

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

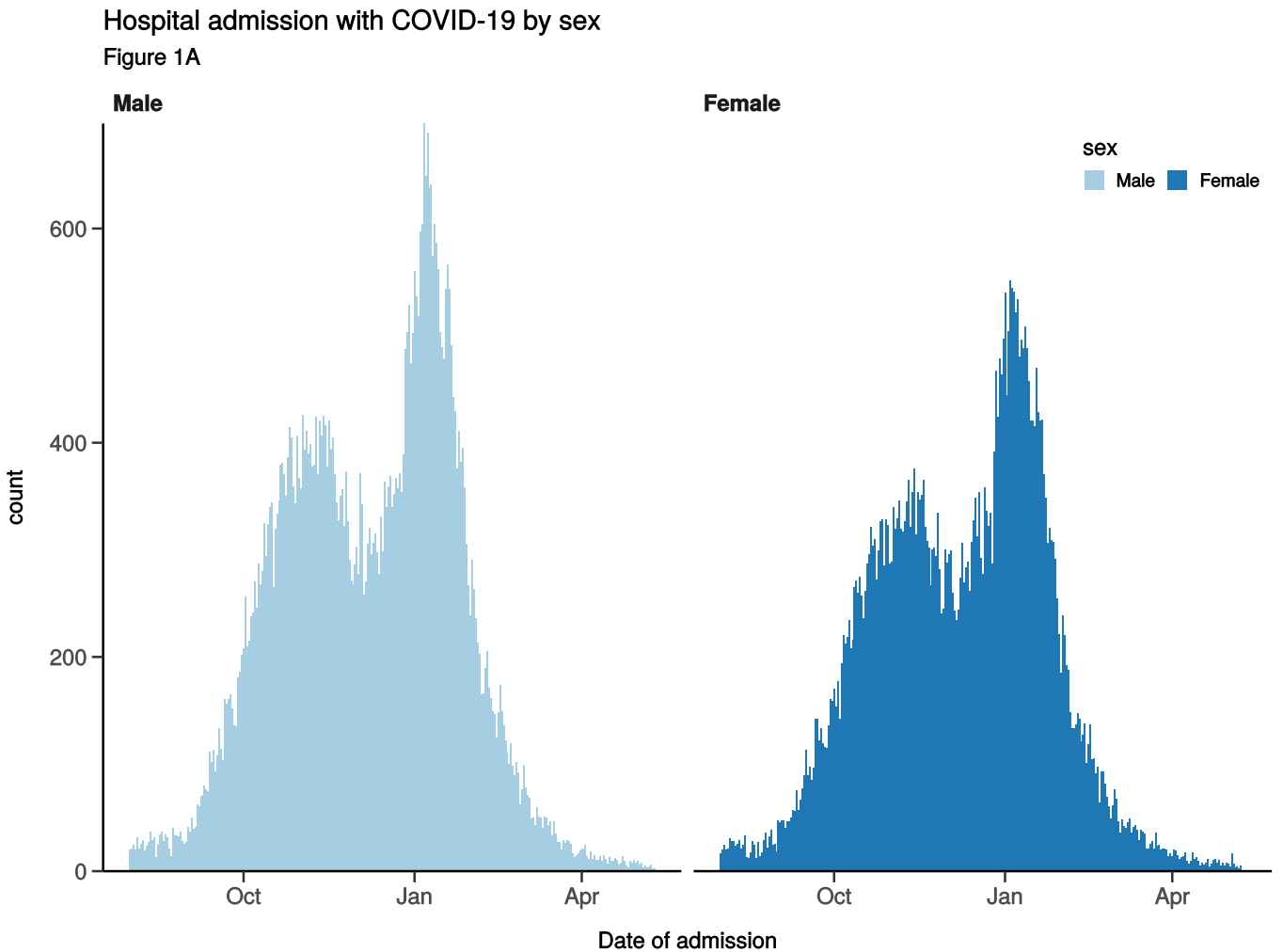
Executive summary

Includes patients admitted after 01 August 2020

There are 106569 patients included in CO-CIN. Of these, 21625 patient(s) have died and 18419 required ICU. 64219 have been discharged home.

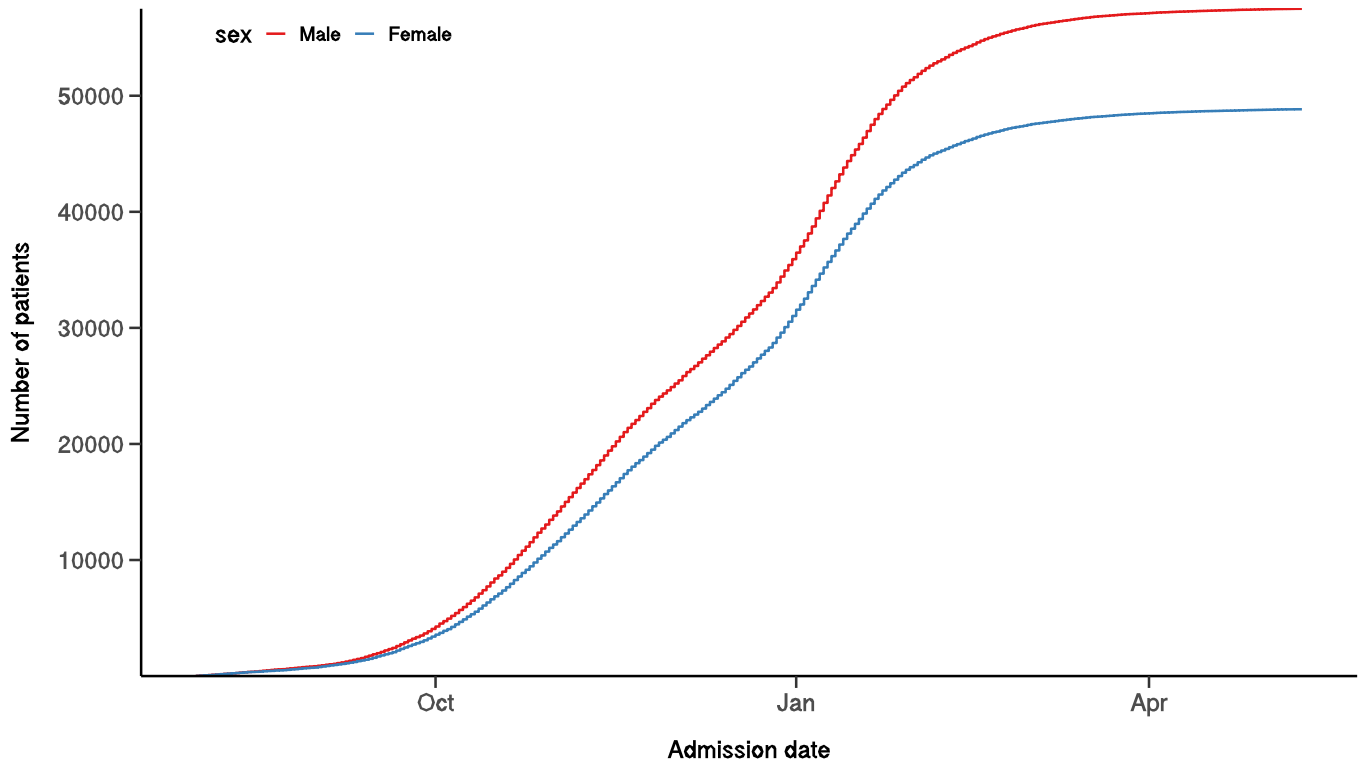
Admission

Figure 1



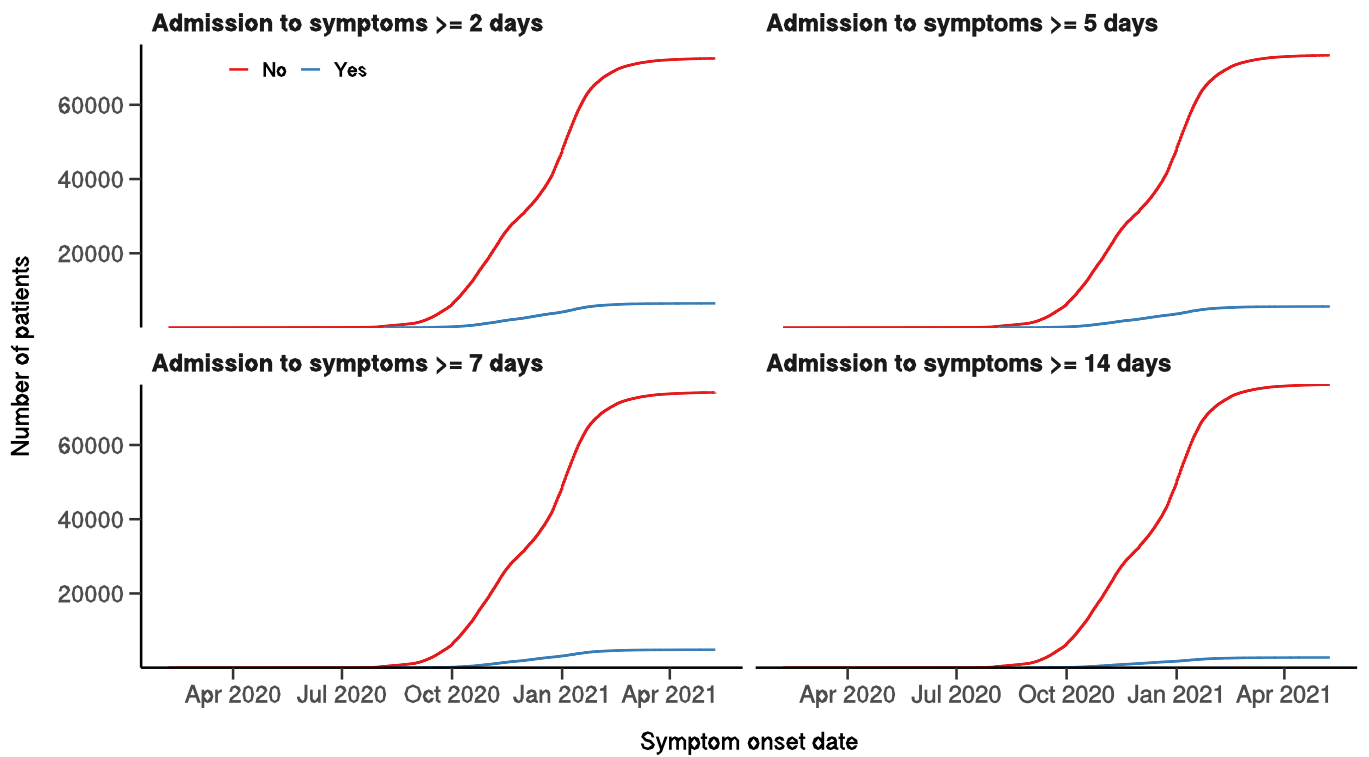
Hospital admission with COVID-19 by sex

Figure 1B



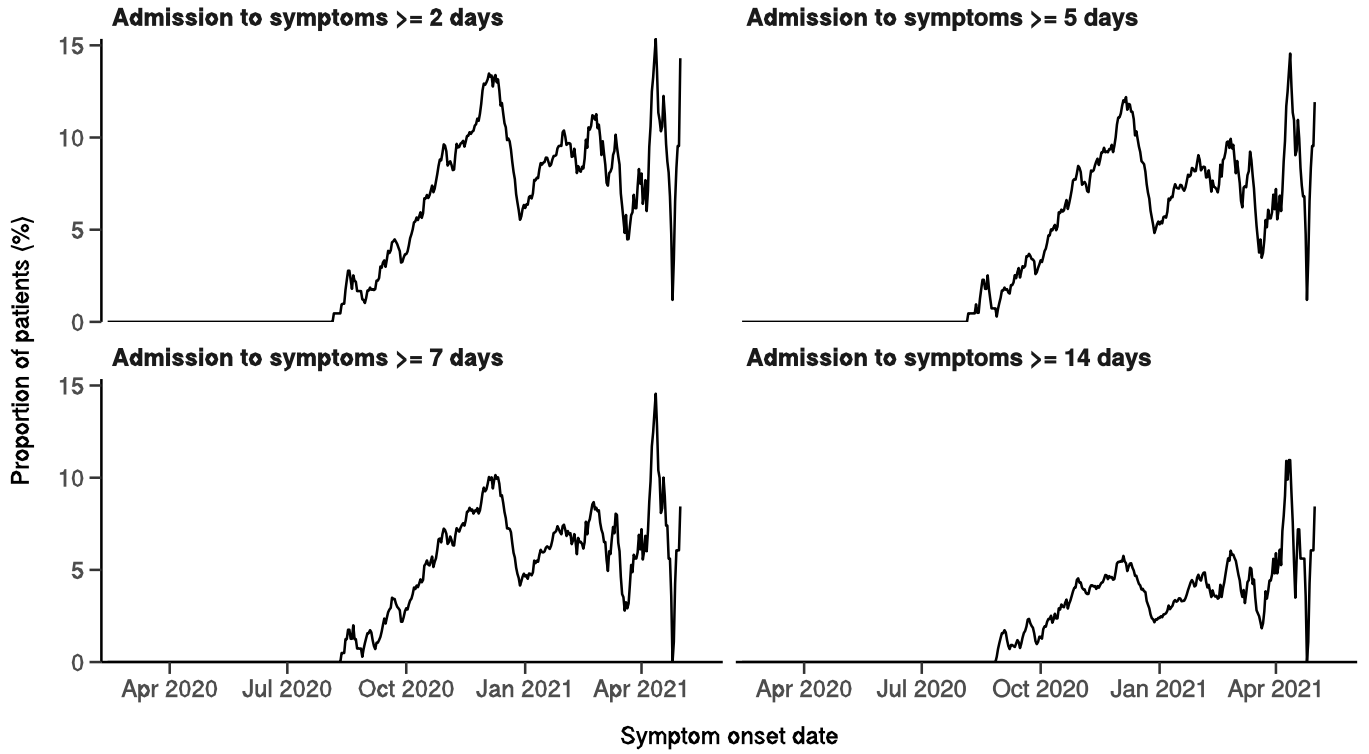
Number with symptom onset occurring after admission to hospital

