

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

Dynamic content updated: 2020-12-09 03:39:43.

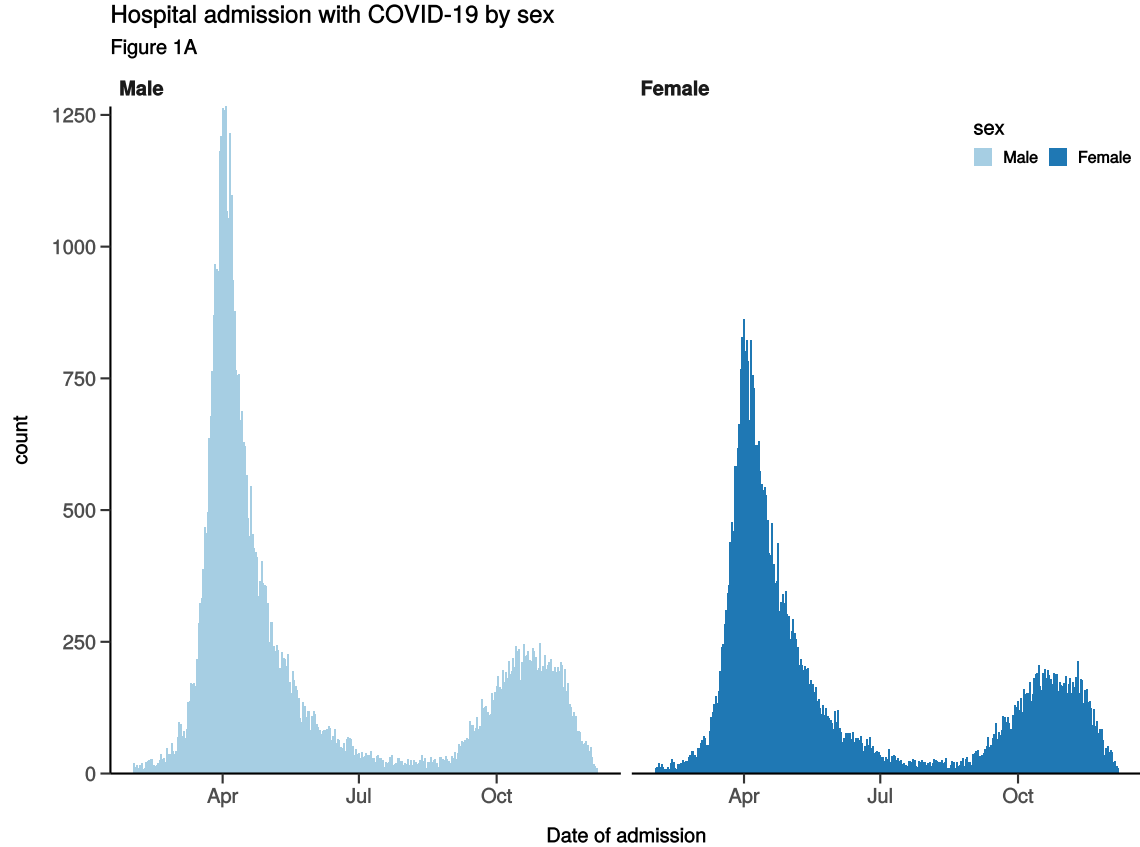
## Executive summary

### Includes all patients

There are 116849 patients included in CO-CIN. Of these, 28192 patient(s) have died and 14371 required ICU. 60923 have been discharged home.

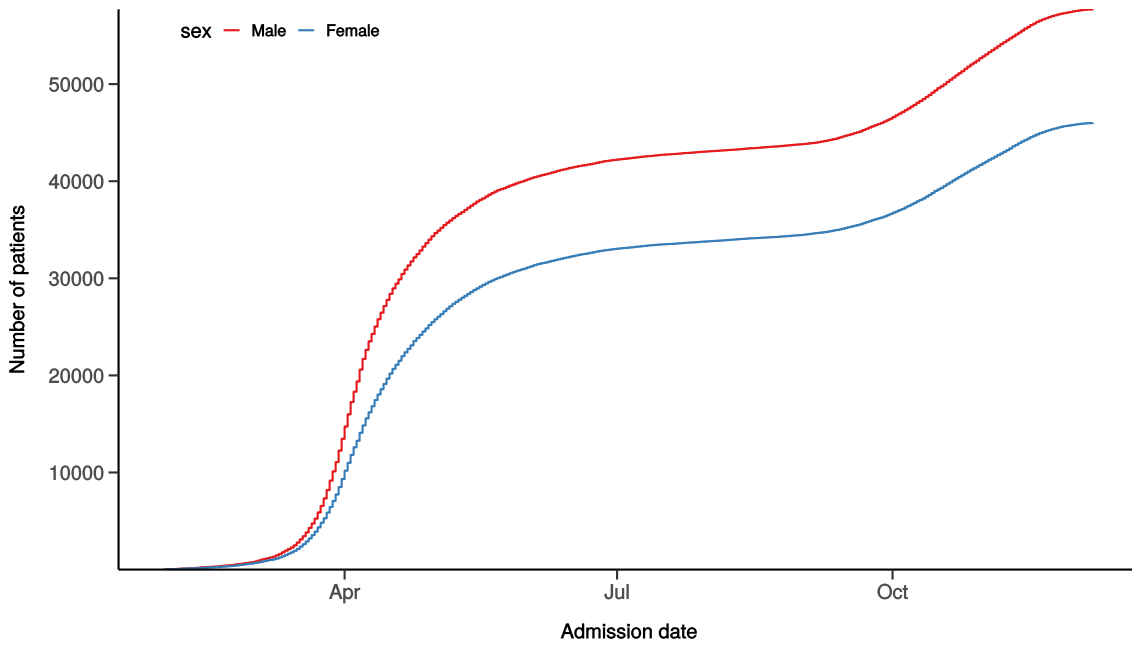
## Admission

Figure 1



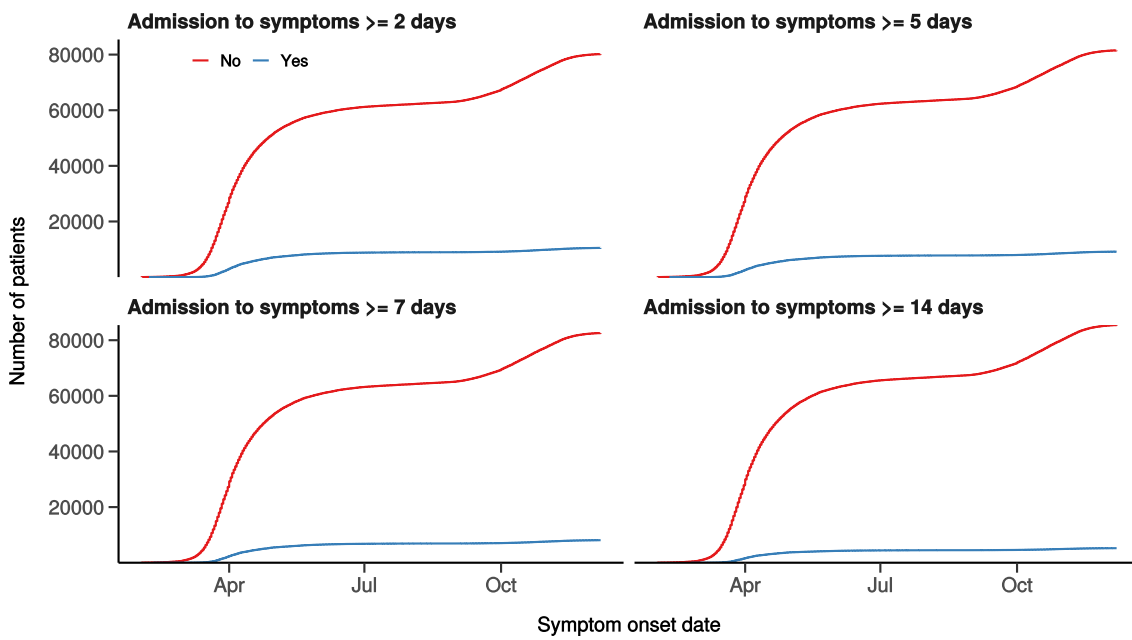
### Hospital admission with COVID-19 by sex

Figure 1B



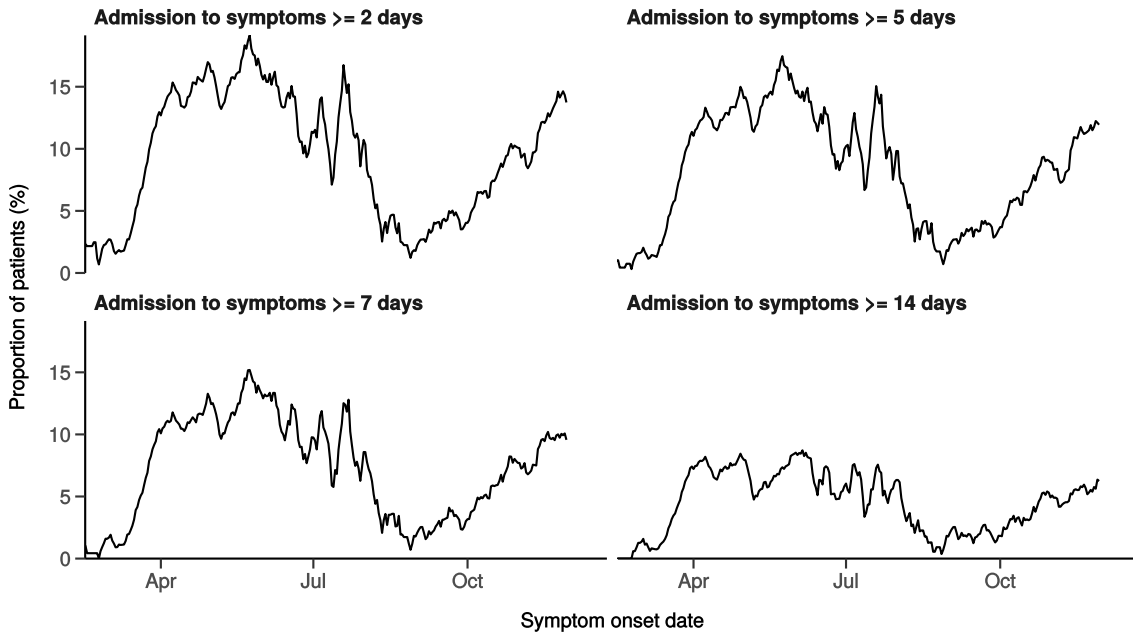
### Number with symptom onset occurring after admission to hospital

