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

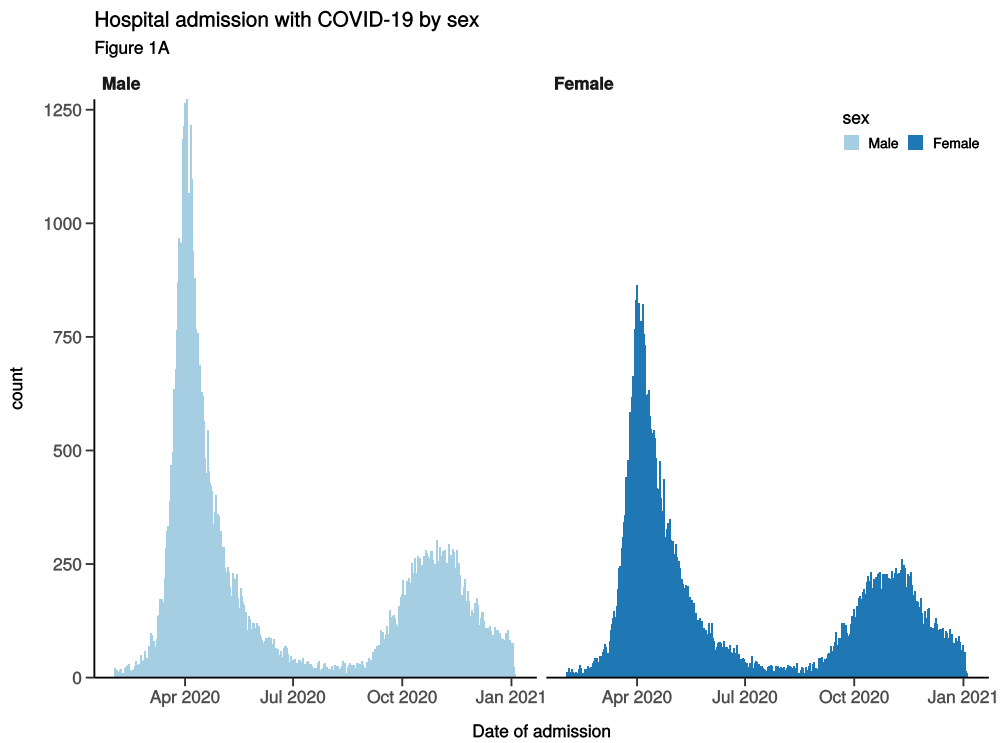Dynamic content updated: 2021-01-06 04:07:49.

Executive summary

Includes all patients

There are 136654 patients included in CO-CIN. Of these, 30580 patient(s) have died and 17385 required ICU. 68293 have been discharged home.
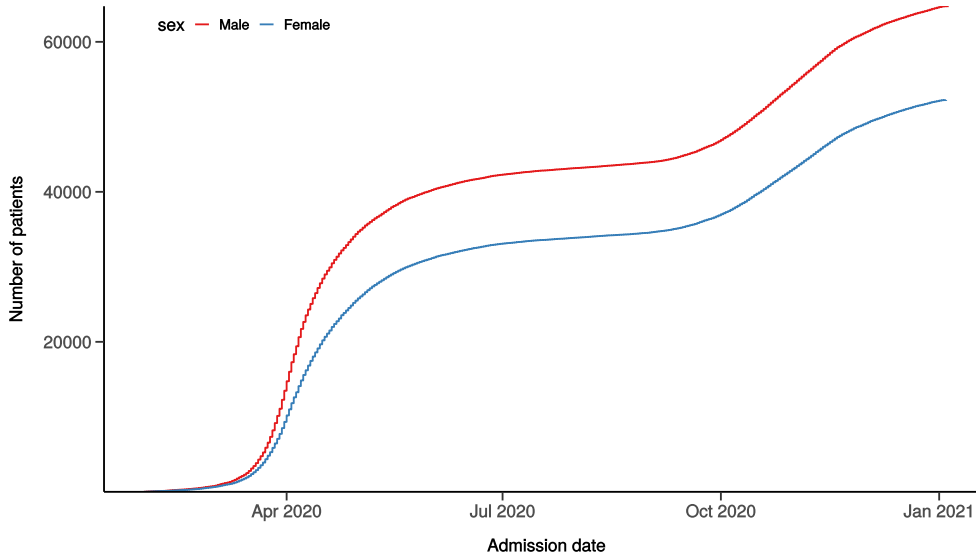
Admission

Figure 1
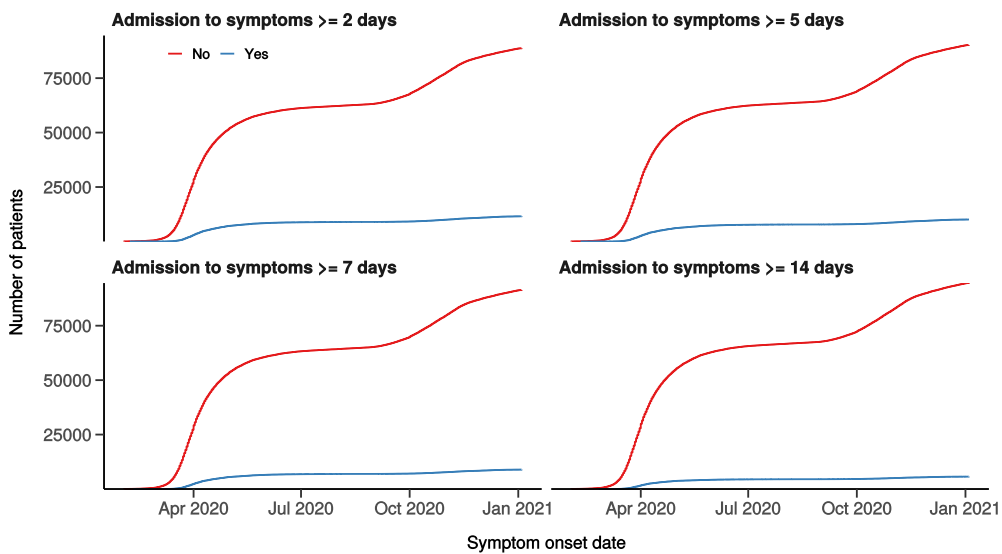
Hospital admission with COVID-19 by sex
Figure 1A

Hospital admission with COVID-19 by sex
Figure 1B
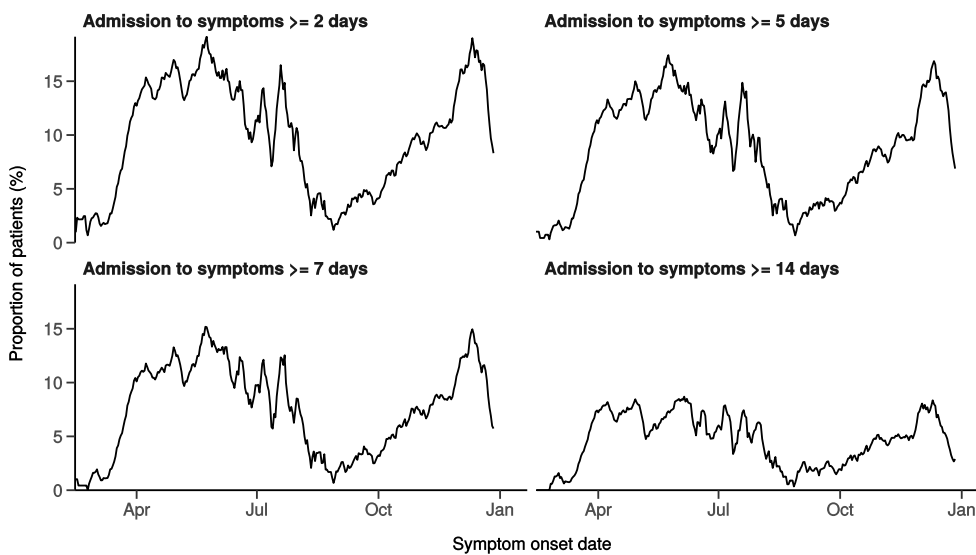
Number with symptom onset occuring after admission to hospital
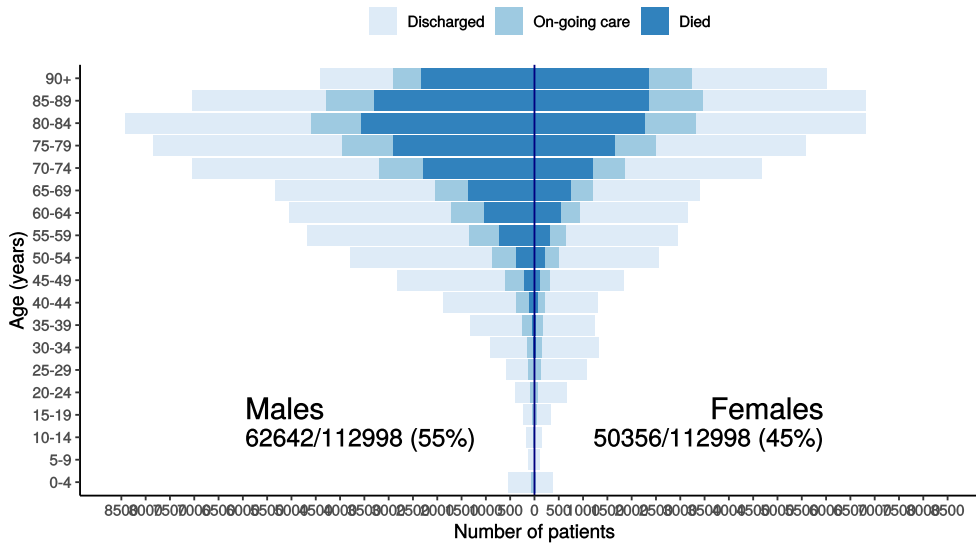Figure 1C

