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

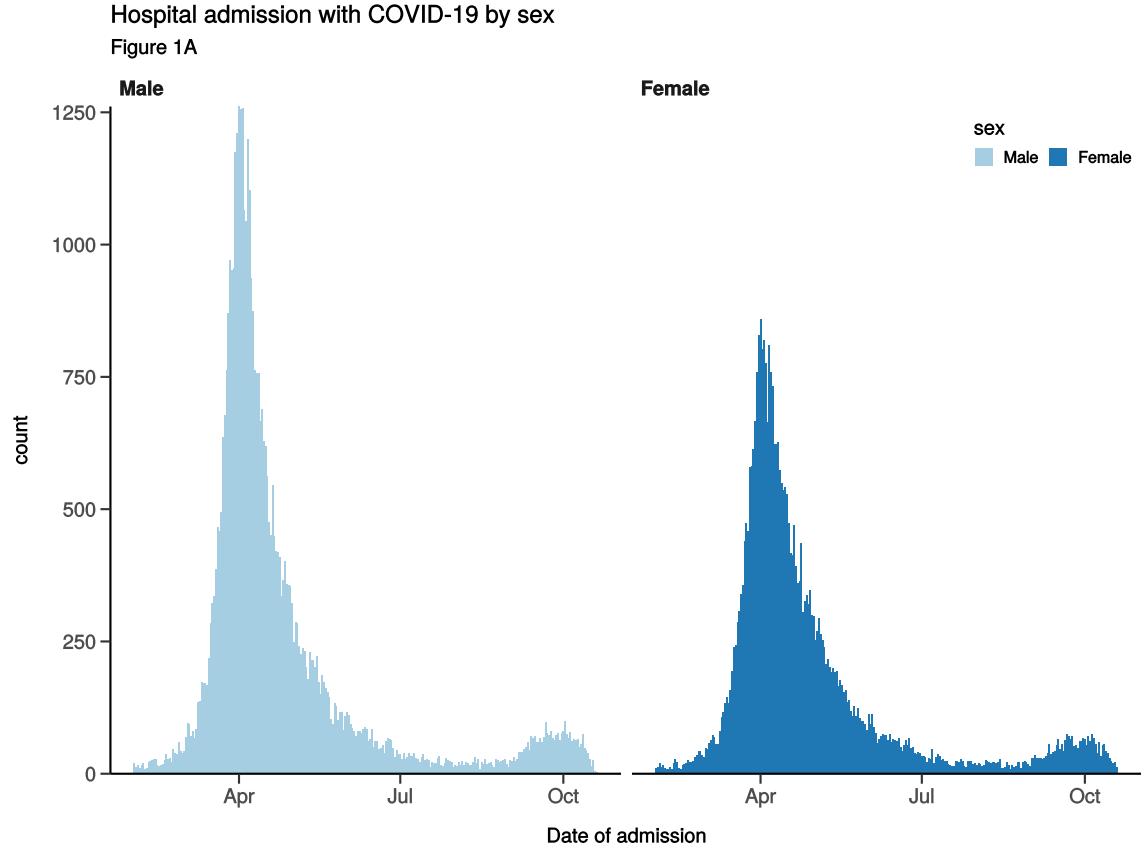Dynamic content updated: 2020-10-21 04:32:45.

Executive summary

Includes all patients

There are 88504 patients included in CO-CIN. Of these, 24551 patient(s) have died and 11437 required ICU. 49268 have been discharged home.
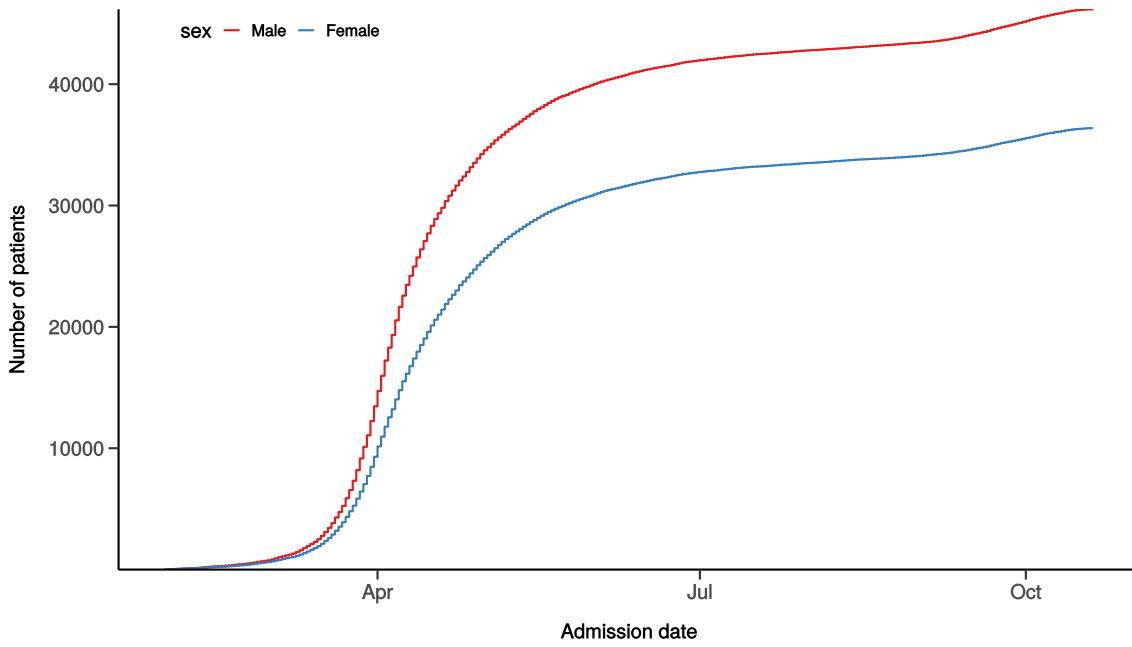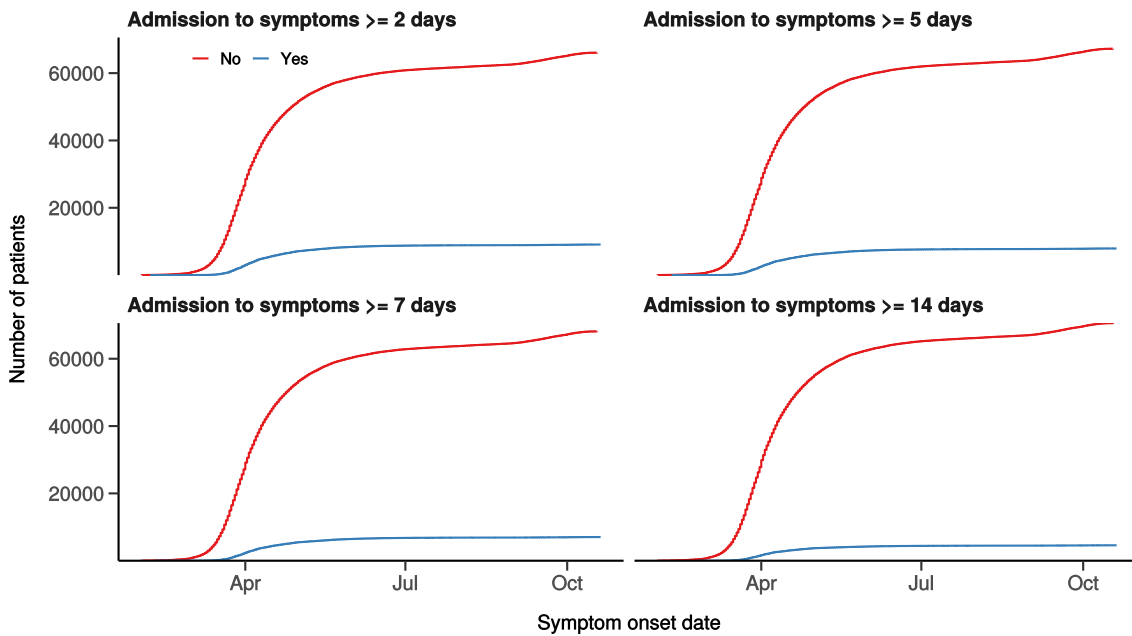
Admission

Figure 1

Hospital admission with COVID-19 by sex

Figure 1A

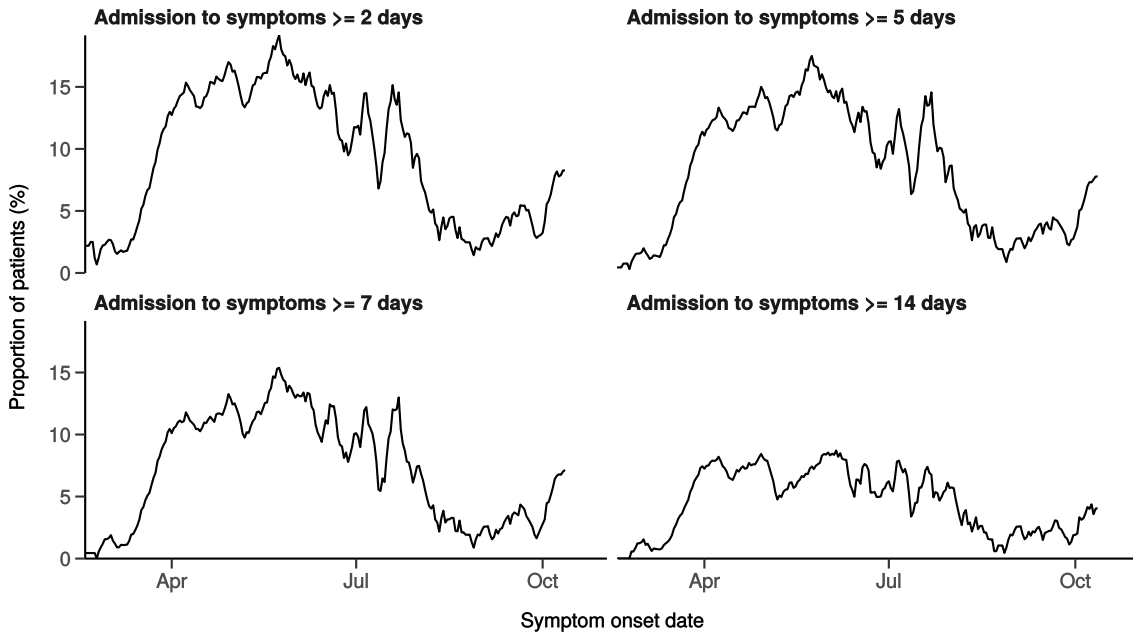## Hospital admission with COVID-19 by sex
Figure 1B

