

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

Executive summary

Includes patients admitted after 01 August 2020

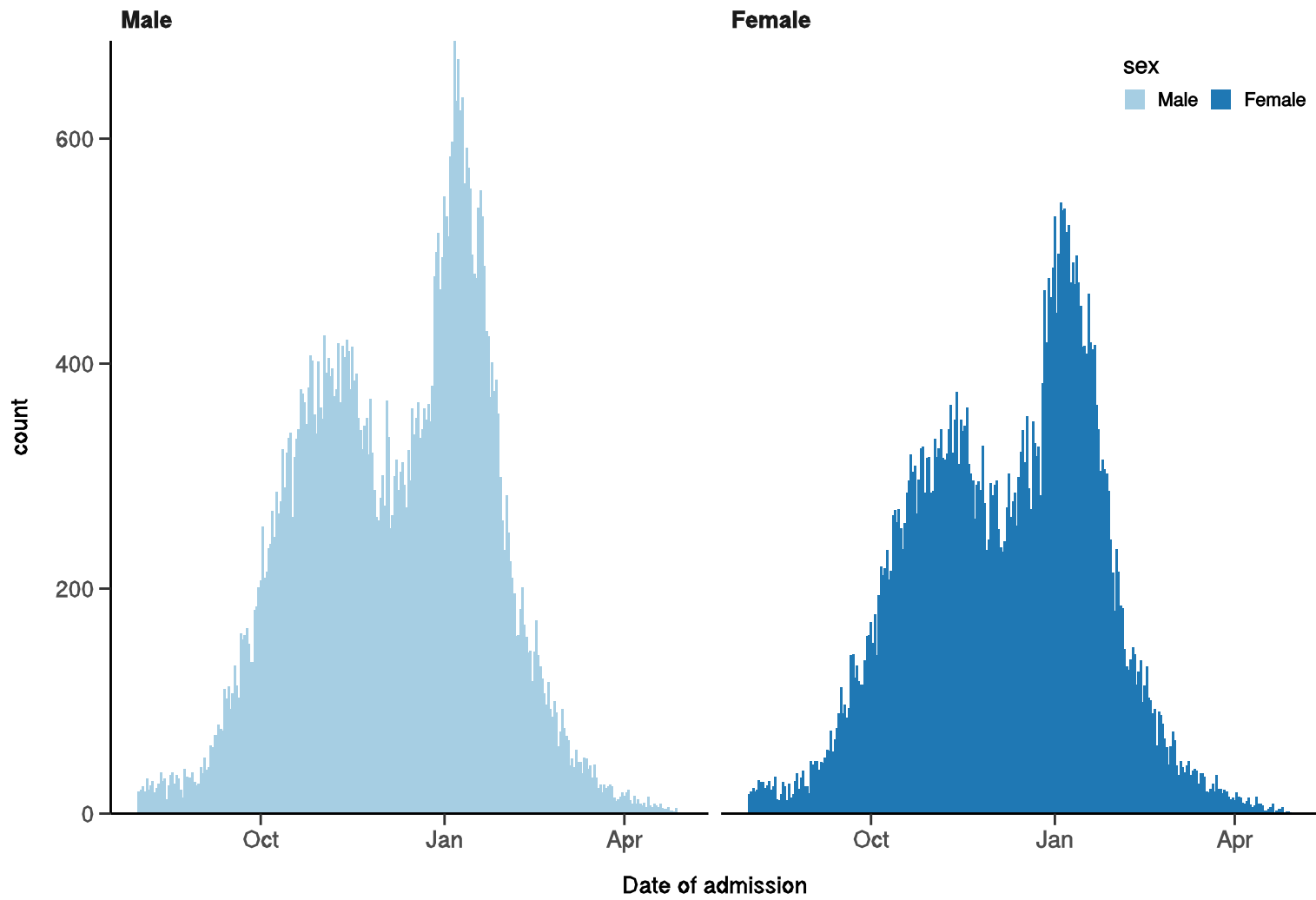
There are 104666 patients included in CO-CIN. Of these, 21177 patient(s) have died and 18043 required ICU. 62747 have been discharged home.

Admission

Figure 1

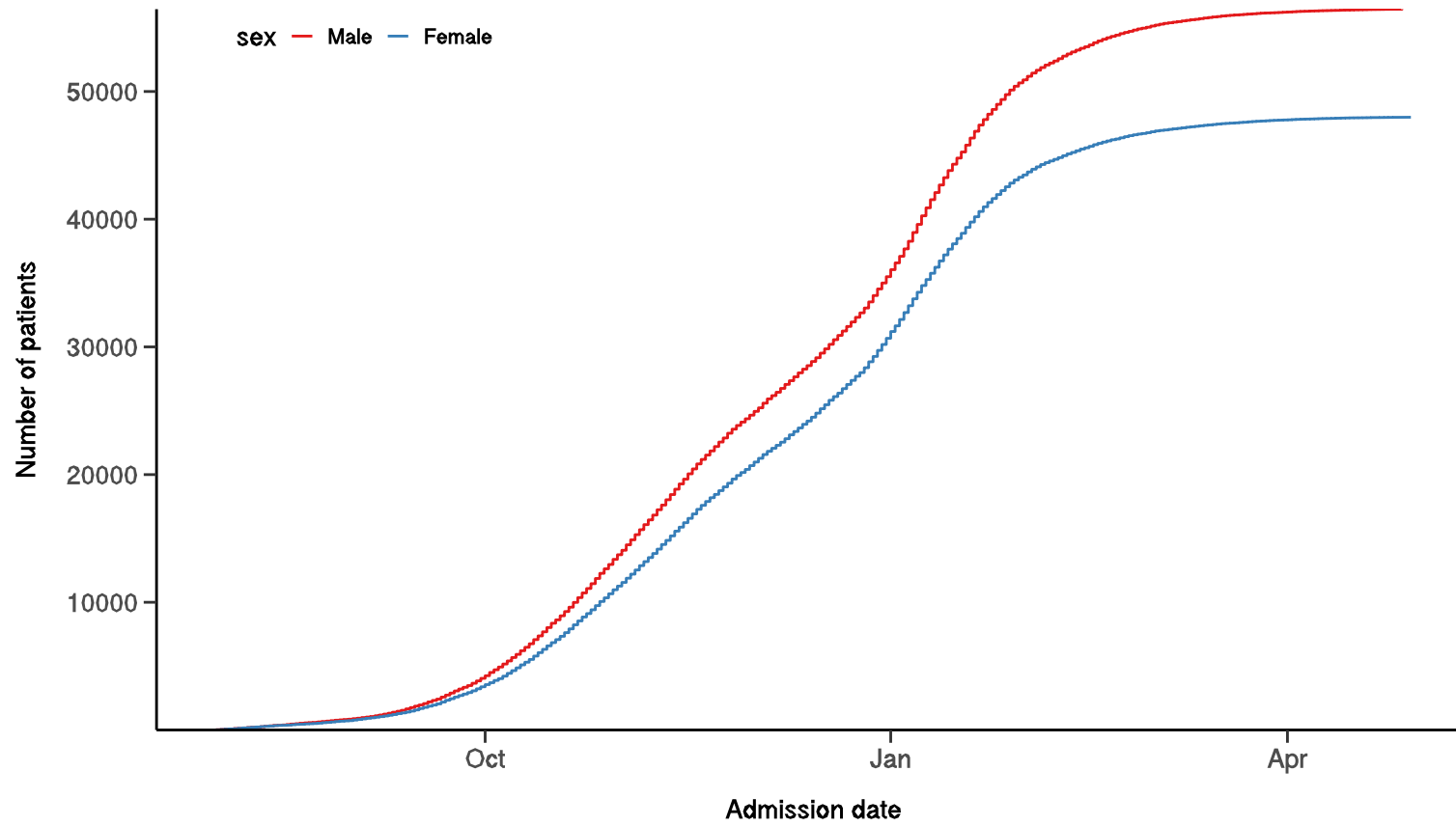
Hospital admission with COVID-19 by sex

Figure 1A



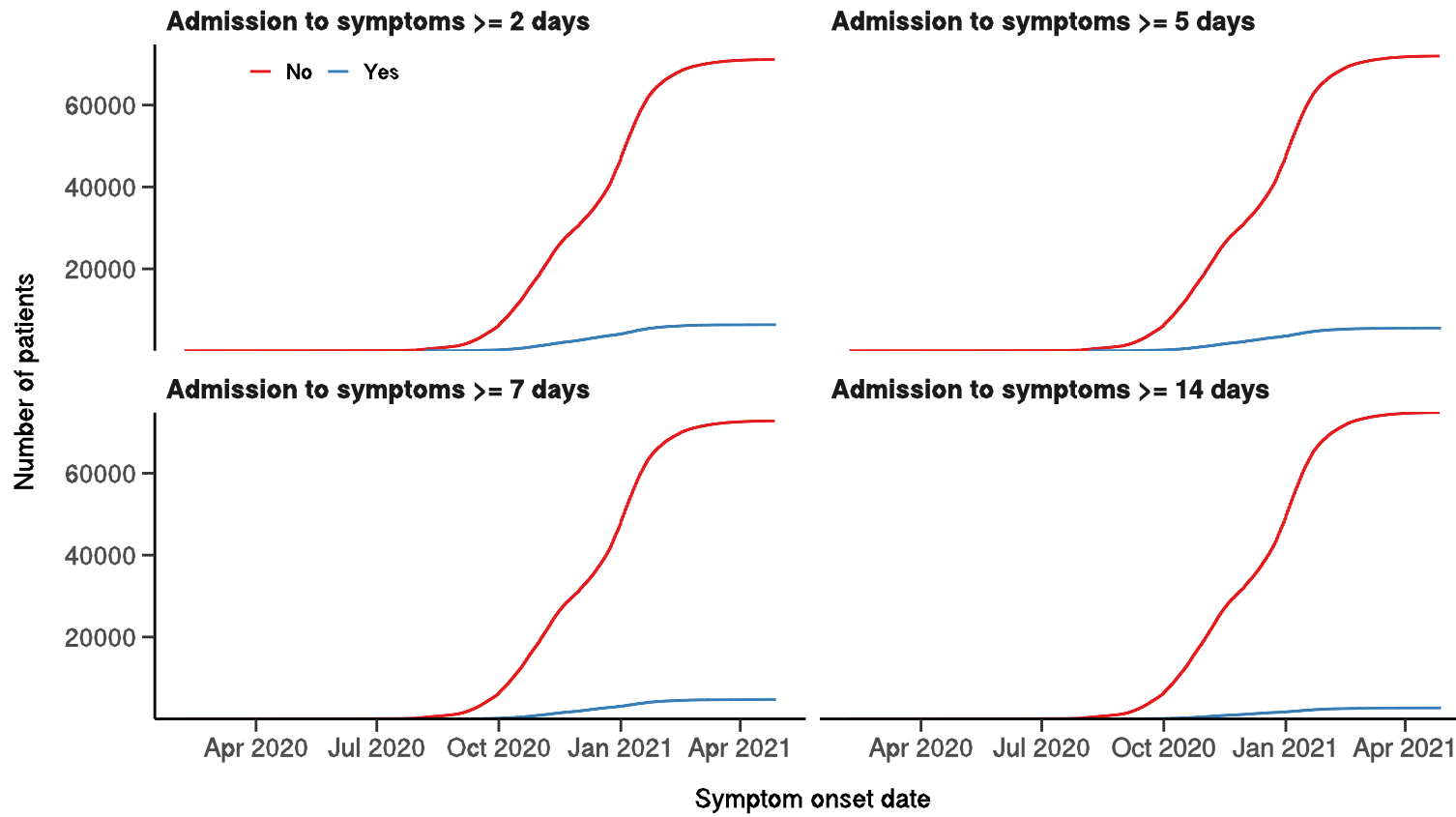
Hospital admission with COVID-19 by sex

Figure 1B



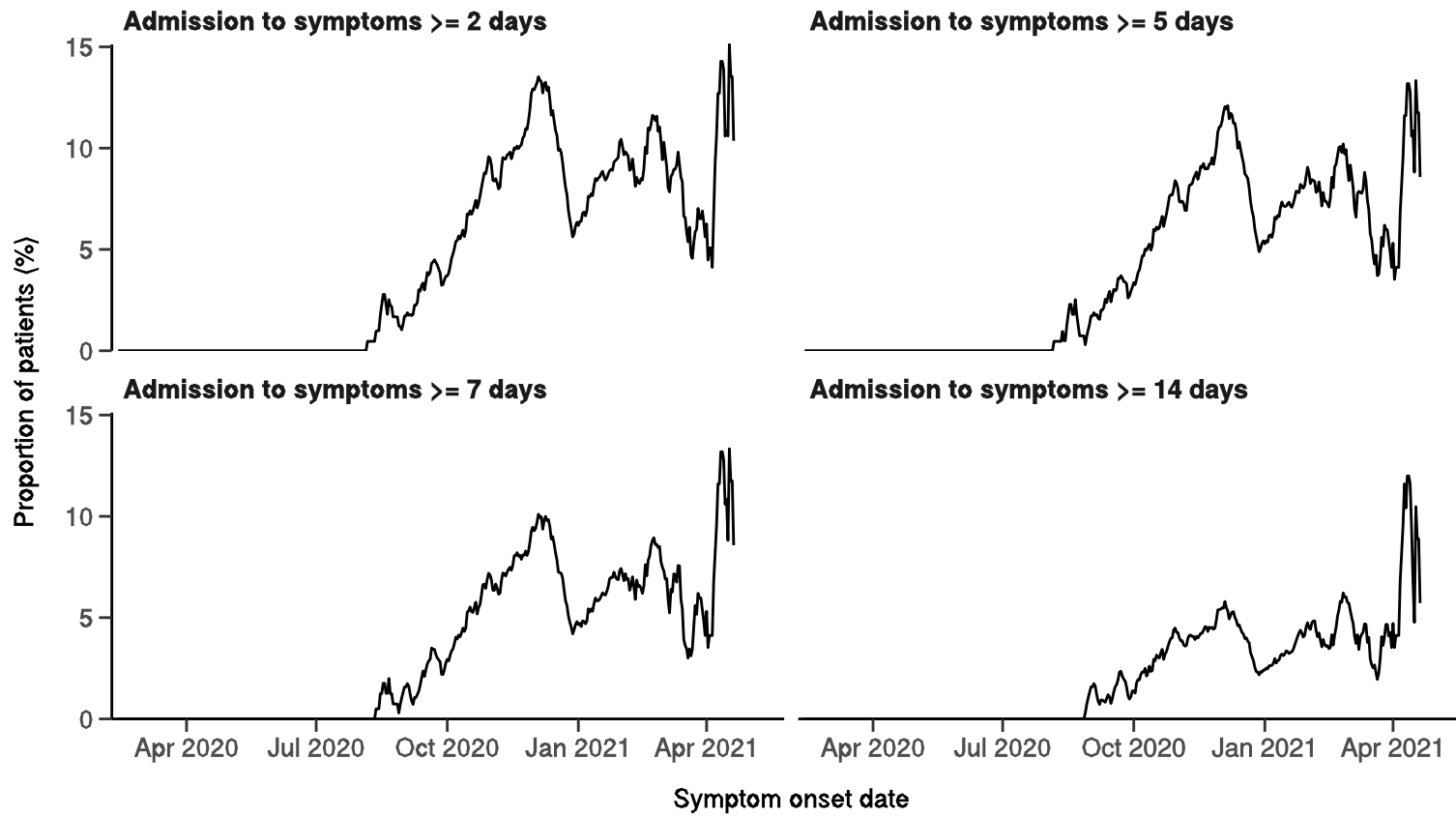
Number with symptom onset occurring after admission to hospital

