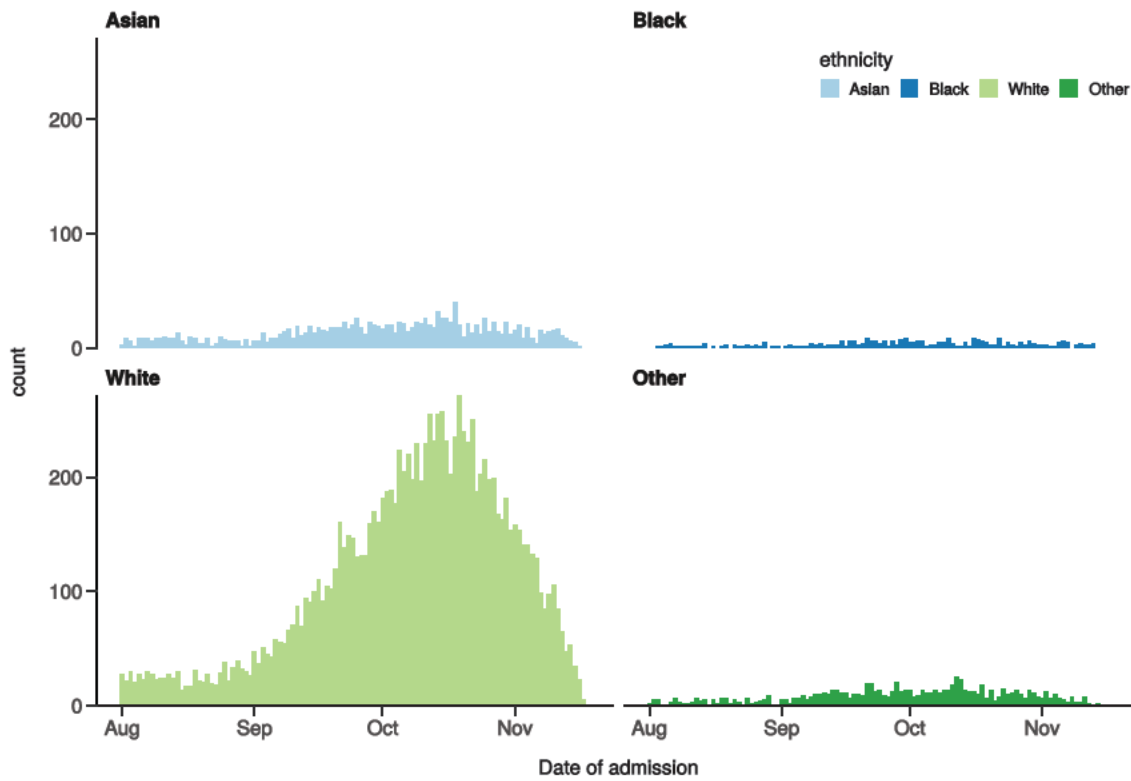Figure 1D - 7-day rolling percentage. n = 11763

Patients with outcome stratified by age, and sex

Figure 1E

Hospital admission with COVID-19 by ethnicity
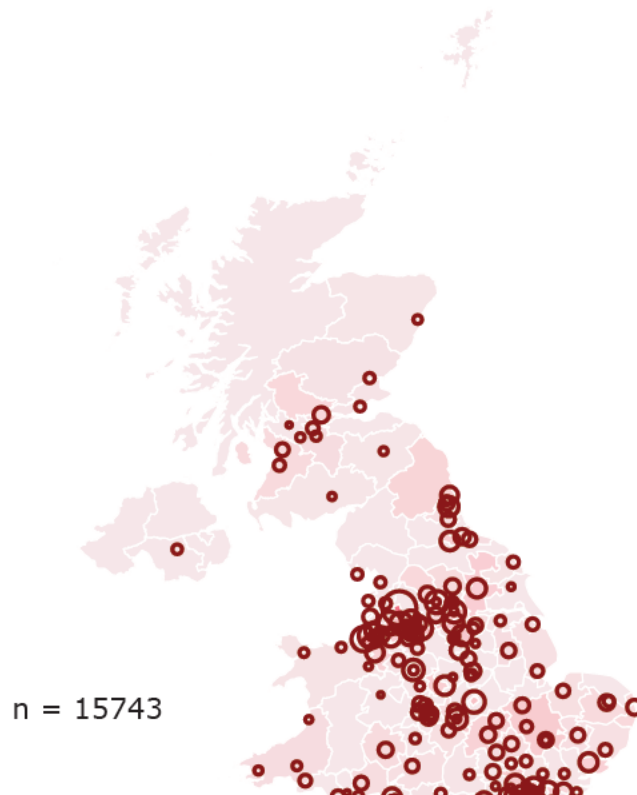Figure 1F

Location by CCG / Healthboard

Figure 2

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

n = 15743
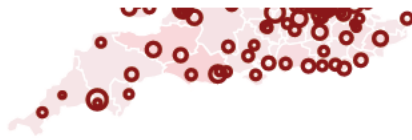
Symptoms and comorbidity

Figure 3A

Symptoms on presentation to hospital
% patients, n = 14213

YES NO Unknown

Comorbidity
% patients, n = 16342

YES NO Unknown

Figure 3B - Symptoms by Age

Symptoms on presentation to hospital
Stratifed by age
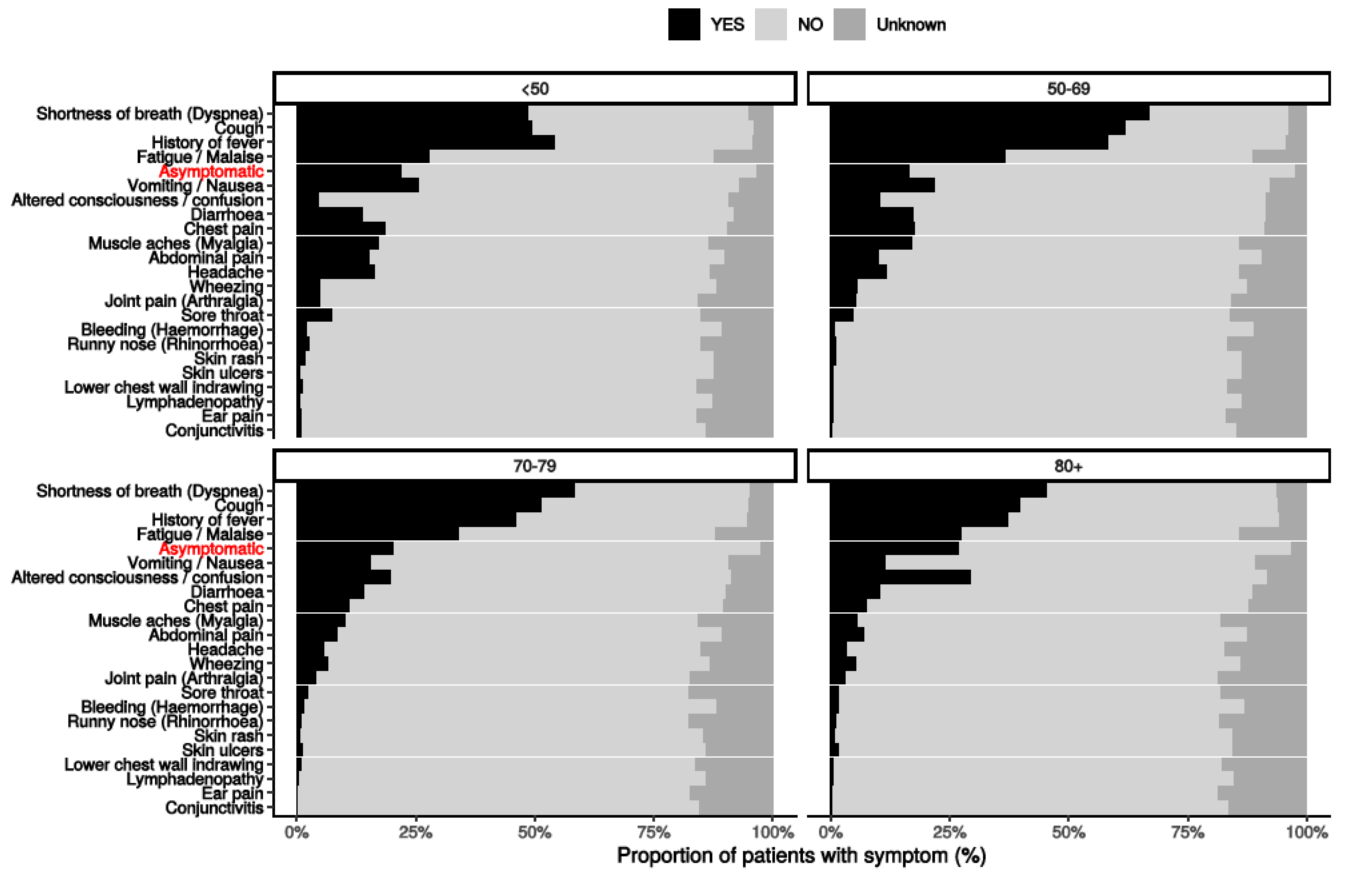
Figure 3C

