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

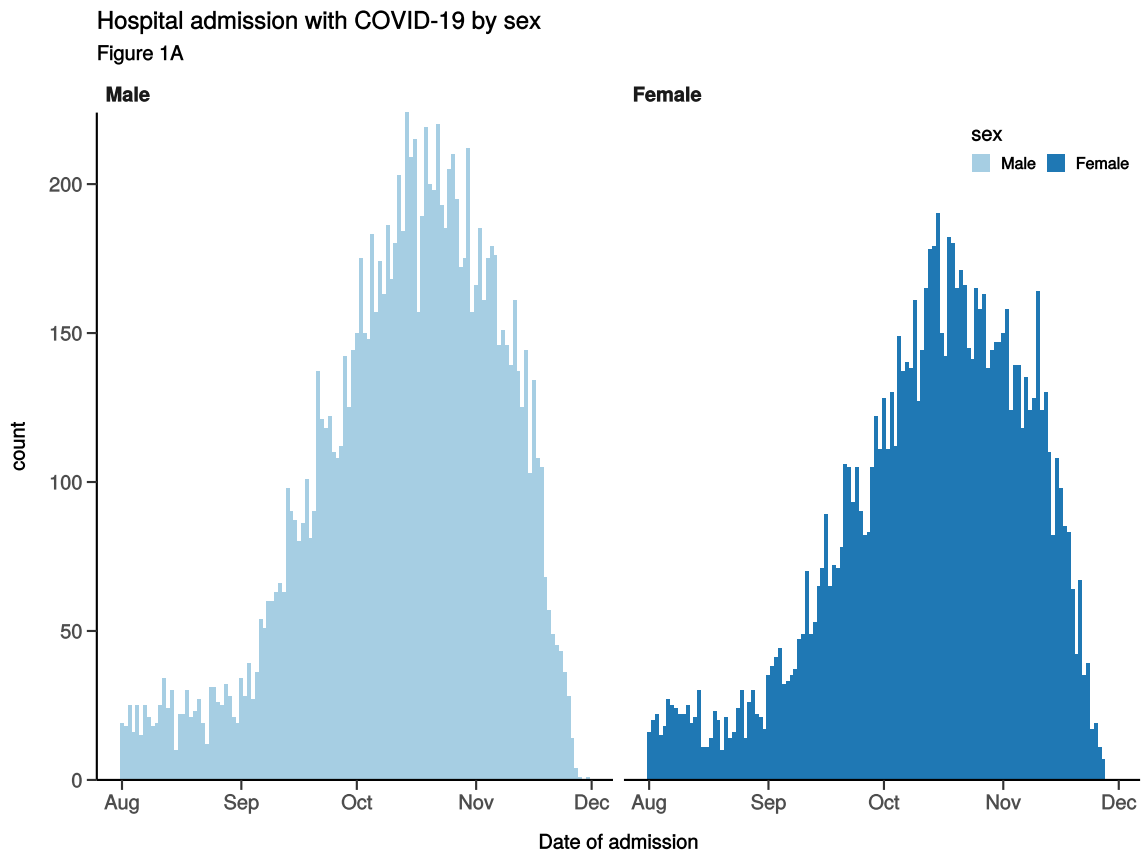Dynamic content updated: 2020-11-30 03:37:21.

Executive summary

Includes patients admitted after 01 August 2020

There are 22028 patients included in CO-CIN. Of these, 3081 patient(s) have died and 2815 required ICU. 11575 have been discharged home.
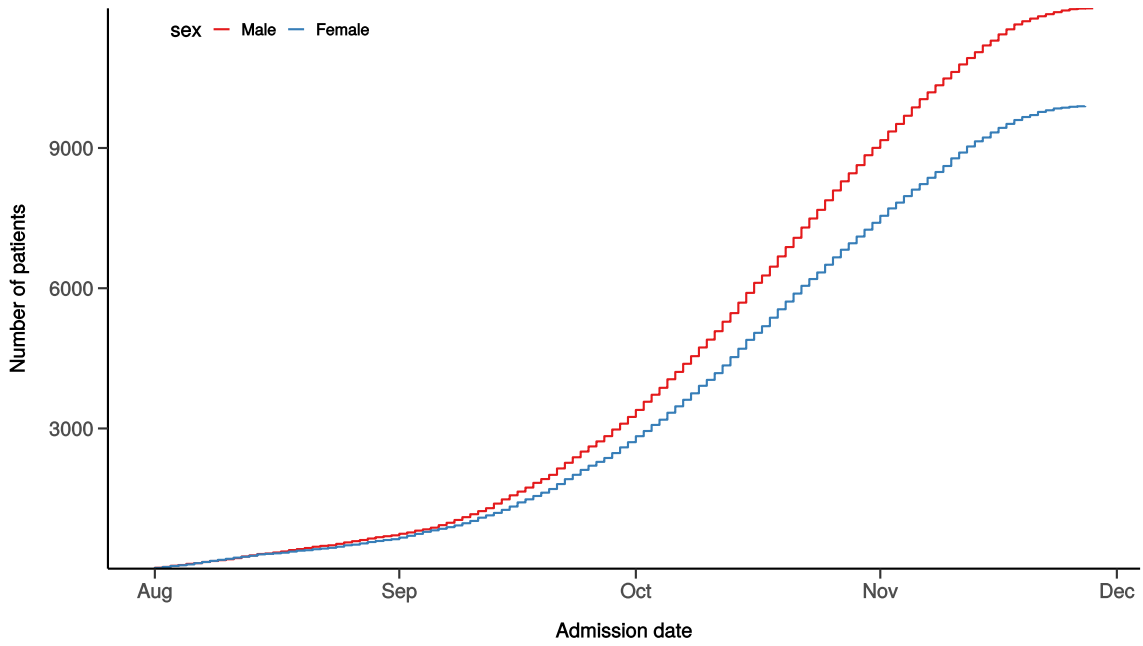
Admission

Figure 1

Hospital admission with COVID-19 by sex
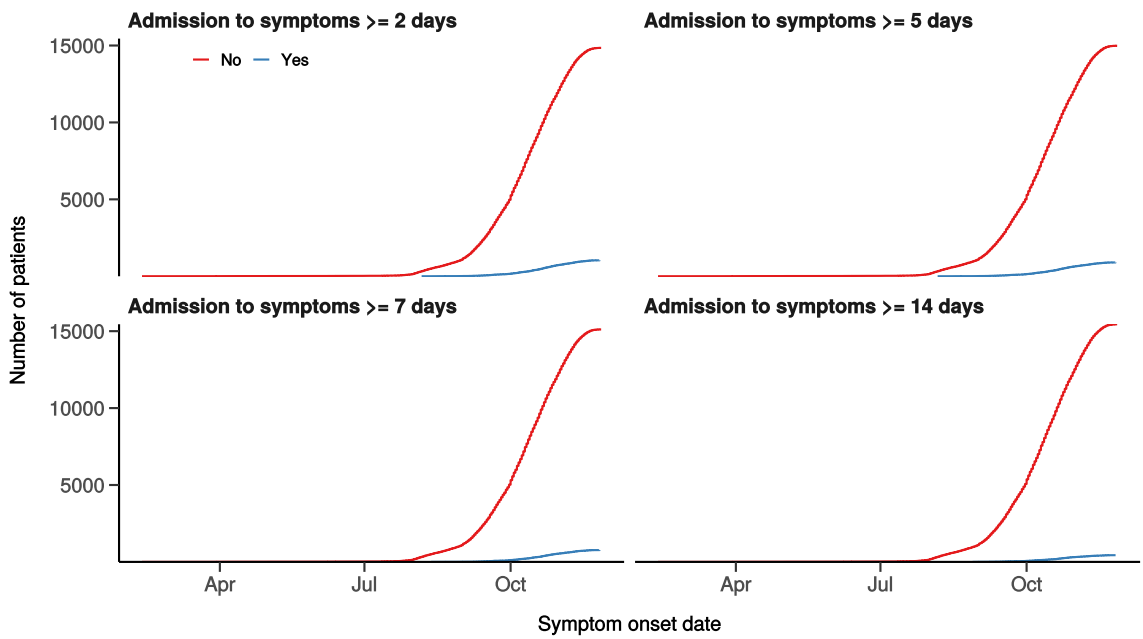Figure 1A

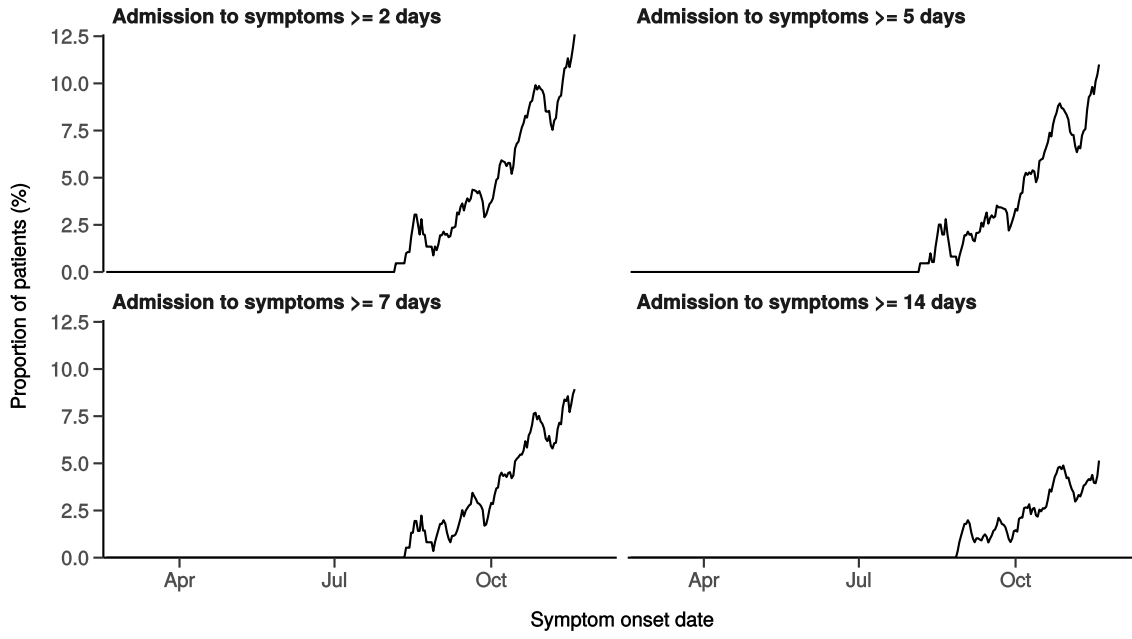## Hospital admission with COVID-19 by sex
Figure 1B