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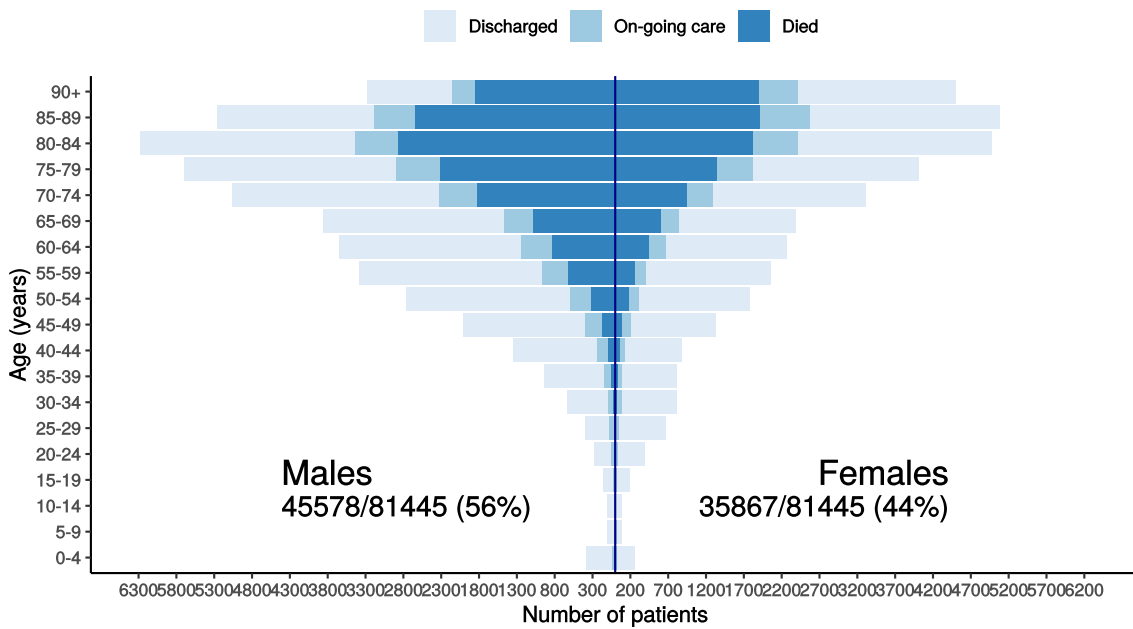### Figure 1C

Proportion with symptom onset occuring after hospital admission

Figure 1D - 7-day rolling percentage. n = 75171
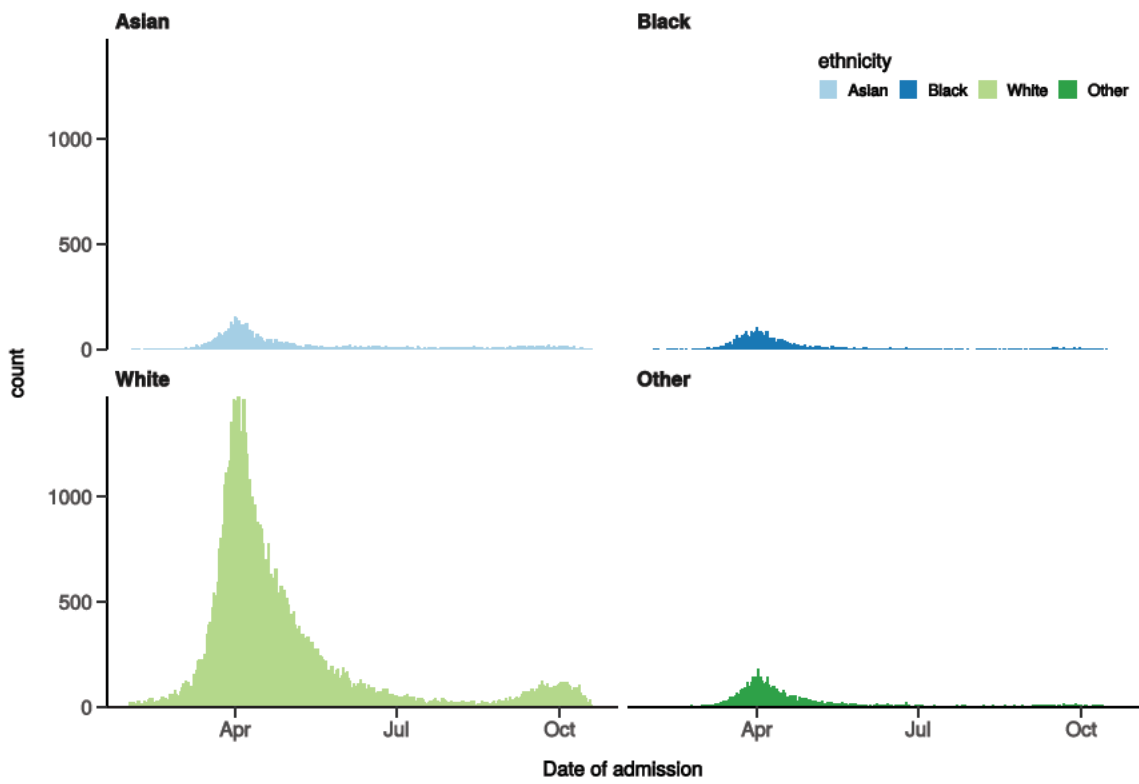

Patients with outcome stratified by age, and sex

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 = 88452
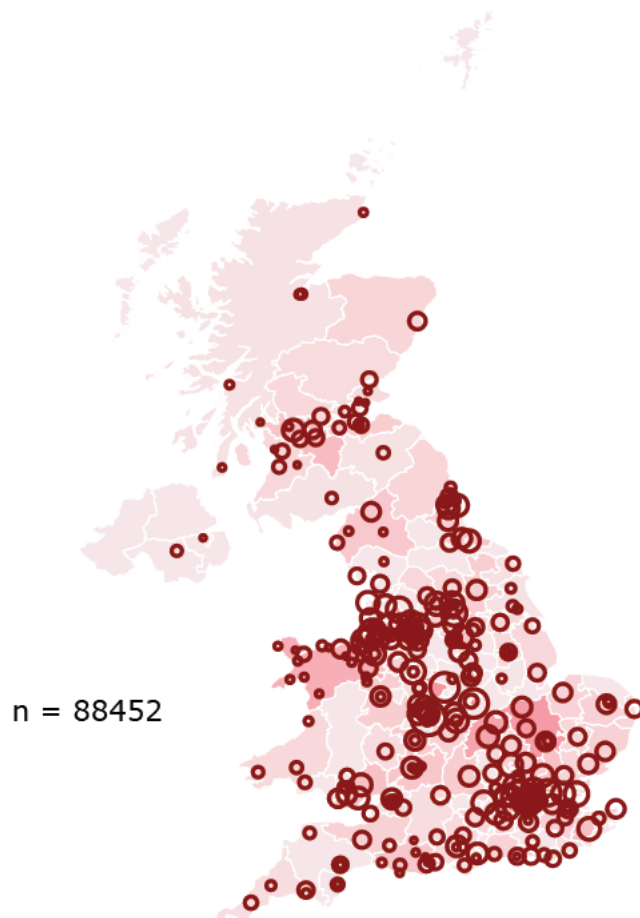
Symptoms and comorbidity

Figure 3A

Symptoms on presentation to hospital (% patients, n = 81599)
Figure 3A

Comorbidity (% patients, n = 88504)
Figure 3B
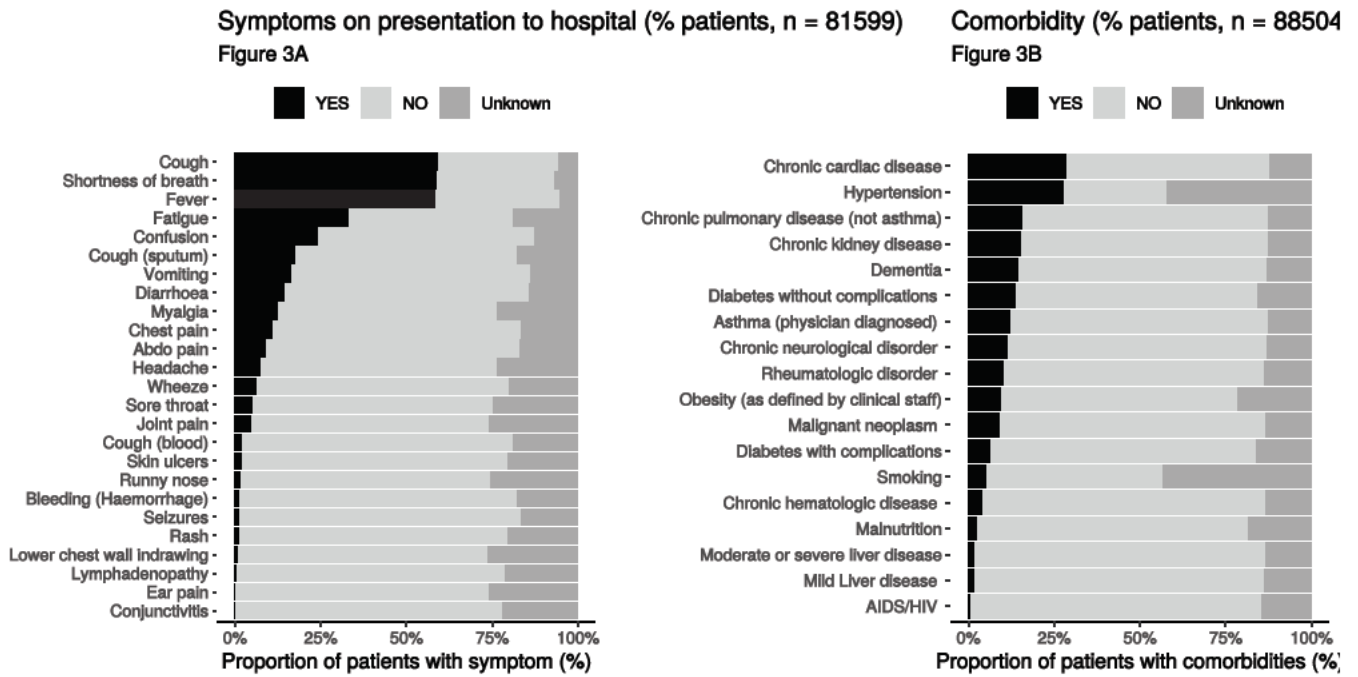
Figure 3B - Symptoms by Age
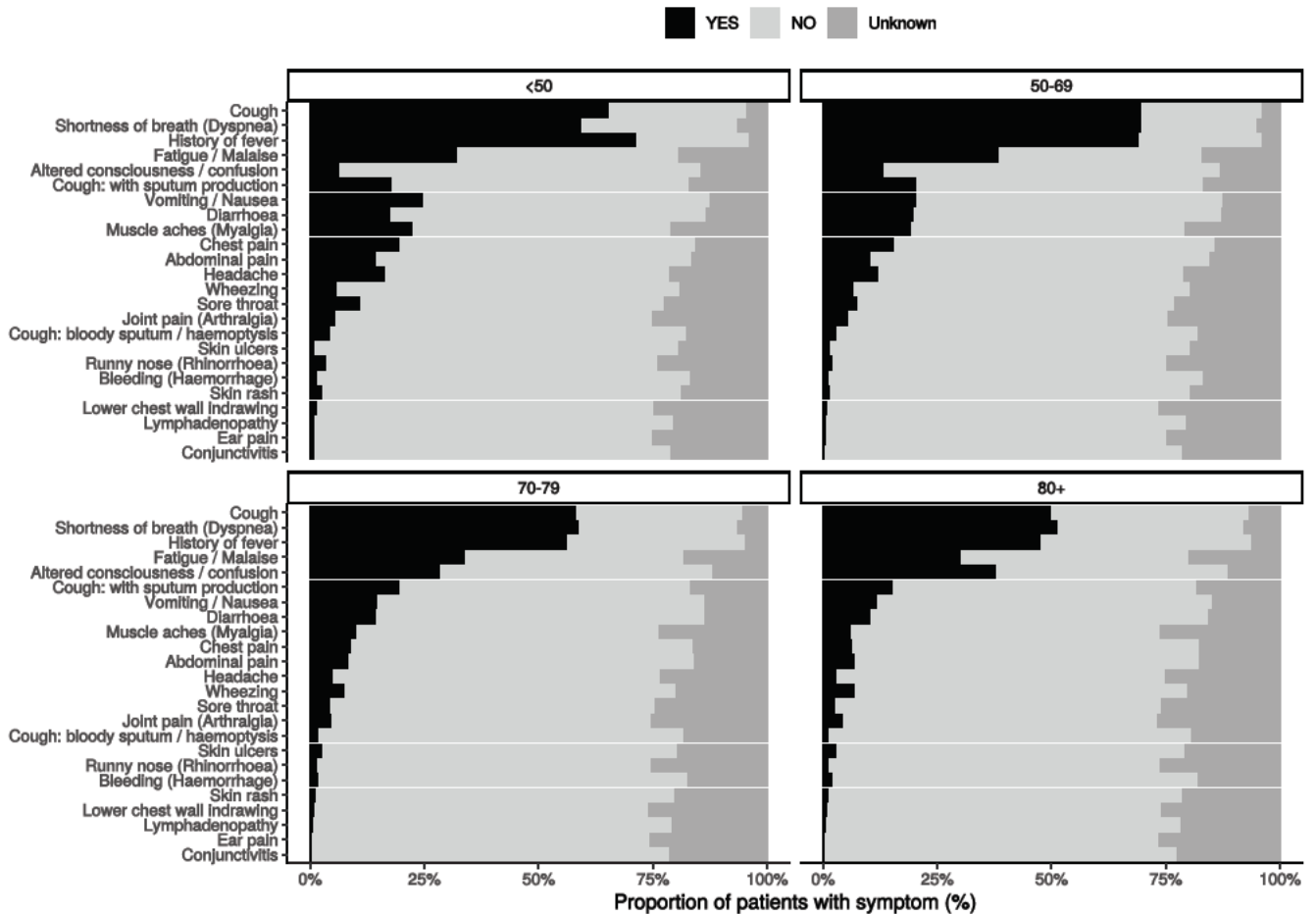
Age Group	Number of Patients included in Symptoms Plot
<50	11854

