

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

Dynamic content updated: 2020-12-16 04:05:16.

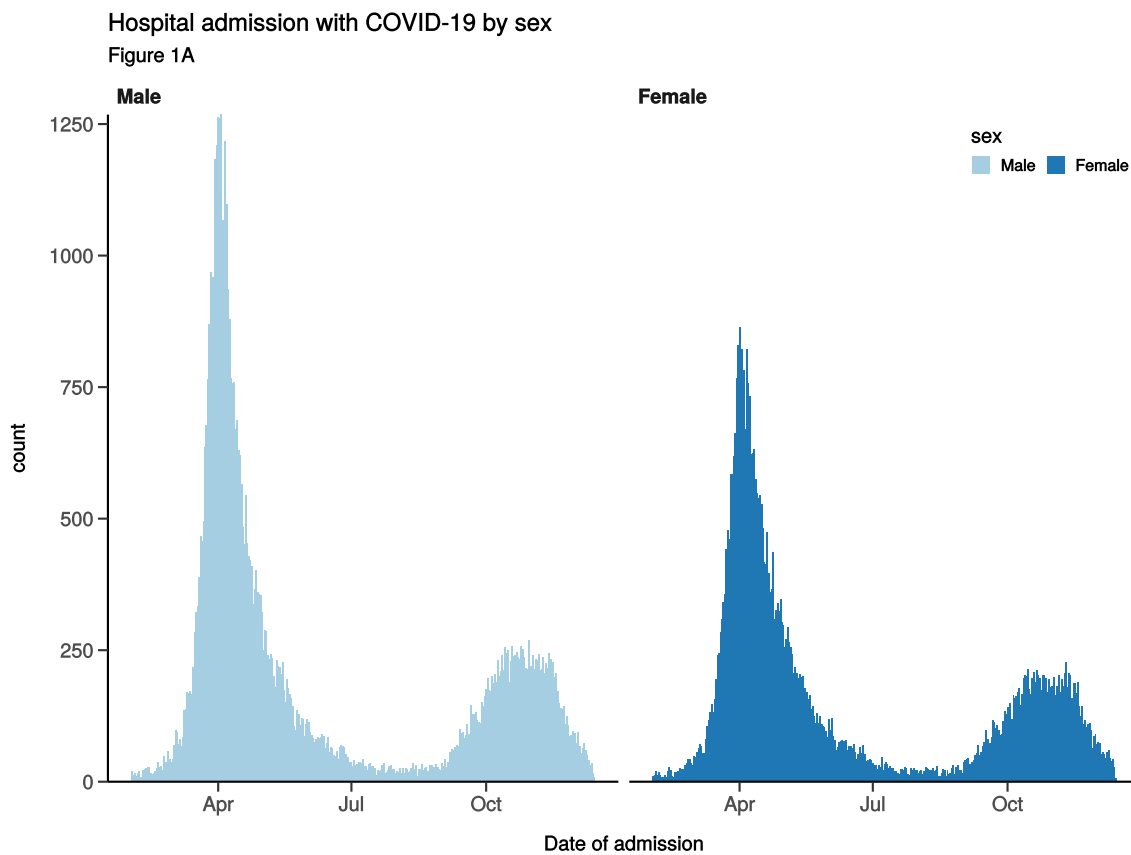
## Executive summary

### Includes all patients

There are 121567 patients included in CO-CIN. Of these, 28868 patient(s) have died and 14961 required ICU. 62895 have been discharged home.

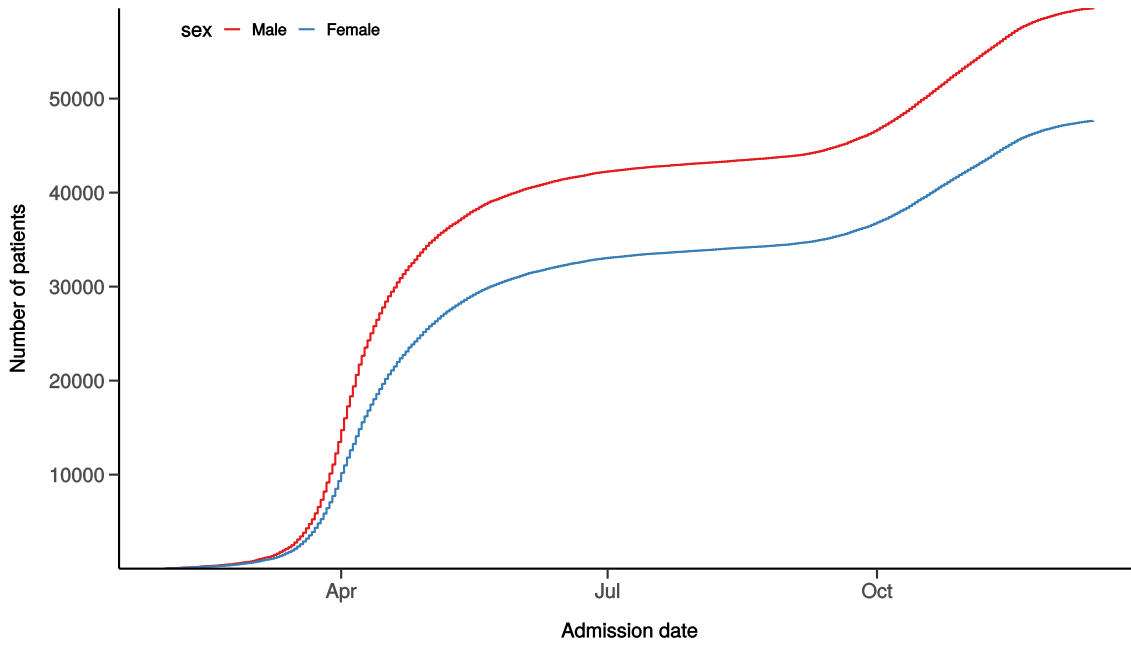
## Admission

Figure 1



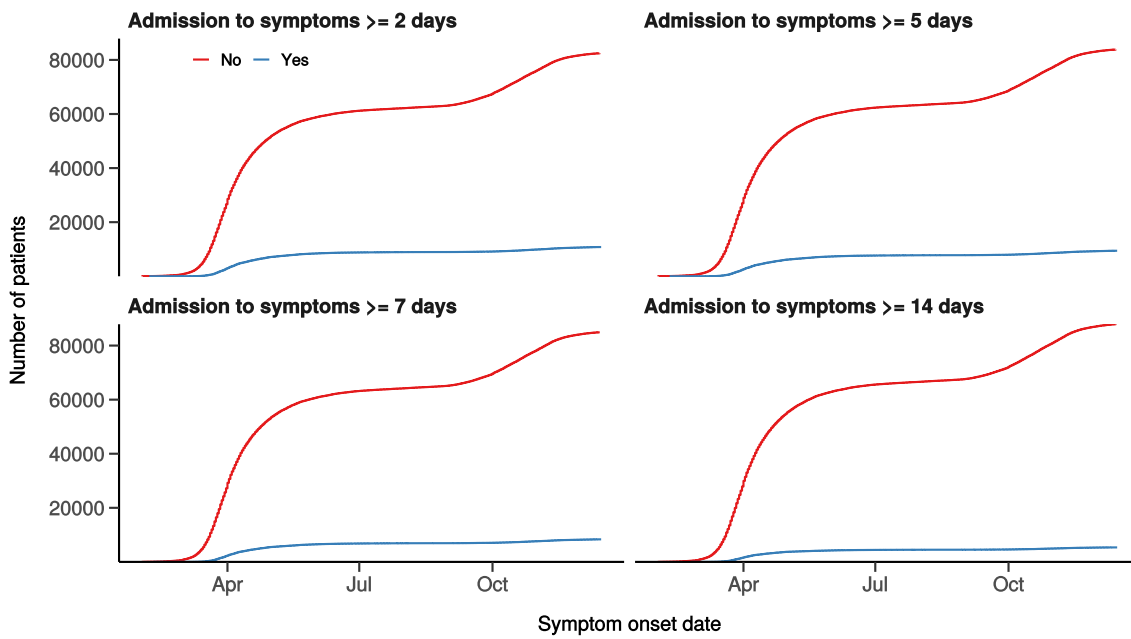
### Hospital admission with COVID-19 by sex

Figure 1B



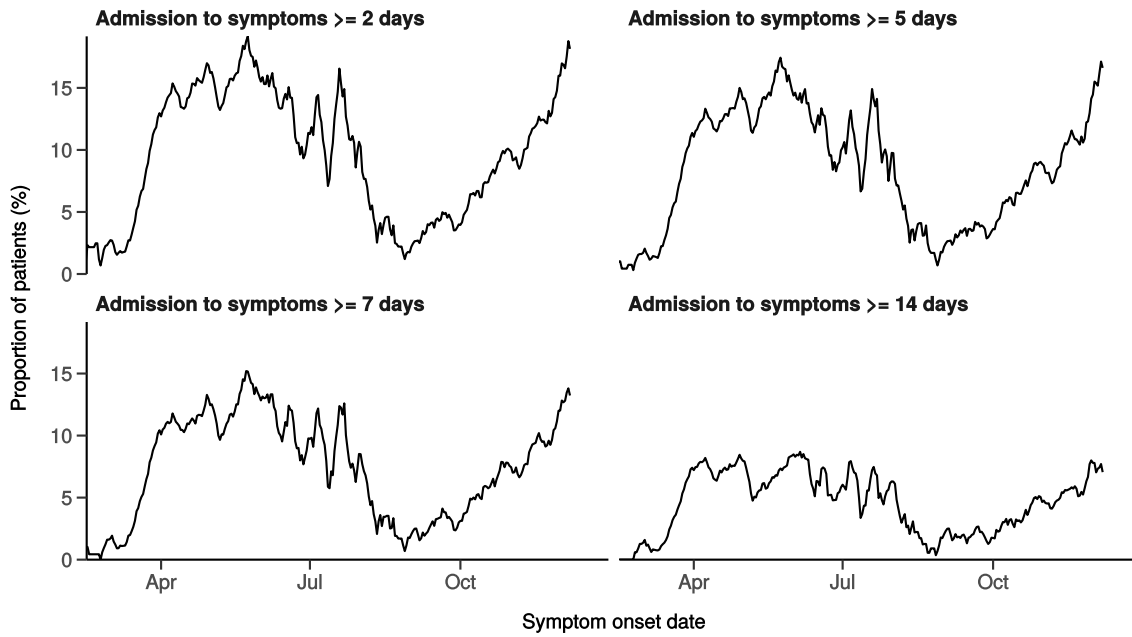
### Number with symptom onset occurring after admission to hospital