Figure 1C



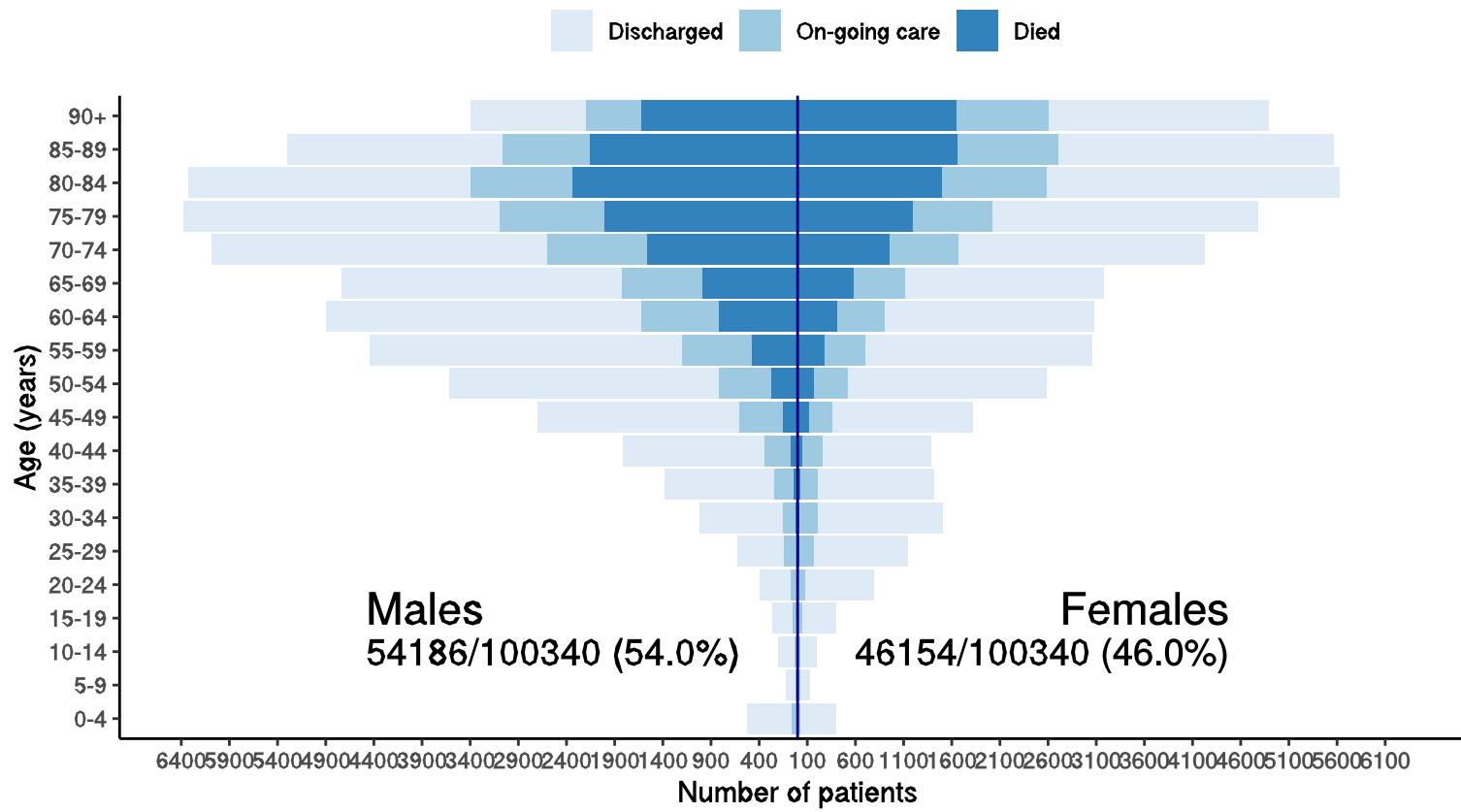
Proportion with symptom onset occurring after hospital admission

Figure 1D - 7-day rolling percentage. n = 77466



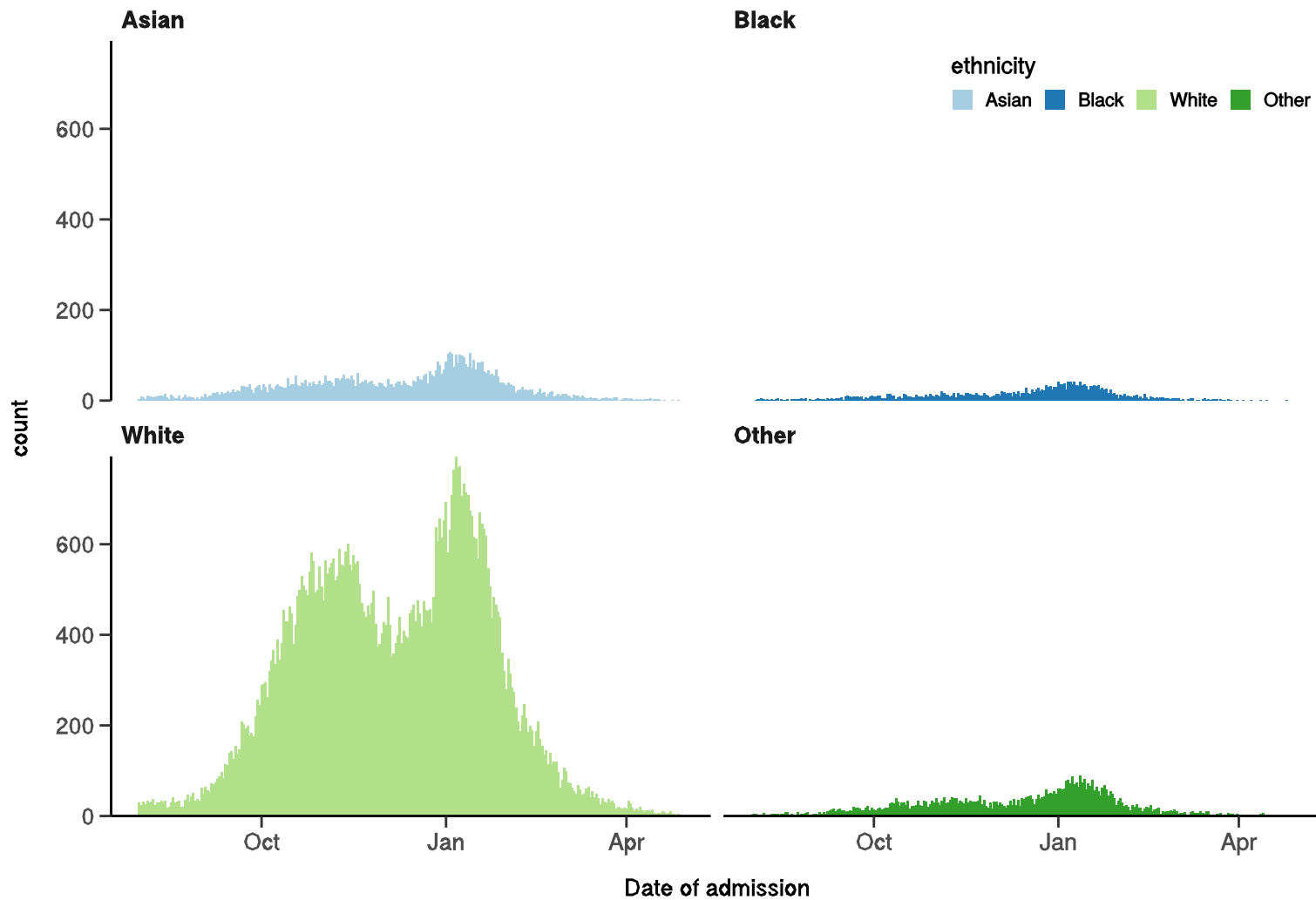
Patients with outcome stratified by age, and sex