Proportion with symptom onset occuring after hospital admission
Figure 1D - 7-day rolling percentage. n = 100266

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

Hospital admission with COVID-19 by ethnicity
Figure 1F
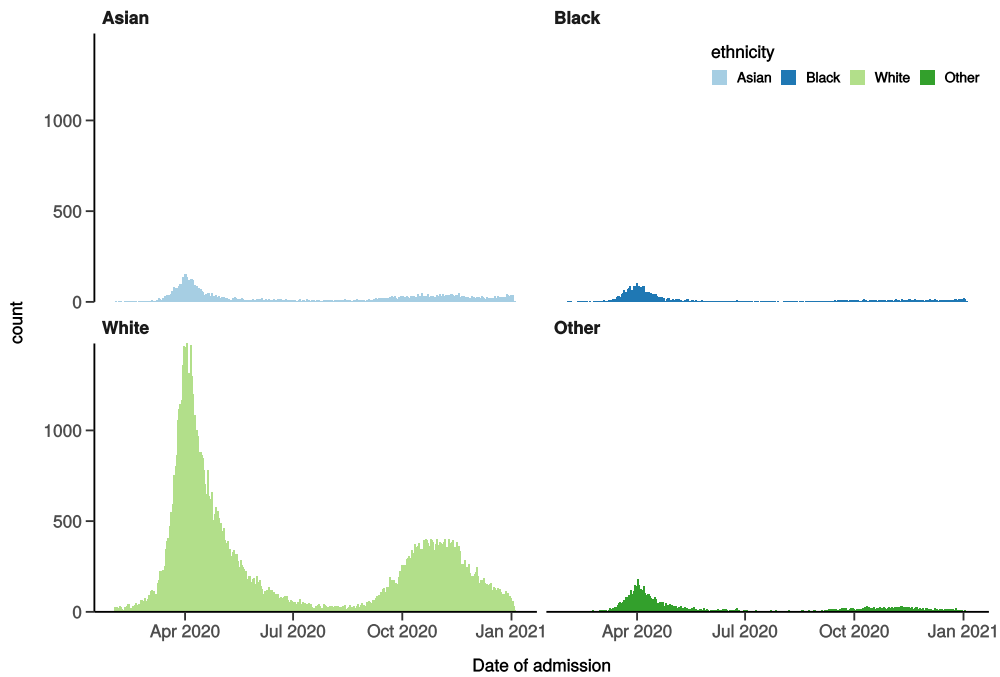
Location by CCG / Healthboard

Figure 2

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

n = 136200
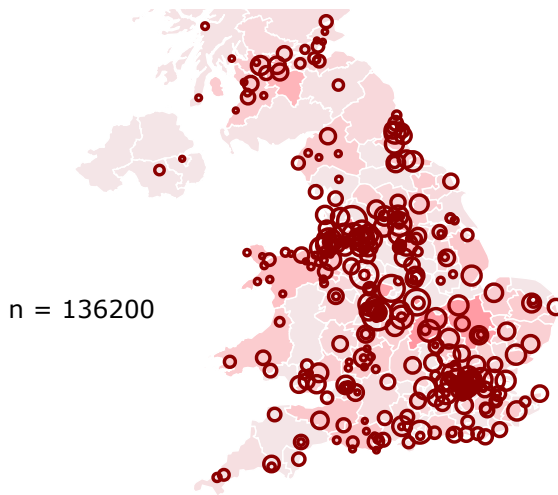
Symptoms and comorbidity

Figure 3A

Symptoms on presentation to hospital
% patients, n = 113848

Comorbidity
% patients, n = 136654
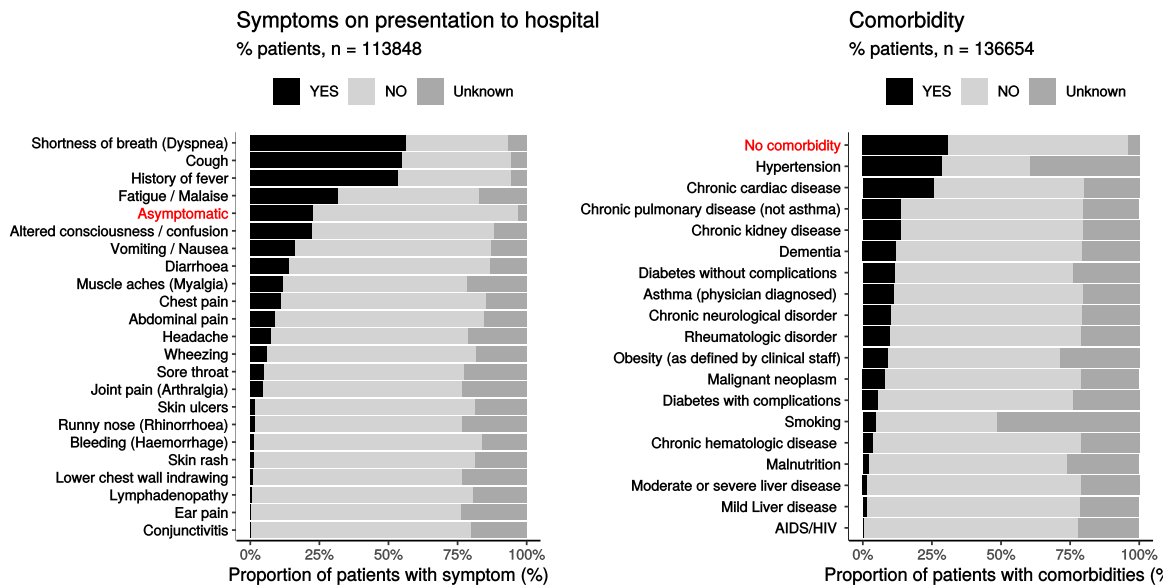
Figure 3B - Symptoms by Age

Symptoms on presentation to hospital
Stratifed by age
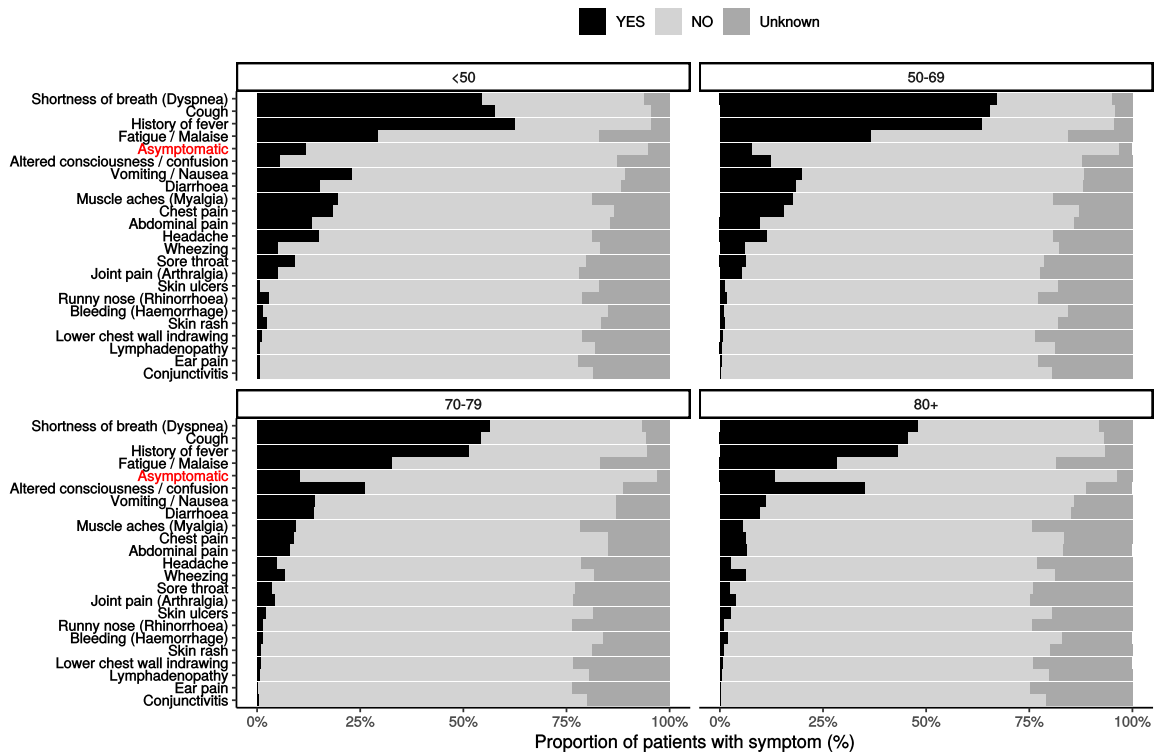
Figure 3C

