

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

Executive summary

Includes patients admitted after 01 August 2020

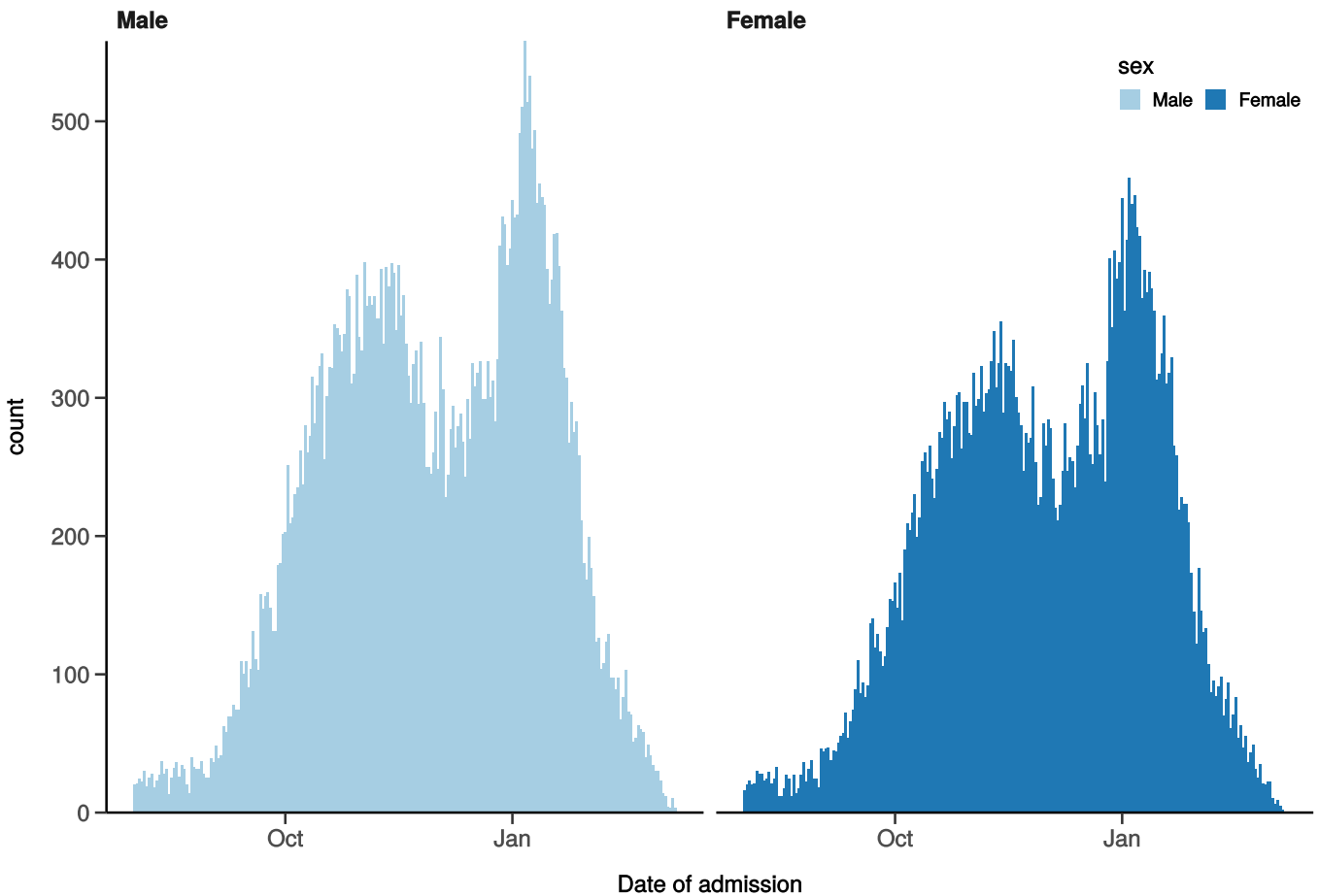
There are 88699 patients included in CO-CIN. Of these, 16799 patient(s) have died and 15089 required ICU. 50132 have been discharged home.

Admission

Figure 1

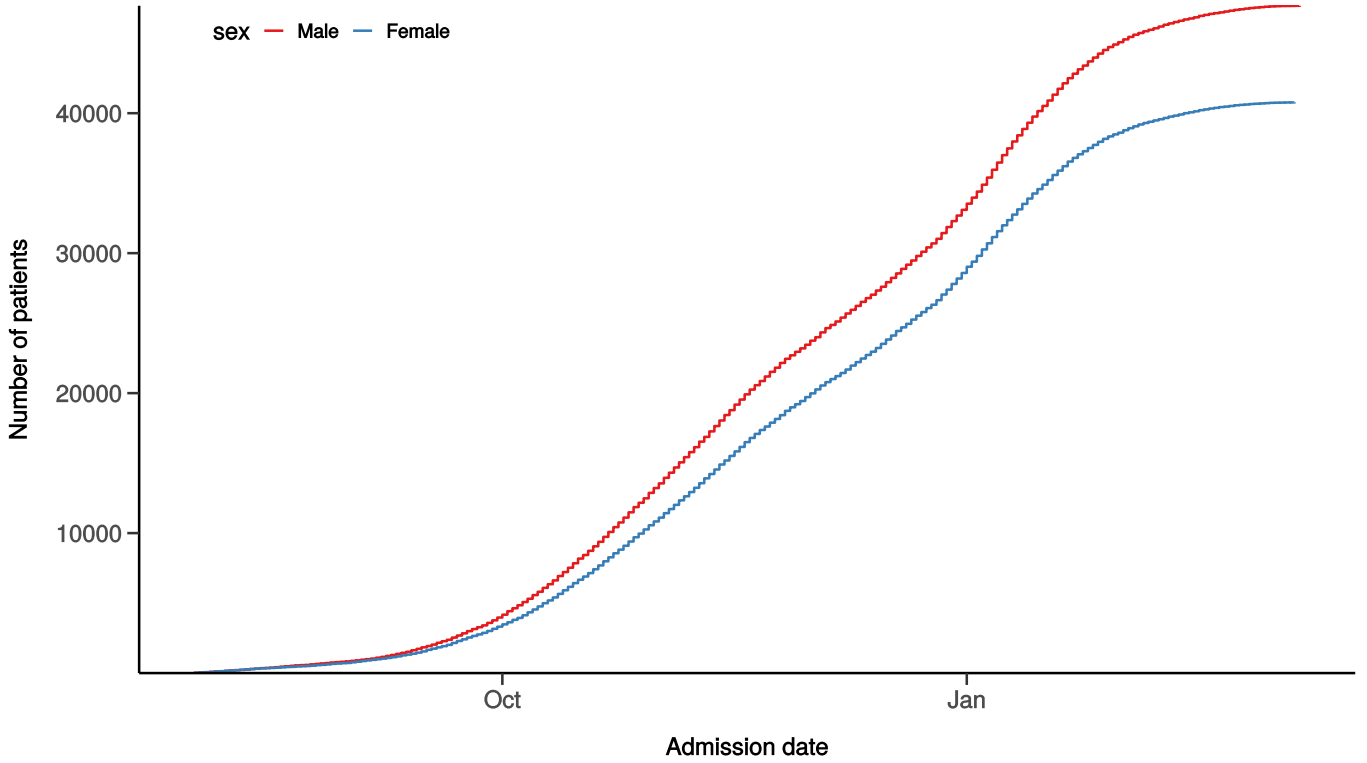
Hospital admission with COVID-19 by sex

Figure 1A



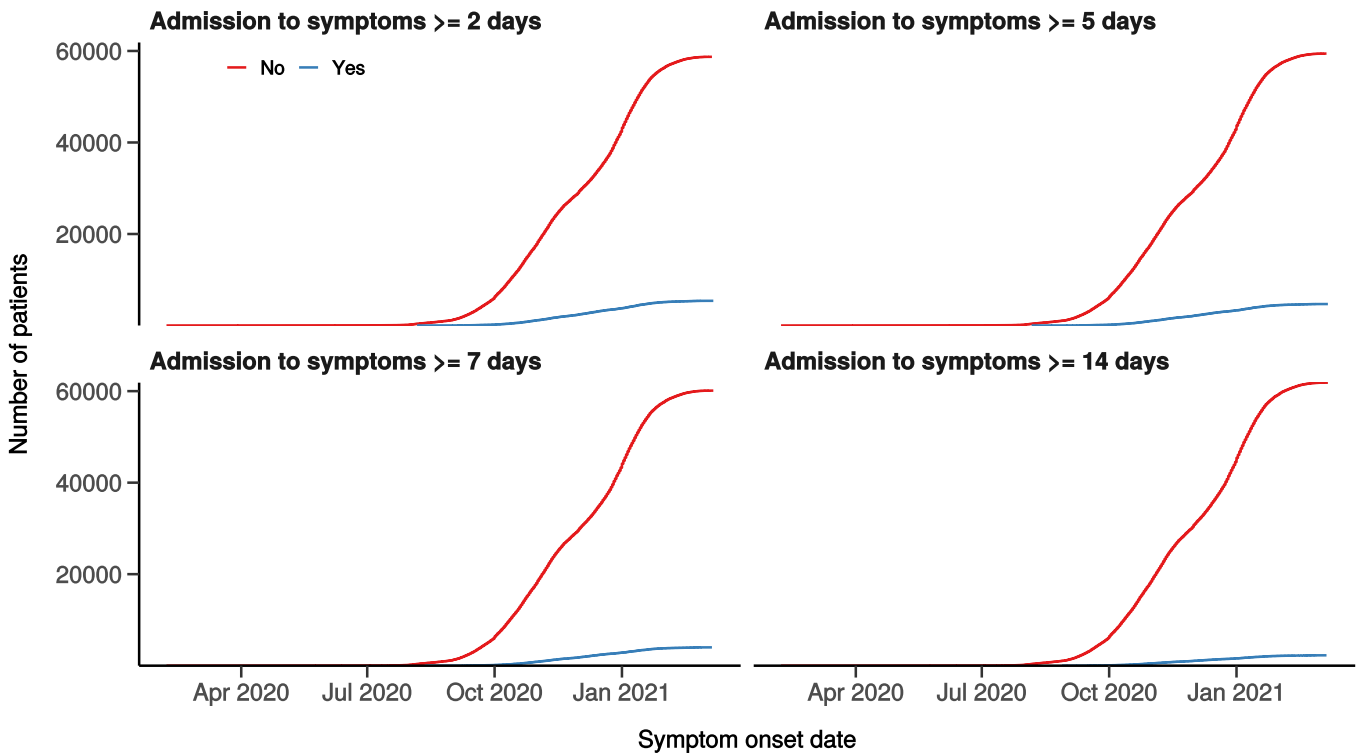
Hospital admission with COVID-19 by sex

Figure 1B



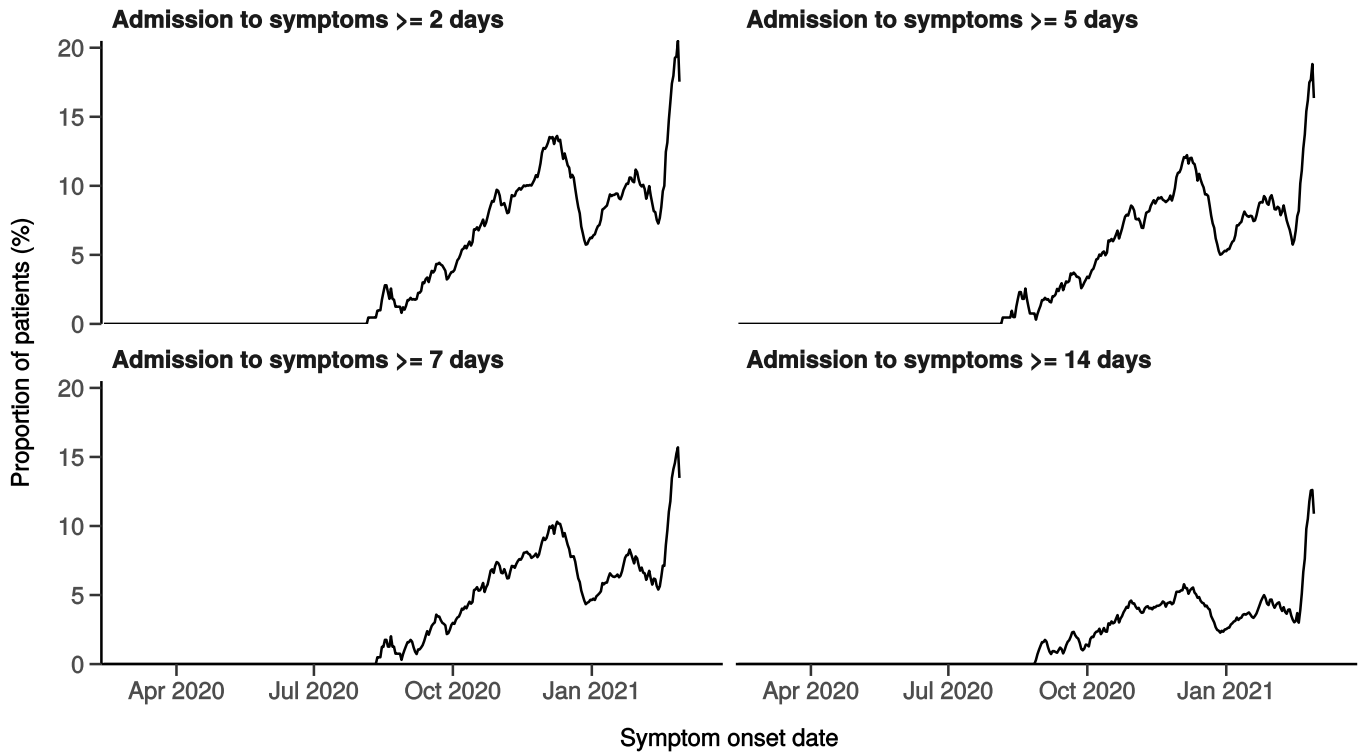
Number with symptom onset occurring after admission to hospital