Figure 1C



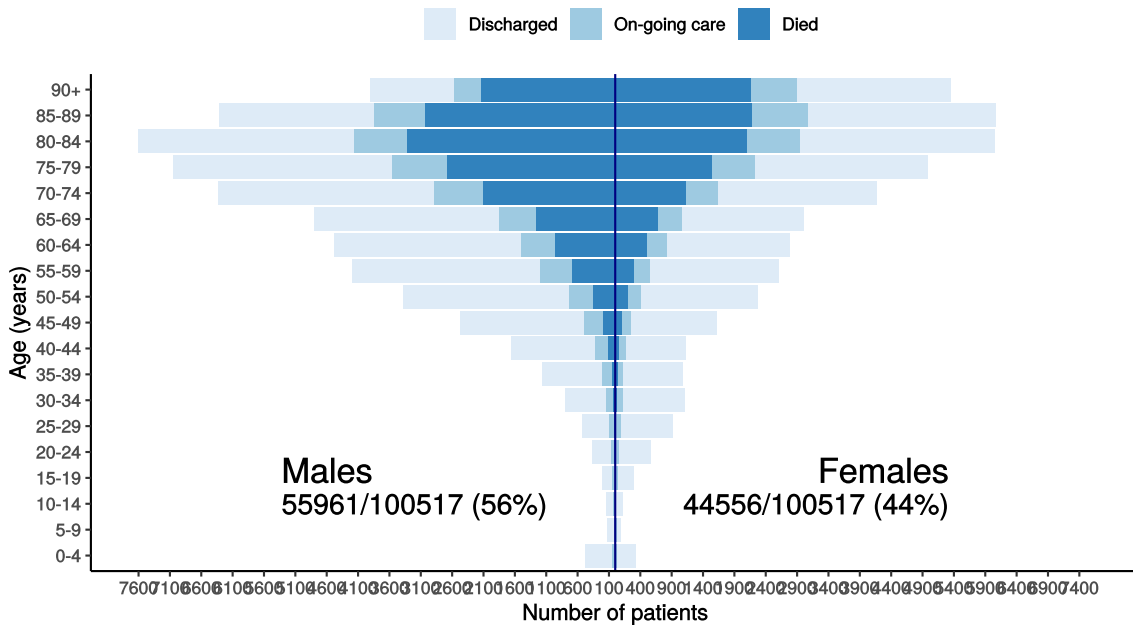
Proportion with symptom onset occurring after hospital admission

Figure 1D - 7-day rolling percentage. n = 90657

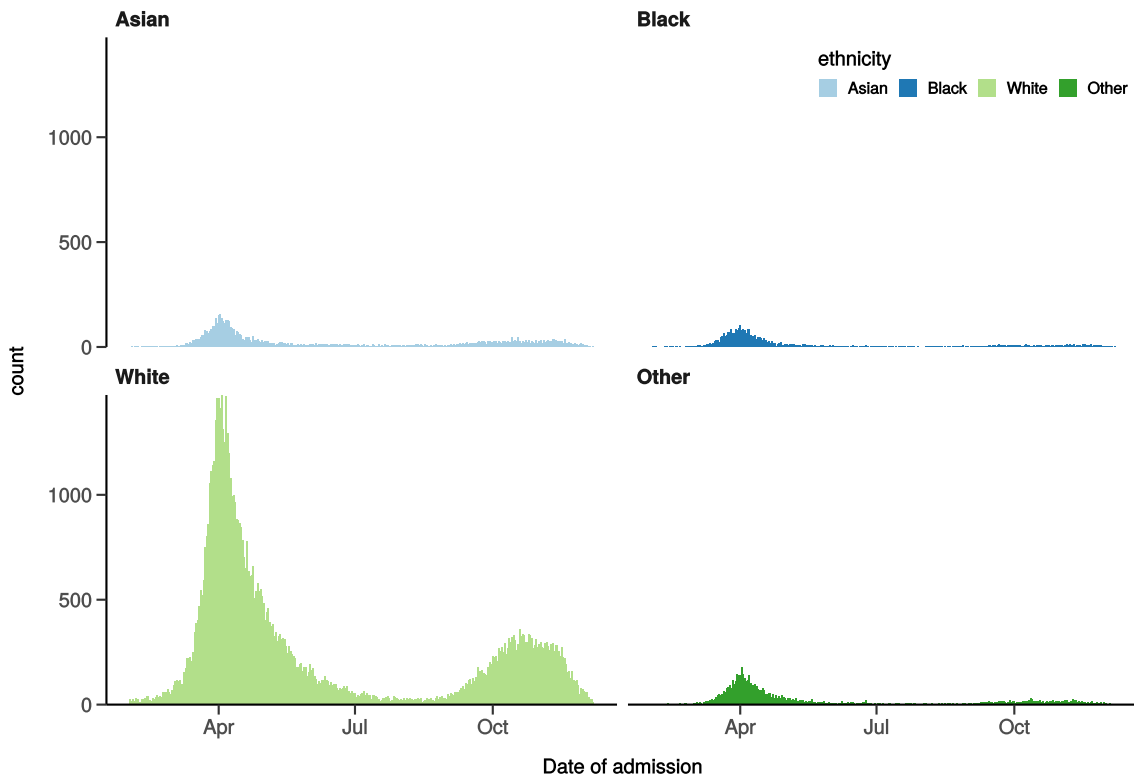


Patients with outcome stratified by age, and sex

Figure 1E



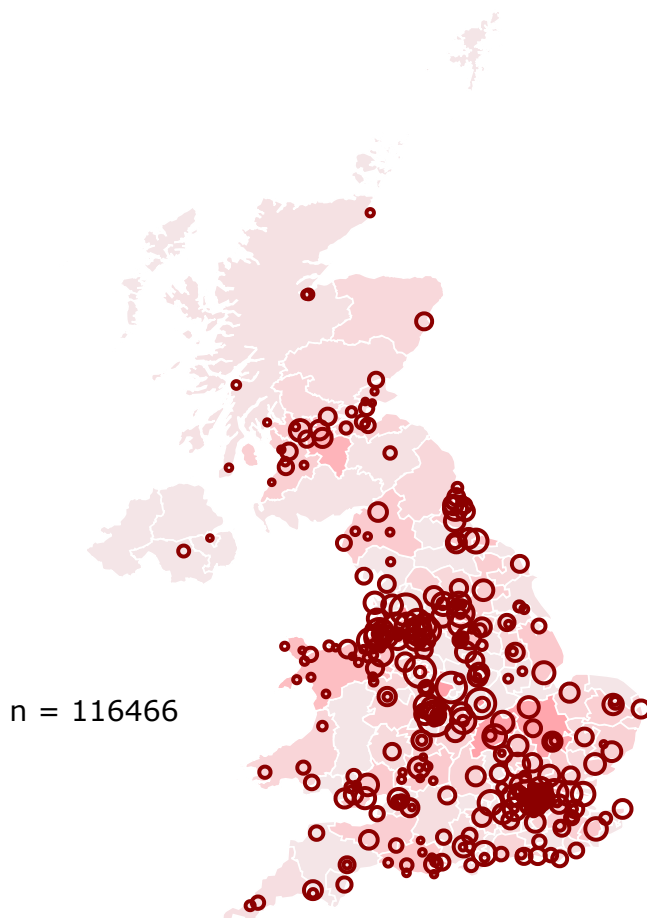
Hospital admission with COVID-19 by ethnicity  
Figure 1F