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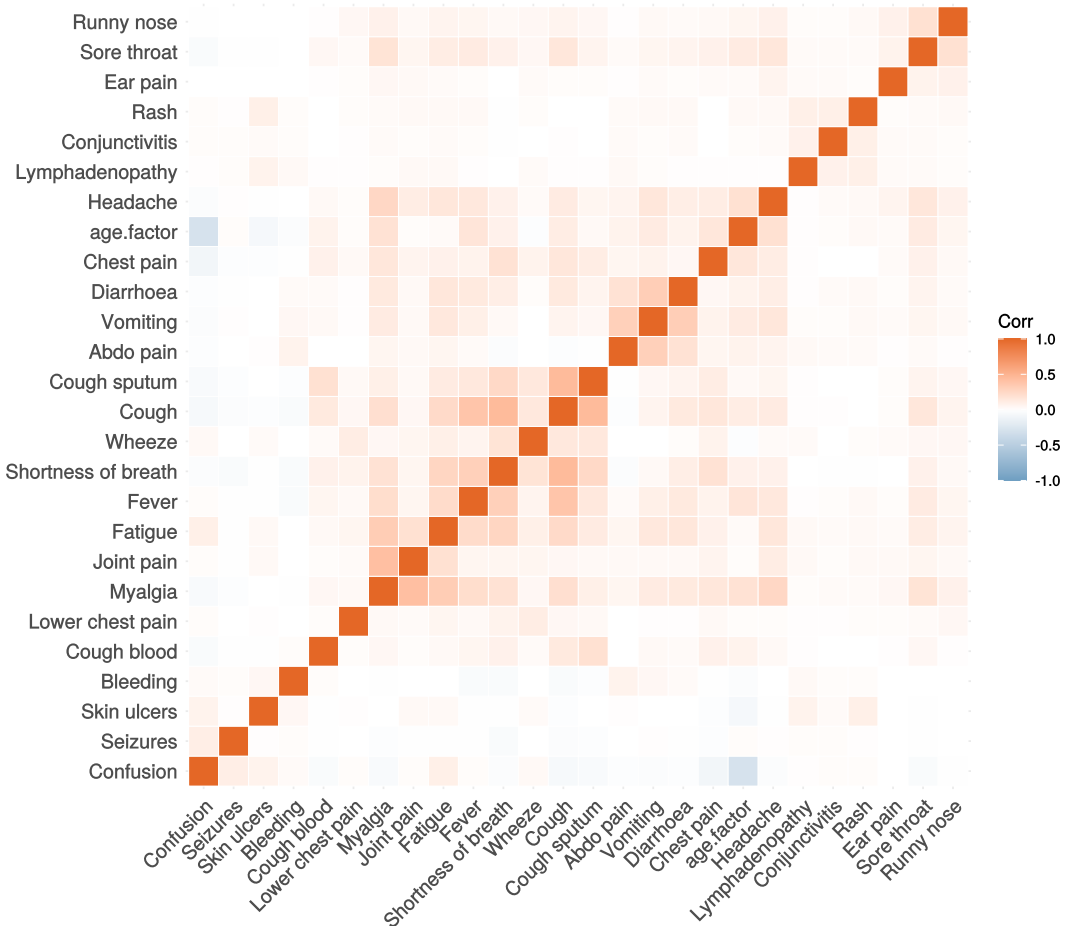
Symptoms (diagnostic criteria)

Figure 4A
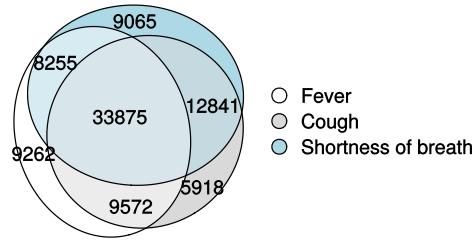
Symptoms (most common)

Figure 4B

n = 113848
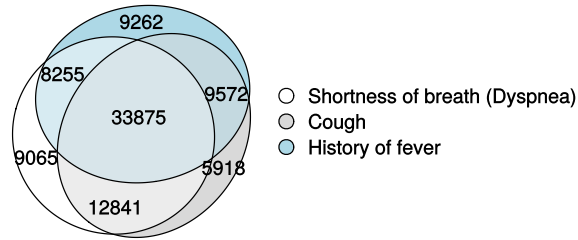
Comorbidity (most common)

Figure 4C

n = 136654
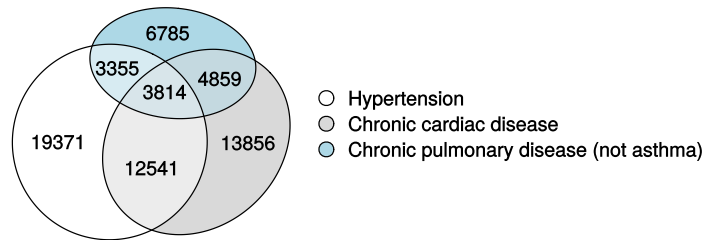
Medication prior to illness

Figure 5

Number of medications prior to admission
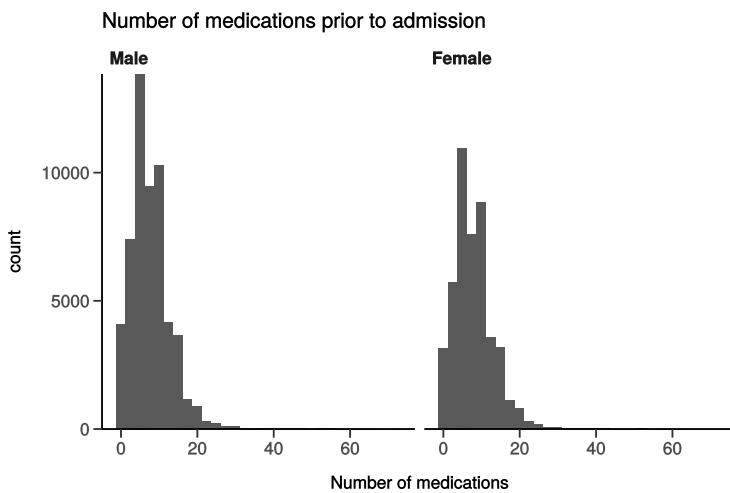
Preadmission treatment
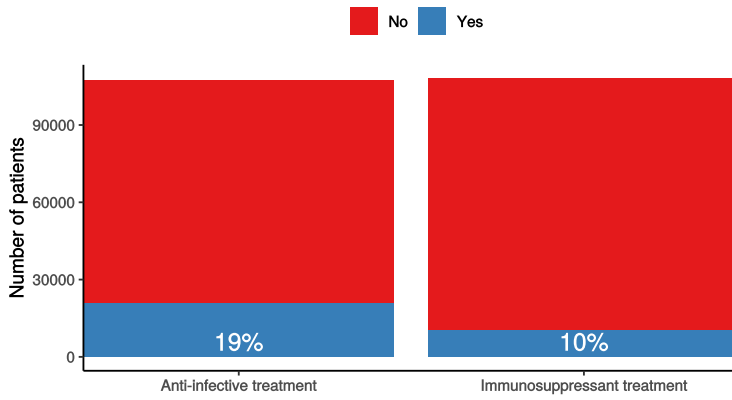
Figure 6

Patient flow

Figure 7A - All patients

N = 116607
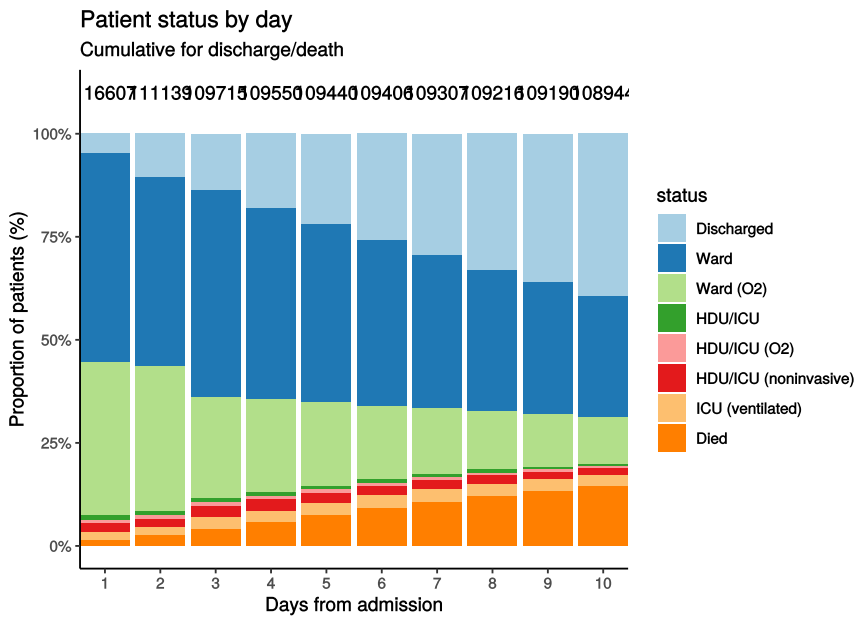
Figure 7B - Patients admitted >=14 days and <=28 days ago