Figure 1C



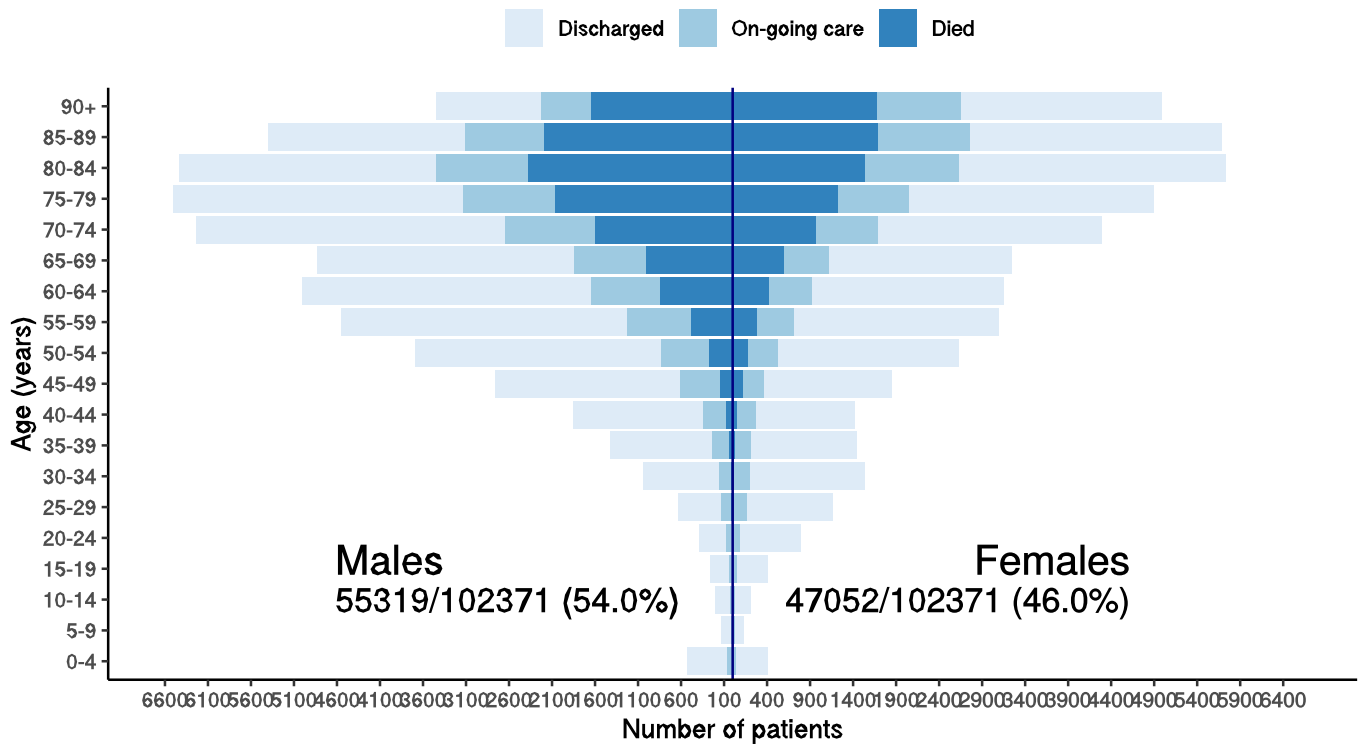
Proportion with symptom onset occurring after hospital admission

Figure 1D - 7-day rolling percentage. n = 78995



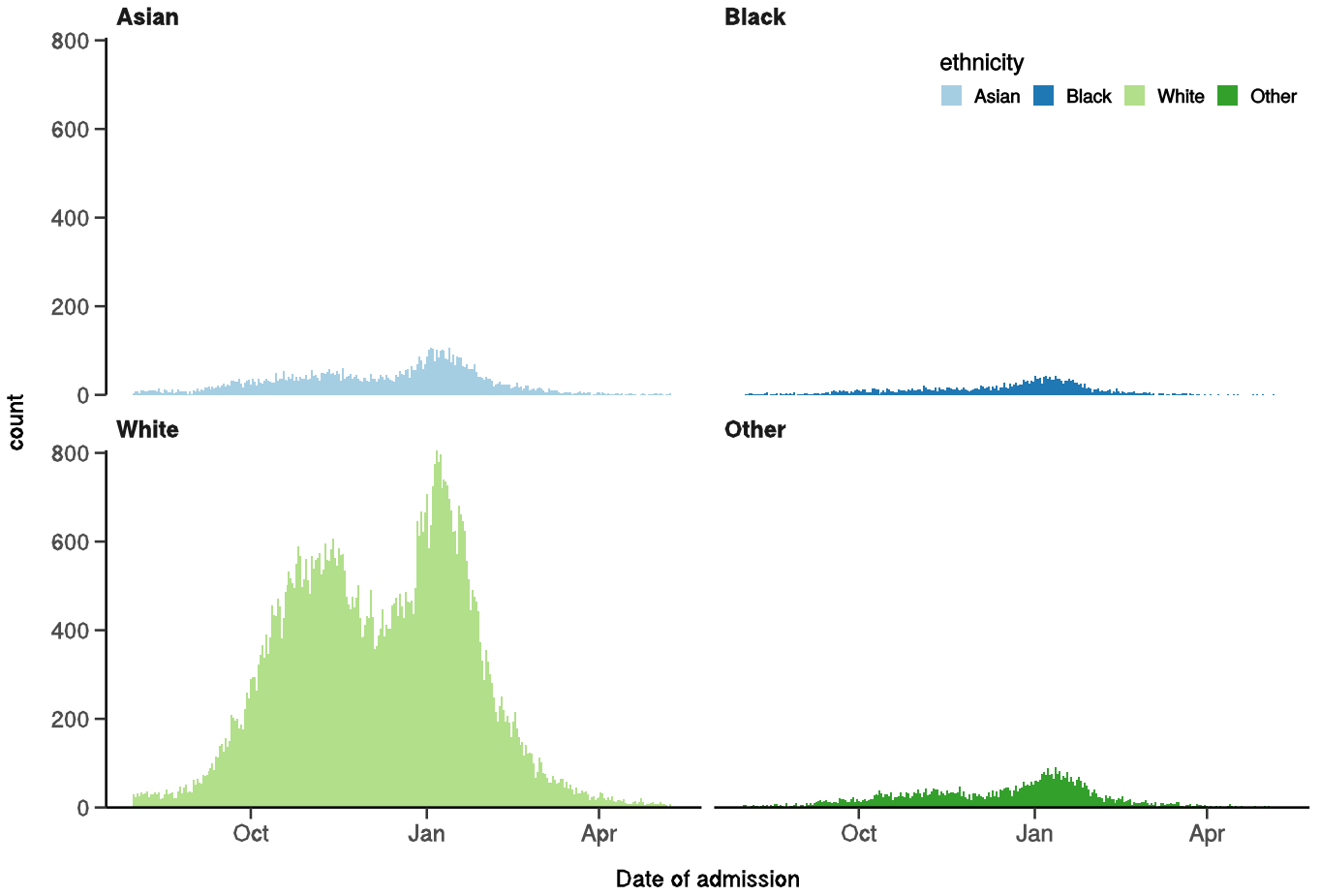
Patients with outcome stratified by age, and sex