Figure 1E



Hospital admission with COVID-19 by ethnicity

Figure 1F

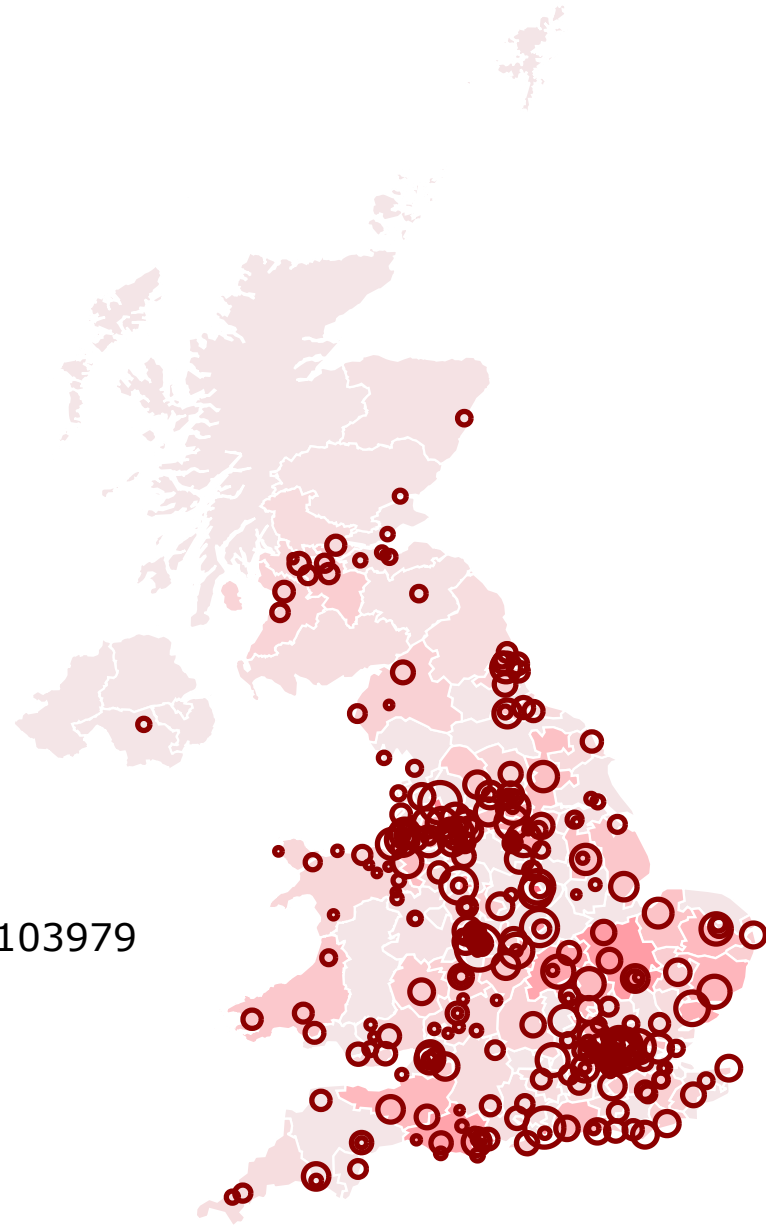


Location by CCG / Healthboard

Figure 2

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

n = 103979



Symptoms and comorbidity

Figure 3A

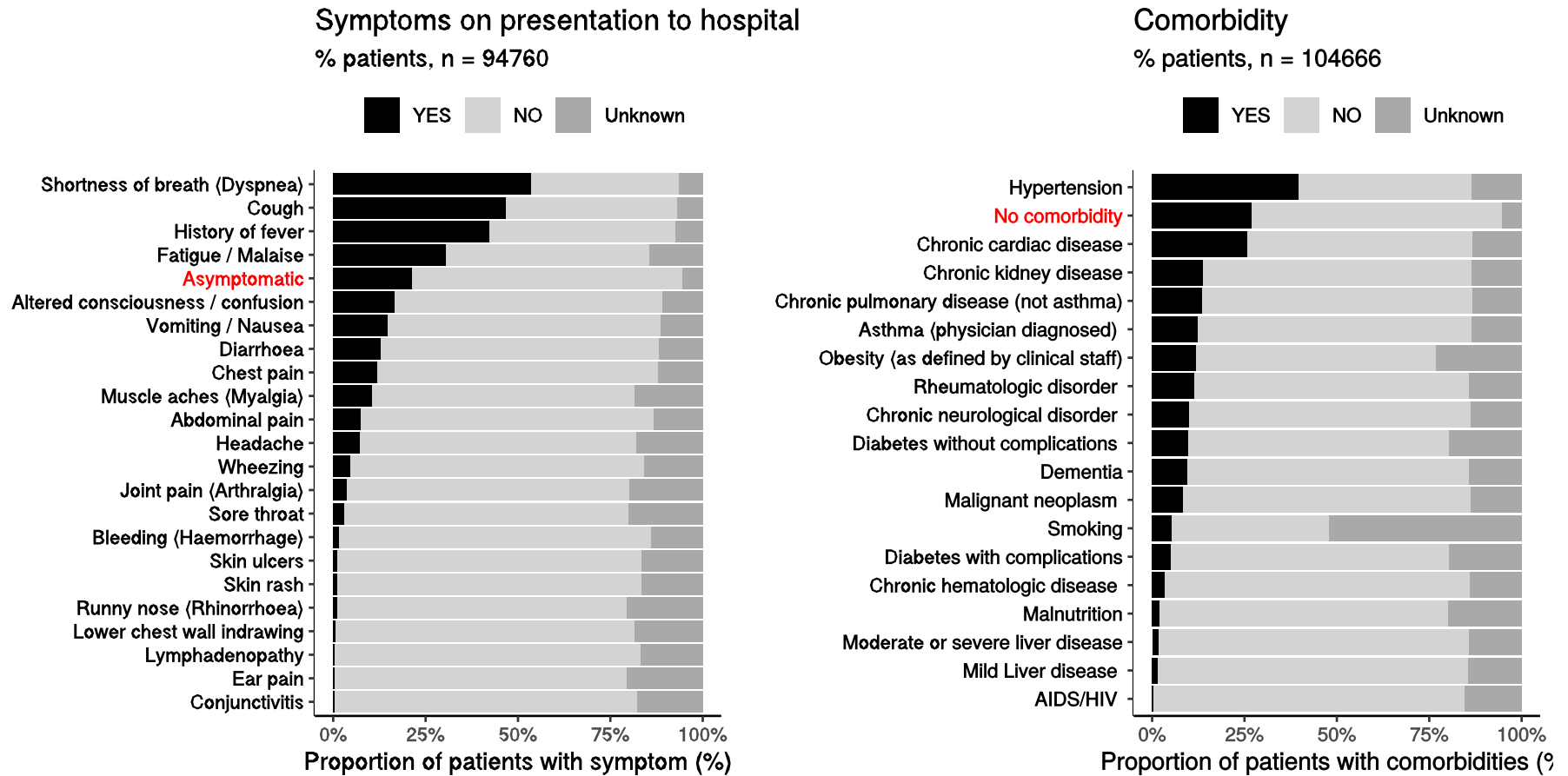


Figure 3B - Symptoms by Age

Symptoms on presentation to hospital
Stratified by age

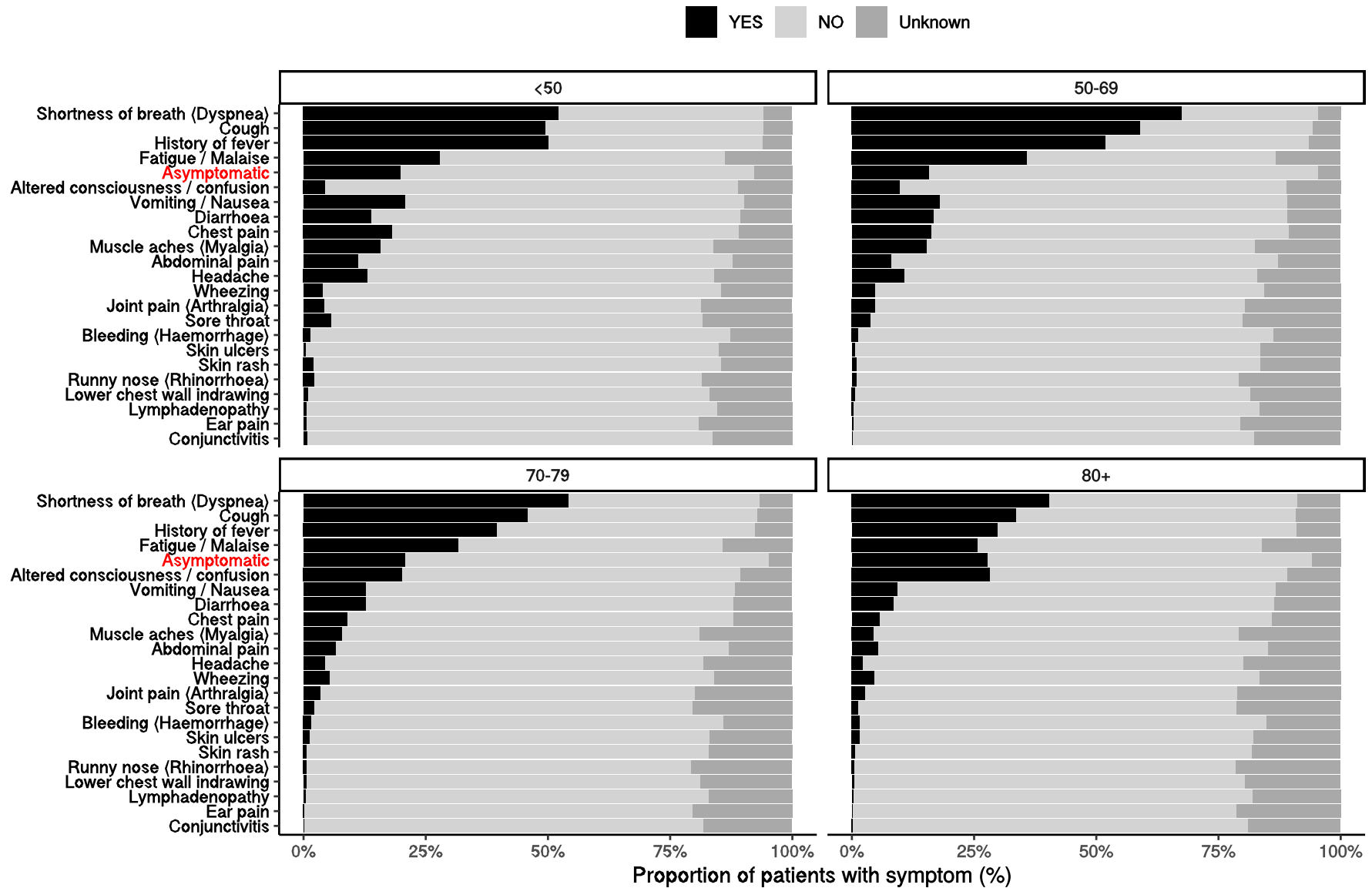
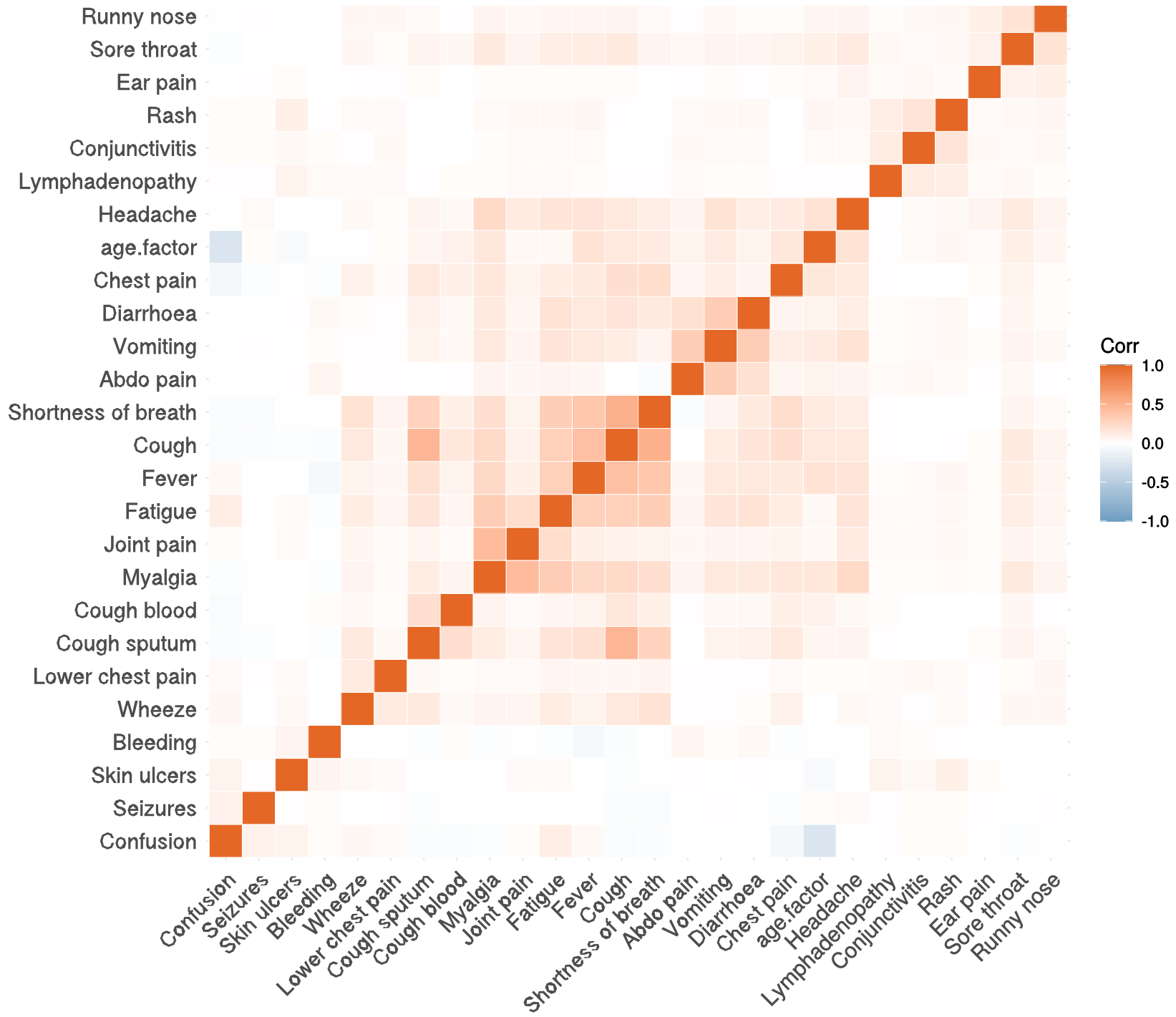


Figure 3C

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

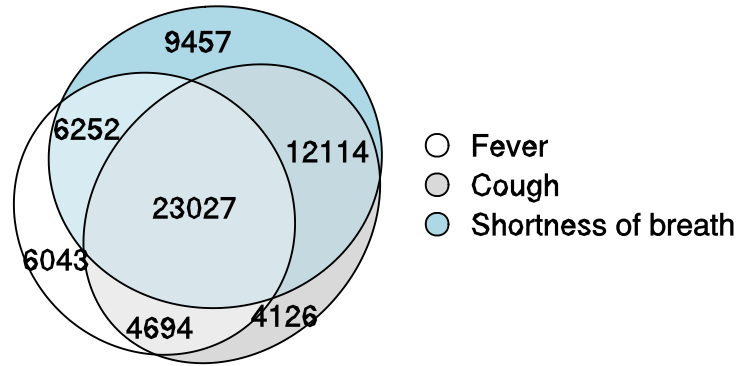




Symptoms (diagnostic criteria)

Figure 4A

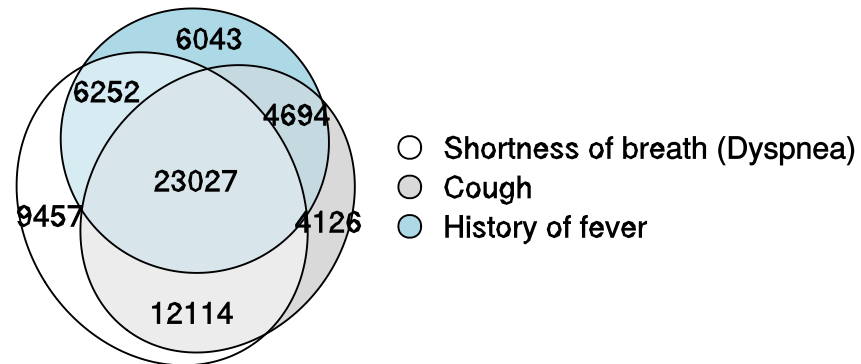
n = 94760



Symptoms (most common)

Figure 4B

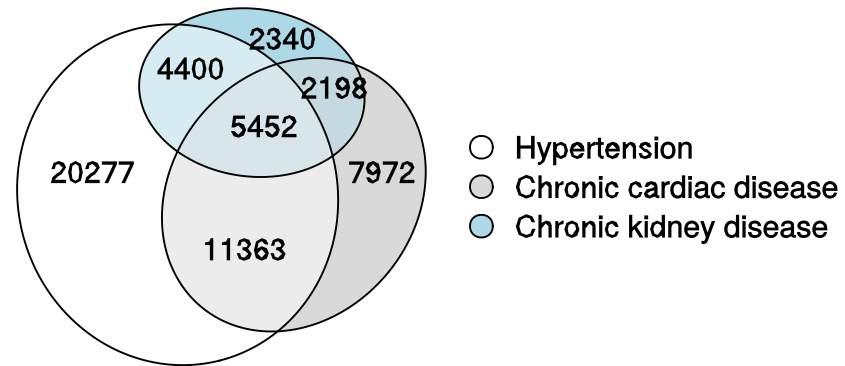
n = 94760



Comorbidity (most common)