N = 2784

Patient status by day
Cumulative for discharge/death
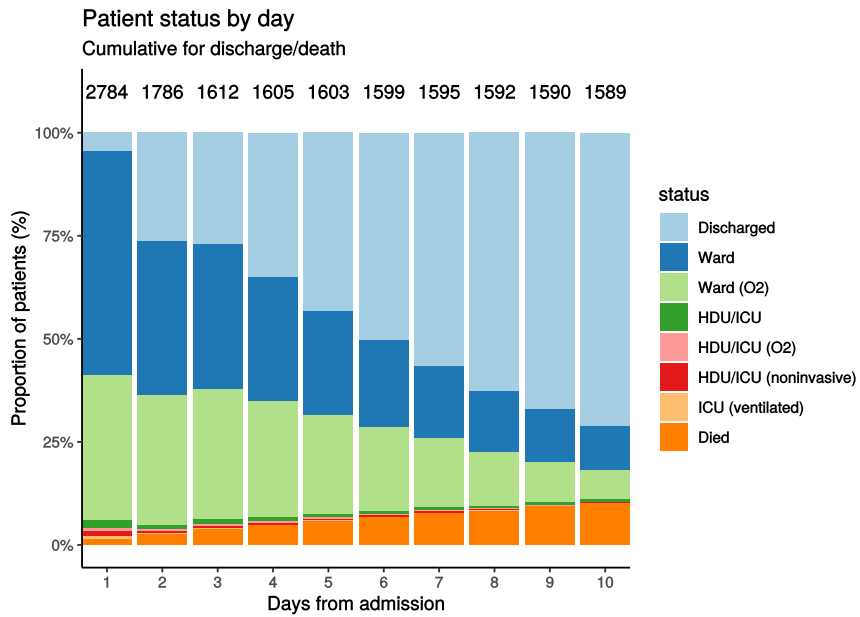
Oxygen requirement

Figure 8A - All patients

N = 110478
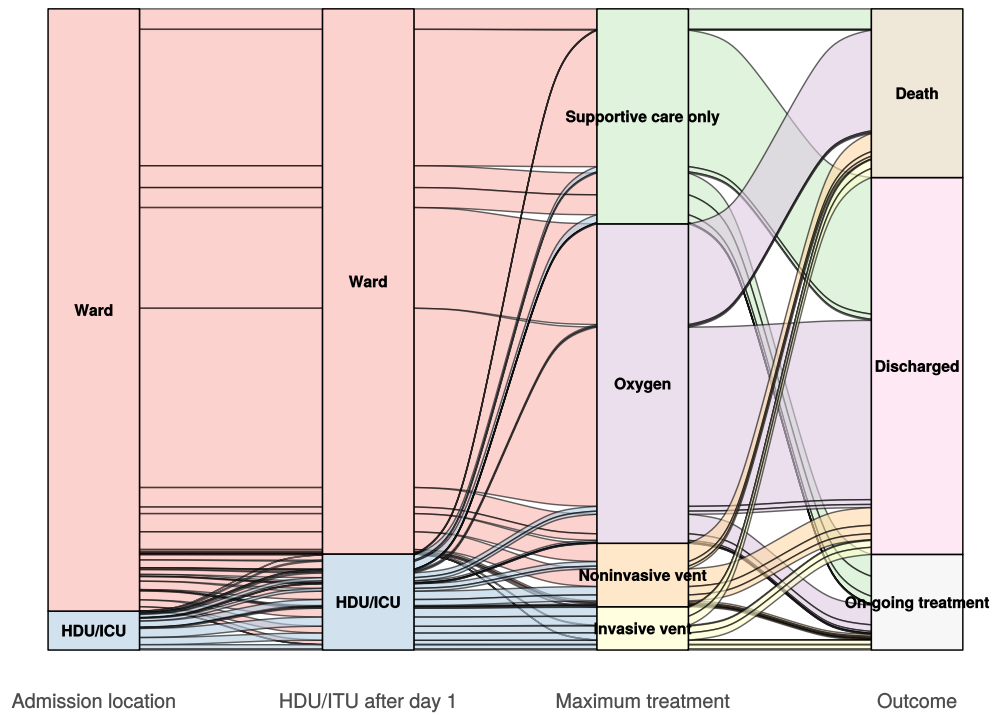
Figure 8B - Patients admitted >=14 days and <=28 days ago

N = 2661

In-hospital medical treatment

Figure 9

In-hospital treatment

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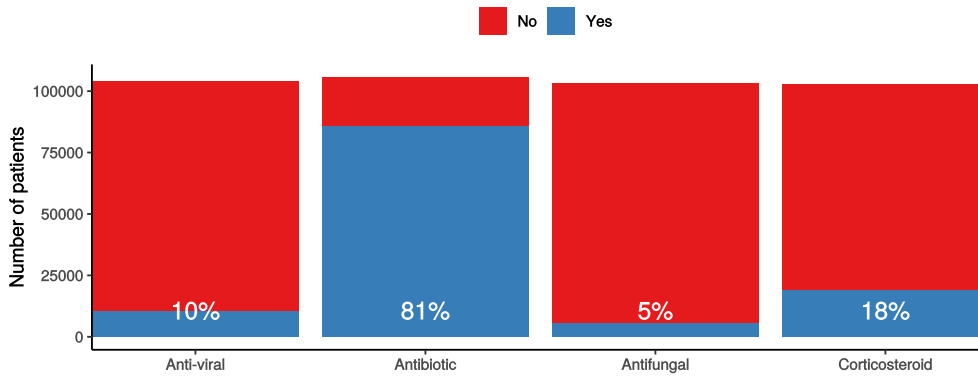
Treatment

Figure 10

ICU/HDU admission
Figure 10A

17385/114685

15%
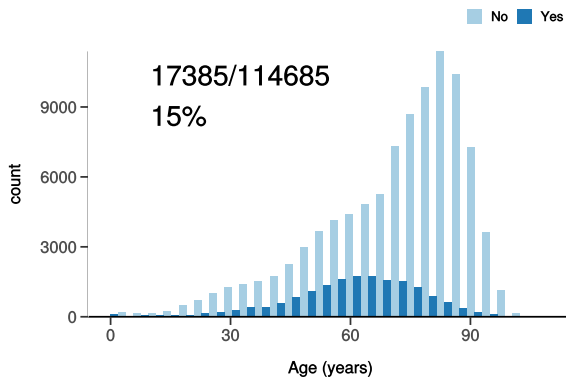
High flow oxygen
Figure 10B

79480/113165

70%

Noninvasive ventilation
Figure 10C

15982/112401

14%
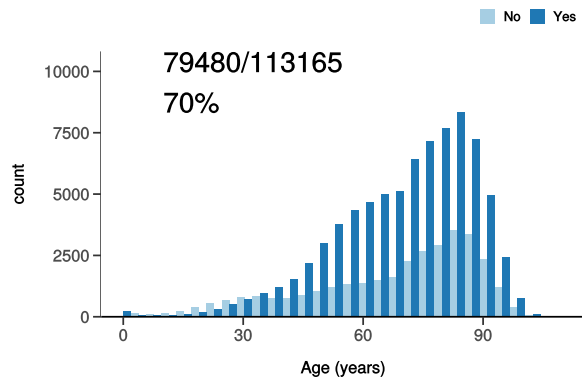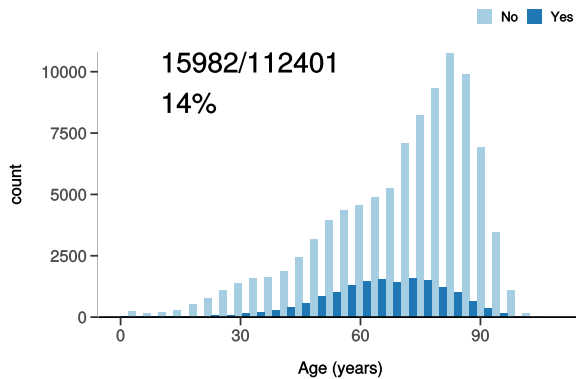
Invasive ventilation
Figure 10D

7836/112661

7%
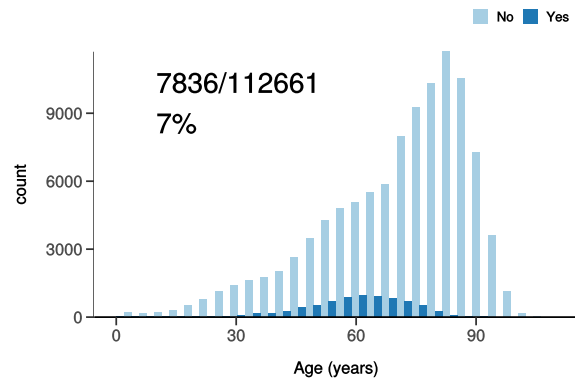
Status in patients admitted >=14 days from today