Figure 1E



Hospital admission with COVID-19 by ethnicity

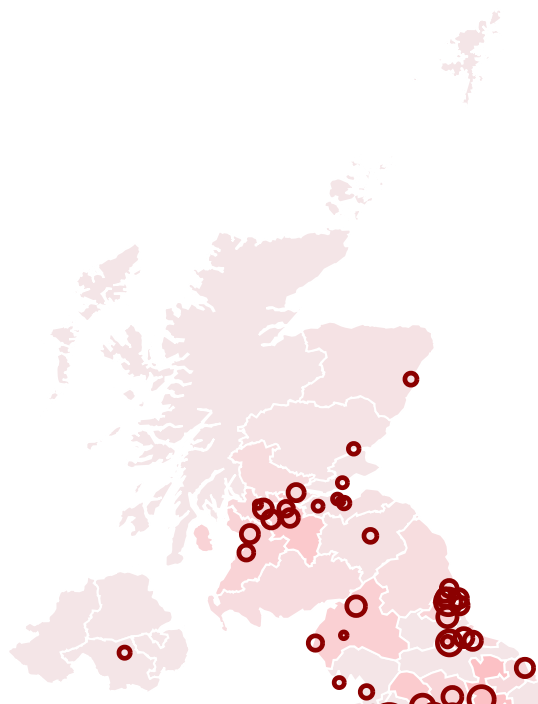
Figure 1F



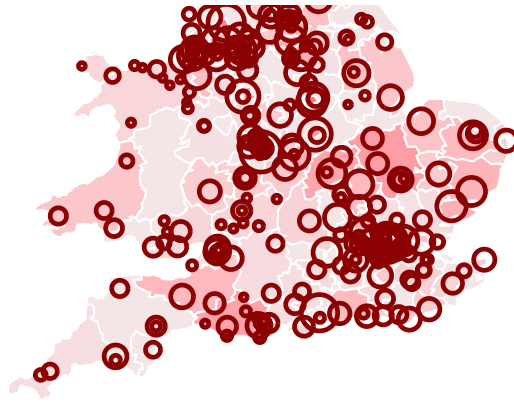
Location by CCG / Healthboard

Figure 2

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



n = 105873



Symptoms and comorbidity

Figure 3A

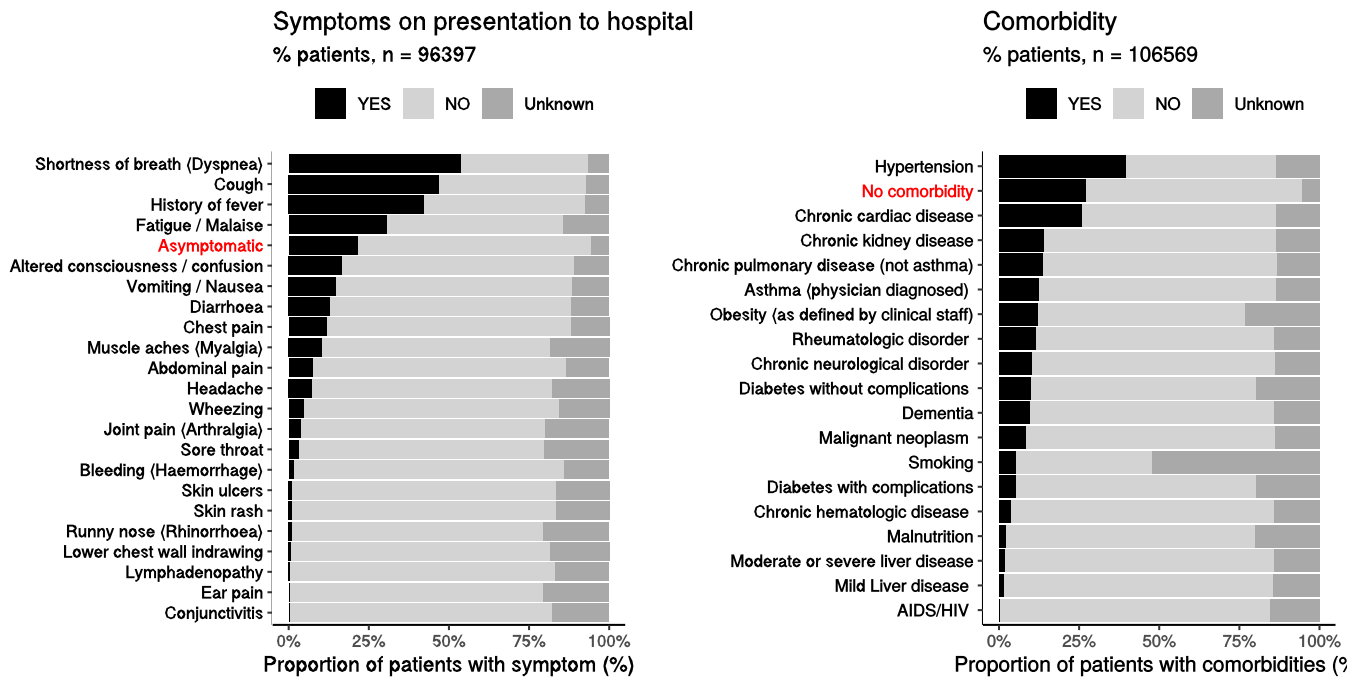


Figure 3B - Symptoms by Age

Symptoms on presentation to hospital
Stratified by age

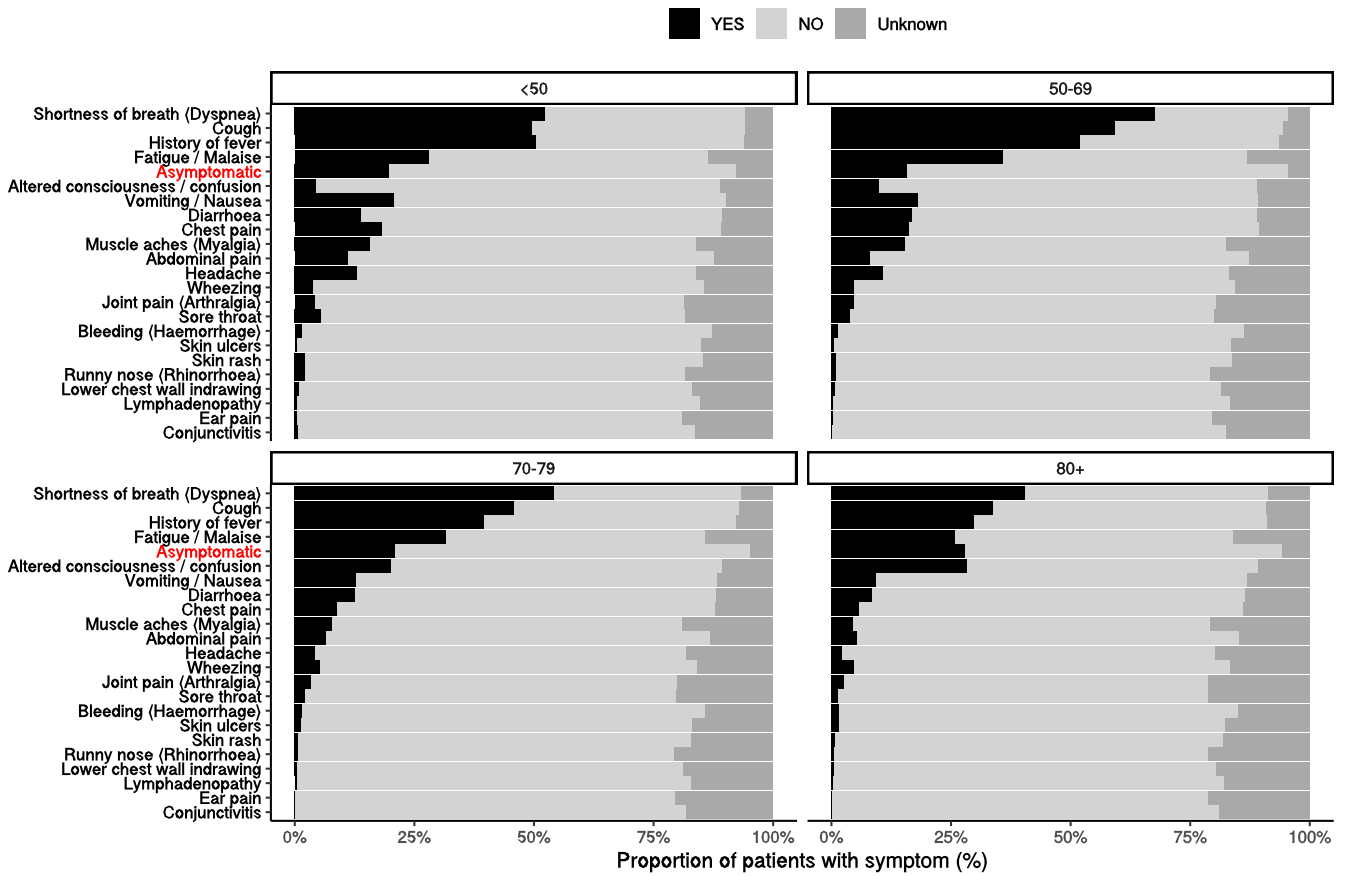
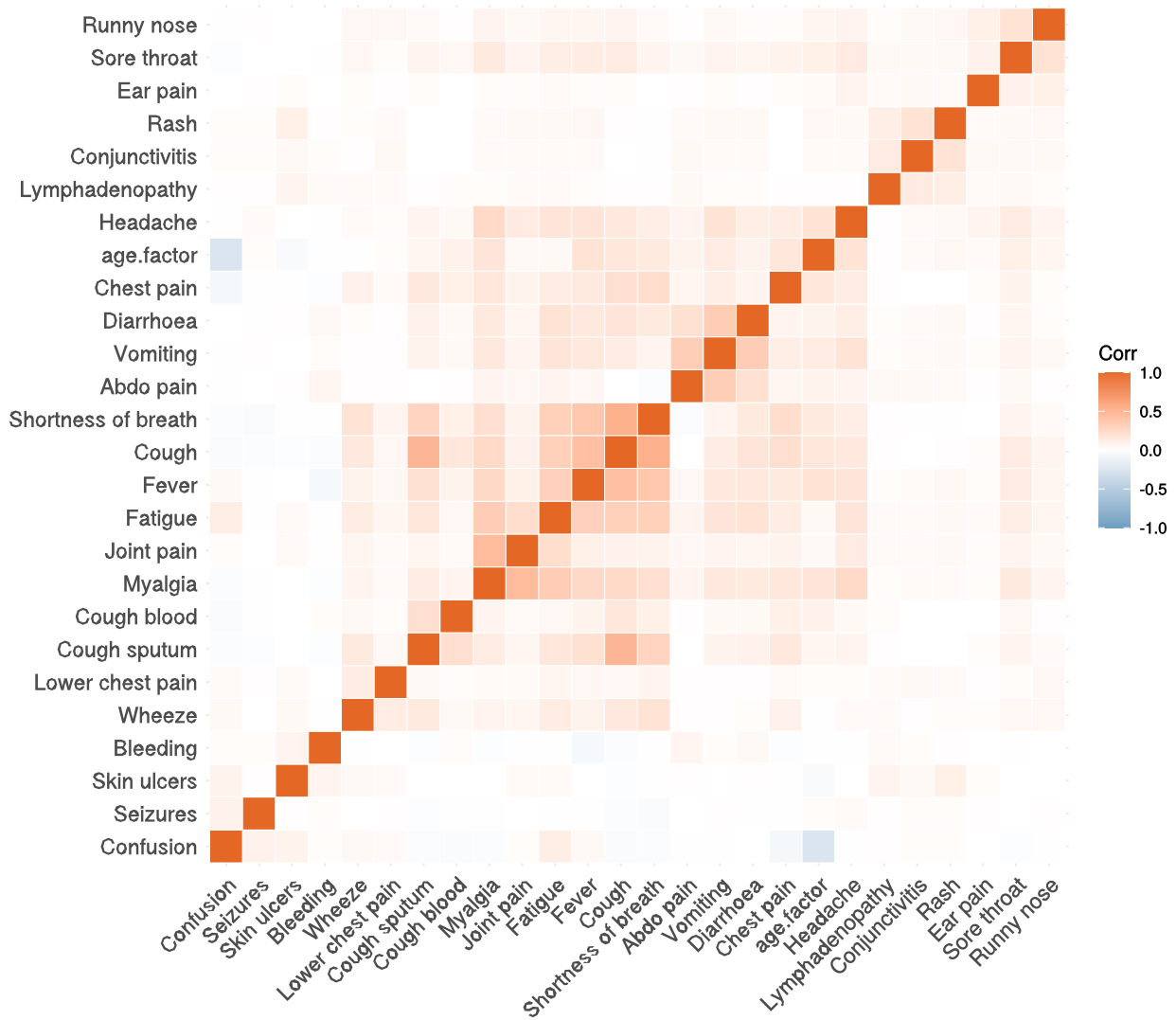


Figure 3C

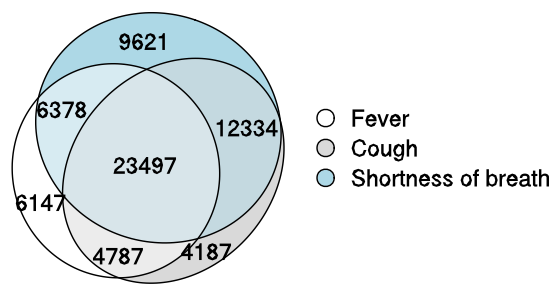
Correlation of symptoms in all pages. Note clusters, top right to bottom left, flu-like, coryzal, abdominal, respiratory, neurocutaneous.



Symptoms (diagnostic criteria)

Figure 4A

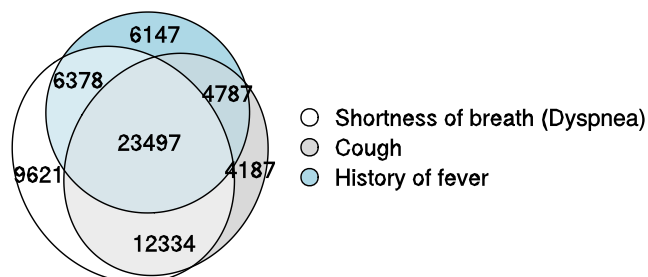
n = 96397



Symptoms (most common)

Figure 4B

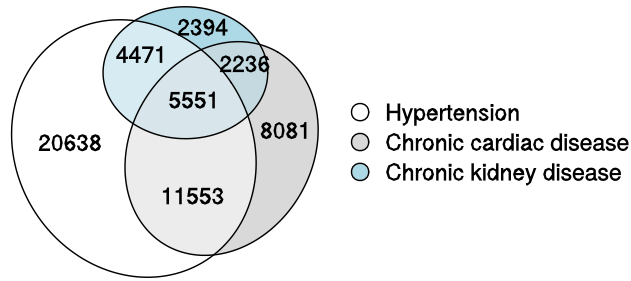
n = 96397



Comorbidity (most common)