## 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

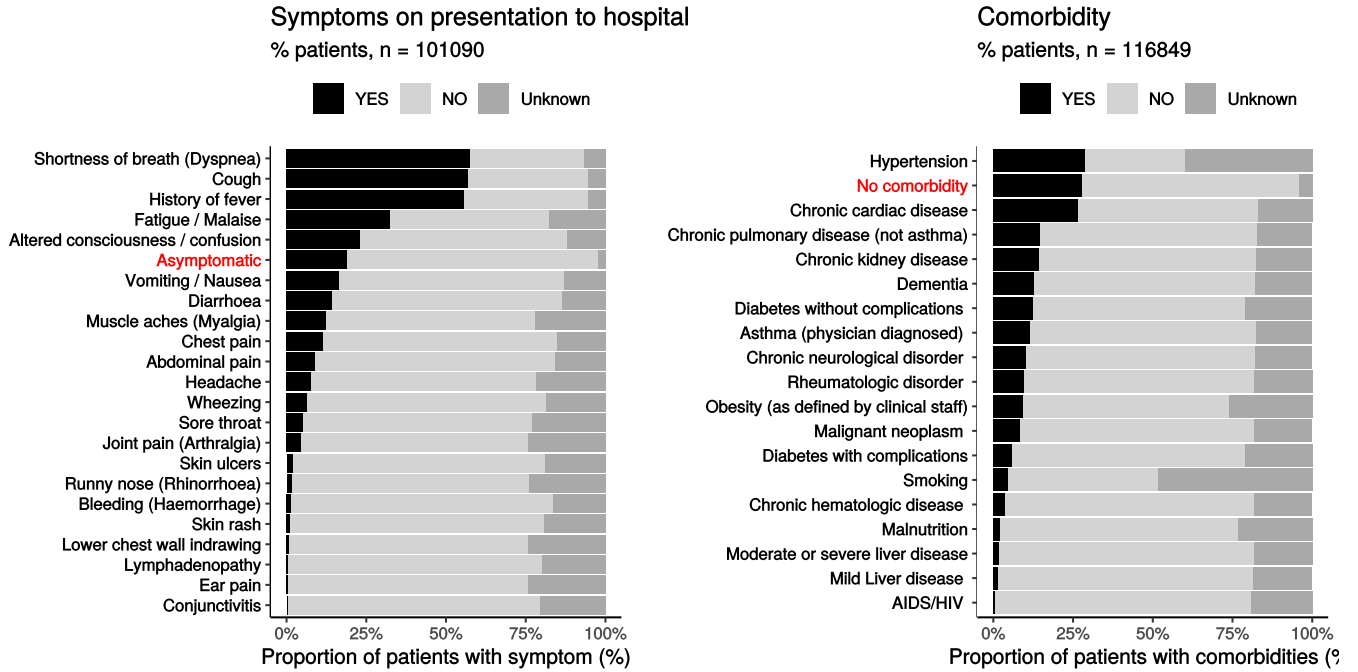


Figure 3B - Symptoms by Age

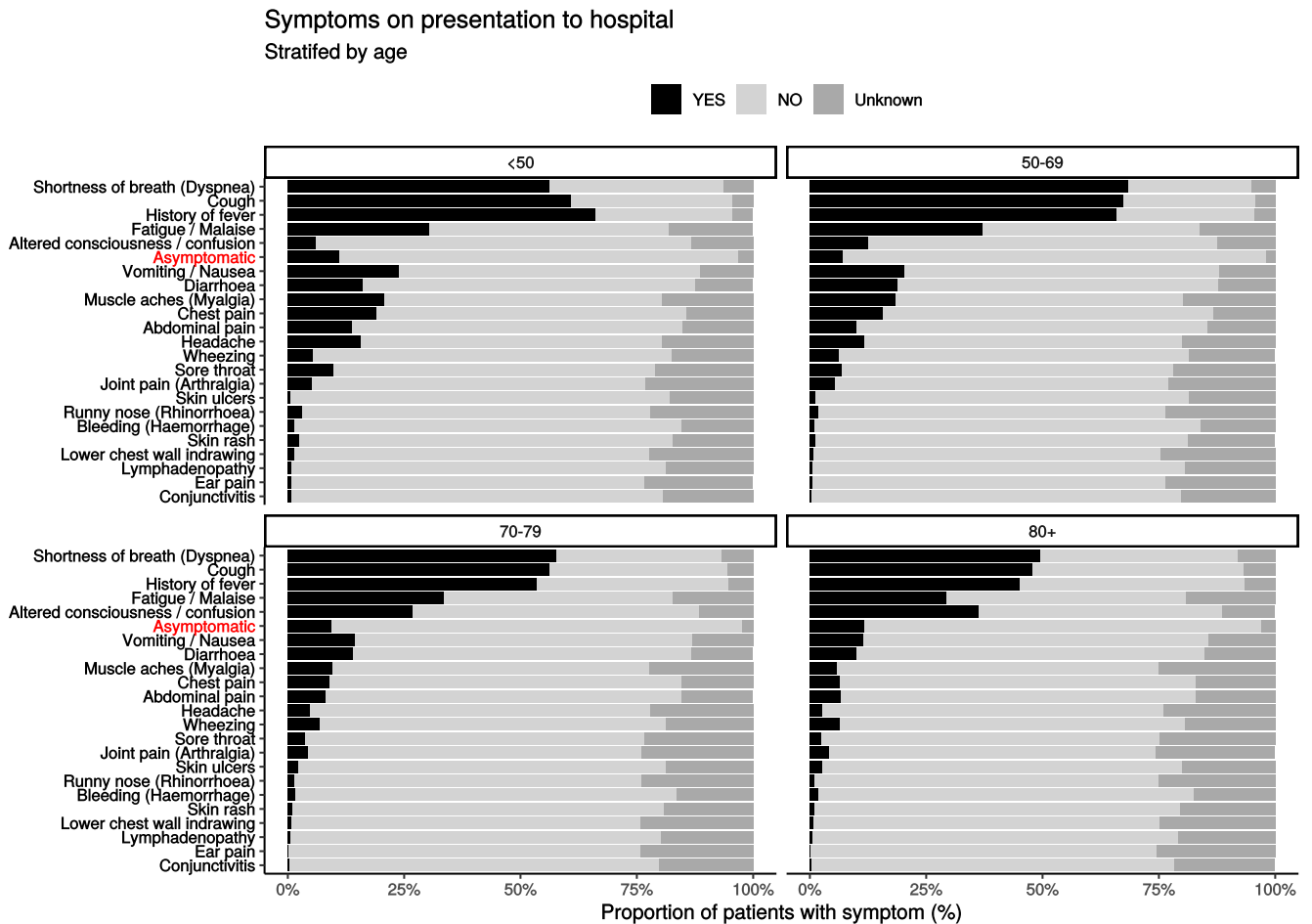
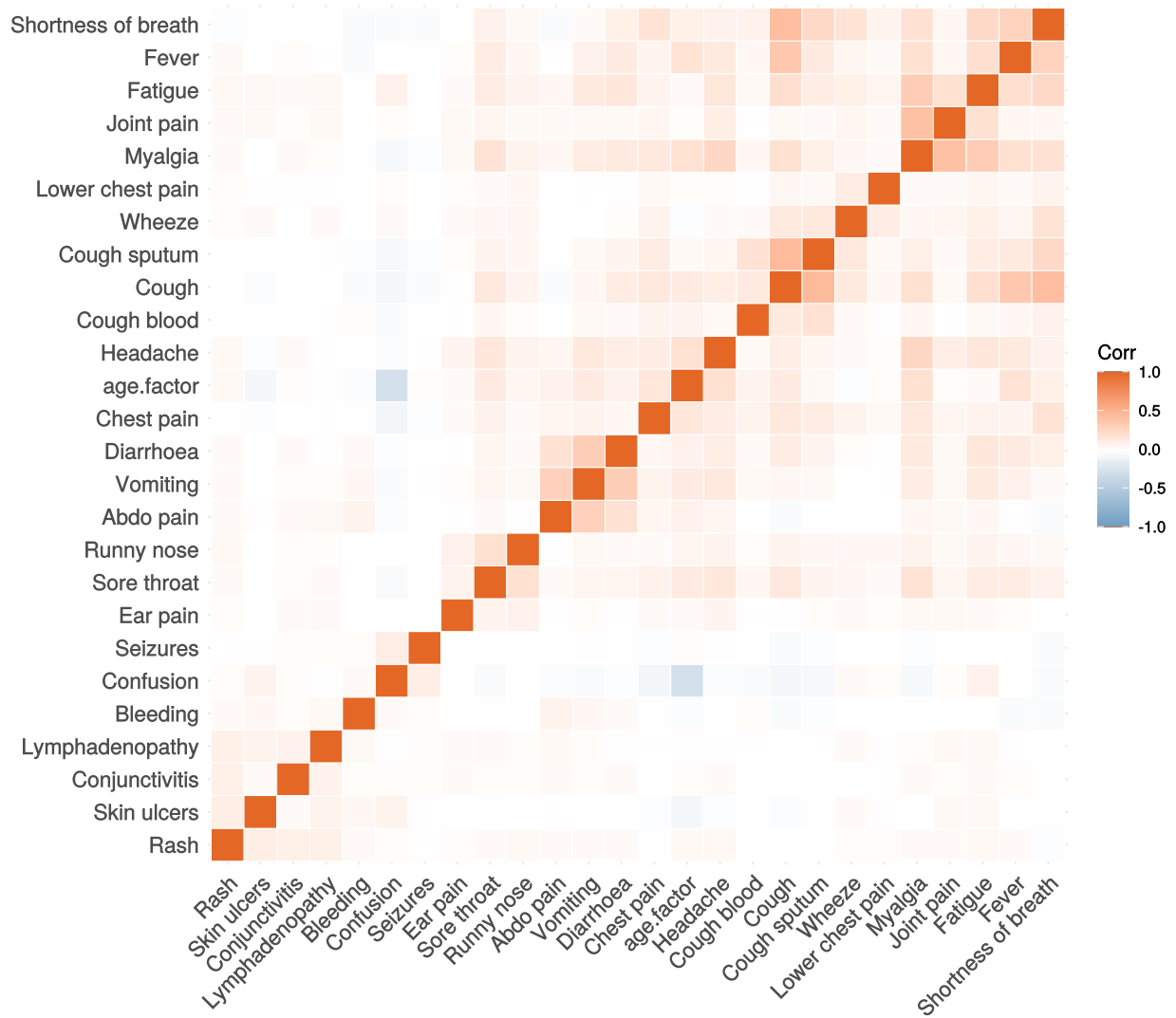


Figure 3C

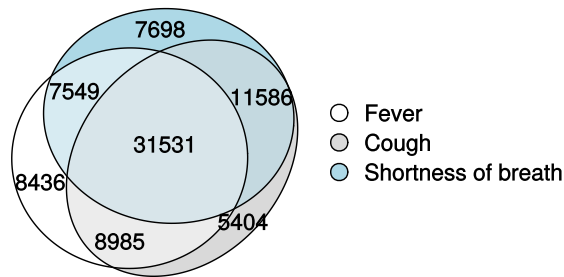
Correlation of symptoms in all pages. Note clusters, top right to bottom left, flu-like, coryzal, abdominal, respiratory, neurocutaneous.