Figure 1C



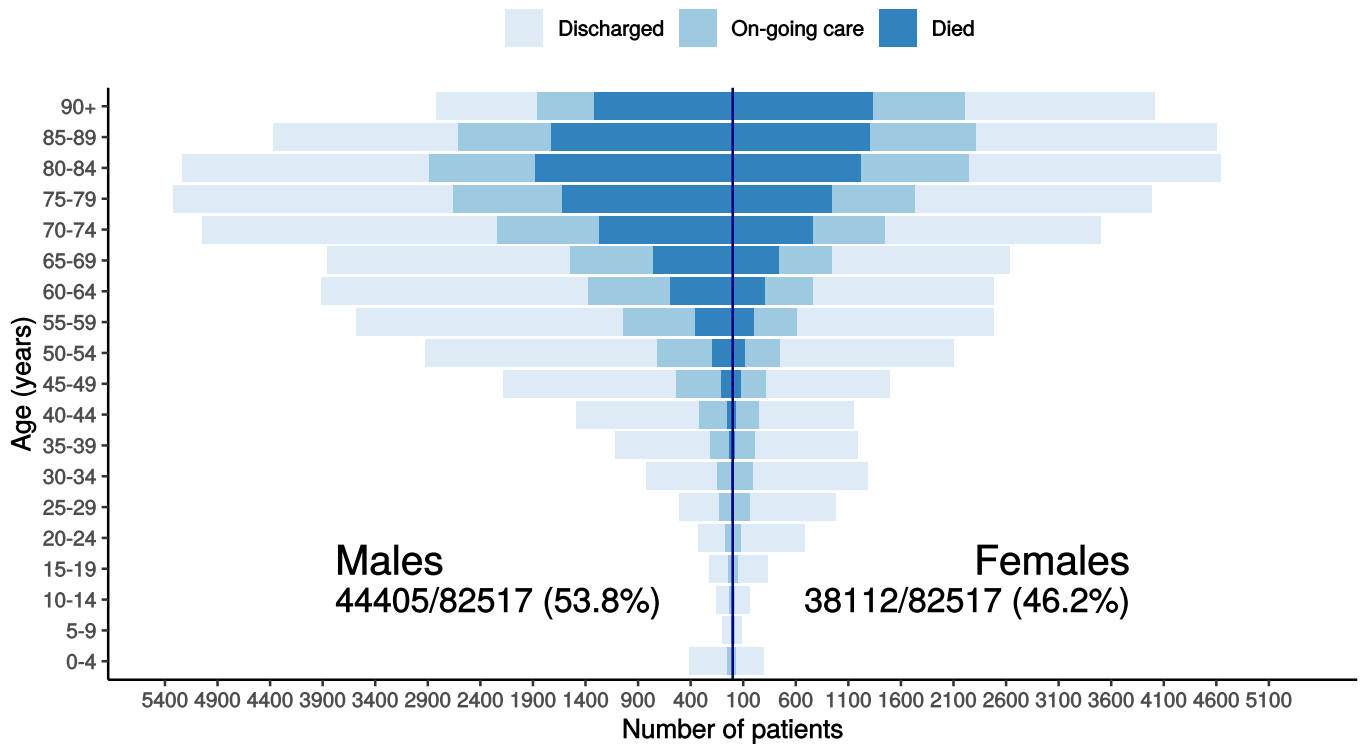
Proportion with symptom onset occurring after hospital admission

Figure 1D - 7-day rolling percentage. n = 64115



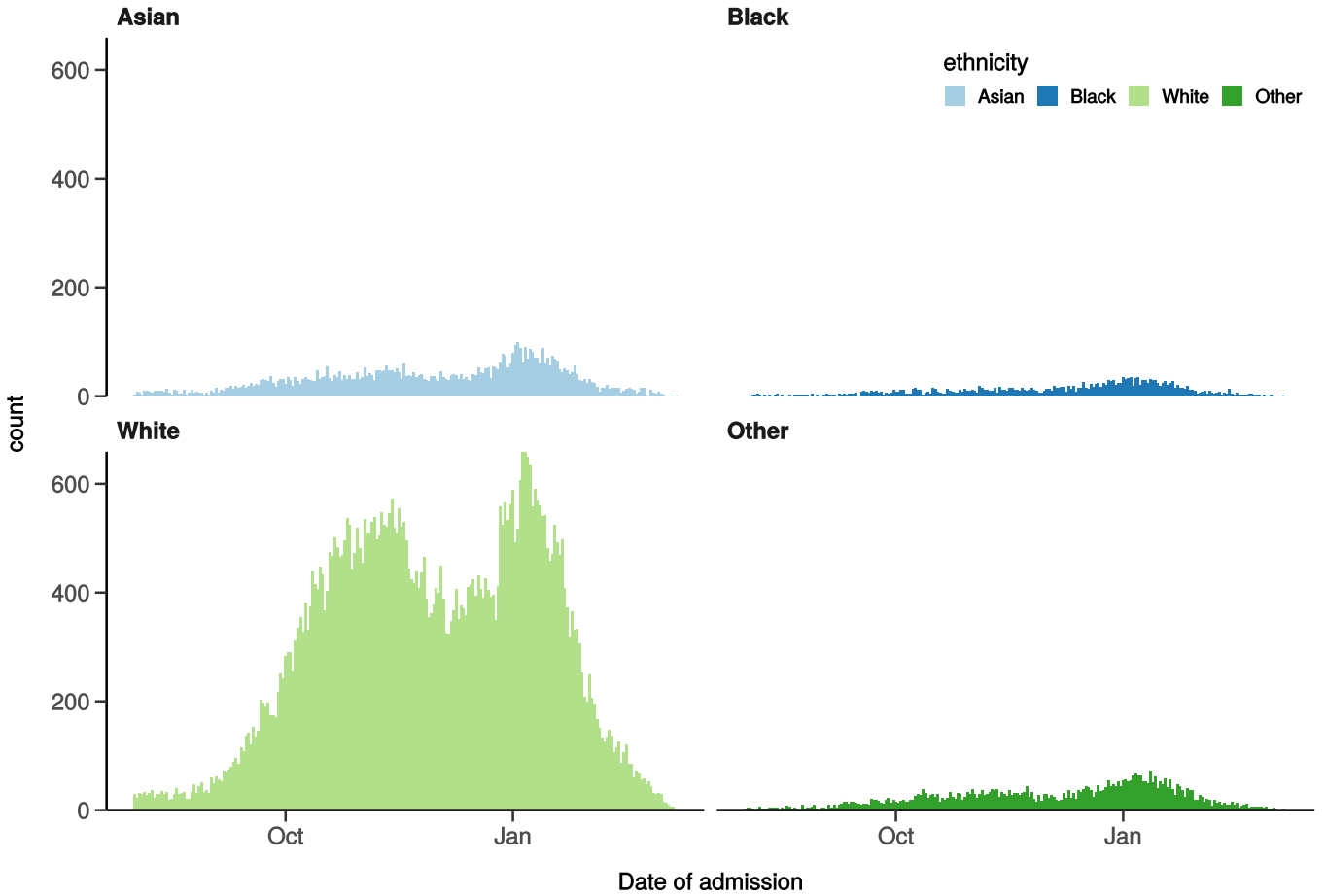
Patients with outcome stratified by age, and sex