Age Group	Number of Patients included in Symptoms Plot
50-69	22277
70-79	18166
80+	29397

Figure 3C

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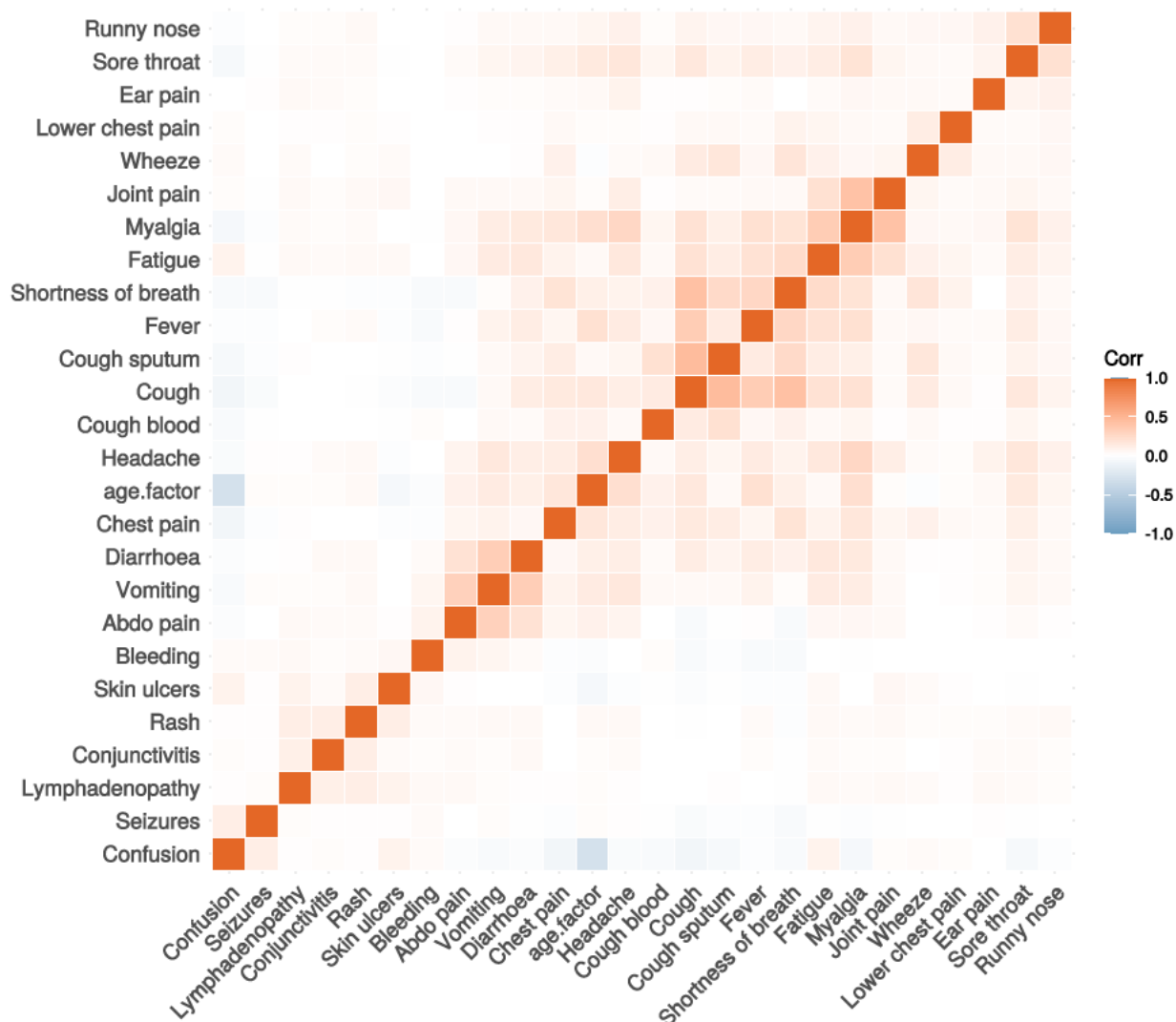
Symptoms (diagnostic criteria)

Figure 4A

n = 81599
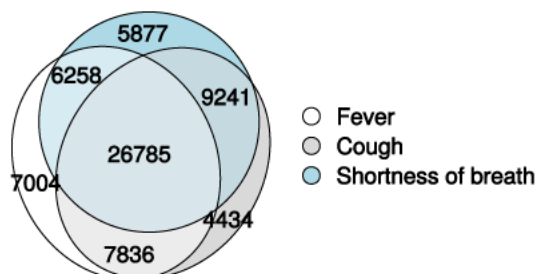
Symptoms (most common)

Figure 4B

n = 81599

7004

7836   6258

26785

5877

4434

9241

Cough
Shortness of breath (Dyspnea)
History of fever
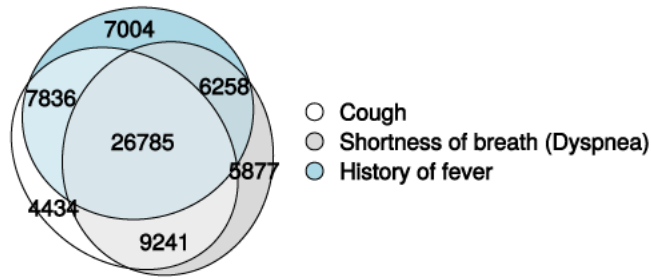
Comorbidity (most common)

Figure 4C

n = 88504

5286

3936   2149

2394   12209

11113   7798

Chronic cardiac disease
Hypertension
Chronic pulmonary disease (not asthma)
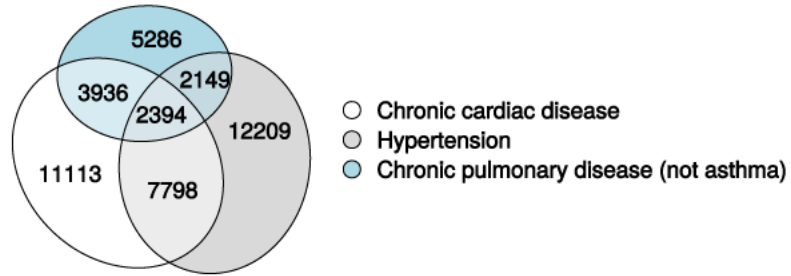
Medication prior to illness