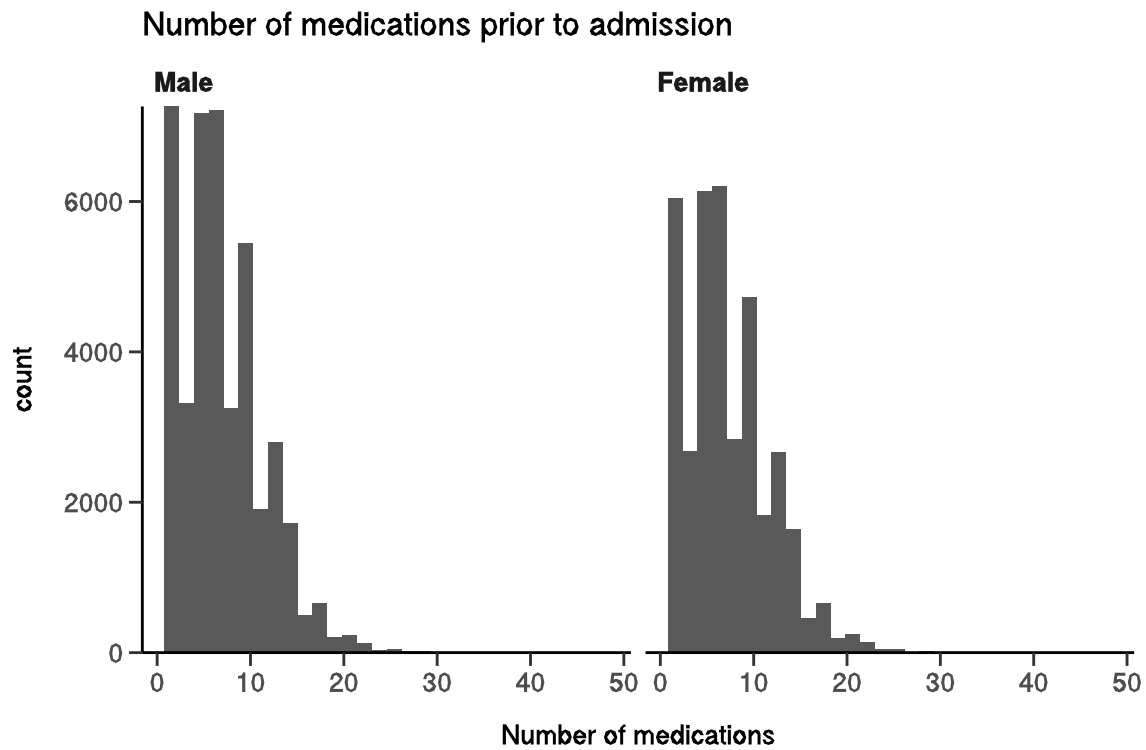
Figure 4C

n = 104666



Medication prior to illness

Figure 5

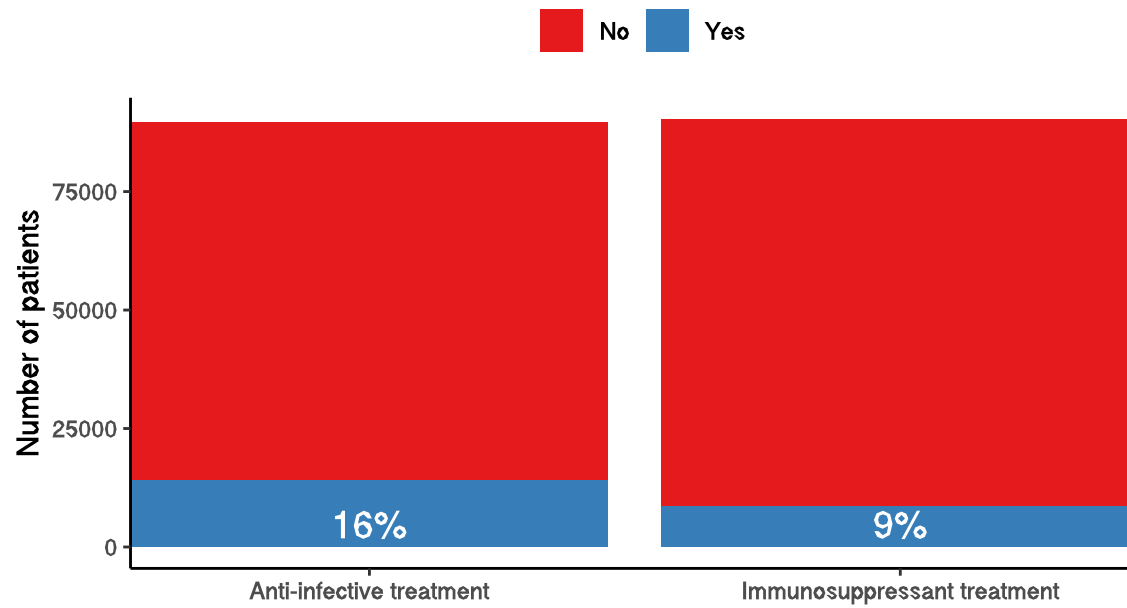


Preadmission treatment

Figure 6

Pre-admission treatment

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



Patient flow

Figure 7A - All patients

N = 101372

Patient status by day

Cumulative for discharge/death

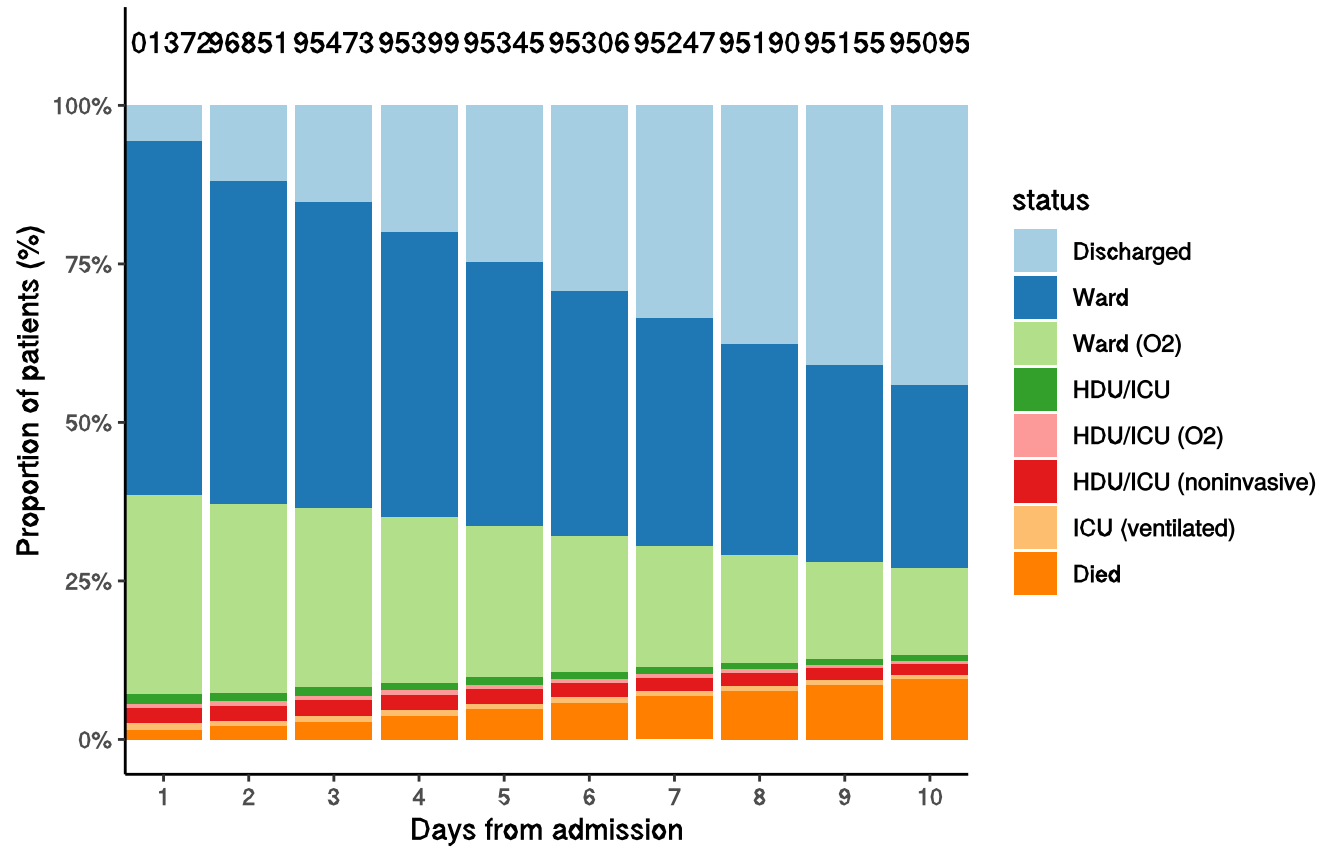
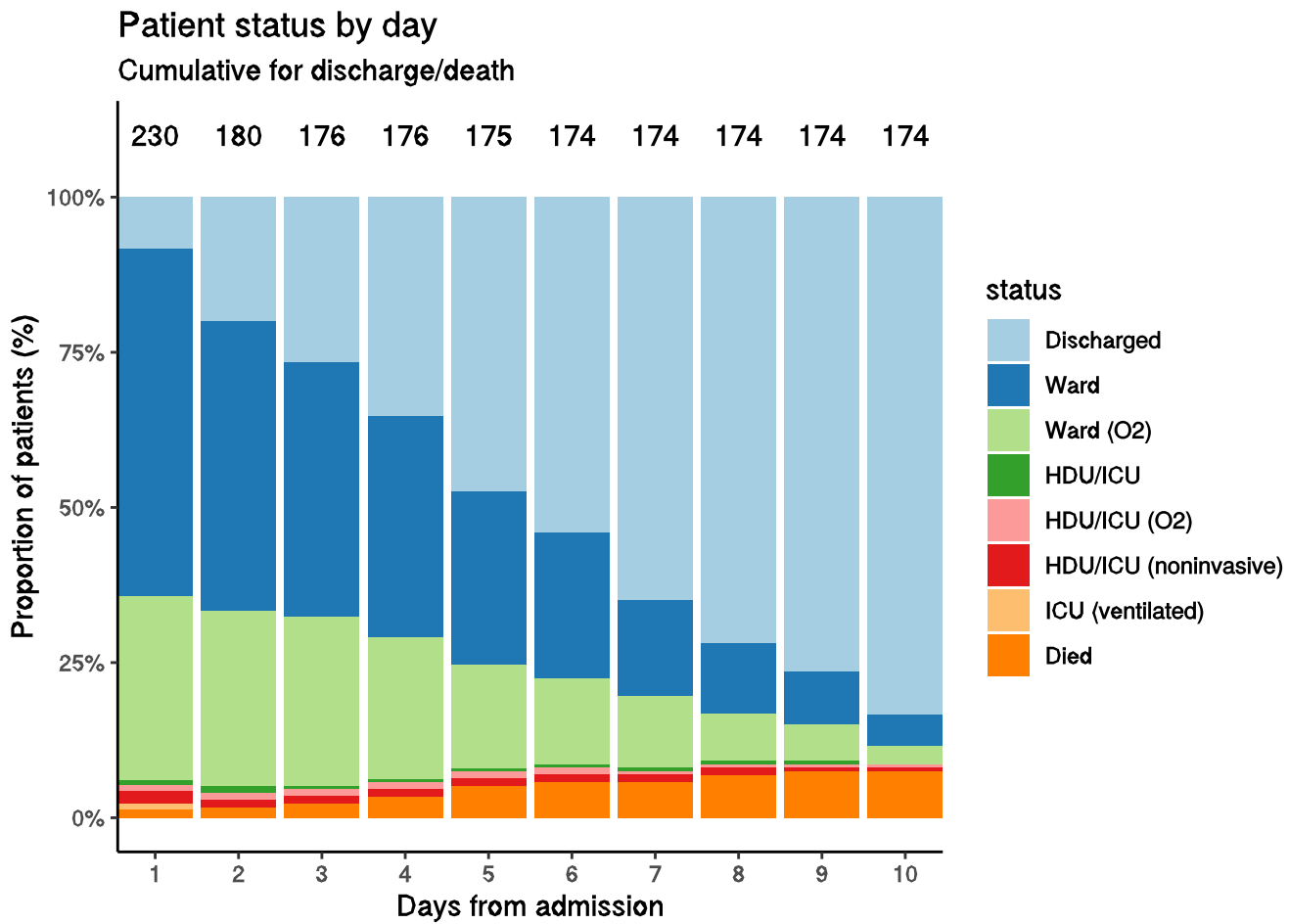


Figure 7B - Patients admitted ≥ 14 days and ≤ 28 days ago

N = 230



Oxygen requirement

Figure 8A - All patients

N = 95827

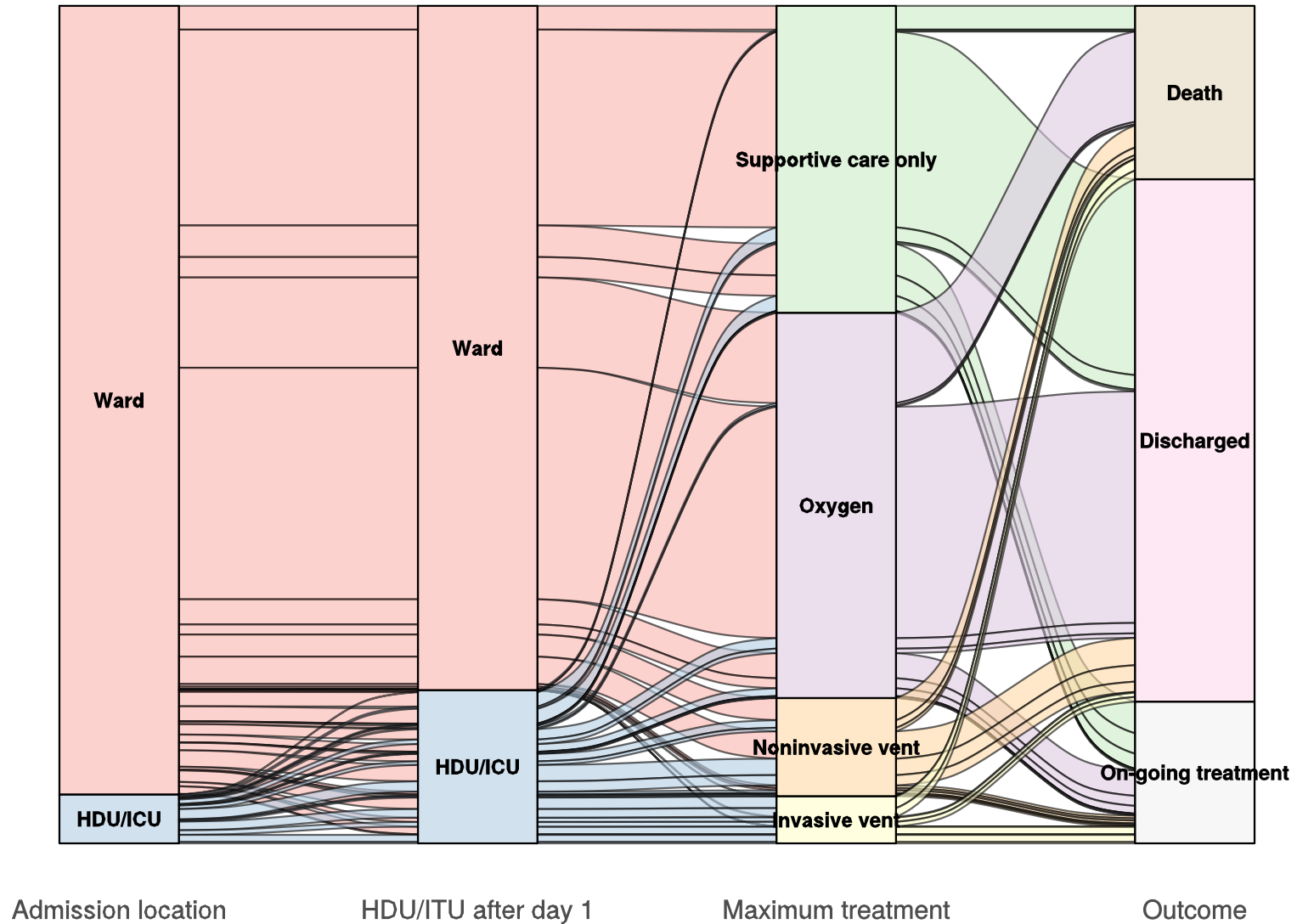


Figure 8B - Patients admitted ≥ 14 days and ≤ 28 days ago

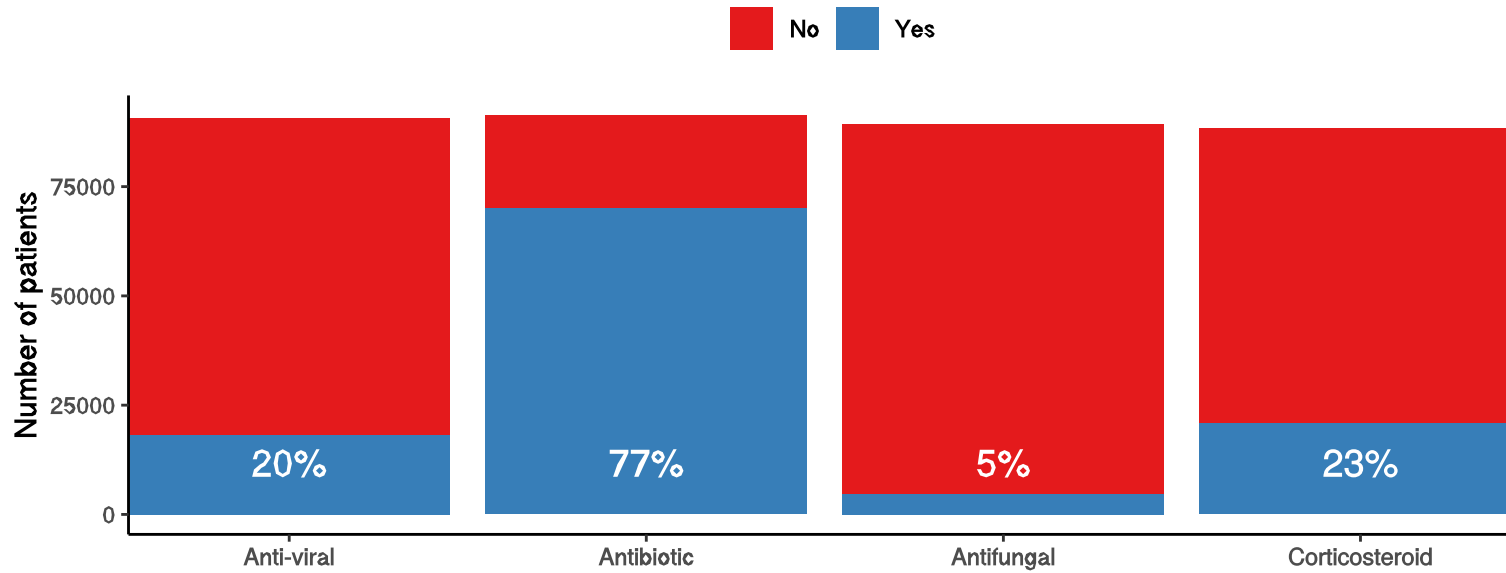
N = 219

In-hospital medical treatment

Figure 9

In-hospital treatment

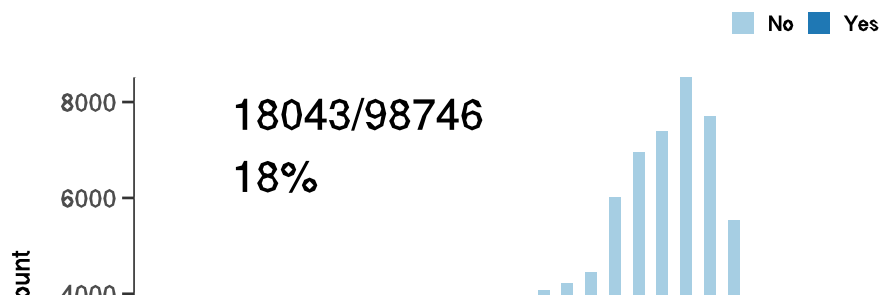
Anti-virals, antibiotics, corticosteroids, and anti-fungals for patients who have completed journey.