### Symptoms (diagnostic criteria)

Figure 4A

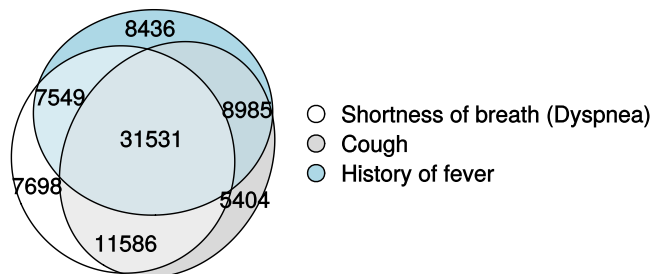
n = 101090



### Symptoms (most common)

Figure 4B

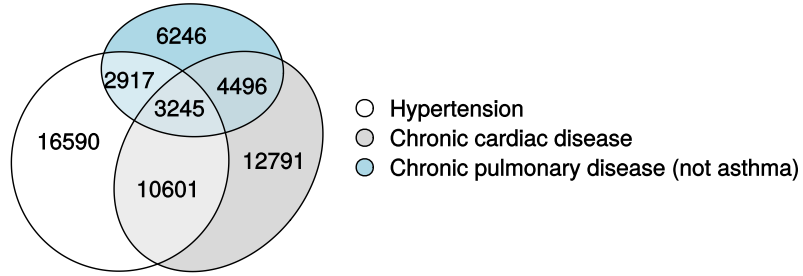
n = 101090



### Comorbidity (most common)

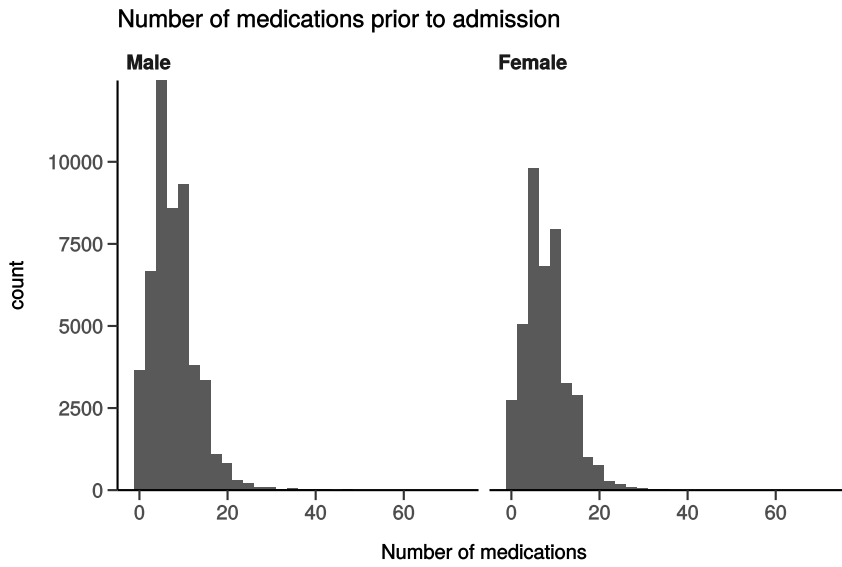
Figure 4C

n = 116849



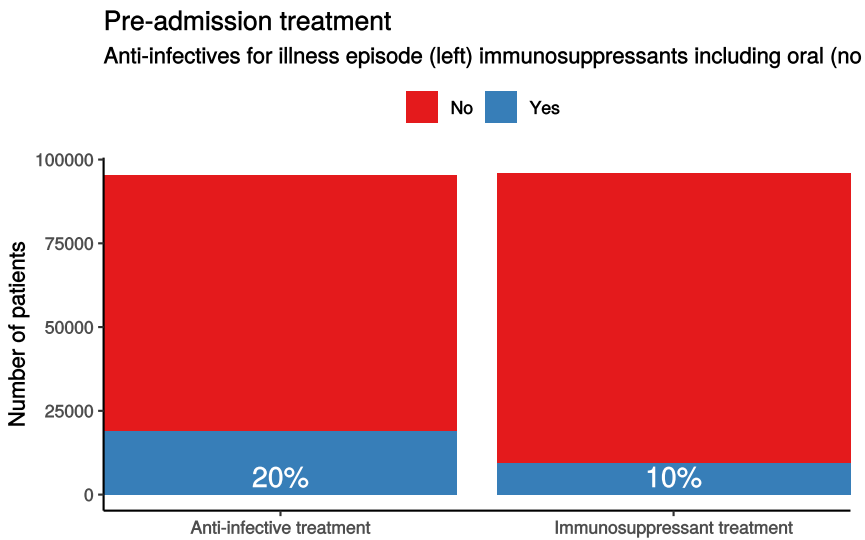
## Medication prior to illness

Figure 5



## Preadmission treatment

Figure 6



## Patient flow

Figure 7A - All patients

N = 103452

### Patient status by day

Cumulative for discharge/death

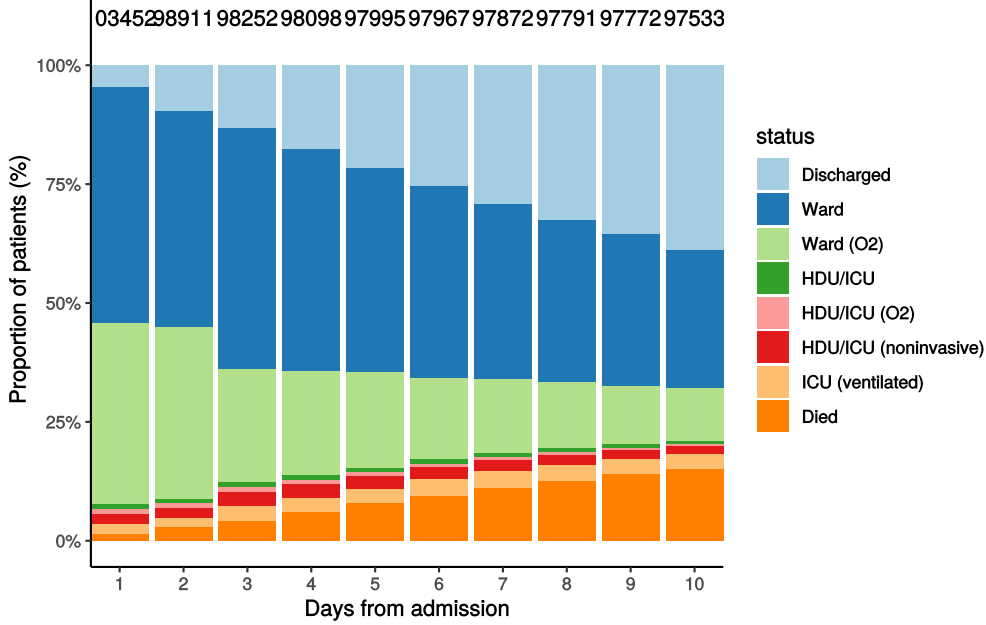
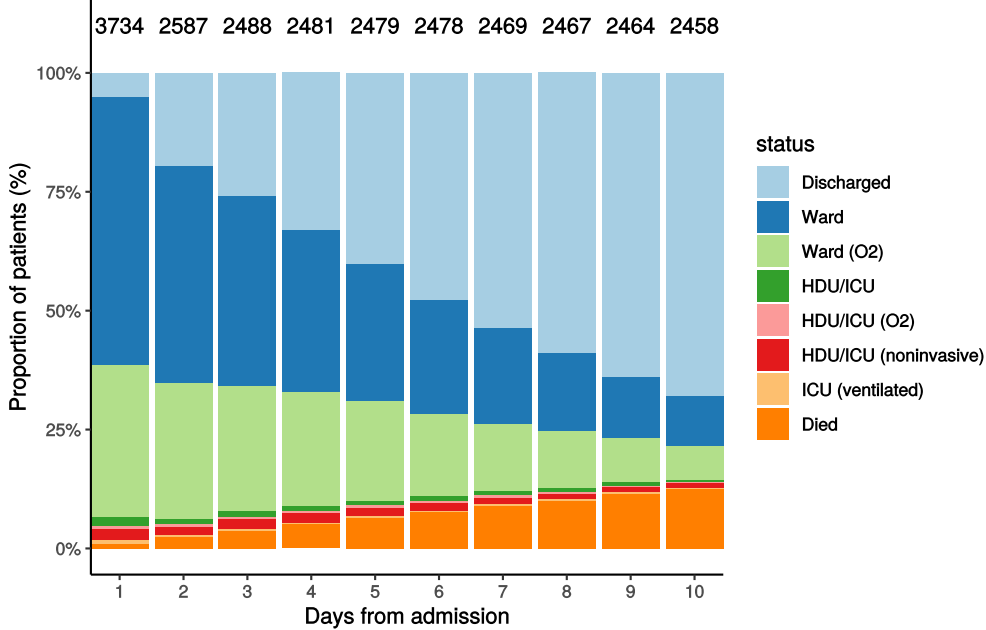


Figure 7B - Patients admitted  $\geq 14$  days and  $\leq 28$  days ago

N = 3734

### Patient status by day

Cumulative for discharge/death



## Oxygen requirement

Figure 8A - All patients

N = 98032



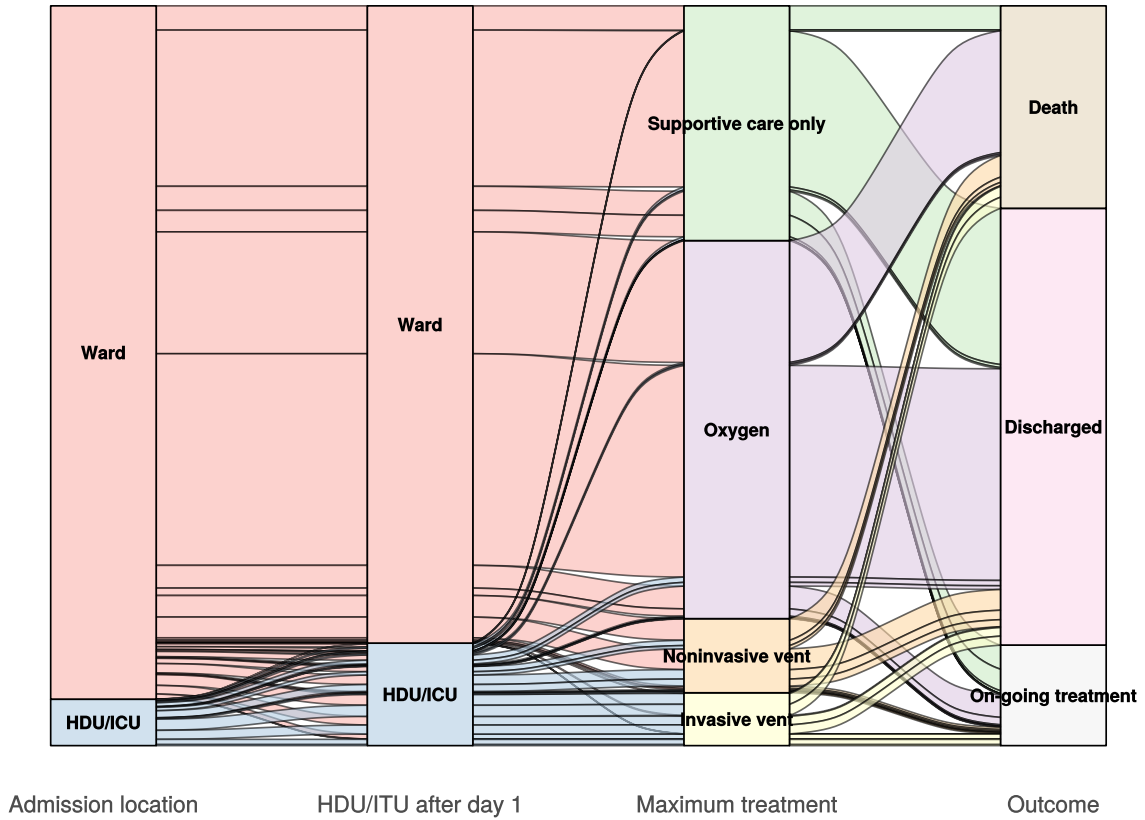


Figure 8B - Patients admitted  $\geq 14$  days and  $\leq 28$  days ago

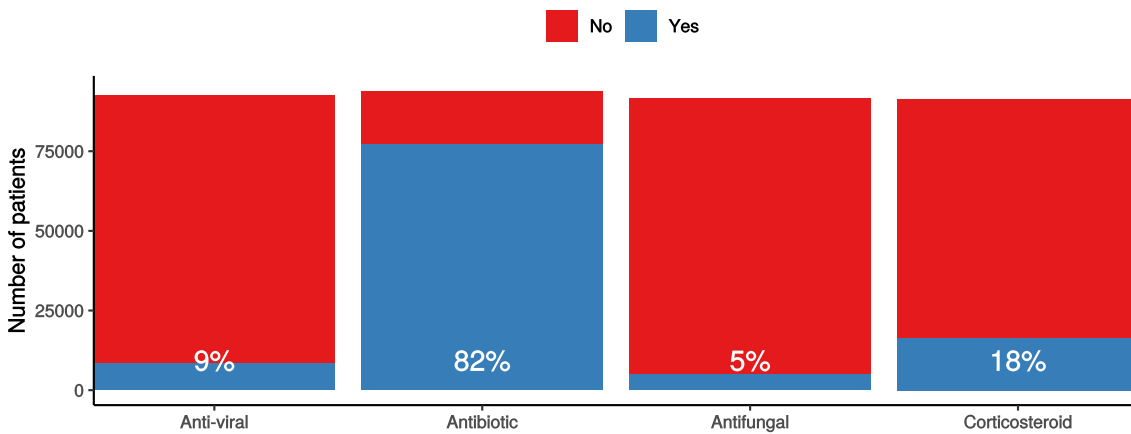
N = 3569

## In-hospital medical treatment

Figure 9

### In-hospital treatment

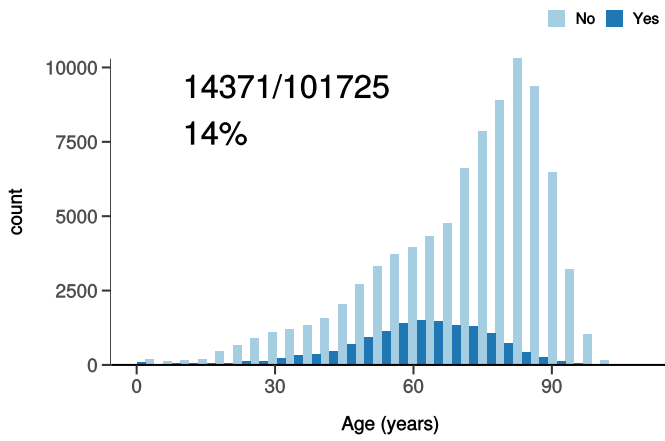
Anti-virals, antibiotics, corticosteroids, and anti-fungals for patients who have completed journey.