Figure 1C



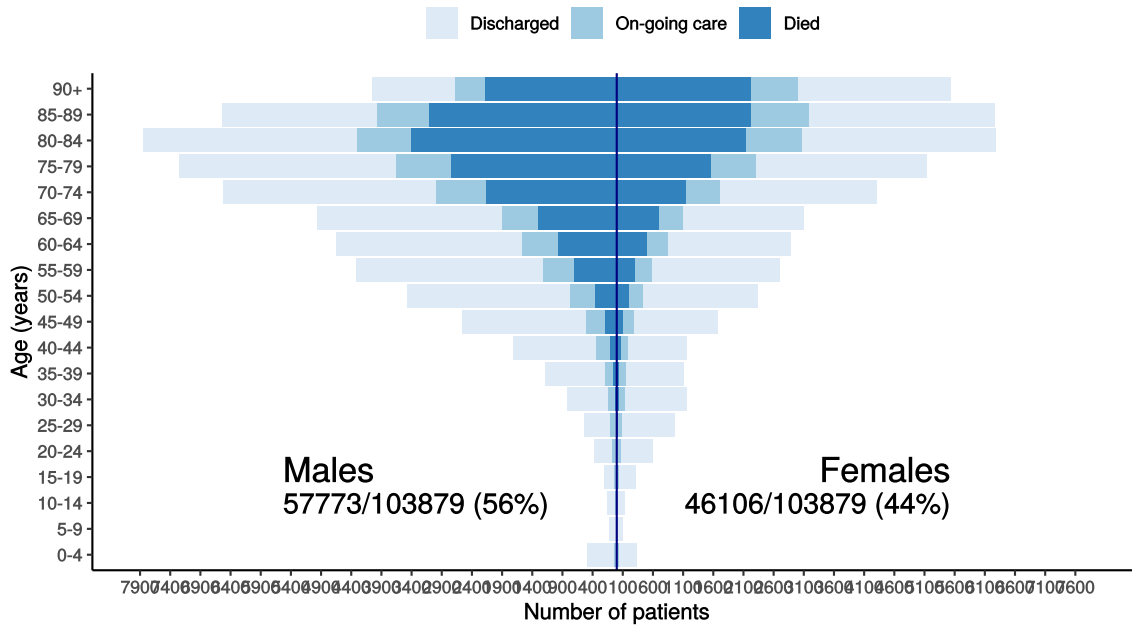
Proportion with symptom onset occurring after hospital admission

Figure 1D - 7-day rolling percentage. n = 93241



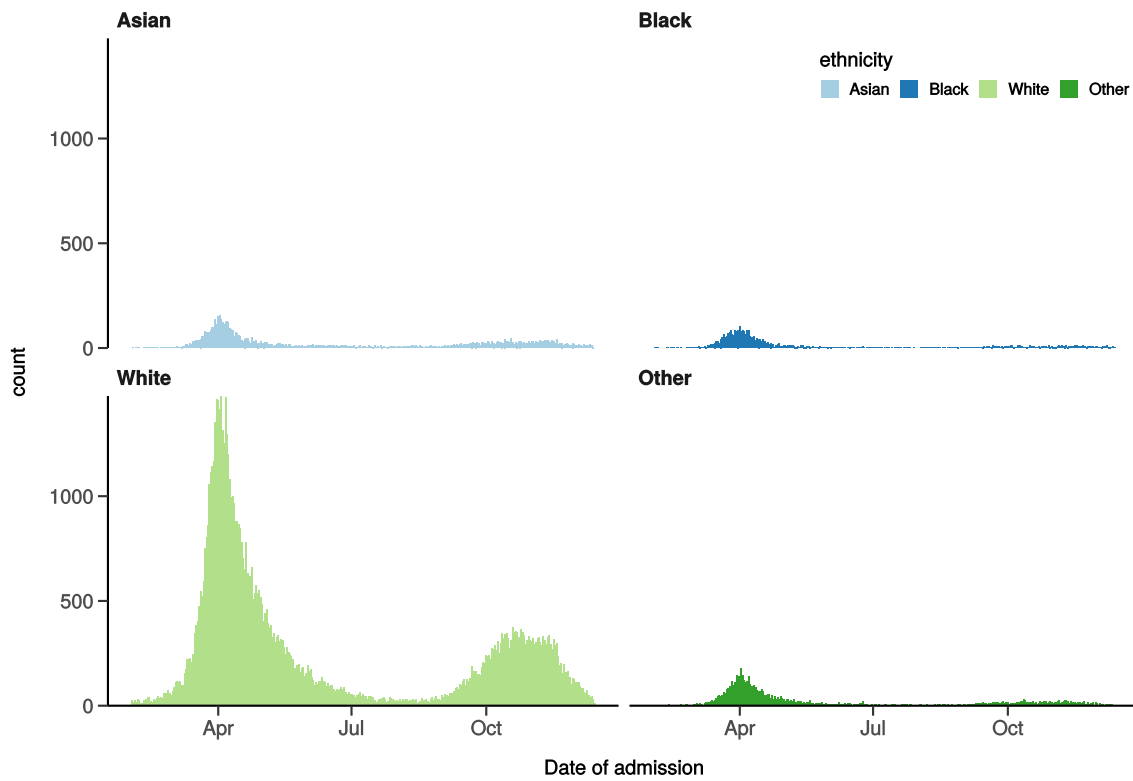
Patients with outcome stratified by age, and sex