Figure 11

All: status in patients admitted >=14 days ago

Figure 11A

Died
30319/112051
27%

On-going care
14106/112051
13%

Discharged alive
67461/112051
60%
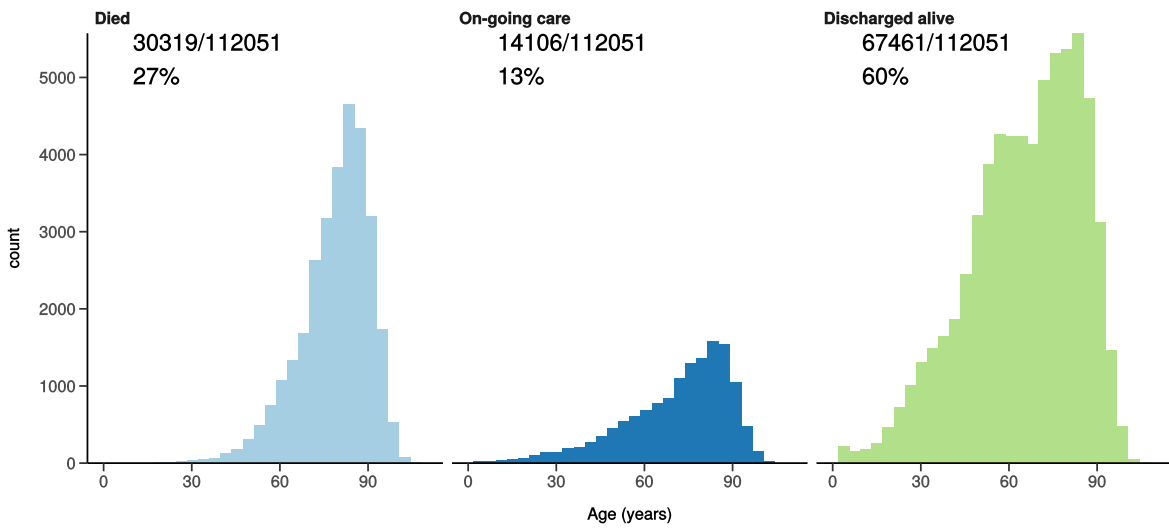
ICU/HDU admissions: status in patients admitted >=14 days ago

Figure 11B

Died
5148/15982
32%

On-going care
3378/15982
21%

Discharged alive
7439/15982
47%
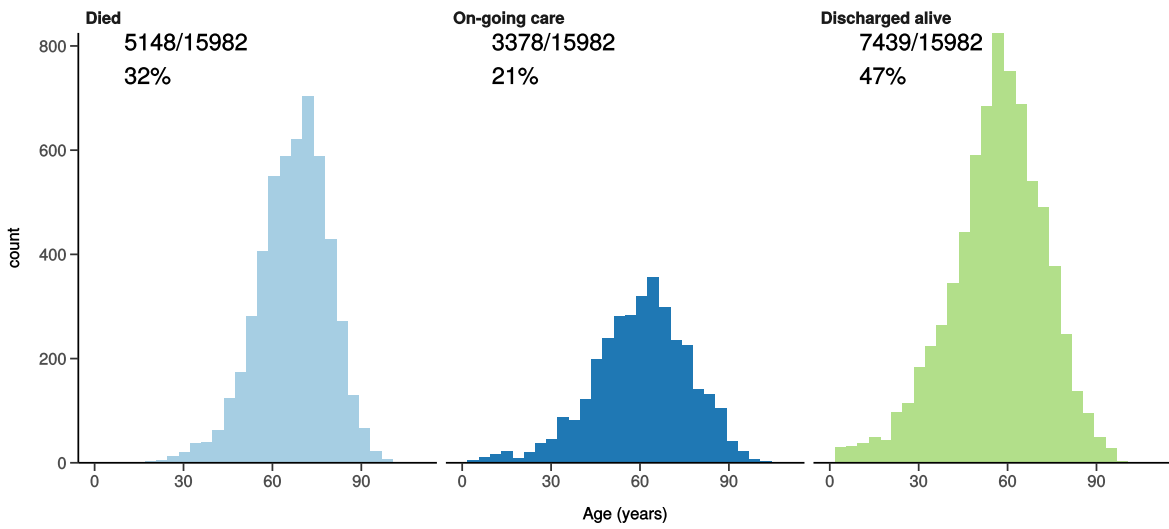
Invasive ventilation: status in patients admitted >=14 days ago

Figure 11c

Died
3324/7623
44%

On-going care
1671/7623
22%

Discharged alive
2623/7623
34%
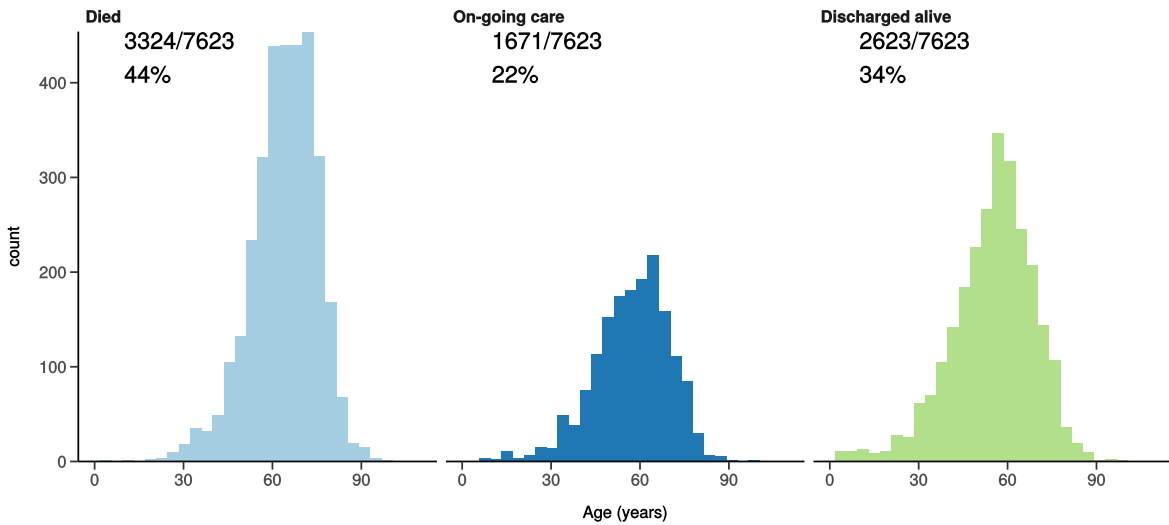
Length of stay stratified by age

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 panels:

<50: Alive 87% by day 14, n=14040; Died 66% by day 14, n=654
50-69: Alive 76% by day 14, n=22175; Died 65% by day 14, n=5069
70-79: Alive 65% by day 14, n=14581; Died 70% by day 14, n=7724
80+: Alive 57% by day 14, n=19994; Died 69% by day 14, n=15468

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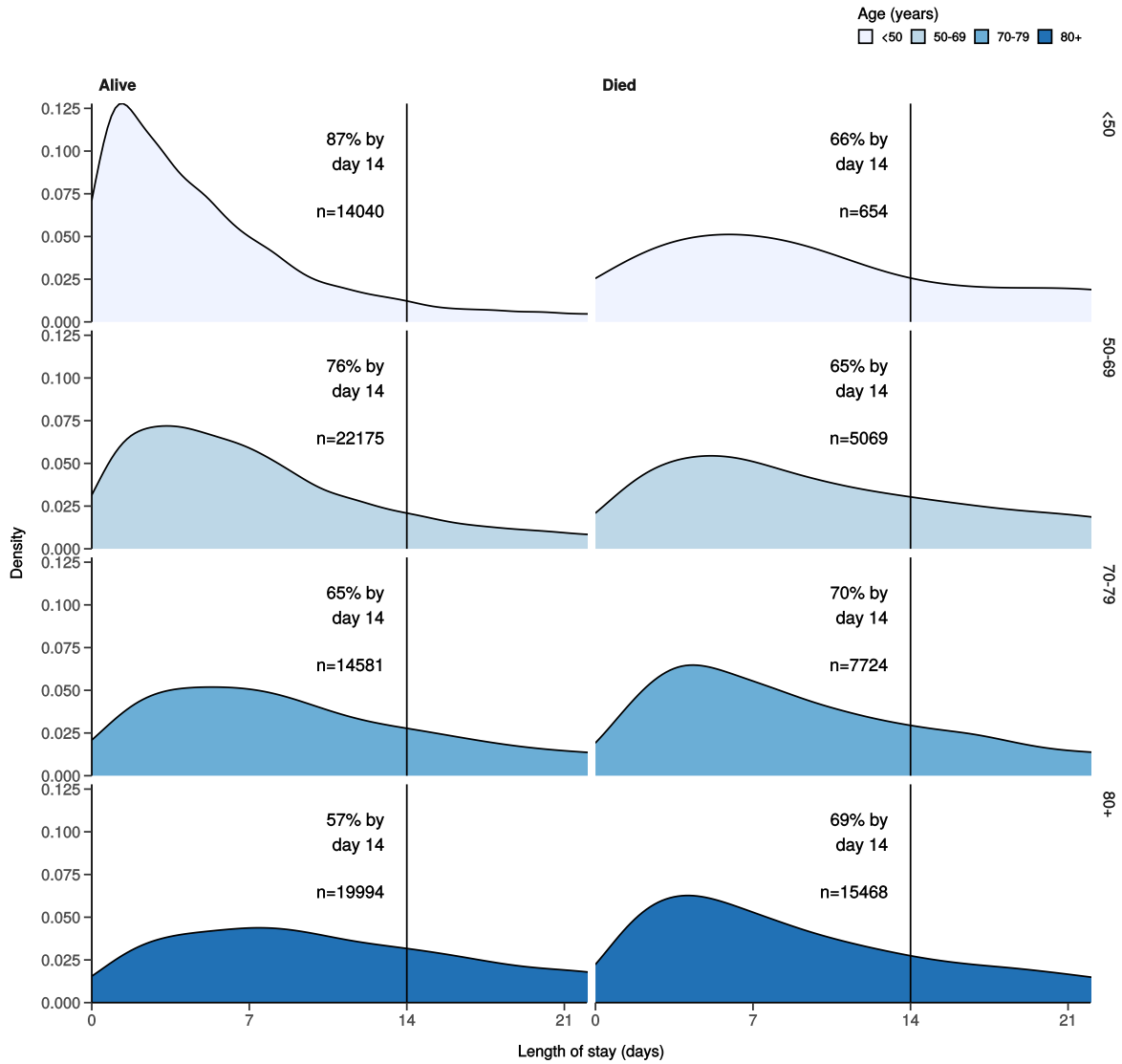
Predictors of death: logistic regression multivariable model