Treatment

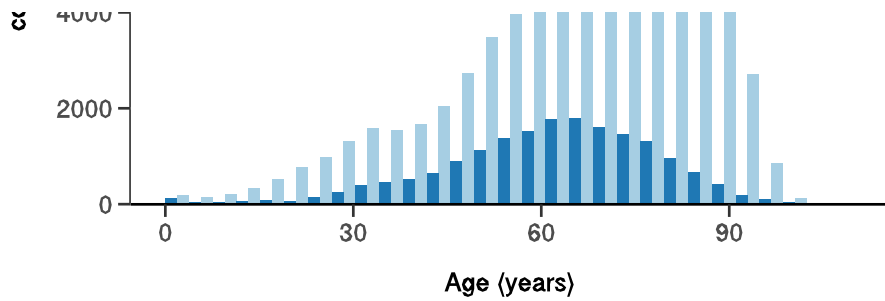
Figure 10

ICU/HDU admission
Figure 10A



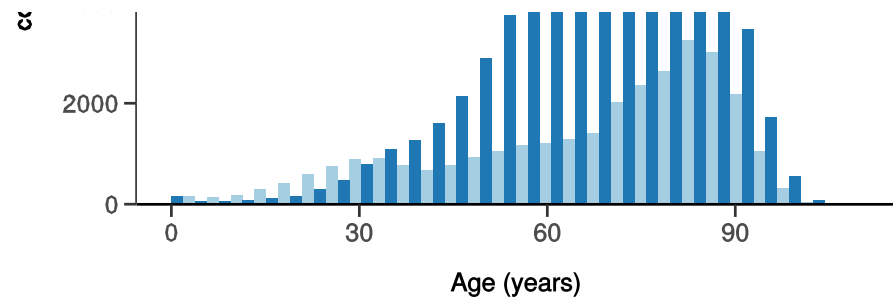
High flow oxygen
Figure 10B





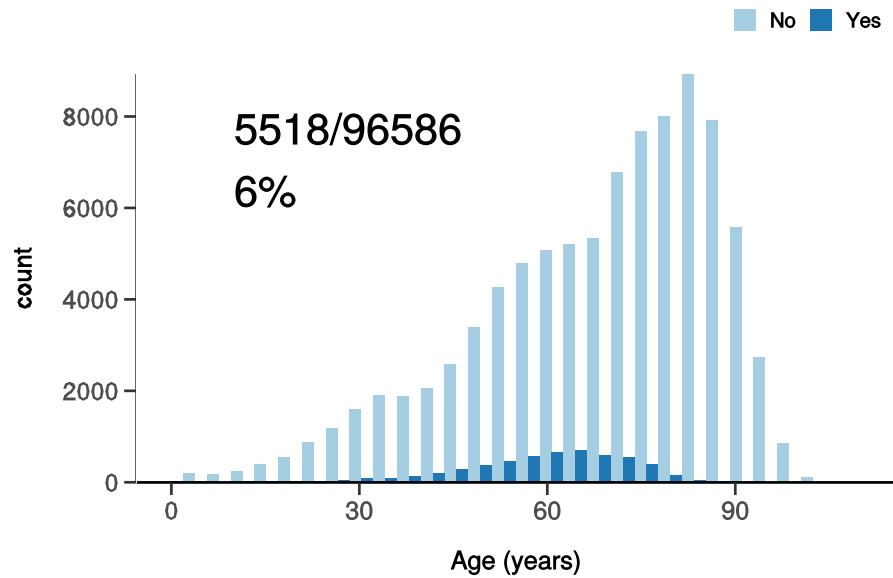
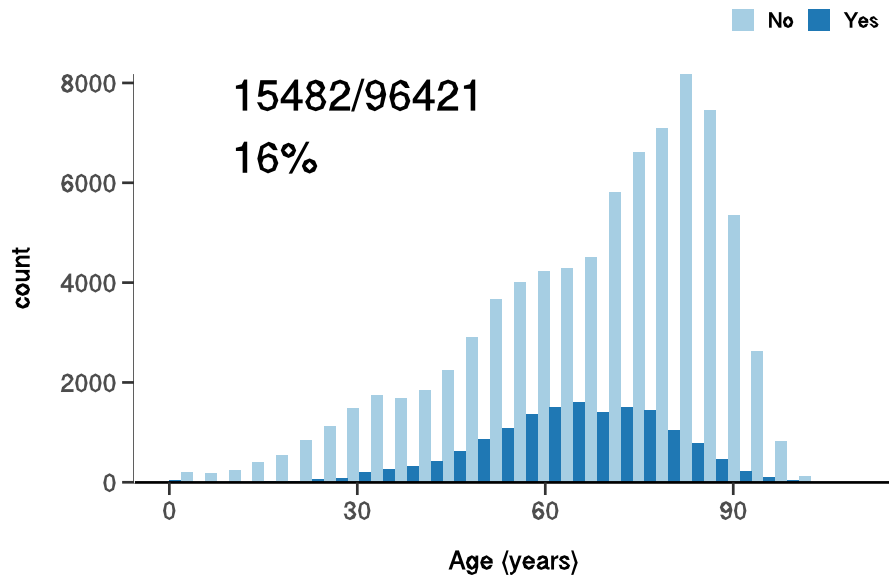
Noninvasive ventilation

Figure 10C



Invasive ventilation

Figure 10D

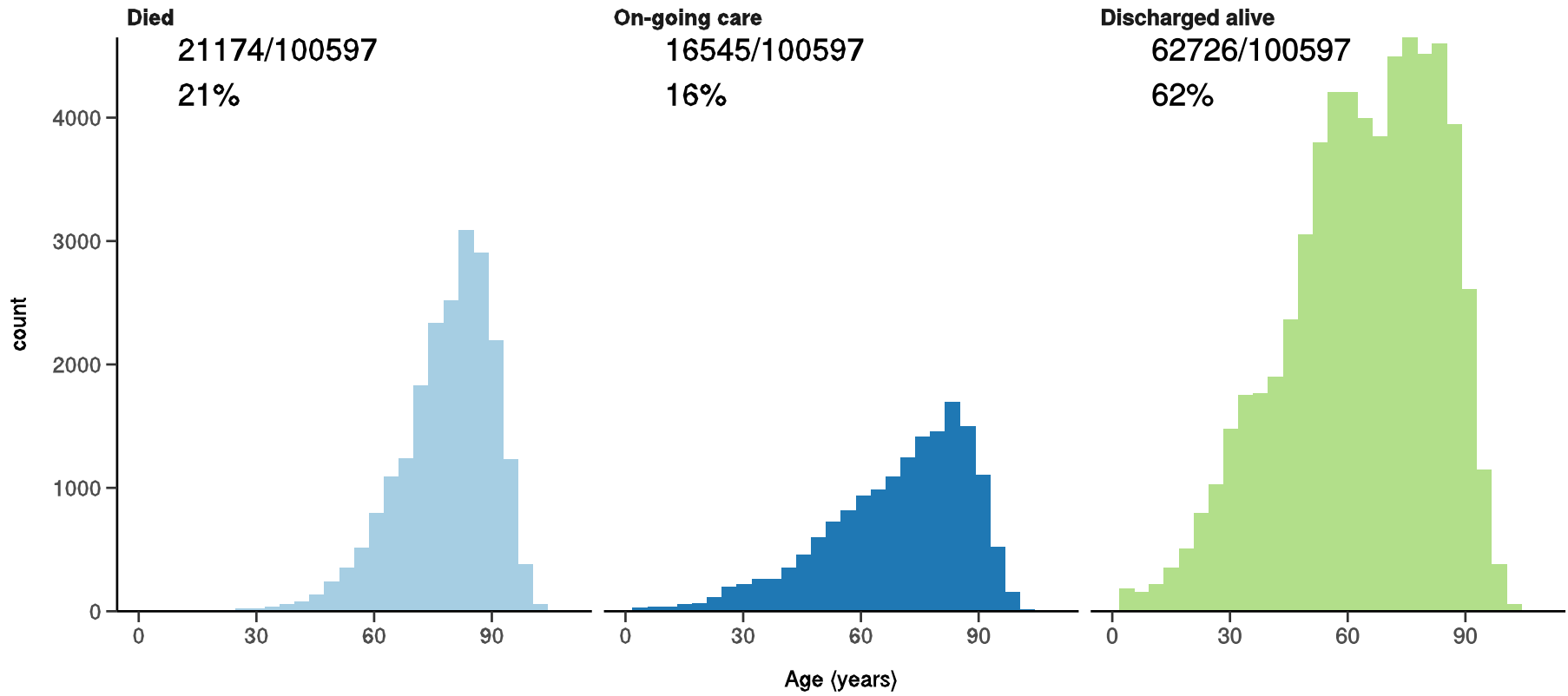


Status in patients admitted ≥ 14 days from today

Figure 11

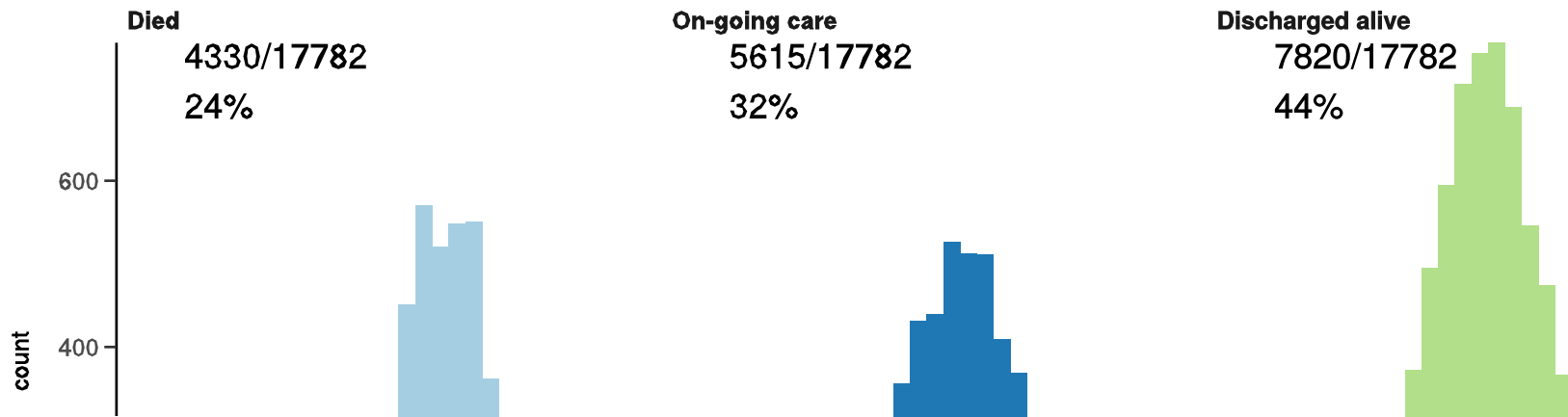
All: status in patients admitted ≥ 14 days ago