Figure 5

Number of medications prior to admission

Male

Female

count
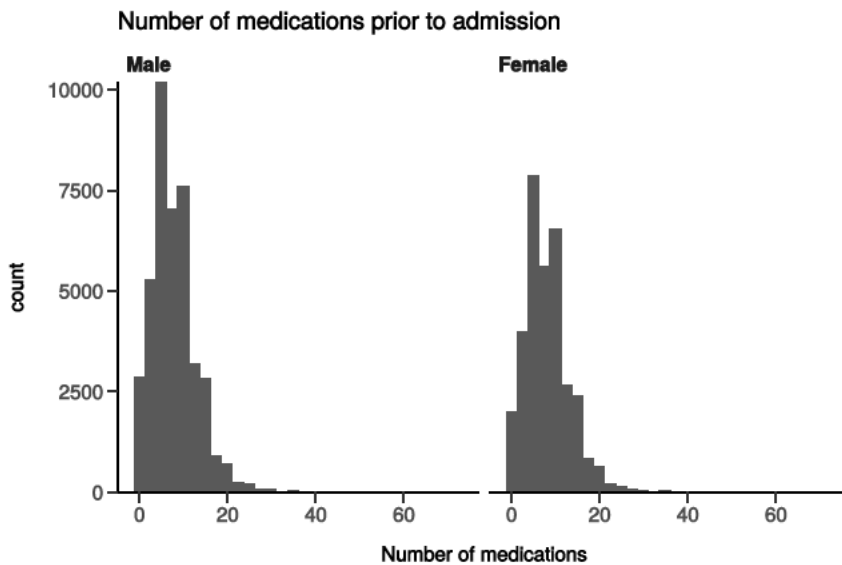
Preadmission treatment

Figure 6

Pre-admission treatment

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

No   **Yes**
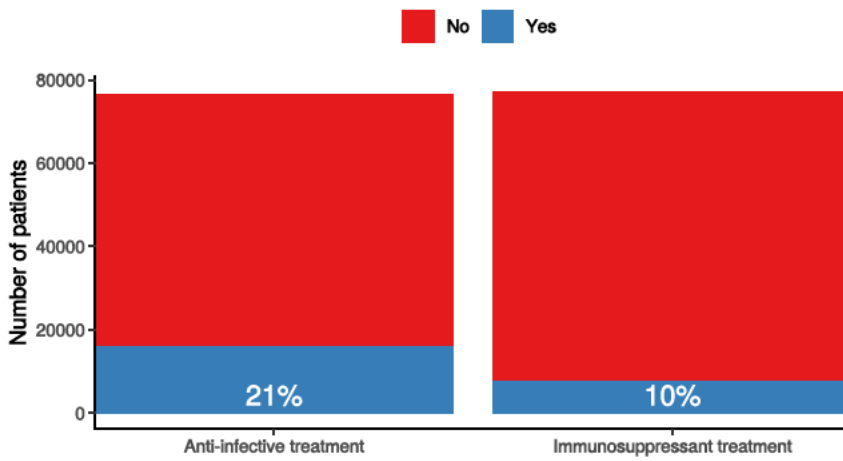
Patient flow

Figure 7A - All patients

N = 83466

Patient status by day
Cumulative for discharge/death
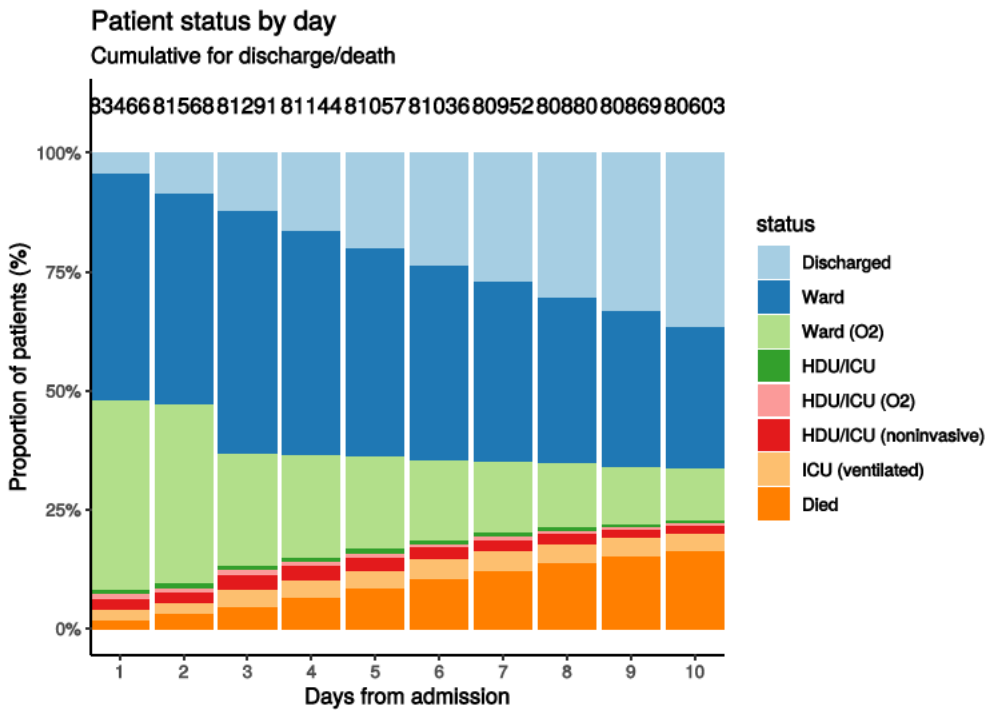
Figure 7B - Patients admitted >=14 days and <=28 days ago

N = 1753

Patient status by day
Cumulative for discharge/death
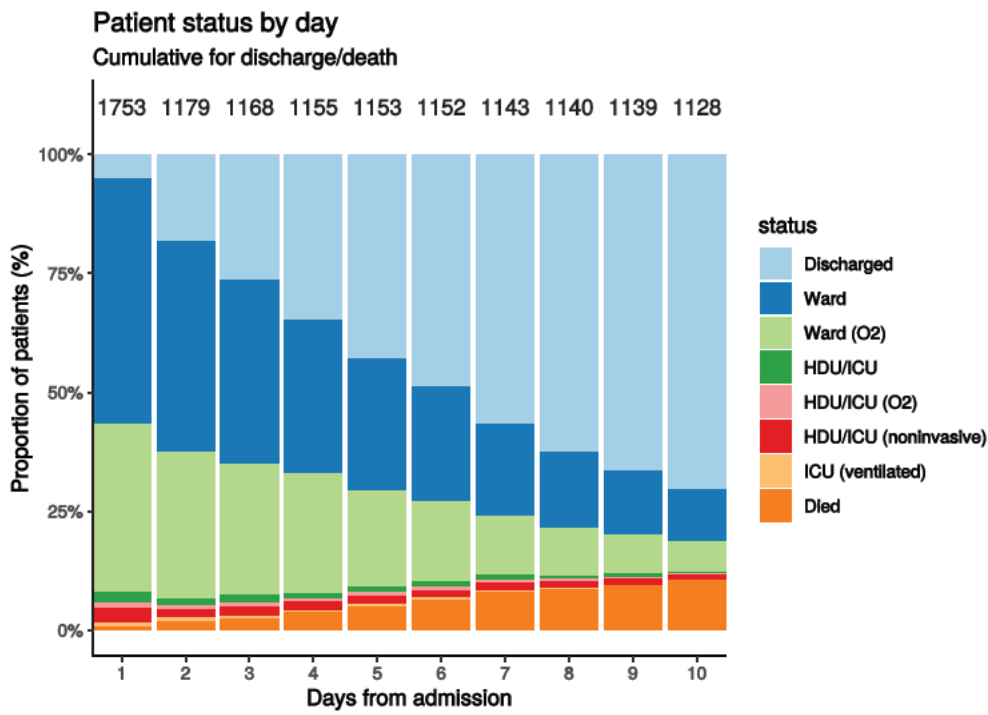
Oxygen requirement

Figure 8A - All patients

N = 78965
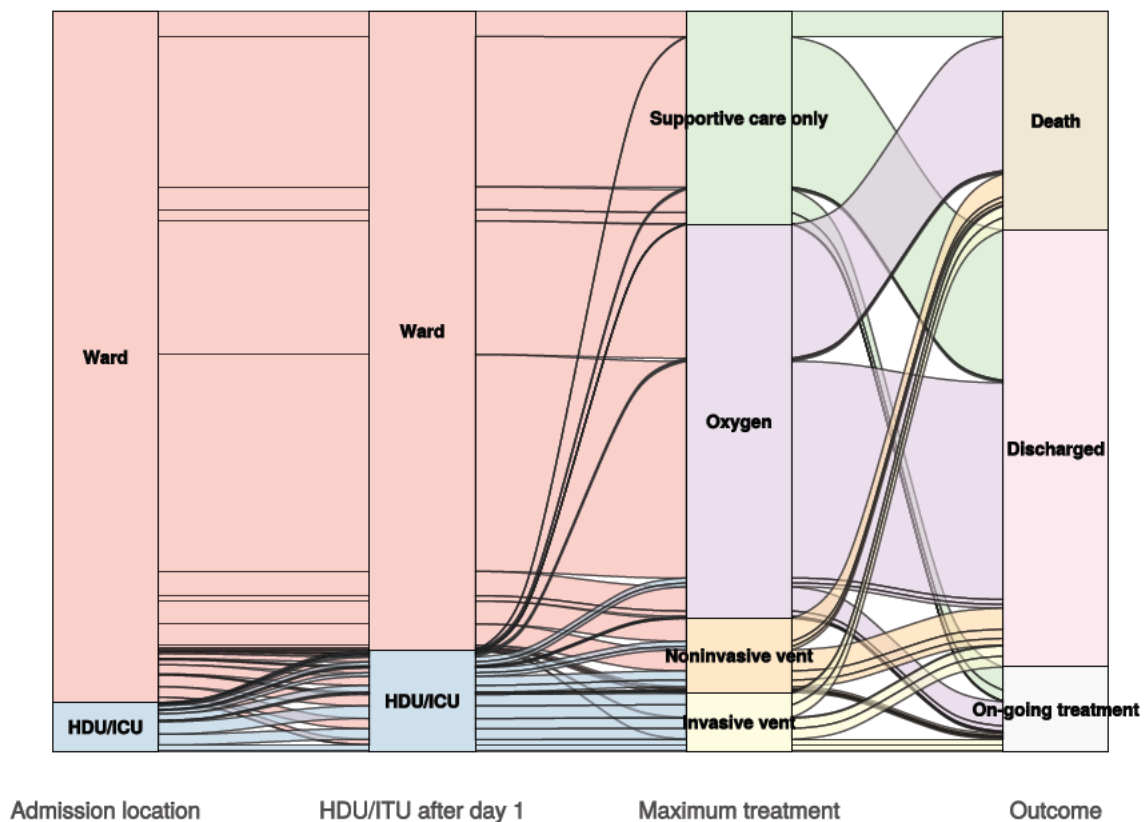
Figure 8B - Patients admitted >=14 days and <=28 days ago

N = 1694

In-hospital medical treatment

Figure 9

In-hospital treatment

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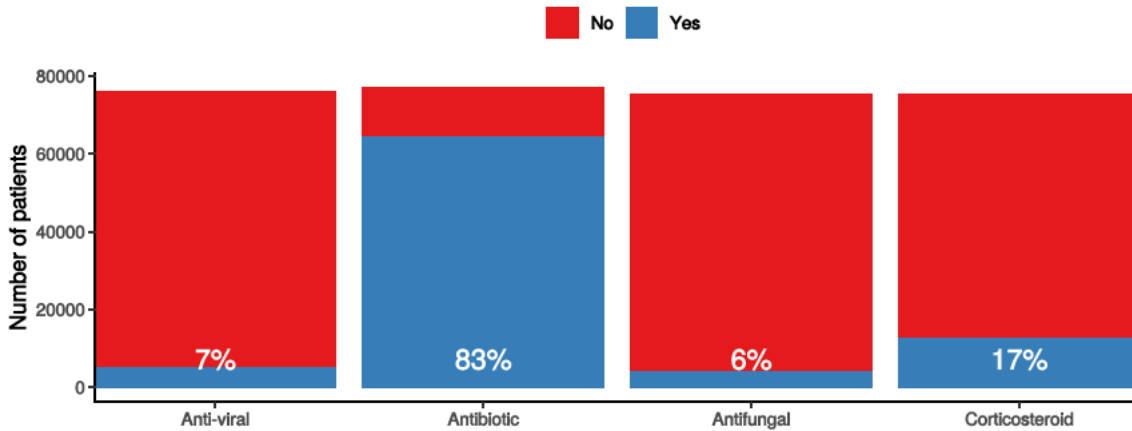
Treatment