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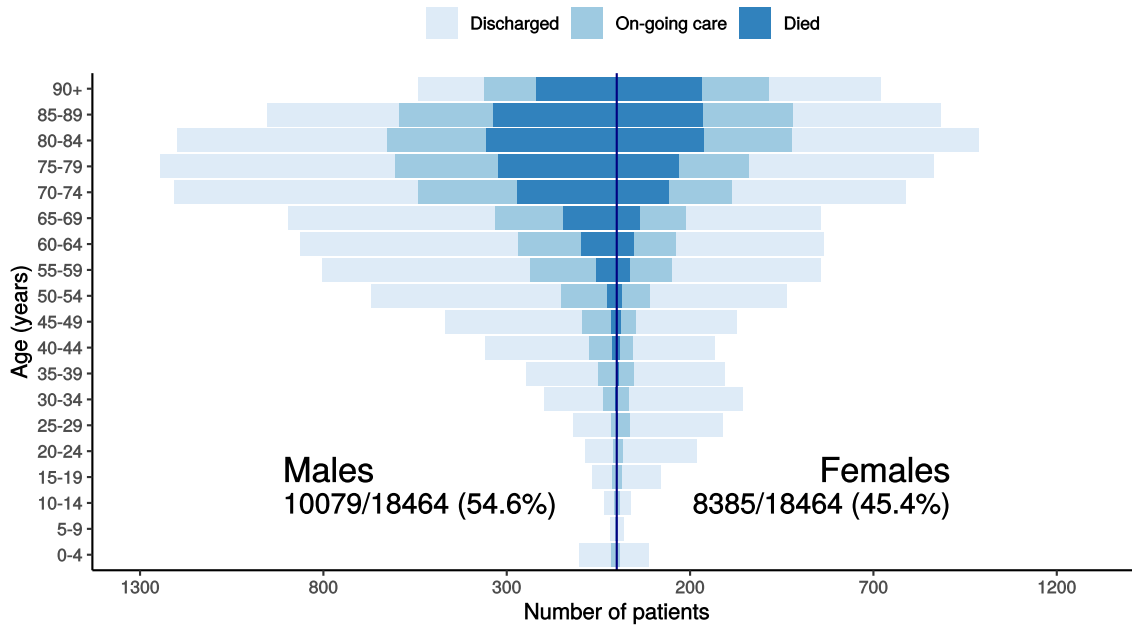Figure 1C

Proportion with symptom onset occuring after hospital admission
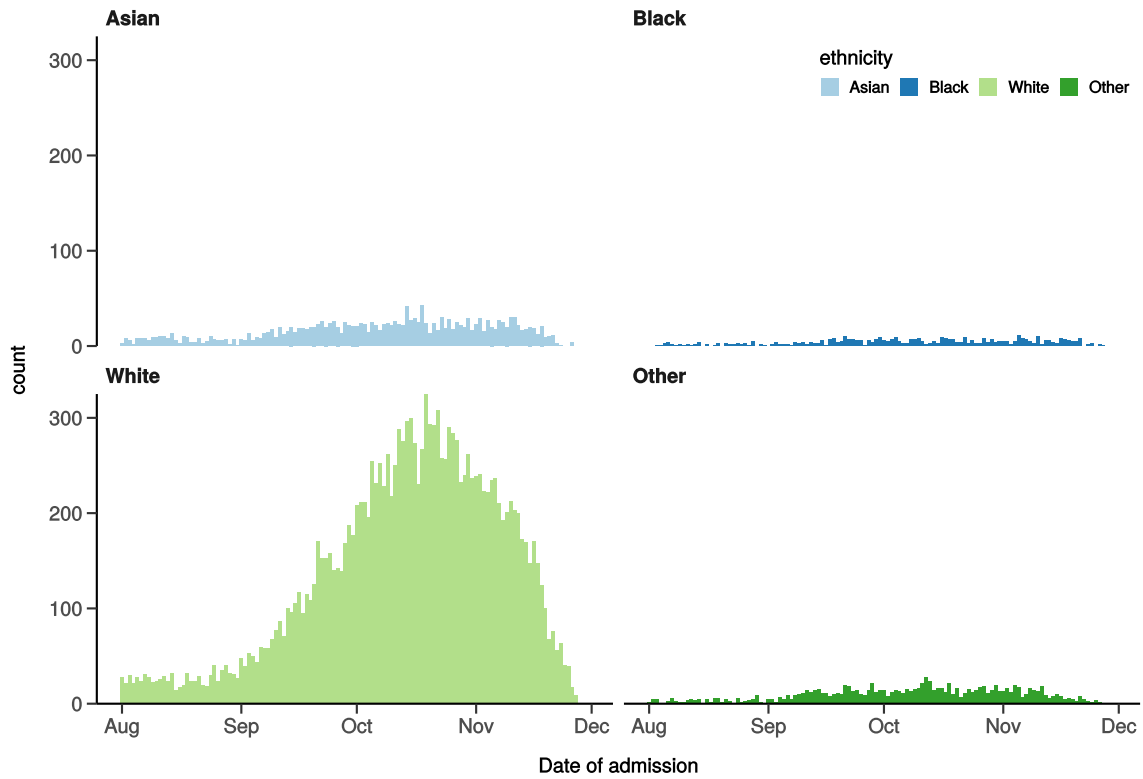Figure 1D - 7-day rolling percentage. n = 15886

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

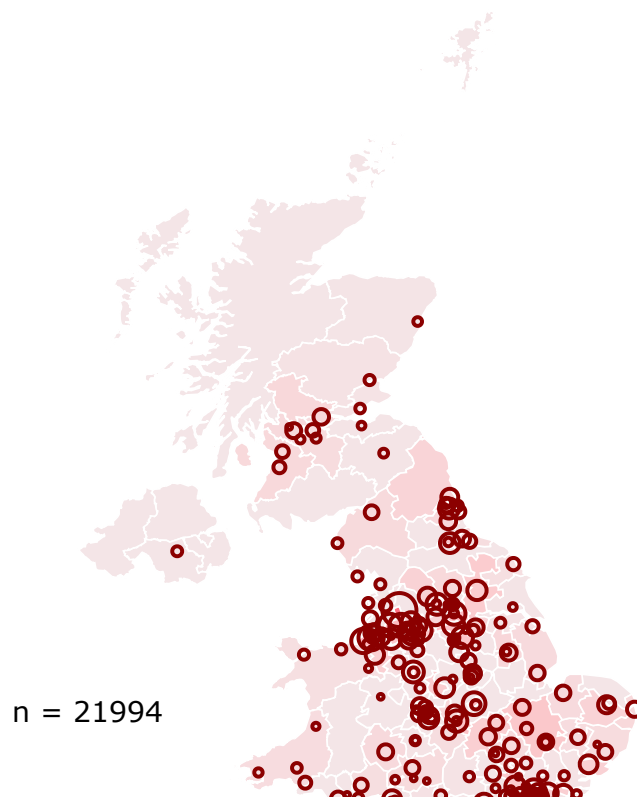## Hospital admission with COVID-19 by ethnicity
Figure 1F

Location by CCG / Healthboard

Figure 2

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

n = 21994

Symptoms and comorbidity

Figure 3A

Symptoms on presentation to hospital
% patients, n = 19487

YES **NO** **Unknown**

Shortness of breath (Dyspnea)
Cough
History of fever
Fatigue / Malaise
Asymptomatic
Vomiting / Nausea
Altered consciousness / confusion
Diarrhoea
Chest pain
Muscle aches (Myalgia)
Abdominal pain
Headache
Wheezing
Joint pain (Arthralgia)
Sore throat
Bleeding (Haemorrhage)
Runny nose (Rhinorrhoea)
Skin rash
Skin ulcers
Lower chest wall indrawing
Lymphadenopathy
Ear pain
Conjunctivitis

0% 25% 50% 75% 100%

Proportion of patients with symptom (%)

Comorbidity
% patients, n = 22028

YES **NO** **Unknown**

Hypertension
No comorbidity
Chronic cardiac disease
Chronic pulmonary disease (not asthma)
Chronic kidney disease
Asthma (physician diagnosed)
Rheumatologic disorder
Obesity (as defined by clinical staff)
Diabetes without complications
Dementia
Chronic neurological disorder
Malignant neoplasm
Smoking
Diabetes with complications
Chronic hematologic disease
Malnutrition
Mild Liver disease
Moderate or severe liver disease
AIDS/HIV

0% 25% 50% 75% 100%

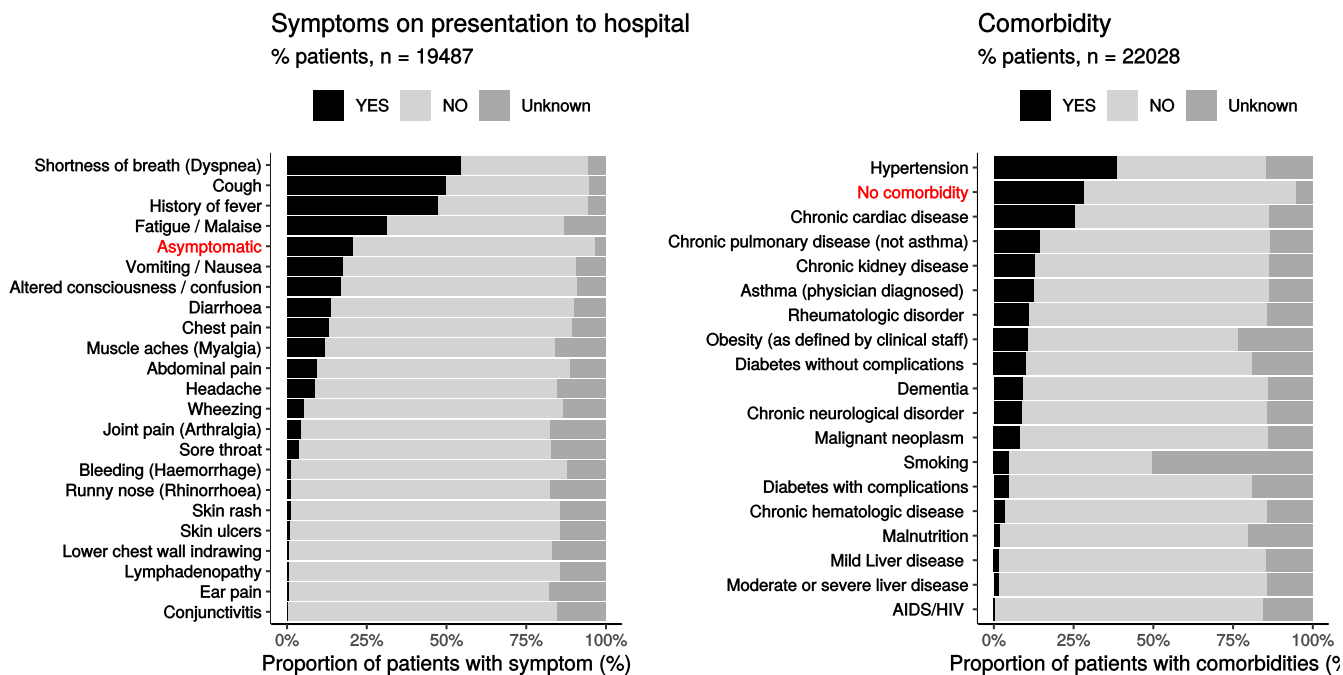Proportion of patients with comorbidities (%