Correlation of symtpoms in all pages. Note clusters, top right to bottom left, flu-like, coryzal, abdominal, respiratory, neurocutaneous.
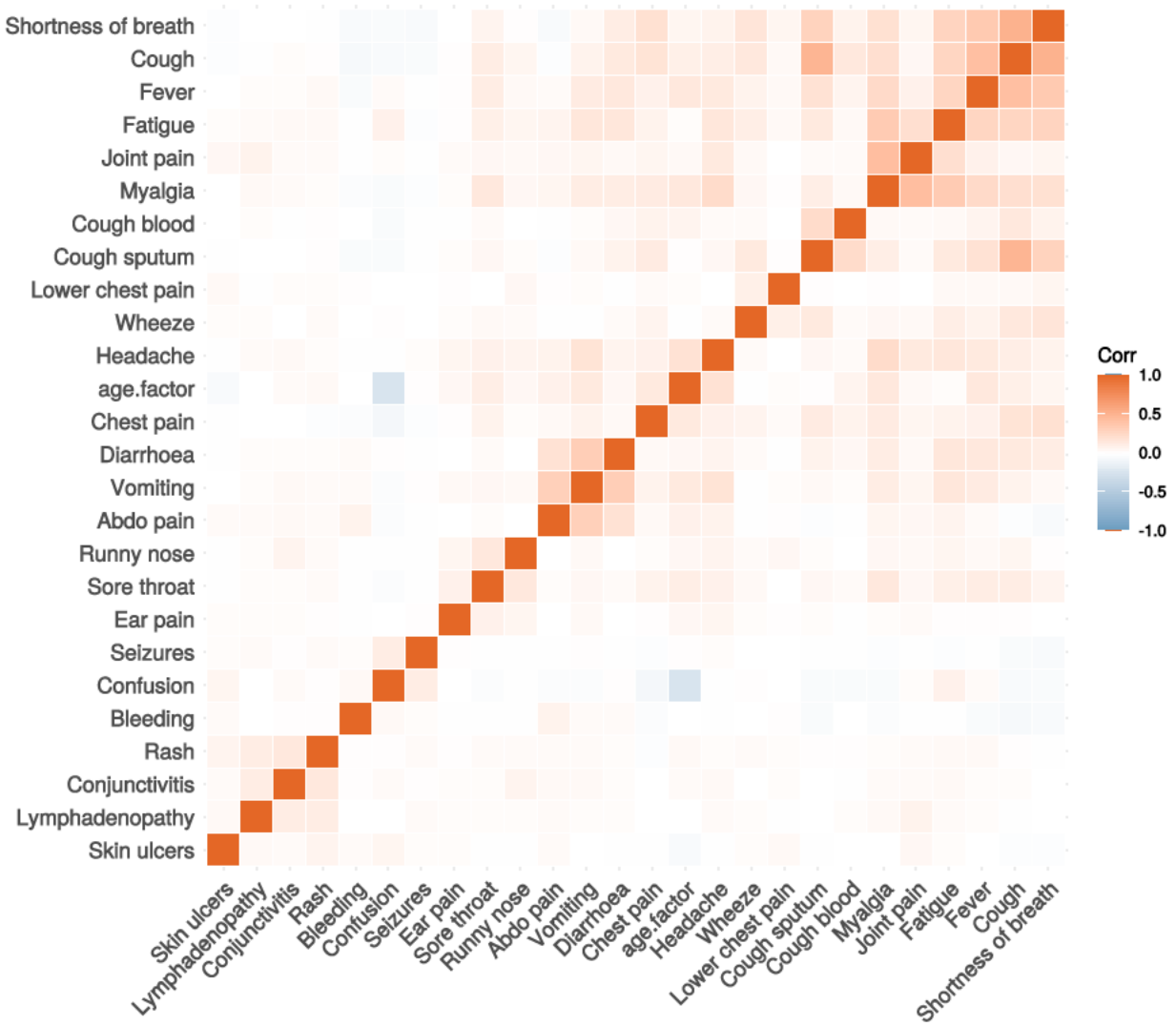
Symptoms (diagnostic criteria)

Figure 4A

n = 14213

Fever
Cough
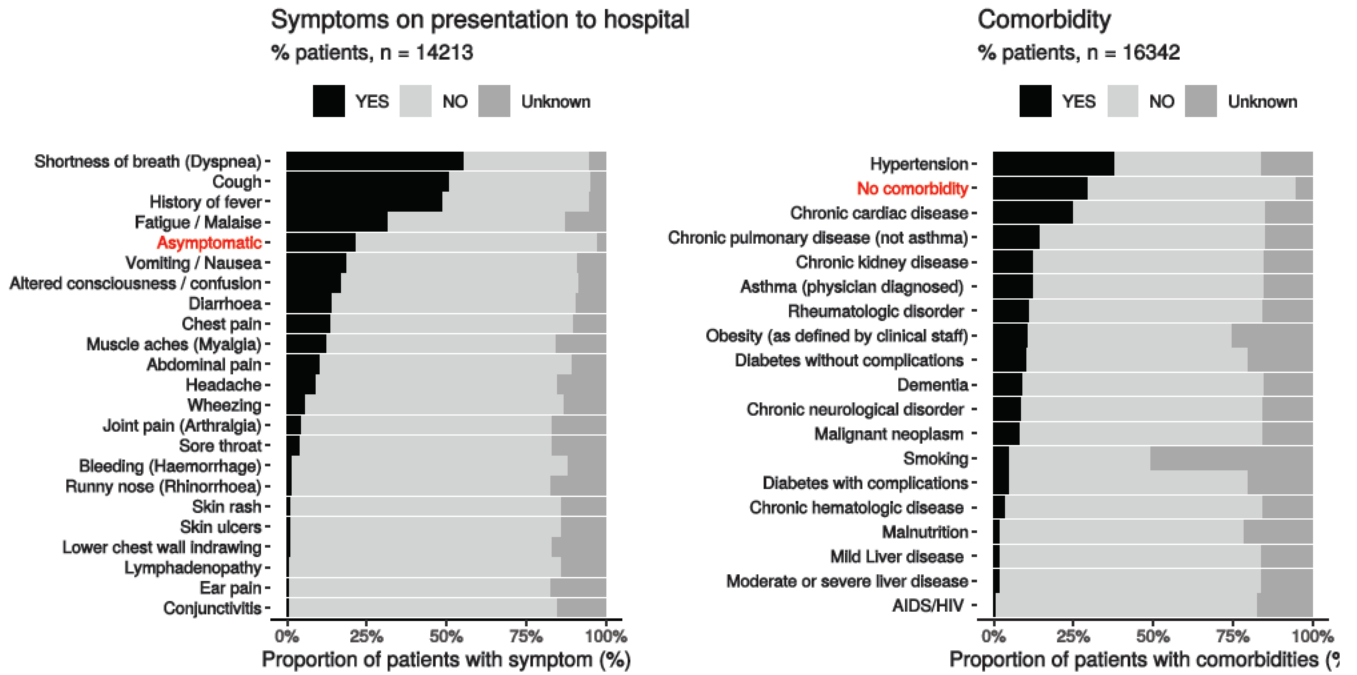Shortness of breath
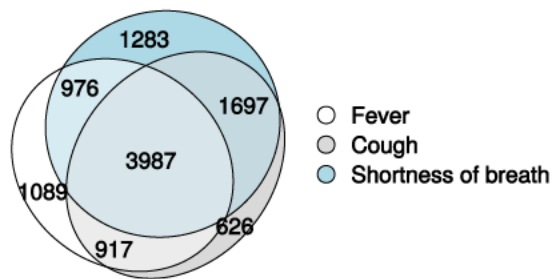
Symptoms (most common)

Figure 4B

n = 14213
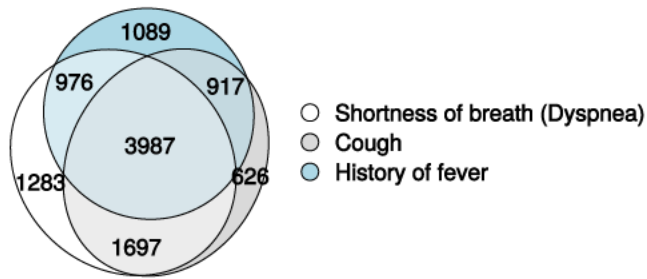
Comorbidity (most common)

Figure 4C

n = 16342
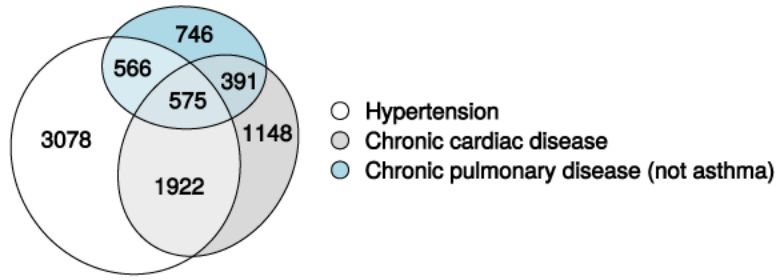
Medication prior to illness

Figure 5

Number of medications prior to admission
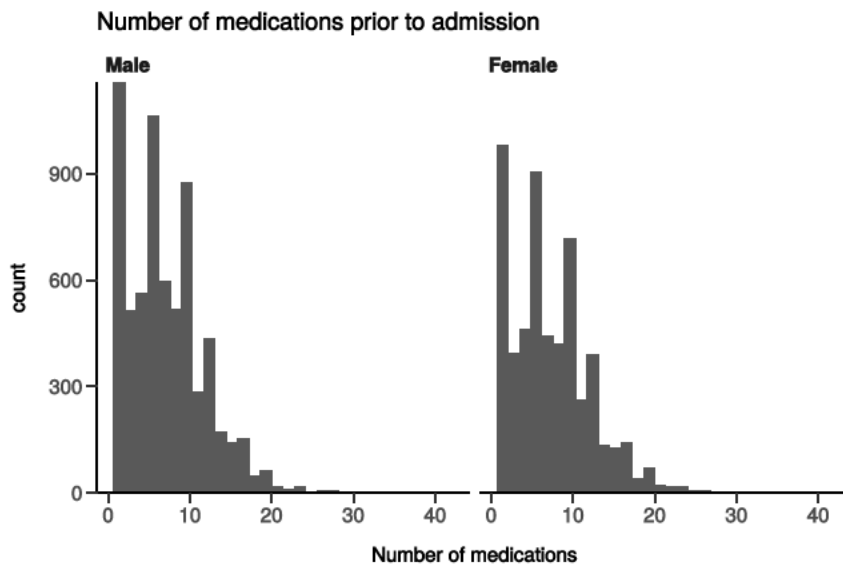
Preadmission treatment