Figure 10

ICU/HDU admission
Figure 10A

11437/82009
14%
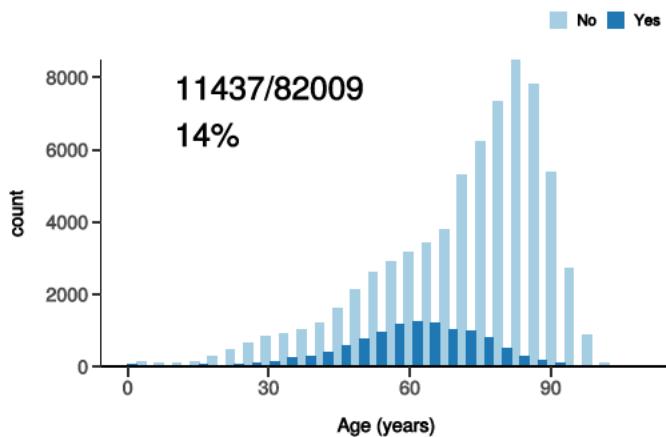
High flow oxygen
Figure 10B

59407/81158
73%

Noninvasive ventilation
Figure 10C

12092/80637
15%
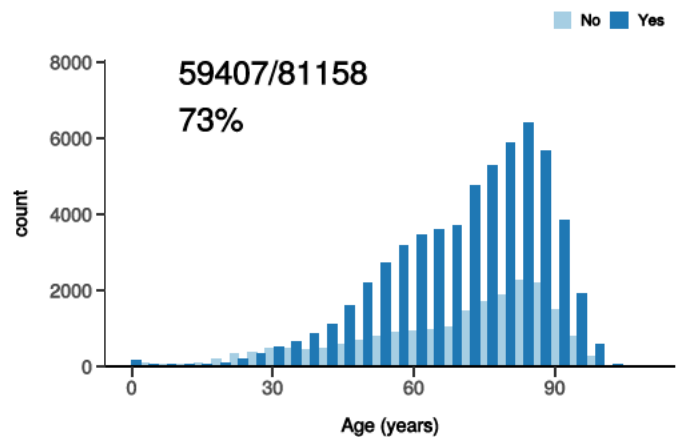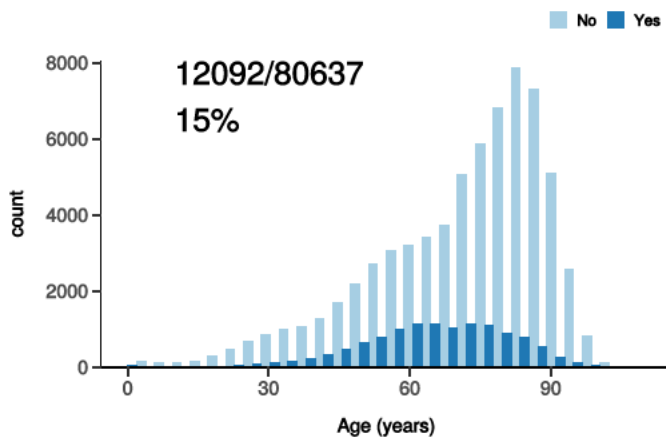
Invasive ventilation
Figure 10D

6666/80835
8%
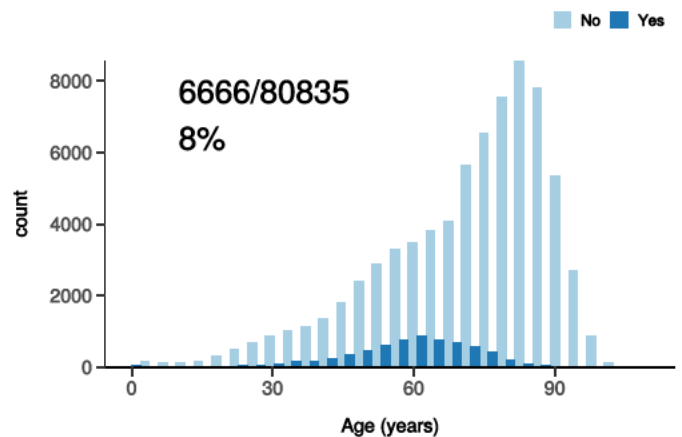
Status in patients admitted >=14 days from today

Figure 11

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

Died	On-going care	Discharged alive
24370/81221	8072/81221	48638/81221
30%	10%	60%
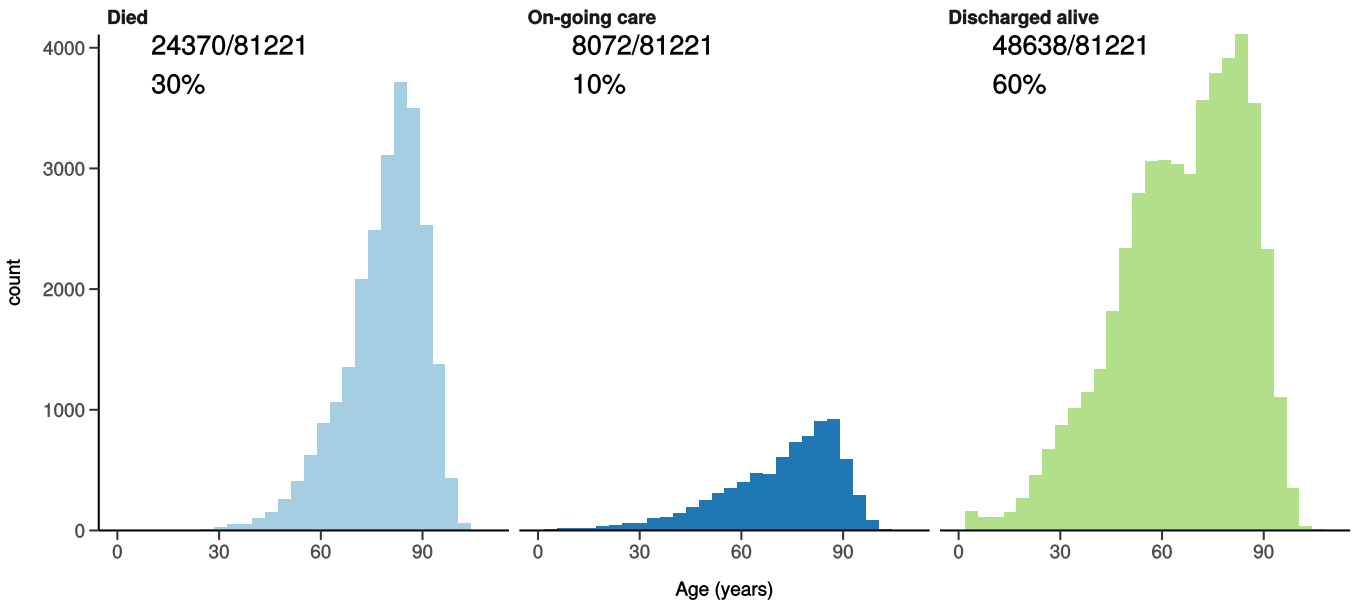
ICU/HDU admissions: status in patients admitted >=14 days ago
Figure 11B

Died	On-going care	Discharged alive
4020/11062	1717/11062	5311/11062
36%	16%	48%
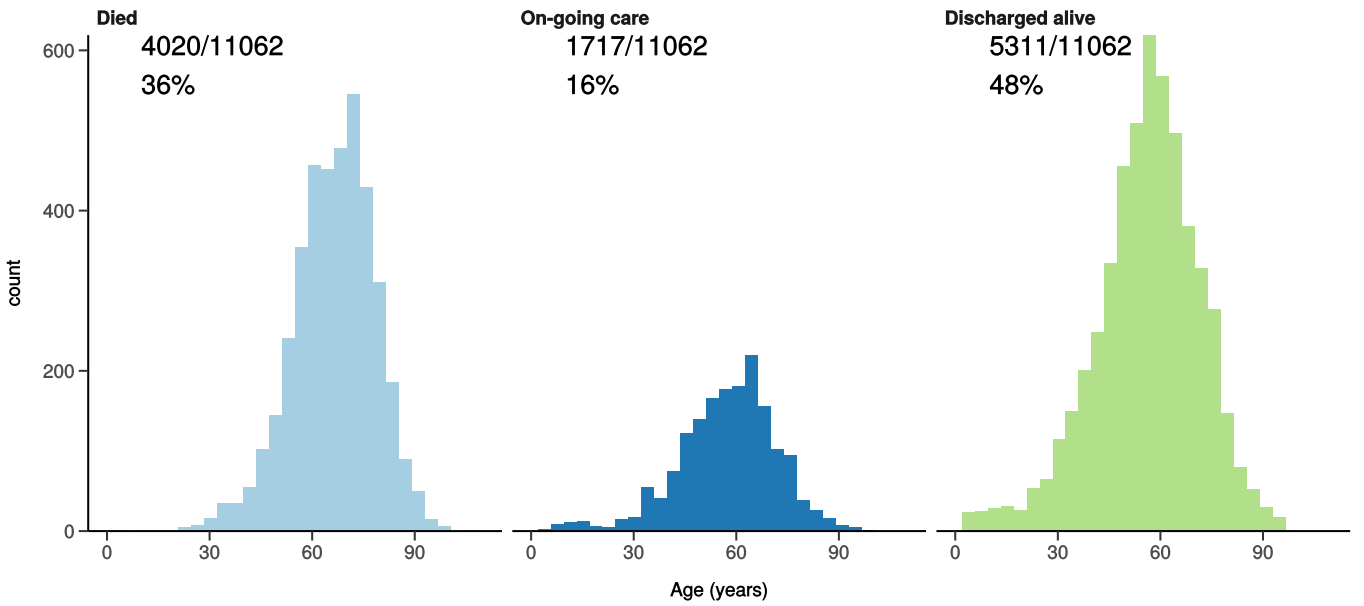
Invasive ventilation: status in patients admitted >=14 days ago
Figure 11c