Figure 1E



## Hospital admission with COVID-19 by ethnicity

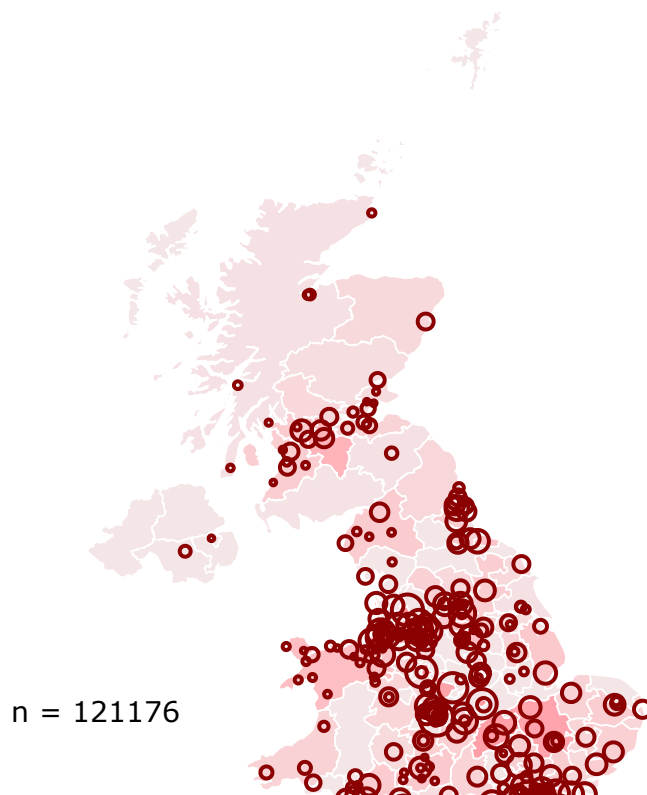
Figure 1F

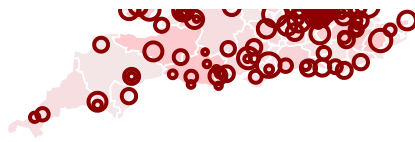


## Location by CCG / Healthboard

Figure 2

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





# Symptoms and comorbidity

Figure 3A

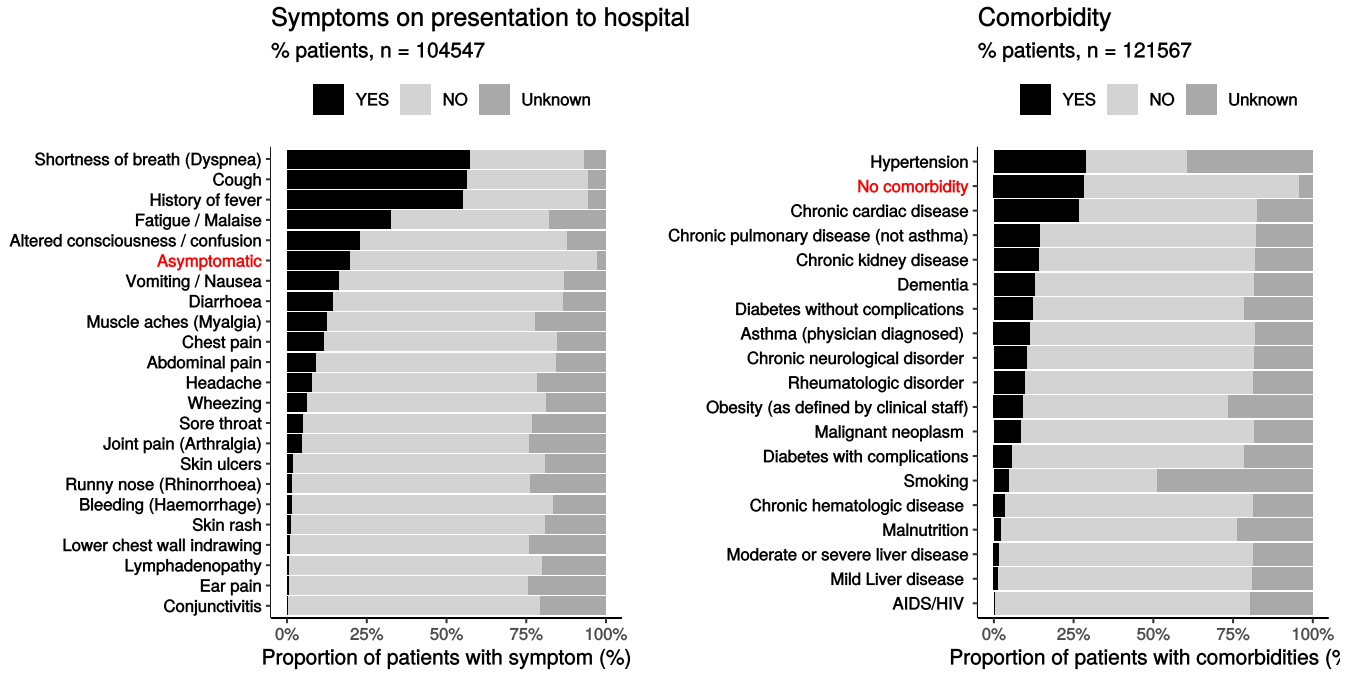


Figure 3B - Symptoms by Age

Symptoms on presentation to hospital  
Stratified by age

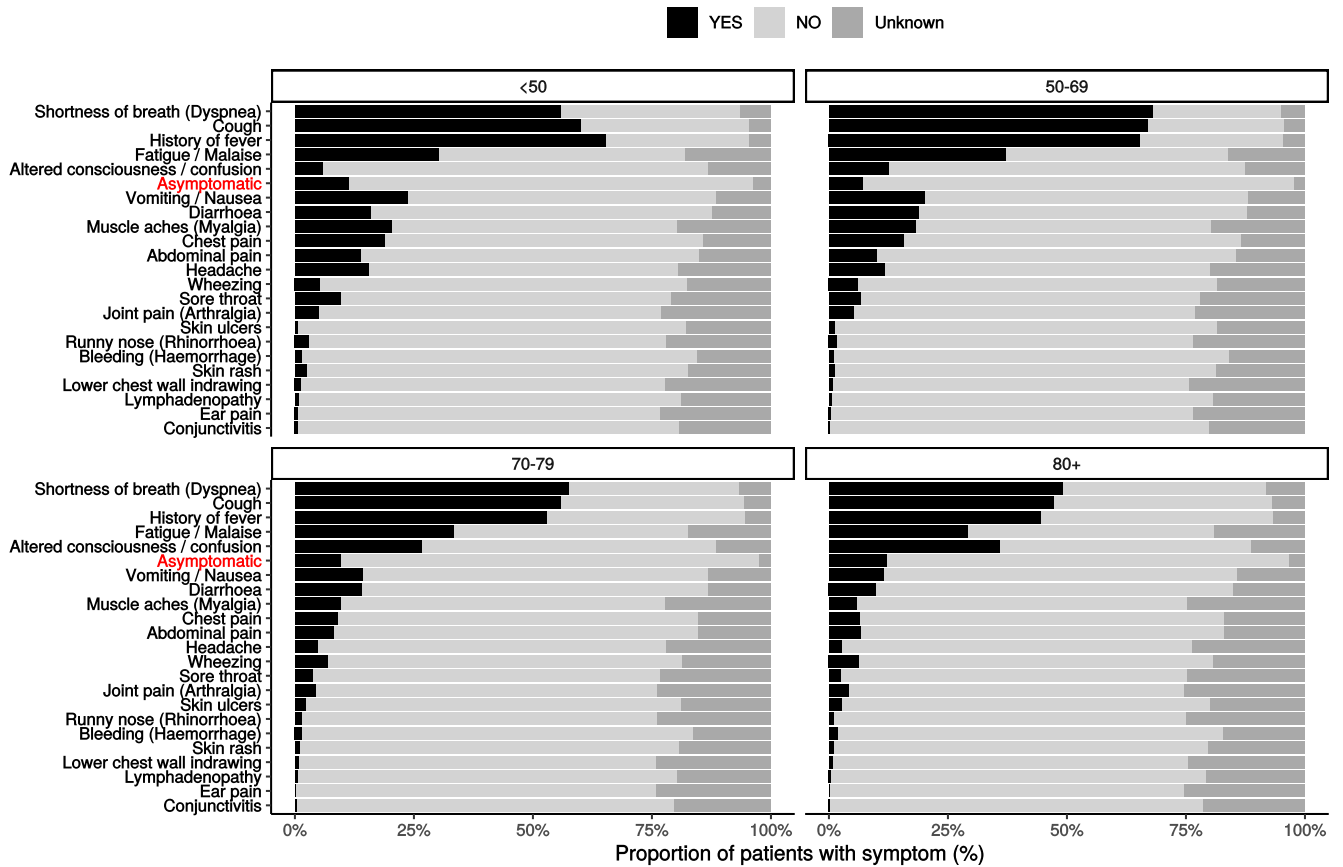
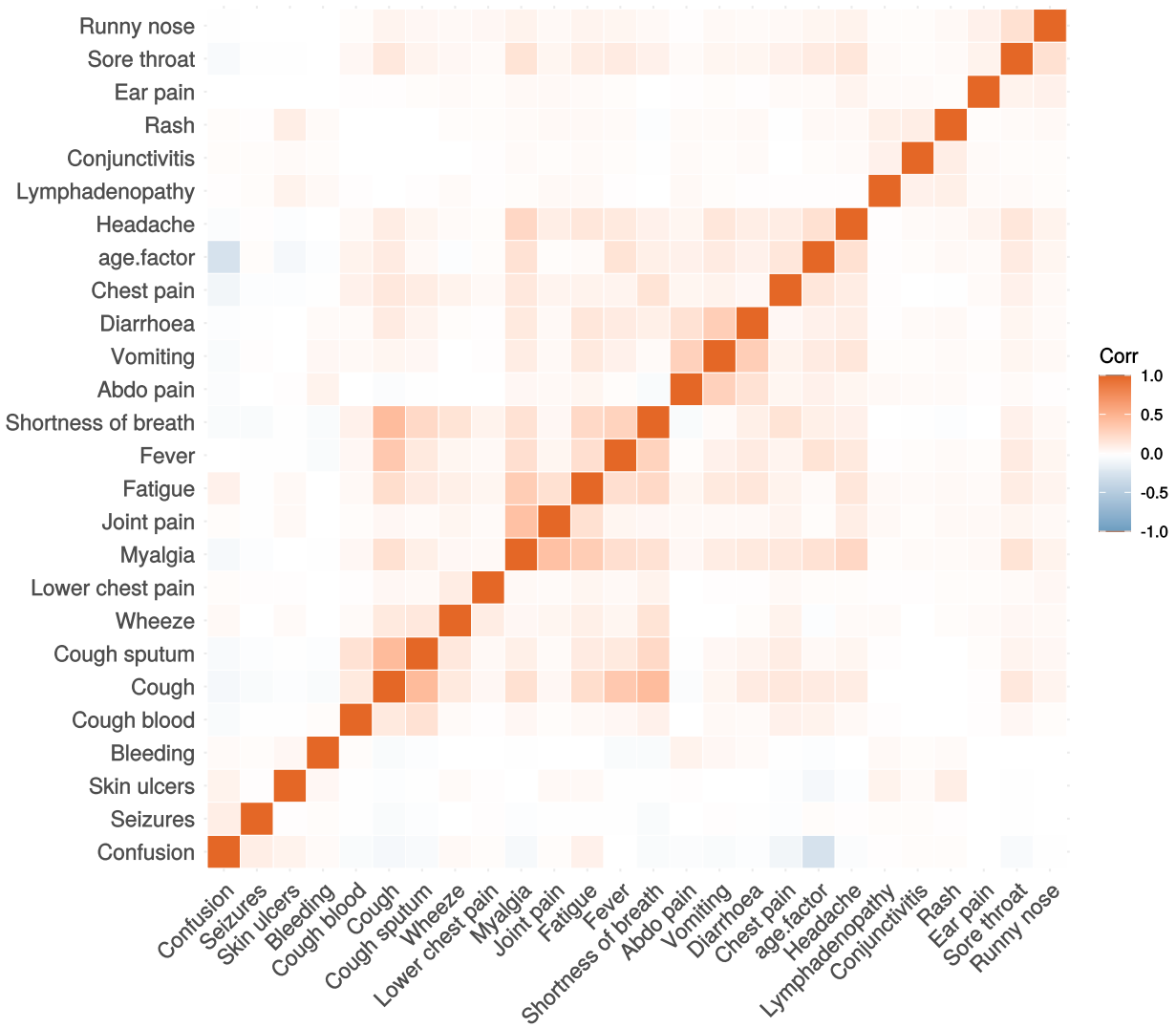


Figure 3C

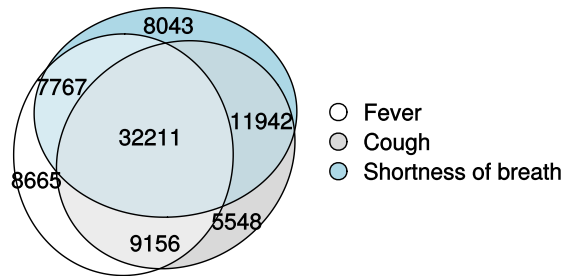
Correlation of symptoms in all pages. Note clusters, top right to bottom left, flu-like, coryzal, abdominal, respiratory, neurocutaneous.