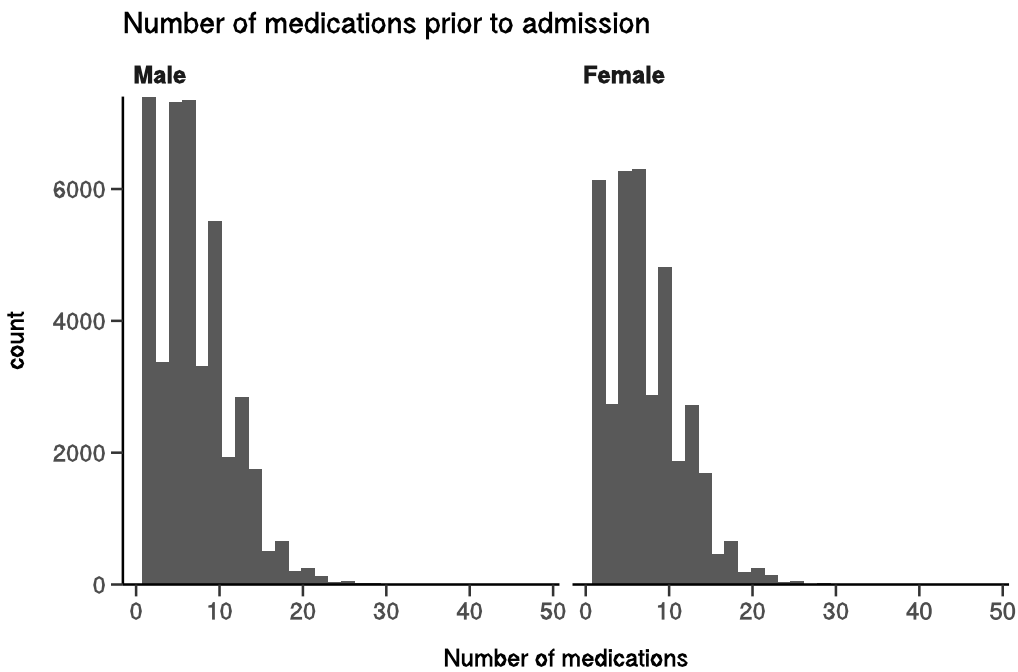
Figure 4C

n = 106569



Medication prior to illness

Figure 5

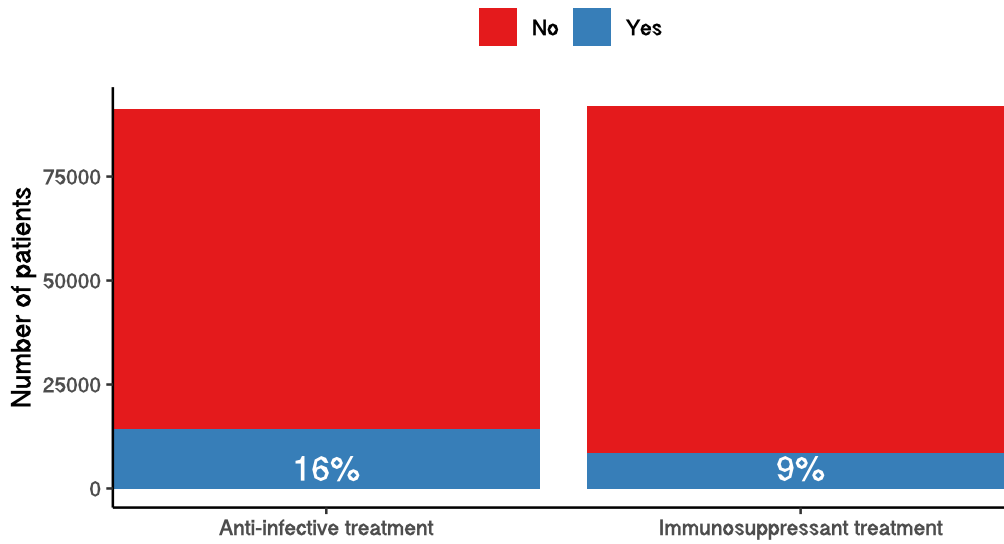


Preadmission treatment

Figure 6

Pre-admission treatment

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



Patient flow

Figure 7A - All patients

N = 103401

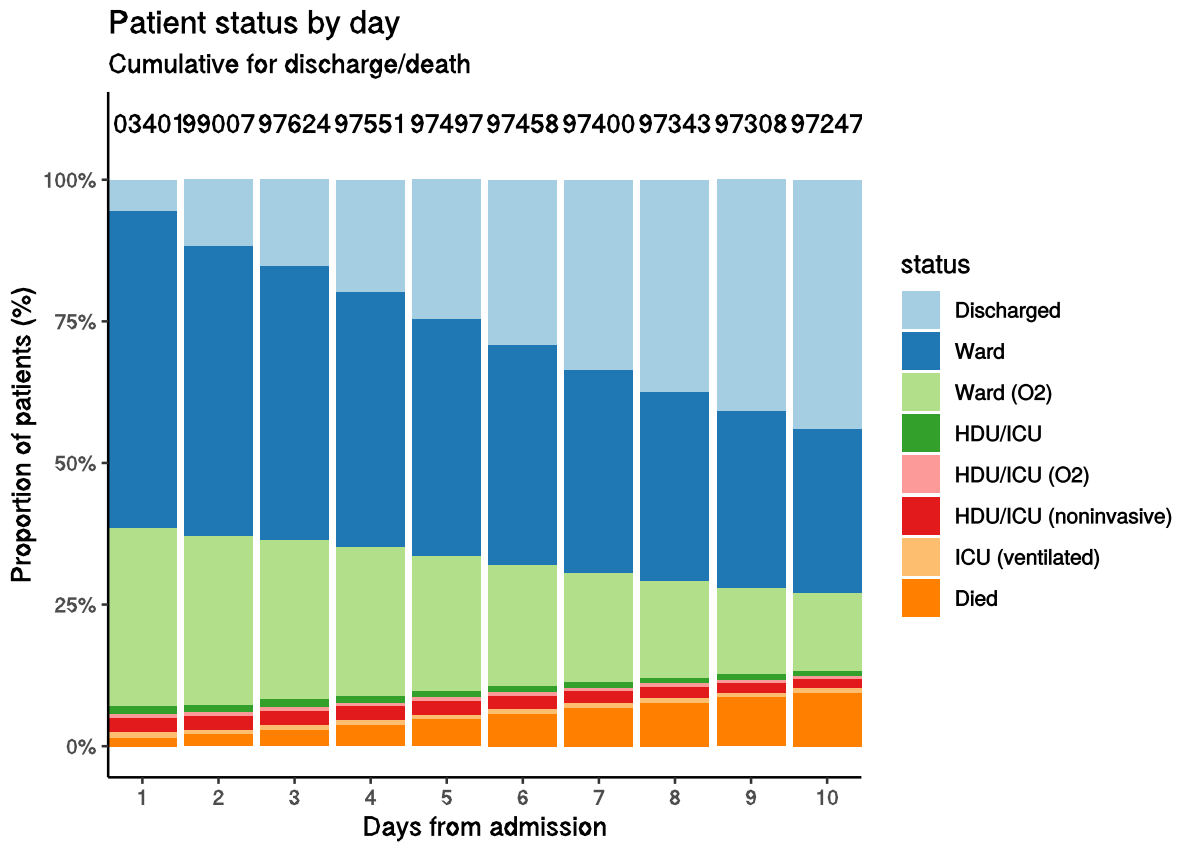
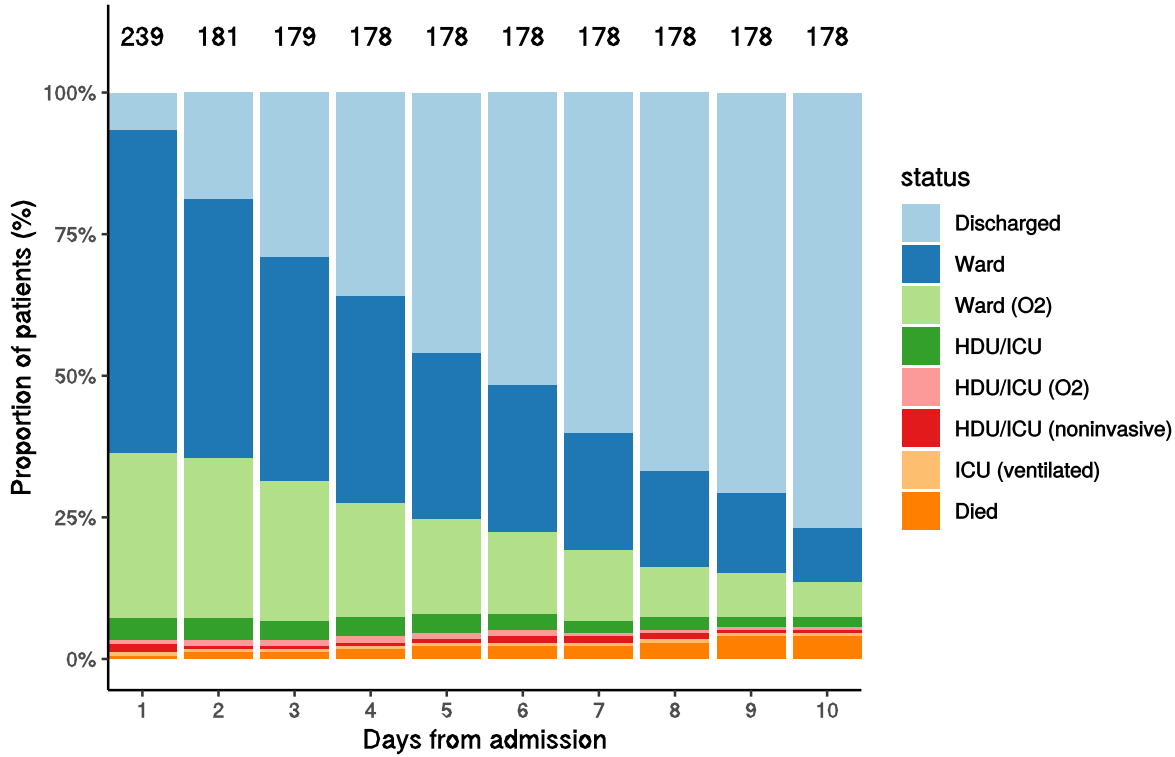