Figure 1E



Hospital admission with COVID-19 by ethnicity

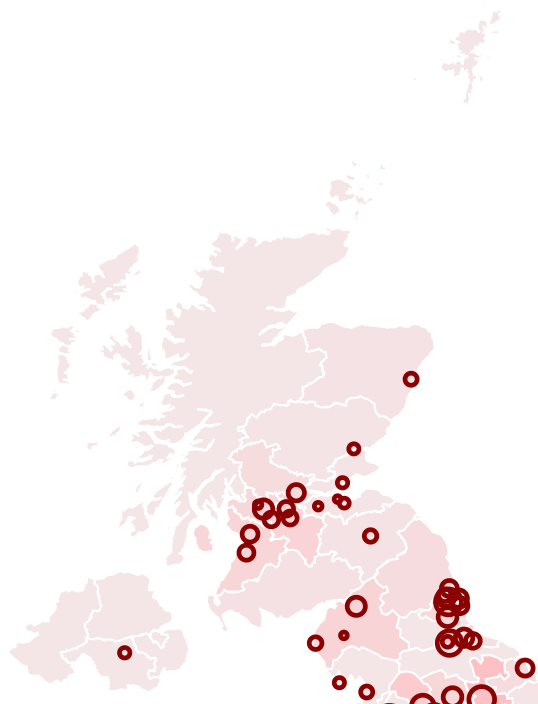
Figure 1F



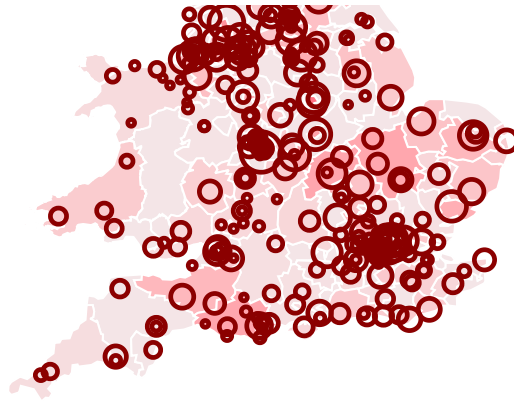
Location by CCG / Healthboard

Figure 2

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



n = 88019



Symptoms and comorbidity

Figure 3A

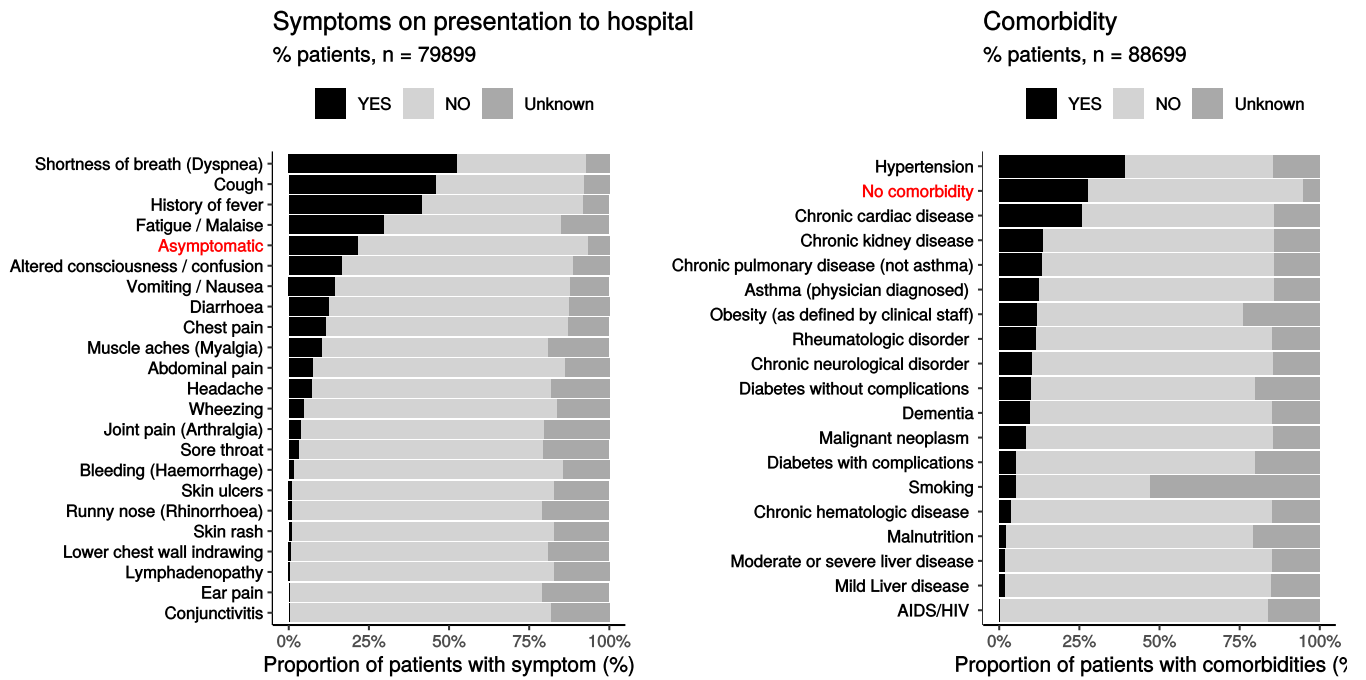


Figure 3B - Symptoms by Age

Symptoms on presentation to hospital
Stratified by age

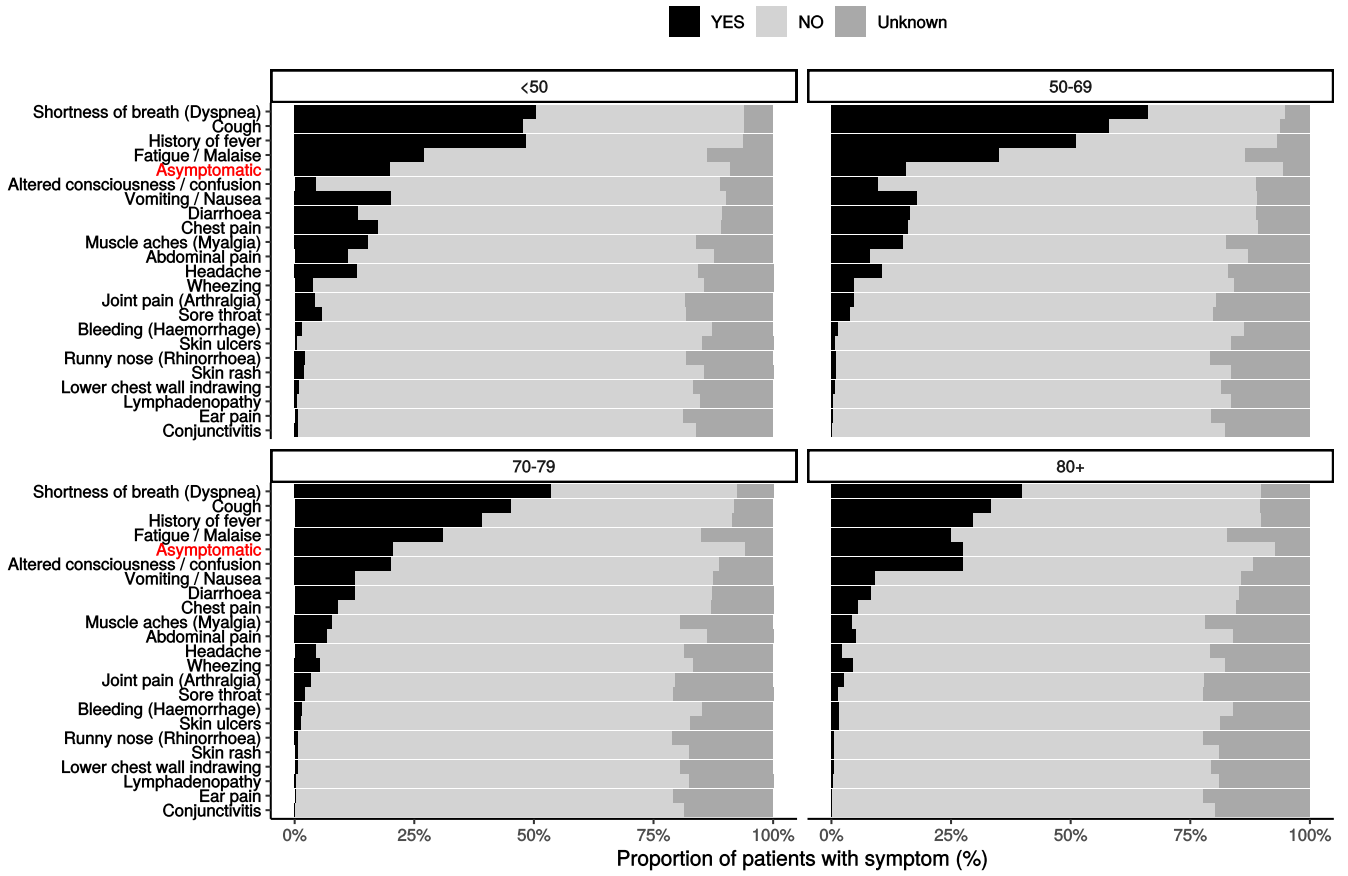
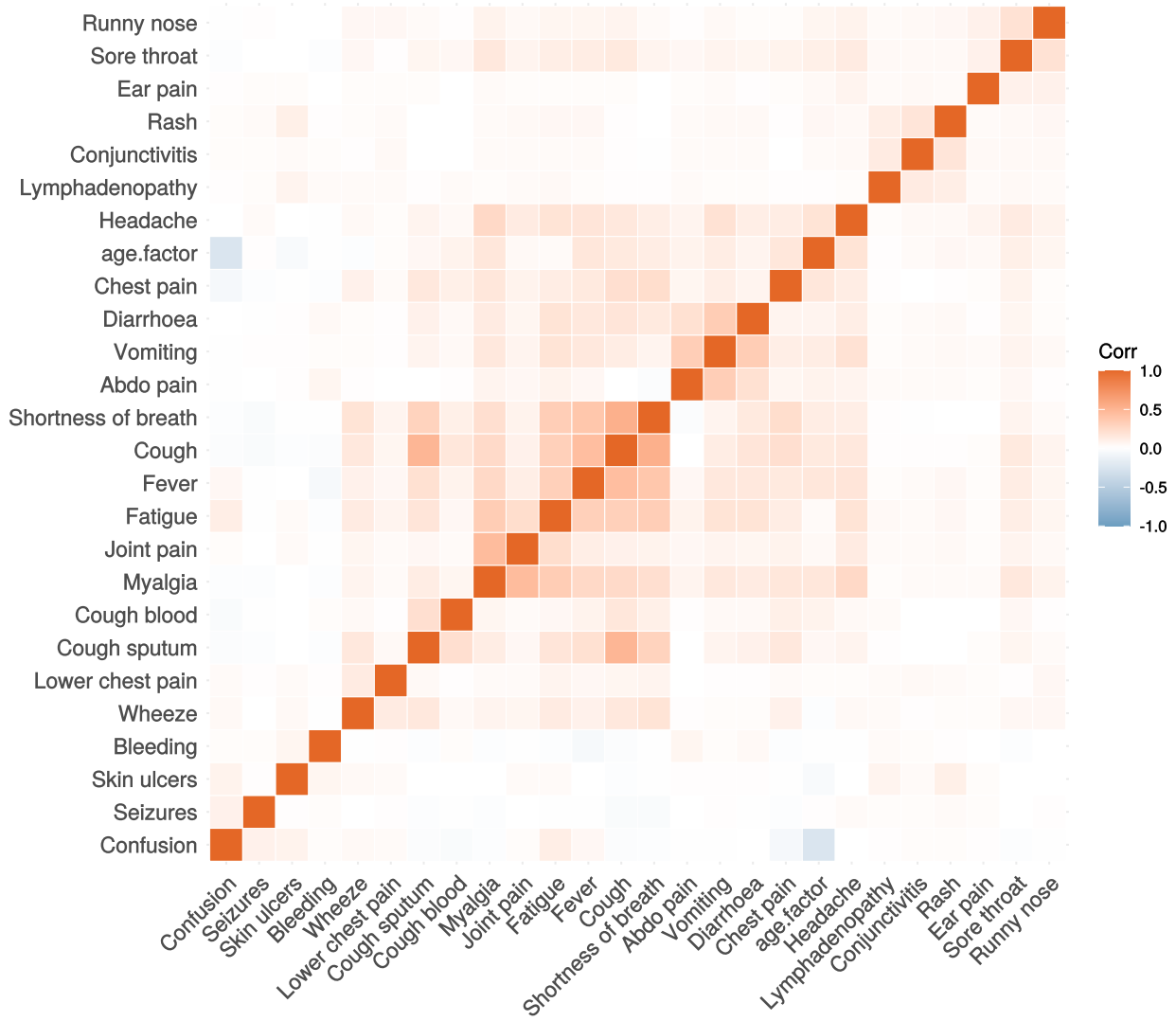


Figure 3C

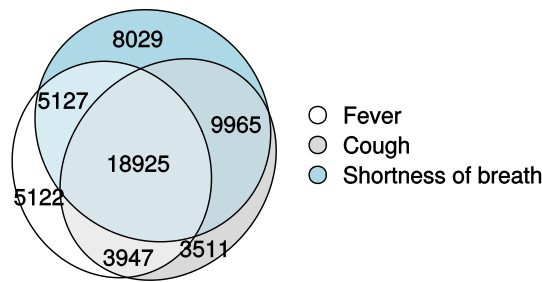
Correlation of symptoms in all pages. Note clusters, top right to bottom left, flu-like, coryzal, abdominal, respiratory, neurocutaneous.



Symptoms (diagnostic criteria)

Figure 4A

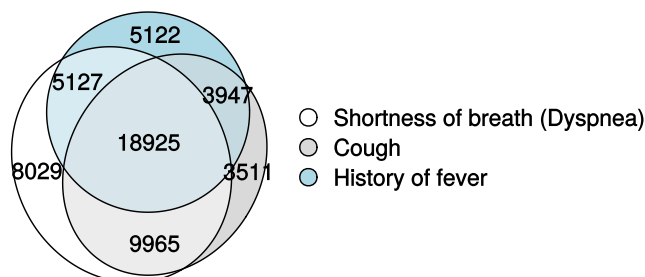
n = 79899



Symptoms (most common)

Figure 4B

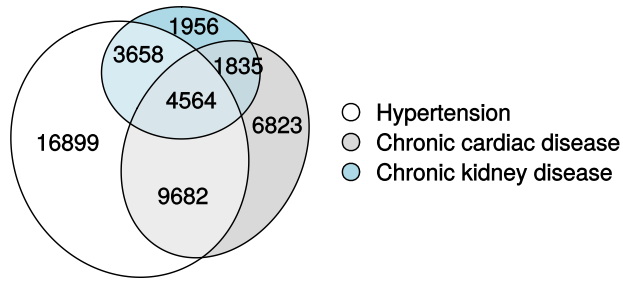
n = 79899



Comorbidity (most common)