Died	On-going care	Discharged alive
2771/6492	1285/6492	2432/6492
43%	20%	37%
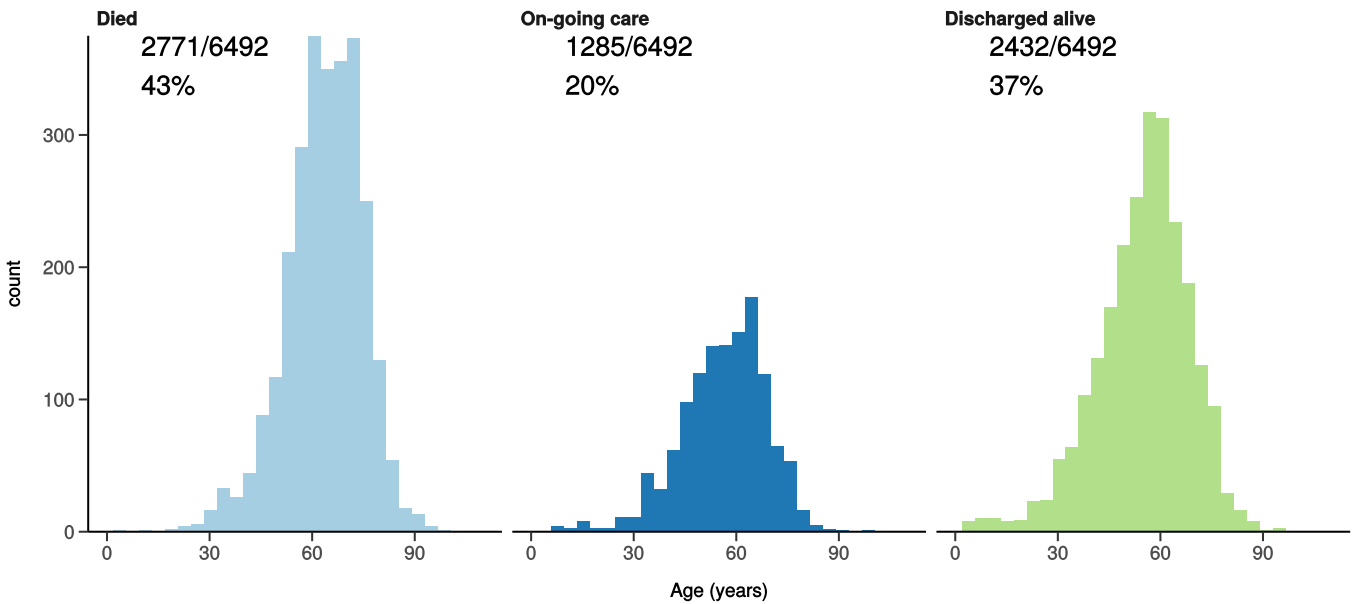
Length of stay stratified by age

Figure 12

Length of stay stratified by age and mortality
Proportion who reach outcome by day 14 shown
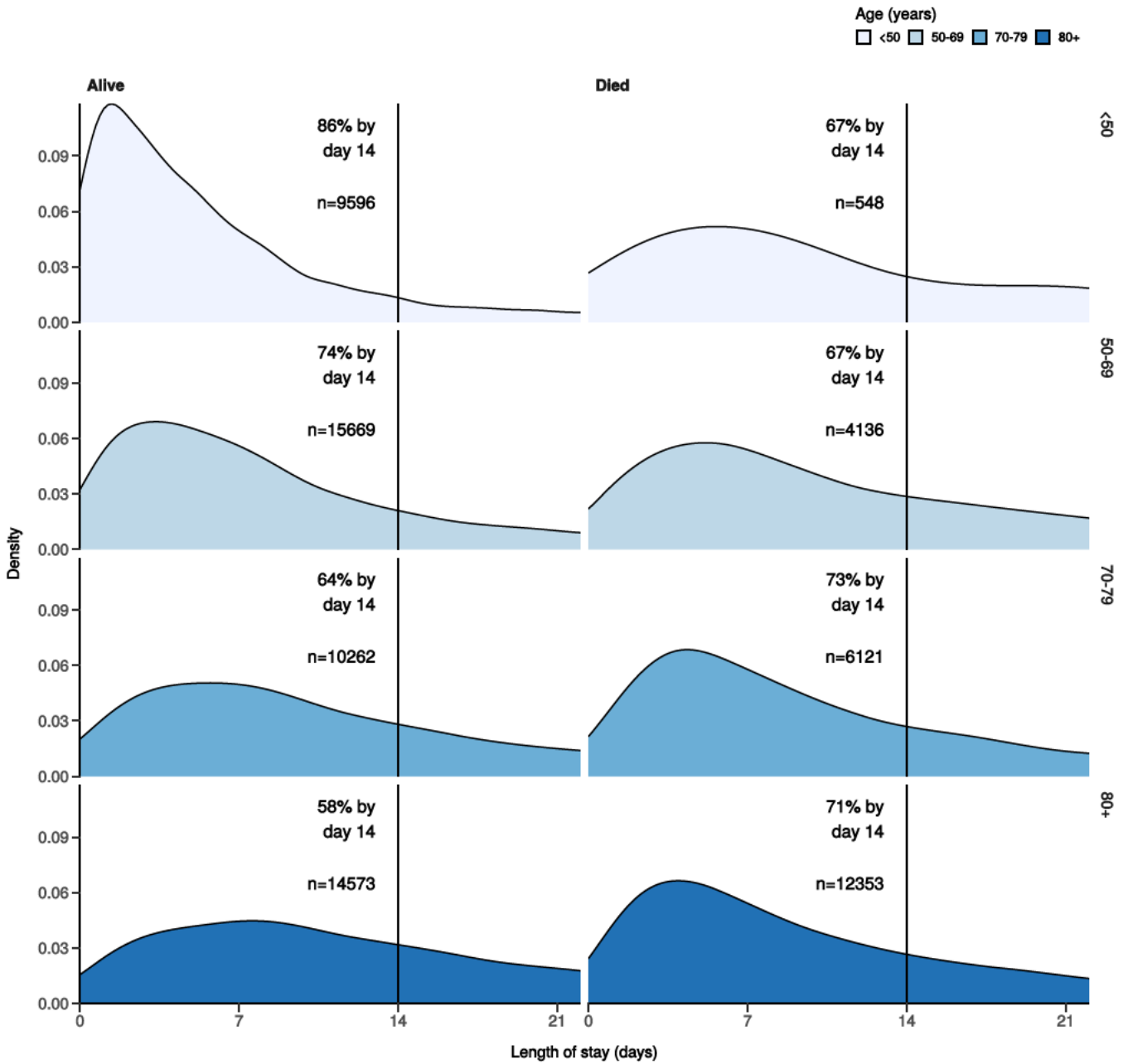
Predictors of death: logistic regression multivariable model

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	10963 (94.9)	585 (5.1)	•	•
	50-69	17345 (80.0)	4339 (20.0)	4.69 (4.29-5.13, p<0.001)	4.38 (3.96-4.85, p<0.001)
	70-79	11339 (63.9)	6403 (36.1)	10.58 (9.69-11.57, p<0.001)	8.89 (8.04-9.86, p<0.001)
	80+	15964 (55.2)	12948 (44.8)	15.20 (13.96-16.59, p<0.001)	12.72 (11.50-14.09, p<0.001)

Dependent: death		No	Yes	OR (univariable)	OR (multivariable)
Sex at Birth	Male	30056 (67.2)	14694 (32.8)	•	•
	Female	25597 (72.7)	9599 (27.3)	0.77 (0.74-0.79, p<0.001)	0.70 (0.68-0.73, p<0.001)
	Not specified	0 (NaN)	0 (NaN)	•	•
Chronic cardiac disease	NO	37701 (74.5)	12898 (25.5)	•	•
	YES	14479 (59.4)	9913 (40.6)	2.00 (1.94-2.07, p<0.001)	1.15 (1.11-1.20, p<0.001)
Chronic pulmonary disease (not asthma)	NO	44127 (71.8)	17330 (28.2)	•	•
	YES	7933 (59.9)	5304 (40.1)	1.70 (1.64-1.77, p<0.001)	1.25 (1.20-1.31, p<0.001)
Chronic neurological disorder	NO	45739 (70.8)	18861 (29.2)	•	•
	YES	5976 (62.6)	3575 (37.4)	1.45 (1.39-1.52, p<0.001)	1.16 (1.10-1.23, p<0.001)
Chronic hematologic disease	NO	49567 (70.1)	21101 (29.9)	•	•
	YES	2001 (62.0)	1228 (38.0)	1.44 (1.34-1.55, p<0.001)	1.14 (1.05-1.25, p=0.002)
Chronic kidney disease	NO	44426 (72.3)	17001 (27.7)	•	•
	YES	7494 (57.4)	5573 (42.6)	1.94 (1.87-2.02, p<0.001)	1.29 (1.23-1.35, p<0.001)
Dementia	NO	45069 (72.8)	16832 (27.2)	•	•
	YES	6693 (54.1)	5687 (45.9)	2.28 (2.19-2.37, p<0.001)	1.37 (1.30-1.44, p<0.001)
Obesity (as defined by clinical staff)	NO	41039 (69.8)	17778 (30.2)	•	•
	YES	5888 (73.6)	2117 (26.4)	0.83 (0.79-0.87, p<0.001)	1.28 (1.20-1.35, p<0.001)
Malignant neoplasm	NO	47284 (71.3)	19051 (28.7)	•	•
	YES	4309 (56.5)	3316 (43.5)	1.91 (1.82-2.00, p<0.001)	1.47 (1.39-1.56, p<0.001)

Number in dataframe = 82640, Number in model = 63519, Missing = 19121, AIC = 68684.4, C-statistic = 0.717, H&L = Chi-sq(8) 126.64 (p<0.001)

Figure 13 - Adjusted odds ratio plot

Death

Age on admission (years)	<50	-	
	50-69	4.38 (3.96-4.85, p<0.001)	
	70-79	8.89 (8.04-9.86, p<0.001)	
	80+	12.72 (11.50-14.09, p<0.001)	
Sex at Birth	Male	-	
	Female	0.70 (0.68-0.73, p<0.001)	
	Not specified	-	
Chronic cardiac disease	YES	1.15 (1.11-1.20, p<0.001)	
Chronic pulmonary disease (not asthma)	YES	1.25 (1.20-1.31, p<0.001)	
Chronic neurological disorder	YES	1.16 (1.10-1.23, p<0.001)	
Chronic hematologic disease	YES	1.14 (1.05-1.25, p=0.002)	
Chronic kidney disease	YES	1.29 (1.23-1.35, p<0.001)	
Dementia	YES	1.37 (1.30-1.44, p<0.001)	
Obesity (as defined by clinical staff)	YES	1.28 (1.20-1.35, p<0.001)	
Malignant neoplasm	YES	1.47 (1.39-1.56, p<0.001)	

Odds ratio (95% CI, log scale)

Figure 14 - ROC

AUC: 0.717
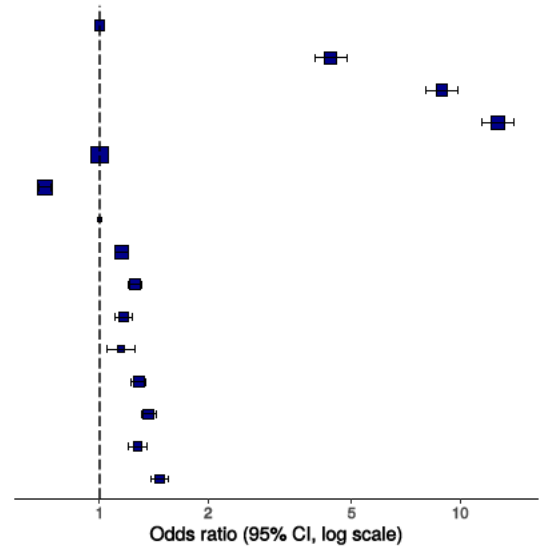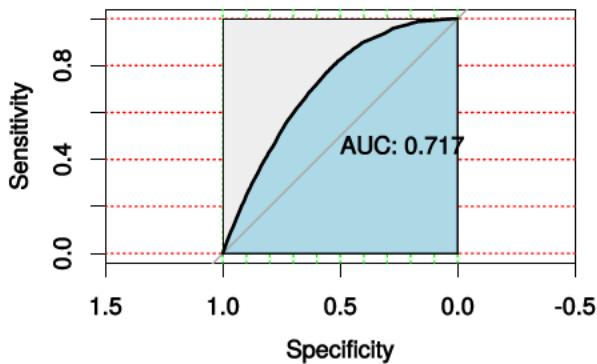
Survival models