Figure 3B - Symptoms by Age

Symptoms on presentation to hospital
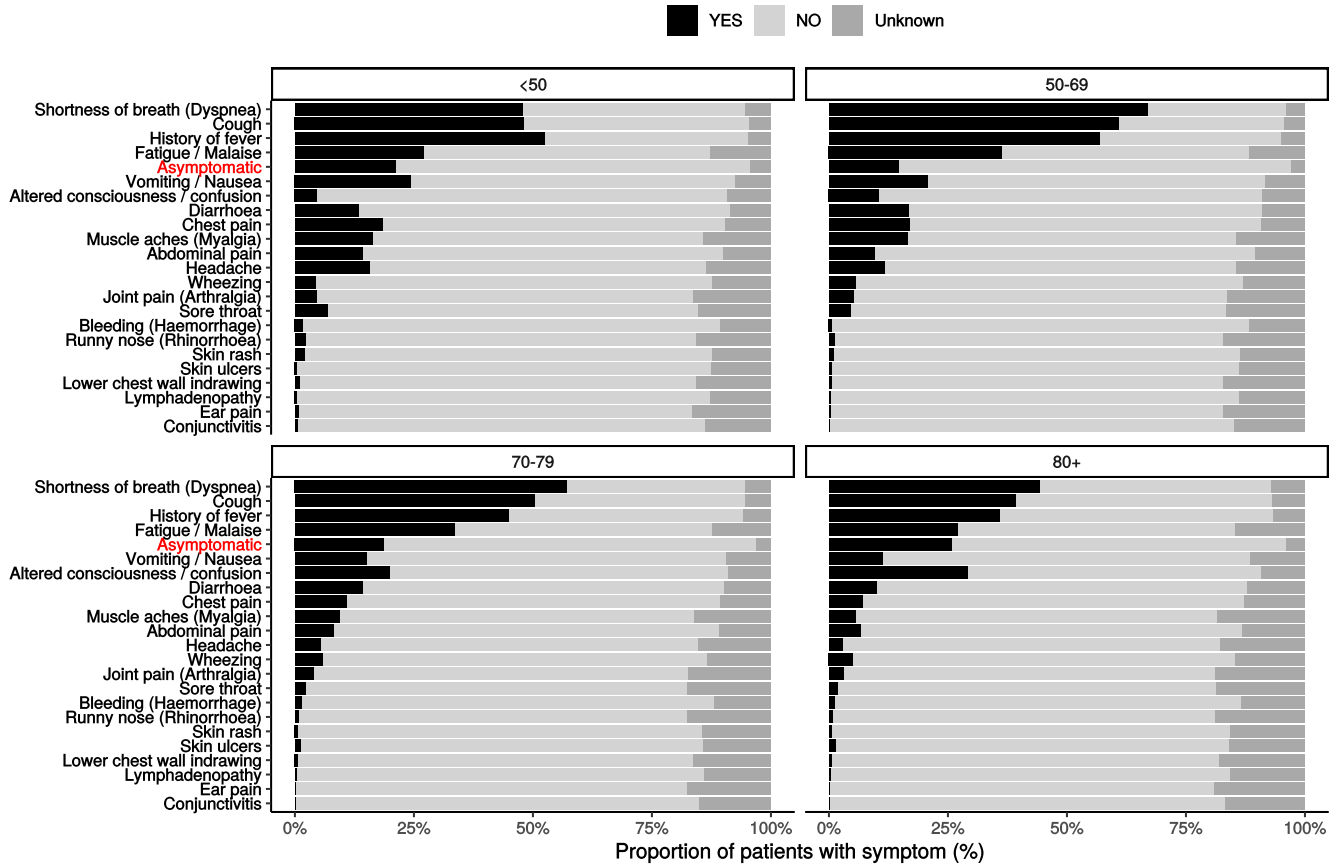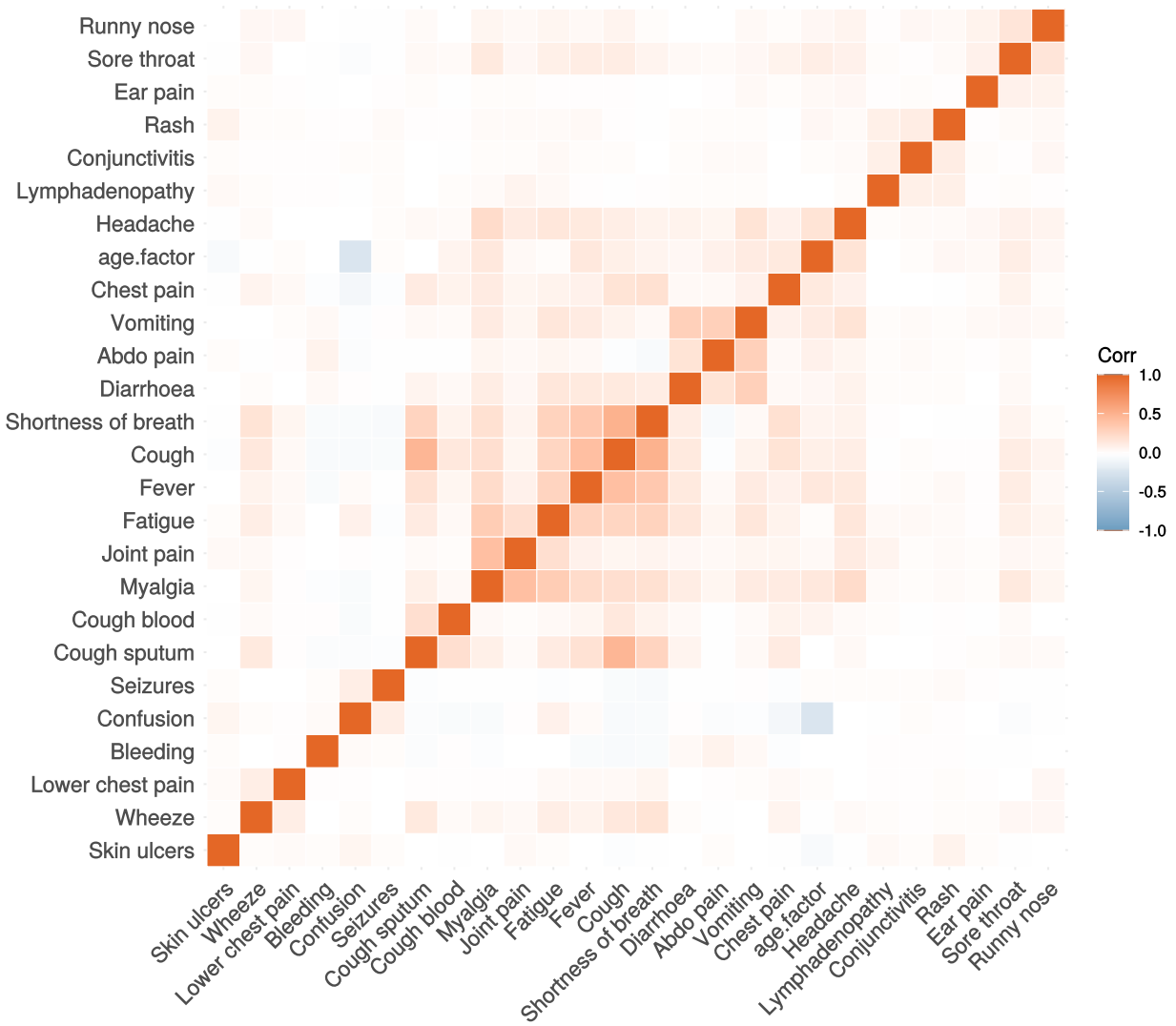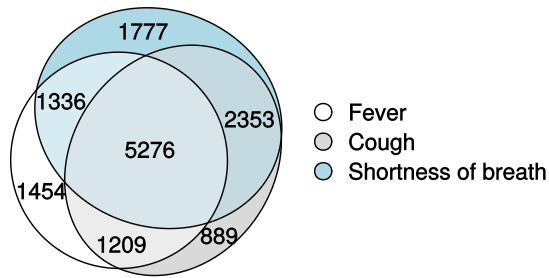Stratifed by age

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 = 19487

Fever
Cough
Shortness of breath

1777
1336
2353
5276
1454
1209
889
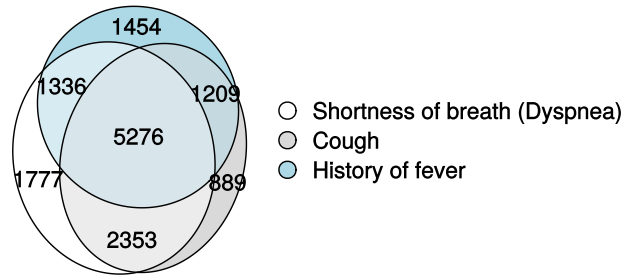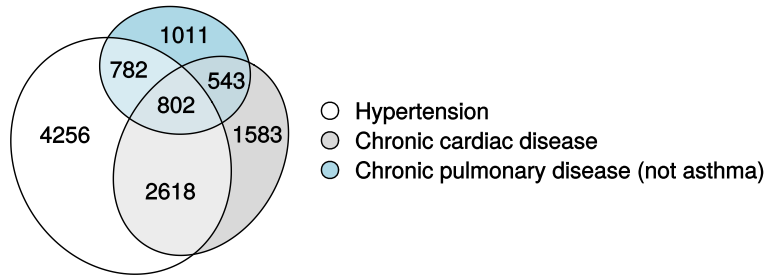
Symptoms (most common)

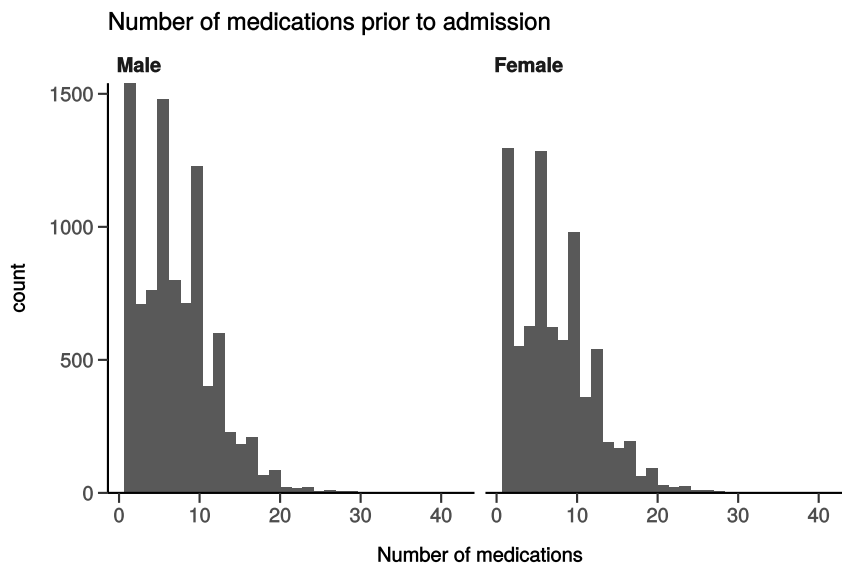**Figure 4B**

n = 19487

Comorbidity (most common)