### Symptoms (diagnostic criteria)

Figure 4A

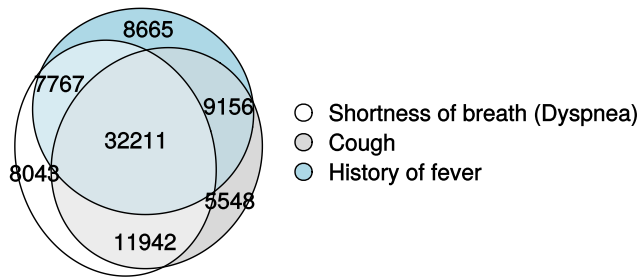
n = 104547



### Symptoms (most common)

Figure 4B

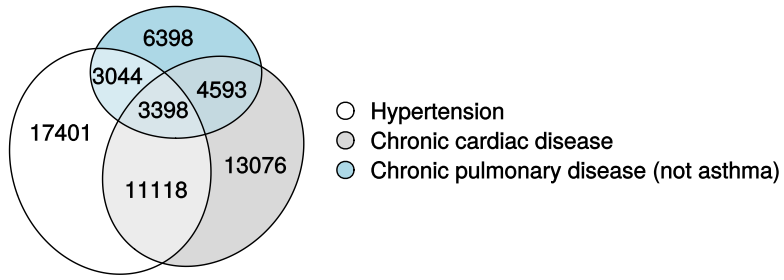
n = 104547



## Comorbidity (most common)

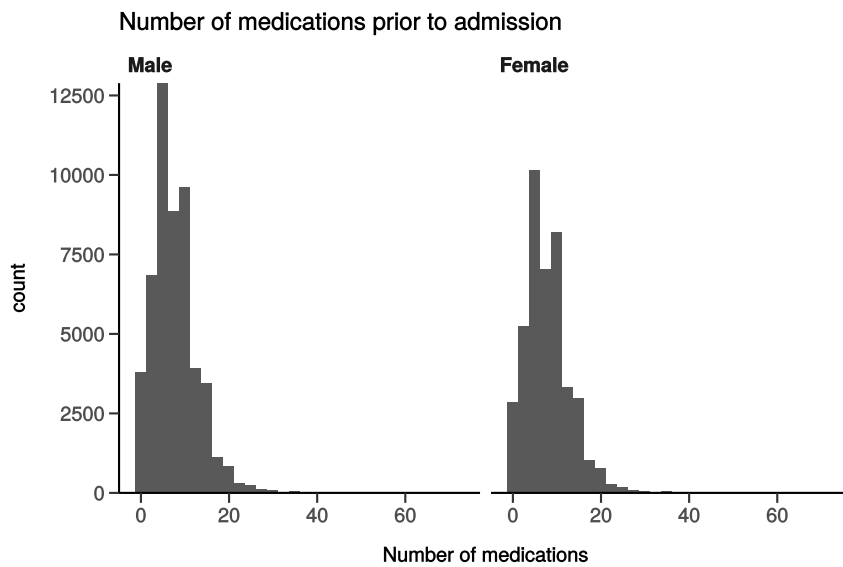
Figure 4C

n = 121567



## Medication prior to illness

Figure 5



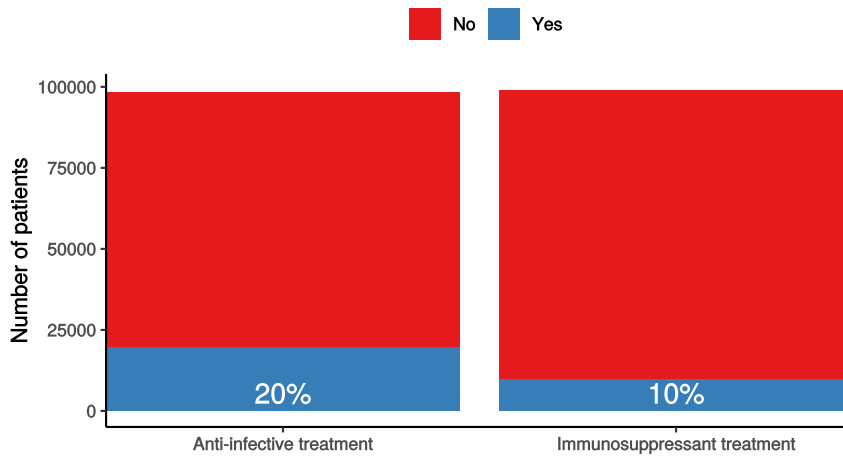
## Preadmission treatment

Figure 6



### Pre-admission treatment

Anti-infectives for illness episode (left) immunosuppressants including oral (no



## Patient flow

Figure 7A - All patients

N = 106988

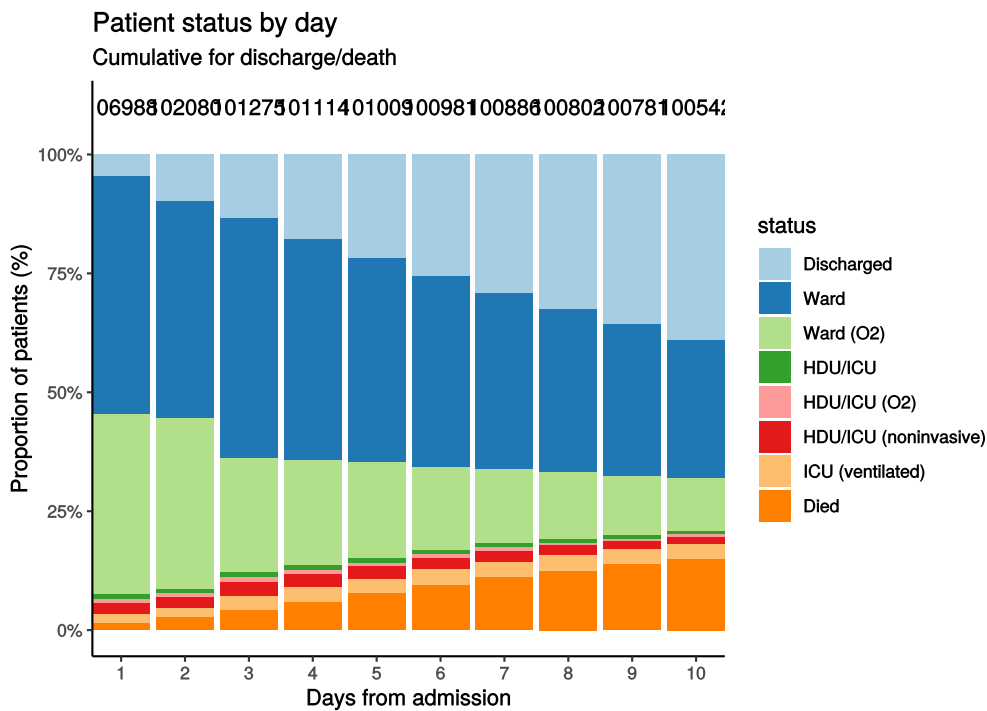
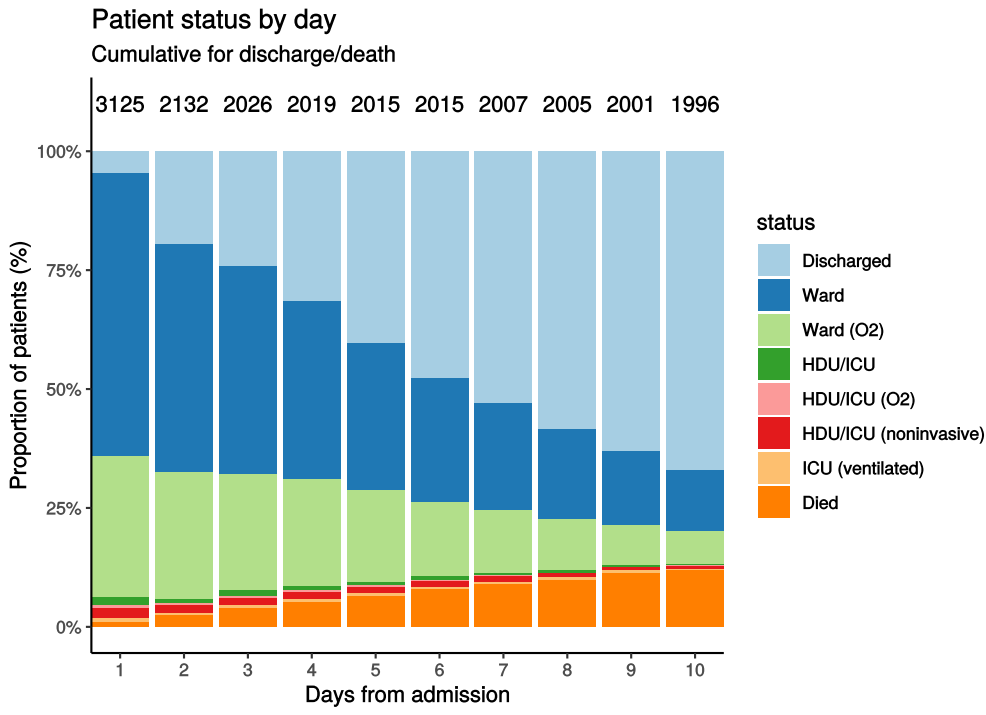


Figure 7B - Patients admitted  $\geq 14$  days and  $\leq 28$  days ago

N = 3125



## Oxygen requirement

Figure 8A - All patients

N = 101394

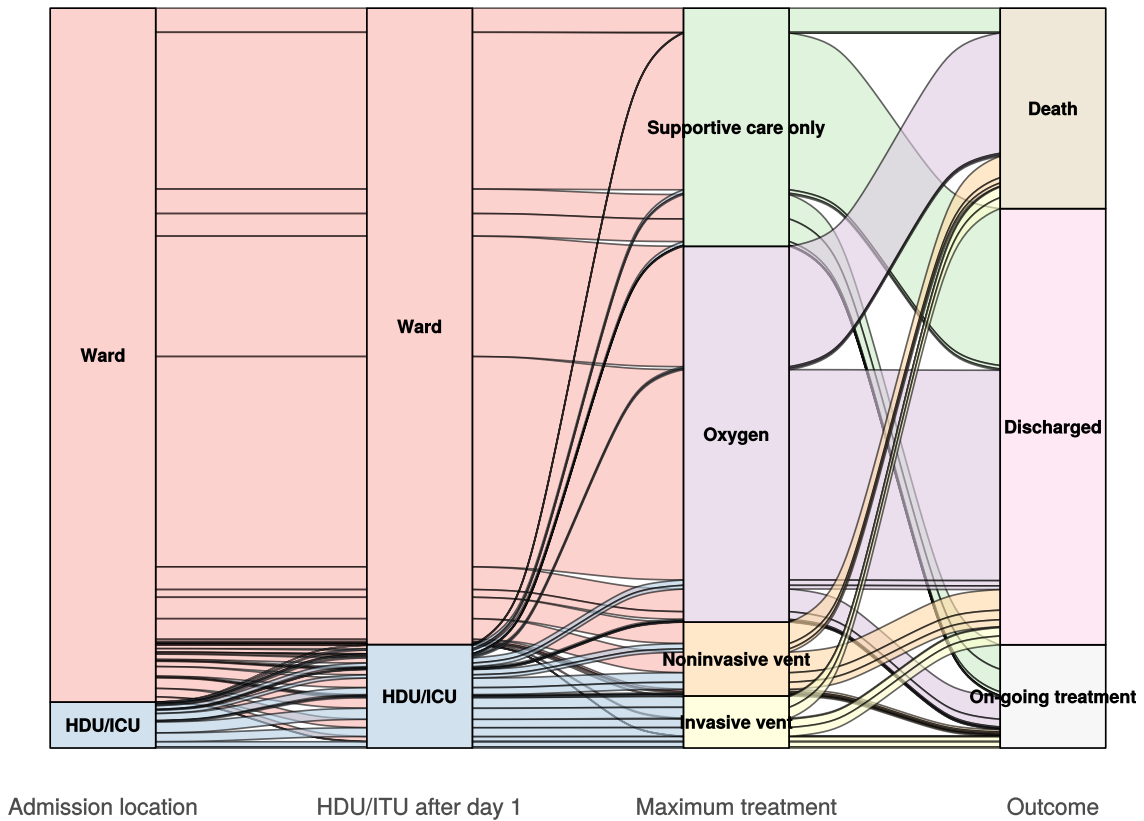


Figure 8B - Patients admitted  $\geq 14$  days and  $\leq 28$  days ago

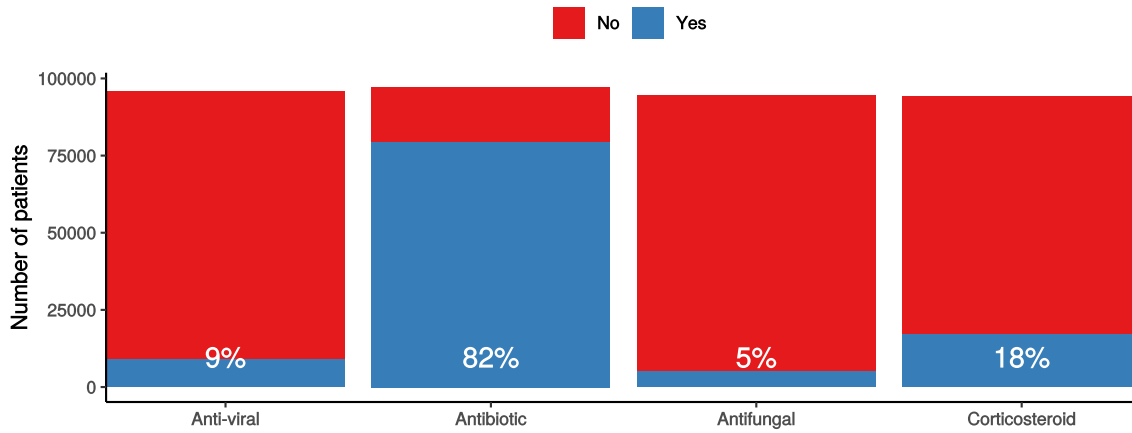
N = 3019

# In-hospital medical treatment

Figure 9

## In-hospital treatment

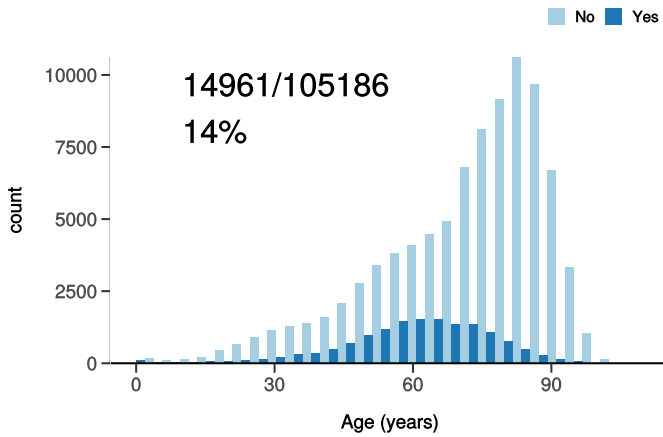
Anti-virals, antibiotics, corticosteroids, and anti-fungals for patients who have completed journey.