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

Figure 15

P-value is log-rank test.

p < 0.0001

Number at risk

age.factor=<18	1207	1167	1151	1149	1148
age.factor=18-49	10975	10588	10297	10141	10054
age.factor=50-74	31309	29252	26765	25069	24084
age.factor=75 and over	39934	34676	28549	25241	23617

sex=Male	46868	42510	37180	33956	32246
sex=Female	36863	33503	29923	27991	27006
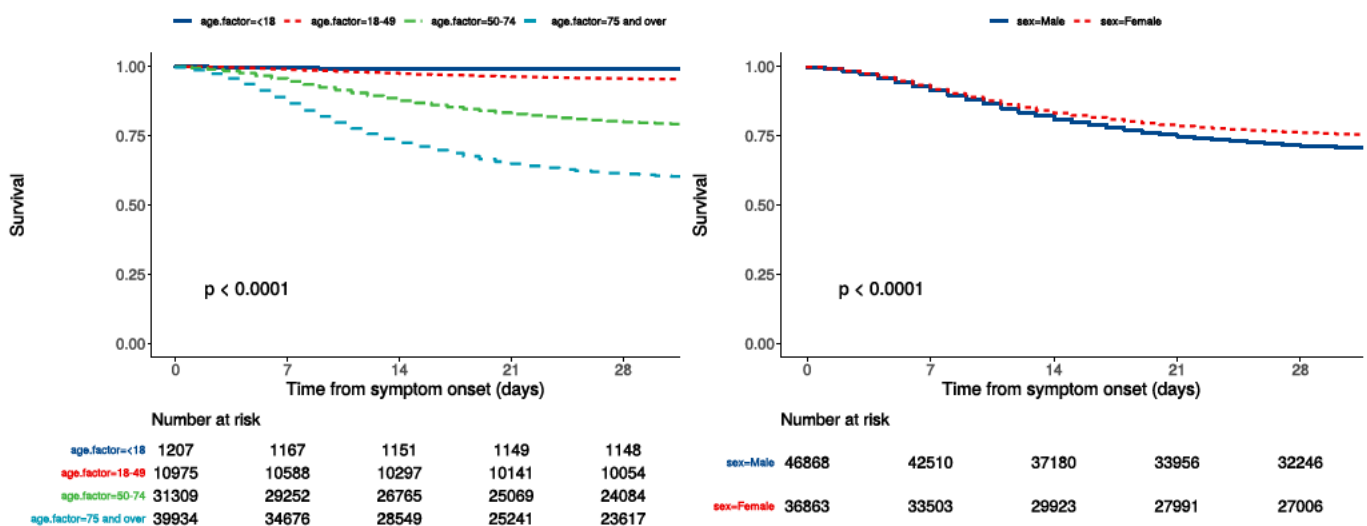
Cox proportional hazards model

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	12182 (14.6)	•	•
	50-69	22725 (27.2)	4.27 (3.92-4.66, p<0.001)	4.13 (3.71-4.59, p<0.001)
	70-79	18529 (22.2)	8.70 (7.99-9.47, p<0.001)	8.13 (7.32-9.03, p<0.001)
	80+	29996 (36.0)	11.73 (10.80-12.75, p<0.001)	10.72 (9.65-11.90, p<0.001)
Sex at Birth	Male	46868 (56.0)	•	•
	Female	36863 (44.0)	0.81 (0.79-0.83, p<0.001)	0.79 (0.77-0.82, p<0.001)
qSOFA score on admission	0	30684 (43.0)	•	•
	1	31919 (44.8)	1.61 (1.56-1.66, p<0.001)	1.72 (1.66-1.78, p<0.001)
	2	7823 (11.0)	3.10 (2.98-3.23, p<0.001)	2.89 (2.76-3.02, p<0.001)
	3	864 (1.2)	5.07 (4.65-5.52, p<0.001)	4.55 (4.13-5.02, p<0.001)
Symptomatic at presentation	No symptoms	4377 (5.4)	•	•
	Symptoms	77116 (94.6)	1.58 (1.48-1.69, p<0.001)	•
Chronic cardiac disease	NO	52418 (67.6)	•	•
	YES	25143 (32.4)	1.79 (1.75-1.84, p<0.001)	1.14 (1.10-1.18, p<0.001)
Chronic kidney disease	NO	63589 (82.5)	•	•
	YES	13464 (17.5)	1.74 (1.69-1.79, p<0.001)	1.22 (1.18-1.27, p<0.001)
Moderate or severe liver disease	NO	74806 (98.0)	•	•
	YES	1512 (2.0)	1.29 (1.19-1.41, p<0.001)	1.43 (1.29-1.59, p<0.001)
Chronic neurological disorder	NO	66900 (87.2)	•	•
	YES	9778 (12.8)	1.38 (1.33-1.43, p<0.001)	•
Malignant neoplasm	NO	68664 (89.8)	•	•
	YES	7831 (10.2)	1.67 (1.61-1.73, p<0.001)	1.34 (1.28-1.40, p<0.001)
Chronic hematologic disease	NO	73121 (95.7)	•	•
	YES	3298 (4.3)	1.34 (1.27-1.42, p<0.001)	•
Obesity (as defined by clinical staff)	NO	60859 (88.0)	•	•
	YES	8290 (12.0)	0.85 (0.81-0.89, p<0.001)	1.17 (1.11-1.23, p<0.001)
Diabetes without complications	NO	62199 (83.8)	•	•
	YES	12062 (16.2)	1.26 (1.21-1.30, p<0.001)	•
Rheumatologic disorder	NO	67462 (88.5)	•	•
	YES	8773 (11.5)	1.19 (1.15-1.24, p<0.001)	•

Dependent: Surv(time, status)		all		HR (univariable)	HR (multivariable)
Dementia	NO	64155 (83.5)	•		•
	YES	12663 (16.5)		2.01 (1.95-2.07, p<0.001)	1.17 (1.13-1.22, p<0.001)
Malnutrition	NO	69900 (97.2)	•		•
	YES	1993 (2.8)		1.44 (1.34-1.55, p<0.001)	•
smoking_mhyn_2levels	NO	45275 (57.5)	•		•
	YES	4384 (5.6)		0.87 (0.82-0.93, p<0.001)	•
	N/K	29096 (36.9)		1.24 (1.20-1.27, p<0.001)	•

Number in dataframe = 84104, Number in model = 58325, Missing = 25779, Number of events = 16698, Concordance = 0.720 (SE = 0.002), R-squared = 0.160(Max possible = 0.998), Likelihood ratio test = 10145.740 (df = 13, p = 0.000)

Figure 16a - Multivariable Cox proportional hazards model
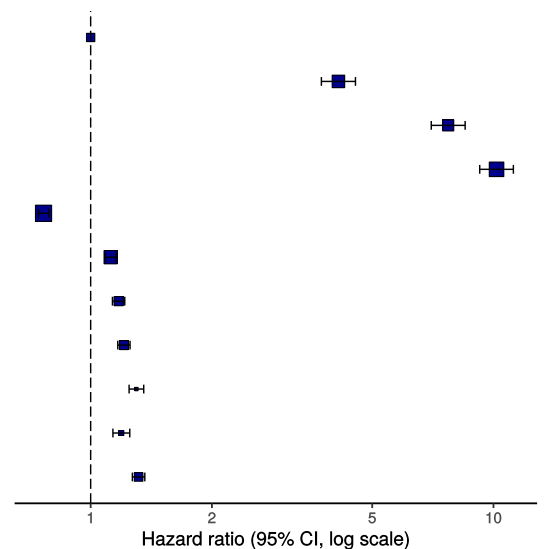
Survival: HR (95% CI, p-value)

Age on admission (years)	<50	-
	50-69	4.13 (3.71-4.59, p<0.001)
	70-79	8.13 (7.32-9.03, p<0.001)
	80+	10.72 (9.65-11.90, p<0.001)
Sex at Birth	Female	0.79 (0.77-0.82, p<0.001)
qSOFA score on admission	0	-
	1	1.72 (1.66-1.78, p<0.001)
	2	2.89 (2.76-3.02, p<0.001)
	3	4.55 (4.13-5.02, p<0.001)
Chronic cardiac disease	YES	1.14 (1.10-1.18, p<0.001)
Chronic kidney disease	YES	1.22 (1.18-1.27, p<0.001)
Moderate or severe liver disease	YES	1.43 (1.29-1.59, p<0.001)
Malignant neoplasm	YES	1.34 (1.28-1.40, p<0.001)
Obesity (as defined by clinical staff)	YES	1.17 (1.11-1.23, p<0.001)
Dementia	YES	1.17 (1.13-1.22, p<0.001)

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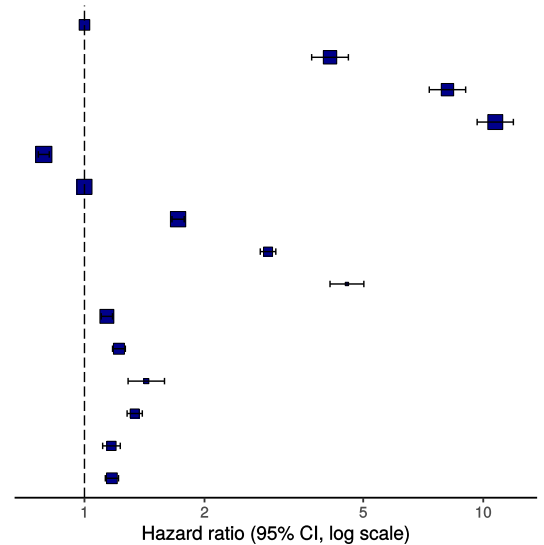
Figure 16b - Multivariable Cox proportional hazards model (age, sex, comorbidities only)

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

Age on admission (years)	<50	-
	50-69	4.12 (3.74-4.54, p<0.001)
	70-79	7.72 (7.01-8.51, p<0.001)
	80+	10.18 (9.24-11.21, p<0.001)
Sex at Birth	Female	0.76 (0.74-0.79, p<0.001)
Chronic cardiac disease	YES	1.12 (1.09-1.16, p<0.001)
Chronic pulmonary disease (not asthma)	YES	1.17 (1.13-1.22, p<0.001)
Chronic kidney disease	YES	1.21 (1.17-1.25, p<0.001)
Malignant neoplasm	YES	1.30 (1.25-1.35, p<0.001)
Obesity (as defined by clinical staff)	YES	1.19 (1.14-1.25, p<0.001)
Dementia	YES	1.32 (1.27-1.36, p<0.001)