Figure 4C

n = 22028

Medication prior to illness

Figure 5

Preadmission treatment

Figure 6

Pre-admission treatment

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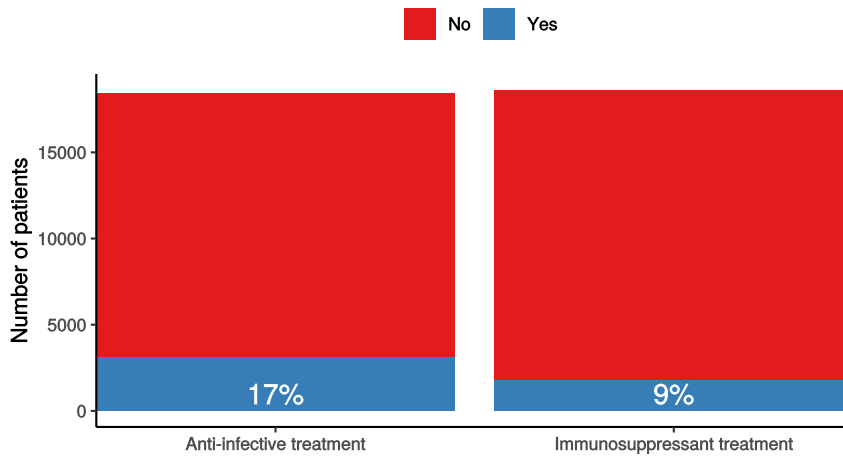
Patient flow

Figure 7A - All patients

N = 20015
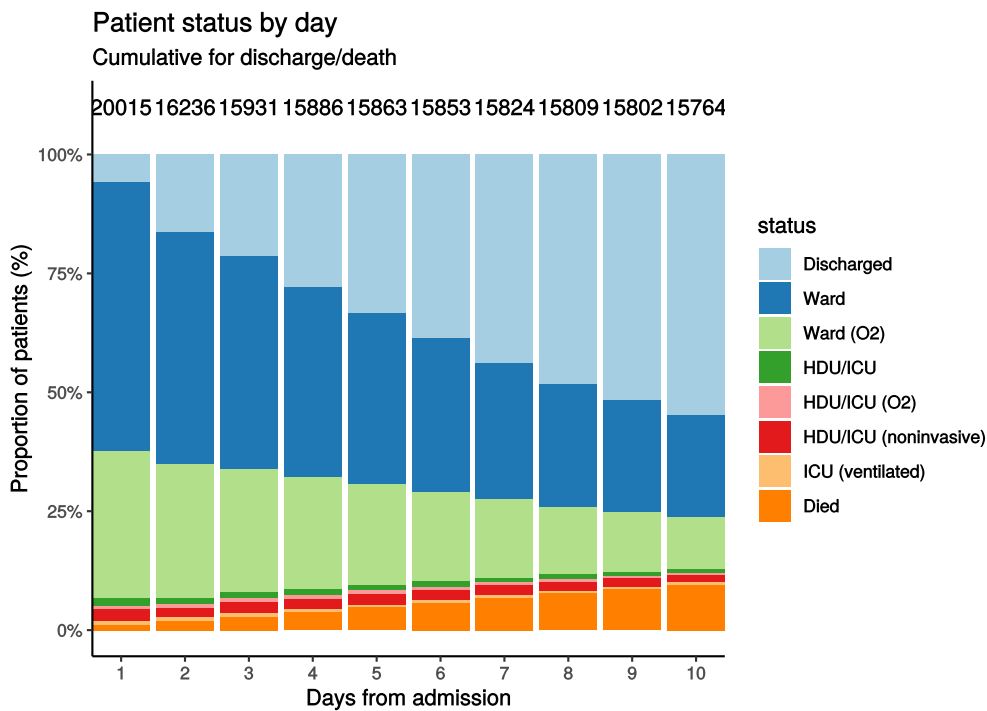
Figure 7B - Patients admitted >=14 days and <=28 days ago

N = 3590

Patient status by day
Cumulative for discharge/death

3590 2446 2342 2334 2328 2325 2319 2317 2314 2305
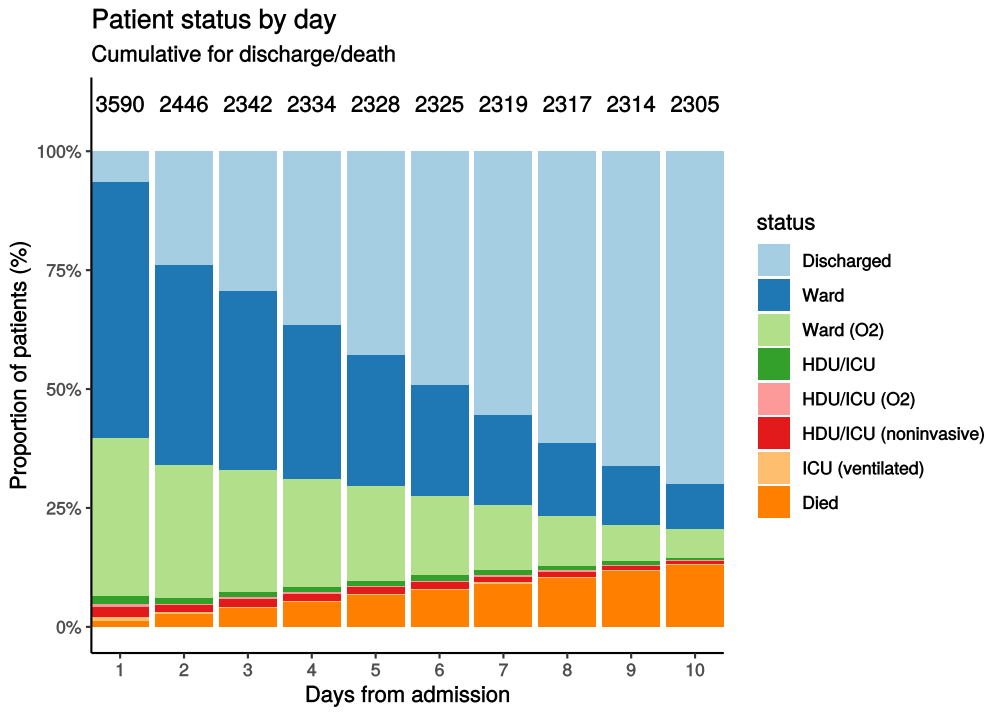
Oxygen requirement

Figure 8A - All patients

N = 19013
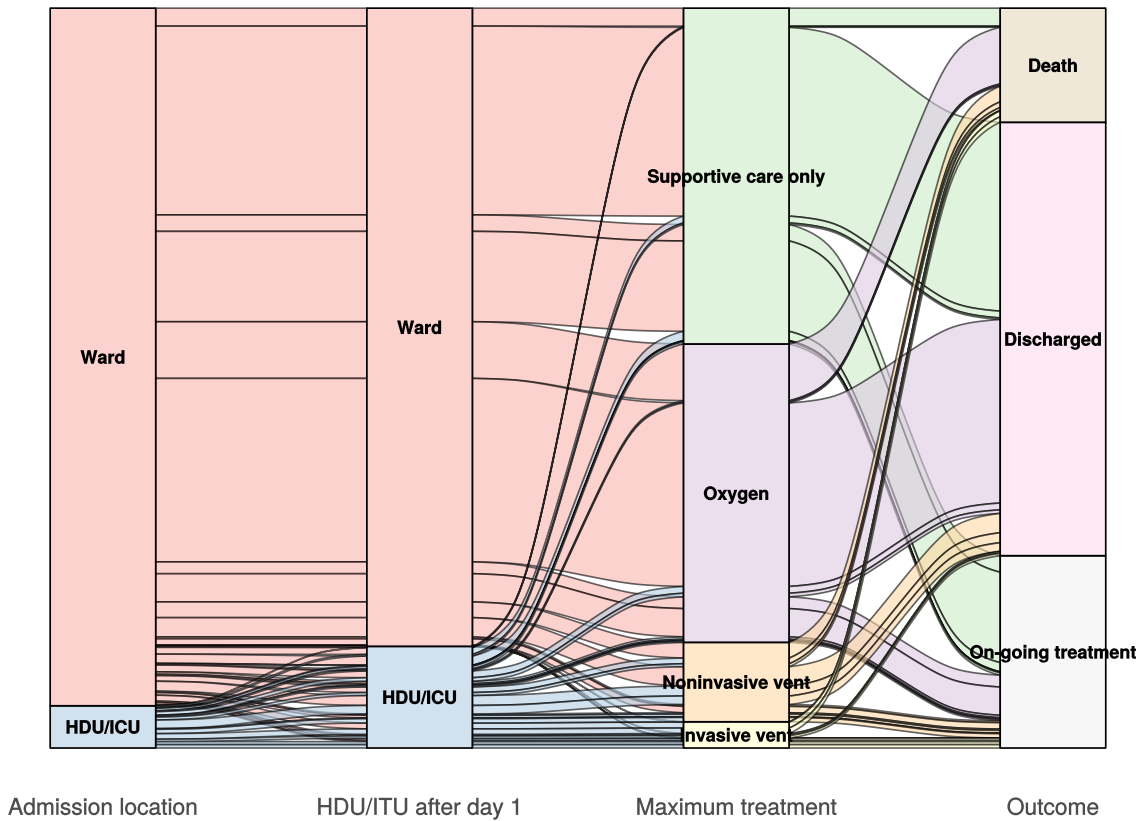
Figure 8B - Patients admitted >=14 days and <=28 days ago

N = 3376

In-hospital medical treatment

Figure 9

In-hospital treatment

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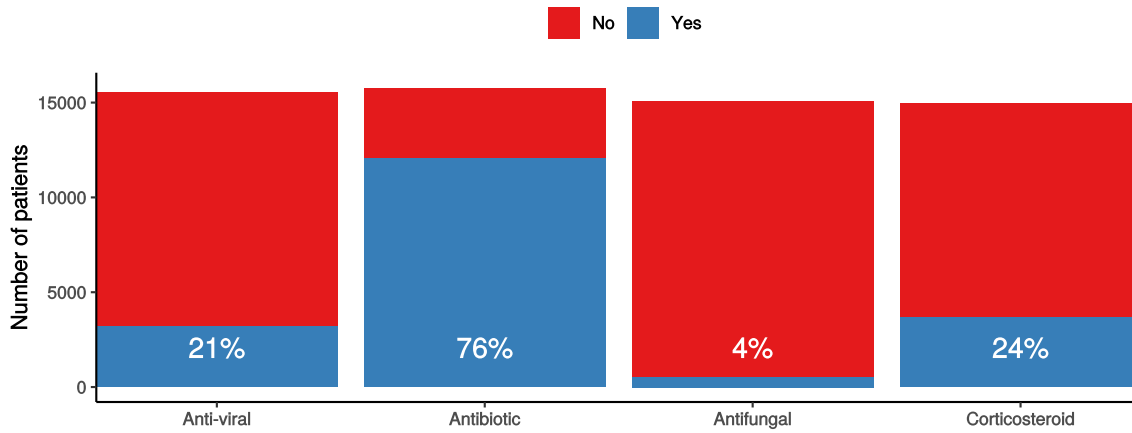
Treatment

Figure 10

ICU/HDU admission
Figure 10A

2815/19648
14%
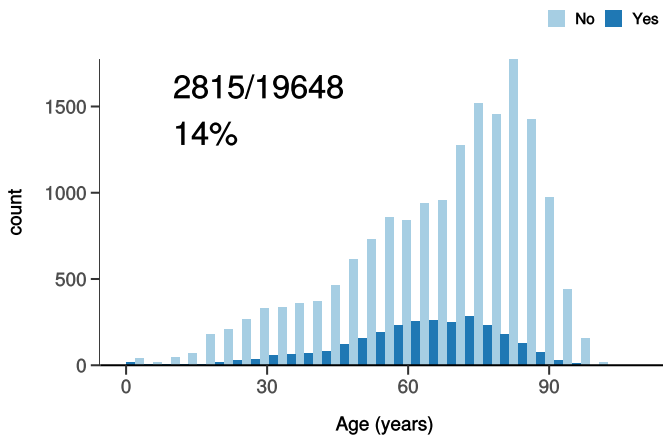
High flow oxygen
Figure 10B

