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

Dynamic content updated: 2020-11-25 03:38:03.
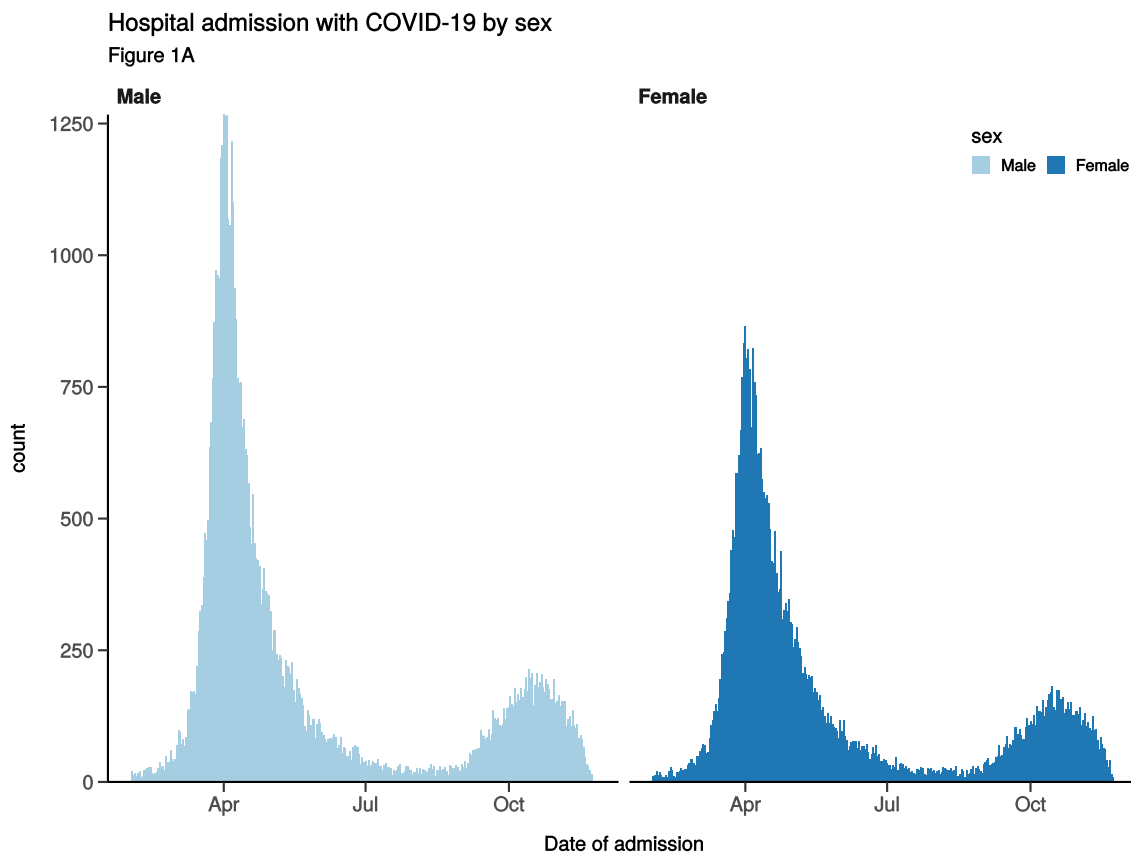
Executive summary

Includes all patients

There are 108437 patients included in CO-CIN. Of these, 26744 patient(s) have died and 13400 required ICU. 56789 have been discharged home.
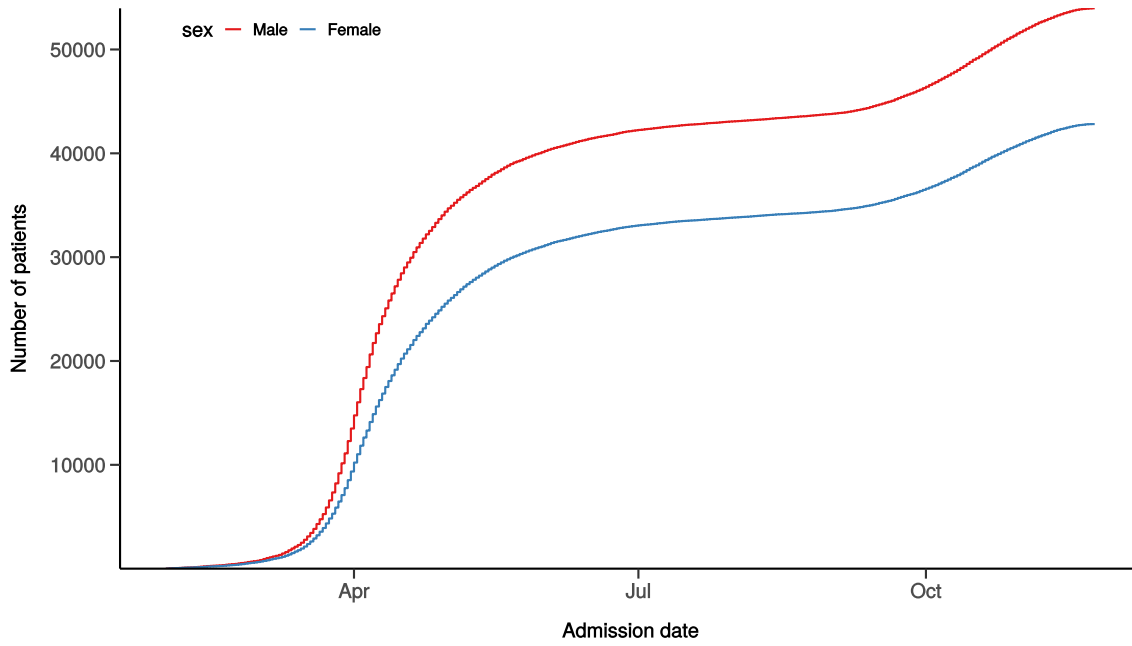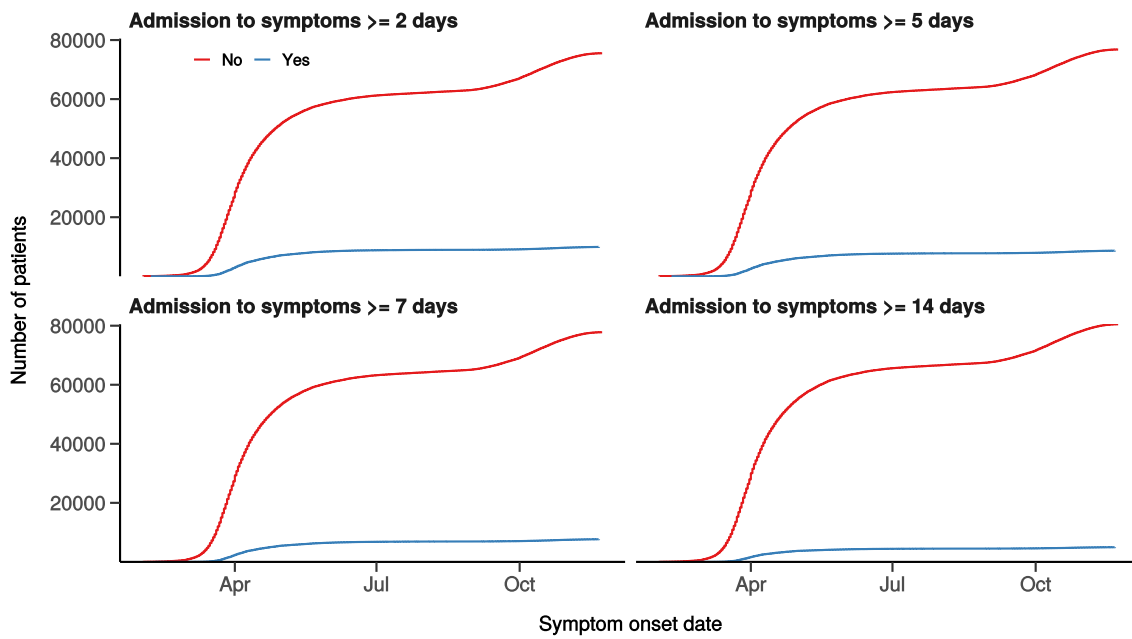
Admission

Figure 1

Hospital admission with COVID-19 by sex
Figure 1A

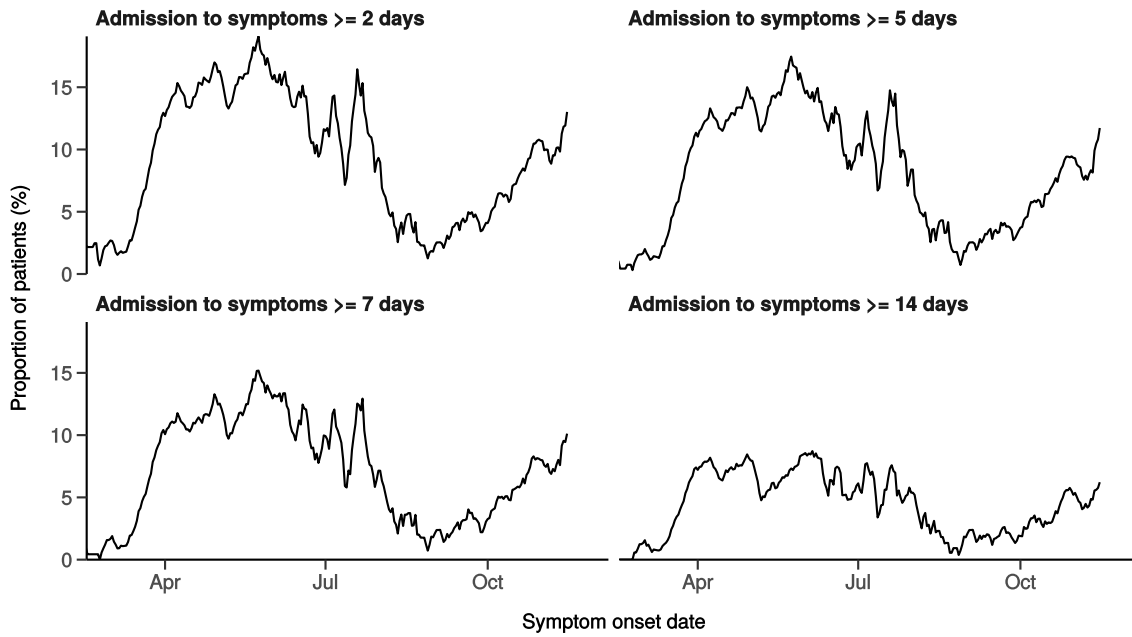## Hospital admission with COVID-19 by sex
Figure 1B