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	15877 (95.8)	701 (4.2)	•	•
	50-69	24300 (82.1)	5304 (17.9)	4.94 (4.56-5.37, p<0.001)	4.50 (4.11-4.93, p<0.001)
	70-79	16051 (66.6)	8054 (33.4)	11.36 (10.50-12.32, p<0.001)	9.23 (8.43-10.12, p<0.001)
	80+	21856 (57.5)	16166 (42.5)	16.75 (15.50-18.13, p<0.001)	13.40 (12.25-14.69, p<0.001)
Sex at Birth	Male	41778 (69.5)	18336 (30.5)	•	•
	Female	36352 (75.3)	11907 (24.7)	0.75 (0.73-0.77, p<0.001)	0.69 (0.66-0.71, p<0.001)
	Not specified	0 (NaN)	0 (NaN)	•	•

Dependent: death		No	Yes	OR (univariable)	OR (multivariable)
Chronic cardiac disease	NO	53375 (77.0)	15914 (23.0)	-	-
	YES	20229 (61.7)	12535 (38.3)	2.08 (2.02-2.14, p<0.001)	1.16 (1.12-1.20, p<0.001)
Chronic pulmonary disease (not asthma)	NO	62635 (74.4)	21577 (25.6)	-	-
	YES	10878 (61.8)	6716 (38.2)	1.79 (1.73-1.85, p<0.001)	1.31 (1.26-1.37, p<0.001)
Chronic neurological disorder	NO	64782 (73.3)	23630 (26.7)	-	-
	YES	8273 (65.2)	4409 (34.8)	1.46 (1.40-1.52, p<0.001)	1.13 (1.07-1.18, p<0.001)
Chronic hematologic disease	NO	69983 (72.6)	26374 (27.4)	-	-
	YES	2878 (64.9)	1556 (35.1)	1.43 (1.35-1.53, p<0.001)	1.07 (0.99-1.16, p=0.070)
Chronic kidney disease	NO	62976 (74.8)	21168 (25.2)	-	-
	YES	10341 (59.5)	7044 (40.5)	2.03 (1.96-2.10, p<0.001)	1.30 (1.25-1.36, p<0.001)
Dementia	NO	64376 (75.2)	21278 (24.8)	-	-
	YES	8702 (56.2)	6777 (43.8)	2.36 (2.27-2.44, p<0.001)	1.39 (1.33-1.45, p<0.001)
Obesity (as defined by clinical staff)	NO	57396 (72.2)	22130 (27.8)	-	-
	YES	8782 (76.6)	2676 (23.4)	0.79 (0.75-0.83, p<0.001)	1.17 (1.11-1.23, p<0.001)
Malignant neoplasm	NO	66846 (73.8)	23711 (26.2)	-	-
	YES	6067 (58.7)	4269 (41.3)	1.98 (1.90-2.07, p<0.001)	1.49 (1.42-1.57, p<0.001)

Number in dataframe = 116529, Number in model = 86667, Missing = 29862, AIC = 89503.5, C-statistic = 0.724, H&L = Chi-sq(8) 145.98 (p<0.001)

Figure 13 - Adjusted odds ratio plot

Death

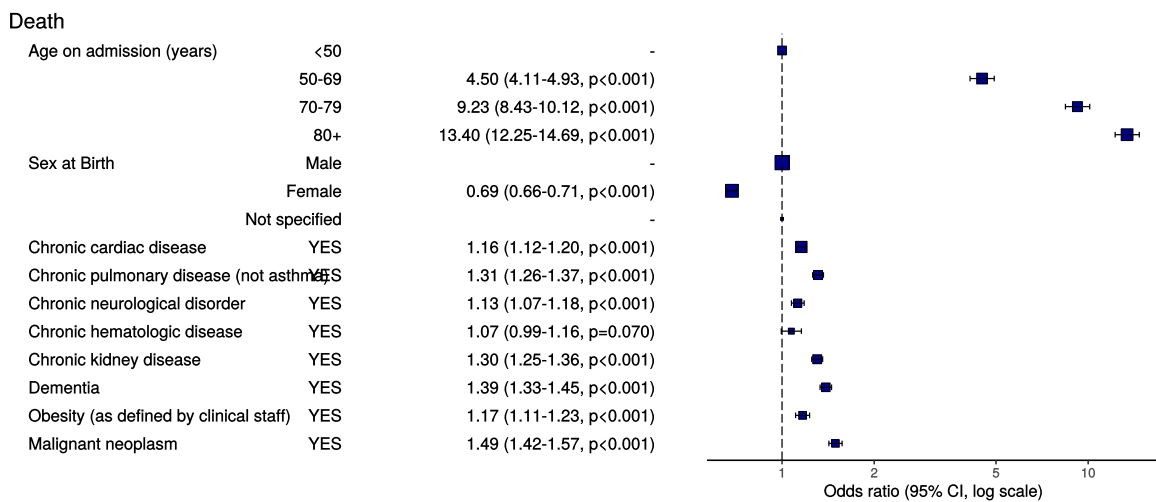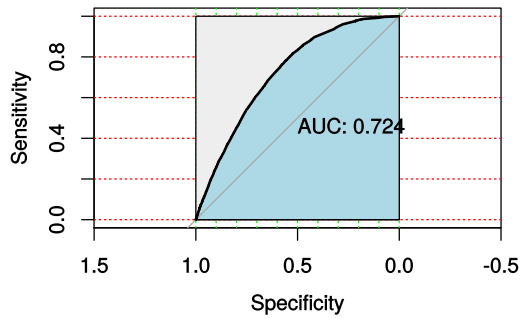|			
Age on admission (years)	<50	-	
	50-69	4.50 (4.11-4.93, p<0.001)	
	70-79	9.23 (8.43-10.12, p<0.001)	
	80+	13.40 (12.25-14.69, p<0.001)	
Sex at Birth	Male	-	
	Female	0.69 (0.66-0.71, p<0.001)	
	Not specified	-	
Chronic cardiac disease	YES	1.16 (1.12-1.20, p<0.001)	
Chronic pulmonary disease (not asthma)	YES	1.31 (1.26-1.37, p<0.001)	
Chronic neurological disorder	YES	1.13 (1.07-1.18, p<0.001)	
Chronic hematologic disease	YES	1.07 (0.99-1.16, p=0.070)	
Chronic kidney disease	YES	1.30 (1.25-1.36, p<0.001)	
Dementia	YES	1.39 (1.33-1.45, p<0.001)	
Obesity (as defined by clinical staff)	YES	1.17 (1.11-1.23, p<0.001)	
Malignant neoplasm	YES	1.49 (1.42-1.57, p<0.001)	

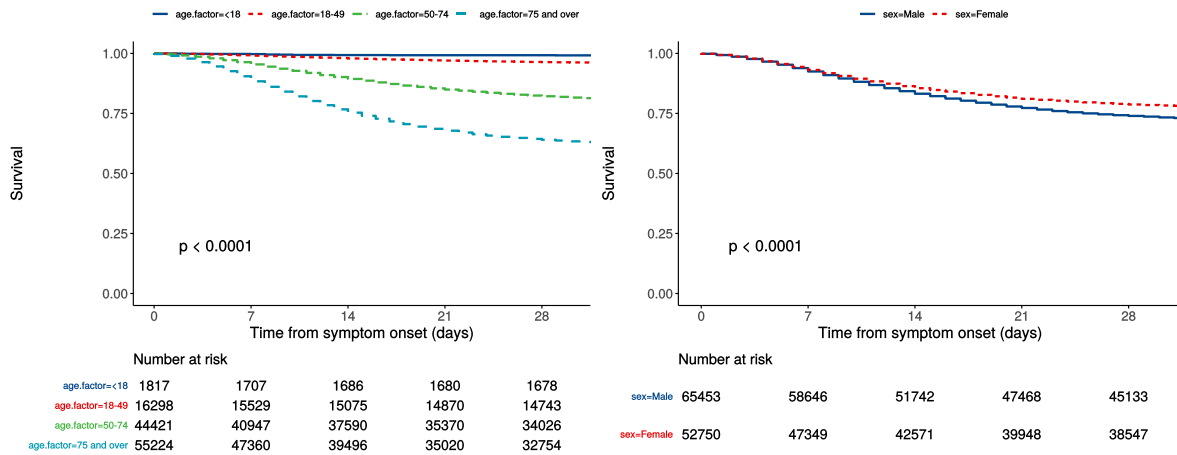Odds ratio (95% CI, log scale)