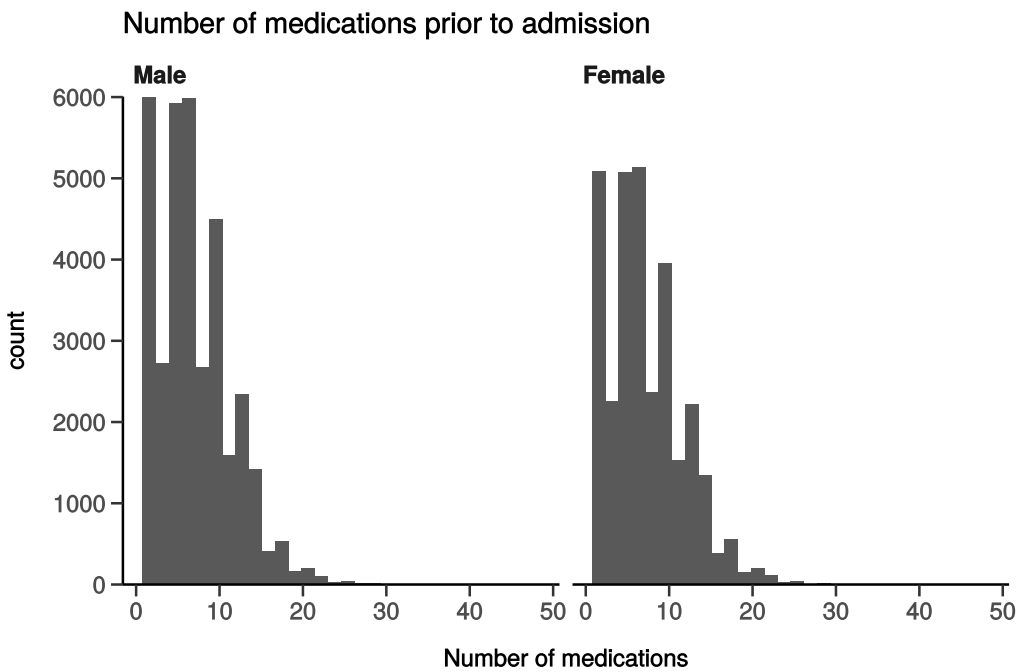
Figure 4C

n = 88699



Medication prior to illness

Figure 5

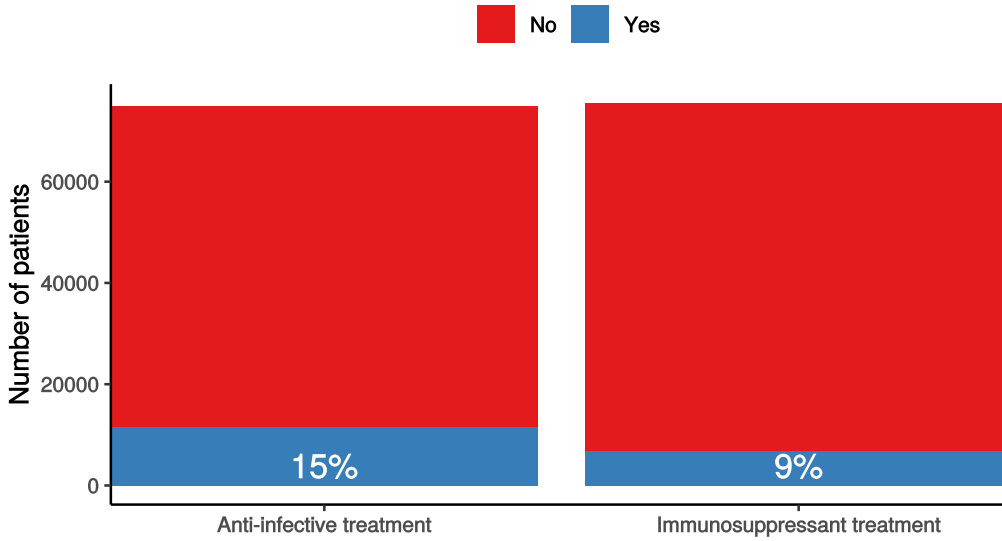


Preadmission treatment

Figure 6

Pre-admission treatment

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



Patient flow

Figure 7A - All patients

N = 83808

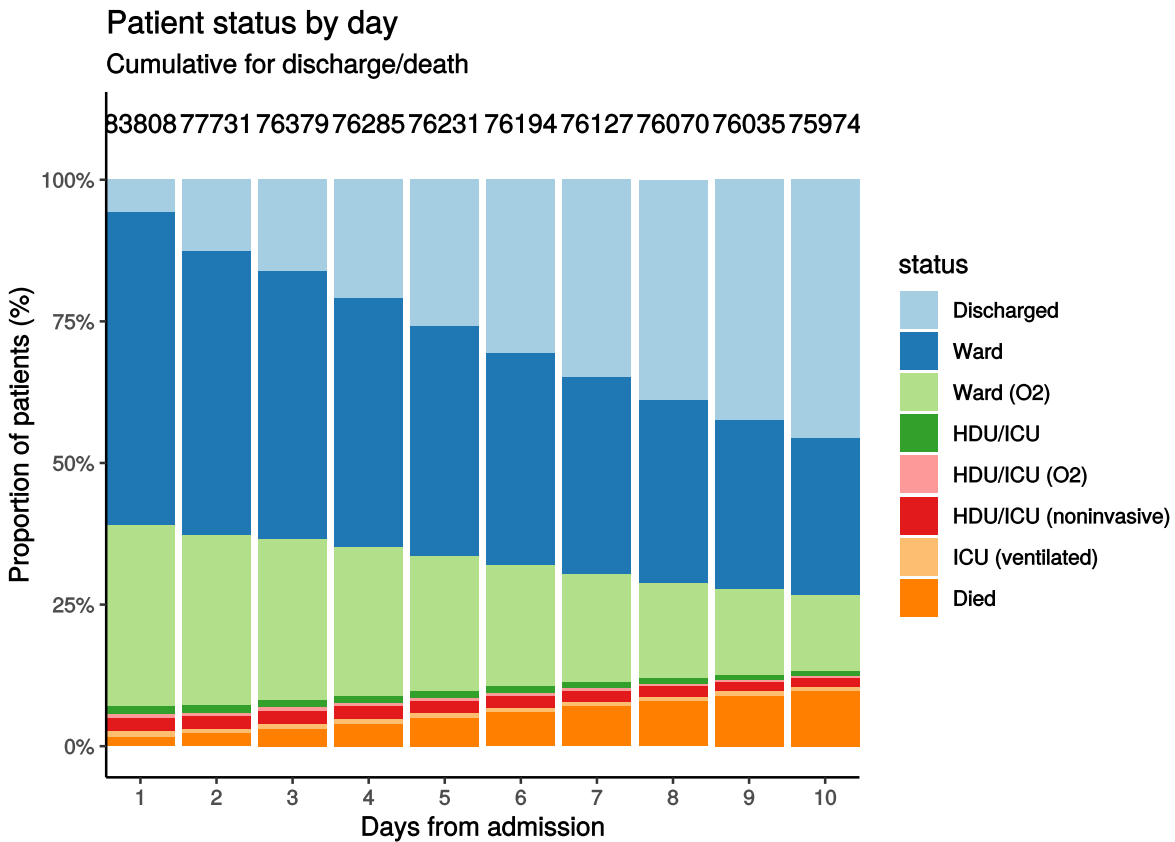
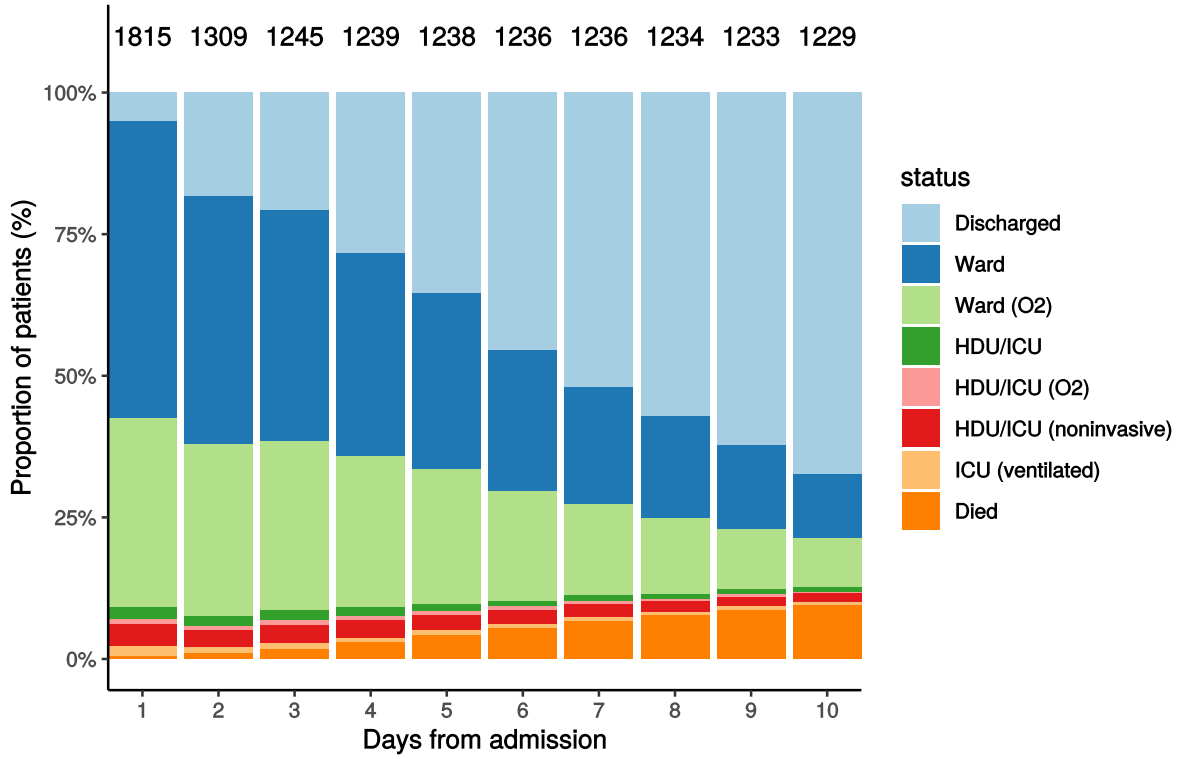