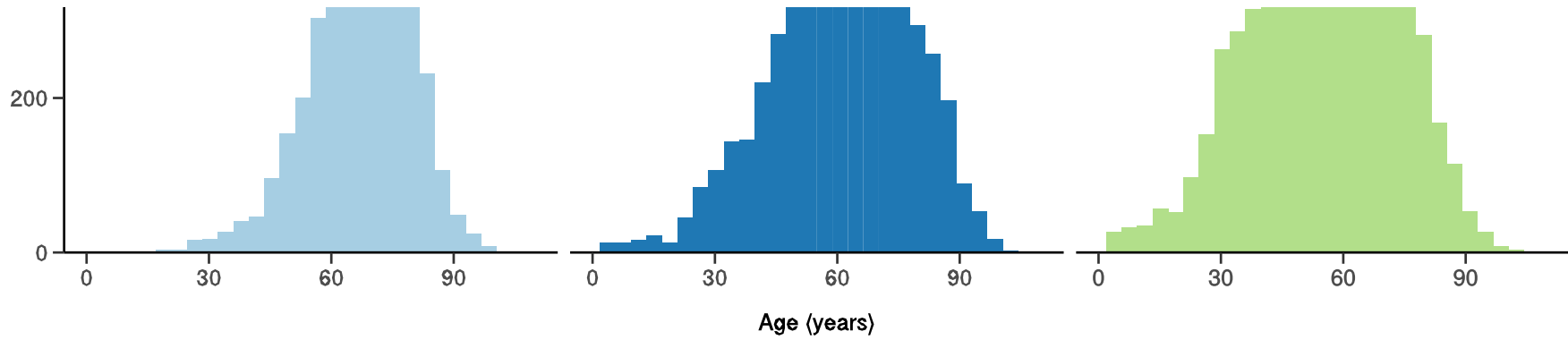
Figure 11A



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

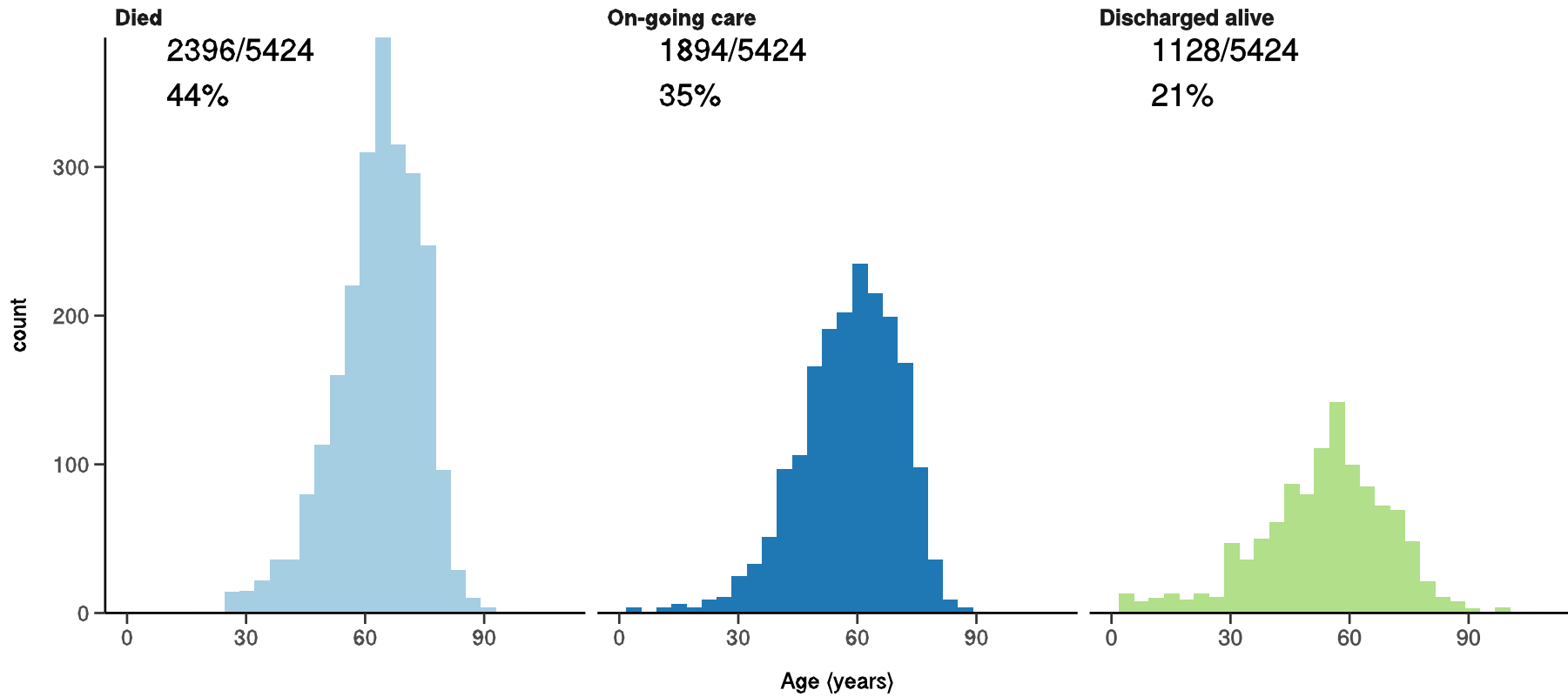
Figure 11B





Invasive ventilation: status in patients admitted ≥ 14 days ago

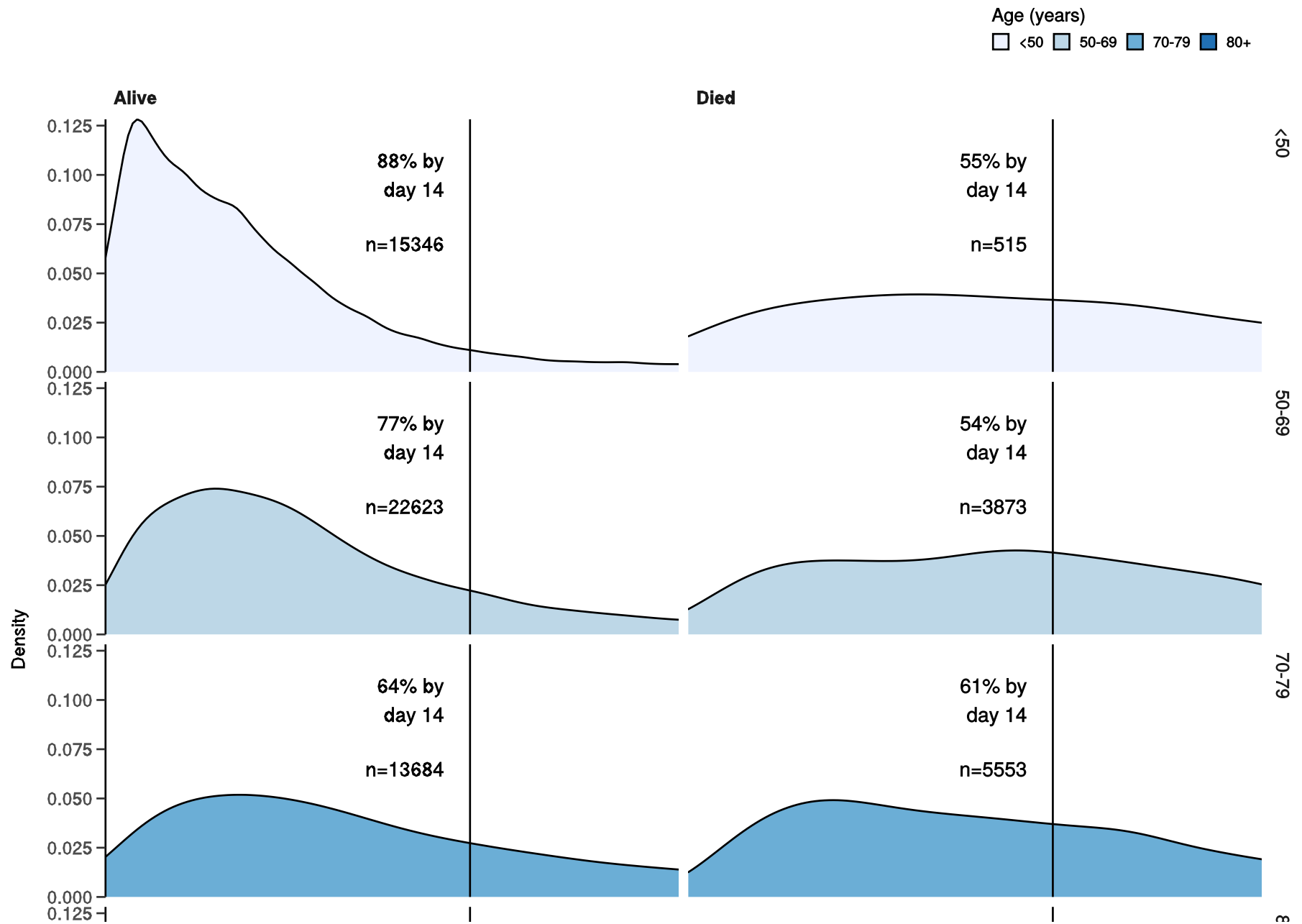
Figure 11c

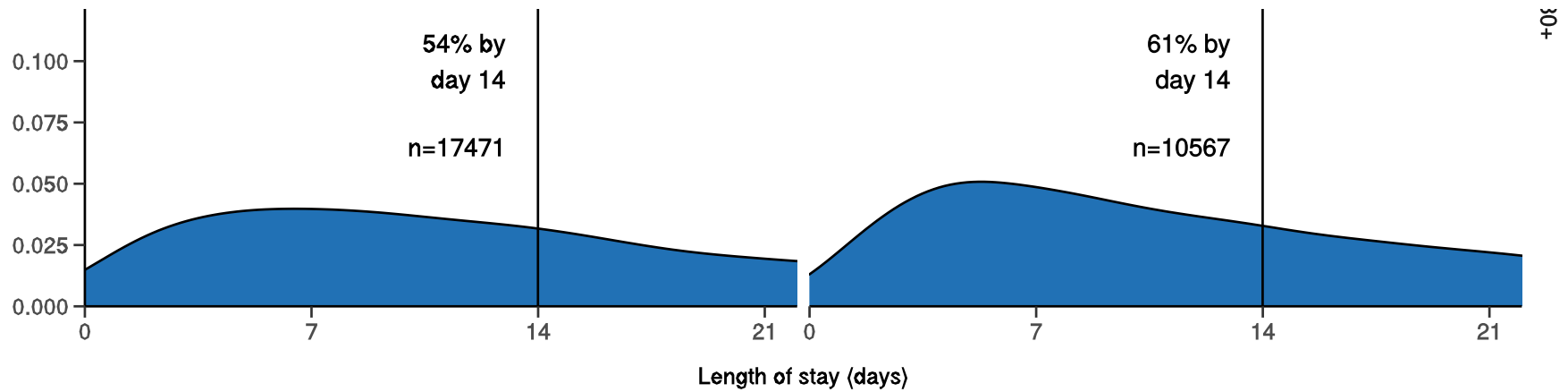


Length of stay stratified by age

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	16981 (96.9)	535 (3.1)	•	•
	50-69	24343 (85.9)	3986 (14.1)	5.20 (4.74-5.71, p<0.001)	4.36 (3.94-4.84, p<0.001)
	70-79	14825 (72.2)	5706 (27.8)	12.22 (11.16-13.40, p<0.001)	8.91 (8.04-9.90, p<0.001)
	80+	18903 (63.4)	10896 (36.6)	18.30 (16.75-20.03, p<0.001)	13.03 (11.76-14.47, p<0.001)
Sex at Birth	Male	39365 (75.9)	12532 (24.1)	•	•
	Female	35715 (80.6)	8602 (19.4)	0.76 (0.73-0.78, p<0.001)	0.70 (0.67-0.72, p<0.001)

Dependent: death		No	Yes	OR (univariable)	OR (multivariable)
	Not specified	0 (NaN)	0 (NaN)	•	•
Chronic cardiac disease	NO	49972 (82.9)	10341 (17.1)	•	•
	YES	17160 (67.2)	8369 (32.8)	2.36 (2.28-2.44, p<0.001)	1.22 (1.17-1.27, p<0.001)
Chronic pulmonary disease (not asthma)	NO	58458 (80.5)	14144 (19.5)	•	•
	YES	8706 (65.7)	4549 (34.3)	2.16 (2.07-2.25, p<0.001)	1.53 (1.45-1.60, p<0.001)
Chronic neurological disorder	NO	59547 (79.1)	15757 (20.9)	•	•
	YES	7262 (72.4)	2763 (27.6)	1.44 (1.37-1.51, p<0.001)	1.03 (0.97-1.09, p=0.300)
Chronic hematologic disease	NO	64246 (78.6)	17537 (21.4)	•	•
	YES	2503 (72.2)	964 (27.8)	1.41 (1.31-1.52, p<0.001)	0.92 (0.84-1.01, p=0.090)
Chronic kidney disease	NO	58212 (80.8)	13789 (19.2)	•	•
	YES	8794 (64.6)	4824 (35.4)	2.32 (2.23-2.41, p<0.001)	1.33 (1.27-1.40, p<0.001)
Dementia	NO	60695 (80.4)	14781 (19.6)	•	•
	YES	5919 (62.5)	3553 (37.5)	2.46 (2.36-2.58, p<0.001)	1.36 (1.29-1.44, p<0.001)

Dependent: death		No	Yes	OR (univariable)	OR (multivariable)
Obesity (as defined by clinical staff)	NO	50557 (78.3)	14023 (21.7)	•	•
	YES	9667 (81.6)	2178 (18.4)	0.81 (0.77-0.85, p<0.001)	1.17 (1.11-1.24, p<0.001)
Malignant neoplasm	NO	61580 (79.9)	15514 (20.1)	•	•
	YES	5208 (63.2)	3030 (36.8)	2.31 (2.20-2.42, p<0.001)	1.66 (1.56-1.75, p<0.001)

Number in dataframe = 104378, Number in model = 73145, Missing = 31233, AIC = 65721.7, C-statistic = 0.74, H&L = Chi-sq(8) 225.09 (p<0.001)

Figure 13 - Adjusted odds ratio plot

Death

Age on admission (years)	<50	-
	50-69	4.36 (3.94-4.84, p<0.001)
	70-79	8.91 (8.04-9.90, p<0.001)
	80+	13.03 (11.76-14.47, p<0.001)
Sex at Birth	Male	-
	Female	0.70 (0.67-0.72, p<0.001)
	Not specified	-
Chronic cardiac disease	YES	1.22 (1.17-1.27, p<0.001)
Chronic pulmonary disease (not asthma)	YES	1.53 (1.45-1.60, p<0.001)
Chronic neurological disorder	YES	1.03 (0.97-1.09, p=0.300)
Chronic hematologic disease	YES	0.92 (0.84-1.01, p=0.090)
Chronic kidney disease	YES	1.33 (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 (1.11-1.24, p<0.001)
Malignant neoplasm	YES	1.66 (1.56-1.75, p<0.001)

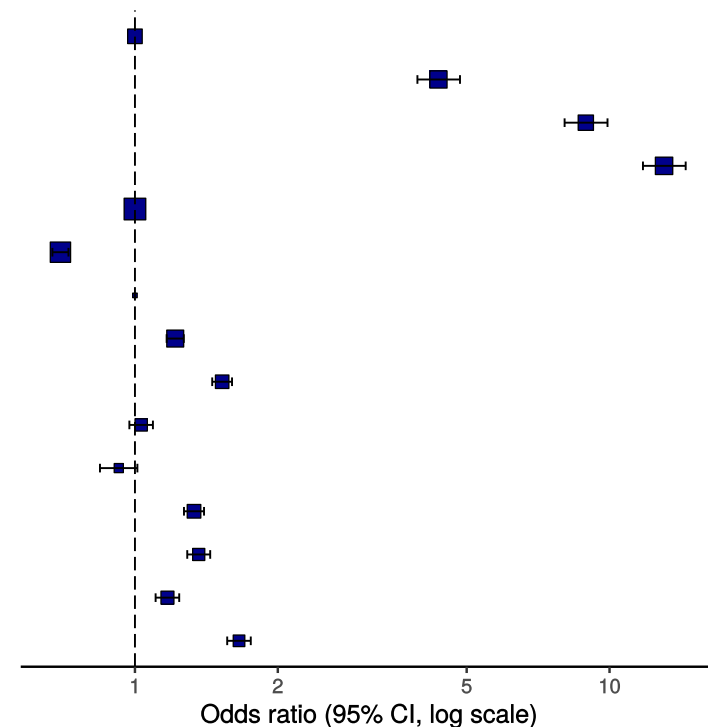
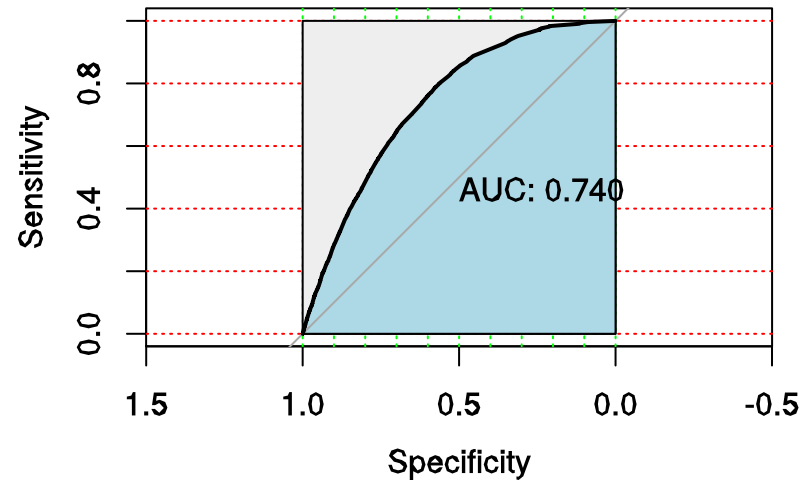