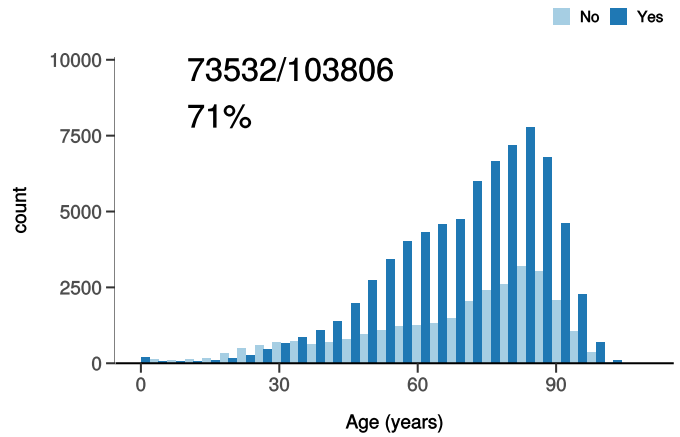
# Treatment

Figure 10

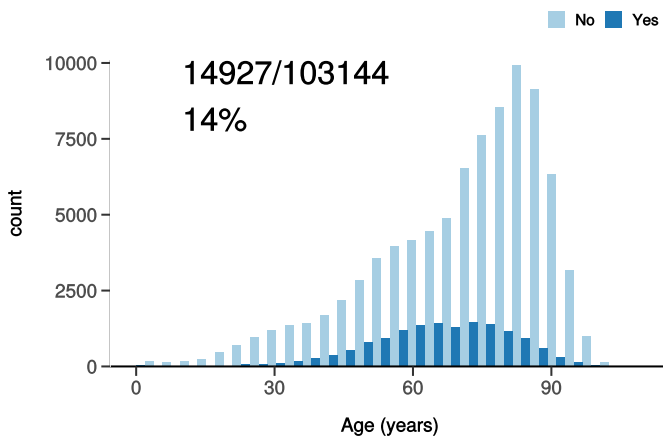
ICU/HDU admission  
Figure 10A



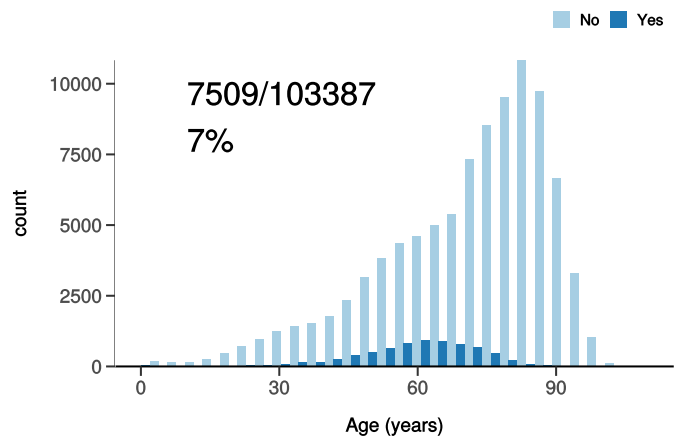
High flow oxygen  
Figure 10B



Noninvasive ventilation  
Figure 10C



Invasive ventilation  
Figure 10D

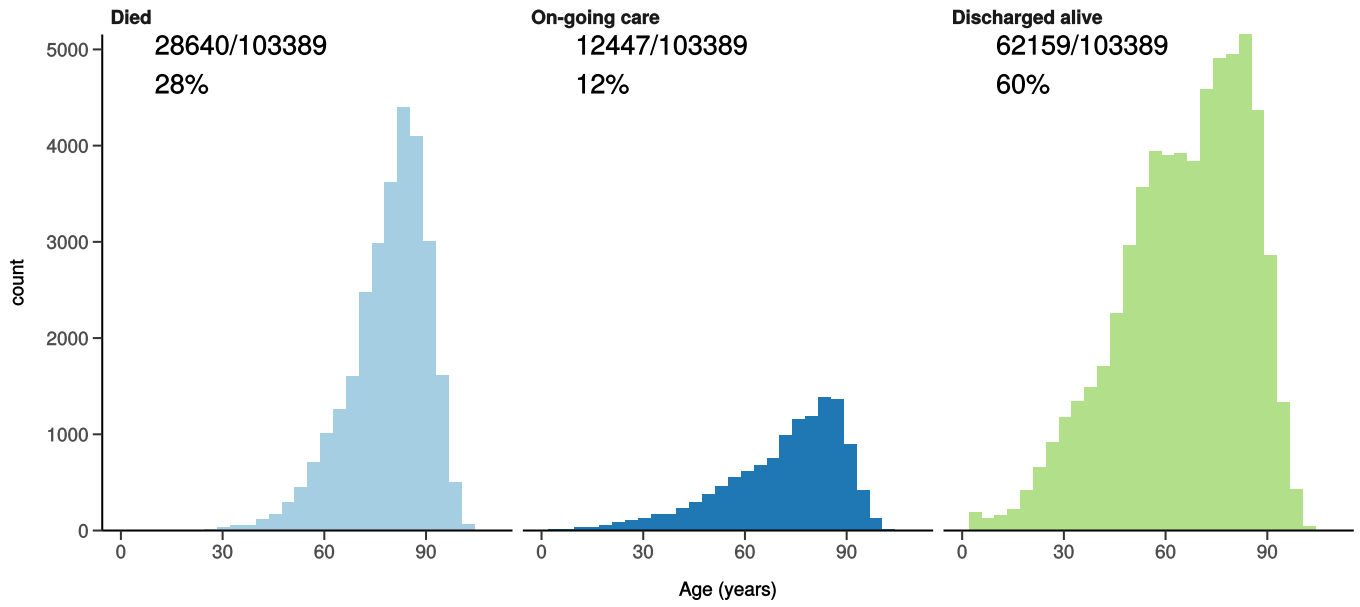


# Status in patients admitted $\geq 14$ days from today

Figure 11

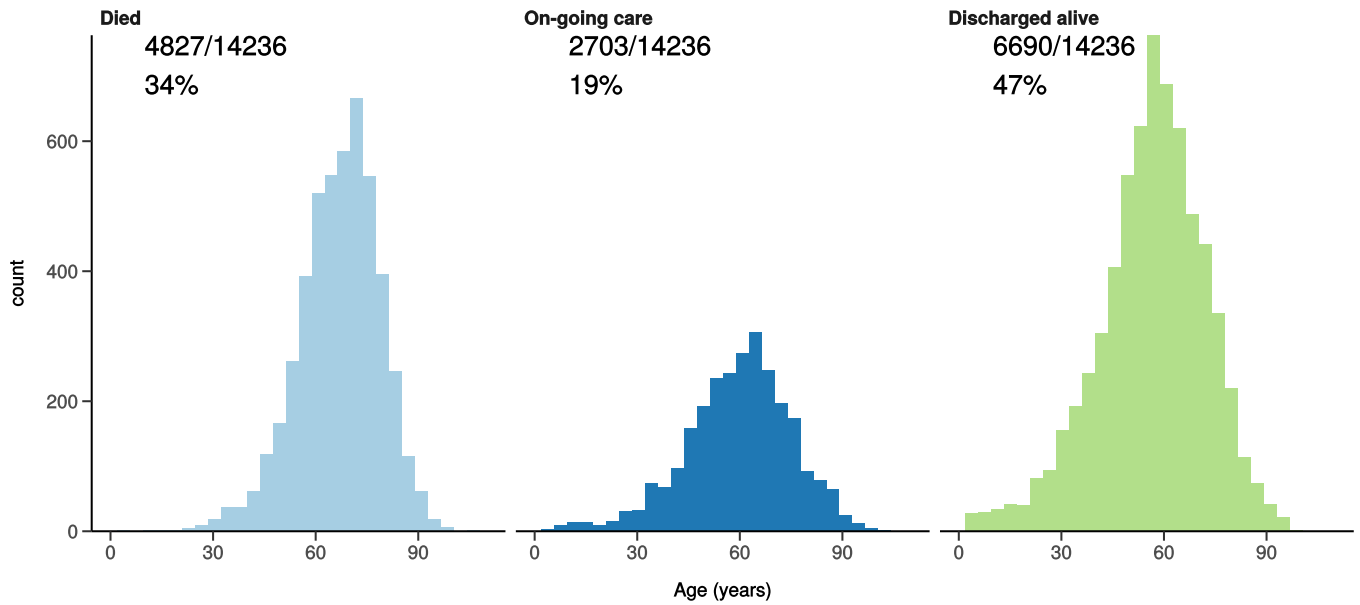
All: status in patients admitted  $\geq 14$  days ago

Figure 11A



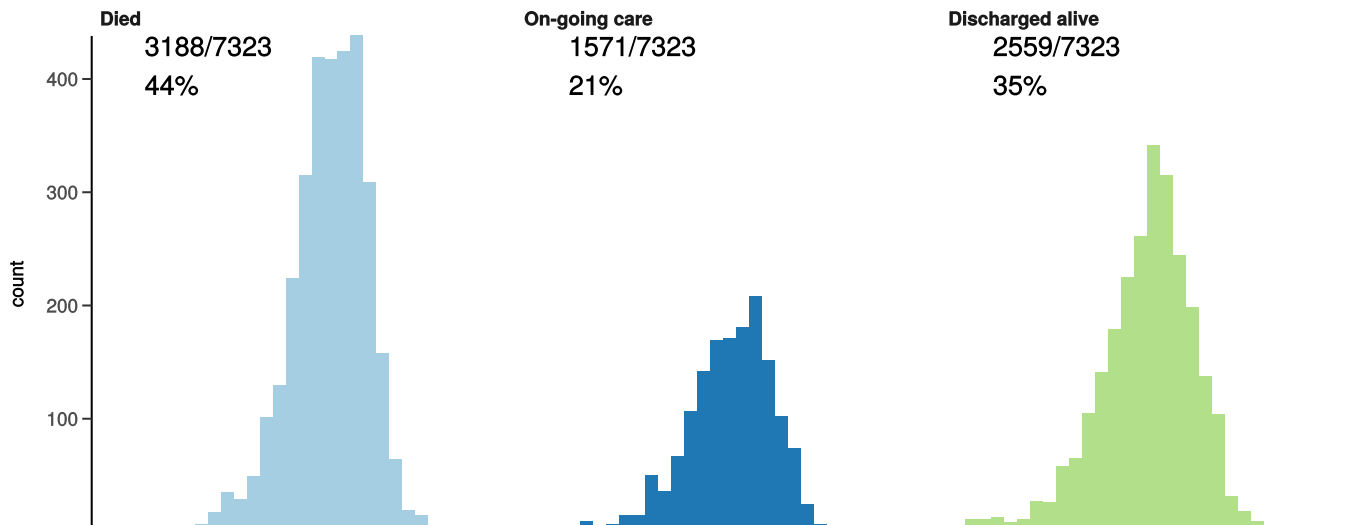
ICU/HDU admissions: status in patients admitted  $\geq 14$  days ago