Figure 7B - Patients admitted ≥ 14 days and ≤ 28 days ago

N = 239

Patient status by day

Cumulative for discharge/death



Oxygen requirement

Figure 8A - All patients

N = 97787

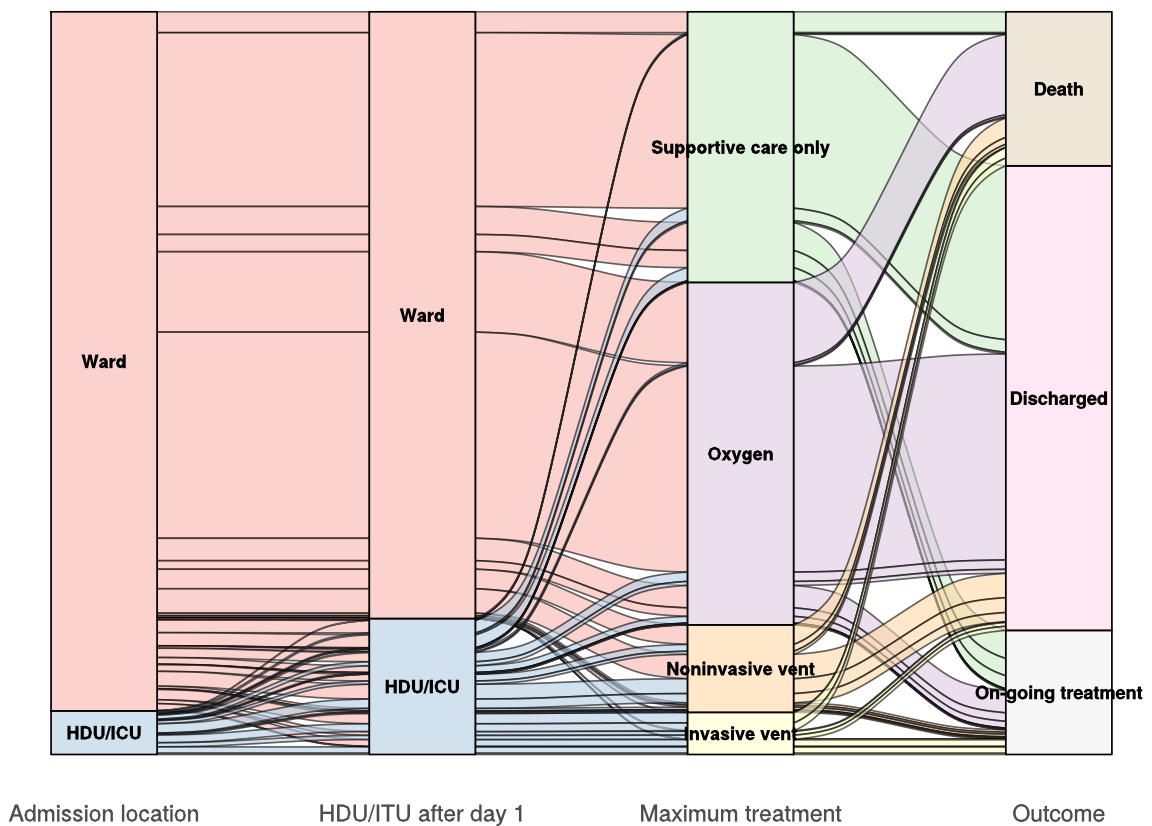


Figure 8B - Patients admitted ≥ 14 days and ≤ 28 days ago

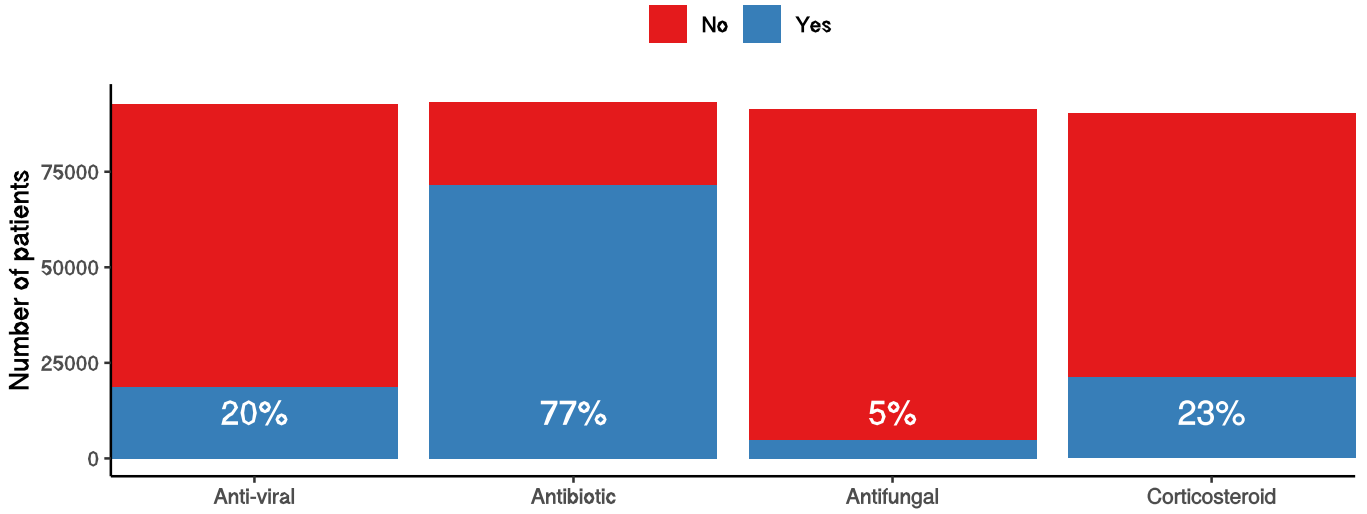
N = 228

In-hospital medical treatment

Figure 9

In-hospital treatment

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

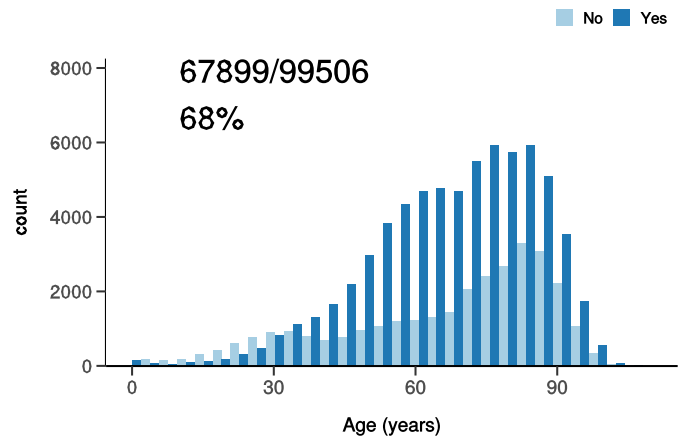
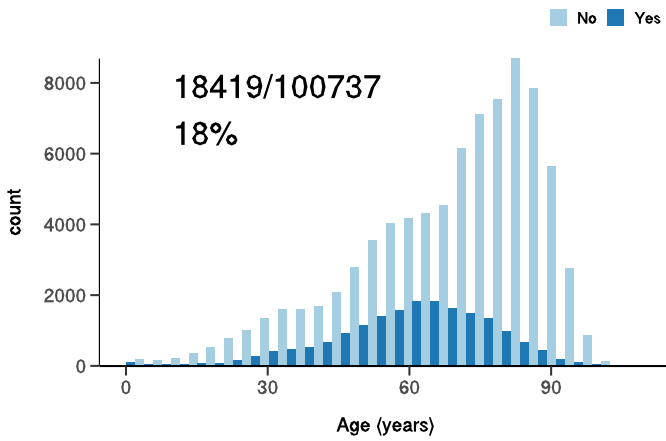


Treatment

Figure 10

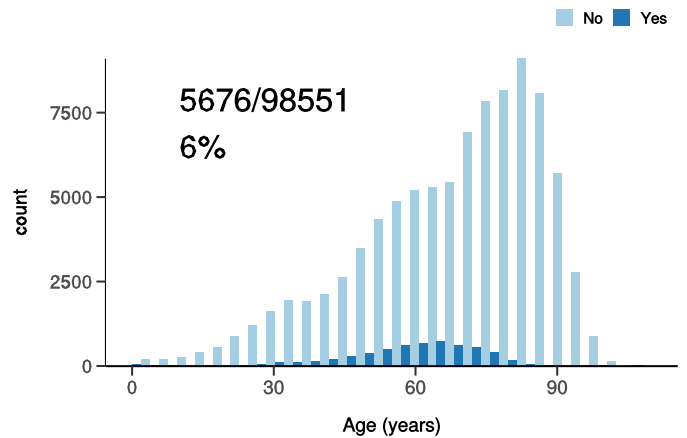
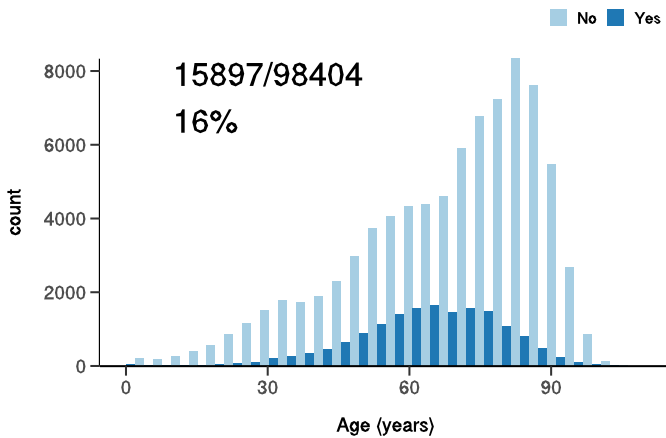
ICU/HDU admission
Figure 10A

High flow oxygen
Figure 10B



Noninvasive ventilation
Figure 10C

Invasive ventilation
Figure 10D

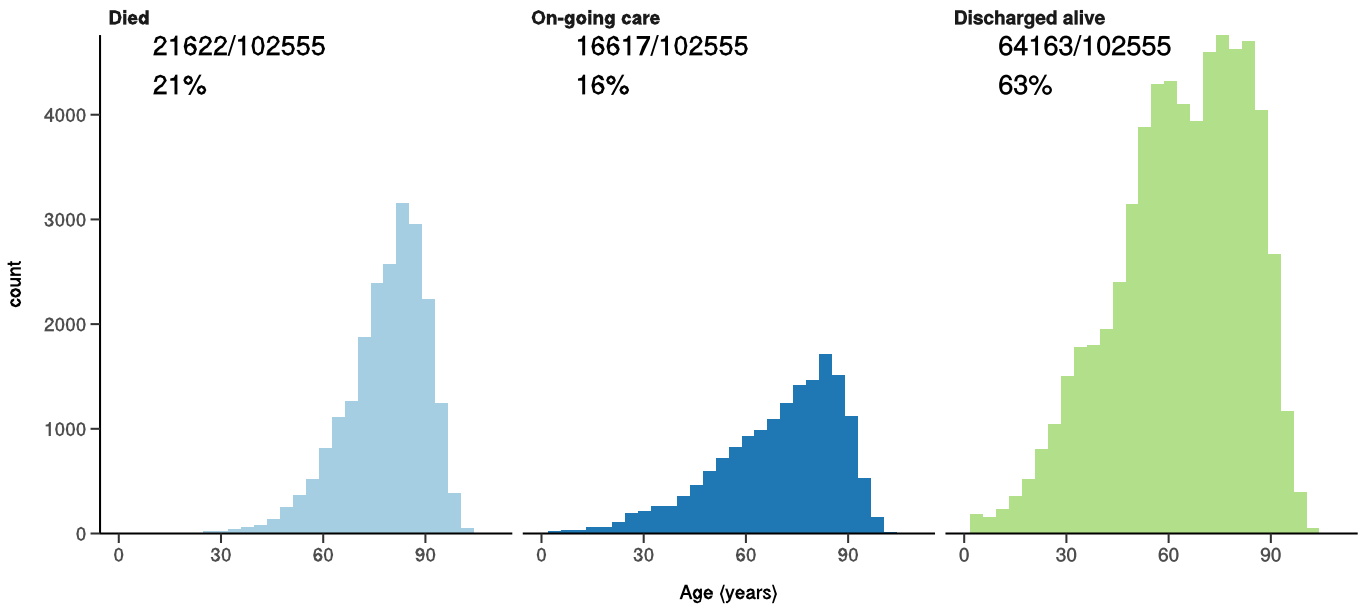


Status in patients admitted ≥ 14 days from today

Figure 11

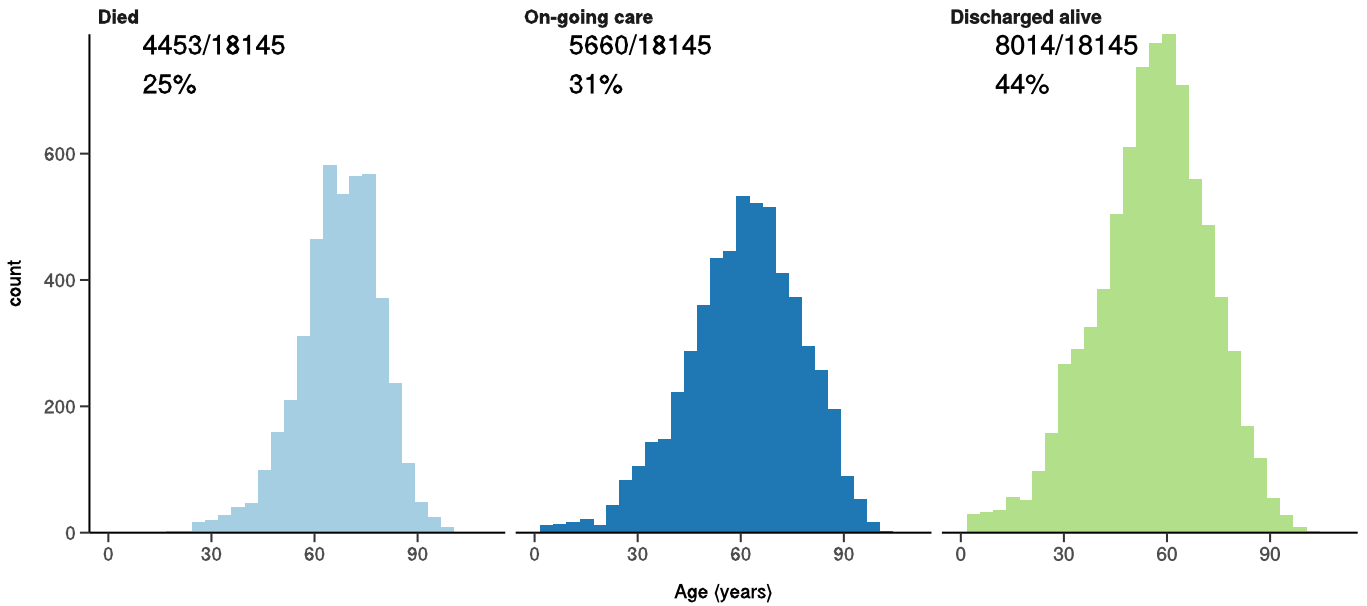
All: status in patients admitted ≥ 14 days ago

Figure 11A



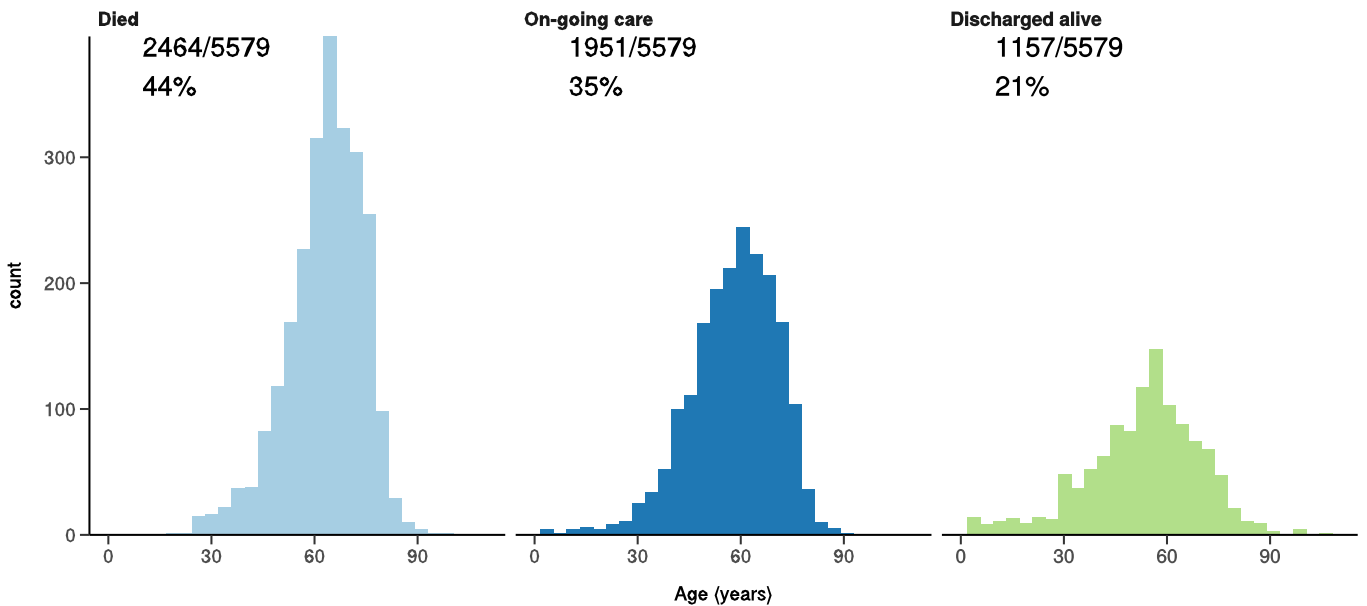
ICU/HDU admissions: status in patients admitted ≥ 14 days ago