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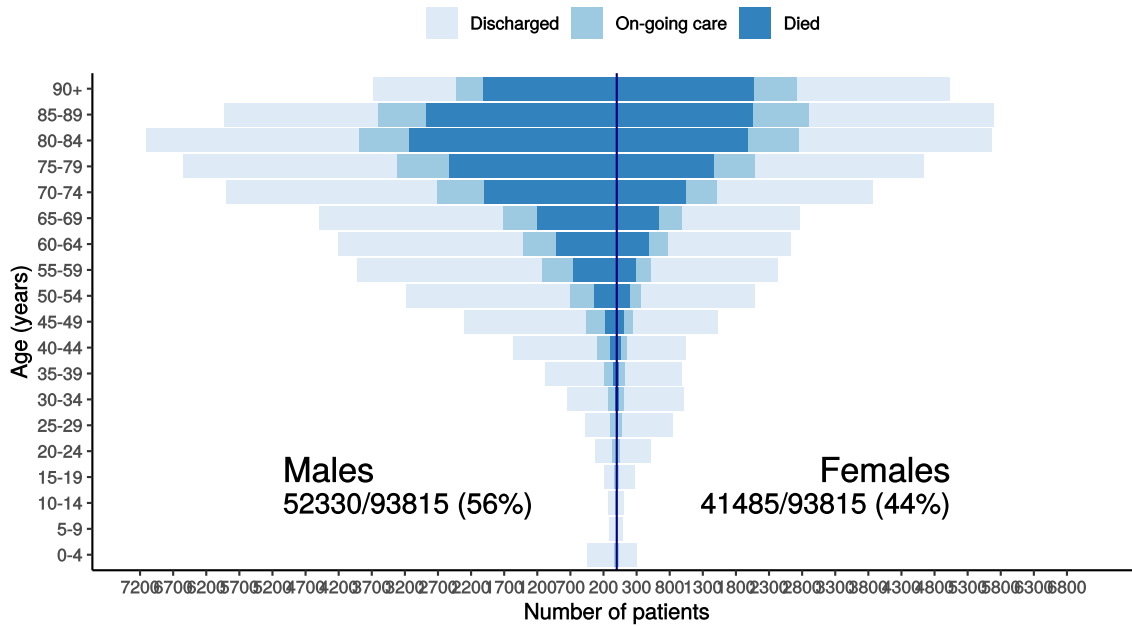### Figure 1C

Proportion with symptom onset occuring after hospital admission

Figure 1D - 7-day rolling percentage. n = 85469

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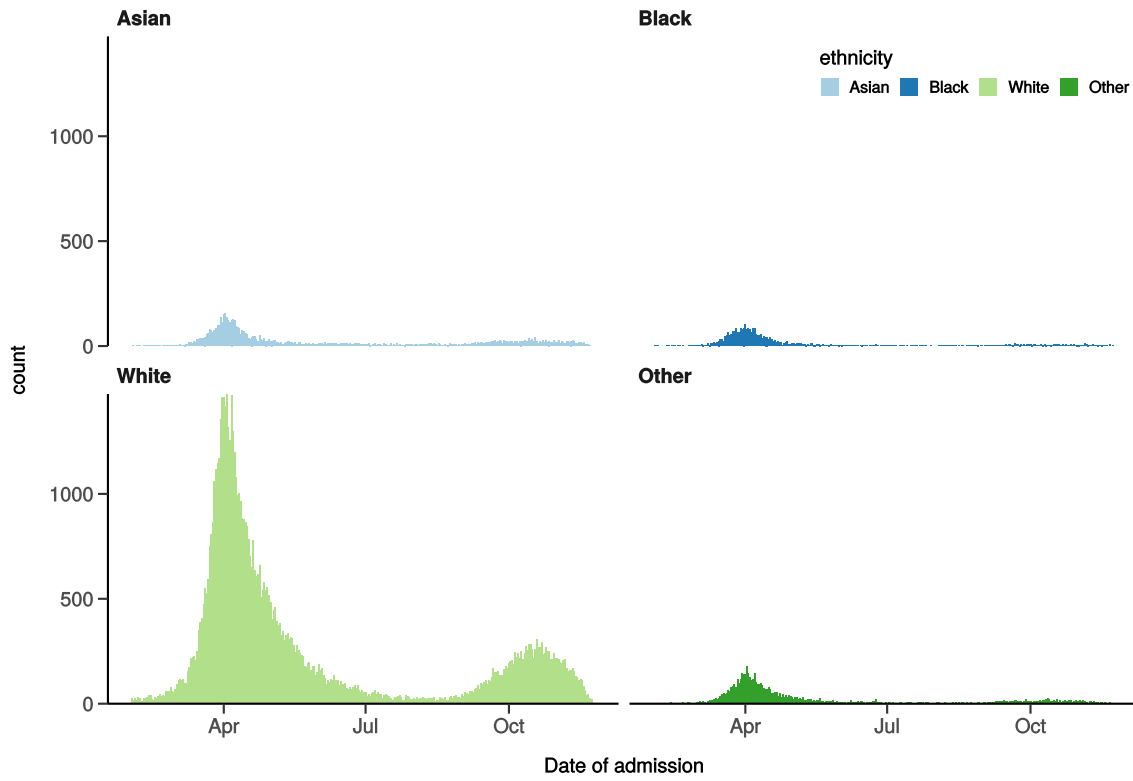
Figure 1E

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 = 104420
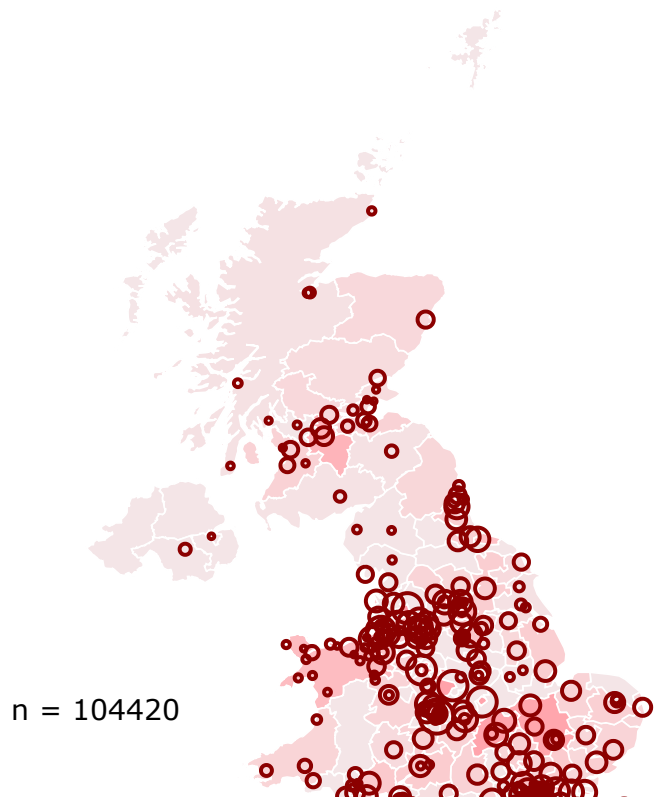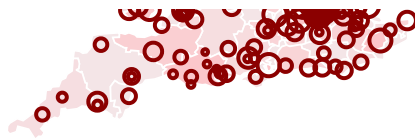
Symptoms and comorbidity

Figure 3A

Symptoms on presentation to hospital
% patients, n = 94391

Comorbidity
% patients, n = 108437
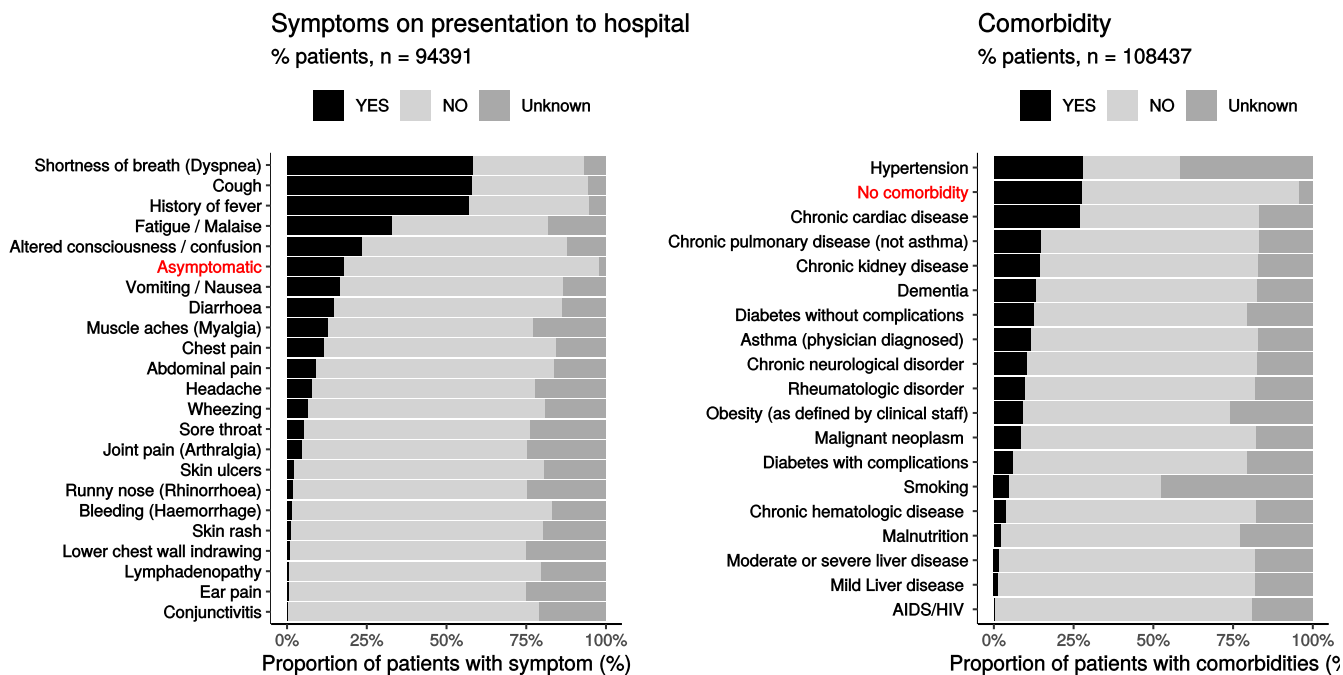
Figure 3B - Symptoms by Age