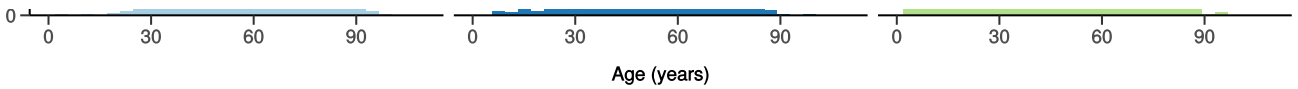
Figure 11B



Invasive ventilation: status in patients admitted  $\geq 14$  days ago

Figure 11c

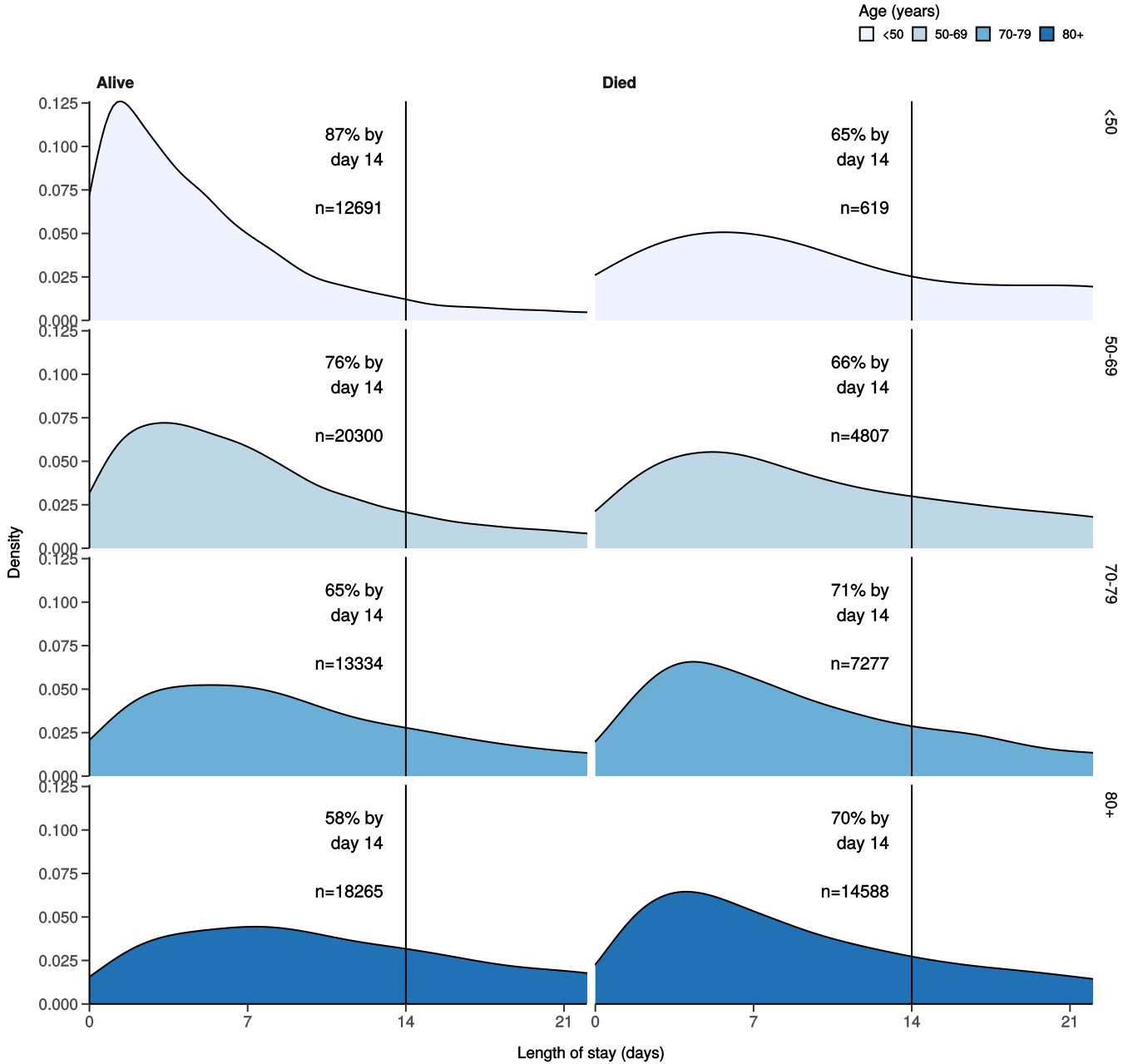




# Length of stay stratified by age

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	14435 (95.6)	663 (4.4)	•	•

Dependent: death		No	Yes	OR (univariable)	OR (multivariable)
	50-69	22307 (81.6)	5036 (18.4)	4.92 (4.52-5.35, p<0.001)	4.49 (4.09-4.94, p<0.001)
	70-79	14685 (65.9)	7600 (34.1)	11.27 (10.38-12.25, p<0.001)	9.22 (8.40-10.15, p<0.001)
	80+	19977 (56.7)	15250 (43.3)	16.62 (15.35-18.03, p<0.001)	13.47 (12.28-14.81, p<0.001)
Sex at Birth	Male	38321 (68.9)	17330 (31.1)	•	•
	Female	33127 (74.7)	11237 (25.3)	0.75 (0.73-0.77, p<0.001)	0.69 (0.67-0.71, p<0.001)
	Not specified	0 (NaN)	0 (NaN)	•	•
Chronic cardiac disease	NO	48849 (76.4)	15061 (23.6)	•	•
	YES	18431 (60.9)	11818 (39.1)	2.08 (2.02-2.14, p<0.001)	1.17 (1.12-1.21, p<0.001)
Chronic pulmonary disease (not asthma)	NO	57147 (73.7)	20387 (26.3)	•	•
	YES	10040 (61.4)	6324 (38.6)	1.77 (1.70-1.83, p<0.001)	1.29 (1.24-1.34, p<0.001)
Chronic neurological disorder	NO	59222 (72.6)	22304 (27.4)	•	•
	YES	7538 (64.4)	4176 (35.6)	1.47 (1.41-1.53, p<0.001)	1.15 (1.09-1.20, p<0.001)
Chronic hematologic disease	NO	64019 (72.0)	24897 (28.0)	•	•
	YES	2567 (63.7)	1463 (36.3)	1.47 (1.37-1.56, p<0.001)	1.12 (1.04-1.22, p=0.004)
Chronic kidney disease	NO	57547 (74.2)	20017 (25.8)	•	•
	YES	9457 (58.8)	6619 (41.2)	2.01 (1.94-2.08, p<0.001)	1.30 (1.24-1.35, p<0.001)
Dementia	NO	58683 (74.5)	20054 (25.5)	•	•
	YES	8113 (55.6)	6469 (44.4)	2.33 (2.25-2.42, p<0.001)	1.37 (1.31-1.43, p<0.001)
Obesity (as defined by clinical staff)	NO	52480 (71.5)	20896 (28.5)	•	•
	YES	7893 (75.8)	2524 (24.2)	0.80 (0.77-0.84, p<0.001)	1.20 (1.14-1.27, p<0.001)
Malignant neoplasm	NO	61111 (73.2)	22426 (26.8)	•	•
	YES	5530 (58.1)	3986 (41.9)	1.96 (1.88-2.05, p<0.001)	1.49 (1.41-1.57, p<0.001)

Number in dataframe = 107211, Number in model = 79769, Missing = 27442, AIC = 83341.5, C-statistic = 0.724, H&L = Chi-sq(8) 142.41 (p<0.001)

**Figure 13 - Adjusted odds ratio plot**

Death

Age on admission (years)	<50	-
	50-69	4.49 (4.09-4.94, p<0.001)
	70-79	9.22 (8.40-10.15, p<0.001)
	80+	13.47 (12.28-14.81, p<0.001)
Sex at Birth	Male	-
	Female	0.69 (0.67-0.71, p<0.001)
	Not specified	-
Chronic cardiac disease	YES	1.17 (1.12-1.21, p<0.001)
Chronic pulmonary disease (not asthma)	YES	1.29 (1.24-1.34, p<0.001)
Chronic neurological disorder	YES	1.15 (1.09-1.20, p<0.001)
Chronic hematologic disease	YES	1.12 (1.04-1.22, p=0.004)
Chronic kidney disease	YES	1.30 (1.24-1.35, p<0.001)
Dementia	YES	1.37 (1.31-1.43, p<0.001)
Obesity (as defined by clinical staff)	YES	1.20 (1.14-1.27, p<0.001)
Malignant neoplasm	YES	1.49 (1.41-1.57, p<0.001)

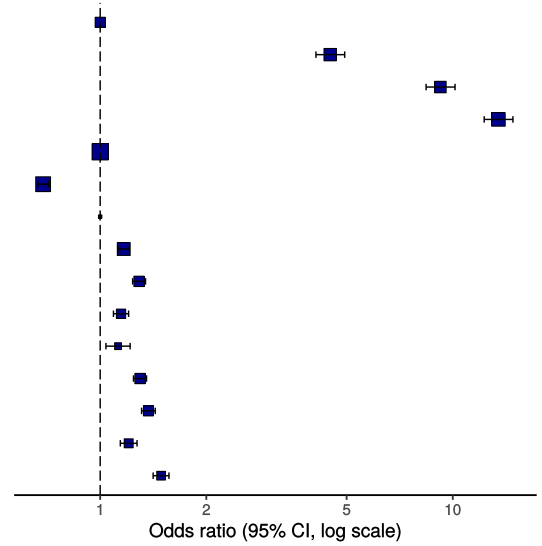
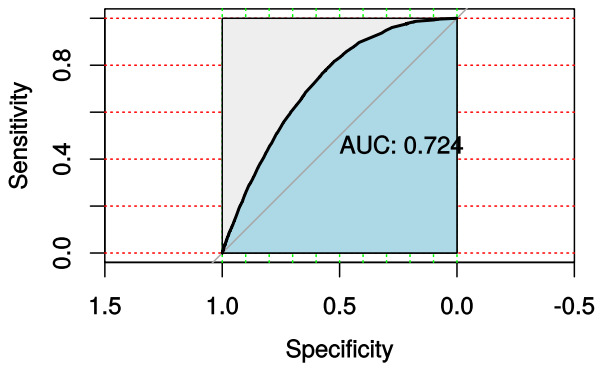