Figure 14 - ROC

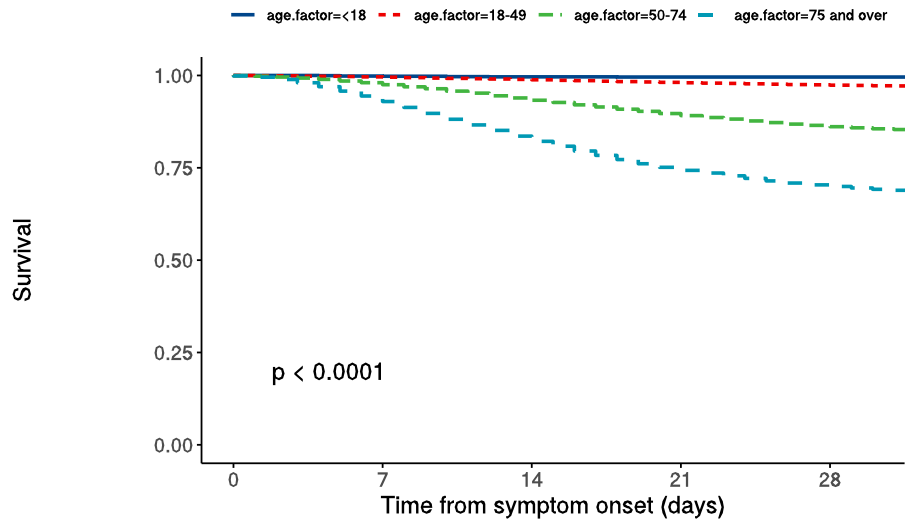


Survival models

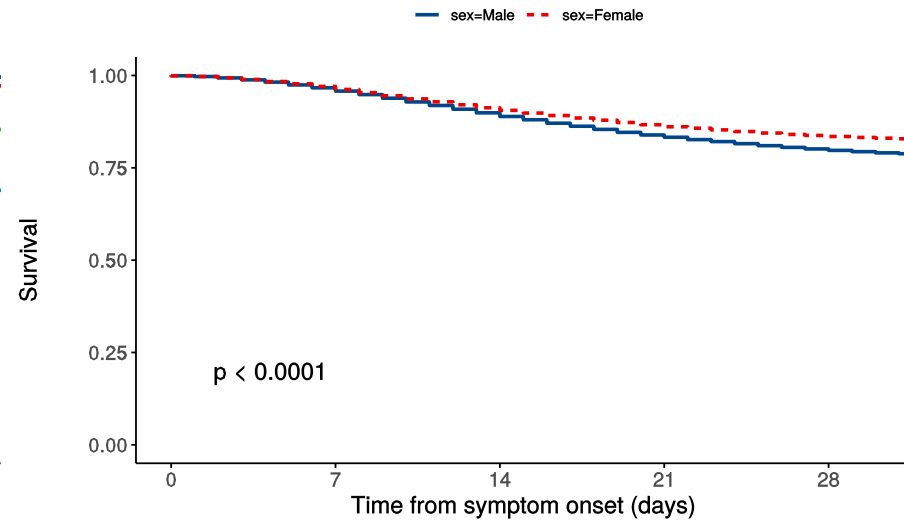
Kaplan-Meier plots for survival from symptom onset stratified by age (left) and sex (right)

Figure 15

P-value is log-rank test.



	0	7	14	21	28
age.factor=<18	1974	1861	1841	1837	1835
age.factor=18-49	16871	16101	15677	15482	15354
age.factor=50-74	41470	38757	36296	34403	33085
age.factor=75 and over	43733	39027	34067	30408	28387



	0	7	14	21	28
sex=Male	56241	51636	47051	43585	41512
sex=Female	47841	44059	40779	38500	37106

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	18845 (18.1)	•	•
	50-69	30748 (29.5)	4.83 (4.41-5.29, $p < 0.001$)	4.17 (3.74-4.64, $p < 0.001$)
	70-79	22333 (21.5)	10.45 (9.56-11.42, $p < 0.001$)	8.70 (7.82-9.67, $p < 0.001$)
	80+	32143 (30.9)	14.79 (13.56-16.14, $p < 0.001$)	12.13 (10.91-13.49, $p < 0.001$)

Dependent: Surv(time, status)		all	HR (univariable)	HR (multivariable)
Sex at Birth	Male	56241 (54.0)	•	•
	Female	47841 (46.0)	0.79 (0.77-0.81, p<0.001)	0.77 (0.74-0.79, p<0.001)
qSOFA score on admission	0	42691 (50.0)	•	•
	1	36540 (42.8)	1.56 (1.51-1.61, p<0.001)	1.75 (1.69-1.82, p<0.001)
	2	5808 (6.8)	3.04 (2.90-3.19, p<0.001)	2.98 (2.82-3.15, p<0.001)
	3	421 (0.5)	4.51 (3.94-5.17, p<0.001)	4.18 (3.59-4.87, p<0.001)
Symptomatic at presentation	No symptoms	15570 (16.4)	•	•
	Symptoms	79305 (83.6)	1.48 (1.41-1.54, p<0.001)	•
Chronic cardiac disease	NO	63579 (70.3)	•	•
	YES	26883 (29.7)	2.14 (2.08-2.20, p<0.001)	1.21 (1.17-1.26, p<0.001)
Chronic kidney disease	NO	75900 (84.1)	•	•
	YES	14334 (15.9)	2.07 (2.01-2.14, p<0.001)	1.24 (1.19-1.29, p<0.001)
Moderate or severe liver disease	NO	87870 (98.1)	•	•
	YES	1707 (1.9)	1.56 (1.43-1.70, p<0.001)	1.63 (1.46-1.81, p<0.001)
Chronic neurological disorder	NO	79420 (88.3)	•	•
	YES	10483 (11.7)	1.39 (1.33-1.44, p<0.001)	•

Dependent: Surv(time, status)		all	HR (univariable)	HR (multivariable)
Malignant neoplasm	NO	81231 (90.4)	•	•
	YES	8667 (9.6)	2.04 (1.96-2.12, p<0.001)	1.48 (1.41-1.55, p<0.001)
Chronic hematologic disease	NO	86186 (96.0)	•	•
	YES	3606 (4.0)	1.37 (1.28-1.46, p<0.001)	•
Obesity (as defined by clinical staff)	NO	67899 (84.5)	•	•
	YES	12422 (15.5)	0.83 (0.79-0.87, p<0.001)	1.09 (1.04-1.15, p=0.001)
Diabetes without complications	NO	73627 (87.8)	•	•
	YES	10193 (12.2)	1.19 (1.13-1.24, p<0.001)	•
Rheumatologic disorder	NO	77718 (86.7)	•	•
	YES	11891 (13.3)	1.24 (1.19-1.29, p<0.001)	•
Dementia	NO	79558 (88.9)	•	•
	YES	9978 (11.1)	2.19 (2.11-2.27, p<0.001)	1.19 (1.14-1.25, p<0.001)
Malnutrition	NO	81580 (97.6)	•	•
	YES	2021 (2.4)	1.75 (1.62-1.90, p<0.001)	•
smoking_mhyn_2levels	NO	44507 (47.2)	•	•

Dependent: Surv(time, status)		all	HR (univariable)	HR (multivariable)
	YES	5430 (5.8)	0.91 (0.85-0.97, p=0.005)	•
	N/K	44435 (47.1)	1.20 (1.16-1.23, p<0.001)	•

Number in dataframe = 104307, Number in model = 69413, Missing = 34894, Number of events = 13966, Concordance = 0.738 (SE = 0.002), R-squared = 0.134 (Max possible = 0.988), Likelihood ratio test = 10003.379 (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 (3.74-4.64, p<0.001)
	70-79	8.70 (7.82-9.67, p<0.001)
	80+	12.13 (10.91-13.49, p<0.001)
Sex at Birth	Female	0.77 (0.74-0.79, p<0.001)
qSOFA score on admission	0	-
	1	1.75 (1.69-1.82, p<0.001)
	2	2.98 (2.82-3.15, p<0.001)
	3	4.18 (3.59-4.87, p<0.001)
Chronic cardiac disease	YES	1.21 (1.17-1.26, p<0.001)
Chronic kidney disease	YES	1.24 (1.19-1.29, p<0.001)
Moderate or severe liver disease	YES	1.63 (1.46-1.81, 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)

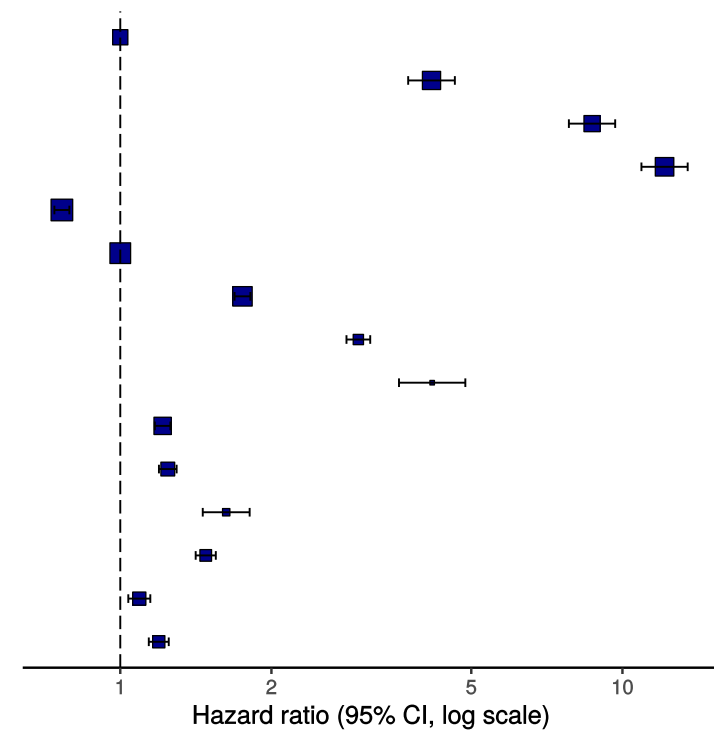
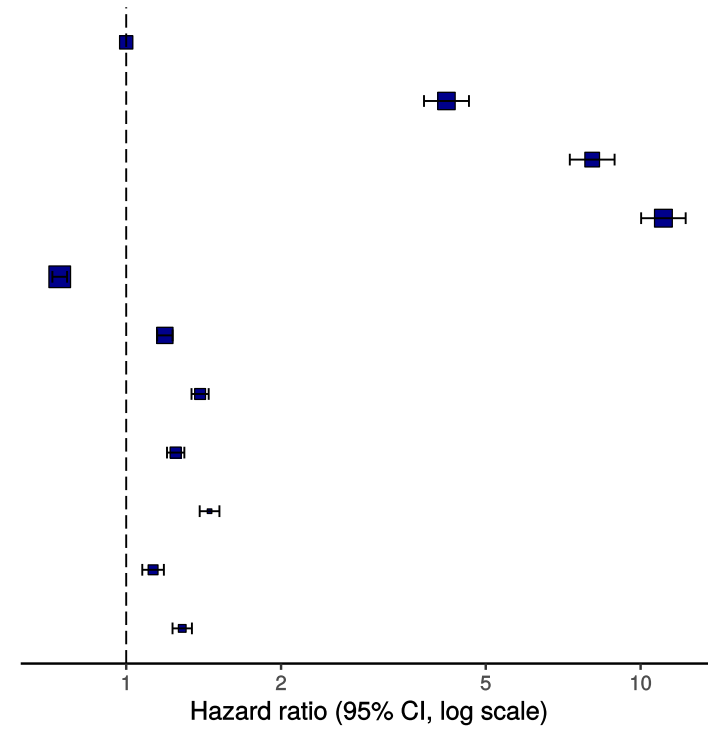


Figure 16b - Multivariable Cox proportional hazards model (age, sex, comorbidities only)

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

Age on admission (years)	<50	-
	50-69	4.19 (3.79-4.64, p<0.001)
	70-79	8.05 (7.28-8.90, p<0.001)
	80+	11.07 (10.02-12.24, 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	1.39 (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 = 0.7386898

Figure 17 - Predictions calibration plot

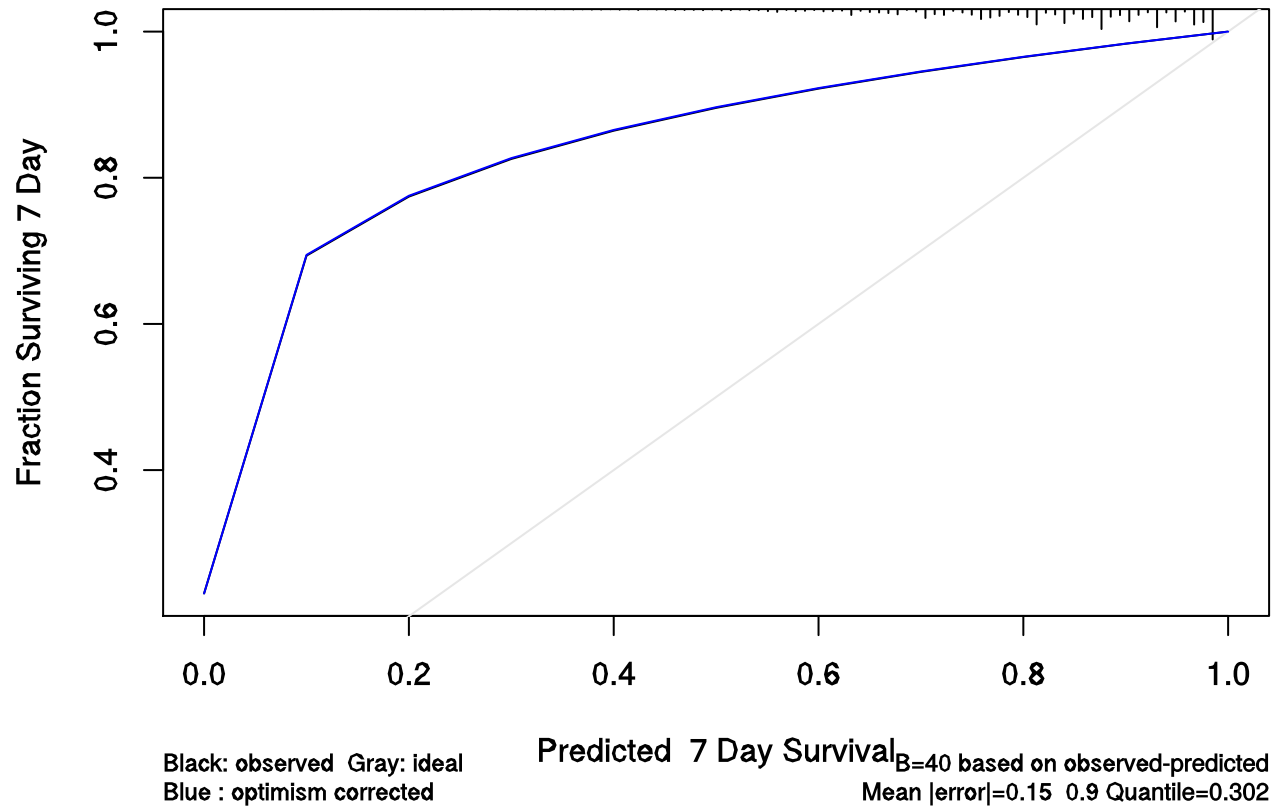


Figure 18 - Prognostic model predictions

Again, for demonstration of methods.