Hazard ratio (95% CI, log scale)

ROC = 0.719711

Figure 17 - Predictions calibration plot

Black: observed Gray: ideal
Blue : optimism corrected

Predicted 7 Day Survival B=40 based on observed-predicted
Mean |error|=0.198 0.9 Quantile=0.362
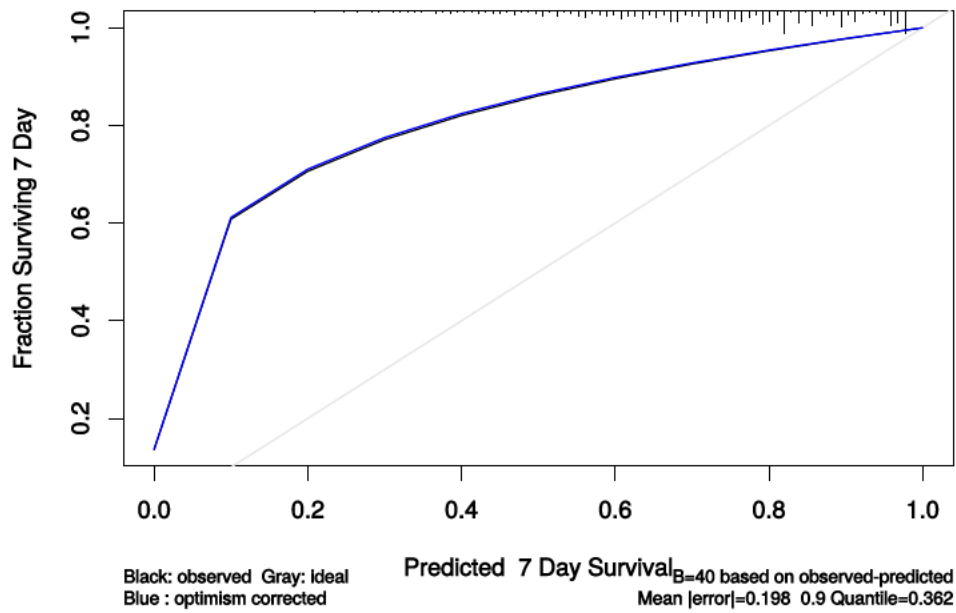
Figure 18 - Prognostic model predictions

Again, for demonstration of methods.

Prognostic model for survival 7 days after onset

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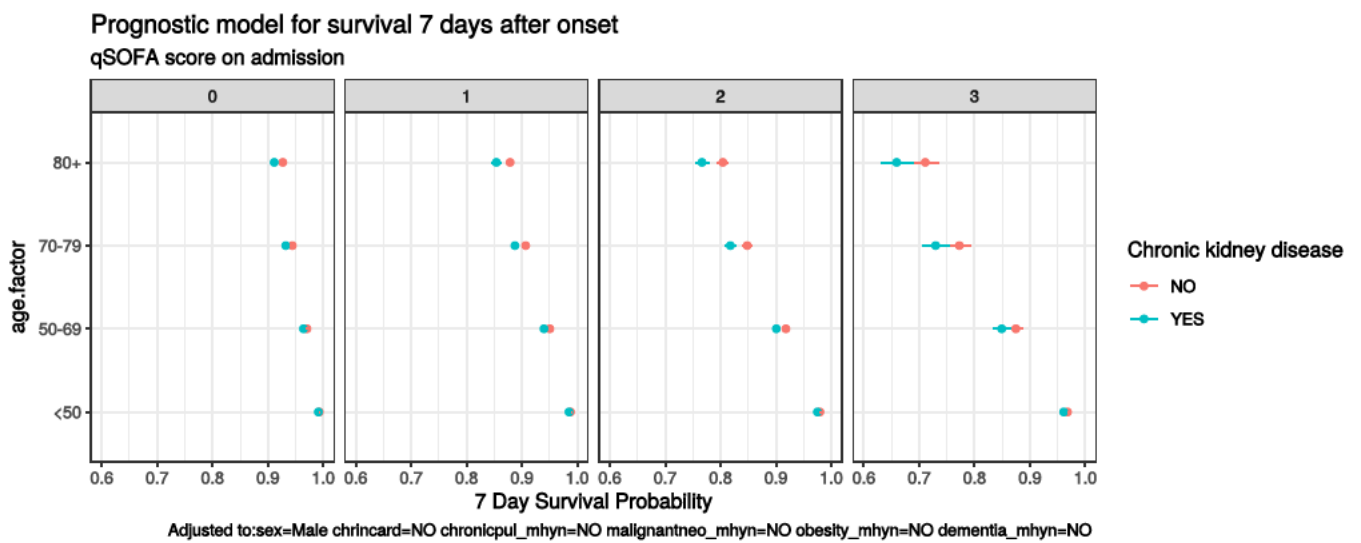
Figure 19 - Death by severity (NEWS) on admission
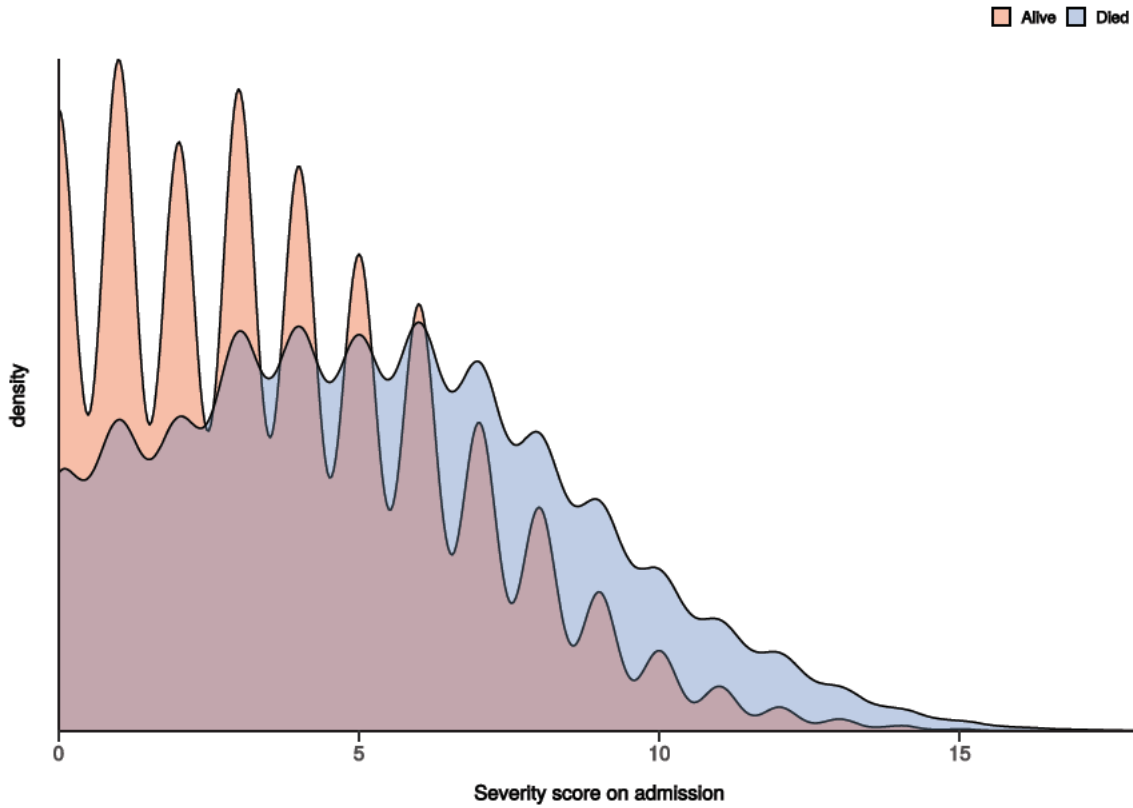
Number of deaths by NEWS score at admission

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

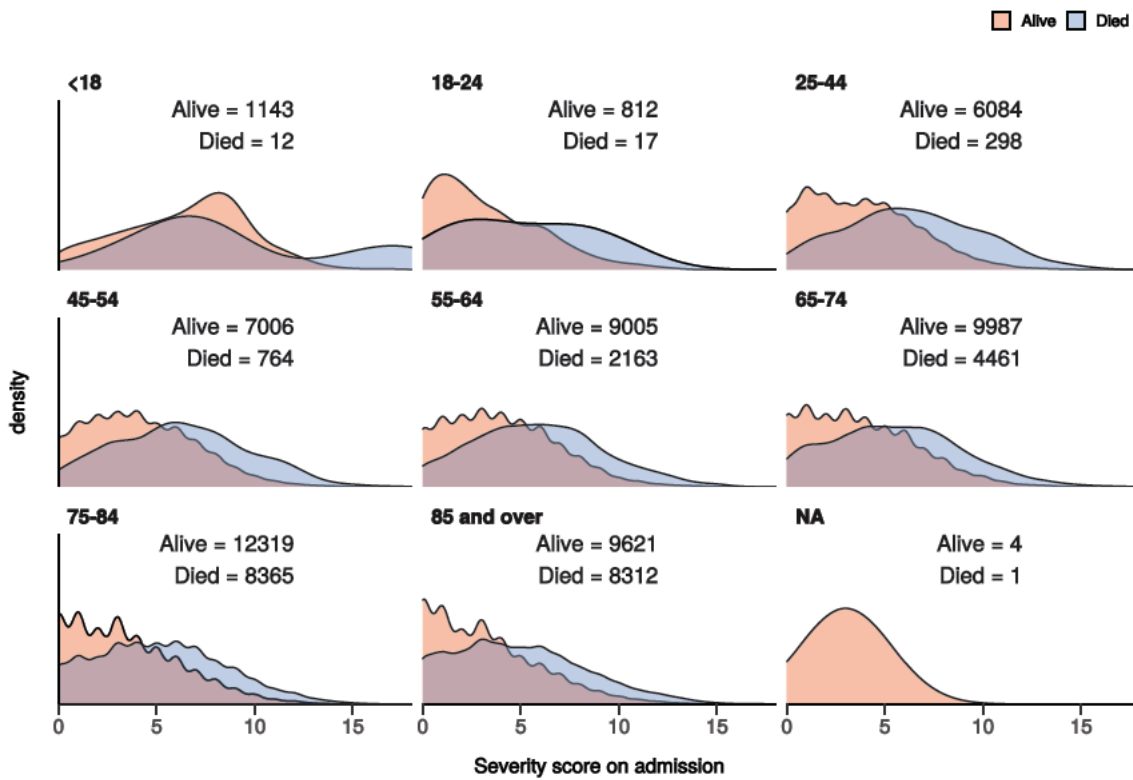## Number of deaths by NEWS score at admission
Stratified by age

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