11837/19165
62%
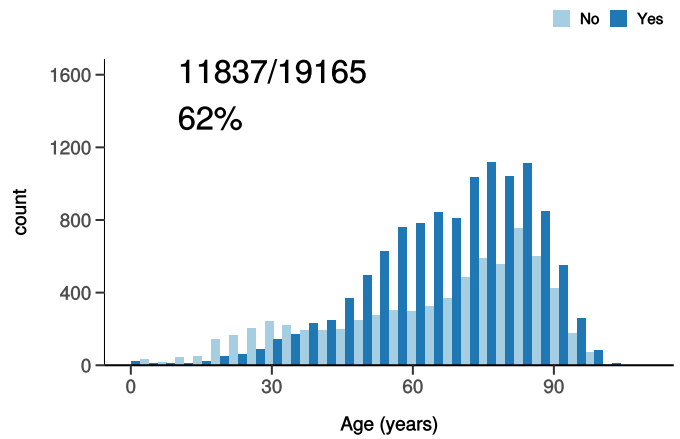
Noninvasive ventilation
Figure 10C

2589/19052
14%
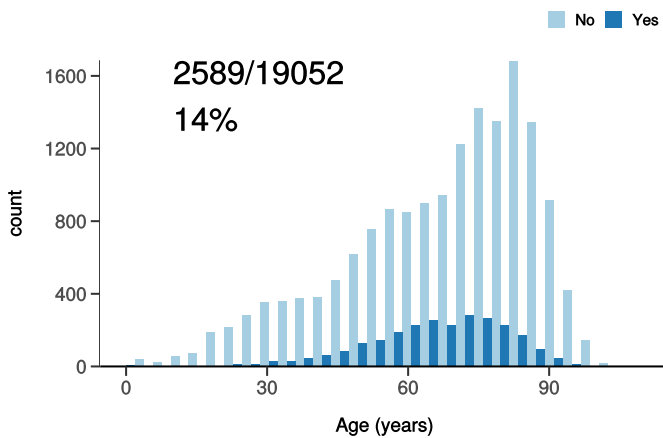
Invasive ventilation
Figure 10D

708/19069
4%
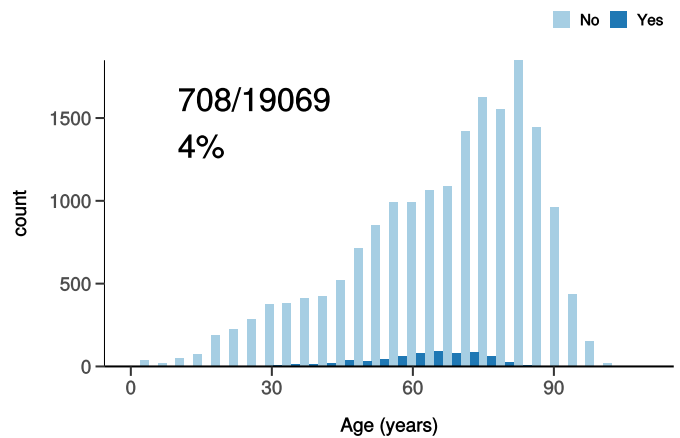
Status in patients admitted >=14 days from today

Figure 11

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

Died 3052/17905 17%

On-going care 3495/17905 20%

Discharged alive 11332/17905 63%
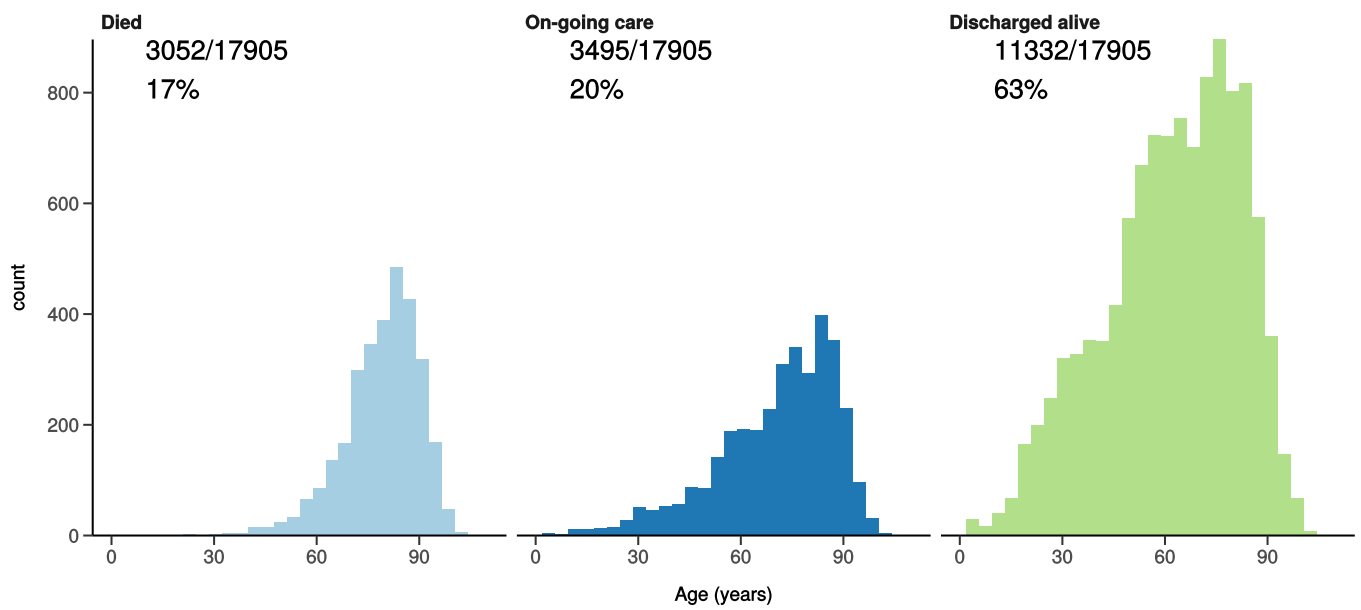
ICU/HDU admissions: status in patients admitted >=14 days ago
Figure 11B

Died 617/2491 25%

On-going care 799/2491 32%

Discharged alive 1073/2491 43%
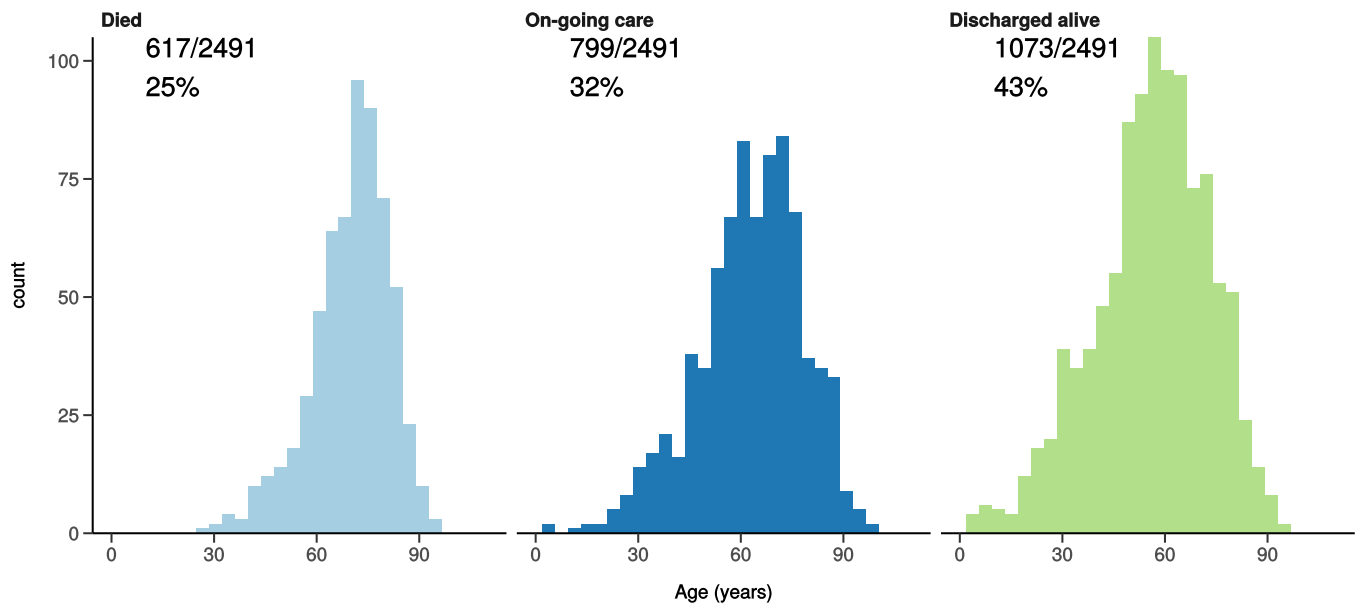
Invasive ventilation: status in patients admitted >=14 days ago
Figure 11c

Died 304/660 46%

On-going care 238/660 36%

Discharged alive 117/660 18%
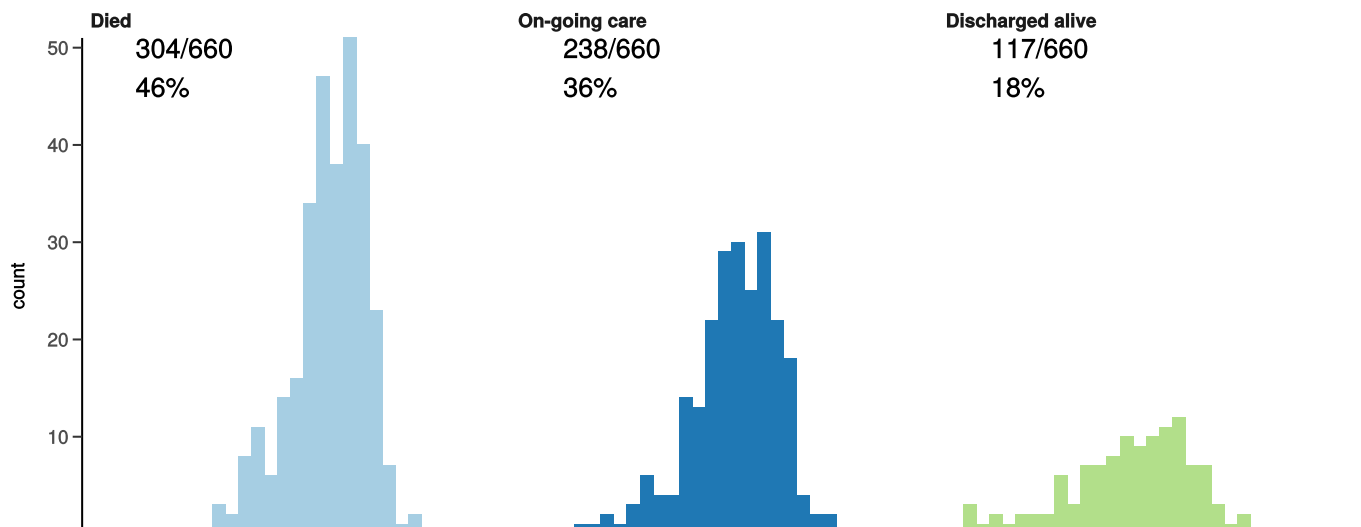
Length of stay stratified by age