Symptoms on presentation to hospital
Stratifed by age
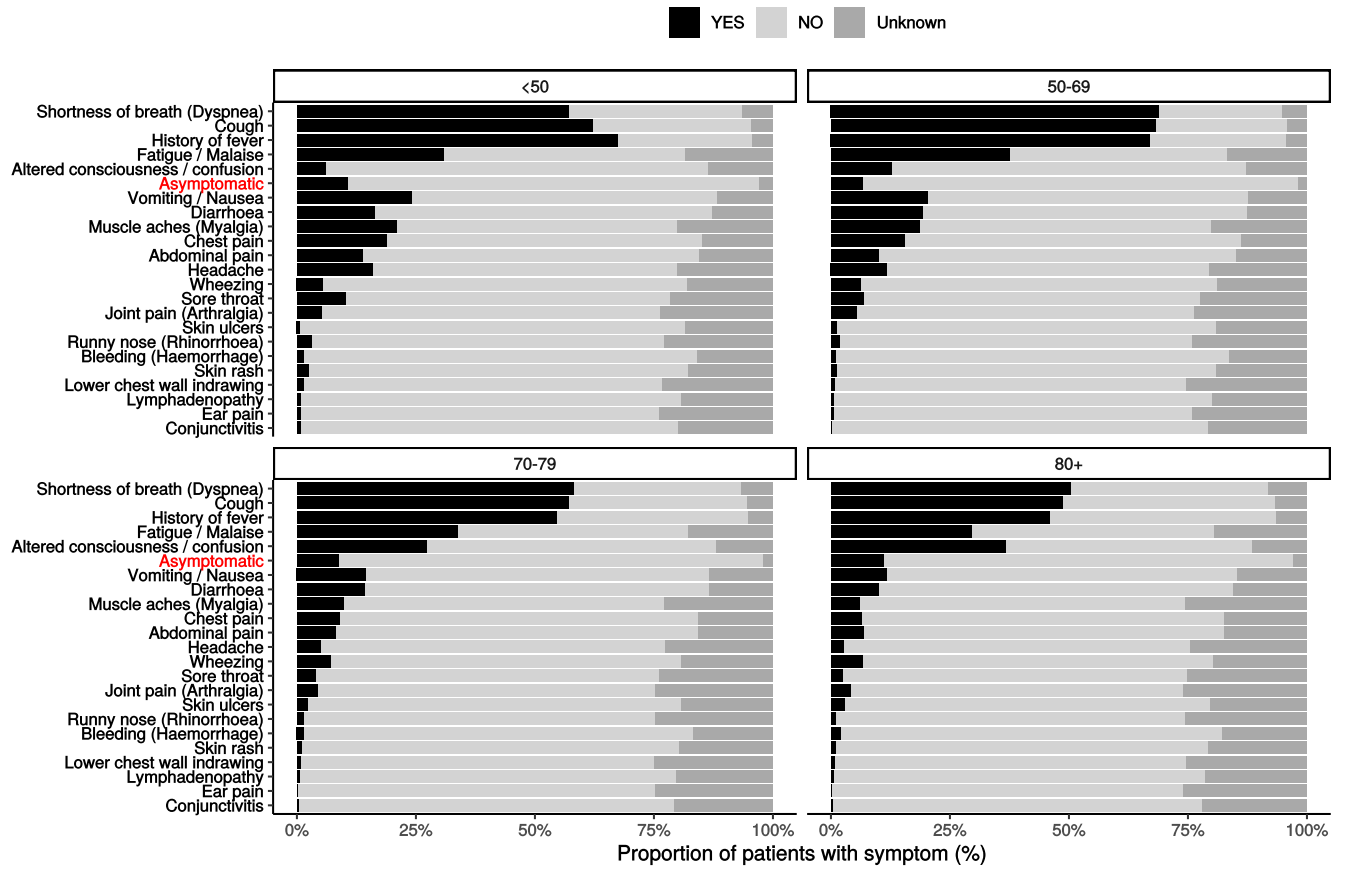
Figure 3C

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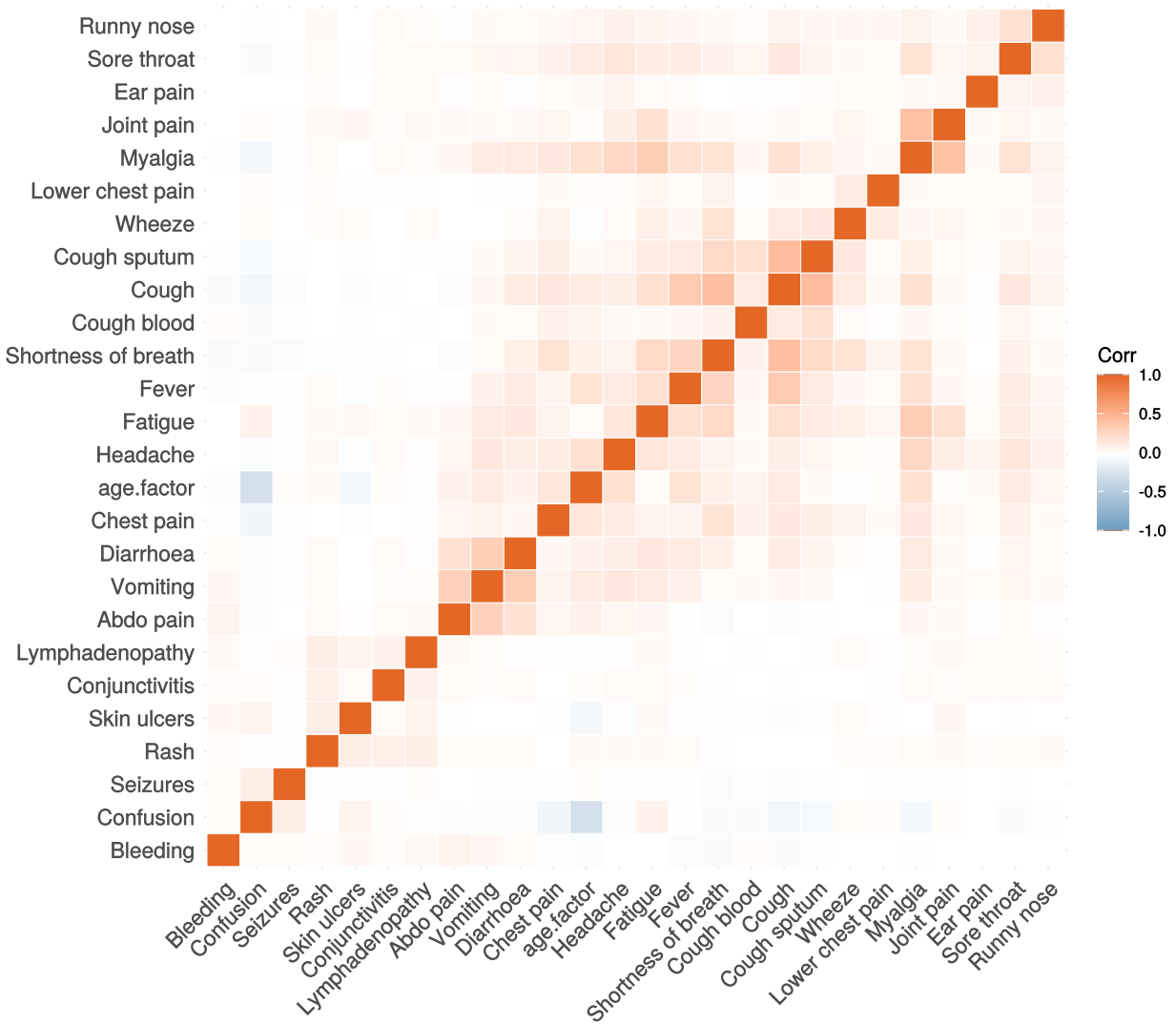
Symptoms (diagnostic criteria)

Figure 4A

n = 94391

- ○ Fever
- ○ Cough
- ○ Shortness of breath
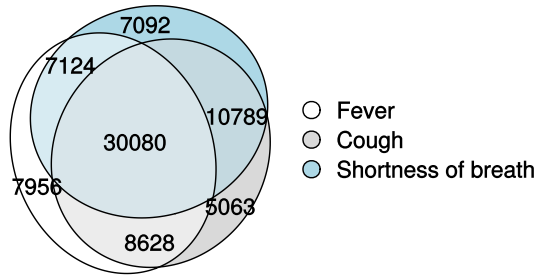
Symptoms (most common)

Figure 4B

n = 94391

Shortness of breath (Dyspnea)
Cough
History of fever

7956
7124
30080
8628
7092
5063
10789
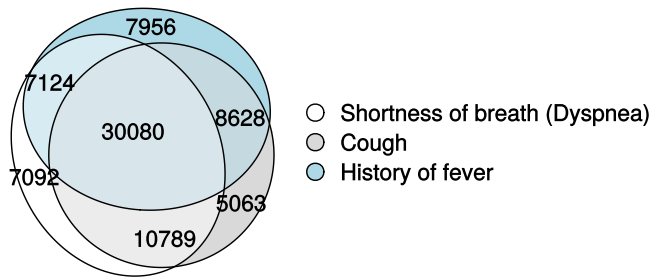
Comorbidity (most common)

Figure 4C

n = 108437

Hypertension
Chronic cardiac disease
Chronic pulmonary disease (not asthma)

5939
2655
4304
2933
15006
12202
9646
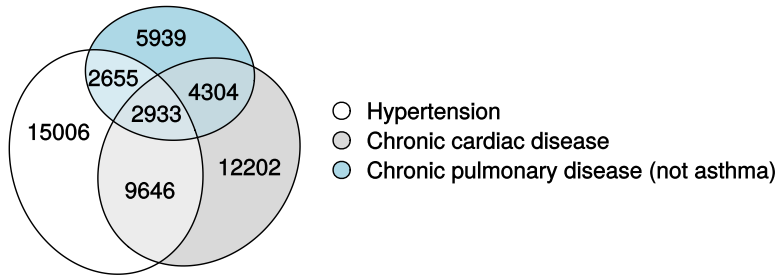
Medication prior to illness

Figure 5

Number of medications prior to admission

Male

Female

Number of medications
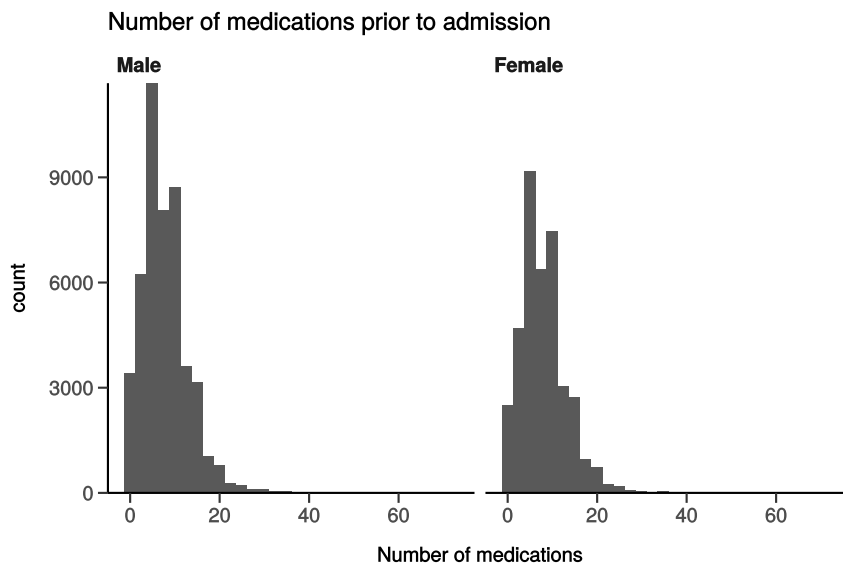
Preadmission treatment

Figure 6

Pre-admission treatment

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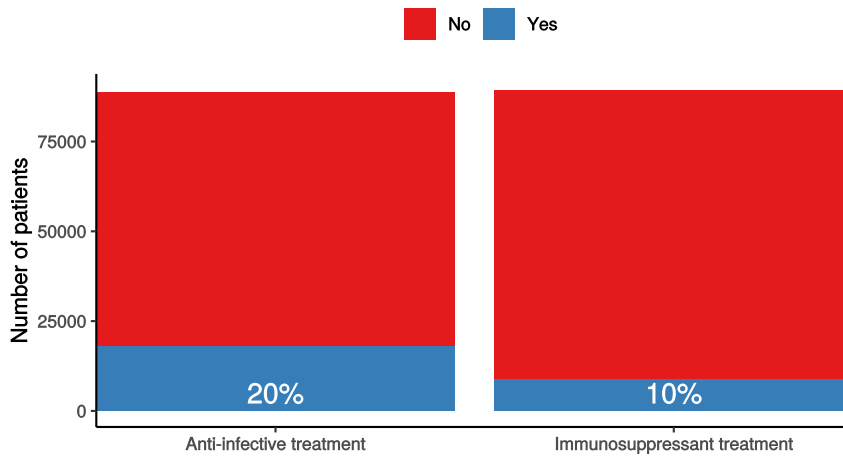
Patient flow