Figure 7B - Patients admitted ≥ 14 days and ≤ 28 days ago

N = 1815

Patient status by day

Cumulative for discharge/death



Oxygen requirement

Figure 8A - All patients

N = 78943

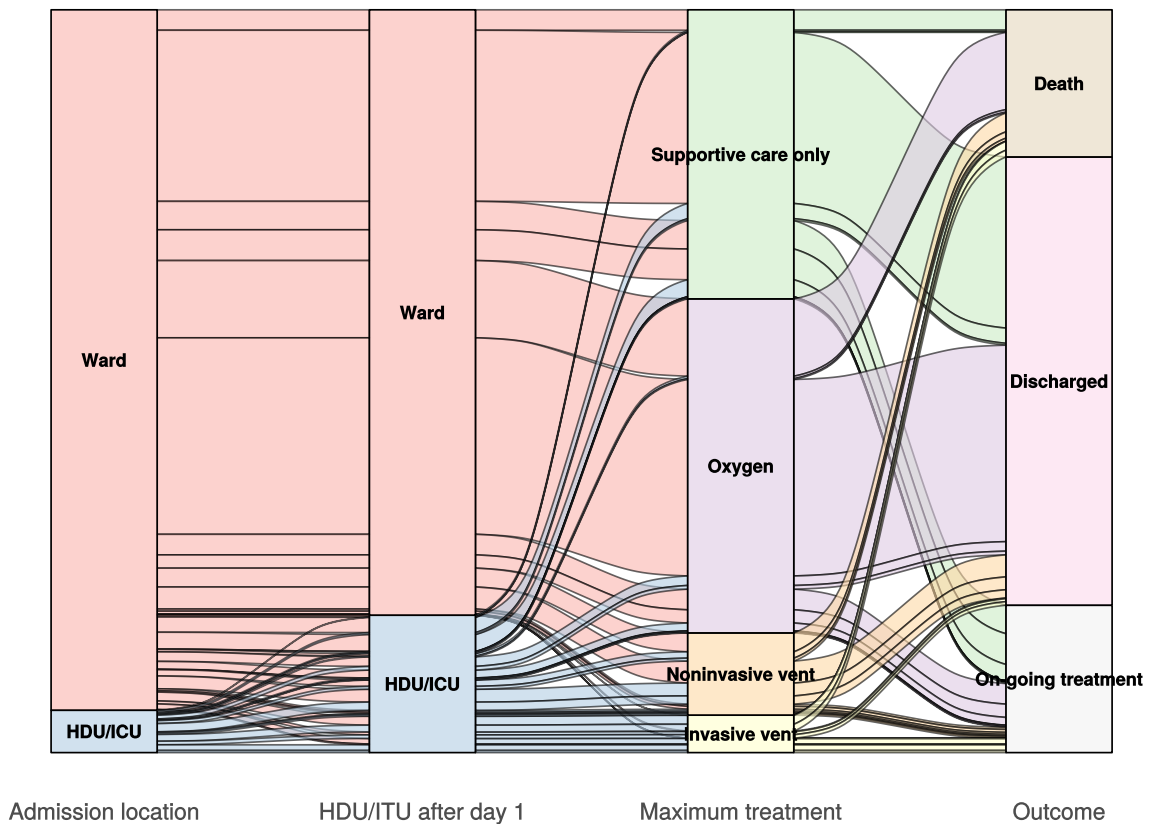


Figure 8B - Patients admitted ≥ 14 days and ≤ 28 days ago

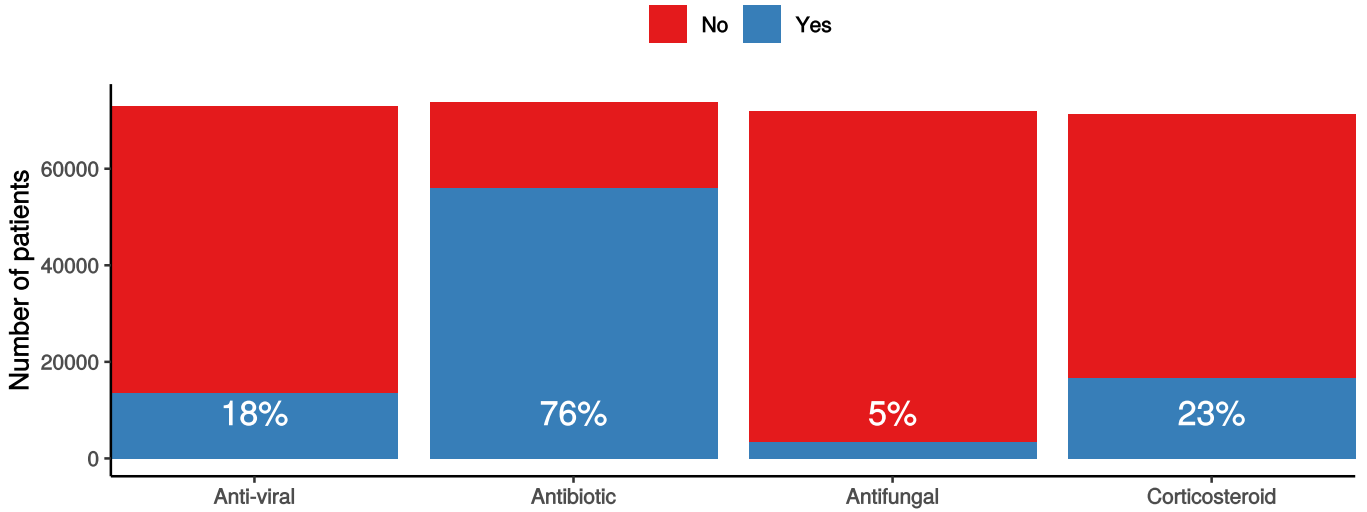
N = 1746

In-hospital medical treatment

Figure 9

In-hospital treatment

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



Treatment

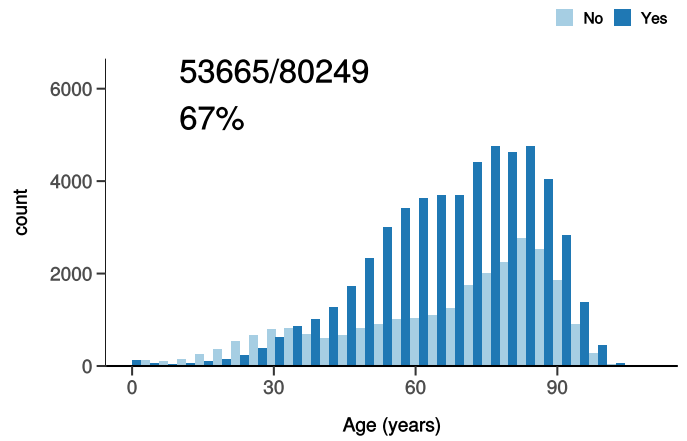
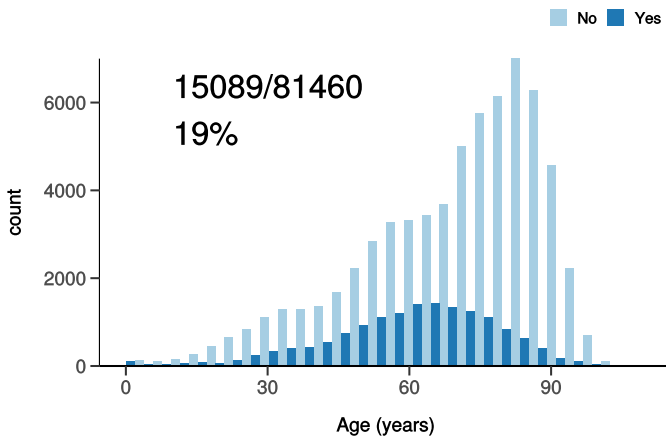
Figure 10

ICU/HDU admission

Figure 10A

High flow oxygen

Figure 10B

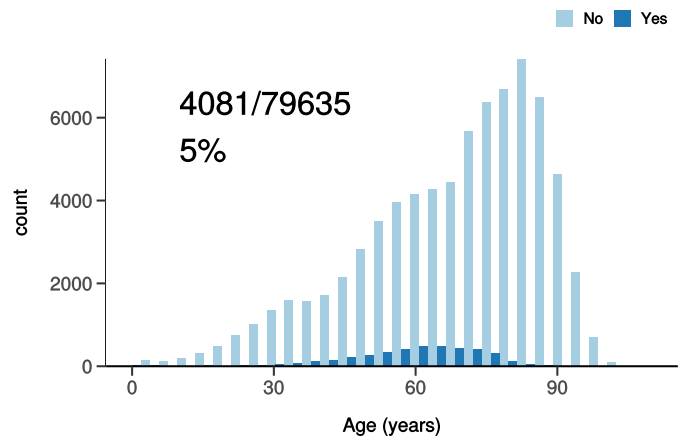
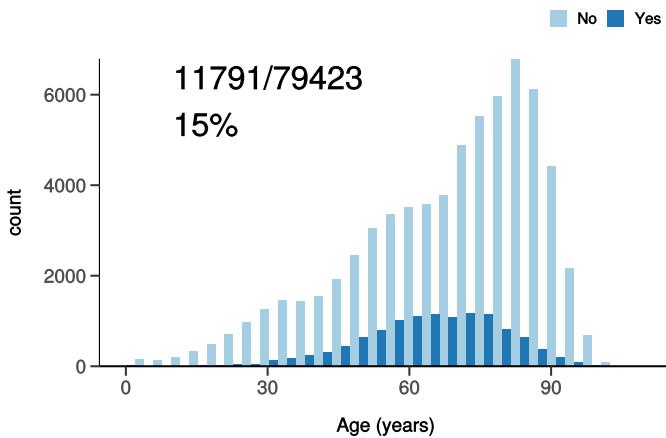


Noninvasive ventilation

Figure 10C

Invasive ventilation

Figure 10D

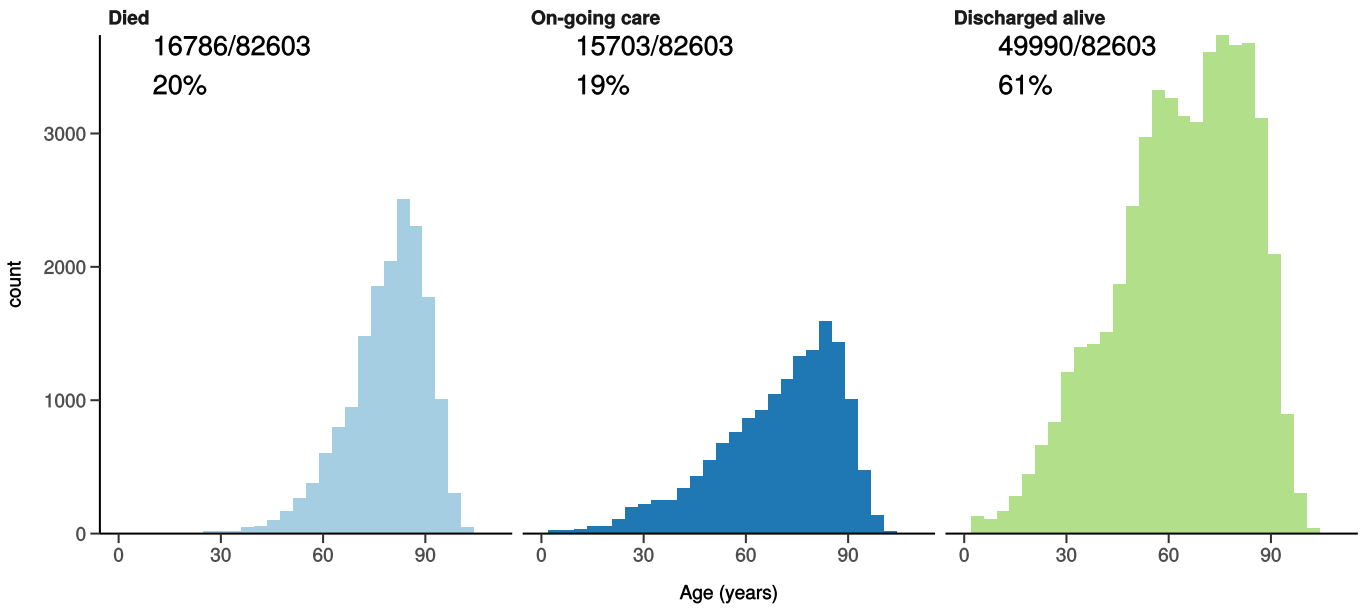


Status in patients admitted ≥ 14 days from today

Figure 11

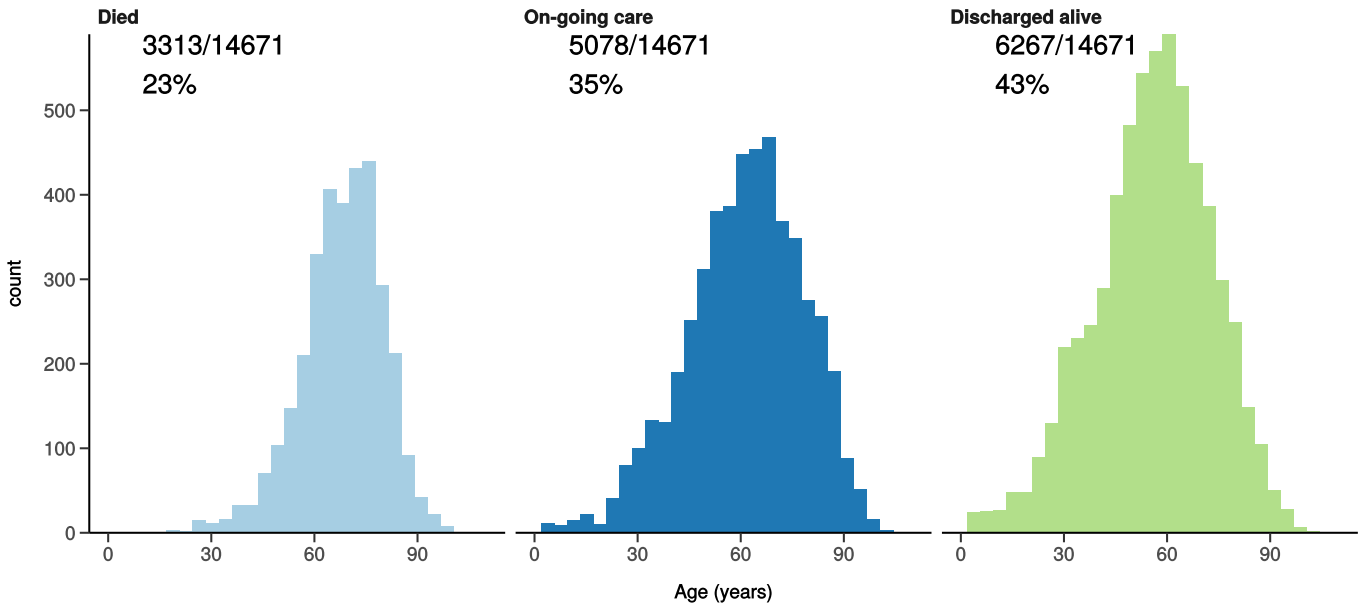
All: status in patients admitted ≥ 14 days ago

Figure 11A



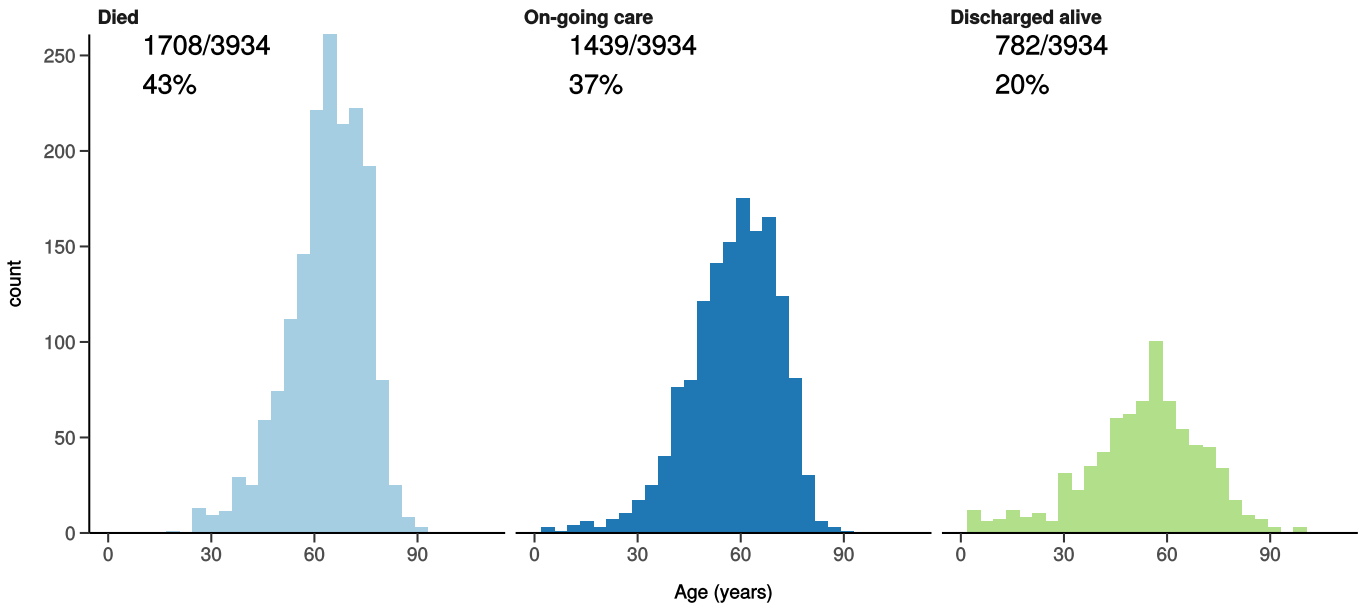
ICU/HDU admissions: status in patients admitted ≥ 14 days ago