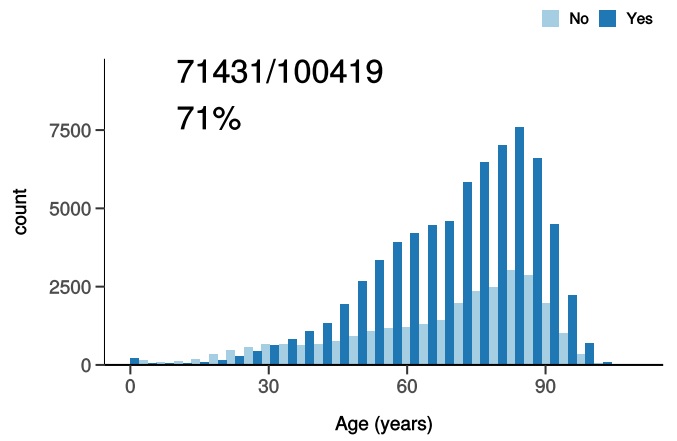
## Treatment

Figure 10

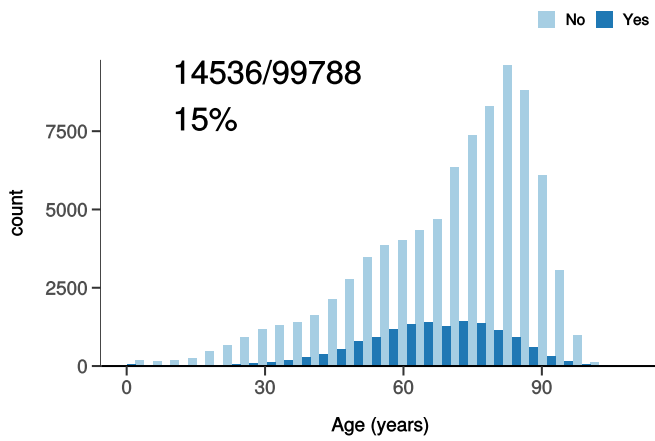
ICU/HDU admission  
Figure 10A



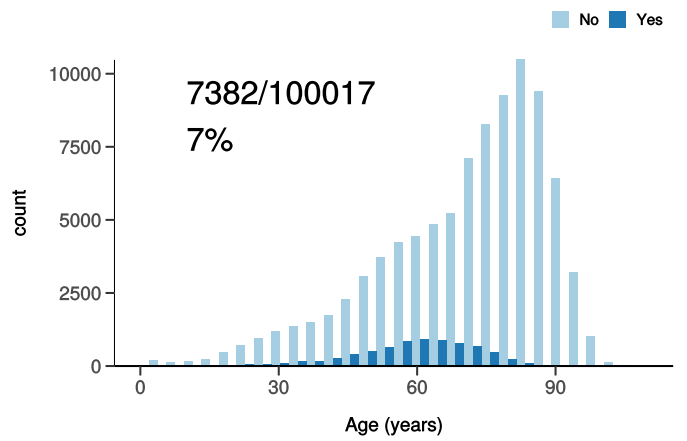
High flow oxygen  
Figure 10B



Noninvasive ventilation  
Figure 10C



Invasive ventilation  
Figure 10D

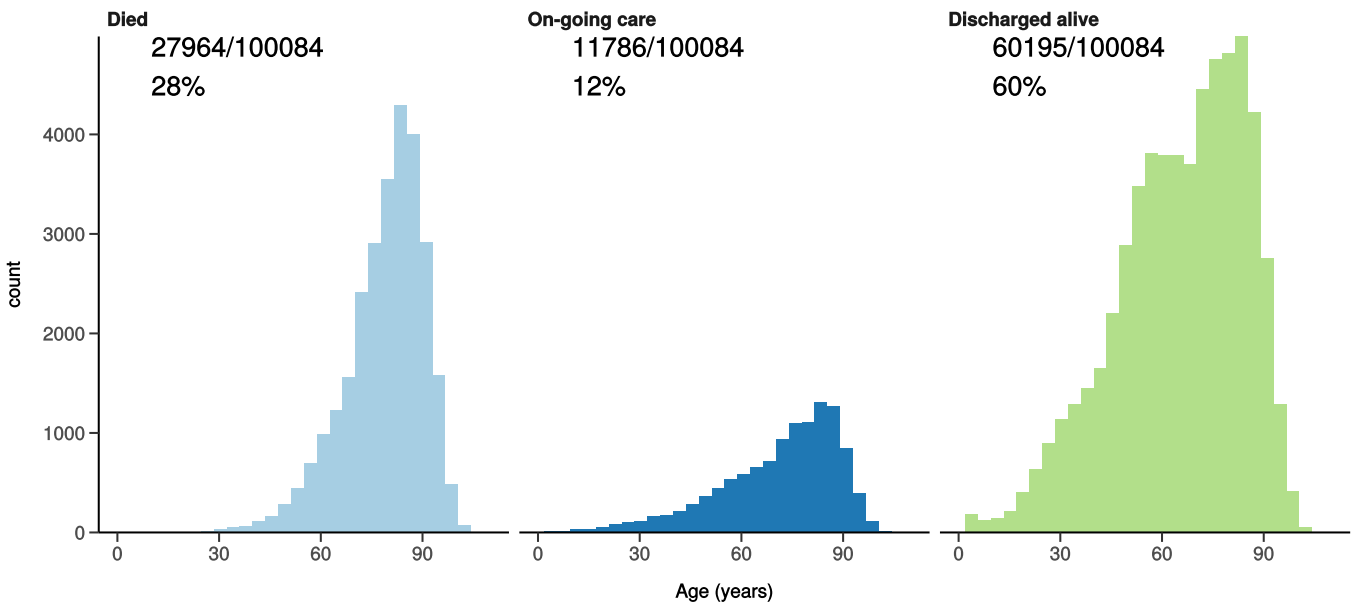


## Status in patients admitted $\geq 14$ days from today

Figure 11

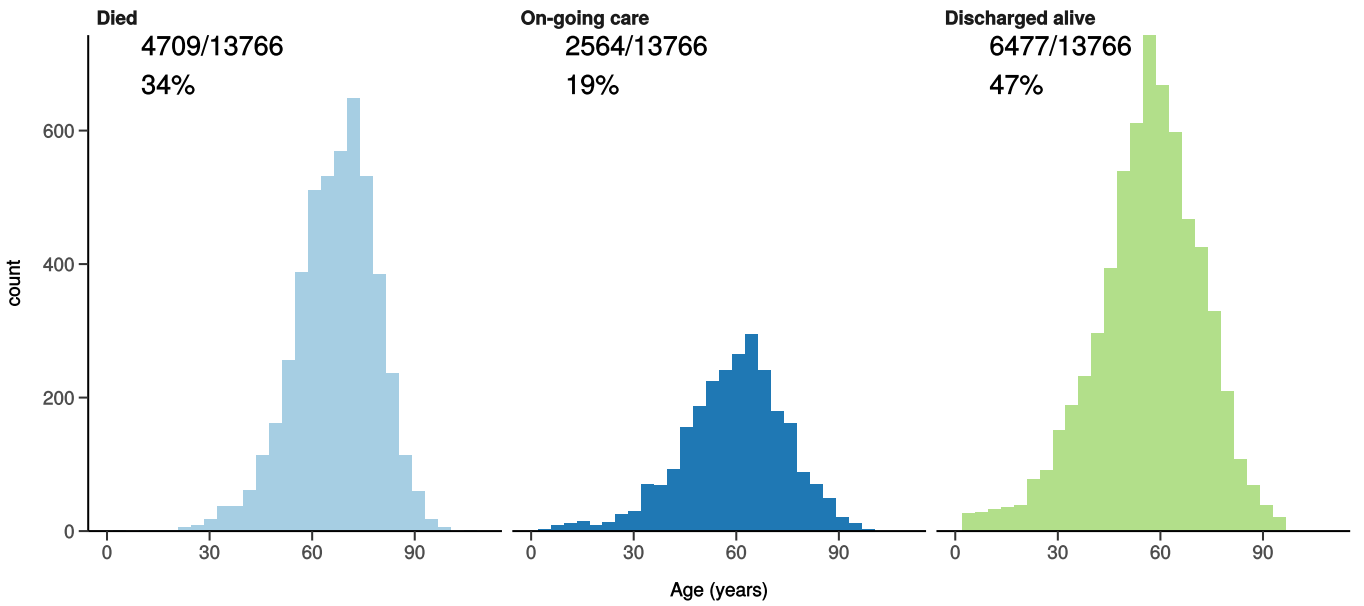
All: status in patients admitted  $\geq 14$  days ago

Figure 11A



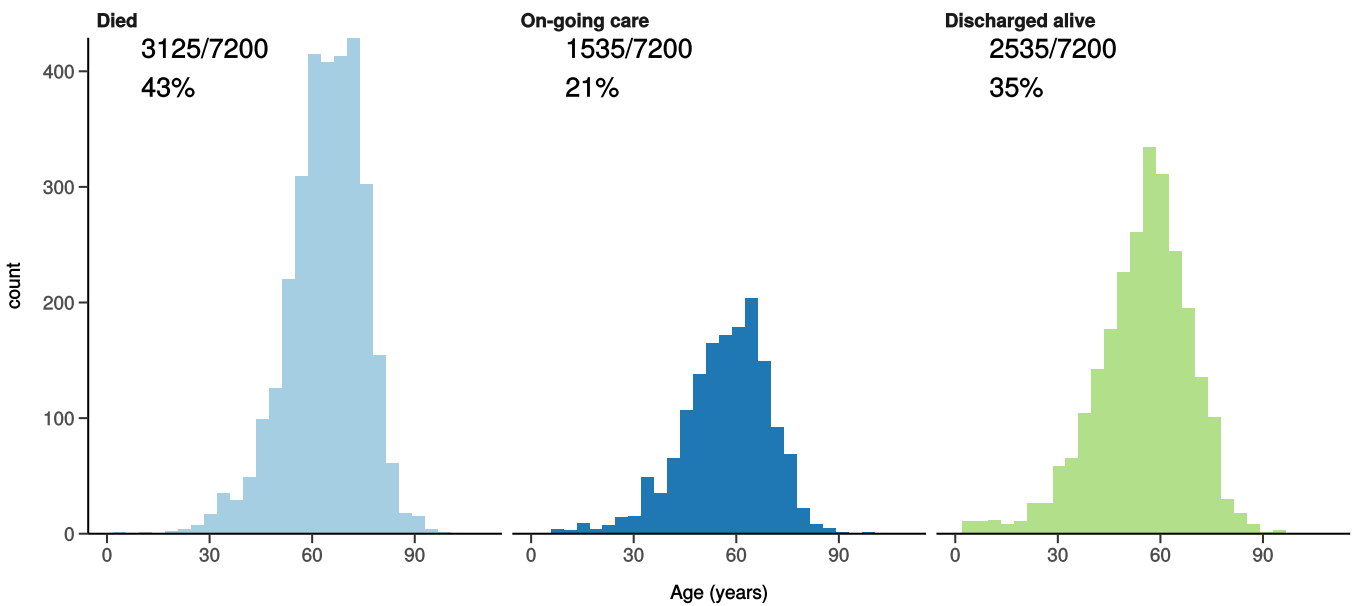
ICU/HDU admissions: status in patients admitted  $\geq 14$  days ago