Figure 12

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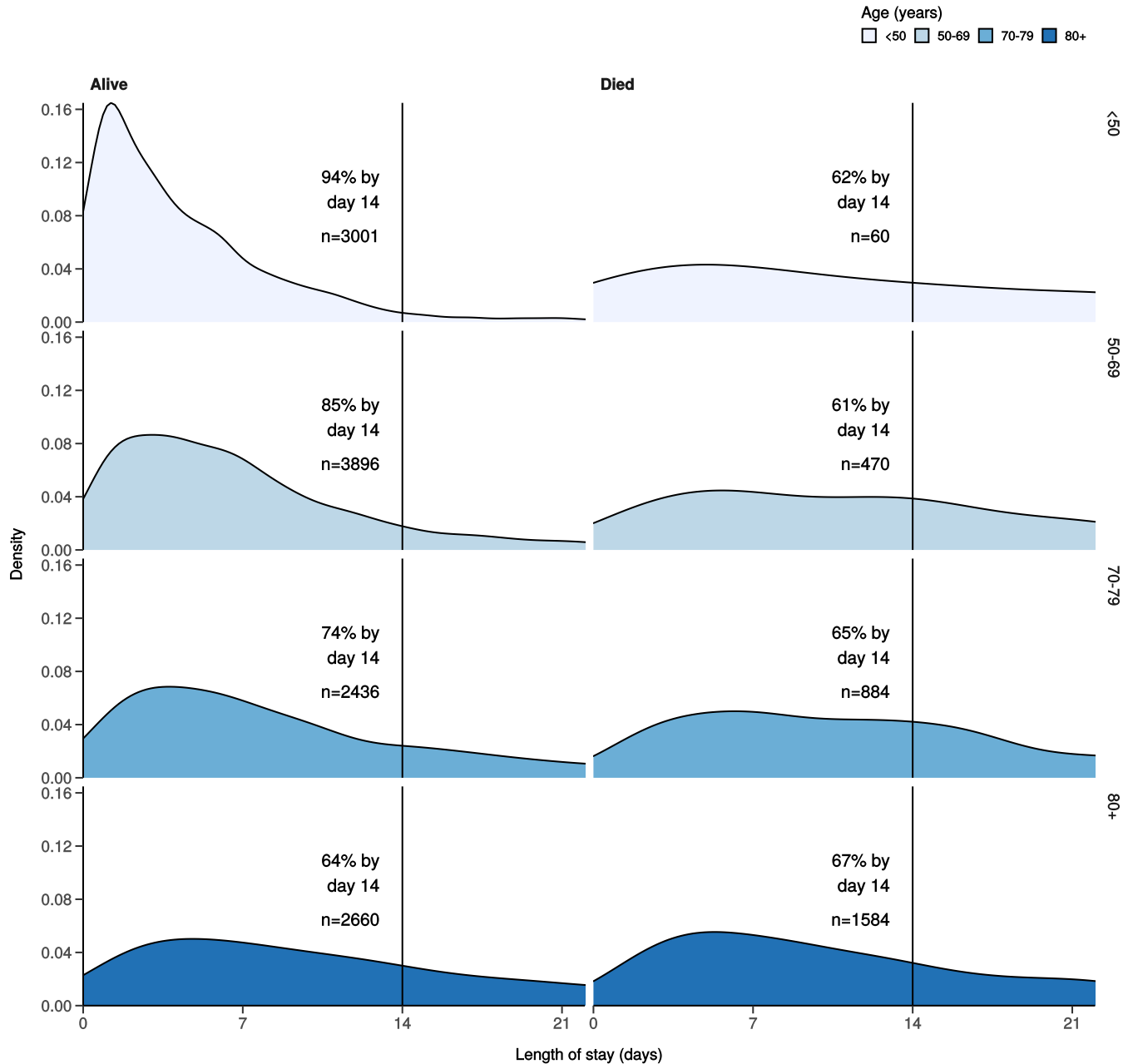
Predictors of death: logistic regression multivariable model

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	3208 (98.0)	65 (2.0)	•	•
	50-69	4051 (89.4)	481 (10.6)	5.86 (4.54-7.69, p<0.001)	4.95 (3.72-6.73, p<0.001)

Dependent: death		No	Yes	OR (univariable)	OR (multivariable)
	70-79	2555 (74.0)	897 (26.0)	17.33 (13.51-22.61, p<0.001)	12.61 (9.49-17.10, p<0.001)
	80+	2797 (63.6)	1600 (36.4)	28.23 (22.11-36.71, p<0.001)	20.08 (15.13-27.21, p<0.001)
Sex at Birth	Male	6652 (78.2)	1849 (21.8)	•	•
	Female	5963 (83.3)	1194 (16.7)	0.72 (0.66-0.78, p<0.001)	0.67 (0.60-0.74, p<0.001)
	Not specified	0 (NaN)	0 (NaN)	•	•
Chronic cardiac disease	NO	9007 (85.7)	1504 (14.3)	•	•
	YES	2905 (68.4)	1344 (31.6)	2.77 (2.55-3.02, p<0.001)	1.29 (1.16-1.43, p<0.001)
Chronic pulmonary disease (not asthma)	NO	10300 (83.2)	2080 (16.8)	•	•
	YES	1613 (67.7)	770 (32.3)	2.36 (2.14-2.61, p<0.001)	1.56 (1.39-1.75, p<0.001)
Chronic neurological disorder	NO	10804 (81.7)	2423 (18.3)	•	•
	YES	1058 (72.9)	394 (27.1)	1.66 (1.47-1.88, p<0.001)	1.13 (0.97-1.31, p=0.120)
Chronic hematologic disease	NO	11430 (81.2)	2641 (18.8)	•	•
	YES	430 (71.1)	175 (28.9)	1.76 (1.47-2.11, p<0.001)	1.20 (0.96-1.50, p=0.112)
Chronic kidney disease	NO	10500 (83.4)	2095 (16.6)	•	•
	YES	1395 (65.4)	738 (34.6)	2.65 (2.40-2.93, p<0.001)	1.41 (1.25-1.60, p<0.001)
Dementia	NO	10955 (82.7)	2286 (17.3)	•	•
	YES	922 (64.0)	519 (36.0)	2.70 (2.40-3.03, p<0.001)	1.27 (1.10-1.47, p=0.001)
Obesity (as defined by clinical staff)	NO	9002 (80.6)	2167 (19.4)	•	•
	YES	1584 (84.7)	287 (15.3)	0.75 (0.66-0.86, p<0.001)	1.05 (0.90-1.23, p=0.528)
Malignant neoplasm	NO	10972 (82.4)	2347 (17.6)	•	•
	YES	898 (65.1)	482 (34.9)	2.51 (2.23-2.83, p<0.001)	1.63 (1.41-1.89, p<0.001)

Number in dataframe = 20860, Number in model = 12526, Missing = 8334, AIC = 10088.1, C-statistic = 0.775, H&L = Chi-sq(8) 19.63 (p=0.012)

Figure 13 - Adjusted odds ratio plot

Death

Age on admission (years)	<50	-	
	50-69	4.95 (3.72-6.73, p<0.001)	
	70-79	12.61 (9.49-17.10, p<0.001)	
	80+	20.08 (15.13-27.21, p<0.001)	
Sex at Birth	Male	-	
	Female	0.67 (0.60-0.74, p<0.001)	
	Not specified	-	
Chronic cardiac disease	YES	1.29 (1.16-1.43, p<0.001)	
Chronic pulmonary disease (not asthma)	YES	1.56 (1.39-1.75, p<0.001)	
Chronic neurological disorder	YES	1.13 (0.97-1.31, p=0.120)	
Chronic hematologic disease	YES	1.20 (0.96-1.50, p=0.112)	
Chronic kidney disease	YES	1.41 (1.25-1.60, p<0.001)	
Dementia	YES	1.27 (1.10-1.47, p=0.001)	
Obesity (as defined by clinical staff)	YES	1.05 (0.90-1.23, p=0.528)	
Malignant neoplasm	YES	1.63 (1.41-1.89, p<0.001)	

Odds ratio (95% CI, log scale)

Figure 14 - ROC

AUC: 0.775
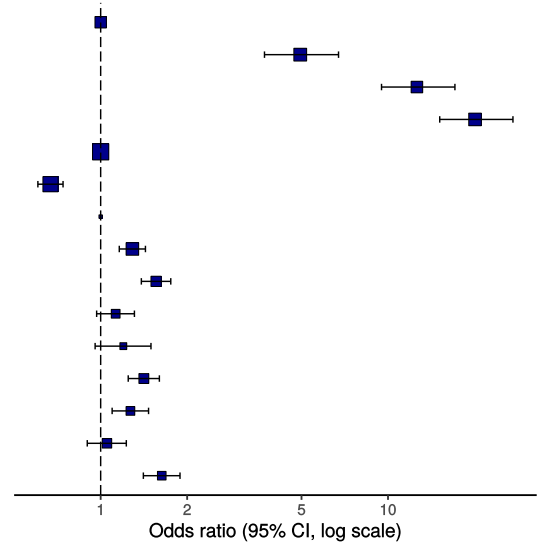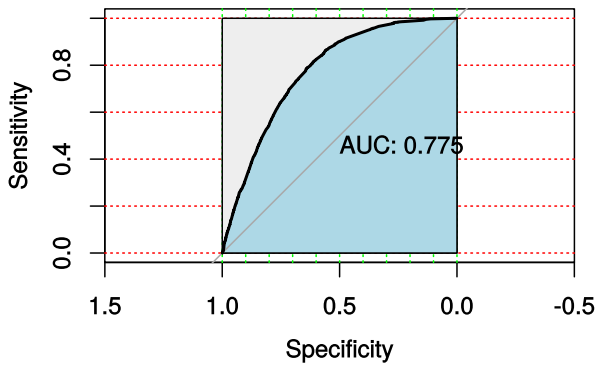
Survival models

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	416	347	341	340	340
age.factor=18-49	3736	3272	3082	3040	3016
age.factor=50-74	8666	7078	6305	5887	5647
age.factor=75 and over	8944	6668	5502	4819	4488