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	18127 (15.4)	•	•
	50-69	32209 (27.3)	4.57 (4.23-4.95, p<0.001)	4.24 (3.85-4.66, p<0.001)
	70-79	26272 (22.3)	9.55 (8.84-10.32, p<0.001)	8.56 (7.78-9.41, p<0.001)
	80+	41175 (35.0)	13.22 (12.25-14.26, p<0.001)	11.57 (10.53-12.71, p<0.001)
Sex at Birth	Male	65465 (55.4)	•	•
	Female	52750 (44.6)	0.79 (0.77-0.81, p<0.001)	0.77 (0.75-0.79, p<0.001)
qSOFA score on admission	0	45545 (45.7)	•	•
	1	43554 (43.7)	1.66 (1.62-1.71, p<0.001)	1.78 (1.73-1.84, p<0.001)
	2	9609 (9.6)	3.29 (3.18-3.41, p<0.001)	3.05 (2.93-3.18, p<0.001)
	3	977 (1.0)	5.58 (5.15-6.06, p<0.001)	4.99 (4.55-5.47, p<0.001)
Symptomatic at presentation	No symptoms	10684 (9.4)	•	•

Dependent: Surv(time, status)		all	HR (univariable)	HR (multivariable)
	Symptoms	103260 (90.6)	1.91 (1.82-2.01, p<0.001)	•
Chronic cardiac disease	NO	73975 (67.9)	•	•
	YES	34908 (32.1)	1.86 (1.82-1.91, p<0.001)	1.15 (1.11-1.18, p<0.001)
Chronic kidney disease	NO	89884 (83.0)	•	•
	YES	18454 (17.0)	1.82 (1.77-1.87, p<0.001)	1.24 (1.20-1.28, p<0.001)
Moderate or severe liver disease	NO	105255 (98.0)	•	•
	YES	2104 (2.0)	1.32 (1.22-1.42, p<0.001)	1.43 (1.30-1.57, p<0.001)
Chronic neurological disorder	NO	94316 (87.4)	•	•
	YES	13540 (12.6)	1.38 (1.34-1.43, p<0.001)	•
Malignant neoplasm	NO	96698 (89.8)	•	•
	YES	10952 (10.2)	1.74 (1.69-1.80, p<0.001)	1.38 (1.32-1.43, p<0.001)
Chronic hematologic disease	NO	102806 (95.6)	•	•
	YES	4711 (4.4)	1.34 (1.27-1.41, p<0.001)	•
Obesity (as defined by clinical staff)	NO	84860 (87.4)	•	•
	YES	12210 (12.6)	0.81 (0.78-0.84, p<0.001)	1.10 (1.05-1.15, p<0.001)
Diabetes without complications	NO	87862 (84.9)	•	•
	YES	15632 (15.1)	1.27 (1.24-1.32, p<0.001)	•
Rheumatologic disorder	NO	94197 (87.7)	•	•
	YES	13153 (12.3)	1.15 (1.11-1.19, p<0.001)	•
Dementia	NO	91590 (84.9)	•	•
	YES	16324 (15.1)	2.09 (2.04-2.15, p<0.001)	1.18 (1.14-1.22, p<0.001)
Malnutrition	NO	98101 (97.4)	•	•
	YES	2664 (2.6)	1.53 (1.44-1.64, p<0.001)	•
smoking_mhyn_2levels	NO	60033 (54.0)	•	•
	YES	6142 (5.5)	0.86 (0.81-0.91, p<0.001)	•
	N/K	45060 (40.5)	1.15 (1.12-1.18, p<0.001)	•

Number in dataframe = 118728, Number in model = 81676, Missing = 37052, Number of events = 20856, Concordance = 0.729 (SE = 0.002), R-squared = 0.156(Max possible = 0.997), Likelihood ratio test = 13881.281 (df = 13, p = 0.000)

Figure 16a - Multivariable Cox proportional hazards model

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

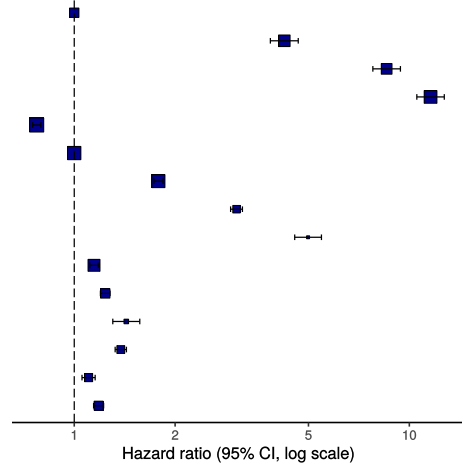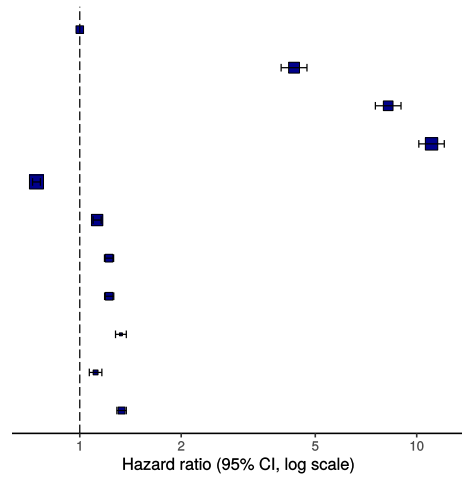|		HR (95% CI, p-value)
Age on admission (years)	<50	-
	50-69	4.24 (3.85-4.66, p<0.001)
	70-79	8.56 (7.78-9.41, p<0.001)
	80+	11.57 (10.53-12.71, p<0.001)
Sex at Birth	Female	0.77 (0.75-0.79, p<0.001)
qSOFA score on admission	0	-
	1	1.78 (1.73-1.84, p<0.001)
	2	3.05 (2.93-3.18, p<0.001)
	3	4.99 (4.55-5.47, p<0.001)
Chronic cardiac disease	YES	1.15 (1.11-1.18, p<0.001)
Chronic kidney disease	YES	1.24 (1.20-1.28, p<0.001)
Moderate or severe liver disease	YES	1.43 (1.30-1.57, p<0.001)
Malignant neoplasm	YES	1.38 (1.32-1.43, p<0.001)
Obesity (as defined by clinical staff)	YES	1.10 (1.05-1.15, p<0.001)
Dementia	YES	1.18 (1.14-1.22, 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)

		HR (95% CI, p-value)
Age on admission (years)	<50	-
	50-69	4.32 (3.96-4.72, p<0.001)
	70-79	8.23 (7.54-8.98, p<0.001)
	80+	11.07 (10.14-12.07, p<0.001)
Sex at Birth	Female	0.74 (0.72-0.76, p<0.001)
Chronic cardiac disease	YES	1.13 (1.10-1.16, p<0.001)
Chronic pulmonary disease (not asthma)	YES	1.22 (1.18-1.26, p<0.001)
Chronic kidney disease	YES	1.22 (1.18-1.26, 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	1.33 (1.29-1.37, p<0.001)

Hazard ratio (95% CI, log scale)

ROC = 0.72955

Figure 17 - Predictions calibration plot

Black: observed Gray: ideal
Blue : optimism corrected

Predicted 7 Day Survival B=40 based on observed-predicted
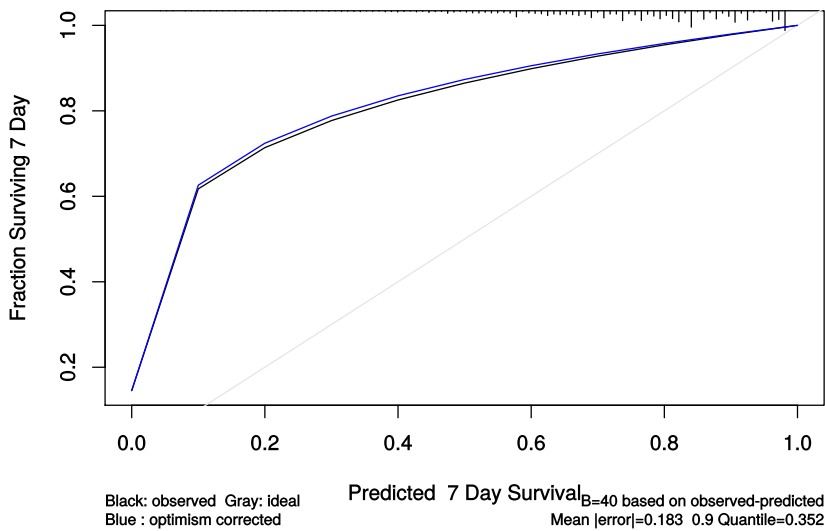Mean |error|=0.183 0.9 Quantile=0.352