Figure 6

Pre-admission treatment

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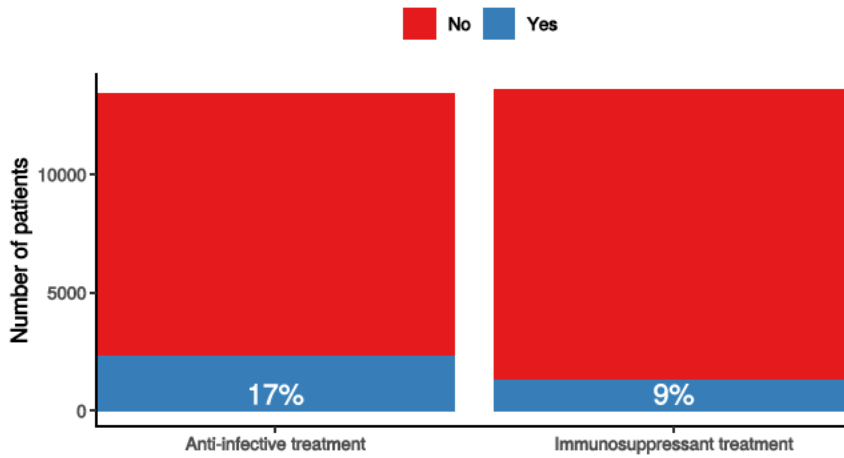
Patient flow

Figure 7A - All patients

N = 14573
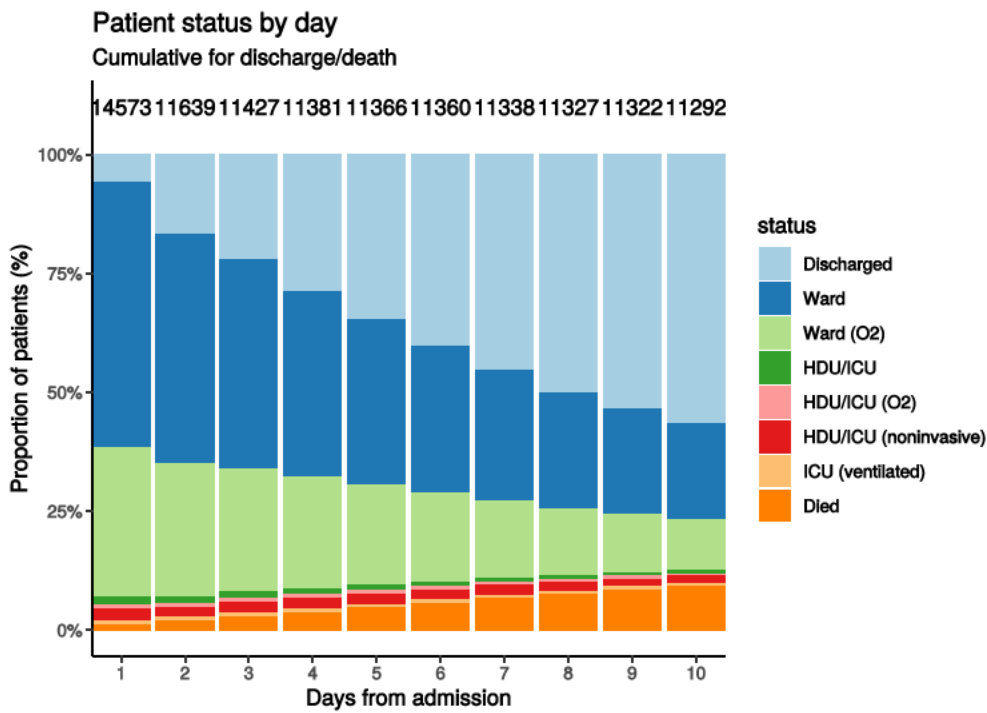
Figure 7B - Patients admitted >=14 days and <=28 days ago

N = 3006

Patient status by day

Cumulative for discharge/death
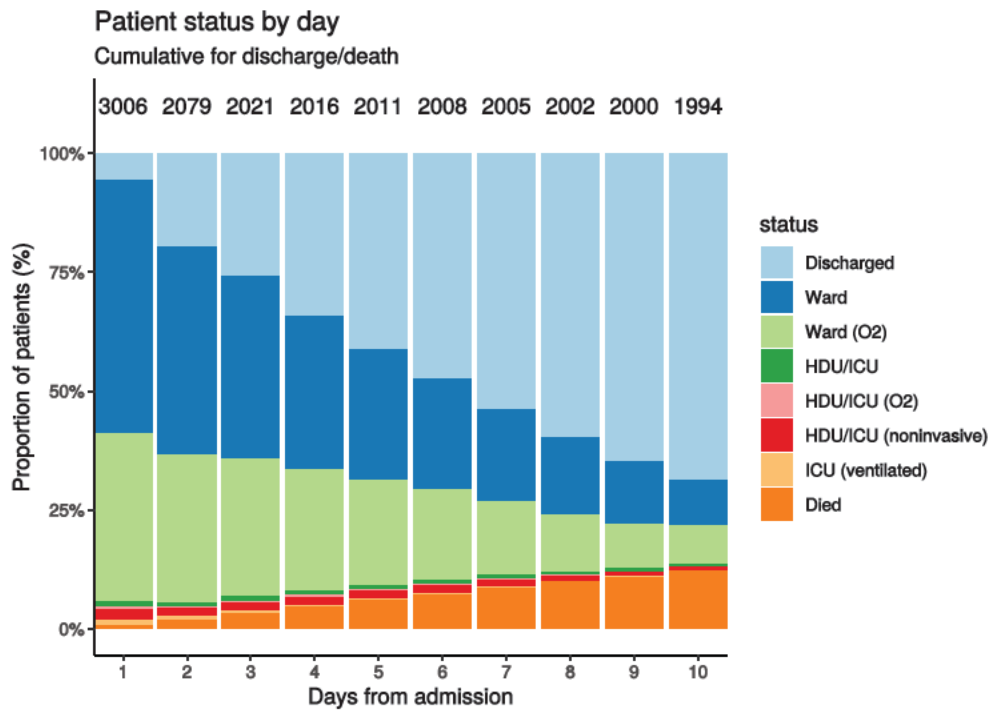
Oxygen requirement

Figure 8A - All patients

N = 13877

Admission location | HDU/ITU after day 1 | Maximum treatment | Outcome
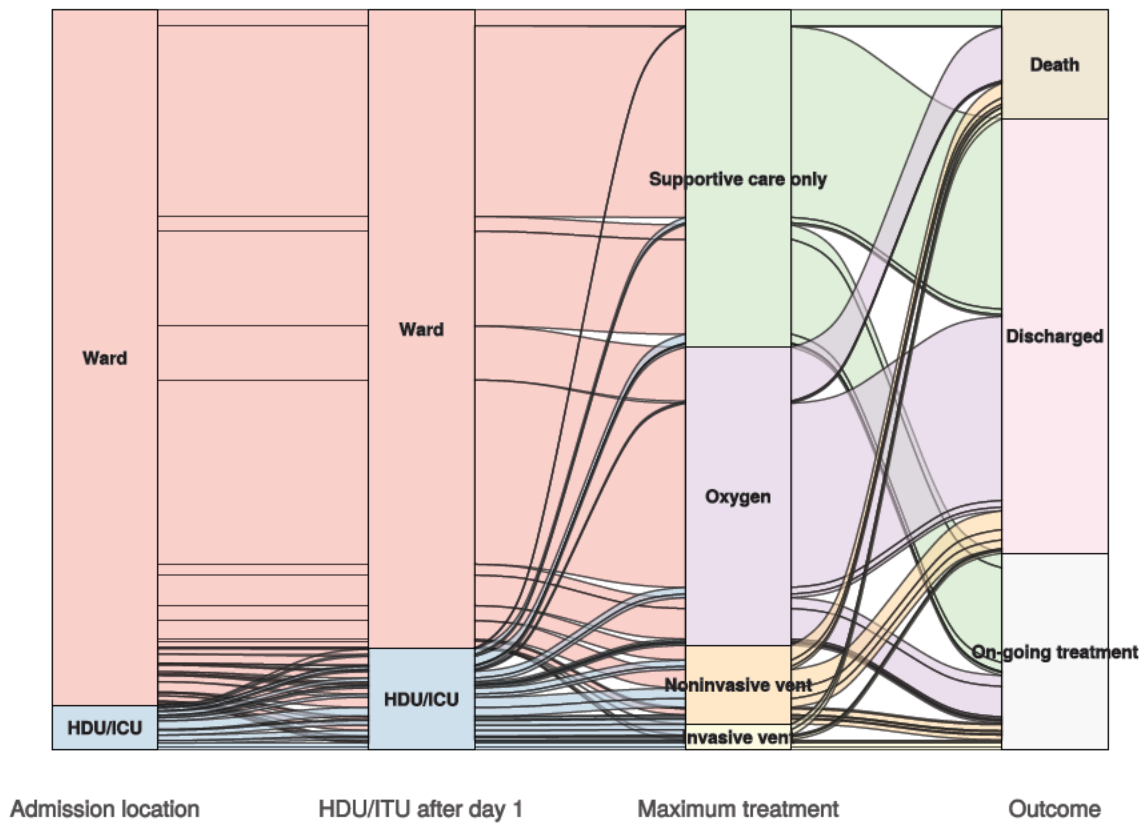
Figure 8B - Patients admitted >=14 days and <=28 days ago