Figure 7A - All patients

N = 96535

Patient status by day

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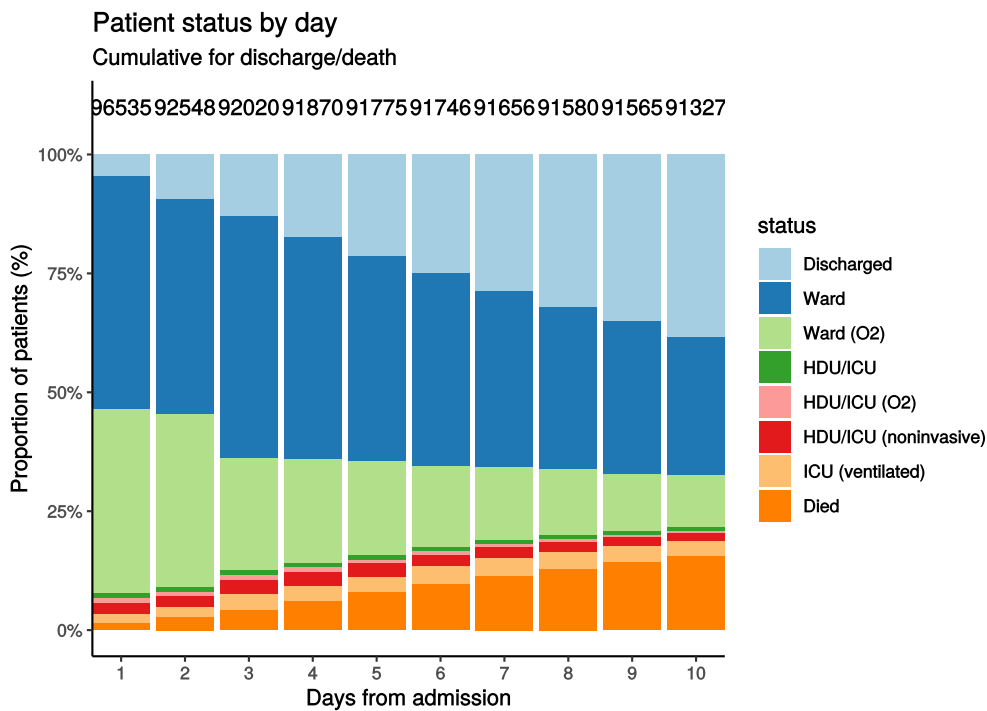
Figure 7B - Patients admitted >=14 days and <=28 days ago

N = 3369

Patient status by day

Cumulative for discharge/death

| 3369 | 2297 | 2239 | 2230 | 2226 | 2220 | 2212 | 2211 | 2209 | 2200 |

status
- Discharged
- Ward
- Ward (O2)
- HDU/ICU
- HDU/ICU (O2)
- HDU/ICU (noninvasive)
- ICU (ventilated)
- Died
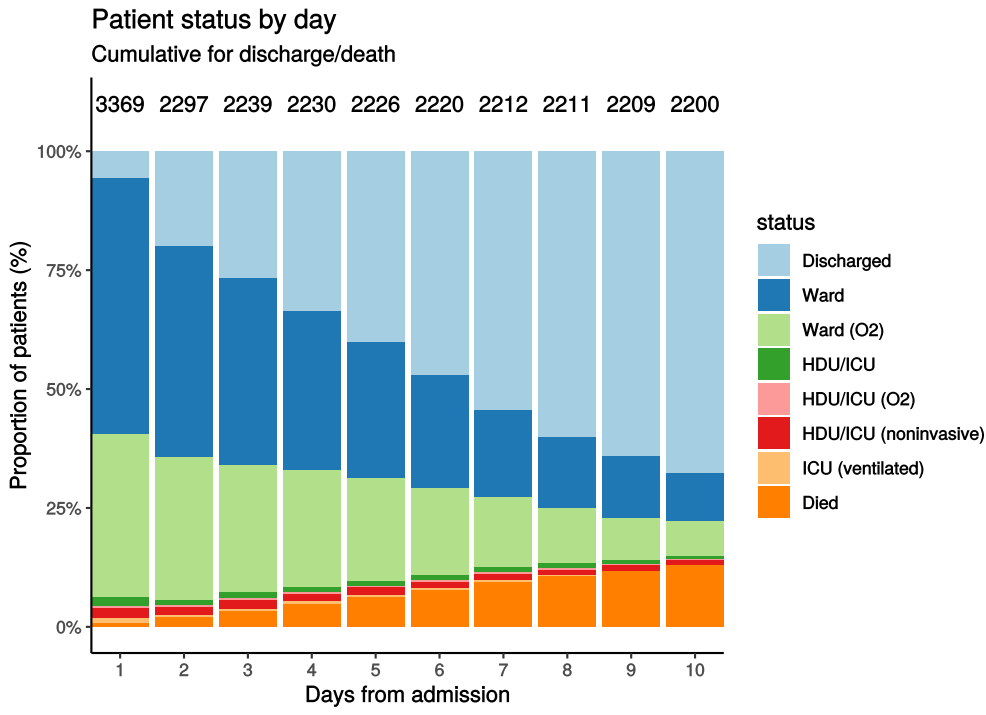
Oxygen requirement

Figure 8A - All patients

N = 91473
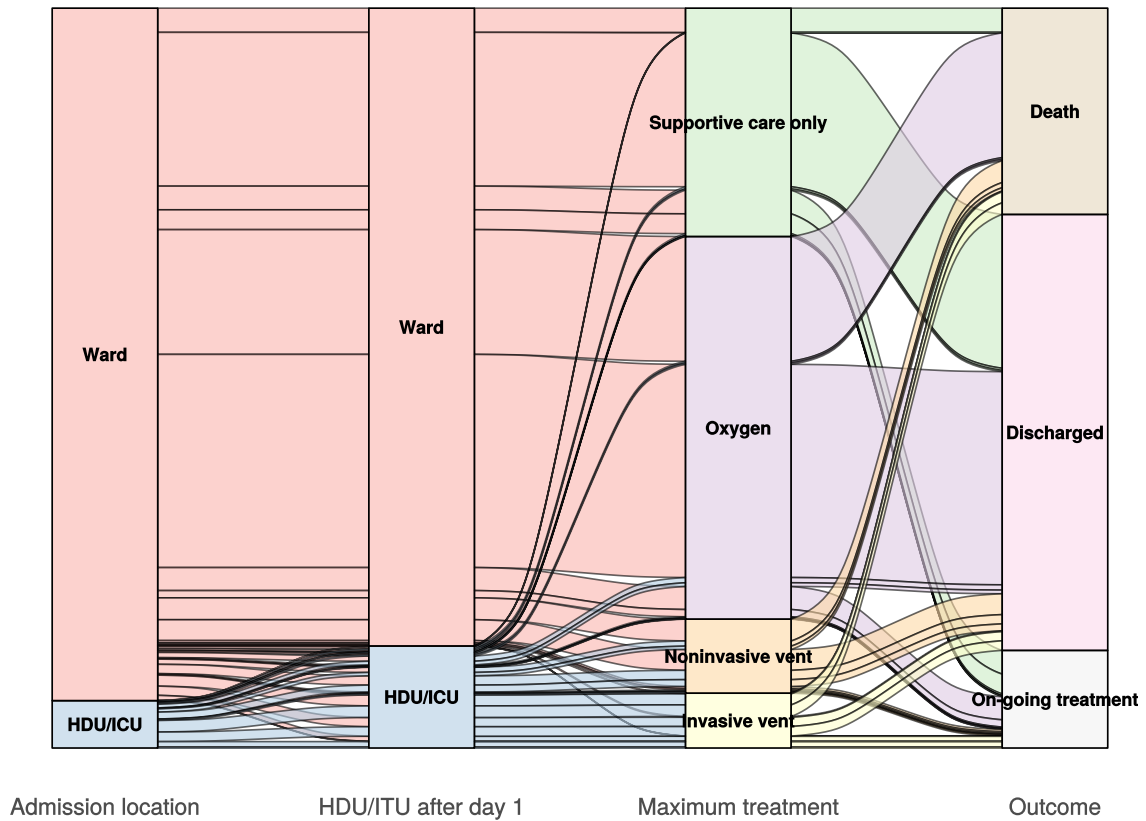
Figure 8B - Patients admitted >=14 days and <=28 days ago

N = 3227

In-hospital medical treatment

Figure 9

In-hospital treatment

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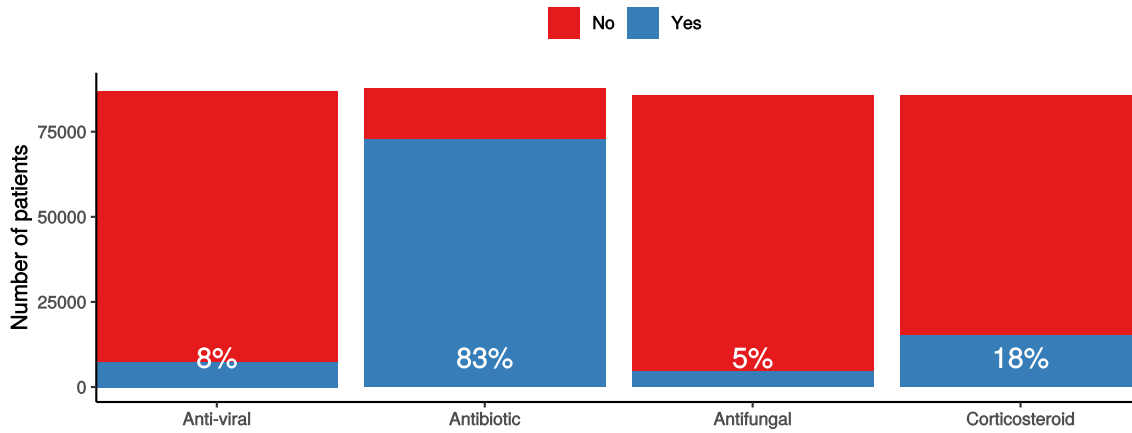
Treatment