Figure 11B



Invasive ventilation: status in patients admitted ≥ 14 days ago

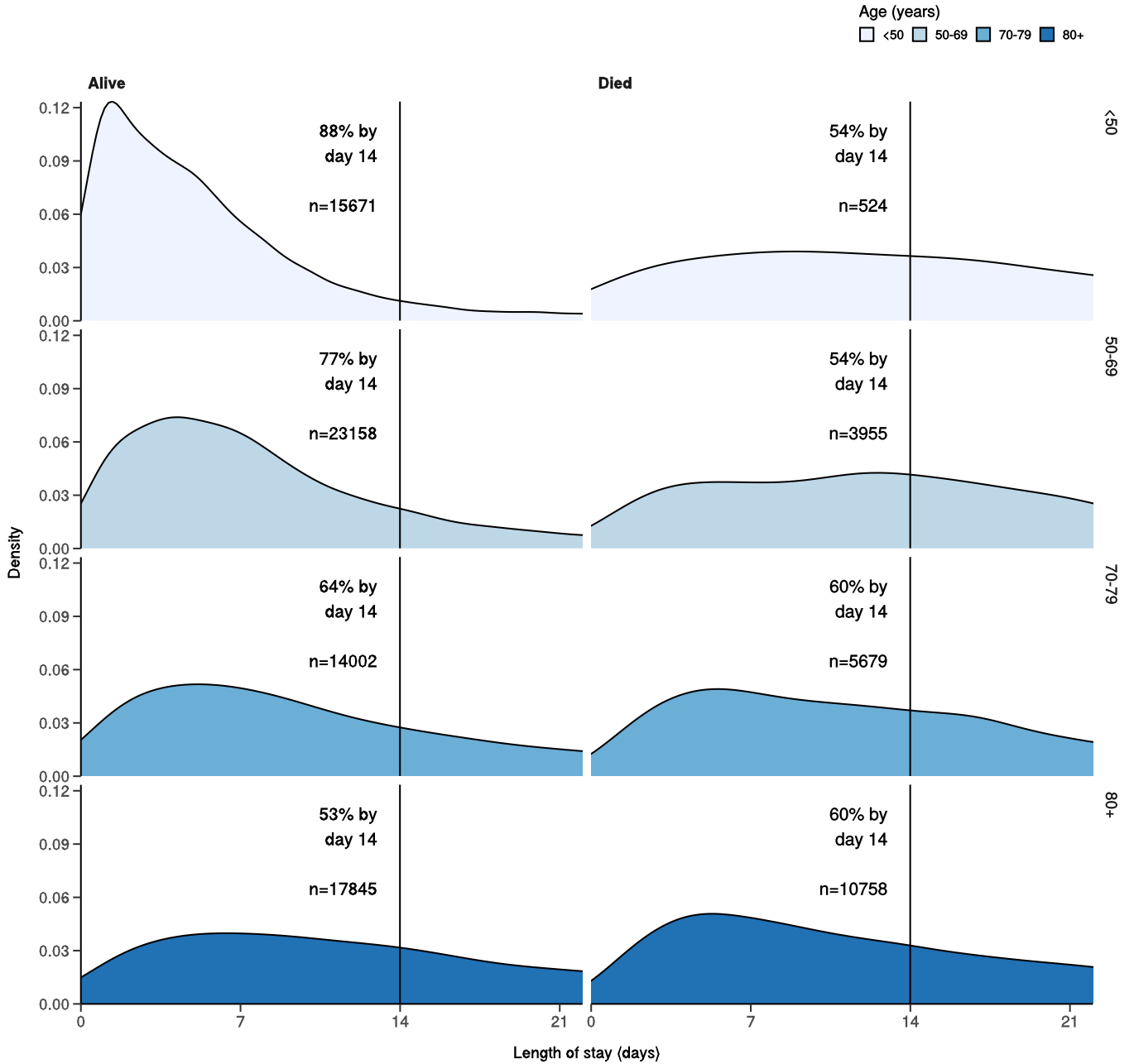
Figure 11c



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	17317 (96.9)	546 (3.1)	•	•
	50-69	24923 (85.9)	4078 (14.1)	5.19 (4.74-5.69, p<0.001)	4.36 (3.94-4.83, p<0.001)

Dependent: death		No	Yes	OR (univariable)	OR (multivariable)
	70-79	15169 (72.2)	5845 (27.8)	12.22 (11.18-13.39, p<0.001)	8.93 (8.07-9.91, p<0.001)
	80+	19308 (63.5)	11100 (36.5)	18.23 (16.71-19.94, p<0.001)	13.02 (11.76-14.45, p<0.001)
Sex at Birth	Male	40292 (75.9)	12792 (24.1)	•	•
	Female	36452 (80.6)	8787 (19.4)	0.76 (0.74-0.78, p<0.001)	0.70 (0.67-0.73, p<0.001)
	Not specified	0 (NaN)	0 (NaN)	•	•
Chronic cardiac disease	NO	50954 (82.8)	10549 (17.2)	•	•
	YES	17501 (67.3)	8514 (32.7)	2.35 (2.27-2.43, p<0.001)	1.21 (1.16-1.26, p<0.001)
Chronic pulmonary disease (not asthma)	NO	59617 (80.5)	14413 (19.5)	•	•
	YES	8872 (65.7)	4637 (34.3)	2.16 (2.08-2.25, p<0.001)	1.53 (1.46-1.60, p<0.001)
Chronic neurological disorder	NO	60716 (79.1)	16066 (20.9)	•	•
	YES	7408 (72.5)	2809 (27.5)	1.43 (1.37-1.50, p<0.001)	1.03 (0.97-1.09, p=0.312)
Chronic hematologic disease	NO	65527 (78.6)	17884 (21.4)	•	•
	YES	2542 (72.3)	975 (27.7)	1.41 (1.30-1.52, p<0.001)	0.92 (0.84-1.01, p=0.073)
Chronic kidney disease	NO	59359 (80.9)	14055 (19.1)	•	•
	YES	8969 (64.6)	4917 (35.4)	2.32 (2.23-2.41, p<0.001)	1.34 (1.27-1.40, p<0.001)
Dementia	NO	61913 (80.4)	15078 (19.6)	•	•
	YES	6014 (62.5)	3610 (37.5)	2.46 (2.36-2.58, p<0.001)	1.36 (1.29-1.44, p<0.001)
Obesity (as defined by clinical staff)	NO	51532 (78.3)	14297 (21.7)	•	•
	YES	9867 (81.6)	2218 (18.4)	0.81 (0.77-0.85, p<0.001)	1.17 (1.10-1.24, p<0.001)

Dependent: death		No	Yes	OR (univariable)	OR (multivariable)
Malignant neoplasm	NO	62801 (79.9)	15815 (20.1)	•	•
	YES	5306 (63.2)	3083 (36.8)	2.31 (2.20-2.42, p<0.001)	1.65 (1.56-1.75, p<0.001)

Number in dataframe = 106198, Number in model = 74596, Missing = 31602, AIC = 67049.6, C-statistic = 0.74, H&L = Chi-sq(8) 230.61 (p<0.001)

Figure 13 - Adjusted odds ratio plot

Death

Age on admission (years)	<50	-
	50-69	4.36 (3.94-4.83, p<0.001)
	70-79	8.93 (8.07-9.91, p<0.001)
	80+	13.02 (11.76-14.45, p<0.001)
Sex at Birth	Male	-
	Female	0.70 (0.67-0.73, p<0.001)
	Not specified	-
Chronic cardiac disease	YES	1.21 (1.16-1.26, p<0.001)
Chronic pulmonary disease (not asthma)	YES	1.53 (1.46-1.60, p<0.001)
Chronic neurological disorder	YES	1.03 (0.97-1.09, p=0.312)
Chronic hematologic disease	YES	0.92 (0.84-1.01, p=0.073)
Chronic kidney disease	YES	1.34 (1.27-1.40, p<0.001)
Dementia	YES	1.36 (1.29-1.44, p<0.001)
Obesity (as defined by clinical staff)	YES	1.17 (1.10-1.24, p<0.001)
Malignant neoplasm	YES	1.65 (1.56-1.75, p<0.001)

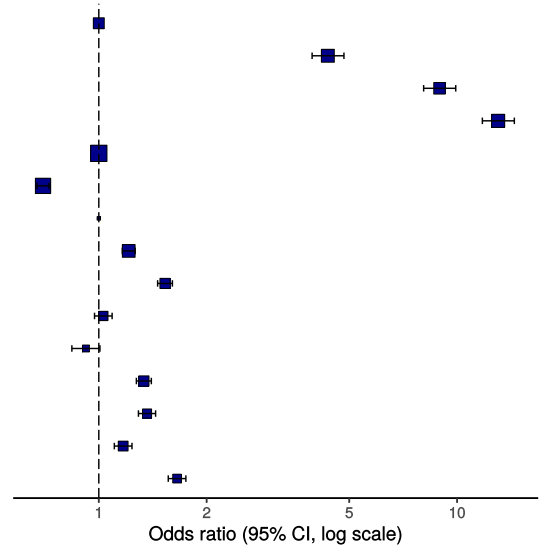
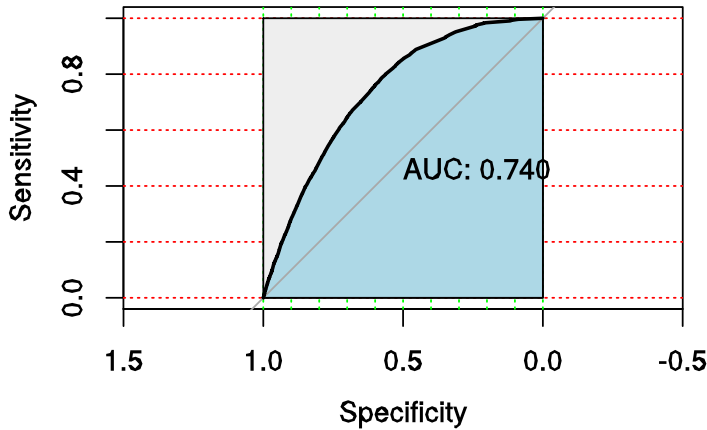