Figure 11B



Invasive ventilation: status in patients admitted ≥ 14 days ago

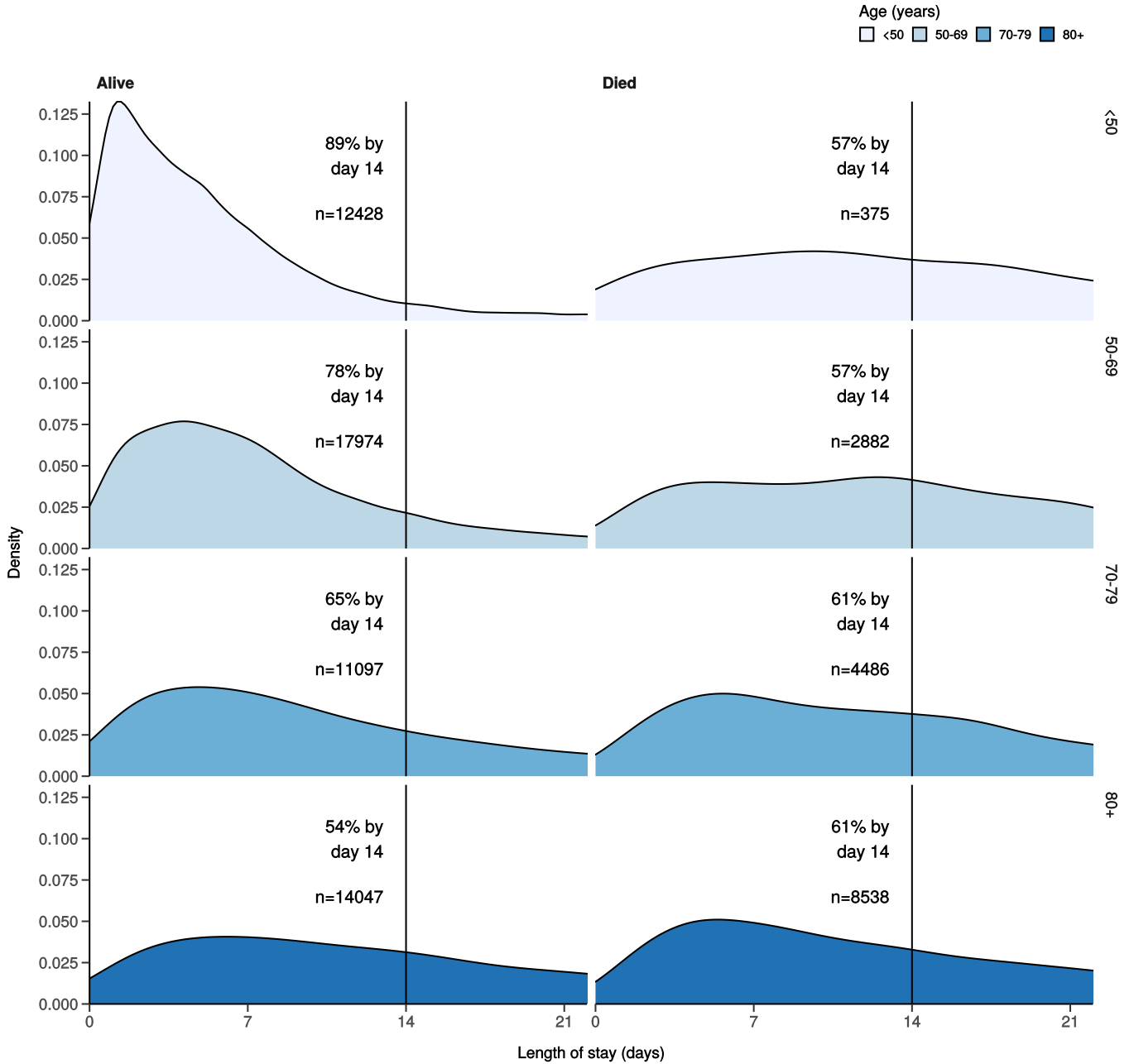
Figure 11c



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	13681 (97.2)	388 (2.8)	•	•
	50-69	19267 (86.7)	2965 (13.3)	5.43 (4.88-6.05, p<0.001)	4.62 (4.10-5.22, p<0.001)

Dependent: death		No	Yes	OR (univariable)	OR (multivariable)
	70-79	12019 (72.3)	4597 (27.7)	13.49 (12.14-15.02, p<0.001)	9.91 (8.79-11.21, p<0.001)
	80+	15197 (63.4)	8791 (36.6)	20.40 (18.40-22.67, p<0.001)	14.83 (13.17-16.77, p<0.001)
Sex at Birth	Male	31362 (75.9)	9960 (24.1)	•	•
	Female	28830 (80.9)	6793 (19.1)	0.74 (0.72-0.77, p<0.001)	0.69 (0.66-0.72, p<0.001)
	Not specified	0 (NaN)	0 (NaN)	•	•
Chronic cardiac disease	NO	40504 (83.2)	8193 (16.8)	•	•
	YES	14201 (67.6)	6807 (32.4)	2.37 (2.28-2.46, p<0.001)	1.20 (1.14-1.26, p<0.001)
Chronic pulmonary disease (not asthma)	NO	47627 (80.9)	11260 (19.1)	•	•
	YES	7118 (65.7)	3714 (34.3)	2.21 (2.11-2.31, p<0.001)	1.56 (1.48-1.64, p<0.001)
Chronic neurological disorder	NO	48485 (79.4)	12583 (20.6)	•	•
	YES	5981 (72.6)	2254 (27.4)	1.45 (1.38-1.53, p<0.001)	1.03 (0.96-1.09, p=0.439)
Chronic hematologic disease	NO	52280 (78.8)	14026 (21.2)	•	•
	YES	2126 (72.8)	796 (27.2)	1.40 (1.28-1.52, p<0.001)	0.90 (0.81-0.99, p=0.033)
Chronic kidney disease	NO	47456 (81.1)	11038 (18.9)	•	•
	YES	7163 (64.9)	3869 (35.1)	2.32 (2.22-2.43, p<0.001)	1.32 (1.25-1.40, p<0.001)
Dementia	NO	49452 (80.8)	11765 (19.2)	•	•
	YES	4879 (62.6)	2915 (37.4)	2.51 (2.39-2.64, p<0.001)	1.37 (1.29-1.46, p<0.001)
Obesity (as defined by clinical staff)	NO	41252 (78.6)	11221 (21.4)	•	•
	YES	7725 (81.7)	1732 (18.3)	0.82 (0.78-0.87, p<0.001)	1.18 (1.10-1.25, p<0.001)

Dependent: death		No	Yes	OR (univariable)	OR (multivariable)
Malignant neoplasm	NO	50185 (80.2)	12403 (19.8)	•	•
	YES	4260 (63.6)	2442 (36.4)	2.32 (2.20-2.45, p<0.001)	1.66 (1.56-1.77, p<0.001)

Number in dataframe = 88015, Number in model = 59281, Missing = 28734, AIC = 52472.1, C-statistic = 0.746, H&L = Chi-sq(8) 210.64 (p<0.001)

Figure 13 - Adjusted odds ratio plot

Death

Age on admission (years)	<50	-
	50-69	4.62 (4.10-5.22, p<0.001)
	70-79	9.91 (8.79-11.21, p<0.001)
	80+	14.83 (13.17-16.77, p<0.001)
Sex at Birth	Male	-
	Female	0.69 (0.66-0.72, p<0.001)
	Not specified	-
Chronic cardiac disease	YES	1.20 (1.14-1.26, p<0.001)
Chronic pulmonary disease (not asthma)	YES	1.56 (1.48-1.64, p<0.001)
Chronic neurological disorder	YES	1.03 (0.96-1.09, p=0.439)
Chronic hematologic disease	YES	0.90 (0.81-0.99, p=0.033)
Chronic kidney disease	YES	1.32 (1.25-1.40, p<0.001)
Dementia	YES	1.37 (1.29-1.46, p<0.001)
Obesity (as defined by clinical staff)	YES	1.18 (1.10-1.25, p<0.001)
Malignant neoplasm	YES	1.66 (1.56-1.77, p<0.001)

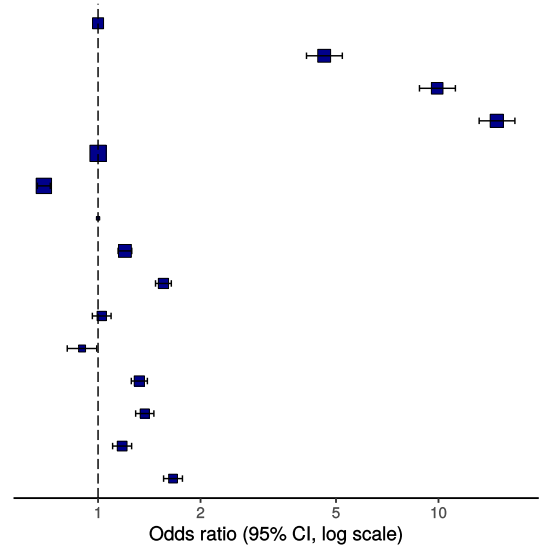
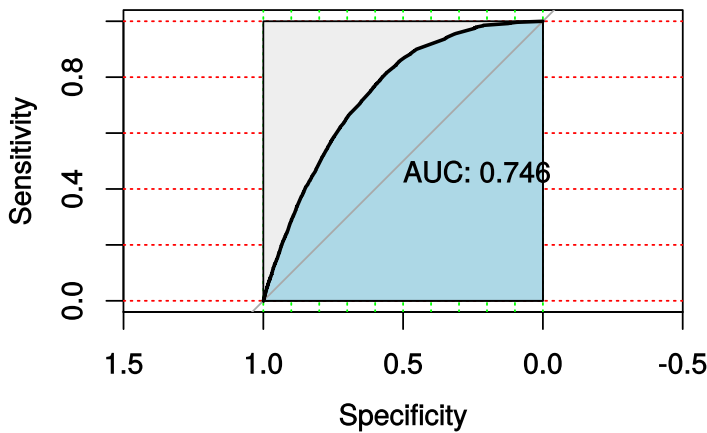