Figure 10

ICU/HDU admission
Figure 10A

13400/94993

14%
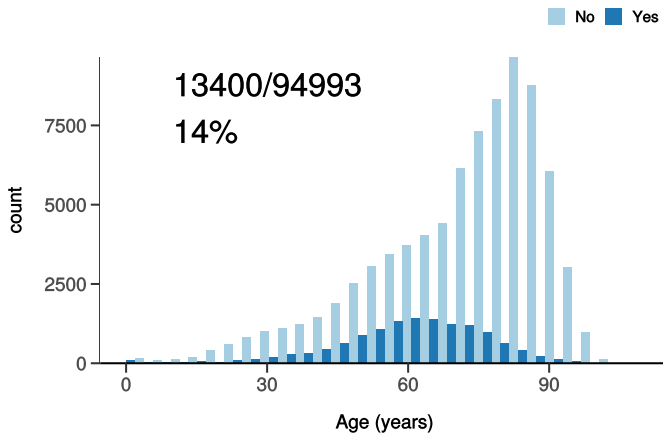
High flow oxygen
Figure 10B

67320/93777

72%

Noninvasive ventilation
Figure 10C

13703/93204

15%
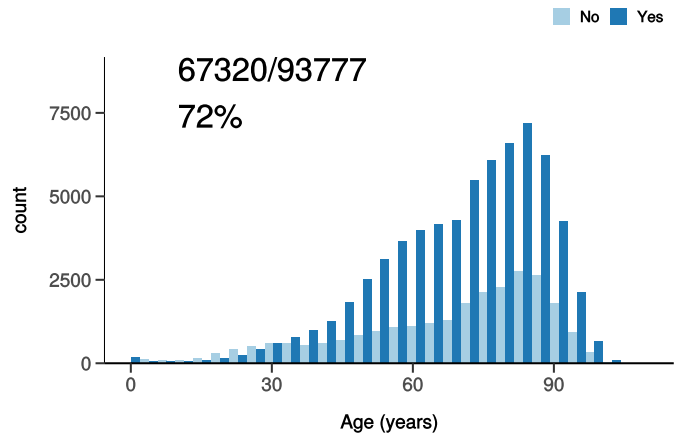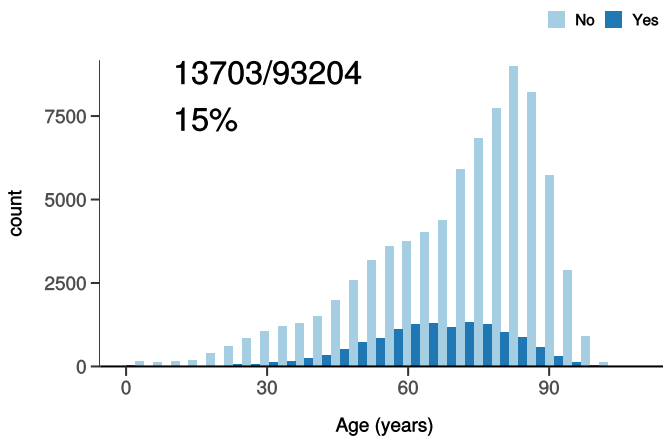
Invasive ventilation
Figure 10D

7169/93407

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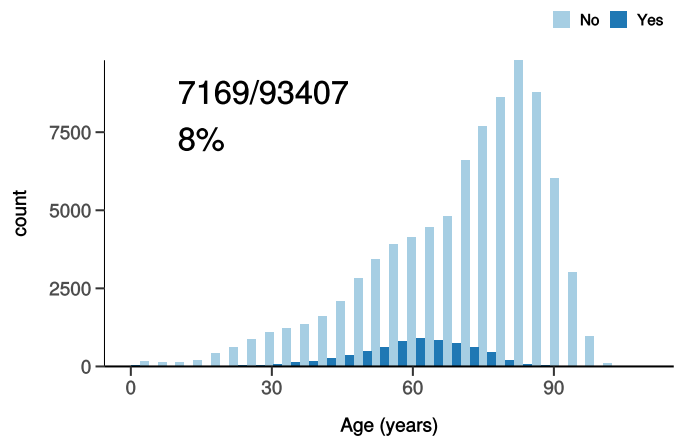
Status in patients admitted >=14 days from today

Figure 11

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

Died
26549/93262
28%

On-going care
10596/93262
11%

Discharged alive
55988/93262
60%
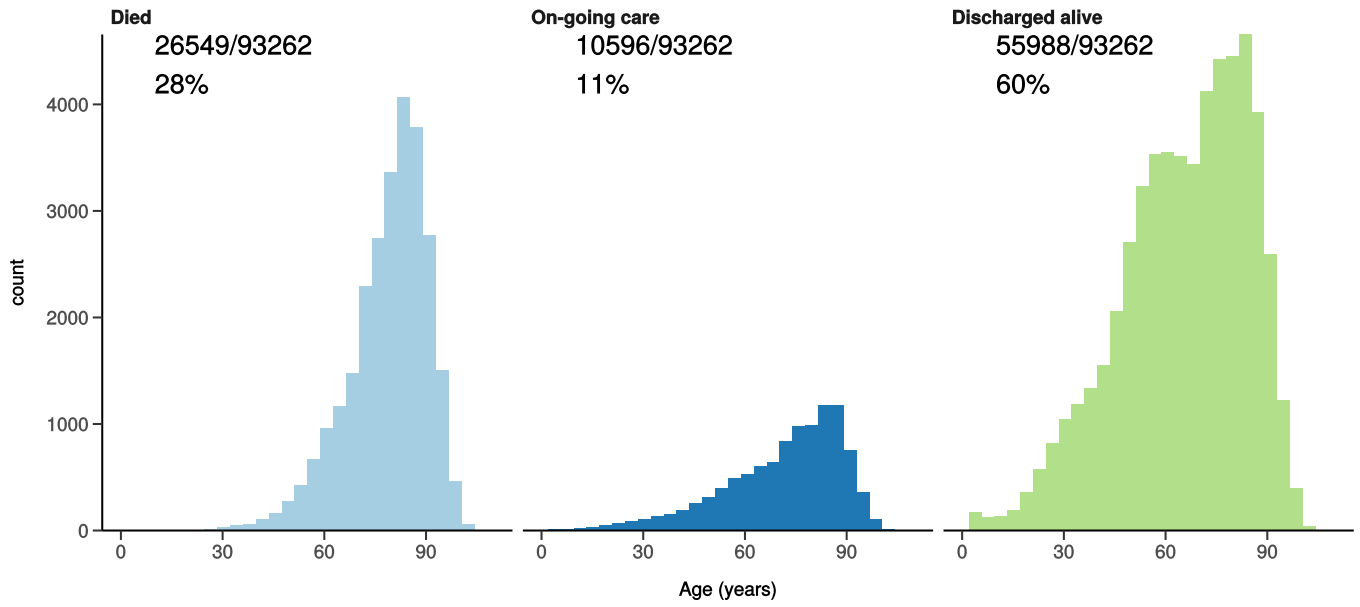
ICU/HDU admissions: status in patients admitted >=14 days ago
Figure 11B

Died
4461/12794
35%

On-going care
2262/12794
18%

Discharged alive
6055/12794
47%
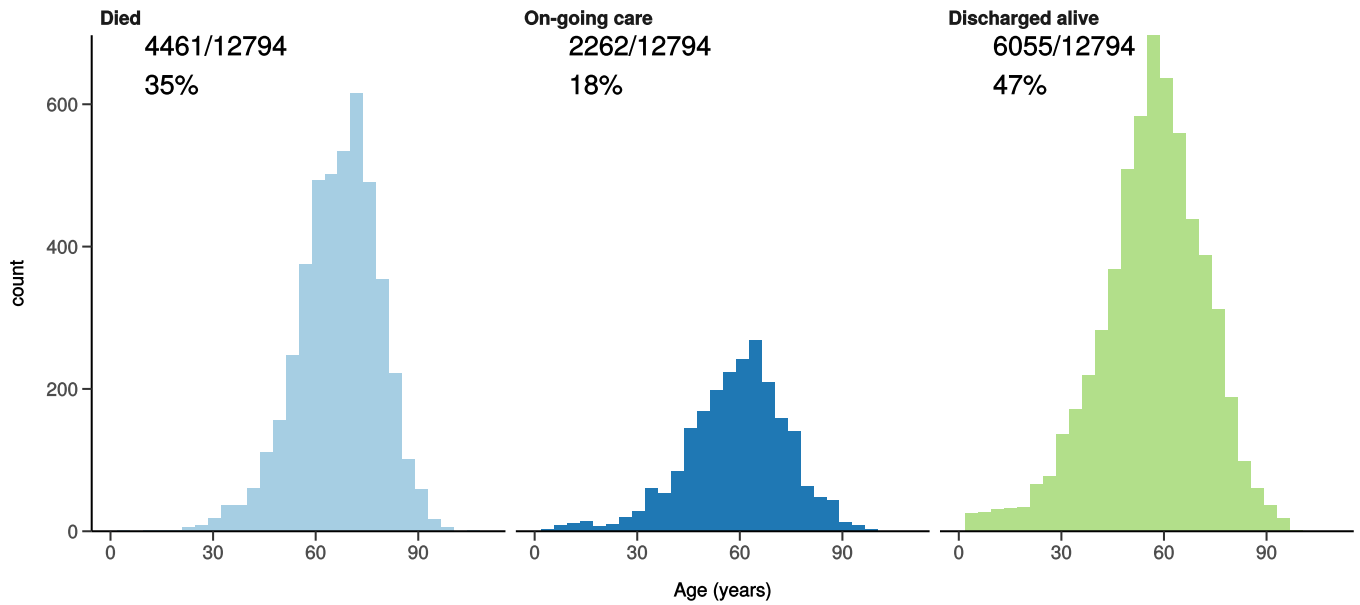
Invasive ventilation: status in patients admitted >=14 days ago
Figure 11c

Died
3001/6977
43%

On-going care
1455/6977
21%

Discharged alive
2516/6977
36%
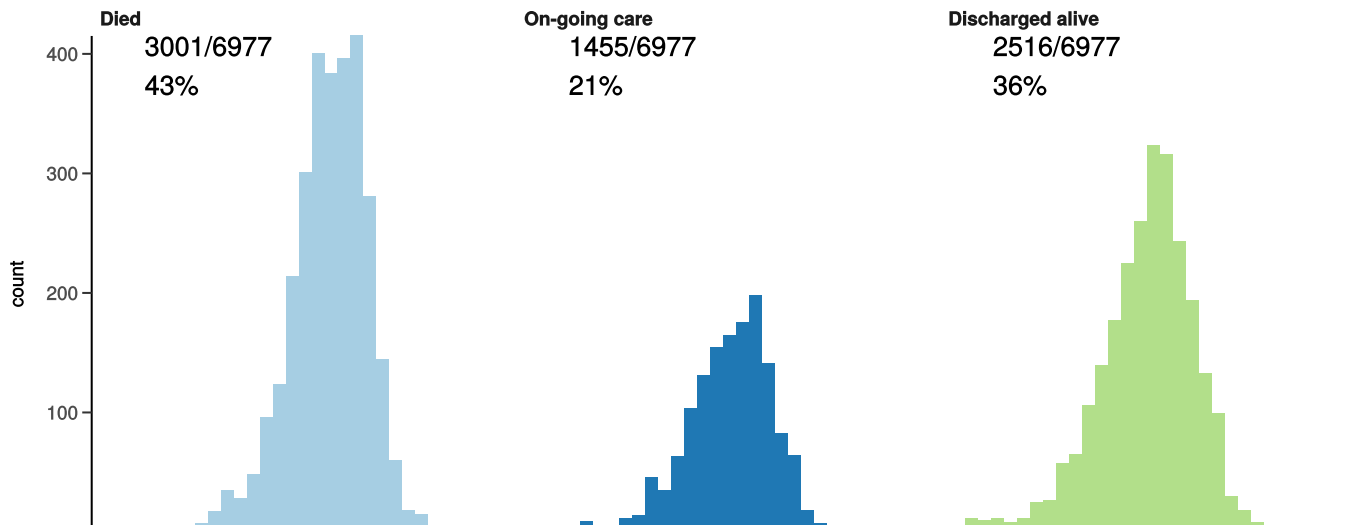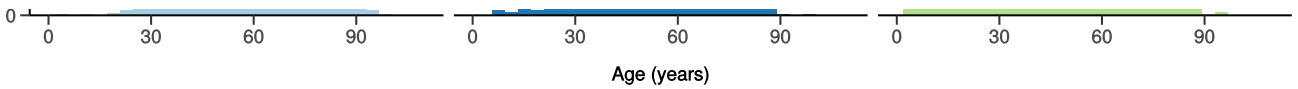
Length of stay stratified by age