Figure 14 - ROC

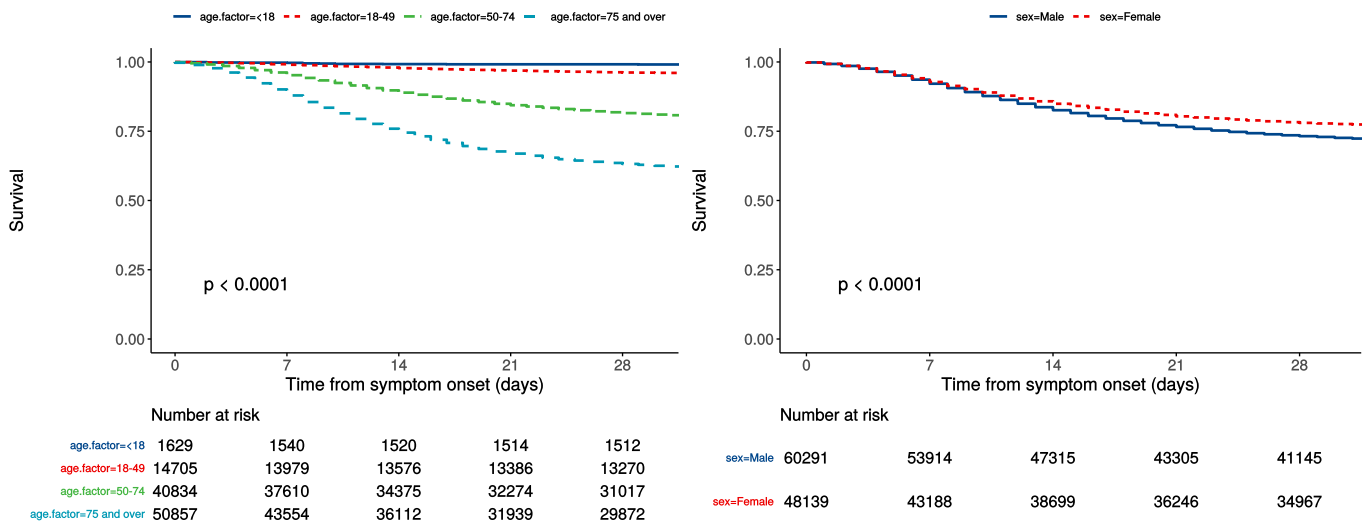


Survival models

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	16346 (15.1)	•	•
	50-69	29552 (27.4)	4.52 (4.17-4.90, p<0.001)	4.19 (3.80-4.62, p<0.001)
	70-79	24213 (22.4)	9.36 (8.64-10.13, p<0.001)	8.38 (7.60-9.24, p<0.001)
	80+	37935 (35.1)	12.95 (11.98-14.00, p<0.001)	11.36 (10.31-12.52, p<0.001)
Sex at Birth	Male	60303 (55.6)	•	•
	Female	48139 (44.4)	0.79 (0.77-0.81, p<0.001)	0.77 (0.75-0.80, p<0.001)
qSOFA score on admission	0	41189 (45.0)	•	•
	1	40308 (44.0)	1.65 (1.61-1.70, p<0.001)	1.77 (1.71-1.83, p<0.001)
	2	9117 (10.0)	3.27 (3.15-3.39, p<0.001)	3.02 (2.90-3.15, p<0.001)
	3	938 (1.0)	5.50 (5.06-5.98, p<0.001)	4.89 (4.46-5.37, p<0.001)
Symptomatic at presentation	No symptoms	8211 (7.8)	•	•
	Symptoms	96439 (92.2)	1.78 (1.68-1.88, p<0.001)	•
Chronic cardiac disease	NO	67901 (67.9)	•	•
	YES	32045 (32.1)	1.86 (1.82-1.91, p<0.001)	1.15 (1.12-1.19, p<0.001)
Chronic kidney disease	NO	82409 (82.9)	•	•
	YES	17000 (17.1)	1.80 (1.75-1.85, p<0.001)	1.23 (1.19-1.28, p<0.001)
Moderate or severe liver disease	NO	96571 (98.1)	•	•
	YES	1914 (1.9)	1.31 (1.21-1.42, p<0.001)	1.40 (1.27-1.55, p<0.001)
Chronic neurological disorder	NO	86577 (87.5)	•	•
	YES	12368 (12.5)	1.39 (1.35-1.44, p<0.001)	•
Malignant neoplasm	NO	88664 (89.8)	•	•
	YES	10085 (10.2)	1.72 (1.66-1.78, p<0.001)	1.37 (1.32-1.42, p<0.001)
Chronic hematologic disease	NO	94362 (95.7)	•	•
	YES	4249 (4.3)	1.36 (1.29-1.44, p<0.001)	•
Obesity (as defined by clinical staff)	NO	77876 (87.6)	•	•
	YES	11023 (12.4)	0.82 (0.79-0.86, p<0.001)	1.13 (1.08-1.18, p<0.001)

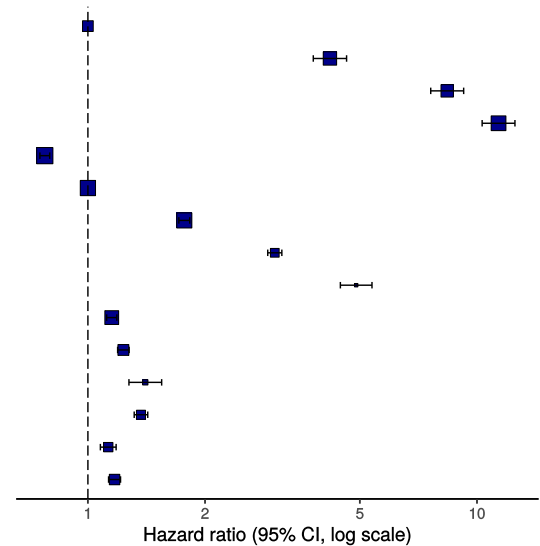
Dependent: Surv(time, status)		all	HR (univariable)	HR (multivariable)
Diabetes without complications	NO	80475 (84.6)	•	•
	YES	14632 (15.4)	1.27 (1.23-1.31, p<0.001)	•
Rheumatologic disorder	NO	86708 (88.1)	•	•
	YES	11742 (11.9)	1.18 (1.14-1.22, p<0.001)	•
Dementia	NO	83745 (84.6)	•	•
	YES	15283 (15.4)	2.06 (2.01-2.12, p<0.001)	1.17 (1.13-1.21, p<0.001)
Malnutrition	NO	89963 (97.3)	•	•
	YES	2456 (2.7)	1.51 (1.41-1.61, p<0.001)	•
smoking_mhyn_2levels	NO	56024 (54.9)	•	•
	YES	5655 (5.5)	0.86 (0.82-0.91, p<0.001)	•
	N/K	40291 (39.5)	1.18 (1.16-1.21, p<0.001)	•

Number in dataframe = 108921, Number in model = 74855, Missing = 34066, Number of events = 19684, Concordance = 0.727 (SE = 0.002), R-squared = 0.158( Max possible = 0.997), Likelihood ratio test = 12840.369 (df = 13, p = 0.000)

**Figure 16a - Multivariable Cox proportional hazards model**

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

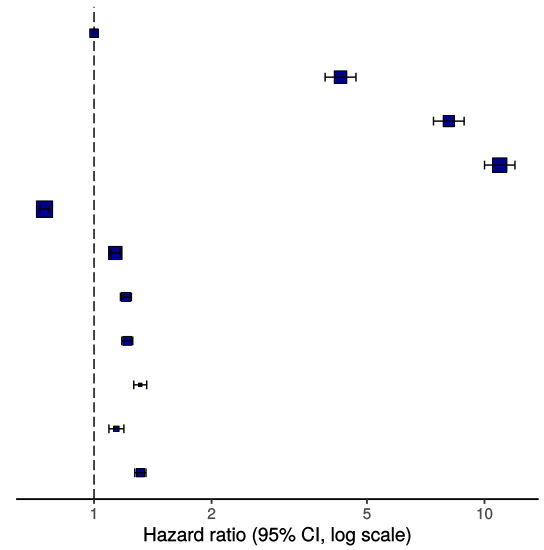
Age on admission (years)	<50	-
	50-69	4.19 (3.80-4.62, p<0.001)
	70-79	8.38 (7.60-9.24, p<0.001)
	80+	11.36 (10.31-12.52, p<0.001)
Sex at Birth	Female	0.77 (0.75-0.80, p<0.001)
qSOFA score on admission	0	-
	1	1.77 (1.71-1.83, p<0.001)
	2	3.02 (2.90-3.15, p<0.001)
	3	4.89 (4.46-5.37, p<0.001)
Chronic cardiac disease	YES	1.15 (1.12-1.19, p<0.001)
Chronic kidney disease	YES	1.23 (1.19-1.28, p<0.001)
Moderate or severe liver disease	YES	1.40 (1.27-1.55, p<0.001)
Malignant neoplasm	YES	1.37 (1.32-1.42, p<0.001)
Obesity (as defined by clinical staff)	YES	1.13 (1.08-1.18, p<0.001)
Dementia	YES	1.17 (1.13-1.21, 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	4.28 (3.91-4.69, p<0.001)
	70-79	8.10 (7.40-8.87, p<0.001)
	80+	10.94 (10.00-11.97, p<0.001)
Sex at Birth	Female	0.75 (0.73-0.77, p<0.001)
Chronic cardiac disease	YES	1.13 (1.10-1.17, p<0.001)
Chronic pulmonary disease (not asthma)	YES	1.21 (1.17-1.25, p<0.001)
Chronic kidney disease	YES	1.22 (1.18-1.26, p<0.001)
Malignant neoplasm	YES	1.31 (1.26-1.36, p<0.001)
Obesity (as defined by clinical staff)	YES	1.14 (1.09-1.19, p<0.001)
Dementia	YES	1.31 (1.27-1.36, p<0.001)



ROC = 0.7275193

Figure 17 - Predictions calibration plot

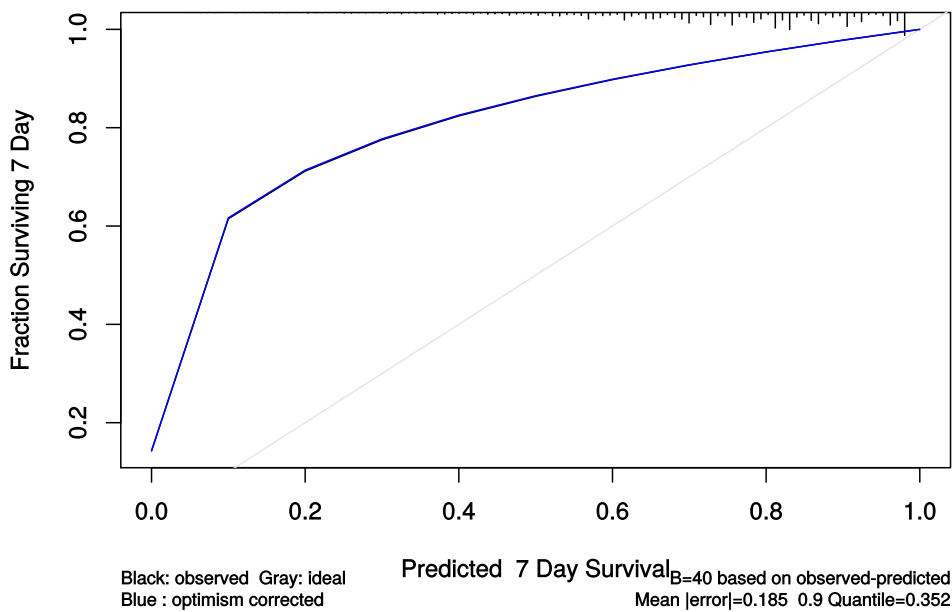


Figure 18 - Prognostic model predictions

Again, for demonstration of methods.