Number at risk					
sex=Male	11915	9451	8197	7499	7141
sex=Female	9844	7901	7020	6576	6339
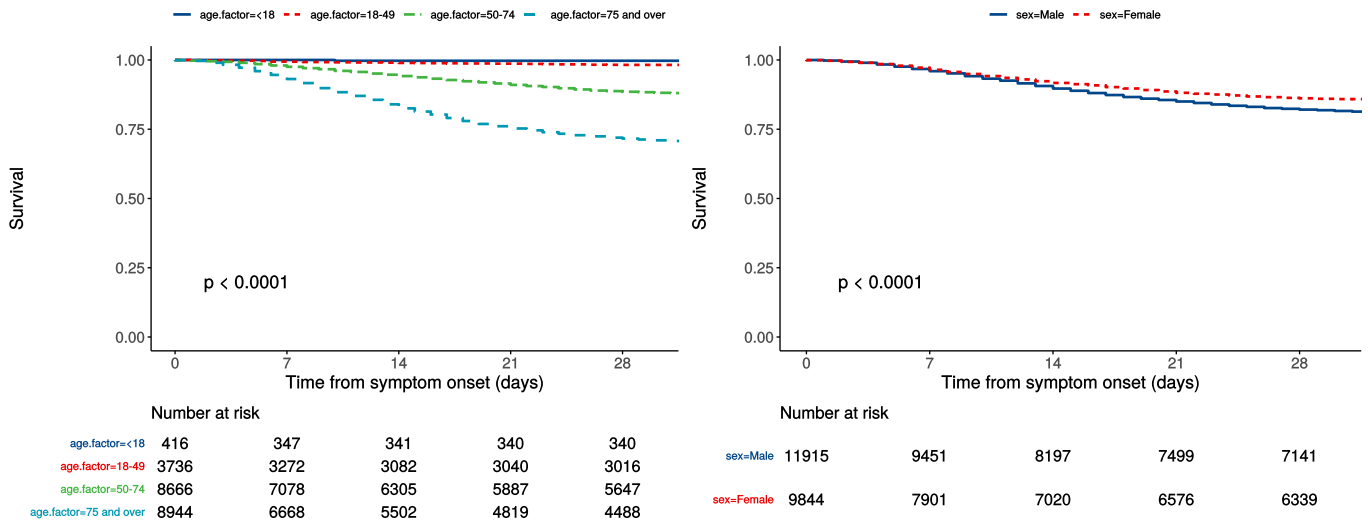
Cox proportional hazards model

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	4164 (19.1)	•	•
	50-69	6304 (28.9)	5.64 (4.33-7.33, p<0.001)	4.33 (3.18-5.88, p<0.001)
	70-79	4894 (22.5)	15.23 (11.80-19.67, p<0.001)	11.75 (8.71-15.85, p<0.001)
	80+	6417 (29.5)	23.25 (18.08-29.91, p<0.001)	17.30 (12.82-23.33, p<0.001)
Sex at Birth	Male	11927 (54.8)	•	•
	Female	9844 (45.2)	0.75 (0.70-0.81, p<0.001)	0.74 (0.68-0.81, p<0.001)
qSOFA score on admission	0	8747 (51.1)	•	•
	1	7210 (42.1)	1.79 (1.64-1.95, p<0.001)	1.98 (1.80-2.18, p<0.001)
	2	1096 (6.4)	4.30 (3.82-4.84, p<0.001)	3.80 (3.32-4.35, p<0.001)
	3	56 (0.3)	8.07 (5.50-11.84, p<0.001)	9.00 (5.92-13.67, p<0.001)
Symptomatic at presentation	No symptoms	2658 (13.5)	•	•
	Symptoms	17090 (86.5)	1.51 (1.34-1.71, p<0.001)	•
Chronic cardiac disease	NO	13440 (70.9)	•	•
	YES	5521 (29.1)	2.48 (2.31-2.67, p<0.001)	1.27 (1.16-1.39, p<0.001)
Chronic kidney disease	NO	16126 (85.2)	•	•
	YES	2803 (14.8)	2.34 (2.16-2.55, p<0.001)	1.33 (1.20-1.47, p<0.001)
Moderate or severe liver disease	NO	18451 (98.2)	•	•
	YES	336 (1.8)	1.68 (1.34-2.10, p<0.001)	1.58 (1.18-2.11, p=0.002)
Chronic neurological disorder	NO	16948 (89.9)	•	•
	YES	1895 (10.1)	1.55 (1.39-1.72, p<0.001)	•
Malignant neoplasm	NO	17070 (90.5)	•	•
	YES	1799 (9.5)	2.21 (2.01-2.44, p<0.001)	1.63 (1.45-1.84, p<0.001)
Chronic hematologic disease	NO	18082 (96.1)	•	•
	YES	740 (3.9)	1.64 (1.40-1.91, p<0.001)	•
Obesity (as defined by clinical staff)	NO	14451 (86.1)	•	•
	YES	2342 (13.9)	0.78 (0.69-0.88, p<0.001)	1.05 (0.92-1.21, p=0.475)

Dependent: Surv(time, status)		all	HR (univariable)	HR (multivariable)
Diabetes without complications	NO	15597 (87.6)	•	•
	YES	2215 (12.4)	1.19 (1.07-1.33, p=0.002)	•
Rheumatologic disorder	NO	16441 (87.4)	•	•
	YES	2372 (12.6)	1.33 (1.20-1.47, p<0.001)	•
Dementia	NO	16928 (89.7)	•	•
	YES	1942 (10.3)	2.34 (2.13-2.57, p<0.001)	1.10 (0.97-1.24, p=0.124)
Malnutrition	NO	17148 (97.9)	•	•
	YES	363 (2.1)	1.64 (1.31-2.05, p<0.001)	•
smoking_mhyn_2levels	NO	9796 (50.1)	•	•
	YES	1058 (5.4)	0.95 (0.80-1.13, p=0.577)	•
	N/K	8713 (44.5)	1.30 (1.20-1.39, p<0.001)	•

Number in dataframe = 21907, Number in model = 13987, Missing = 7920, Number of events = 2095, Concordance = 0.779 (SE = 0.004), R-squared = 0.142(Max possible = 0.938), Likelihood ratio test = 2140.099 (df = 13, p = 0.000)

Figure 16a - Multivariable Cox proportional hazards model
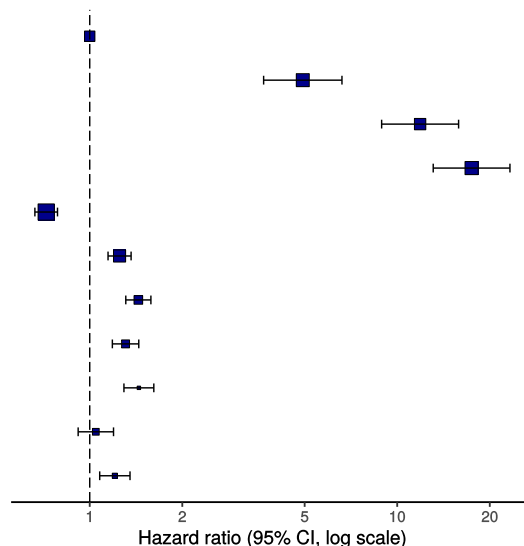

Survival: HR (95% CI, p-value)

Age on admission (years)	<50	-
	50-69	4.33 (3.18-5.88, p<0.001)
	70-79	11.75 (8.71-15.85, p<0.001)
	80+	17.30 (12.82-23.33, p<0.001)
Sex at Birth	Female	0.74 (0.68-0.81, p<0.001)
qSOFA score on admission	0	-
	1	1.98 (1.80-2.18, p<0.001)
	2	3.80 (3.32-4.35, p<0.001)
	3	9.00 (5.92-13.67, p<0.001)
Chronic cardiac disease	YES	1.27 (1.16-1.39, p<0.001)
Chronic kidney disease	YES	1.33 (1.20-1.47, p<0.001)
Moderate or severe liver disease	YES	1.58 (1.18-2.11, p=0.002)
Malignant neoplasm	YES	1.63 (1.45-1.84, p<0.001)
Obesity (as defined by clinical staff)	YES	1.05 (0.92-1.21, p=0.475)
Dementia	YES	1.10 (0.97-1.24, p=0.124)

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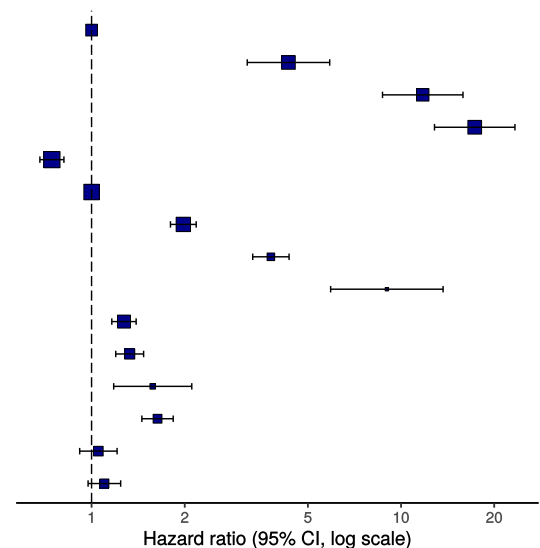
Figure 16b - Multivariable Cox proportional hazards model (age, sex, comorbidities only)

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

Age on admission (years)	<50	-	
	50-69	4.93 (3.68-6.61, p<0.001)	
	70-79	11.87 (8.90-15.84, p<0.001)	
	80+	17.45 (13.09-23.26, p<0.001)	
Sex at Birth	Female	0.72 (0.66-0.79, p<0.001)	
Chronic cardiac disease	YES	1.25 (1.15-1.36, p<0.001)	
Chronic pulmonary disease (not asthma)	YES	1.44 (1.31-1.58, p<0.001)	
Chronic kidney disease	YES	1.31 (1.18-1.44, p<0.001)	
Malignant neoplasm	YES	1.44 (1.29-1.62, p<0.001)	
Obesity (as defined by clinical staff)	YES	1.05 (0.92-1.20, p=0.498)	
Dementia	YES	1.21 (1.08-1.35, p=0.001)	

Hazard ratio (95% CI, log scale)

ROC = 0.7807975

Figure 17 - Predictions calibration plot

Black: observed Gray: ideal
Blue : optimism corrected

Predicted 7 Day Survival B=40 based on observed-predicted
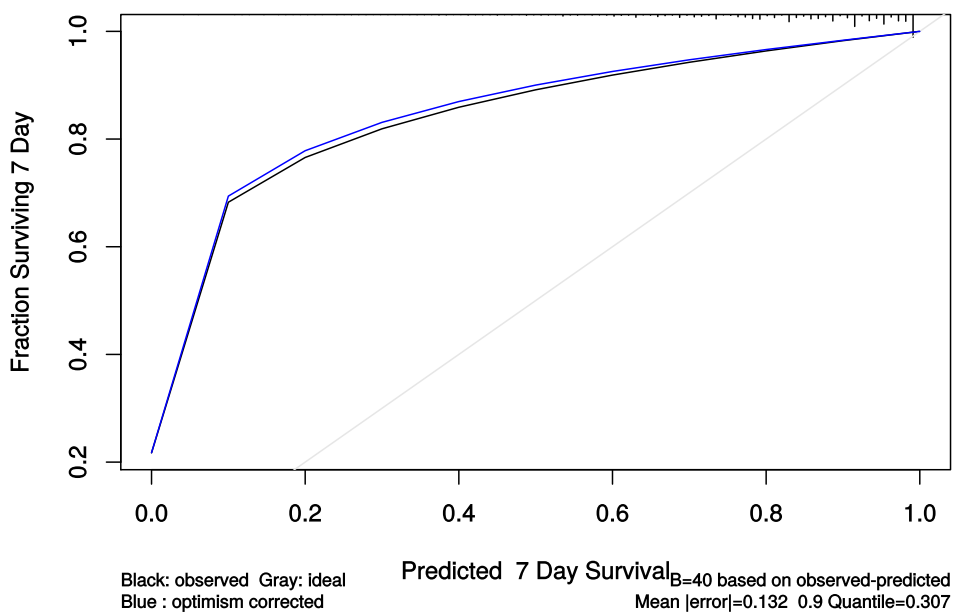Mean |error|=0.132 0.9 Quantile=0.307