N = 2873

In-hospital medical treatment

Figure 9

In-hospital treatment

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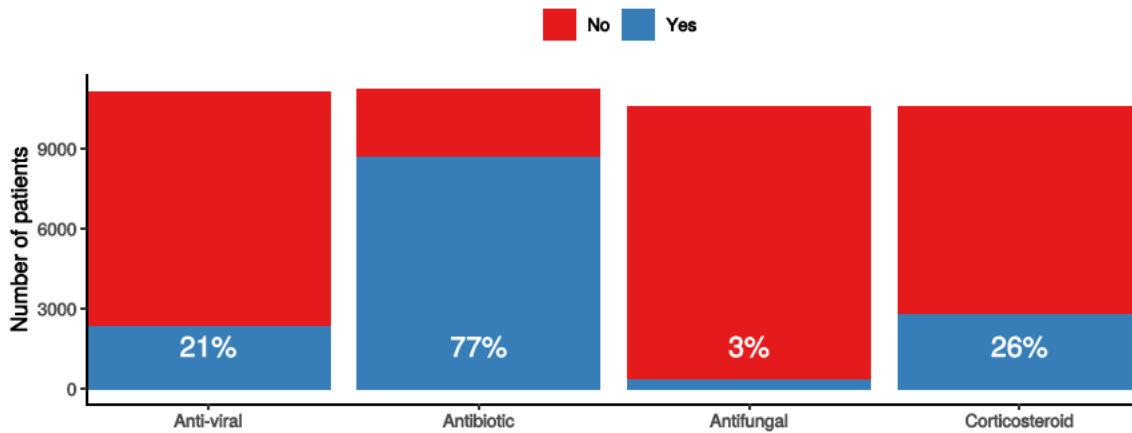
Treatment

Figure 10

ICU/HDU admission
Figure 10A
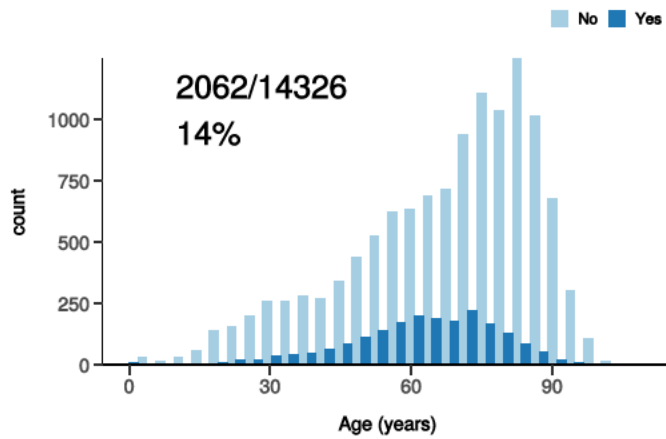
High flow oxygen
Figure 10B
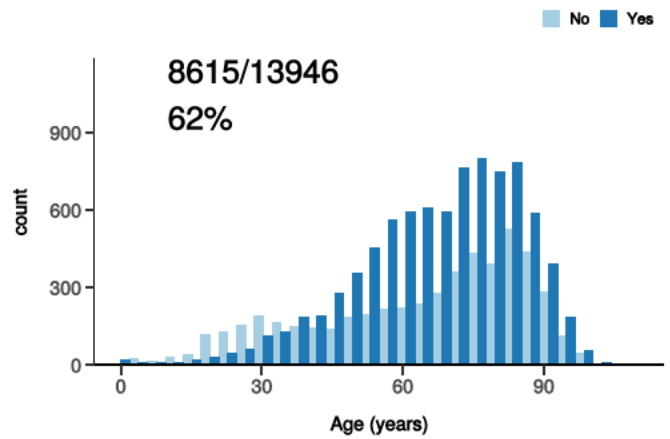
Noninvasive ventilation
Figure 10C
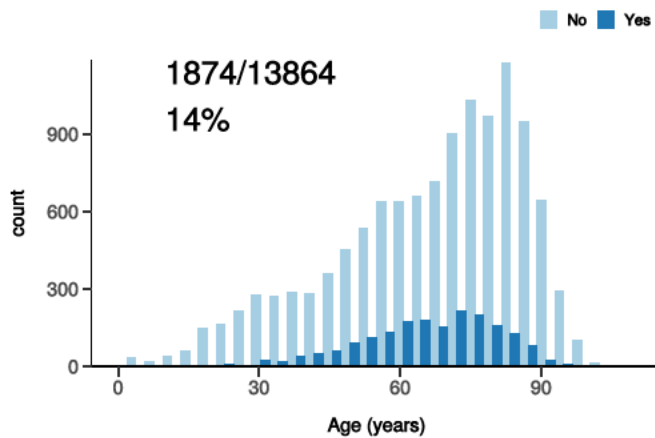
Invasive ventilation
Figure 10D
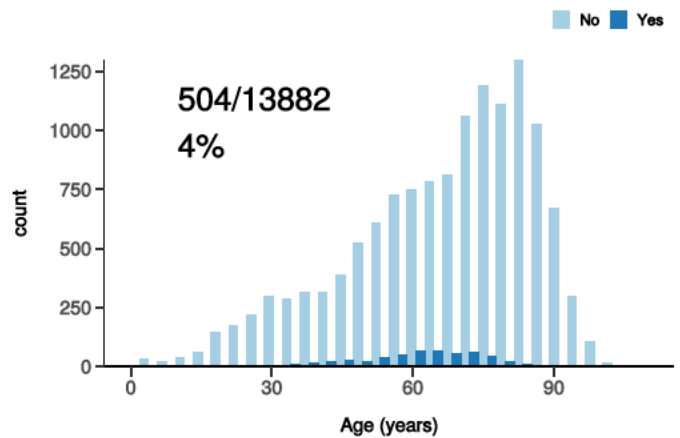
Status in patients admitted >=14 days from today

Figure 11

All: status in patients admitted >=14 days ago
Figure 11A

Died
2090/12764
16%

On-going care
2511/12764
20%

Discharged alive
8151/12764
64%
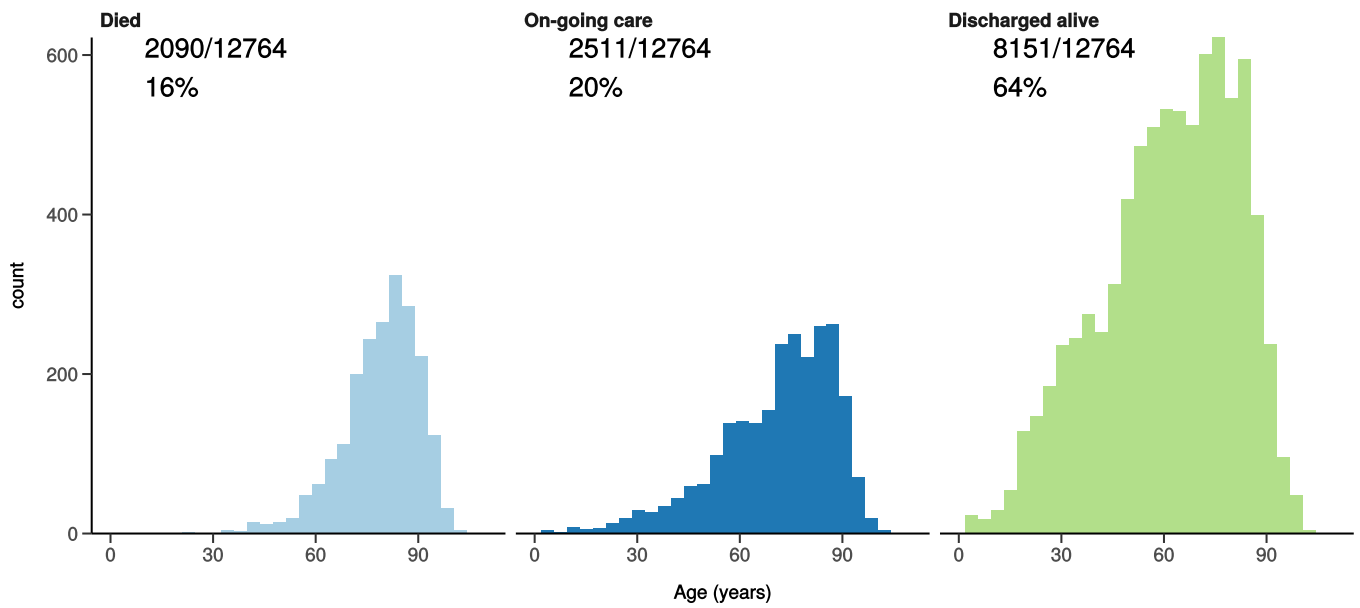
ICU/HDU admissions: status in patients admitted >=14 days ago
Figure 11B