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
87% by day 14   67% by day 14
n=11355   n=587

50-69
75% by day 14   67% by day 14
n=18254   n=4475

70-79
65% by day 14   72% by day 14
n=11963   n=6726

80+
58% by day 14   71% by day 14
n=16447   n=13469

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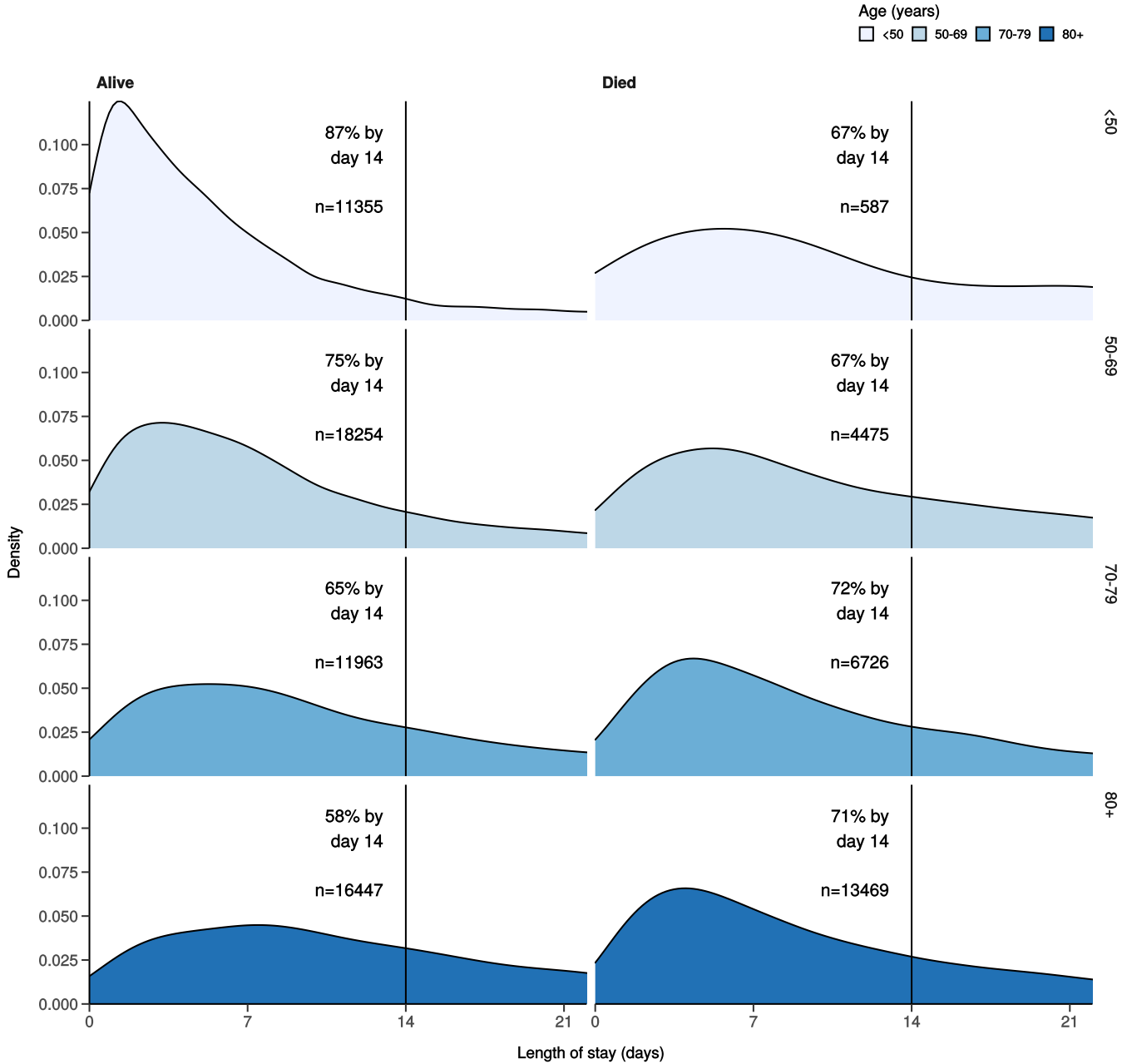
Predictors of death: logistic regression multivariable model

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	12915 (95.3)	632 (4.7)	•	•

Dependent: death		No	Yes	OR (univariable)	OR (multivariable)
	50-69	20061 (81.0)	4696 (19.0)	4.78 (4.39-5.22, p<0.001)	4.41 (4.01-4.87, p<0.001)
	70-79	13150 (65.2)	7027 (34.8)	10.92 (10.04-11.90, p<0.001)	9.05 (8.22-9.99, p<0.001)
	80+	17954 (56.0)	14103 (44.0)	16.05 (14.79-17.45, p<0.001)	13.18 (11.97-14.53, p<0.001)
Sex at Birth	Male	34509 (68.3)	16025 (31.7)	•	•
	Female	29611 (73.9)	10448 (26.1)	0.76 (0.74-0.78, p<0.001)	0.70 (0.67-0.72, p<0.001)
	Not specified	0 (NaN)	0 (NaN)	•	•
Chronic cardiac disease	NO	43741 (75.8)	14000 (24.2)	•	•
	YES	16598 (60.4)	10903 (39.6)	2.05 (1.99-2.12, p<0.001)	1.16 (1.11-1.20, p<0.001)
Chronic pulmonary disease (not asthma)	NO	51163 (73.0)	18909 (27.0)	•	•
	YES	9068 (60.9)	5823 (39.1)	1.74 (1.67-1.80, p<0.001)	1.27 (1.22-1.33, p<0.001)
Chronic neurological disorder	NO	53111 (72.0)	20653 (28.0)	•	•
	YES	6730 (63.6)	3853 (36.4)	1.47 (1.41-1.54, p<0.001)	1.16 (1.10-1.22, p<0.001)
Chronic hematologic disease	NO	57396 (71.4)	23045 (28.6)	•	•
	YES	2291 (62.8)	1359 (37.2)	1.48 (1.38-1.58, p<0.001)	1.15 (1.06-1.25, p=0.001)
Chronic kidney disease	NO	51573 (73.6)	18526 (26.4)	•	•
	YES	8490 (58.1)	6131 (41.9)	2.01 (1.94-2.09, p<0.001)	1.31 (1.25-1.37, p<0.001)
Dementia	NO	52504 (73.9)	18498 (26.1)	•	•
	YES	7383 (54.8)	6082 (45.2)	2.34 (2.25-2.43, p<0.001)	1.38 (1.31-1.44, p<0.001)
Obesity (as defined by clinical staff)	NO	47211 (70.9)	19369 (29.1)	•	•
	YES	6959 (75.0)	2321 (25.0)	0.81 (0.77-0.85, p<0.001)	1.24 (1.17-1.31, p<0.001)
Malignant neoplasm	NO	54769 (72.5)	20787 (27.5)	•	•
	YES	4952 (57.5)	3659 (42.5)	1.95 (1.86-2.04, p<0.001)	1.47 (1.39-1.55, p<0.001)

Number in dataframe = 96450, Number in model = 72191, Missing = 24259, AIC = 76302.1, C-statistic = 0.722, H&L = Chi-sq(8) 120.99 (p<0.001)

Figure 13 - Adjusted odds ratio plot

Death

		Odds ratio	
Age on admission (years)	<50	-	
	50-69	4.41 (4.01-4.87, p<0.001)	
	70-79	9.05 (8.22-9.99, p<0.001)	
	80+	13.18 (11.97-14.53, 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 (1.22-1.33, p<0.001)	
Chronic neurological disorder	YES	1.16 (1.10-1.22, p<0.001)	
Chronic hematologic disease	YES	1.15 (1.06-1.25, p=0.001)	
Chronic kidney disease	YES	1.31 (1.25-1.37, p<0.001)	
Dementia	YES	1.38 (1.31-1.44, p<0.001)	
Obesity (as defined by clinical staff)	YES	1.24 (1.17-1.31, p<0.001)	
Malignant neoplasm	YES	1.47 (1.39-1.55, p<0.001)	

Odds ratio (95% CI, log scale)

Figure 14 - ROC

AUC: 0.722
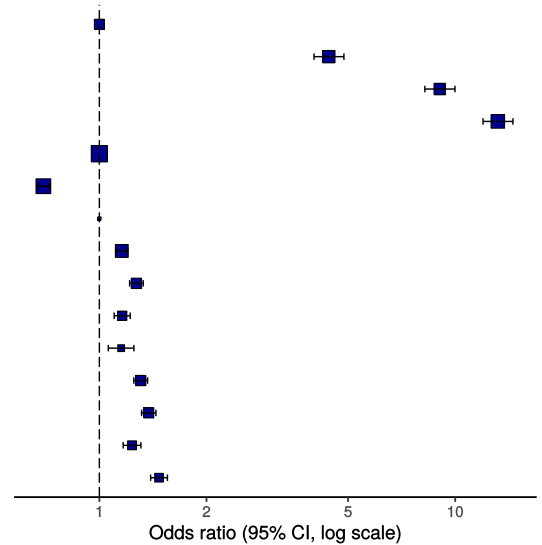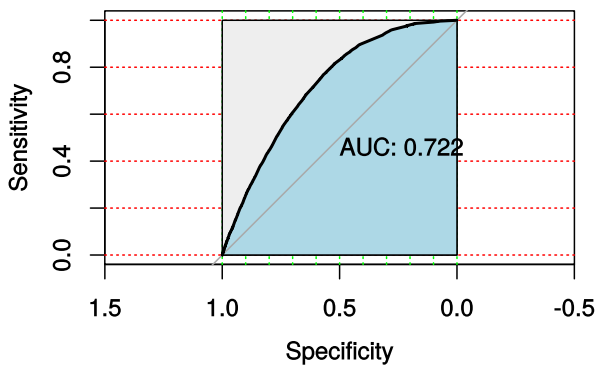
Survival models

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 (left)

	0	7	14	21	28
age.factor=<18	1438	1358	1341	1338	1338
age.factor=18-49	13205	12560	12194	12021	11922
age.factor=50-74	36951	33934	31013	29054	27918
age.factor=75 and over	46032	39319	32430	28678	26823

Number at risk (right)