Figure 14 - ROC

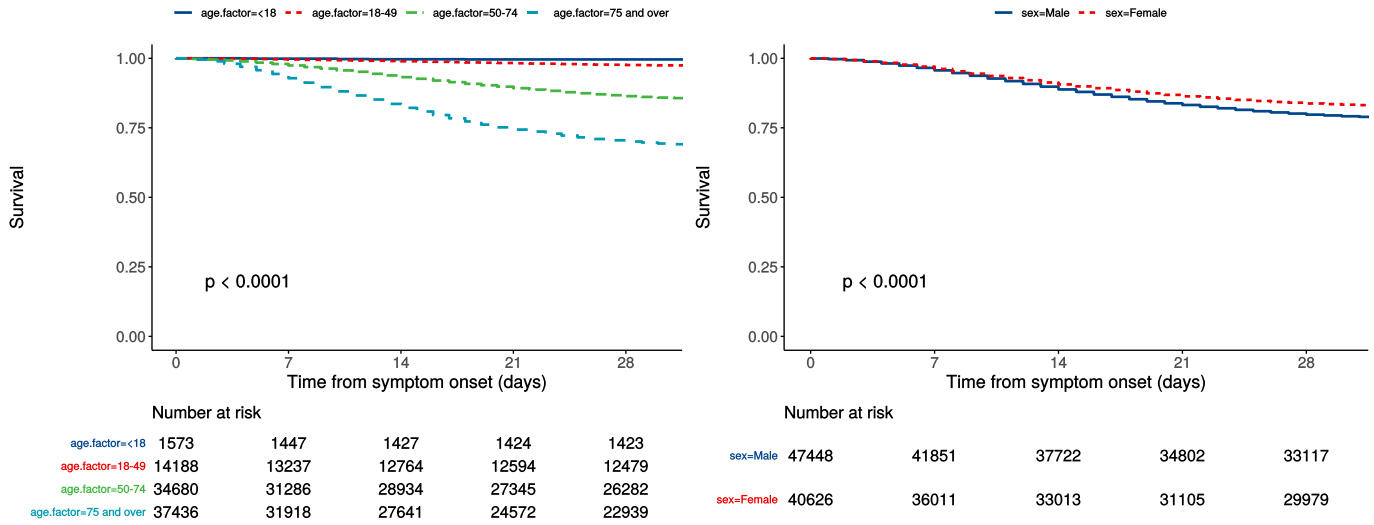


Survival models

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	15789 (18.0)	•	•
	50-69	25556 (29.1)	5.07 (4.56-5.63, p<0.001)	4.39 (3.87-4.99, p<0.001)
	70-79	19129 (21.7)	11.56 (10.42-12.83, p<0.001)	9.59 (8.46-10.86, p<0.001)
	80+	27478 (31.2)	16.50 (14.91-18.27, p<0.001)	13.67 (12.06-15.48, p<0.001)
Sex at Birth	Male	47504 (53.9)	•	•
	Female	40626 (46.1)	0.78 (0.75-0.80, p<0.001)	0.76 (0.73-0.79, p<0.001)
qSOFA score on admission	0	35620 (50.5)	•	•
	1	29887 (42.3)	1.59 (1.54-1.65, p<0.001)	1.77 (1.70-1.85, p<0.001)
	2	4733 (6.7)	3.16 (3.00-3.33, p<0.001)	3.02 (2.84-3.21, p<0.001)
	3	340 (0.5)	4.94 (4.25-5.75, p<0.001)	4.67 (3.94-5.53, p<0.001)
Symptomatic at presentation	No symptoms	13465 (16.8)	•	•
	Symptoms	66779 (83.2)	1.50 (1.43-1.58, p<0.001)	•

Dependent: Surv(time, status)		all	HR (univariable)	HR (multivariable)
Chronic cardiac disease	NO	53221 (70.0)	•	•
	YES	22810 (30.0)	2.16 (2.09-2.23, p<0.001)	1.20 (1.16-1.25, p<0.001)
Chronic kidney disease	NO	63851 (84.2)	•	•
	YES	11961 (15.8)	2.09 (2.01-2.17, p<0.001)	1.24 (1.19-1.30, p<0.001)
Moderate or severe liver disease	NO	73831 (98.1)	•	•
	YES	1422 (1.9)	1.57 (1.43-1.74, p<0.001)	1.65 (1.46-1.87, p<0.001)
Chronic neurological disorder	NO	66665 (88.2)	•	•
	YES	8881 (11.8)	1.40 (1.34-1.46, p<0.001)	•
Malignant neoplasm	NO	68233 (90.3)	•	•
	YES	7296 (9.7)	2.05 (1.96-2.14, p<0.001)	1.49 (1.41-1.57, p<0.001)
Chronic hematologic disease	NO	72312 (95.9)	•	•
	YES	3109 (4.1)	1.36 (1.27-1.46, p<0.001)	•
Obesity (as defined by clinical staff)	NO	57150 (84.8)	•	•
	YES	10226 (15.2)	0.84 (0.80-0.89, p<0.001)	1.11 (1.05-1.17, p<0.001)
Diabetes without complications	NO	61911 (87.6)	•	•
	YES	8777 (12.4)	1.18 (1.13-1.24, p<0.001)	•
Rheumatologic disorder	NO	65142 (86.5)	•	•
	YES	10132 (13.5)	1.25 (1.20-1.31, p<0.001)	•
Dementia	NO	66774 (88.7)	•	•
	YES	8477 (11.3)	2.24 (2.15-2.33, p<0.001)	1.20 (1.14-1.26, p<0.001)
Malnutrition	NO	68490 (97.6)	•	•

Dependent: Surv(time, status)		all	HR (univariable)	HR (multivariable)
	YES	1662 (2.4)	1.72 (1.57-1.88, p<0.001)	•
smoking_mhyn_2levels	NO	36895 (46.7)	•	•
	YES	4532 (5.7)	0.89 (0.82-0.96, p=0.002)	•
	N/K	37622 (47.6)	1.18 (1.14-1.22, p<0.001)	•

Number in dataframe = 88371, Number in model = 57334, Missing = 31037, Number of events = 11061, Concordance = 0.743 (SE = 0.002), R-squared = 0.136(Max possible = 0.984), Likelihood ratio test = 8374.768 (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	4.39 (3.87-4.99, p<0.001)
	70-79	9.59 (8.46-10.86, p<0.001)
	80+	13.67 (12.06-15.48, p<0.001)
Sex at Birth	Female	0.76 (0.73-0.79, p<0.001)
qSOFA score on admission	0	-
	1	1.77 (1.70-1.85, p<0.001)
	2	3.02 (2.84-3.21, p<0.001)
	3	4.67 (3.94-5.53, p<0.001)
Chronic cardiac disease	YES	1.20 (1.16-1.25, p<0.001)
Chronic kidney disease	YES	1.24 (1.19-1.30, p<0.001)
Moderate or severe liver disease	YES	1.65 (1.46-1.87, p<0.001)
Malignant neoplasm	YES	1.49 (1.41-1.57, p<0.001)
Obesity (as defined by clinical staff)	YES	1.11 (1.05-1.17, p<0.001)
Dementia	YES	1.20 (1.14-1.26, p<0.001)

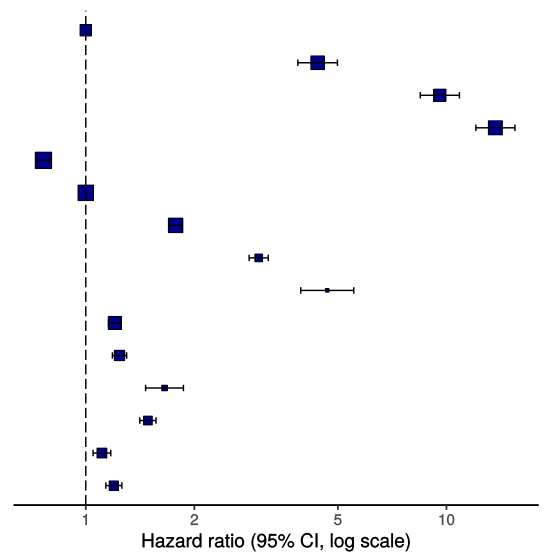
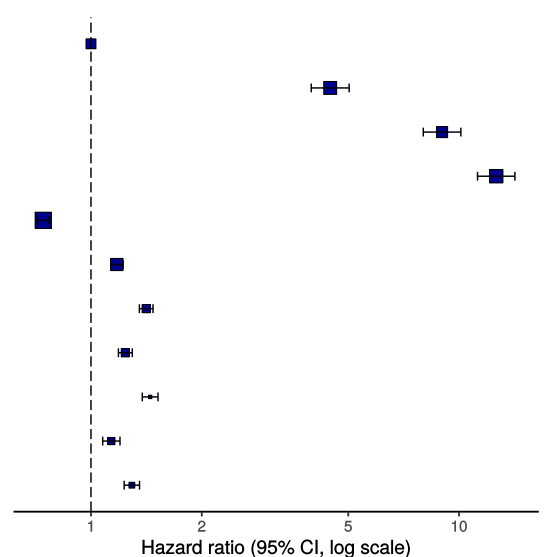


Figure 16b - Multivariable Cox proportional hazards model (age, sex, comorbidities only)

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

Age on admission (years)	<50	-
	50-69	4.47 (3.97-5.03, p<0.001)
	70-79	8.99 (8.00-10.12, p<0.001)
	80+	12.62 (11.23-14.18, p<0.001)
Sex at Birth	Female	0.74 (0.72-0.77, p<0.001)
Chronic cardiac disease	YES	1.18 (1.13-1.22, p<0.001)
Chronic pulmonary disease (not asthma)	YES	1.41 (1.35-1.47, p<0.001)
Chronic kidney disease	YES	1.24 (1.19-1.30, p<0.001)
Malignant neoplasm	YES	1.45 (1.38-1.52, p<0.001)
Obesity (as defined by clinical staff)	YES	1.14 (1.08-1.20, p<0.001)
Dementia	YES	1.29 (1.23-1.36, p<0.001)



ROC = 0.7447875

Figure 17 - Predictions calibration plot

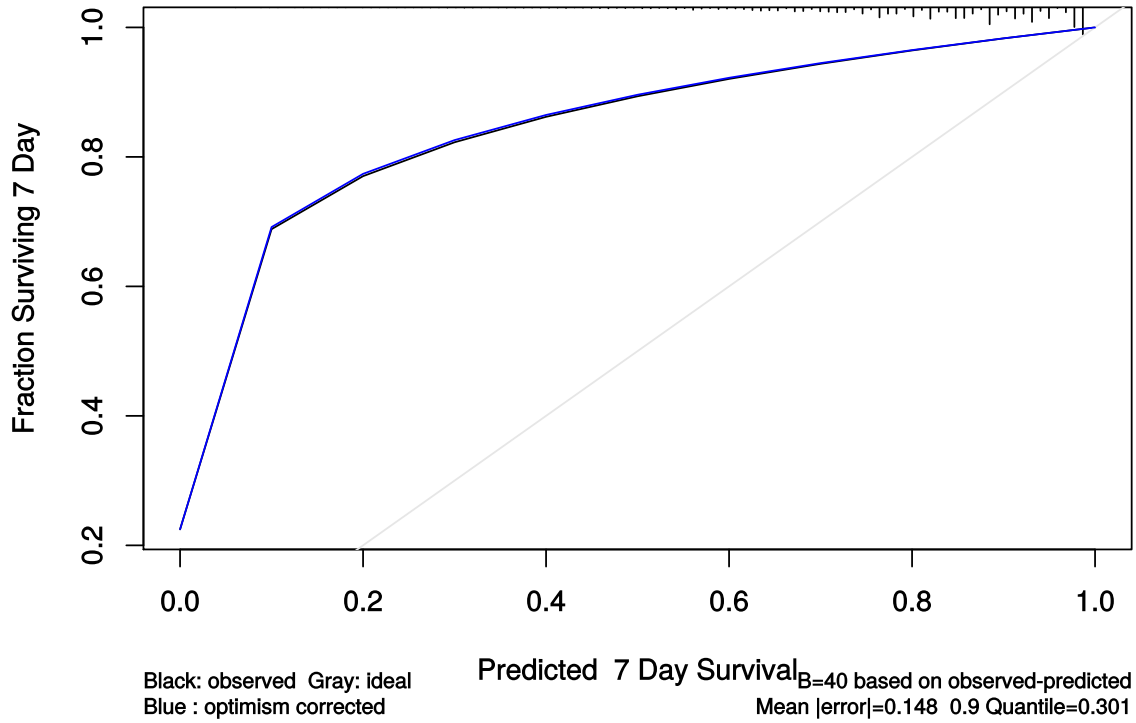


Figure 18 - Prognostic model predictions

Again, for demonstration of methods.