Died
441/1699
26%

On-going care
531/1699
31%

Discharged alive
726/1699
43%
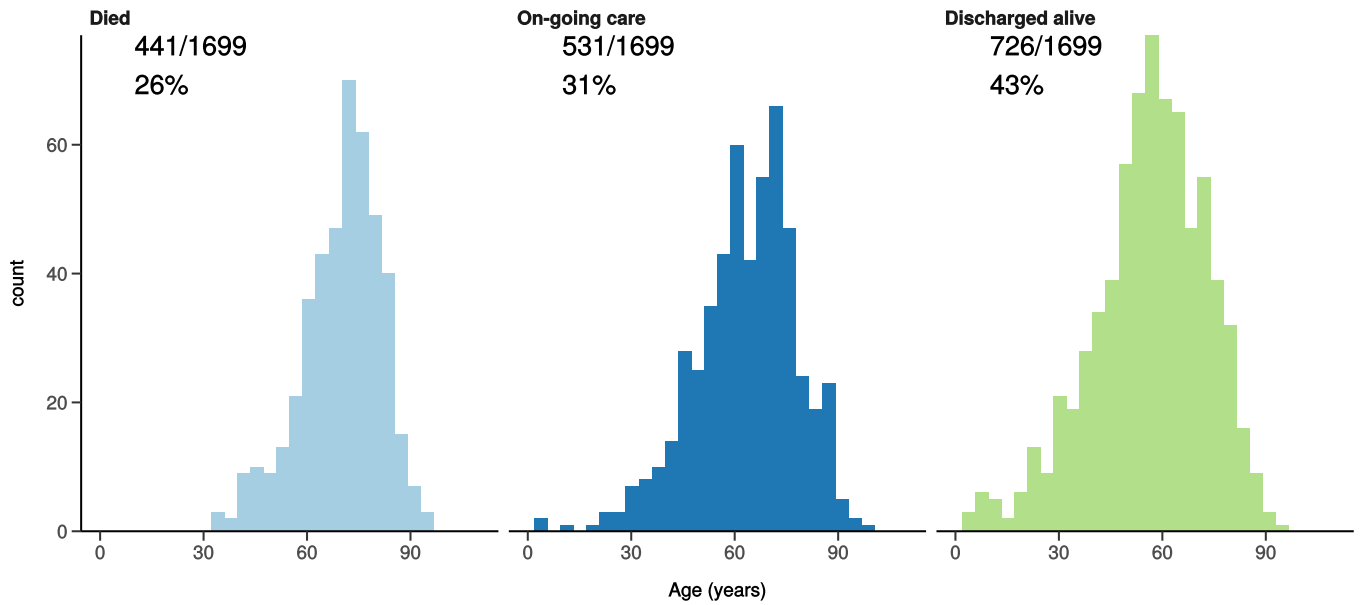
Invasive ventilation: status in patients admitted >=14 days ago
Figure 11c

Died
206/457
45%

On-going care
168/457
37%

Discharged alive
83/457
18%
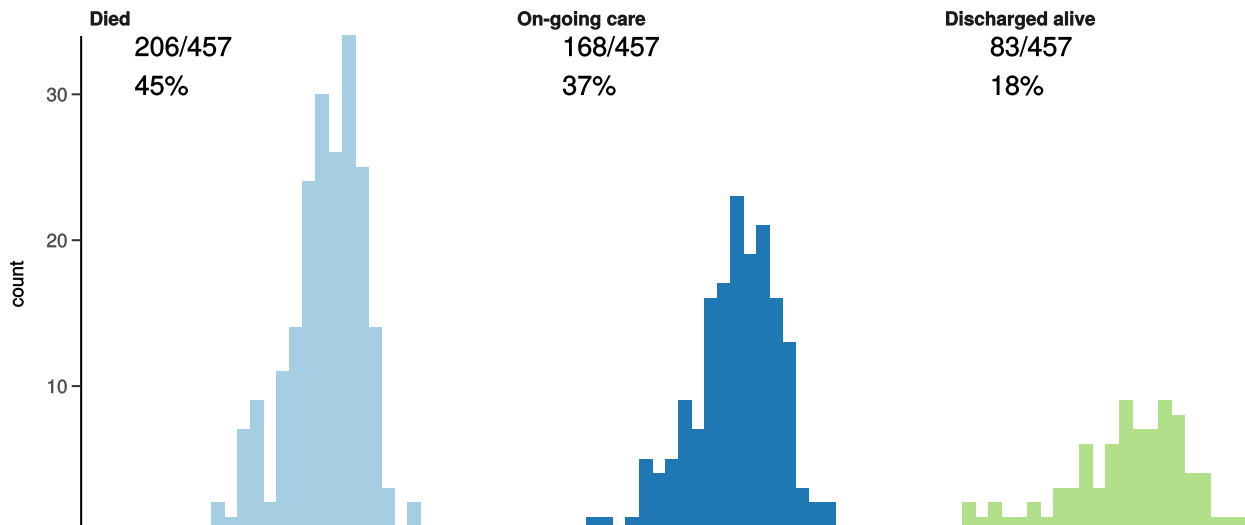
Length of stay stratified by age

Figure 12

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

Age (years)
☐ <50 ☐ 50-69 ☐ 70-79 ■ 80+

Alive / **Died**

- <50: 95% by day 14, n=2259 (Alive); 62% by day 14, n=45 (Died)
- 50-69: 86% by day 14, n=2839 (Alive); 64% by day 14, n=324 (Died)
- 70-79: 77% by day 14, n=1718 (Alive); 69% by day 14, n=611 (Died)
- 80+: 67% by day 14, n=1854 (Alive); 67% by day 14, n=1086 (Died)

Length of stay (days)
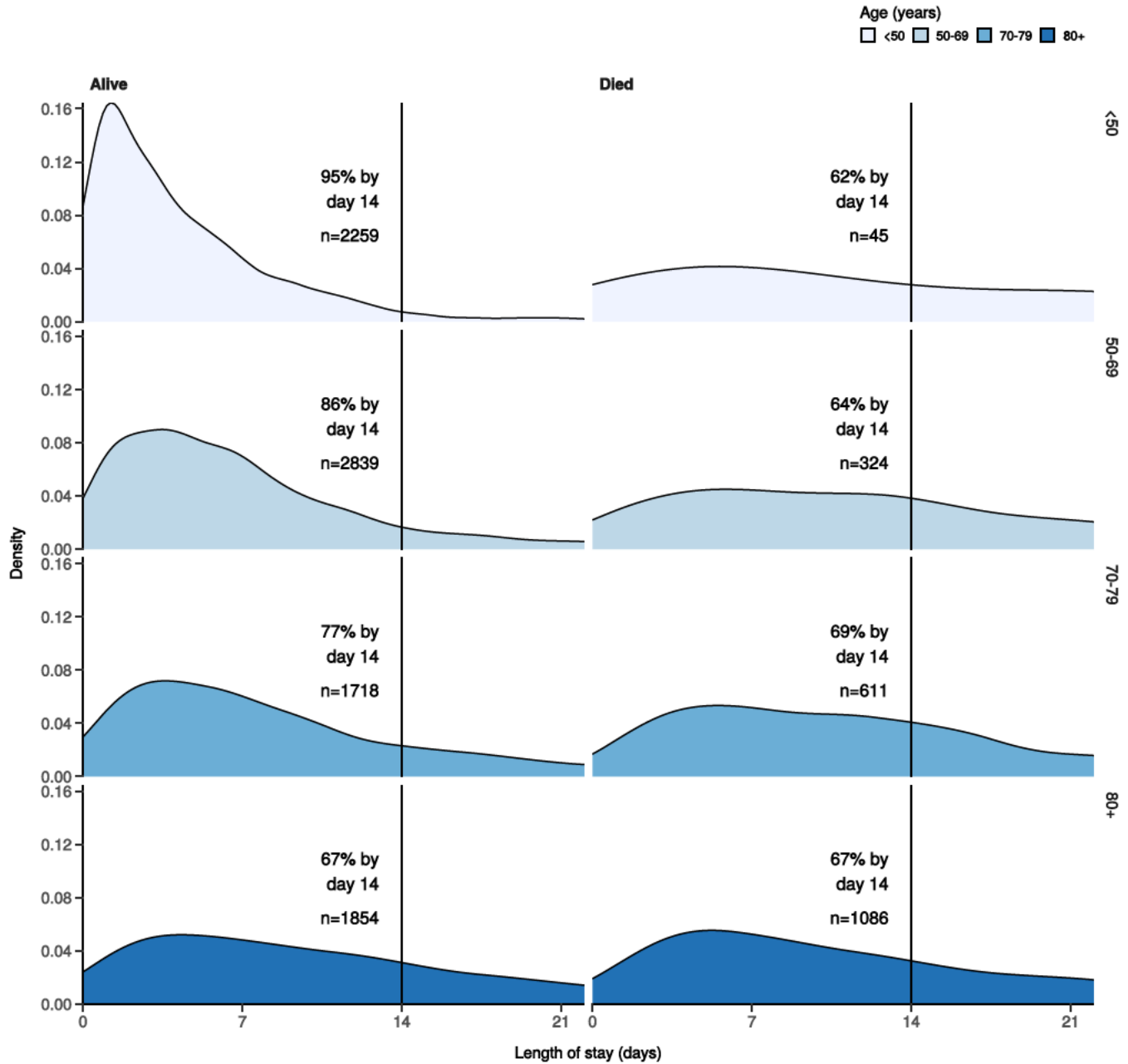
Predictors of death: logistic regression multivariable model