	0	7	14	21	28
sex=Male	54669	48772	42708	39035	37076
sex=Female	43320	38772	34658	32450	31321
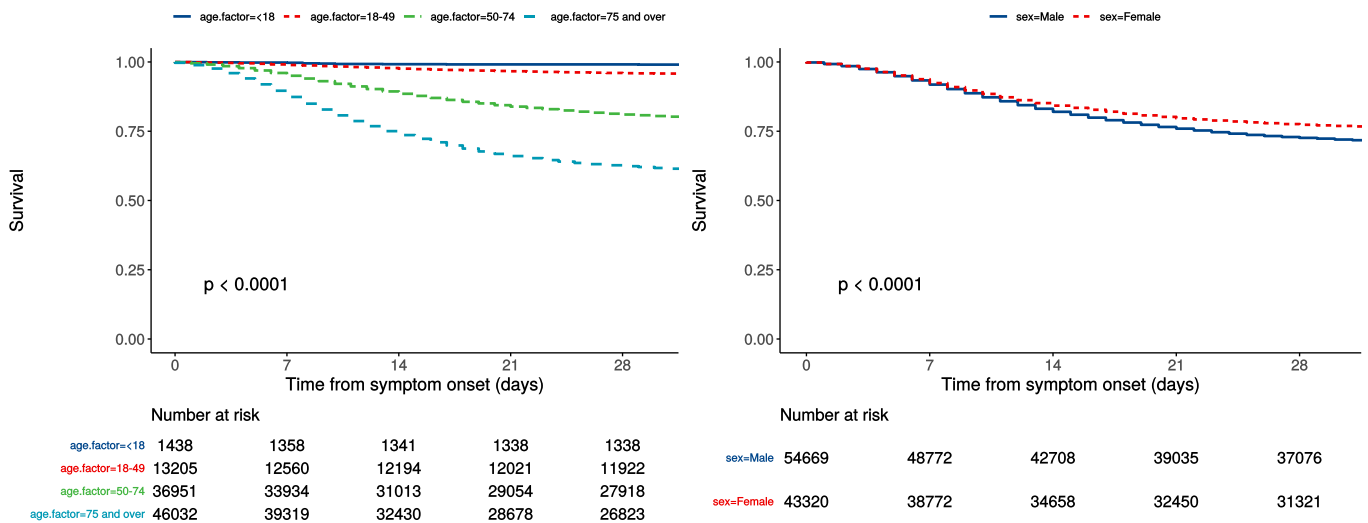
Cox proportional hazards model

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	14655 (15.0)	•	•
	50-69	26783 (27.4)	4.40 (4.04-4.78, p<0.001)	4.12 (3.72-4.56, p<0.001)
	70-79	21842 (22.4)	9.06 (8.35-9.83, p<0.001)	8.24 (7.46-9.12, p<0.001)
	80+	34367 (35.2)	12.50 (11.54-13.54, p<0.001)	11.06 (10.01-12.23, p<0.001)
Sex at Birth	Male	54681 (55.8)	•	•
	Female	43320 (44.2)	0.80 (0.78-0.82, p<0.001)	0.78 (0.76-0.81, p<0.001)
qSOFA score on admission	0	36406 (44.2)	•	•
	1	36581 (44.4)	1.63 (1.59-1.68, p<0.001)	1.75 (1.69-1.81, p<0.001)
	2	8524 (10.3)	3.23 (3.11-3.35, p<0.001)	2.98 (2.85-3.11, p<0.001)
	3	904 (1.1)	5.31 (4.88-5.78, p<0.001)	4.78 (4.34-5.26, p<0.001)
Symptomatic at presentation	No symptoms	6292 (6.7)	•	•
	Symptoms	88214 (93.3)	1.72 (1.62-1.83, p<0.001)	•
Chronic cardiac disease	NO	61107 (67.8)	•	•
	YES	28967 (32.2)	1.84 (1.79-1.88, p<0.001)	1.14 (1.11-1.18, p<0.001)
Chronic kidney disease	NO	74167 (82.8)	•	•
	YES	15368 (17.2)	1.79 (1.74-1.85, p<0.001)	1.23 (1.19-1.28, p<0.001)
Moderate or severe liver disease	NO	86975 (98.0)	•	•
	YES	1733 (2.0)	1.31 (1.21-1.42, p<0.001)	1.41 (1.28-1.56, p<0.001)
Chronic neurological disorder	NO	78031 (87.6)	•	•
	YES	11082 (12.4)	1.40 (1.35-1.45, p<0.001)	•
Malignant neoplasm	NO	79863 (89.8)	•	•
	YES	9084 (10.2)	1.69 (1.64-1.75, p<0.001)	1.35 (1.30-1.41, p<0.001)
Chronic hematologic disease	NO	85030 (95.7)	•	•
	YES	3812 (4.3)	1.37 (1.30-1.45, p<0.001)	•
Obesity (as defined by clinical staff)	NO	70350 (87.8)	•	•
	YES	9820 (12.2)	0.83 (0.80-0.87, p<0.001)	1.14 (1.09-1.20, p<0.001)

Dependent: Surv(time, status)		all	HR (univariable)	HR (multivariable)
Diabetes without complications	NO	72460 (84.3)	•	•
	YES	13462 (15.7)	1.27 (1.22-1.31, p<0.001)	•
Rheumatologic disorder	NO	78277 (88.3)	•	•
	YES	10385 (11.7)	1.19 (1.14-1.23, p<0.001)	•
Dementia	NO	75225 (84.3)	•	•
	YES	14044 (15.7)	2.07 (2.01-2.13, p<0.001)	1.17 (1.13-1.22, p<0.001)
Malnutrition	NO	81230 (97.3)	•	•
	YES	2225 (2.7)	1.48 (1.38-1.59, p<0.001)	•
smoking_mhyn_2levels	NO	51426 (56.1)	•	•
	YES	5094 (5.6)	0.87 (0.82-0.92, p<0.001)	•
	N/K	35164 (38.4)	1.21 (1.18-1.24, p<0.001)	•

Number in dataframe = 98430, Number in model = 67374, Missing = 31056, Number of events = 18203, Concordance = 0.725 (SE = 0.002), R-squared = 0.159(Max possible = 0.997), Likelihood ratio test = 11638.890 (df = 13, p = 0.000)

Figure 16a - Multivariable Cox proportional hazards model

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

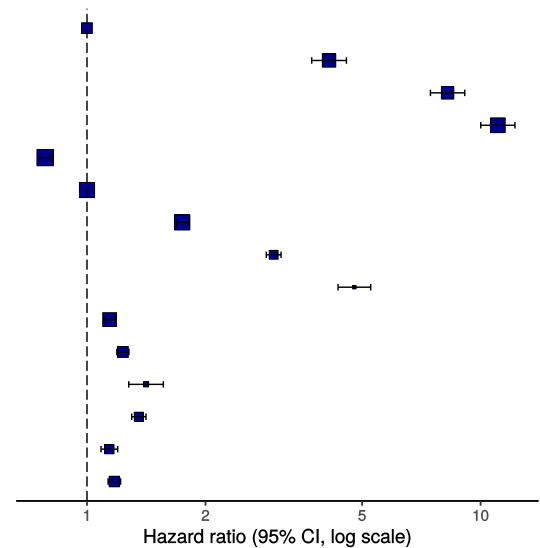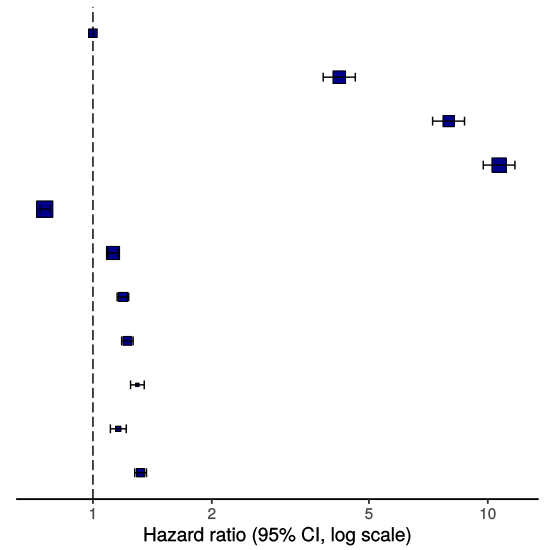| Age on admission (years) | <50 | - |
	50-69	4.12 (3.72-4.56, p<0.001)
	70-79	8.24 (7.46-9.12, p<0.001)
	80+	11.06 (10.01-12.23, p<0.001)
Sex at Birth	Female	0.78 (0.76-0.81, p<0.001)
qSOFA score on admission	0	-
	1	1.75 (1.69-1.81, p<0.001)
	2	2.98 (2.85-3.11, p<0.001)
	3	4.78 (4.34-5.26, p<0.001)
Chronic cardiac disease	YES	1.14 (1.11-1.18, p<0.001)
Chronic kidney disease	YES	1.23 (1.19-1.28, p<0.001)
Moderate or severe liver disease	YES	1.41 (1.28-1.56, p<0.001)
Malignant neoplasm	YES	1.35 (1.30-1.41, p<0.001)
Obesity (as defined by clinical staff)	YES	1.14 (1.09-1.20, 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	4.21 (3.83-4.62, p<0.001)
	70-79	7.96 (7.25-8.73, p<0.001)
	80+	10.68 (9.74-11.72, p<0.001)
Sex at Birth	Female	0.76 (0.73-0.78, 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 (1.18-1.26, p<0.001)
Malignant neoplasm	YES	1.30 (1.25-1.35, p<0.001)
Obesity (as defined by clinical staff)	YES	1.16 (1.11-1.21, p<0.001)
Dementia	YES	1.32 (1.28-1.37, p<0.001)

Hazard ratio (95% CI, log scale)

ROC = 0.7253384

Figure 17 - Predictions calibration plot

Black: observed Gray: ideal
Blue : optimism corrected

Predicted 7 Day Survival $_{B=40 based on observed-predicted}$
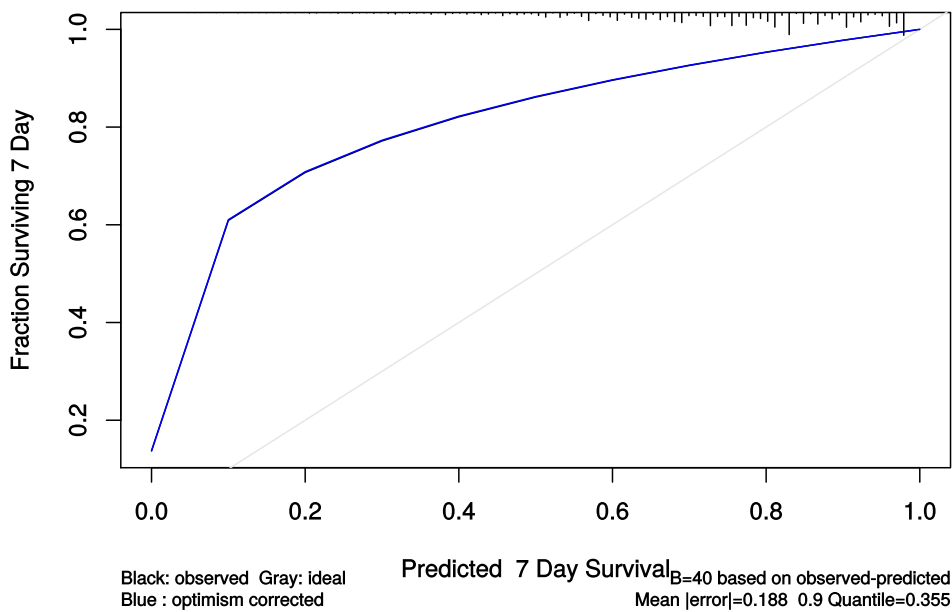Mean |error|=0.188 0.9 Quantile=0.355