Prognostic model for survival 7 days after onset
qSOFA score on admission

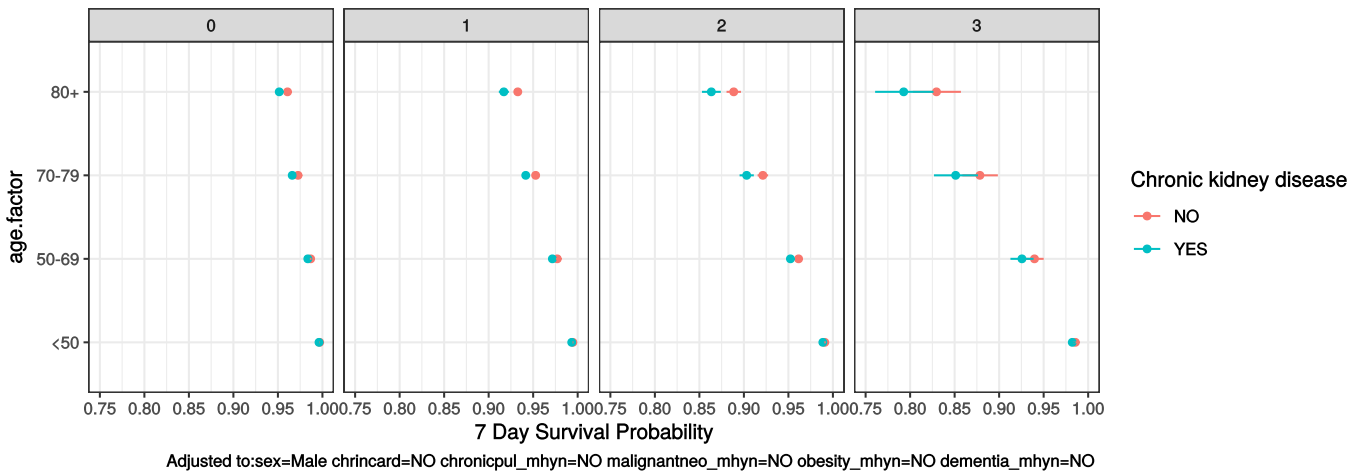


Figure 19 - Death by severity (NEWS) on admission

Number of deaths by NEWS score at admission

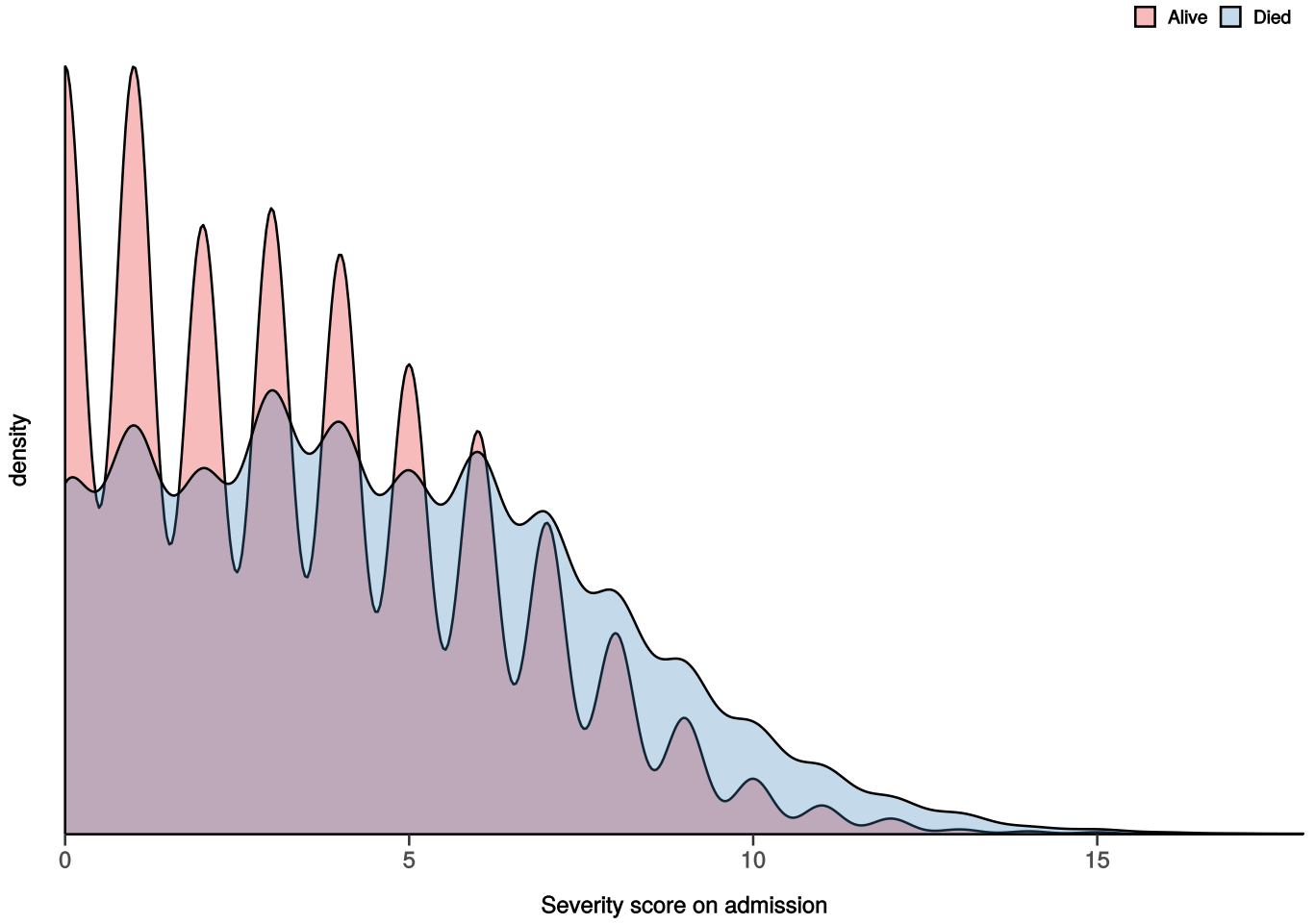


Figure 20 - Death by severity (NEWS) on admission stratified by age

Number of deaths by NEWS score at admission

Stratified by age

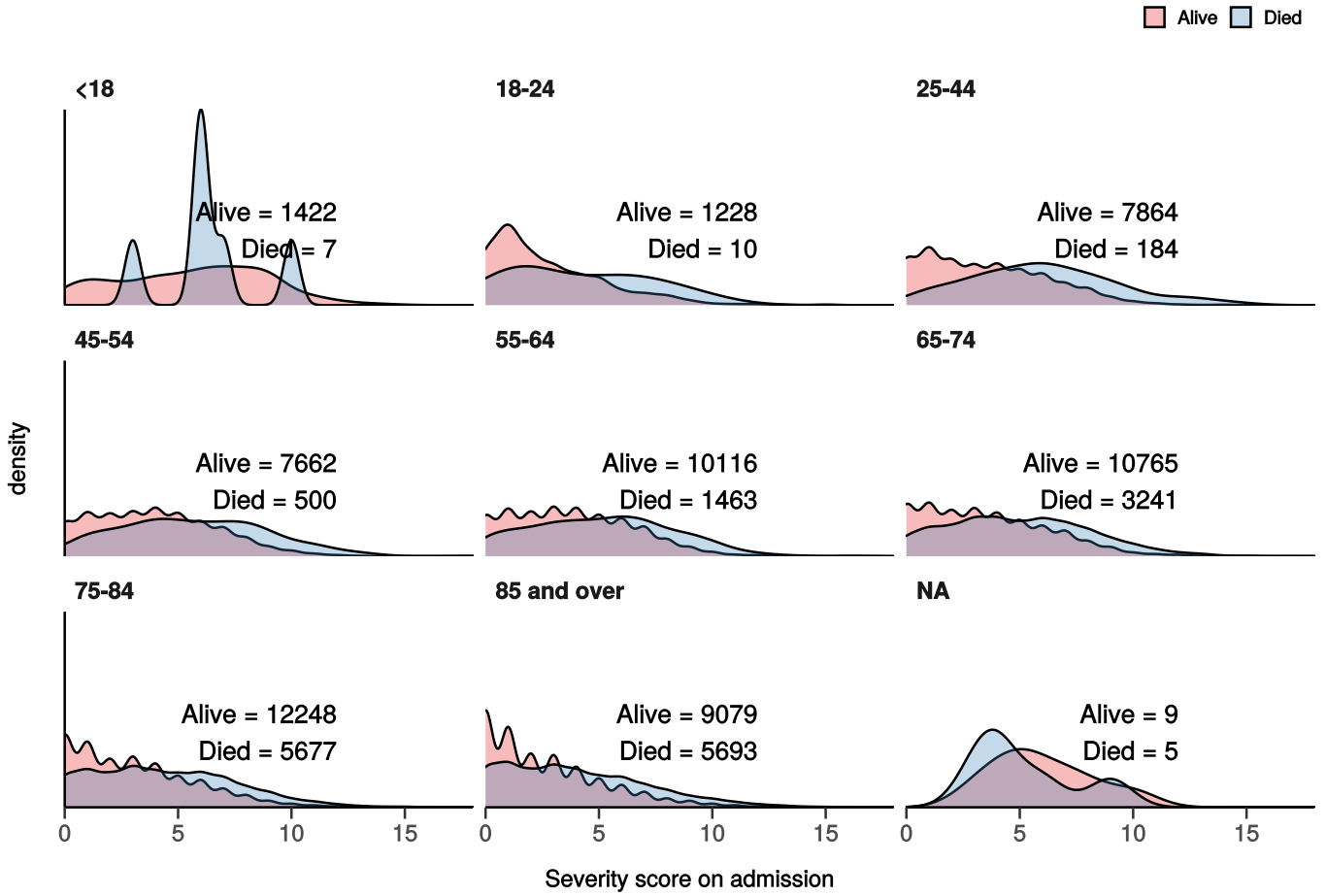
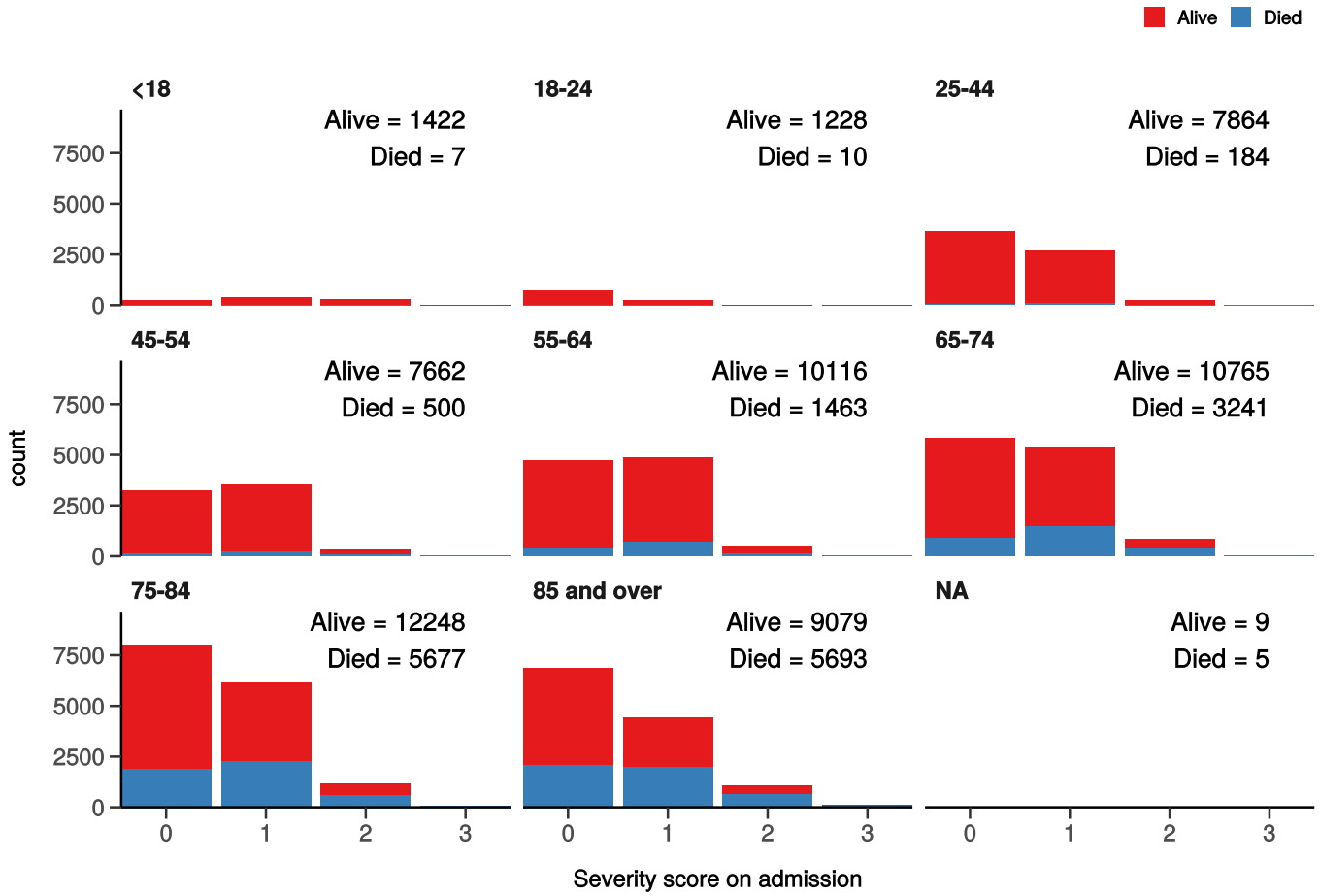


Figure 21 - Death by severity (qSOFA) on admission stratified by age

Number of deaths by qSOFA score at admission

Stratified by age



Healthcare workers

Employed as a healthcare worker?		NO	YES	p
Total N (%)		66934 (97.5)	1741 (2.5)	
NEWS score on admission	Median (IQR)	3.0 (4.0)	4.0 (4.0)	<0.001
Death	No	44866 (75.4)	1477 (93.0)	<0.001
	Yes	14674 (24.6)	111 (7.0)	