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

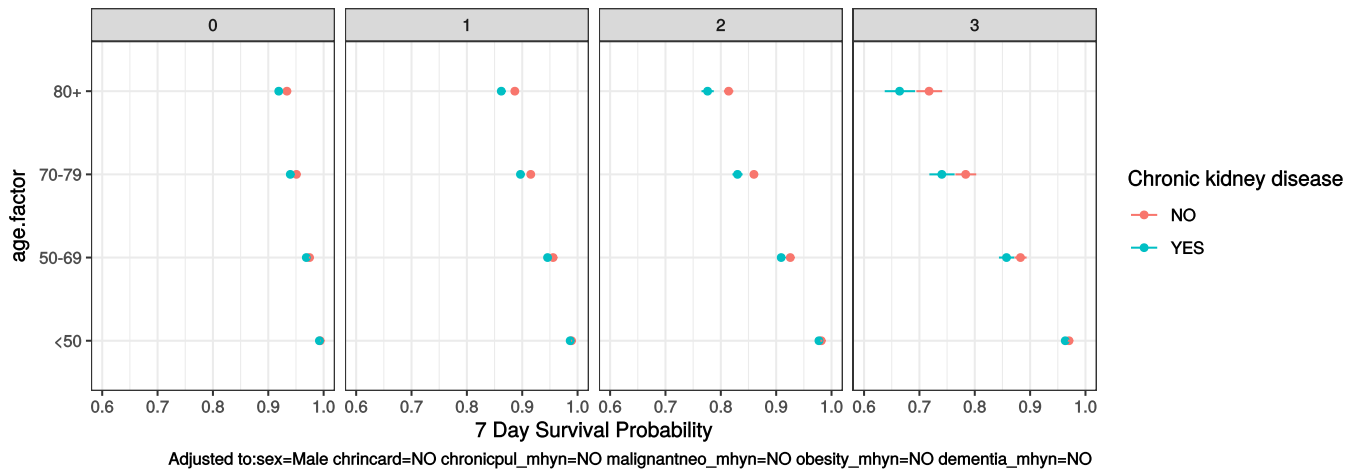


Figure 19 - Death by severity (NEWS) on admission

Number of deaths by NEWS score at admission

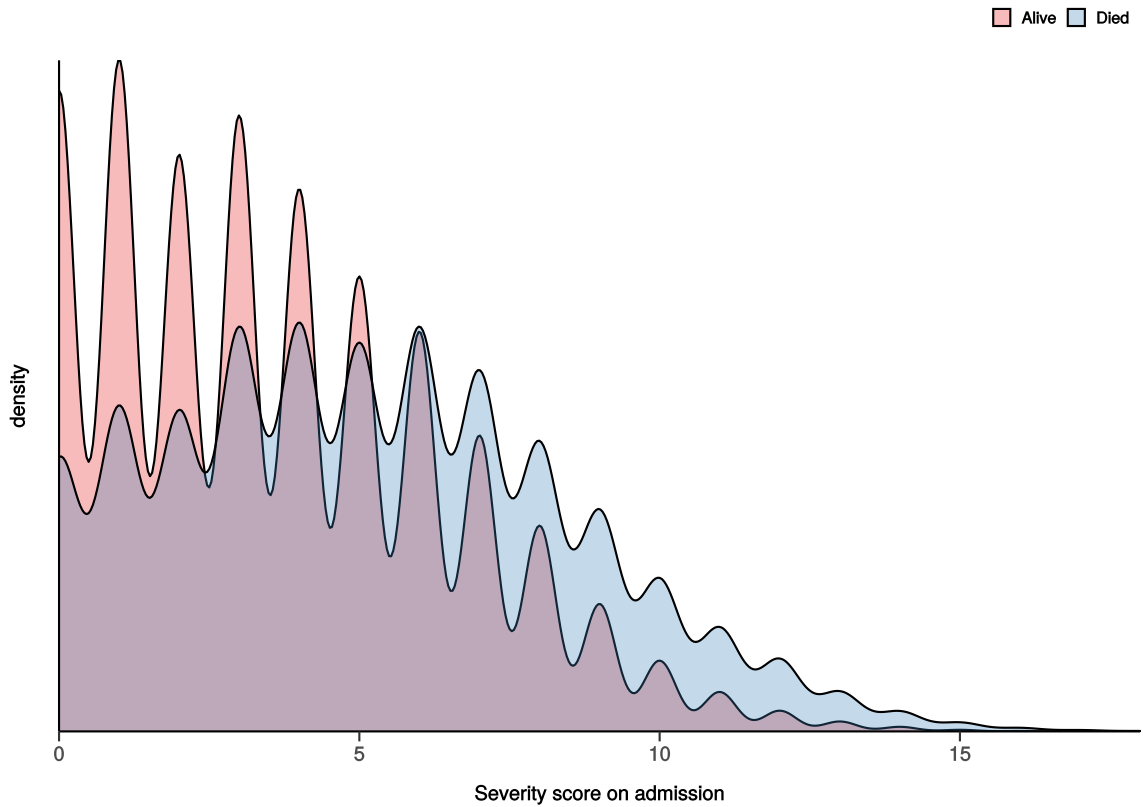


Figure 20 - Death by severity (NEWS) on admission stratified by age

Number of deaths by NEWS score at admission  
Stratified by age

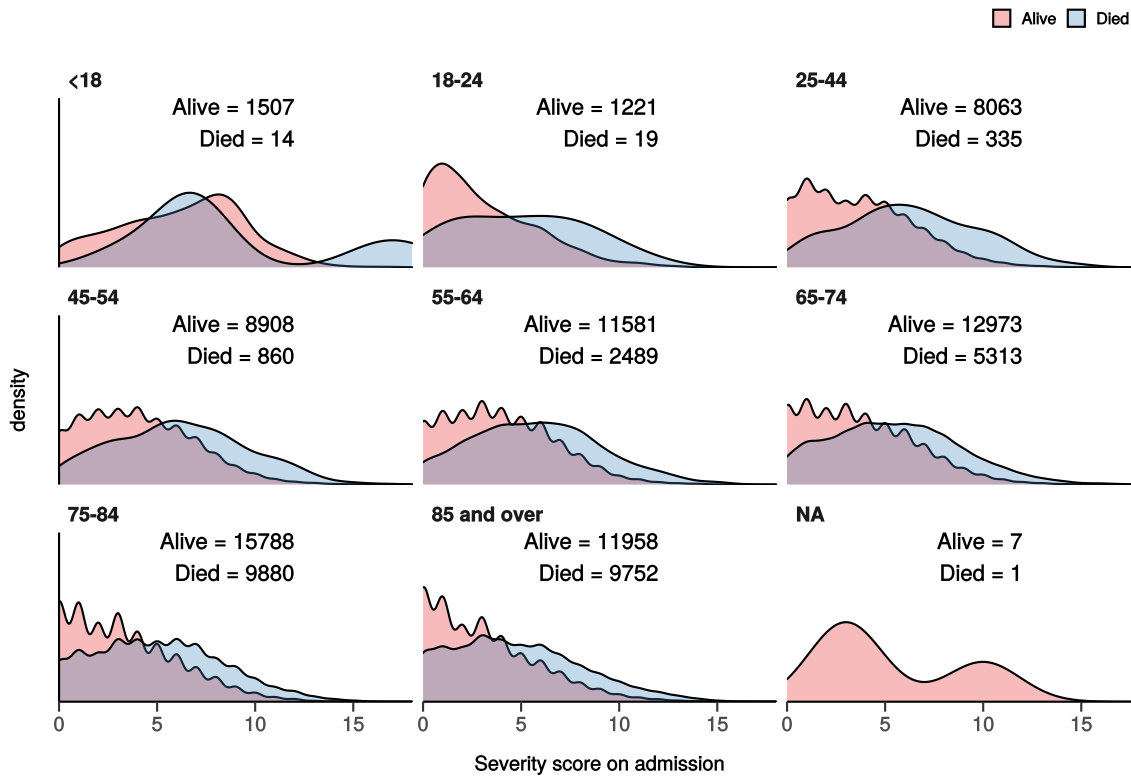
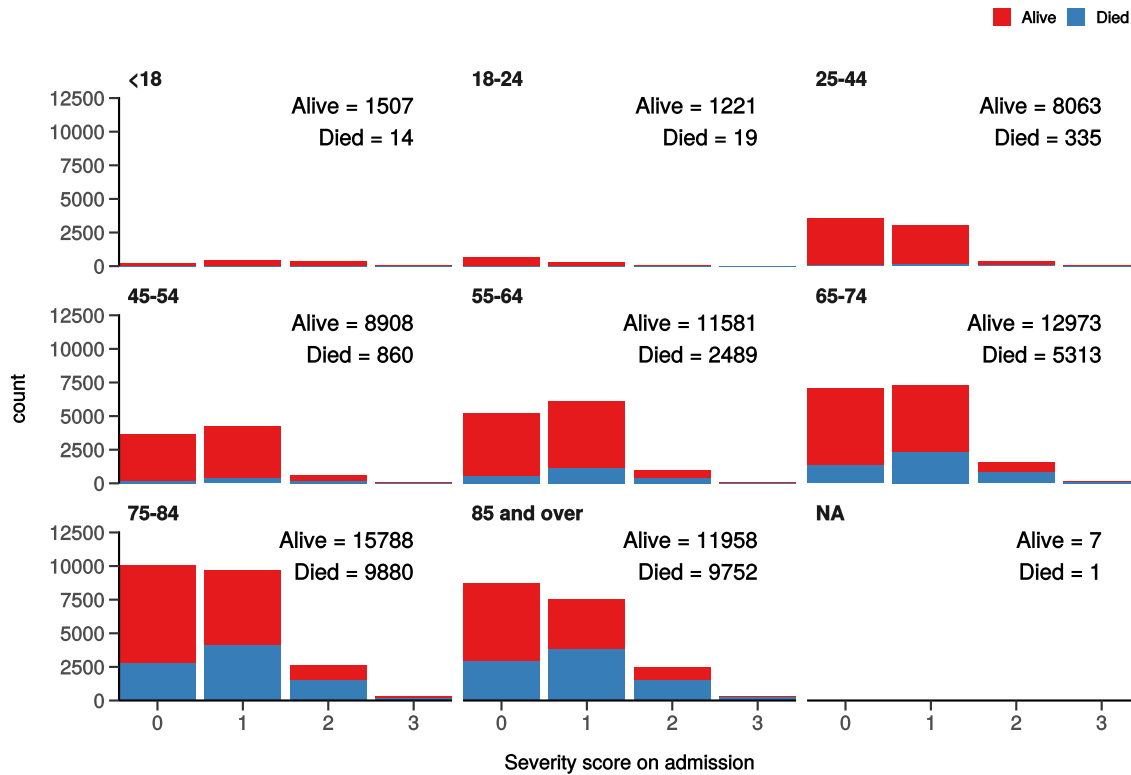


Figure 21 - Death by severity (qSOFA) on admission stratified by age

Number of deaths by qSOFA score at admission  
Stratified by age



## Healthcare workers

Employed as a healthcare worker?

NO

YES

p

<b>Employed as a healthcare worker?</b>		<b>NO</b>	<b>YES</b>	<b>p</b>
Total N (%)		93707 (95.8)	4069 (4.2)	
NEWS score on admission	Median (IQR)	4.0 (5.0)	4.0 (4.0)	<0.001
Death	No	59330 (69.4)	3616 (92.9)	<0.001
	Yes	26152 (30.6)	277 (7.1)	