Figure 11B



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

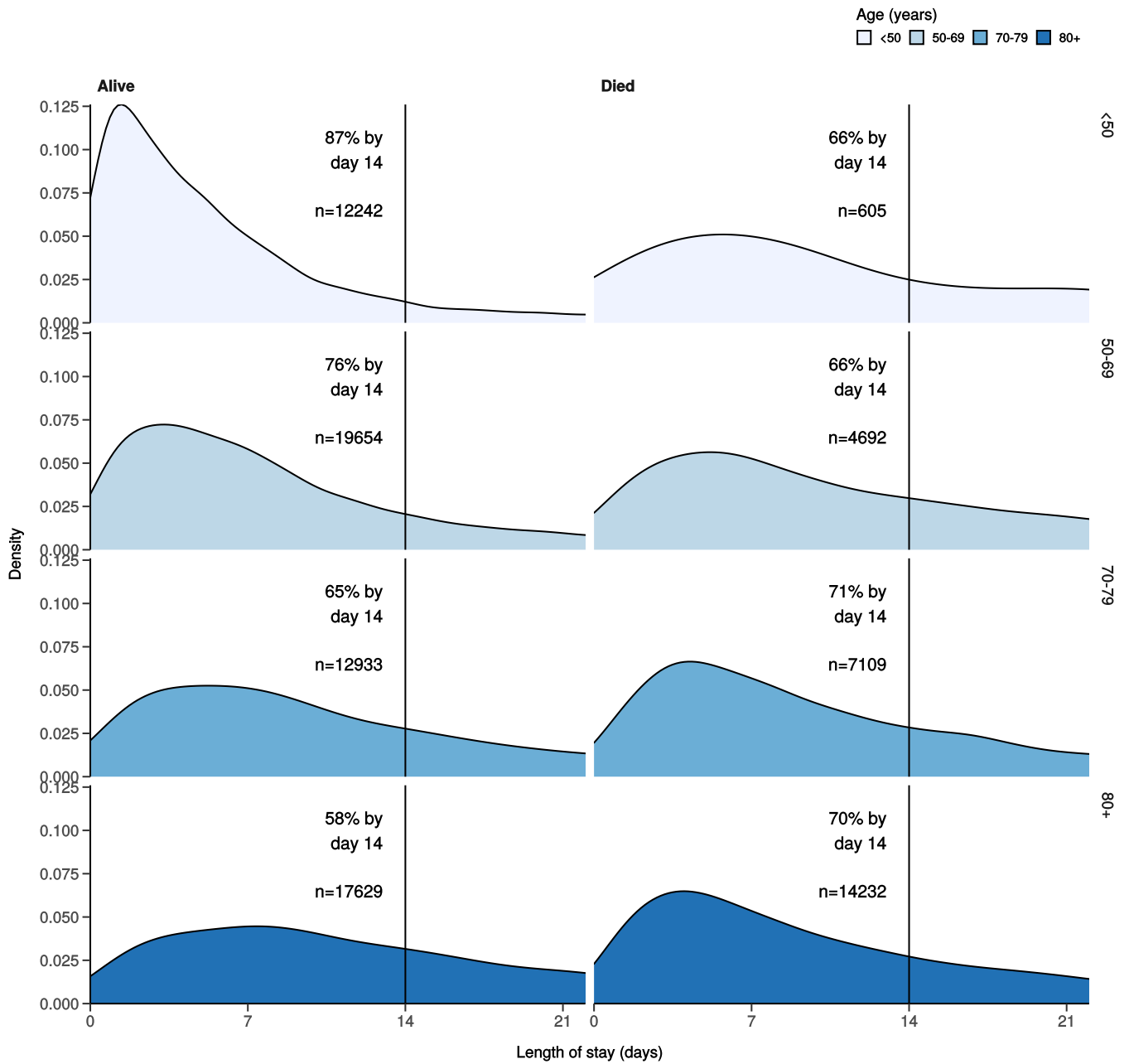
Figure 11c



# 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	13943 (95.5)	650 (4.5)	•	•
	50-69	21583 (81.4)	4917 (18.6)	4.89 (4.49-5.32, p<0.001)	4.47 (4.07-4.92, p<0.001)
	70-79	14217 (65.7)	7423 (34.3)	11.20 (10.31-12.19, p<0.001)	9.19 (8.36-10.12, p<0.001)
	80+	19263 (56.4)	14884 (43.6)	16.57 (15.29-18.00, p<0.001)	13.41 (12.21-14.76, p<0.001)

Dependent: death		No	Yes	OR (univariable)	OR (multivariable)
Sex at Birth	Male	37088 (68.7)	16898 (31.3)	•	•
	Female	31959 (74.4)	10992 (25.6)	0.75 (0.73-0.78, p<0.001)	0.69 (0.67-0.72, p<0.001)
	Not specified	0 (NaN)	0 (NaN)	•	•
Chronic cardiac disease	NO	47178 (76.2)	14699 (23.8)	•	•
	YES	17828 (60.7)	11541 (39.3)	2.08 (2.02-2.14, p<0.001)	1.17 (1.13-1.21, p<0.001)
Chronic pulmonary disease (not asthma)	NO	55173 (73.5)	19901 (26.5)	•	•
	YES	9732 (61.2)	6171 (38.8)	1.76 (1.70-1.82, p<0.001)	1.28 (1.23-1.34, p<0.001)
Chronic neurological disorder	NO	57234 (72.4)	21773 (27.6)	•	•
	YES	7249 (64.1)	4067 (35.9)	1.47 (1.41-1.54, p<0.001)	1.15 (1.10-1.21, p<0.001)
Chronic hematologic disease	NO	61868 (71.8)	24290 (28.2)	•	•
	YES	2458 (63.1)	1436 (36.9)	1.49 (1.39-1.59, p<0.001)	1.15 (1.07-1.25, p<0.001)
Chronic kidney disease	NO	55576 (74.0)	19524 (26.0)	•	•
	YES	9146 (58.6)	6469 (41.4)	2.01 (1.94-2.09, p<0.001)	1.30 (1.24-1.36, p<0.001)
Dementia	NO	56681 (74.3)	19560 (25.7)	•	•
	YES	7854 (55.3)	6337 (44.7)	2.34 (2.25-2.43, p<0.001)	1.37 (1.31-1.44, p<0.001)
Obesity (as defined by clinical staff)	NO	50743 (71.3)	20400 (28.7)	•	•
	YES	7586 (75.5)	2457 (24.5)	0.81 (0.77-0.85, p<0.001)	1.22 (1.15-1.29, p<0.001)
Malignant neoplasm	NO	59044 (73.0)	21886 (27.0)	•	•
	YES	5324 (57.8)	3886 (42.2)	1.97 (1.88-2.06, p<0.001)	1.49 (1.41-1.57, p<0.001)

Number in dataframe = 103806, Number in model = 77287, Missing = 26519, AIC = 81017.2, C-statistic = 0.723, H&L = Chi-sq(8) 142.07 (p<0.001)

**Figure 13 - Adjusted odds ratio plot**

## Death

Age on admission (years)	<50	-
	50-69	4.47 (4.07-4.92, p<0.001)
	70-79	9.19 (8.36-10.12, p<0.001)
	80+	13.41 (12.21-14.76, p<0.001)
Sex at Birth	Male	-
	Female	0.69 (0.67-0.72, p<0.001)
	Not specified	-
Chronic cardiac disease	YES	1.17 (1.13-1.21, p<0.001)
Chronic pulmonary disease (not asthma)	YES	1.28 (1.23-1.34, p<0.001)
Chronic neurological disorder	YES	1.15 (1.10-1.21, p<0.001)
Chronic hematologic disease	YES	1.15 (1.07-1.25, p<0.001)
Chronic kidney disease	YES	1.30 (1.24-1.36, p<0.001)
Dementia	YES	1.37 (1.31-1.44, p<0.001)
Obesity (as defined by clinical staff)	YES	1.22 (1.15-1.29, p<0.001)
Malignant neoplasm	YES	1.49 (1.41-1.57, p<0.001)

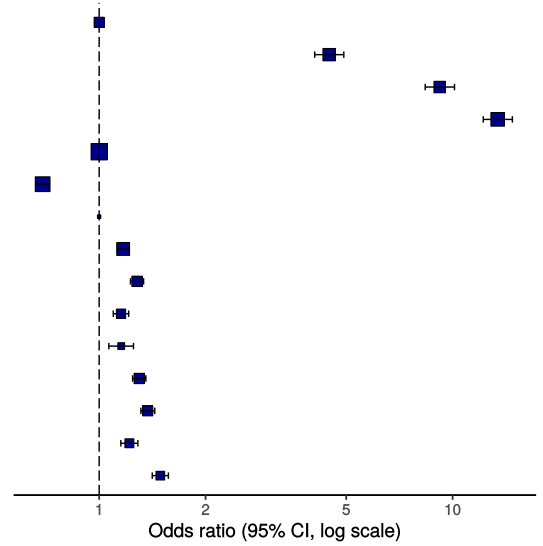
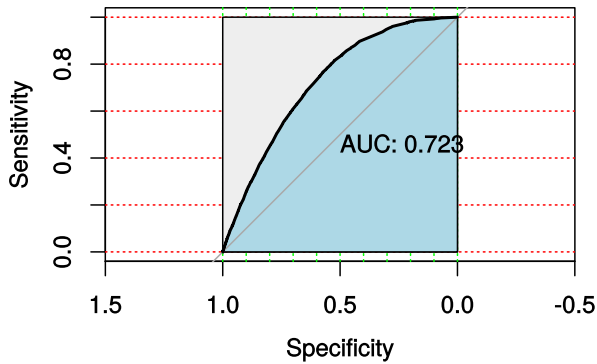