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	2371 (98.0)	48 (2.0)	•	•

Dependent: death		No	Yes	OR (univariable)	OR (multivariable)
	50-69	2896 (89.7)	331 (10.3)	5.65 (4.19-7.77, p<0.001)	4.69 (3.36-6.75, p<0.001)
	70-79	1764 (74.2)	613 (25.8)	17.17 (12.86-23.47, p<0.001)	12.09 (8.68-17.34, p<0.001)
	80+	1914 (63.7)	1091 (36.3)	28.16 (21.20-38.32, p<0.001)	19.23 (13.81-27.55, p<0.001)
Sex at Birth	Male	4739 (79.1)	1255 (20.9)	•	•
	Female	4209 (83.6)	828 (16.4)	0.74 (0.67-0.82, p<0.001)	0.70 (0.62-0.79, p<0.001)
	Not specified	0 (NaN)	0 (NaN)	•	•
Chronic cardiac disease	NO	6421 (86.3)	1017 (13.7)	•	•
	YES	2016 (68.5)	926 (31.5)	2.90 (2.62-3.21, p<0.001)	1.34 (1.18-1.52, p<0.001)
Chronic pulmonary disease (not asthma)	NO	7319 (83.7)	1423 (16.3)	•	•
	YES	1118 (67.9)	528 (32.1)	2.43 (2.16-2.73, p<0.001)	1.57 (1.36-1.80, p<0.001)
Chronic neurological disorder	NO	7698 (82.2)	1667 (17.8)	•	•
	YES	704 (73.3)	257 (26.7)	1.69 (1.45-1.96, p<0.001)	1.13 (0.94-1.36, p=0.195)
Chronic hematologic disease	NO	8109 (81.8)	1803 (18.2)	•	•
	YES	282 (70.1)	120 (29.9)	1.91 (1.53-2.38, p<0.001)	1.44 (1.10-1.88, p=0.008)
Chronic kidney disease	NO	7479 (84.0)	1425 (16.0)	•	•
	YES	946 (65.2)	506 (34.8)	2.81 (2.48-3.17, p<0.001)	1.50 (1.29-1.74, p<0.001)
Dementia	NO	7804 (83.4)	1558 (16.6)	•	•
	YES	615 (63.5)	353 (36.5)	2.88 (2.49-3.31, p<0.001)	1.39 (1.17-1.66, p<0.001)
Obesity (as defined by clinical staff)	NO	6343 (81.1)	1482 (18.9)	•	•
	YES	1112 (84.7)	201 (15.3)	0.77 (0.66-0.91, p=0.002)	1.08 (0.90-1.31, p=0.402)
Malignant neoplasm	NO	7790 (82.8)	1617 (17.2)	•	•
	YES	611 (66.3)	310 (33.7)	2.44 (2.11-2.83, p<0.001)	1.59 (1.33-1.91, p<0.001)

Number in dataframe = 14994, Number in model = 8771, Missing = 6223, AIC = 6899.2, C-statistic = 0.781, H&L = Chi-sq(8) 21.98 (p=0.005)

Figure 13 - Adjusted odds ratio plot

Death

Age on admission (years)	<50	-	
	50-69	4.69 (3.36-6.75, p<0.001)	
	70-79	12.09 (8.68-17.34, p<0.001)	
	80+	19.23 (13.81-27.55, p<0.001)	
Sex at Birth	Male	-	
	Female	0.70 (0.62-0.79, p<0.001)	
	Not specified	-	
Chronic cardiac disease	YES	1.34 (1.18-1.52, p<0.001)	
Chronic pulmonary disease (not asthma)	YES	1.57 (1.36-1.80, p<0.001)	
Chronic neurological disorder	YES	1.13 (0.94-1.36, p=0.195)	
Chronic hematologic disease	YES	1.44 (1.10-1.88, p=0.008)	
Chronic kidney disease	YES	1.50 (1.29-1.74, p<0.001)	
Dementia	YES	1.39 (1.17-1.66, p<0.001)	
Obesity (as defined by clinical staff)	YES	1.08 (0.90-1.31, p=0.402)	
Malignant neoplasm	YES	1.59 (1.33-1.91, p<0.001)	

Odds ratio (95% CI, log scale)

Figure 14 - ROC

AUC: 0.781
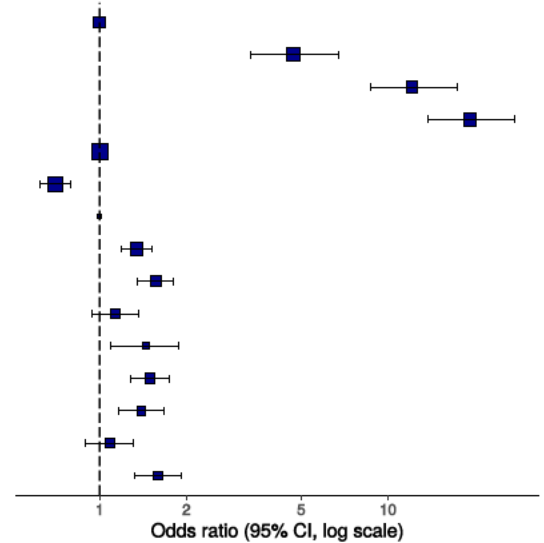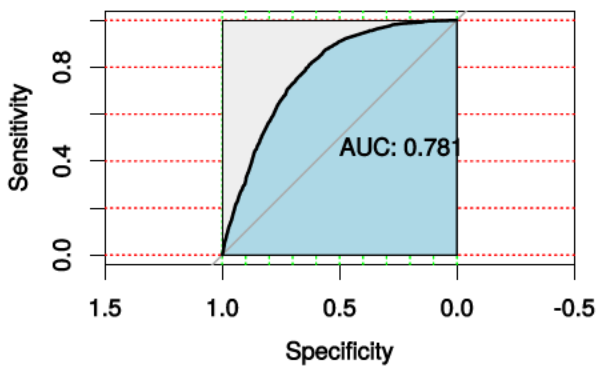
Survival models

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

Figure 15

P-value is log-rank test.

Number at risk					
age.factor=<18	321	266	260	260	260
age.factor=18-49	2848	2440	2300	2275	2254
age.factor=50-74	6502	5164	4571	4267	4107
age.factor=75 and over	6521	4643	3814	3324	3100

Number at risk					
sex=Male	8862	6834	5913	5408	5166
sex=Female	7327	5670	5023	4711	4548
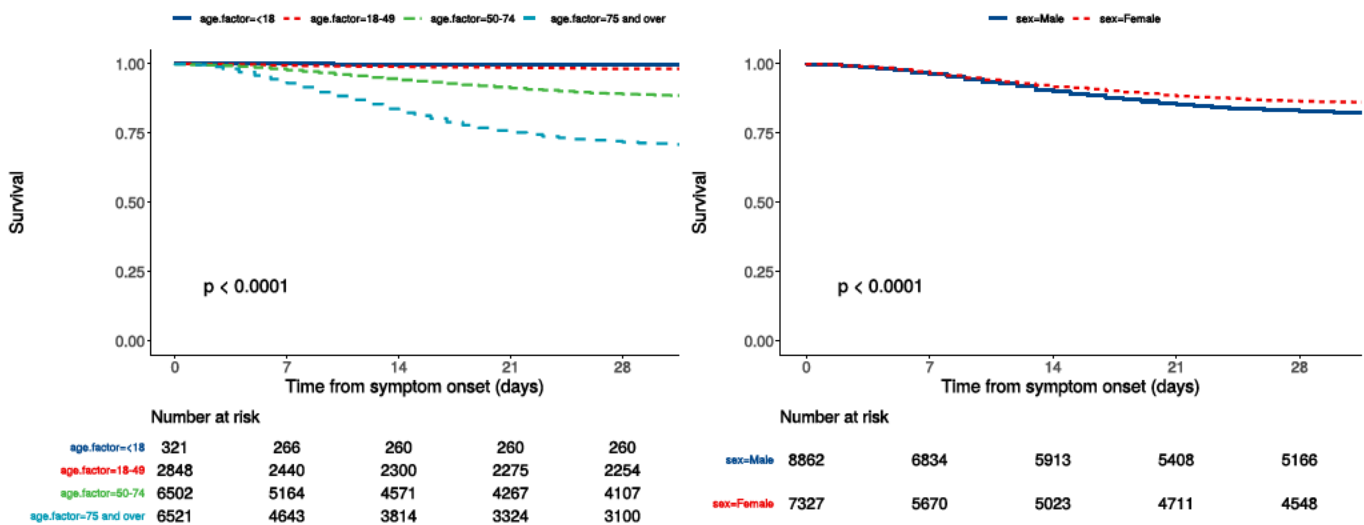
Cox proportional hazards model

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	3169 (19.6)	•	•
	50-69	4730 (29.2)	5.38 (3.97-7.30, p<0.001)	4.50 (3.10-6.52, p<0.001)
	70-79	3630 (22.4)	14.90 (11.08-20.04, p<0.001)	11.94 (8.31-17.16, p<0.001)
	80+	4667 (28.8)	22.93 (17.12-30.70, p<0.001)	18.02 (12.54-25.89, p<0.001)
Sex at Birth	Male	8862 (54.7)	•	•
	Female	7327 (45.3)	0.77 (0.71-0.84, p<0.001)	0.77 (0.69-0.85, p<0.001)
qSOFA score on admission	0	6337 (51.0)	•	•
	1	5250 (42.3)	1.86 (1.68-2.06, p<0.001)	1.97 (1.75-2.21, p<0.001)
	2	796 (6.4)	4.55 (3.95-5.25, p<0.001)	3.76 (3.19-4.42, p<0.001)
	3	42 (0.3)	8.12 (5.14-12.82, p<0.001)	7.64 (4.63-12.62, p<0.001)
Symptomatic at presentation	No symptoms	1840 (12.8)	•	•
	Symptoms	12553 (87.2)	1.51 (1.30-1.76, p<0.001)	•
Chronic cardiac disease	NO	9817 (71.0)	•	•
	YES	4010 (29.0)	2.56 (2.35-2.80, p<0.001)	1.32 (1.19-1.48, p<0.001)
Chronic kidney disease	NO	11814 (85.7)	•	•
	YES	1969 (14.3)	2.49 (2.25-2.75, p<0.001)	1.44 (1.27-1.63, p<0.001)
Moderate or severe liver disease	NO	13429 (98.1)	•	•
	YES	256 (1.9)	1.76 (1.35-2.28, p<0.001)	1.49 (1.05-2.11, p=0.024)
Chronic neurological disorder	NO	12405 (90.3)	•	•
	YES	1326 (9.7)	1.53 (1.34-1.74, p<0.001)	•
Malignant neoplasm	NO	12471 (90.8)	•	•
	YES	1263 (9.2)	2.13 (1.89-2.41, p<0.001)	1.61 (1.40-1.86, p<0.001)
Chronic hematologic disease	NO	13185 (96.2)	•	•
	YES	519 (3.8)	1.76 (1.46-2.10, p<0.001)	•
Obesity (as defined by clinical staff)	NO	10462 (85.9)	•	•
	YES	1720 (14.1)	0.79 (0.68-0.91, p=0.001)	1.03 (0.87-1.22, p=0.744)