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
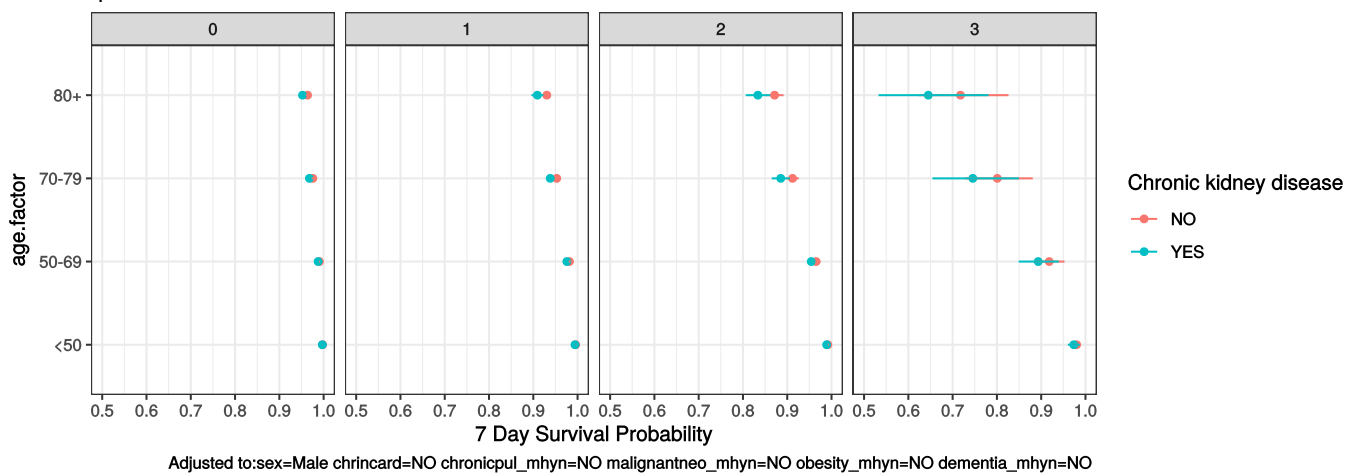
Figure 19 - Death by severity (NEWS) on admission

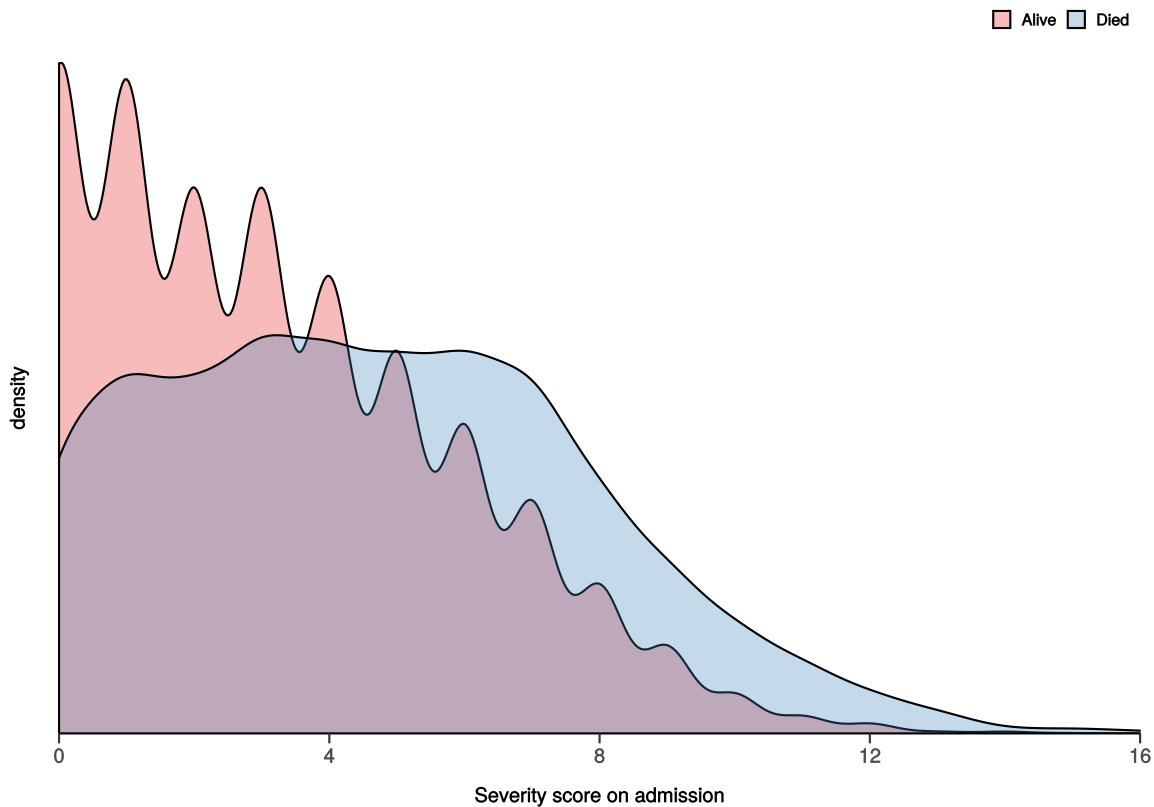### Number of deaths by NEWS score at admission

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

Number of deaths by NEWS score at admission
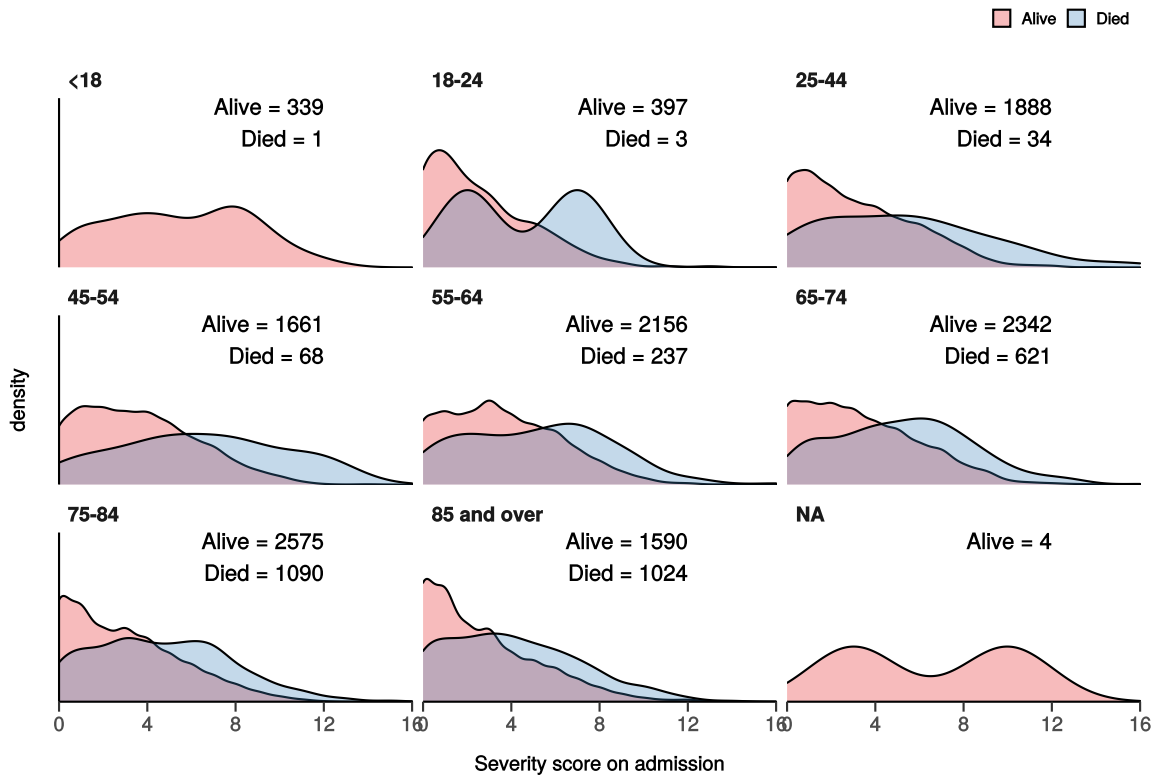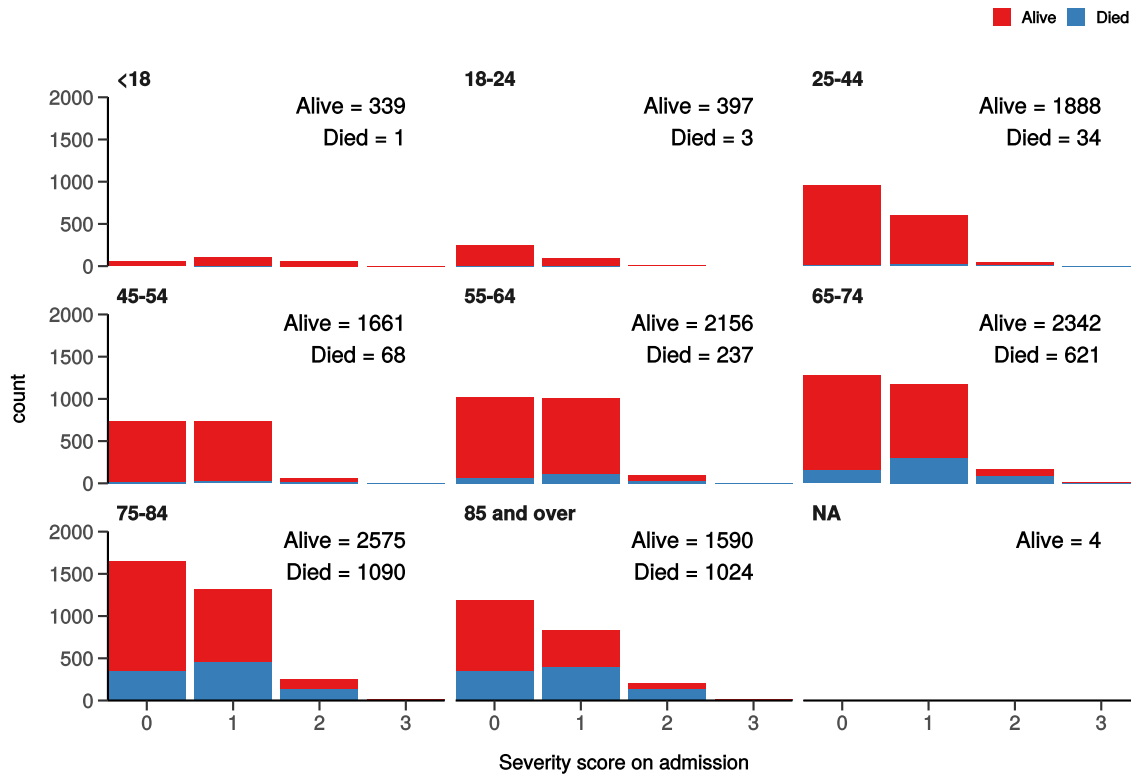Stratified by age

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 (%)		17798 (97.6)	433 (2.4)	
NEWS score on admission	Median (IQR)	3.0 (4.0)	3.0 (3.0)	0.139
Death	No	10367 (78.7)	335 (97.1)	<0.001
	Yes	2812 (21.3)	10 (2.9)	