Figure 14 - ROC

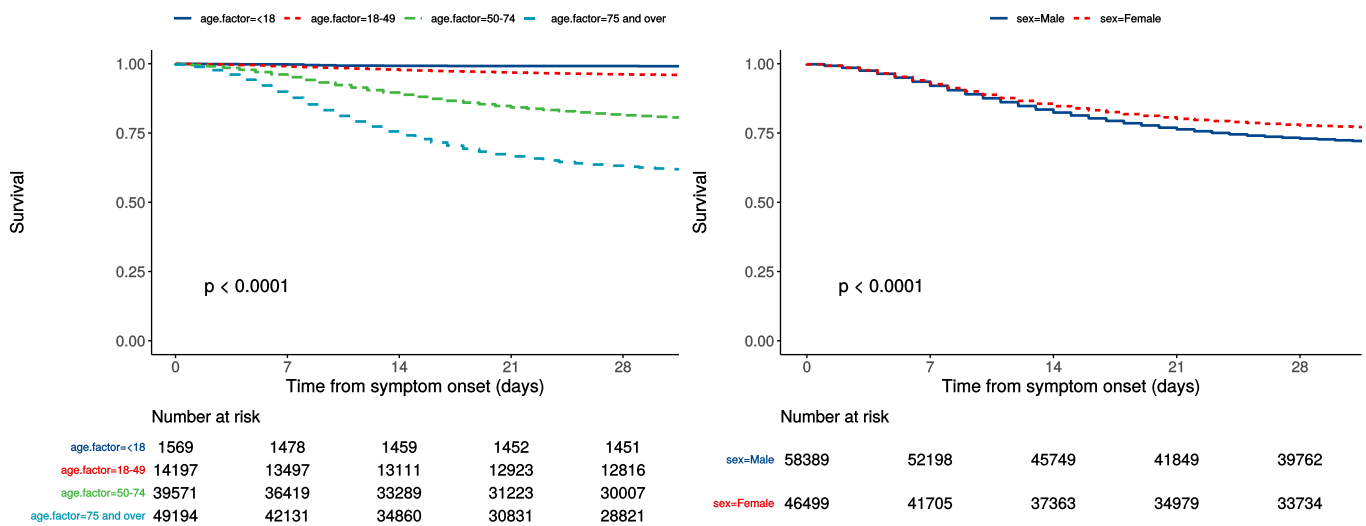


## Survival models

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	15778 (15.1)	•	•
	50-69	28643 (27.4)	4.49 (4.14-4.88, p<0.001)	4.17 (3.77-4.61, p<0.001)
	70-79	23476 (22.5)	9.30 (8.58-10.08, p<0.001)	8.37 (7.59-9.24, p<0.001)
	80+	36655 (35.1)	12.91 (11.92-13.97, p<0.001)	11.28 (10.23-12.45, p<0.001)
Sex at Birth	Male	58401 (55.7)	•	•
	Female	46499 (44.3)	0.79 (0.78-0.81, p<0.001)	0.78 (0.75-0.80, p<0.001)
qSOFA score on admission	0	39532 (44.7)	•	•
	1	39076 (44.2)	1.65 (1.60-1.69, p<0.001)	1.76 (1.71-1.82, p<0.001)
	2	8918 (10.1)	3.26 (3.14-3.38, p<0.001)	3.01 (2.89-3.14, p<0.001)
	3	929 (1.1)	5.46 (5.02-5.93, p<0.001)	4.87 (4.43-5.35, p<0.001)
Symptomatic at presentation	No symptoms	7441 (7.4)	•	•
	Symptoms	93781 (92.6)	1.75 (1.66-1.86, p<0.001)	•
Chronic cardiac disease	NO	65613 (67.9)	•	•
	YES	30995 (32.1)	1.86 (1.81-1.90, p<0.001)	1.15 (1.12-1.19, p<0.001)
Chronic kidney disease	NO	79587 (82.8)	•	•
	YES	16477 (17.2)	1.80 (1.75-1.85, p<0.001)	1.24 (1.20-1.28, p<0.001)
Moderate or severe liver disease	NO	93313 (98.0)	•	•
	YES	1859 (2.0)	1.31 (1.21-1.41, p<0.001)	1.39 (1.26-1.53, p<0.001)
Chronic neurological disorder	NO	83701 (87.5)	•	•
	YES	11911 (12.5)	1.40 (1.35-1.45, p<0.001)	•
Malignant neoplasm	NO	85707 (89.8)	•	•
	YES	9708 (10.2)	1.72 (1.66-1.78, p<0.001)	1.37 (1.32-1.43, p<0.001)
Chronic hematologic disease	NO	91225 (95.7)	•	•
	YES	4076 (4.3)	1.38 (1.31-1.46, p<0.001)	•
Obesity (as defined by clinical staff)	NO	75350 (87.7)	•	•
	YES	10590 (12.3)	0.83 (0.79-0.86, p<0.001)	1.14 (1.08-1.19, p<0.001)
Diabetes without complications	NO	77772 (84.5)	•	•
	YES	14235 (15.5)	1.27 (1.23-1.31, p<0.001)	•
Rheumatologic disorder	NO	83883 (88.2)	•	•
	YES	11242 (11.8)	1.18 (1.14-1.23, p<0.001)	•

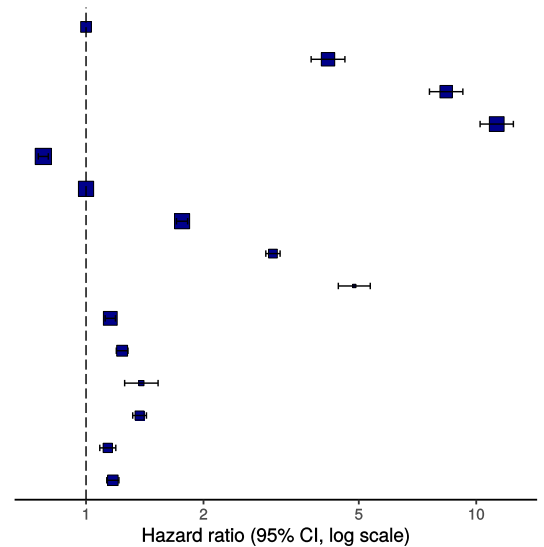
Dependent: Surv(time, status)		all	HR (univariable)	HR (multivariable)
Dementia	NO	80875 (84.5)	•	•
	YES	14850 (15.5)	2.07 (2.01-2.13, p<0.001)	1.17 (1.13-1.21, p<0.001)
Malnutrition	NO	87024 (97.4)	•	•
	YES	2366 (2.6)	1.48 (1.38-1.58, p<0.001)	•
smoking_mhyn_2levels	NO	54464 (55.3)	•	•
	YES	5483 (5.6)	0.87 (0.82-0.92, p<0.001)	•
	N/K	38541 (39.1)	1.19 (1.16-1.22, p<0.001)	•

Number in dataframe = 105371, Number in model = 72346, Missing = 33025, Number of events = 19204, Concordance = 0.727 (SE = 0.002), R-squared = 0.159 (Max possible = 0.997), Likelihood ratio test = 12498.432 (df = 13, p = 0.000)

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

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

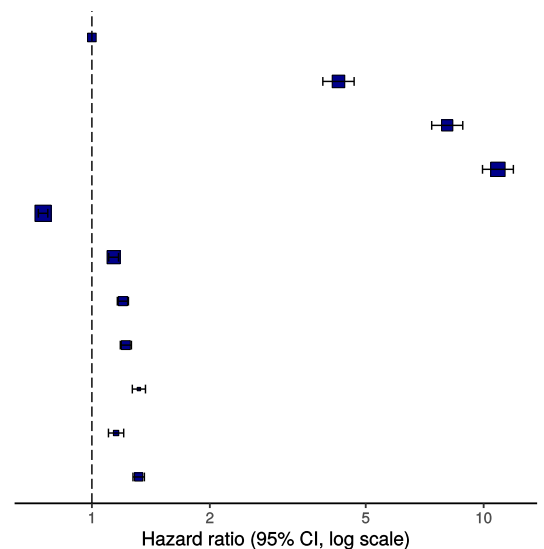
Age on admission (years)	<50	-
	50-69	4.17 (3.77-4.61, p<0.001)
	70-79	8.37 (7.59-9.24, p<0.001)
	80+	11.28 (10.23-12.45, p<0.001)
Sex at Birth	Female	0.78 (0.75-0.80, p<0.001)
qSOFA score on admission	0	-
	1	1.76 (1.71-1.82, p<0.001)
	2	3.01 (2.89-3.14, p<0.001)
	3	4.87 (4.43-5.35, p<0.001)
Chronic cardiac disease	YES	1.15 (1.12-1.19, p<0.001)
Chronic kidney disease	YES	1.24 (1.20-1.28, p<0.001)
Moderate or severe liver disease	YES	1.39 (1.26-1.53, p<0.001)
Malignant neoplasm	YES	1.37 (1.32-1.43, p<0.001)
Obesity (as defined by clinical staff)	YES	1.14 (1.08-1.19, 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	4.26 (3.89-4.67, p<0.001)
	70-79	8.07 (7.37-8.84, p<0.001)
	80+	10.88 (9.93-11.91, p<0.001)
Sex at Birth	Female	0.75 (0.73-0.77, p<0.001)
Chronic cardiac disease	YES	1.14 (1.10-1.17, p<0.001)
Chronic pulmonary disease (not asthma)	YES	1.20 (1.16-1.24, p<0.001)
Chronic kidney disease	YES	1.22 (1.18-1.26, p<0.001)
Malignant neoplasm	YES	1.32 (1.27-1.37, p<0.001)
Obesity (as defined by clinical staff)	YES	1.15 (1.10-1.21, p<0.001)
Dementia	YES	1.32 (1.27-1.36, p<0.001)



ROC = 0.7273082

**Figure 17 - Predictions calibration plot**



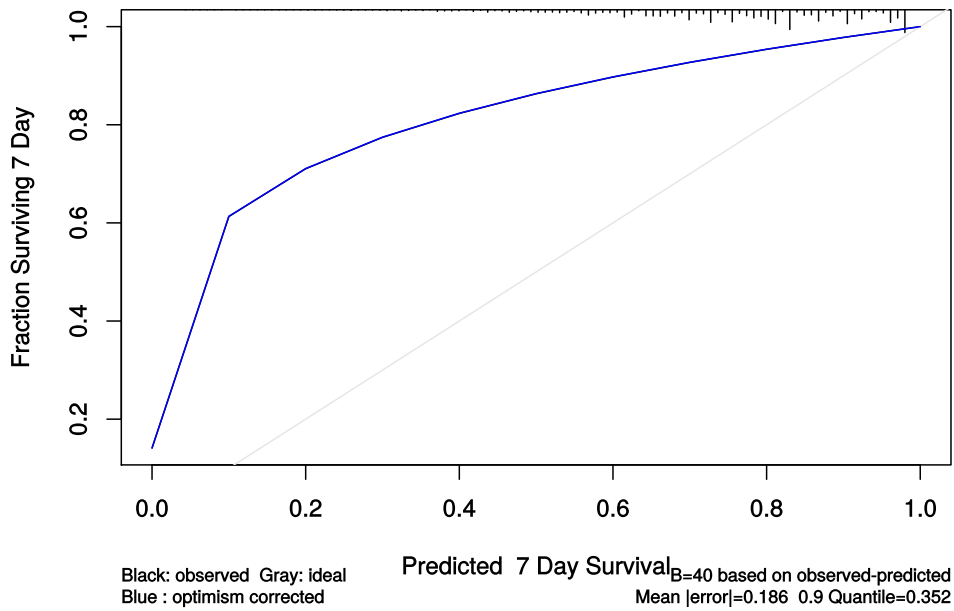


Figure 18 - Prognostic model predictions

Again, for demonstration of methods.