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
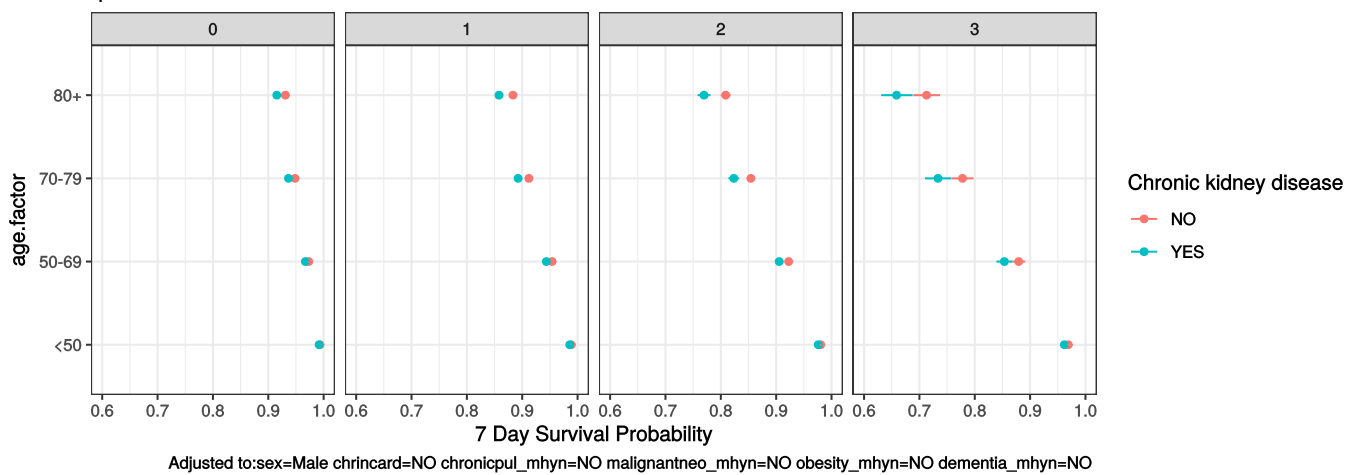
Figure 19 - Death by severity (NEWS) on admission
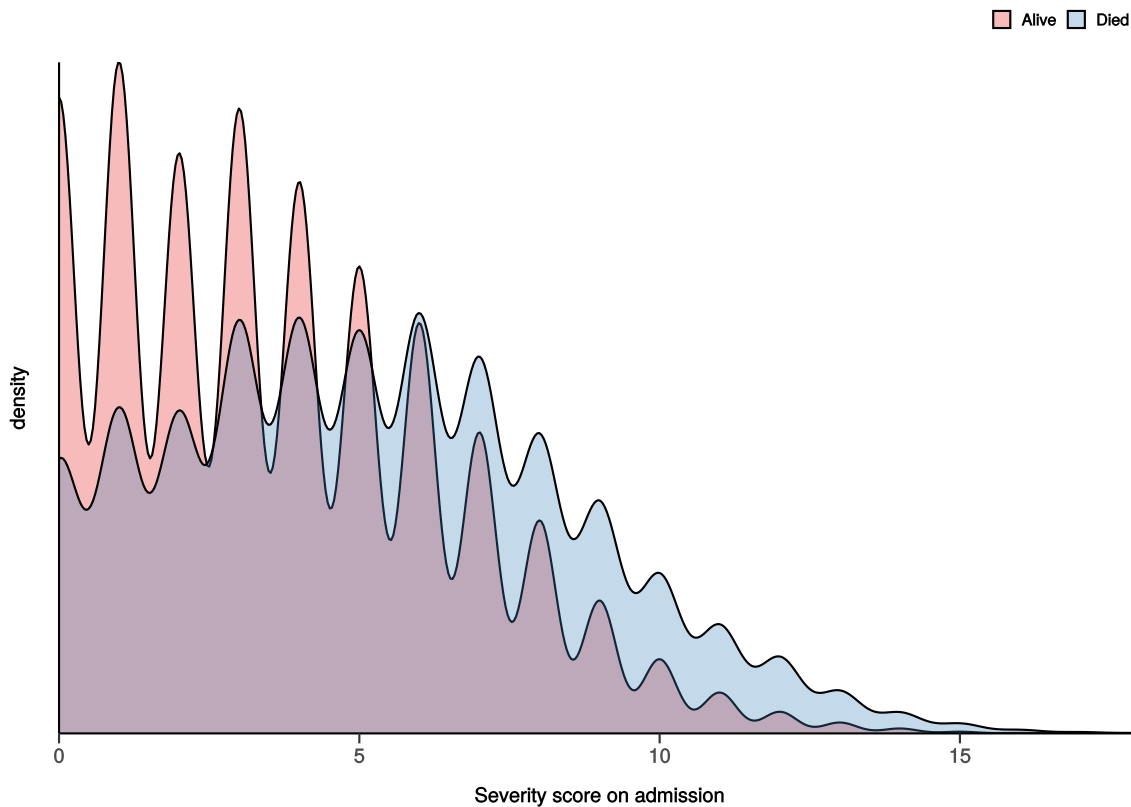
Number of deaths by NEWS score at admission

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

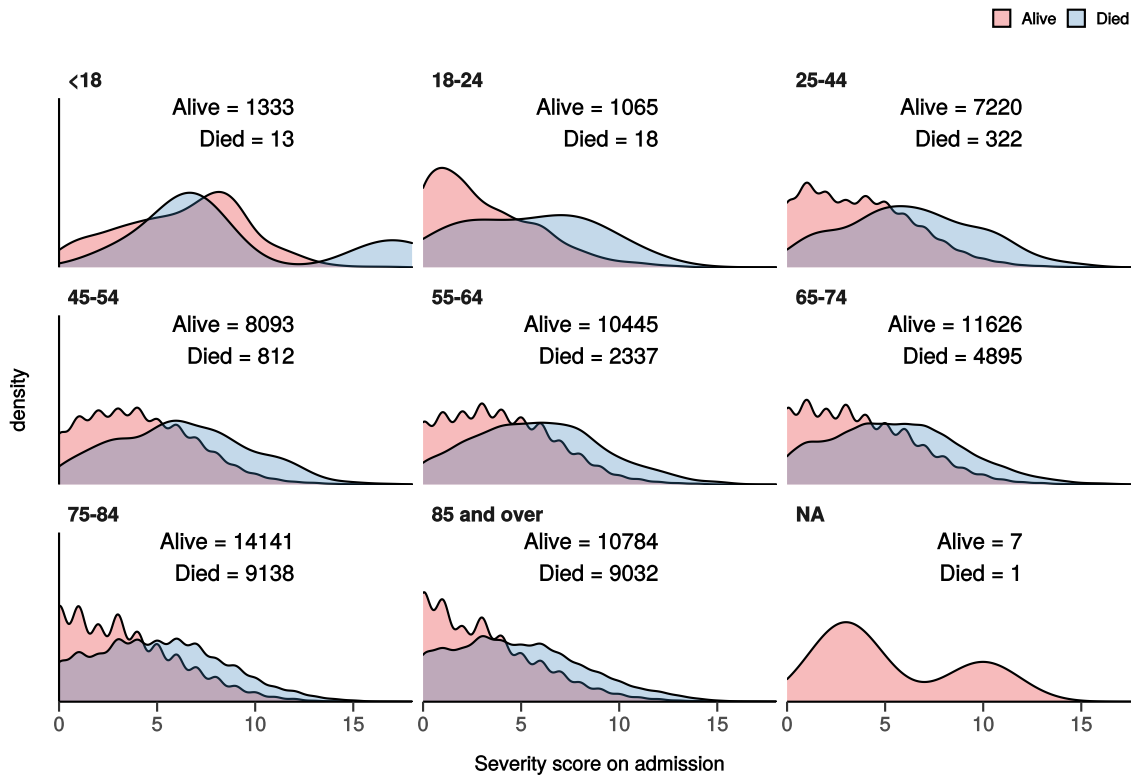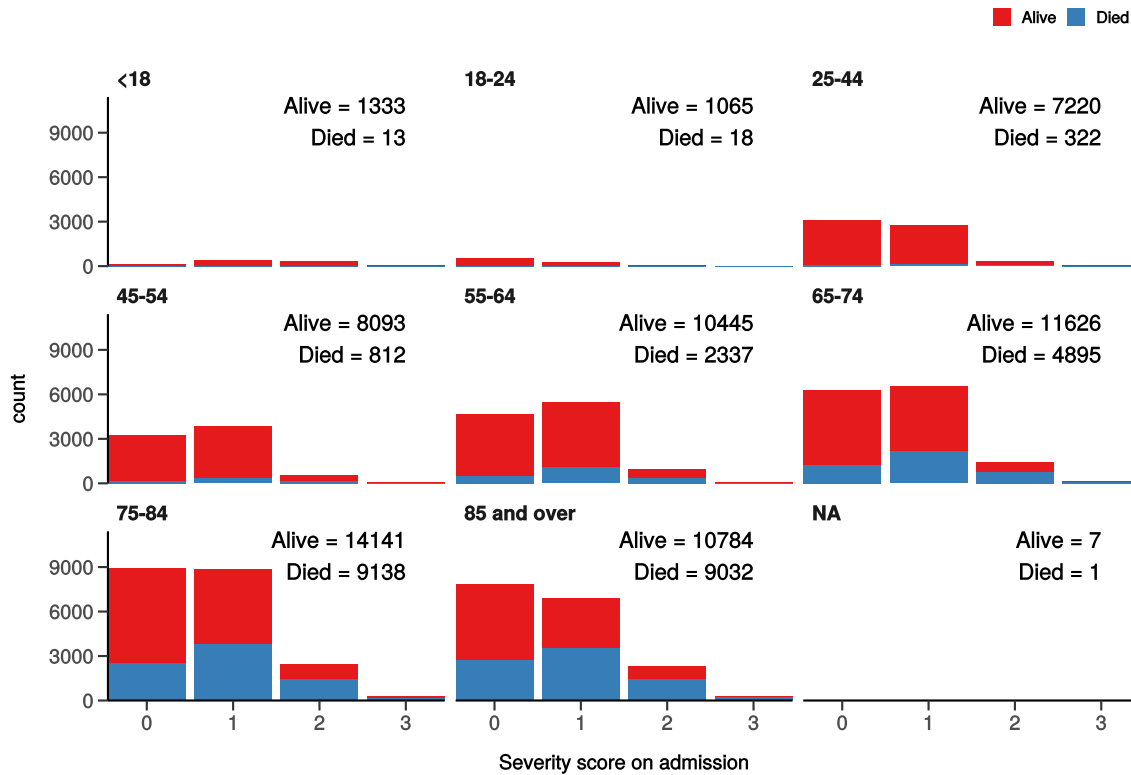Number of deaths by NEWS score at admission
Stratified by age

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
Total N (%)		85136 (95.6)	3874 (4.4)	
NEWS score on admission	Median (IQR)	4.0 (4.0)	4.0 (4.0)	<0.001
Death	No	53712 (68.9)	3452 (92.8)	<0.001
	Yes	24256 (31.1)	266 (7.2)	