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
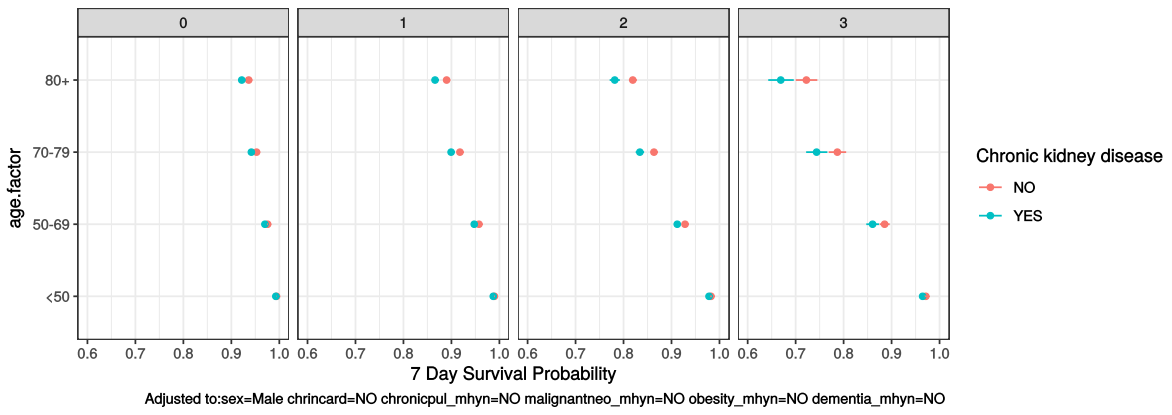
Figure 19 - Death by severity (NEWS) on admission

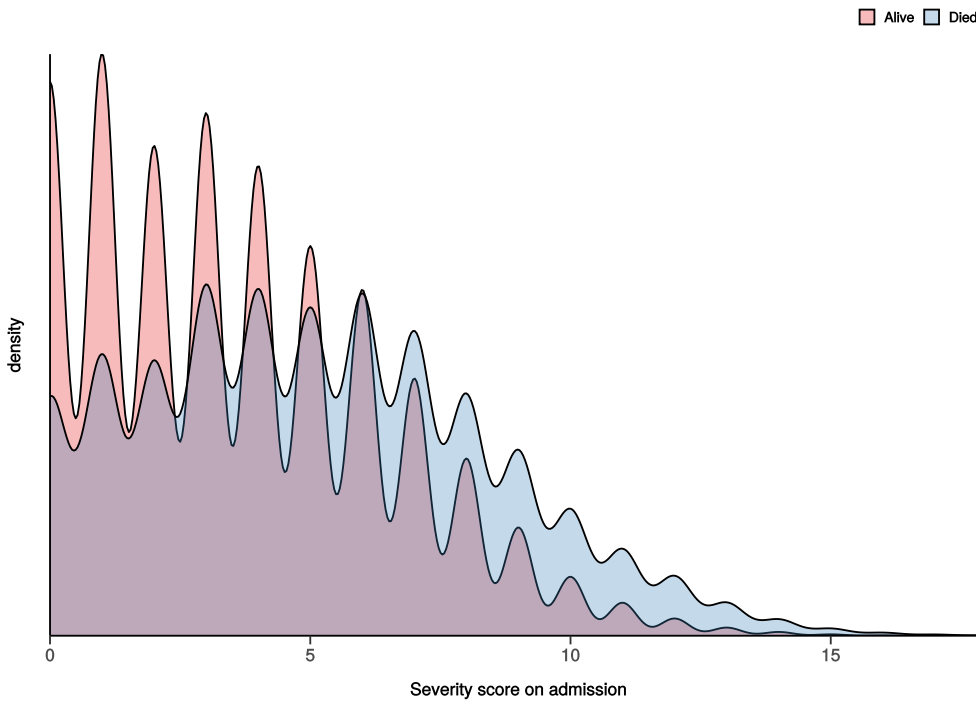Number of deaths by NEWS score at admission

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

Number of deaths by NEWS score at admission
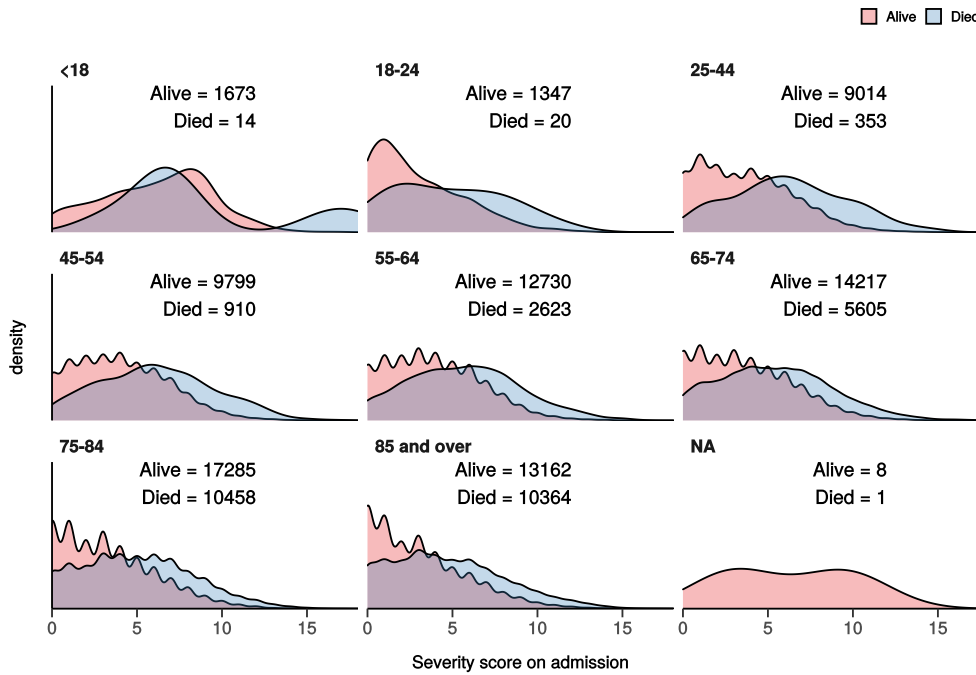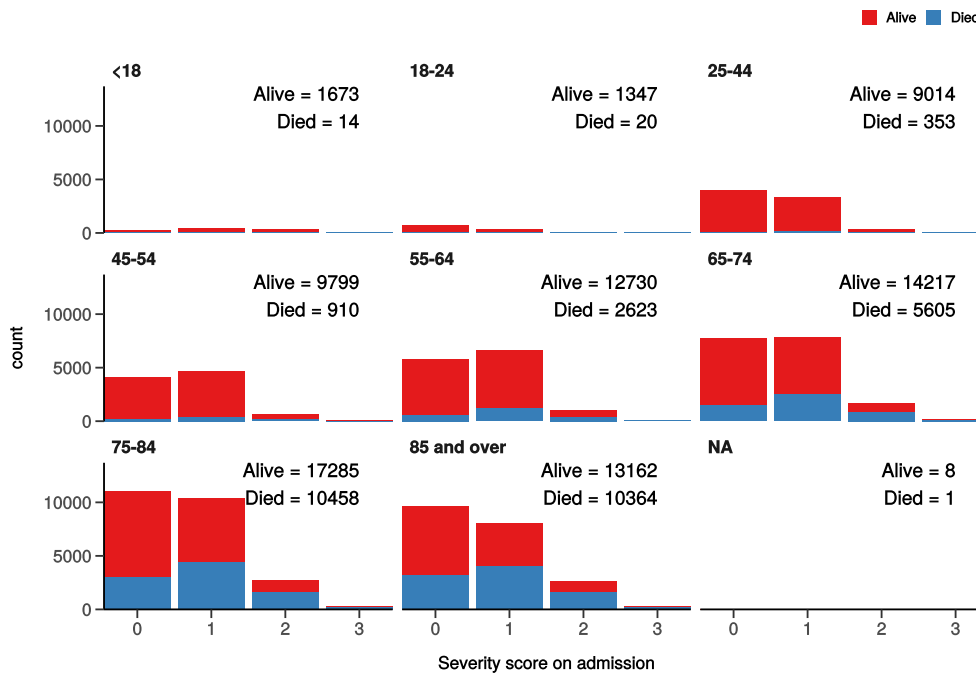Stratified by age

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

Number of deaths by qSOFA score at admission
Stratified by age

Healthcare workers

Employed as a healthcare worker?		NO	YES	p
Total N (%)		101124 (96.0)	4252 (4.0)	
NEWS score on admission	Median (IQR)	4.0 (5.0)	4.0 (4.0)	<0.001
Death	No	64148 (69.9)	3763 (93.0)	<0.001
	Yes	27651 (30.1)	284 (7.0)	