Figure 14 - ROC

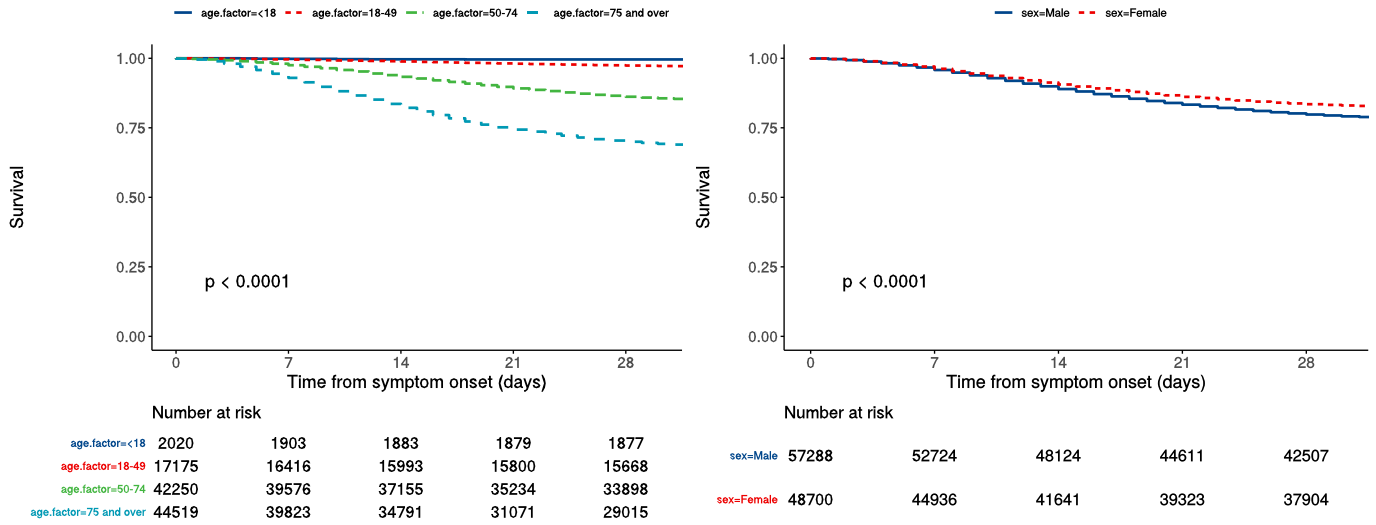


Survival models

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	19195 (18.1)	•	•
	50-69	31325 (29.6)	4.84 (4.43-5.29, p<0.001)	4.17 (3.75-4.63, p<0.001)
	70-79	22753 (21.5)	10.48 (9.60-11.44, p<0.001)	8.74 (7.87-9.71, p<0.001)
	80+	32710 (30.9)	14.80 (13.58-16.13, p<0.001)	12.13 (10.92-13.48, p<0.001)
Sex at Birth	Male	57288 (54.1)	•	•
	Female	48700 (45.9)	0.79 (0.77-0.81, p<0.001)	0.77 (0.74-0.79, p<0.001)
qSOFA score on admission	0	43439 (49.9)	•	•
	1	37323 (42.8)	1.55 (1.50-1.60, p<0.001)	1.75 (1.68-1.81, p<0.001)
	2	5926 (6.8)	3.03 (2.89-3.17, p<0.001)	2.96 (2.81-3.13, p<0.001)
	3	427 (0.5)	4.48 (3.91-5.13, p<0.001)	4.19 (3.60-4.87, p<0.001)
Symptomatic at presentation	No symptoms	15762 (16.3)	•	•
	Symptoms	80731 (83.7)	1.47 (1.41-1.54, p<0.001)	•

Dependent: Surv(time, status)		all	HR (univariable)	HR (multivariable)
Chronic cardiac disease	NO	64681 (70.3)	•	•
	YES	27322 (29.7)	2.13 (2.07-2.19, p<0.001)	1.21 (1.17-1.25, p<0.001)
Chronic kidney disease	NO	77183 (84.1)	•	•
	YES	14594 (15.9)	2.07 (2.00-2.14, p<0.001)	1.25 (1.20-1.30, p<0.001)
Moderate or severe liver disease	NO	89389 (98.1)	•	•
	YES	1732 (1.9)	1.57 (1.44-1.71, p<0.001)	1.64 (1.47-1.82, p<0.001)
Chronic neurological disorder	NO	80771 (88.3)	•	•
	YES	10671 (11.7)	1.38 (1.33-1.44, p<0.001)	•
Malignant neoplasm	NO	82637 (90.4)	•	•
	YES	8797 (9.6)	2.04 (1.96-2.12, p<0.001)	1.48 (1.41-1.55, p<0.001)
Chronic hematologic disease	NO	87676 (96.0)	•	•
	YES	3663 (4.0)	1.36 (1.27-1.45, p<0.001)	•
Obesity (as defined by clinical staff)	NO	69040 (84.5)	•	•
	YES	12649 (15.5)	0.83 (0.79-0.87, p<0.001)	1.09 (1.04-1.15, p=0.001)
Diabetes without complications	NO	74871 (87.9)	•	•
	YES	10342 (12.1)	1.18 (1.13-1.23, p<0.001)	•
Rheumatologic disorder	NO	79035 (86.7)	•	•
	YES	12096 (13.3)	1.24 (1.20-1.29, p<0.001)	•
Dementia	NO	80949 (88.9)	•	•
	YES	10123 (11.1)	2.19 (2.11-2.27, p<0.001)	1.19 (1.14-1.25, p<0.001)

Dependent: Surv(time, status)		all	HR (univariable)	HR (multivariable)
Malnutrition	NO	82972 (97.6)	•	•
	YES	2042 (2.4)	1.75 (1.62-1.90, p<0.001)	•
smoking_mhyn_2levels	NO	45313 (47.2)	•	•
	YES	5517 (5.7)	0.92 (0.86-0.99, p=0.017)	•
	N/K	45134 (47.0)	1.20 (1.17-1.24, p<0.001)	•

Number in dataframe = 106218, Number in model = 70722, Missing = 35496, Number of events = 14260, Concordance = 0.737 (SE = 0.002), R-squared = 0.134(Max possible = 0.988), Likelihood ratio test = 10185.554 (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	4.17 (3.75-4.63, p<0.001)
	70-79	8.74 (7.87-9.71, p<0.001)
	80+	12.13 (10.92-13.48, p<0.001)
Sex at Birth	Female	0.77 (0.74-0.79, p<0.001)
qSOFA score on admission	0	-
	1	1.75 (1.68-1.81, p<0.001)
	2	2.96 (2.81-3.13, p<0.001)
	3	4.19 (3.60-4.87, p<0.001)
Chronic cardiac disease	YES	1.21 (1.17-1.25, p<0.001)
Chronic kidney disease	YES	1.25 (1.20-1.30, p<0.001)
Moderate or severe liver disease	YES	1.64 (1.47-1.82, p<0.001)
Malignant neoplasm	YES	1.48 (1.41-1.55, p<0.001)
Obesity (as defined by clinical staff)	YES	1.09 (1.04-1.15, p=0.001)
Dementia	YES	1.19 (1.14-1.25, p<0.001)

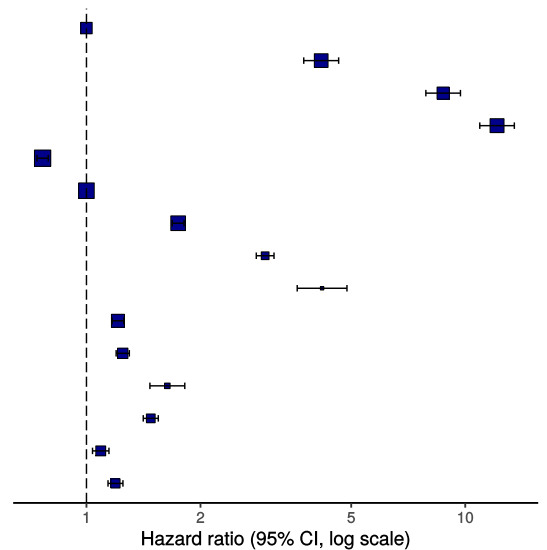
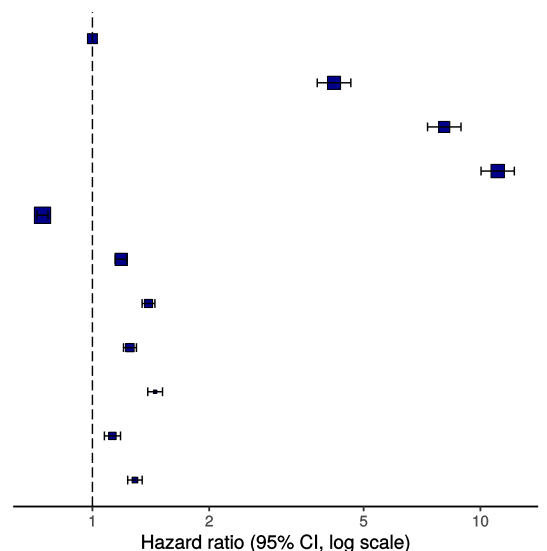


Figure 16b - Multivariable Cox proportional hazards model (age, sex, comorbidities only)

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

Age on admission (years)	<50	-
	50-69	4.20 (3.80-4.63, p<0.001)
	70-79	8.07 (7.31-8.91, p<0.001)
	80+	11.08 (10.04-12.23, p<0.001)
Sex at Birth	Female	0.74 (0.72-0.77, p<0.001)
Chronic cardiac disease	YES	1.19 (1.15-1.23, p<0.001)
Chronic pulmonary disease (not asthma)	YES	1.40 (1.34-1.45, p<0.001)
Chronic kidney disease	YES	1.25 (1.20-1.30, p<0.001)
Malignant neoplasm	YES	1.45 (1.39-1.52, p<0.001)
Obesity (as defined by clinical staff)	YES	1.13 (1.07-1.18, p<0.001)
Dementia	YES	1.29 (1.23-1.34, p<0.001)



ROC = 0.7383981

Figure 17 - Predictions calibration plot

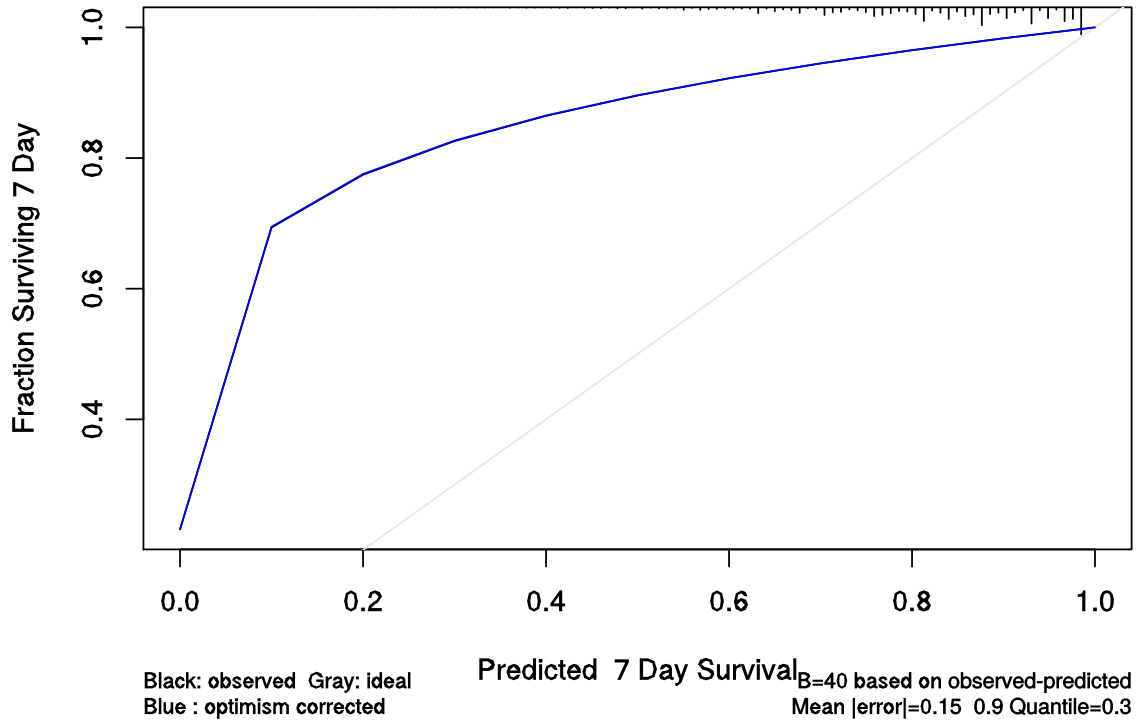


Figure 18 - Prognostic model predictions

Again, for demonstration of methods.