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

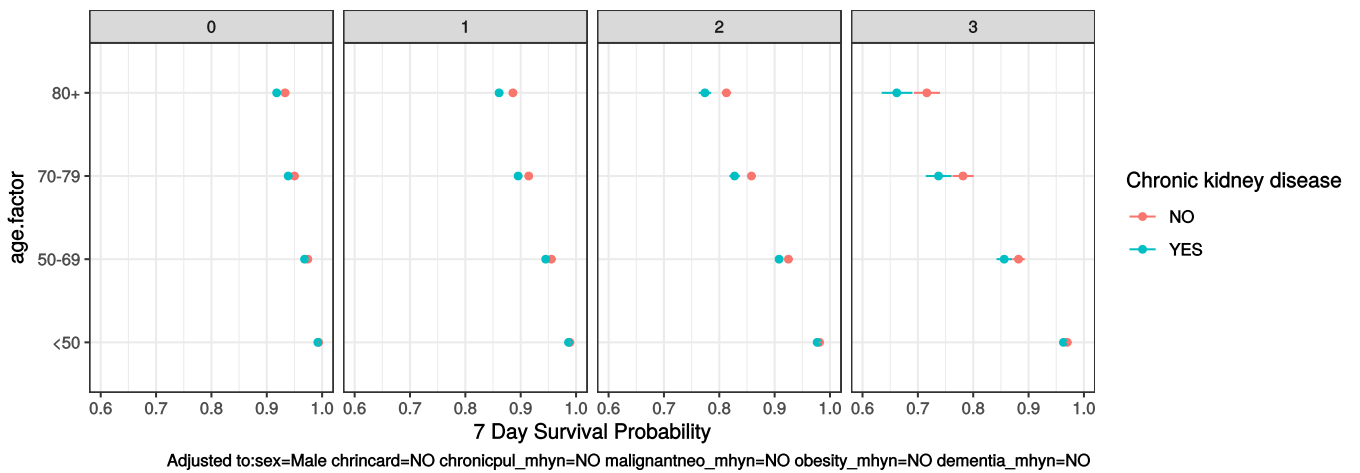


Figure 19 - Death by severity (NEWS) on admission

Number of deaths by NEWS score at admission

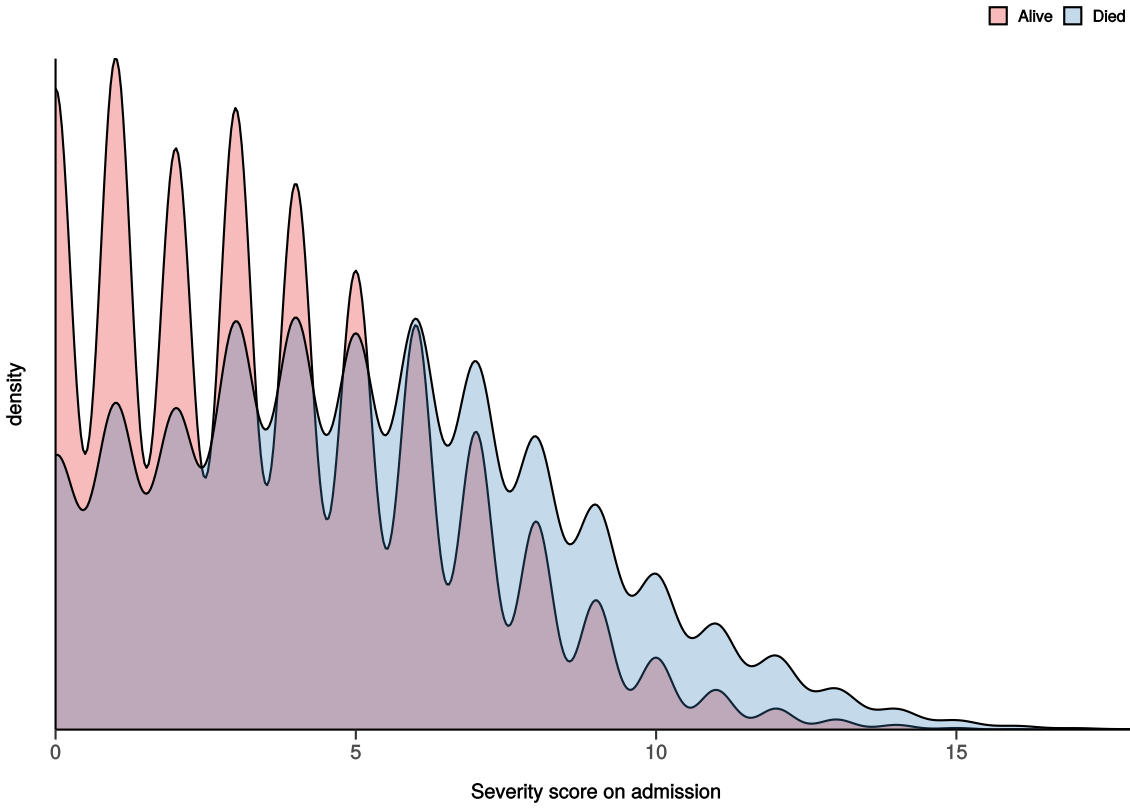


Figure 20 - Death by severity (NEWS) on admission stratified by age

Number of deaths by NEWS score at admission  
Stratified by age

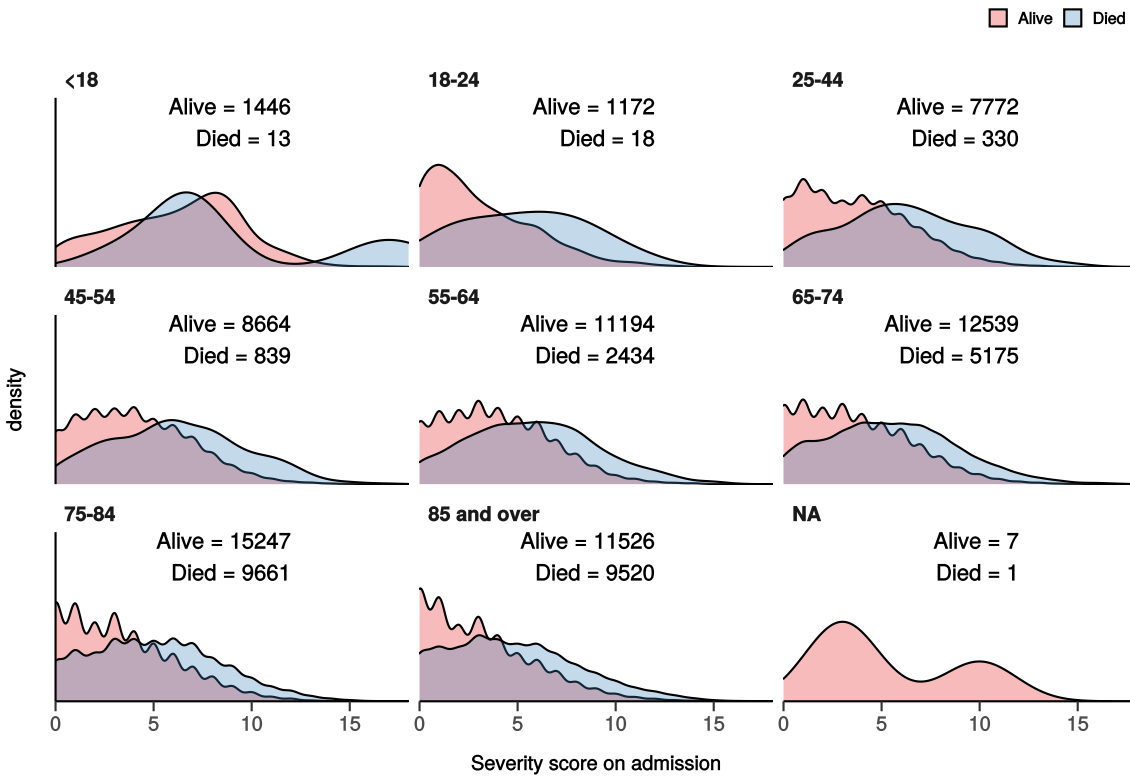
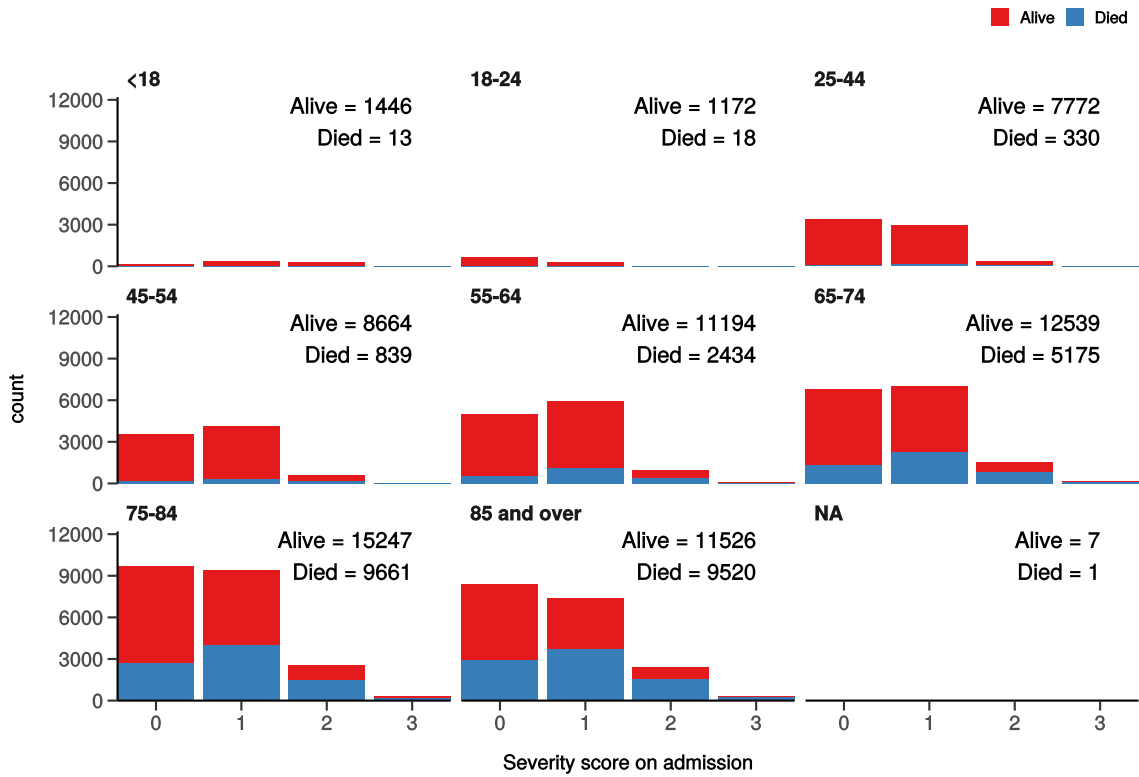


Figure 21 - Death by severity (qSOFA) on admission stratified by age

Number of deaths by qSOFA score at admission  
Stratified by age



## Healthcare workers

Employed as a healthcare worker?		NO	YES	p
Total N (%)		90802 (95.8)	4006 (4.2)	
NEWS score on admission	Median (IQR)	4.0 (4.0)	4.0 (4.0)	<0.001
Death	No	57456 (69.2)	3567 (92.8)	<0.001
	Yes	25535 (30.8)	276 (7.2)	