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

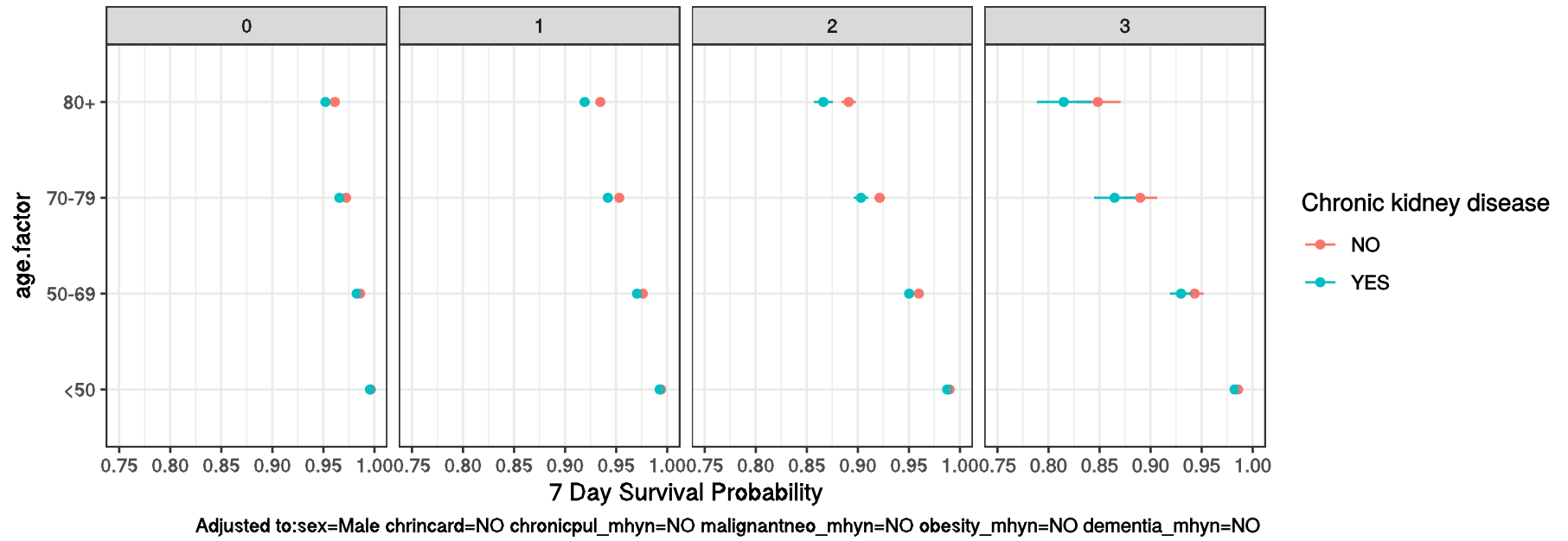


Figure 19 - Death by severity (NEWS) on admission

Number of deaths by NEWS score at admission

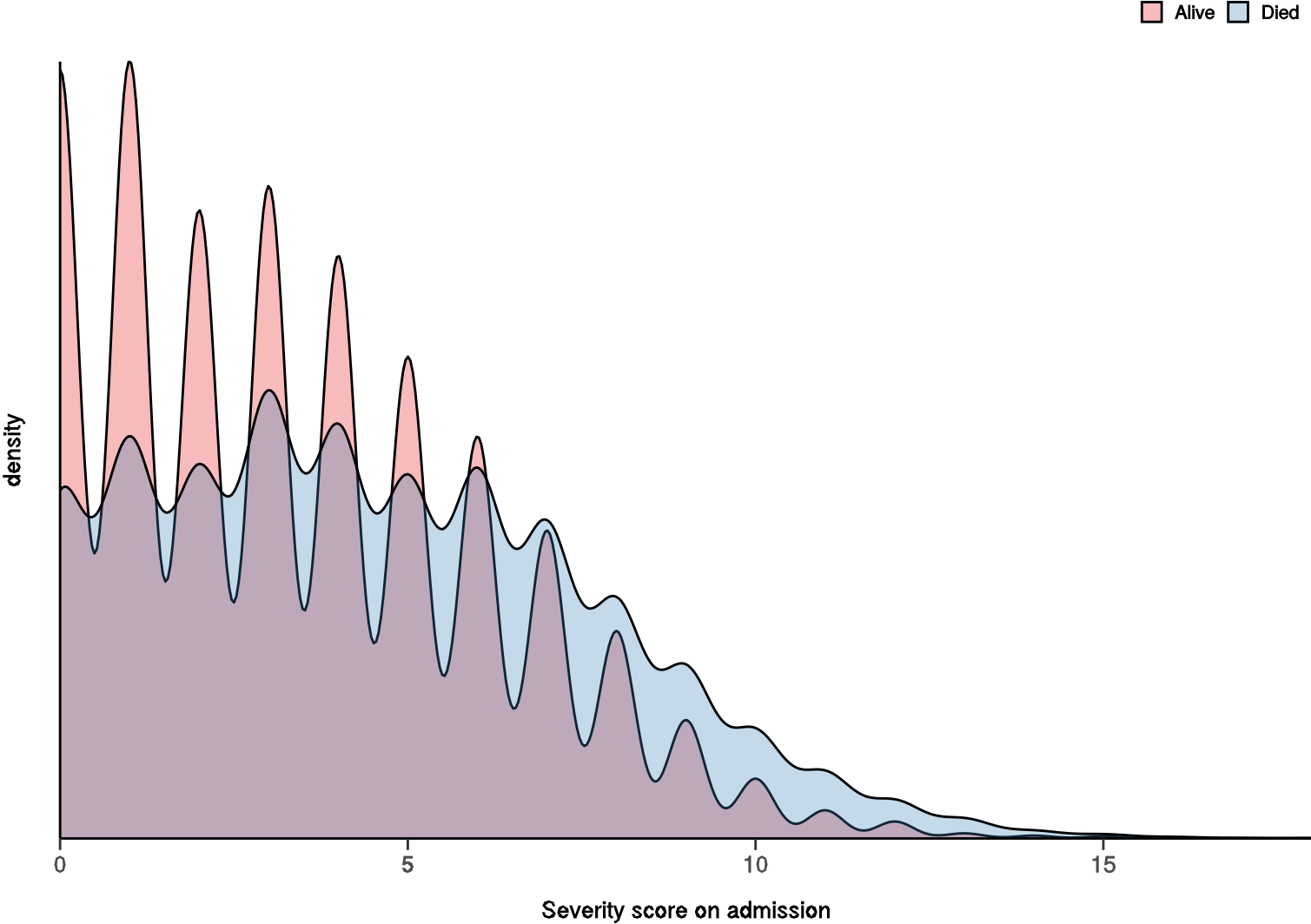


Figure 20 - Death by severity (NEWS) on admission stratified by age

Number of deaths by NEWS score at admission
Stratified by age

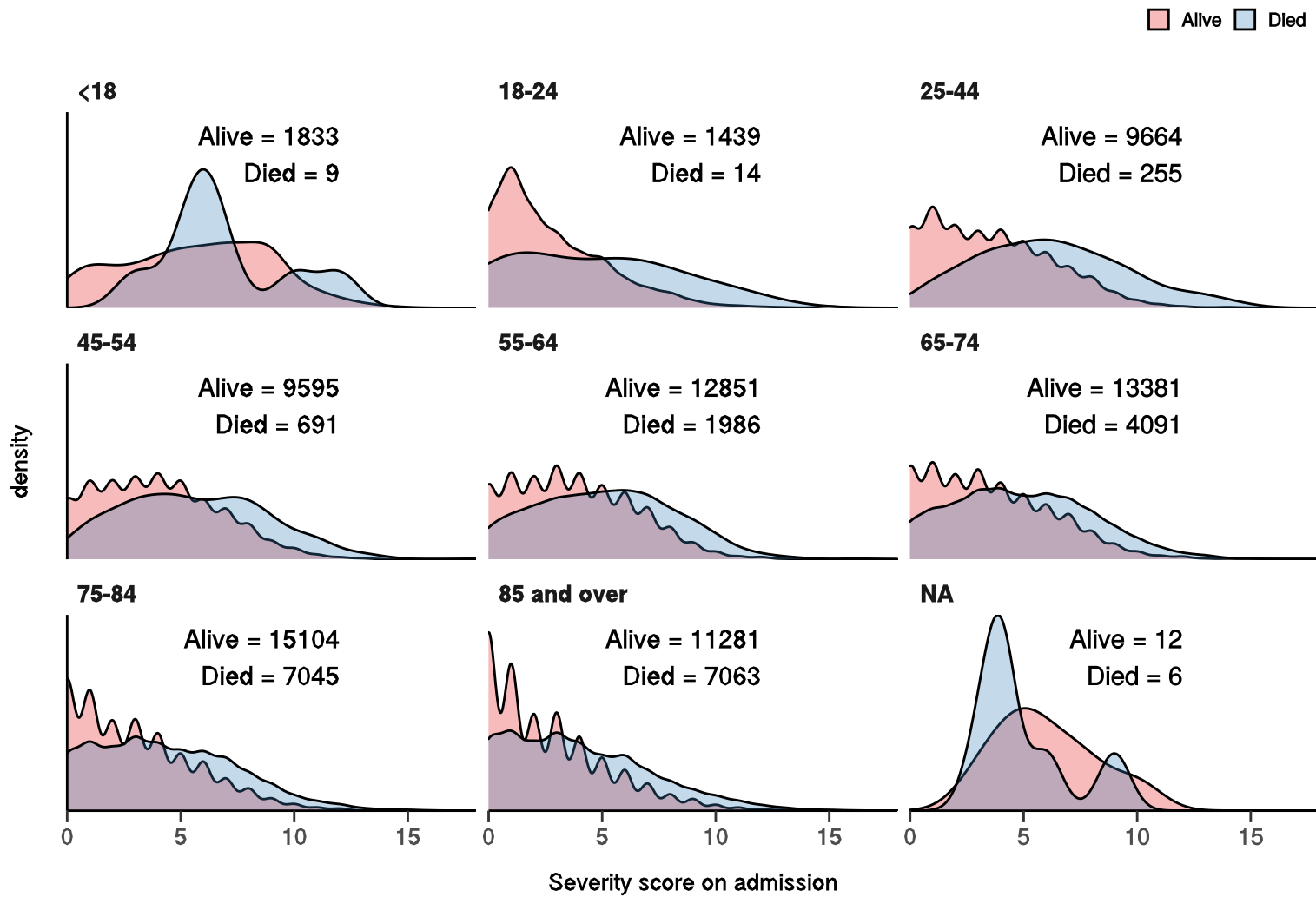
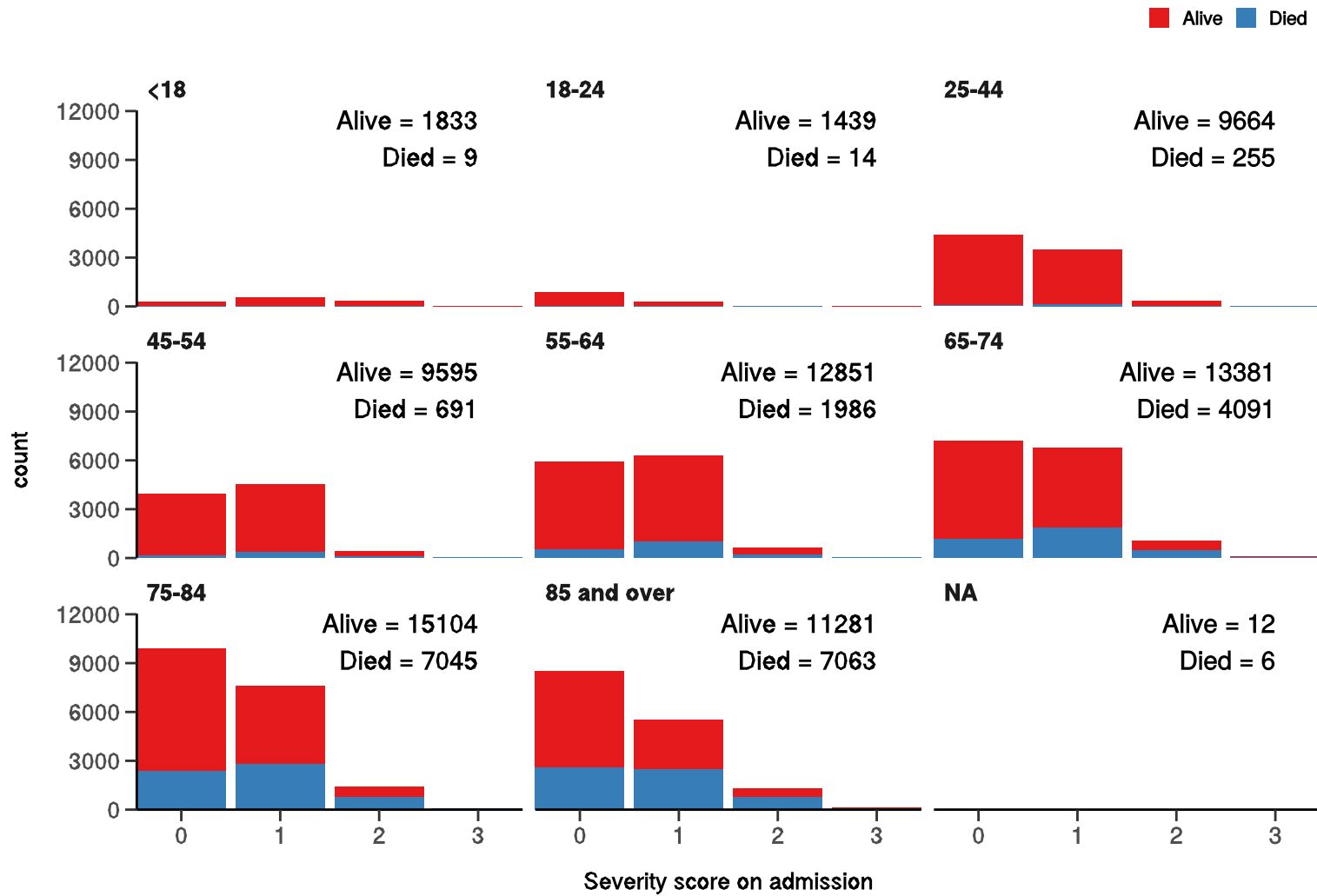


Figure 21 - Death by severity (qSOFA) on admission stratified by age

Number of deaths by qSOFA score at admission
Stratified by age



Healthcare workers

Employed as a healthcare worker?	NO	YES	p
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Employed as a healthcare worker?		NO	YES	p
Total N (%)		80064 (97.4)	2109 (2.6)	
NEWS score on admission	Median (IQR)	3.0 (5.0)	4.0 (4.0)	<0.001
Death	No	56017 (75.4)	1844 (93.1)	<0.001
	Yes	18325 (24.6)	137 (6.9)	