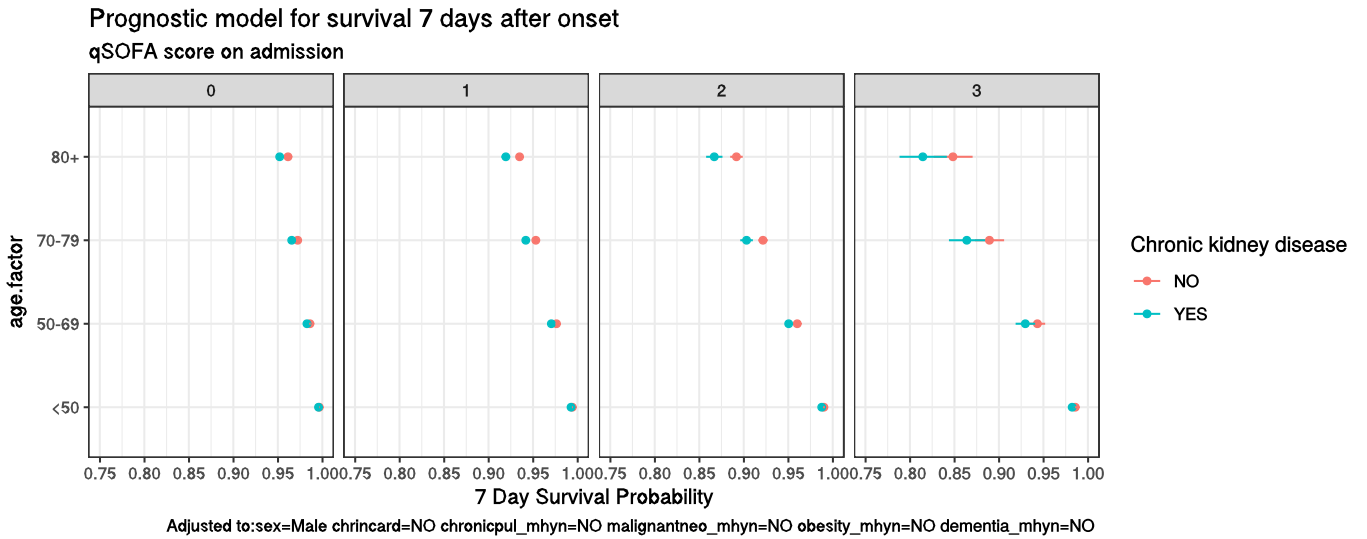


Figure 19 - Death by severity (NEWS) on admission

Number of deaths by NEWS score at admission

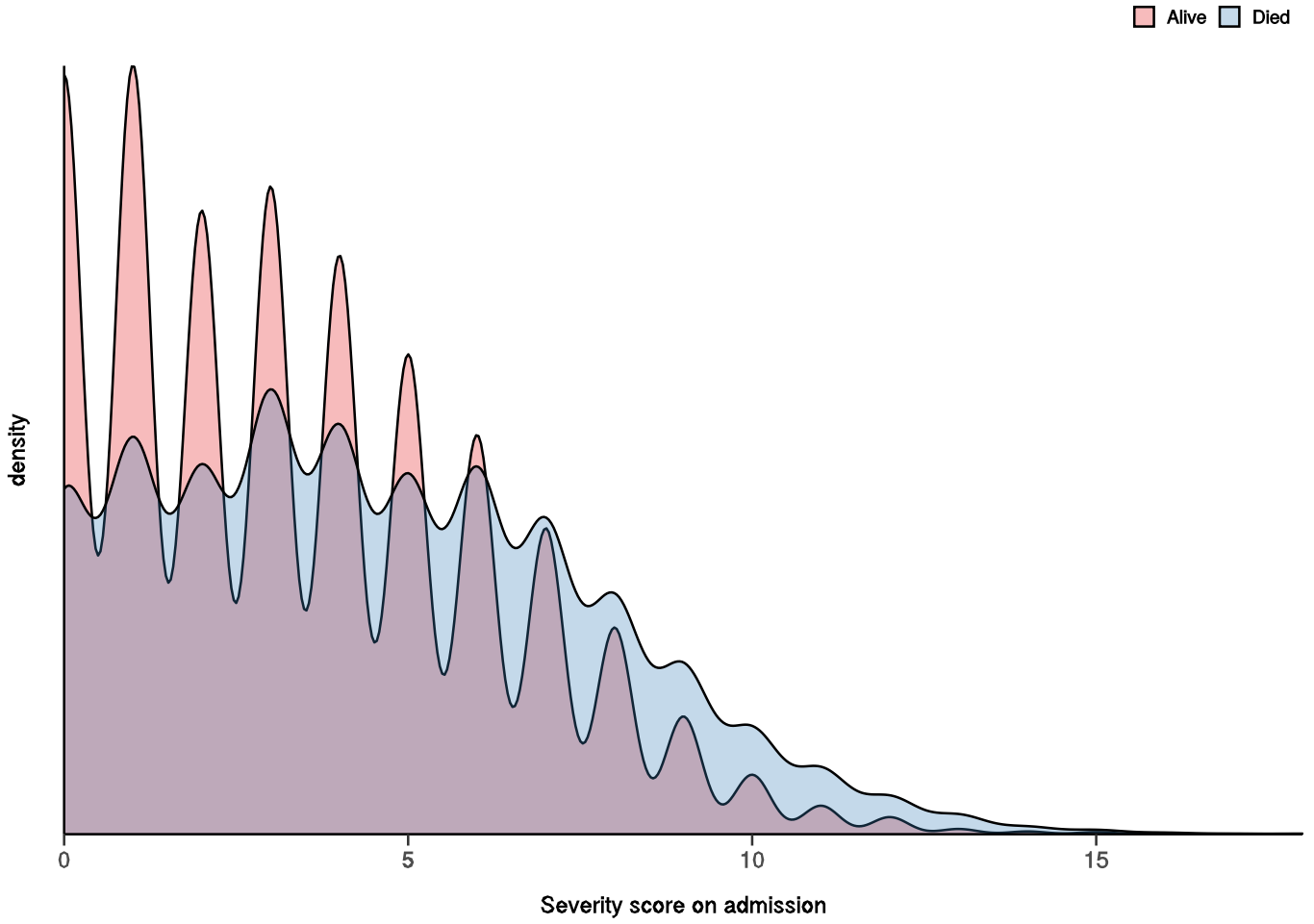


Figure 20 - Death by severity (NEWS) on admission stratified by age

Number of deaths by NEWS score at admission
Stratified by age

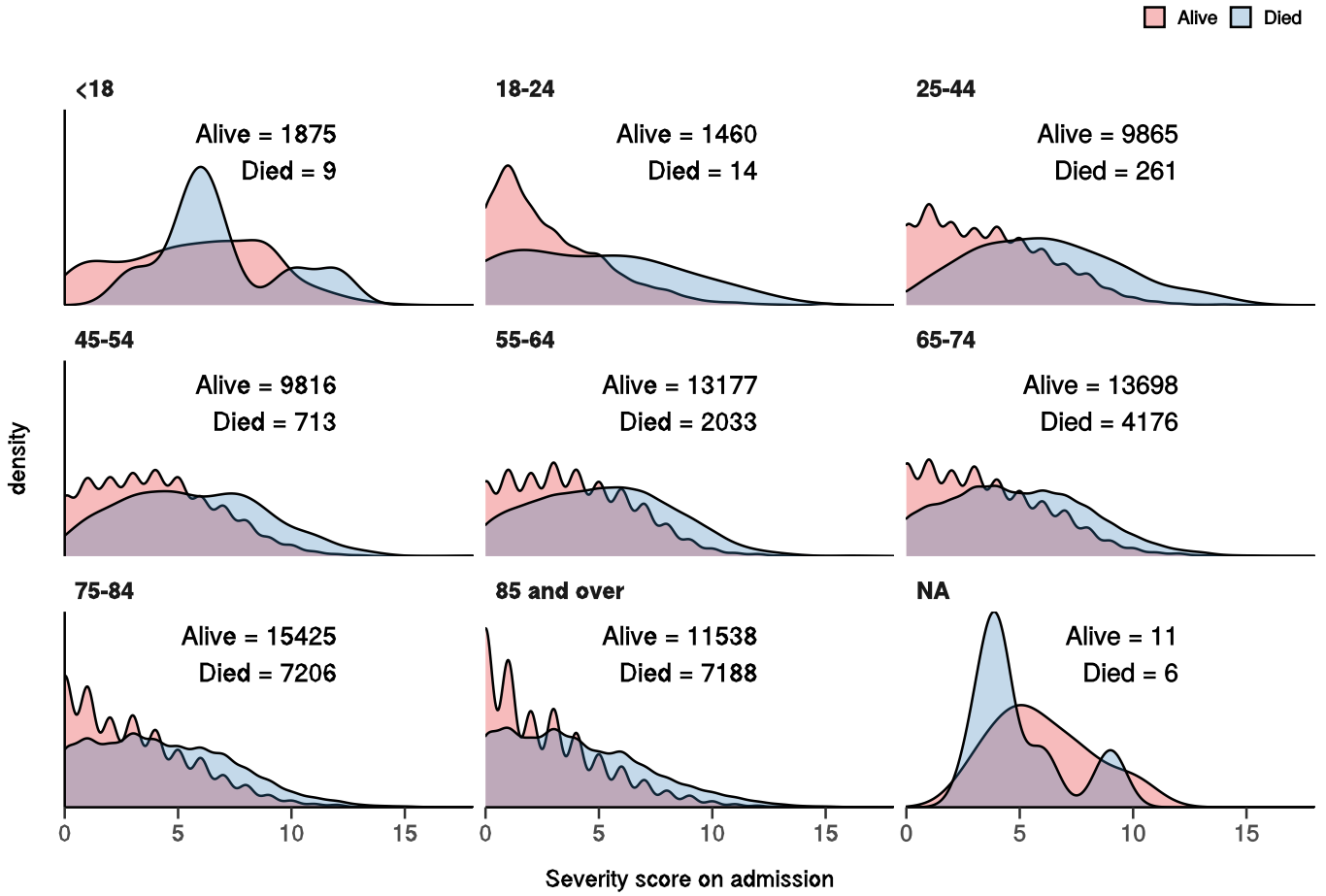
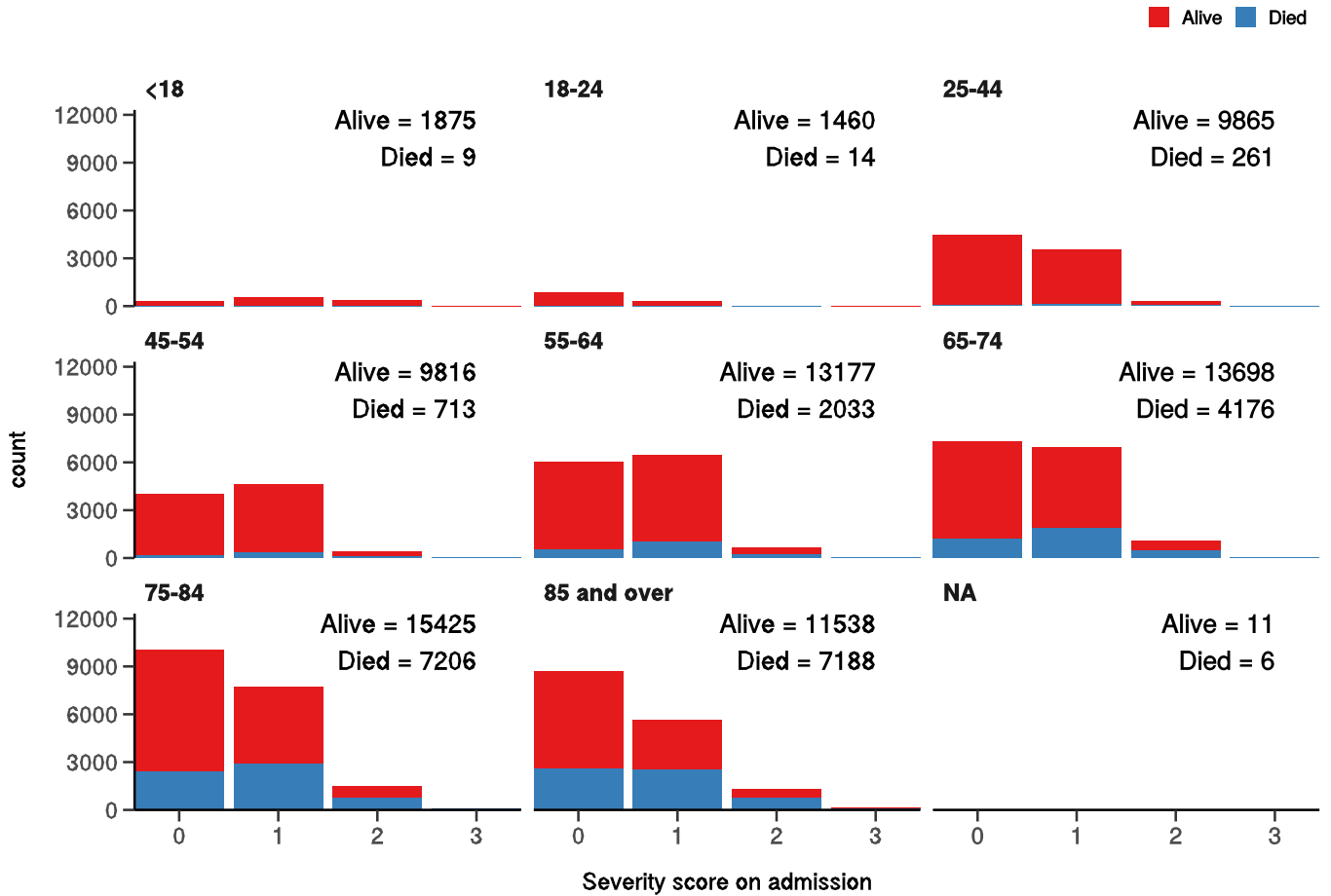


Figure 21 - Death by severity (qSOFA) on admission stratified by age

Number of deaths by qSOFA score at admission

Stratified by age



Healthcare workers

Employed as a healthcare worker?		NO	YES	p
Total N (%)		81615 (97.4)	2151 (2.6)	
NEWS score on admission	Median (IQR)	3.0 (5.0)	4.0 (4.0)	<0.001
Death	No	57344 (75.4)	1887 (93.2)	<0.001
	Yes	18723 (24.6)	138 (6.8)	