Dependent: Surv(time, status)		all	HR (univariable)	HR (multivariable)
Diabetes without complications	NO	11399 (87.7)	•	•
	YES	1600 (12.3)	1.24 (1.09-1.41, p=0.001)	•
Rheumatologic disorder	NO	11988 (87.4)	•	•
	YES	1729 (12.6)	1.35 (1.20-1.52, p<0.001)	•
Dementia	NO	12376 (89.9)	•	•
	YES	1383 (10.1)	2.43 (2.17-2.73, p<0.001)	1.12 (0.97-1.30, p=0.133)
Malnutrition	NO	12502 (98.0)	•	•
	YES	258 (2.0)	2.00 (1.56-2.56, p<0.001)	•
smoking_mhyn_2levels	NO	7201 (50.6)	•	•
	YES	759 (5.3)	0.93 (0.75-1.15, p=0.514)	•
	N/K	6274 (44.1)	1.27 (1.16-1.39, p<0.001)	•

Number in dataframe = 16230, Number in model = 10125, Missing = 6105, Number of events = 1435, Concordance = 0.785 (SE = 0.005), R-squared = 0.140(Max possible = 0.921), Likelihood ratio test = 1522.814 (df = 13, p = 0.000)

Figure 16a - Multivariable Cox proportional hazards model

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

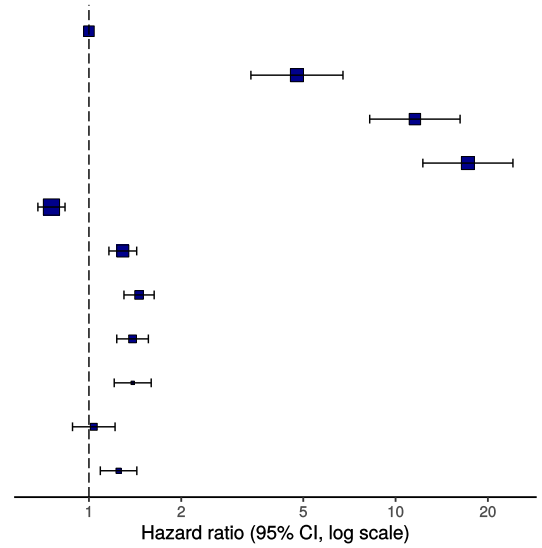|		
Age on admission (years)	<50	-
	50-69	4.50 (3.10-6.52, p<0.001)
	70-79	11.94 (8.31-17.16, p<0.001)
	80+	18.02 (12.54-25.89, p<0.001)
Sex at Birth	Female	0.77 (0.69-0.85, p<0.001)
qSOFA score on admission	0	-
	1	1.97 (1.75-2.21, p<0.001)
	2	3.76 (3.19-4.42, p<0.001)
	3	7.64 (4.63-12.62, p<0.001)
Chronic cardiac disease	YES	1.32 (1.19-1.48, p<0.001)
Chronic kidney disease	YES	1.44 (1.27-1.63, p<0.001)
Moderate or severe liver disease	YES	1.49 (1.05-2.11, p=0.024)
Malignant neoplasm	YES	1.61 (1.40-1.86, p<0.001)
Obesity (as defined by clinical staff)	YES	1.03 (0.87-1.22, p=0.744)
Dementia	YES	1.12 (0.97-1.30, p=0.133)

Hazard ratio (95% CI, log scale)
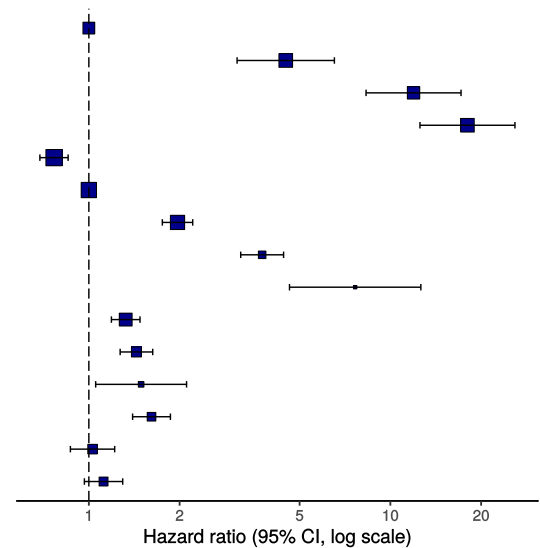
Figure 16b - Multivariable Cox proportional hazards model (age, sex, comorbidities only)

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

Age on admission (years)	<50	-	
	50-69	4.77 (3.37-6.74, p<0.001)	
	70-79	11.56 (8.23-16.23, p<0.001)	
	80+	17.21 (12.27-24.14, p<0.001)	
Sex at Birth	Female	0.75 (0.68-0.84, p<0.001)	
Chronic cardiac disease	YES	1.29 (1.16-1.43, p<0.001)	
Chronic pulmonary disease (not asthma)	YES	1.46 (1.30-1.63, p<0.001)	
Chronic kidney disease	YES	1.39 (1.23-1.56, p<0.001)	
Malignant neoplasm	YES	1.39 (1.21-1.60, p<0.001)	
Obesity (as defined by clinical staff)	YES	1.04 (0.88-1.22, p=0.655)	
Dementia	YES	1.25 (1.09-1.43, p=0.001)	

Hazard ratio (95% CI, log scale)

ROC = 0.7871872

Figure 17 - Predictions calibration plot

Black: observed Gray: ideal
Blue : optimism corrected

Predicted 7 Day Survival B=40 based on observed-predicted
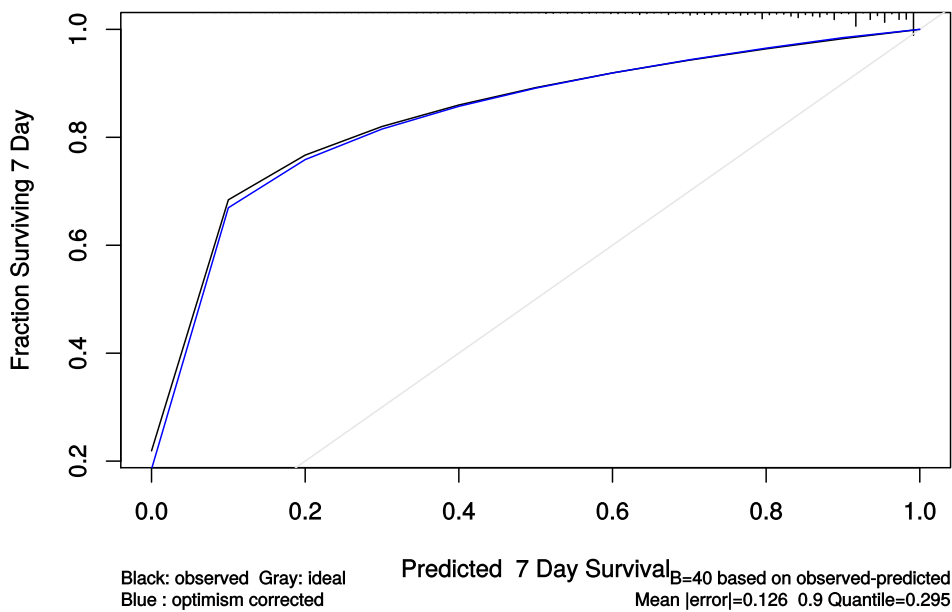Mean |error|=0.126 0.9 Quantile=0.295

Figure 18 - Prognostic model predictions

Again, for demonstration of methods.

Prognostic model for survival 7 days after onset

qSOFA score on admission

Adjusted to:sex=Male chrincard=NO chronicpul_mhyn=NO malignantneo_mhyn=NO obesity_mhyn=NO dementia_mhyn=NO
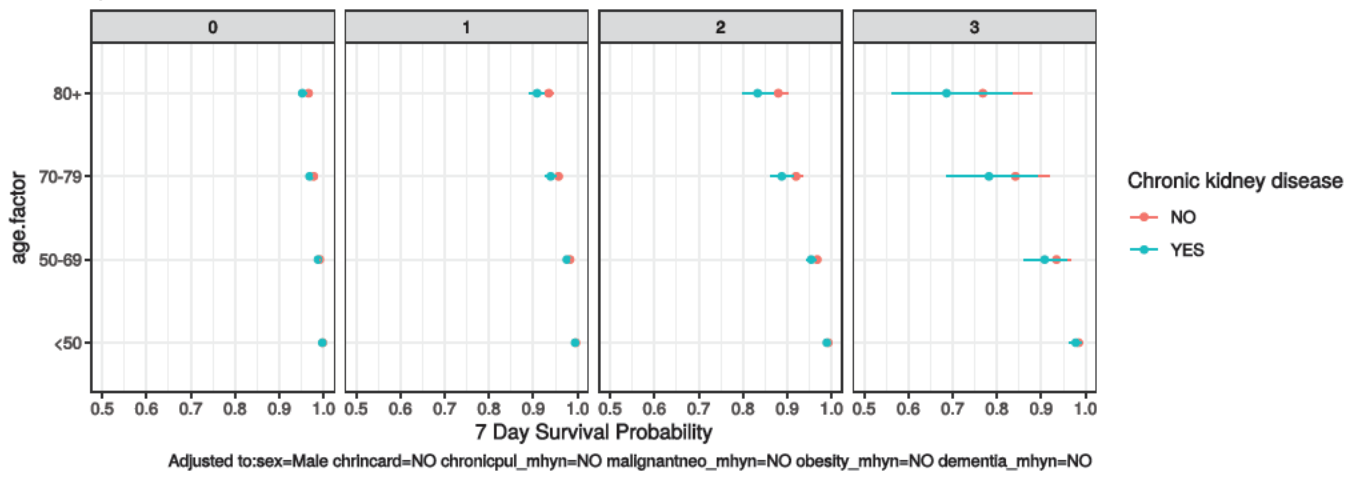
Figure 19 - Death by severity (NEWS) on admission

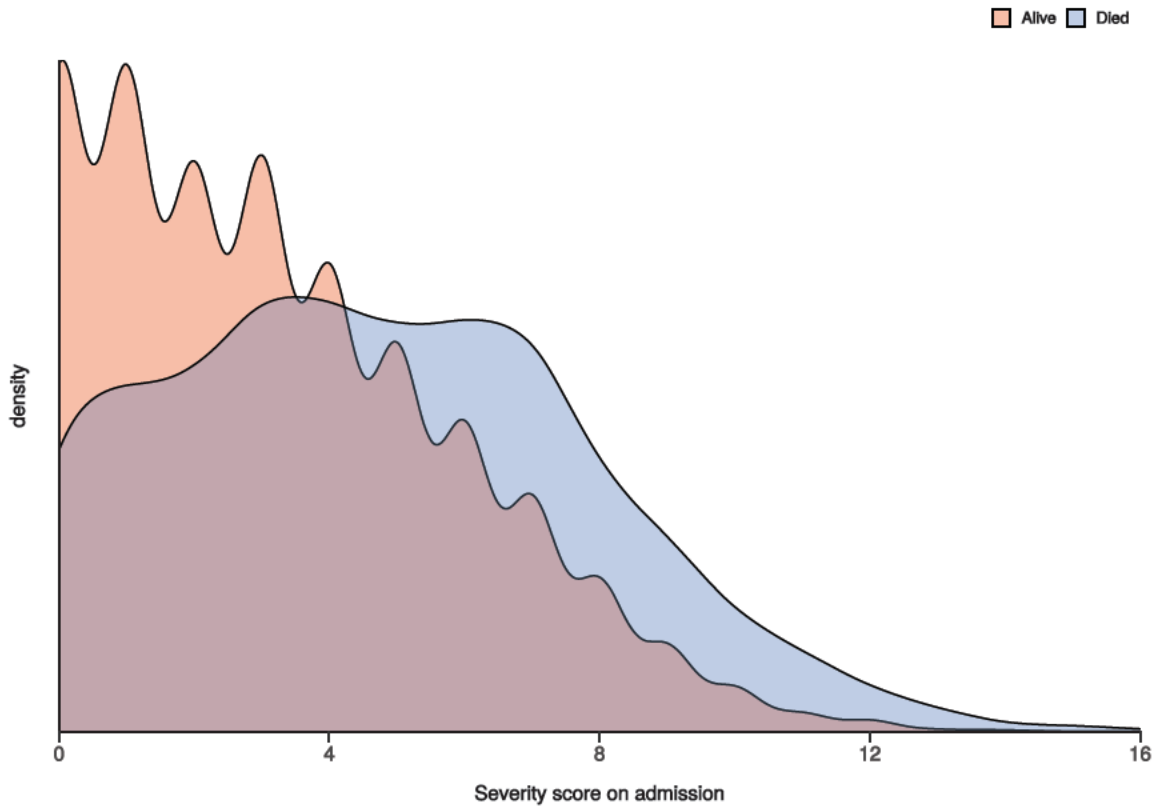Number of deaths by NEWS score at admission

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

Number of deaths by NEWS score at admission
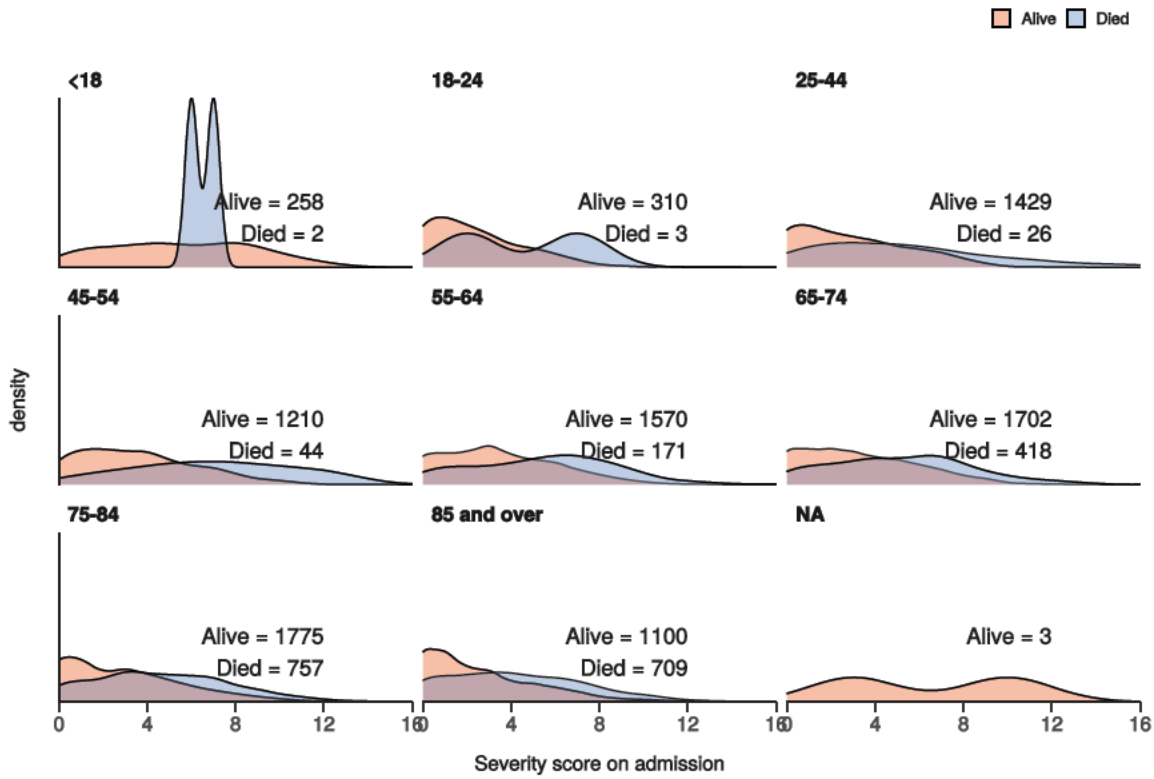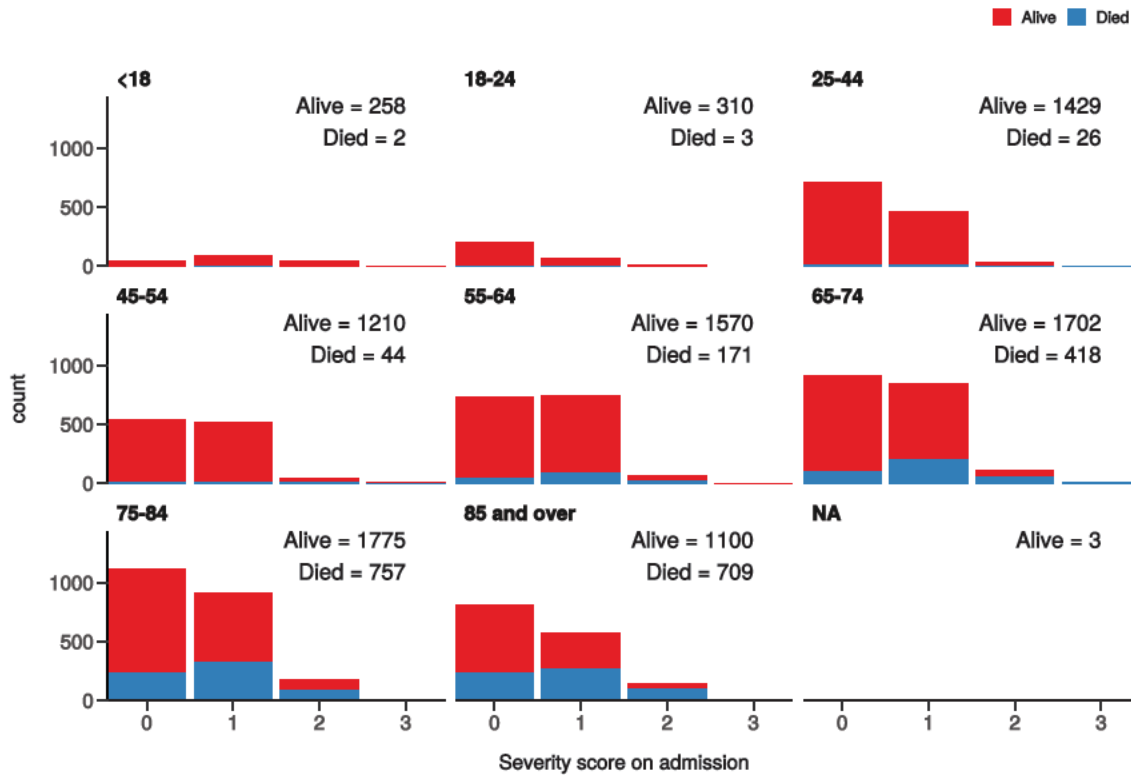Stratified by age

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

Employed as a healthcare worker?		NO	YES	p
Total N (%)		13331 (97.6)	331 (2.4)	
NEWS score on admission	Median (IQR)	3.0 (4.0)	3.0 (4.0)	0.549
Death	No	7629 (79.5)	248 (96.9)	<0.001
	Yes	1965 (20.5)	8 (3.1)	