

# Dynamic CO-CIN report to SAGE and NERVTAG

## [OFFICIAL-SENSITIVE PROTECT]

Dynamic content updated: 2020-04-01 22:59:06.

### Executive summary

The COVID-19 Clinical Information Network (CO-CIN) collated clinical information from the usual health care records of people of all ages admitted to hospital in the UK.

Up to 10th March people with positive swabs were admitted to hospital as part of the containment strategy. Since 10th March, admission is mostly based upon need for treatment of COVID-19 disease. The great majority of cases in the community do not require hospital admission.

In total up until 01 April 2020, CO-CIN has recruited **4639 patients** with confirmed Coronavirus (Figure 1).

While The CO-CIN dataset represents NA% (4639/deaths As of 9am on 1 April 2020, 152,979 people have been tested, of which 29,474) of cases of confirmed Coronavirus cases in the UK per the PHE daily reports (last updated 9am on 1 April 2020).

Patient data is collected and uploaded from start of admission, however a complete patient data set is not available until the episode of care is complete. This causes a predictable lag in available data influenced by the duration of admission which is greatest for the sickest patients.

The geographical location of our patients can be seen in Figure 2, of these 292 had travelled abroad recently, and 663 reported visiting or working in a hospital where COVID-19 cases are being managed.

The median age is 72 (range: 0-167), Male/Female 2073/1308.

The most common symptoms were cough (73%), fever (69%) and shortness of breath (61%) (Figure 3A). 144/3012 (5%) of patients have reported no symptoms. Comorbidity can be seen in Figure 3B. The most common comorbidities were chronic cardiac disease (29%), diabetes (without complications) (20%) and chronic pulmonary disease (19%). 713/3062 (23%) of patients have reported no co morbidity. 15/231 (6%) of women were recorded as being pregnant.

For patients not already in hospital, the median time from onset of symptoms to presentation at hospital was 4 days (range: 0 - 189 days).

The median length of hospital stay was 5 days (range: 1-163, n = 981).

193/1621 (12%) patients required high-flow oxygen after day 1 of treatment.

Currently 424 patient(s) have died and 539 required ICU. 660 have been discharged home.

Interpretation: The dataset is increasingly more representative of the burden of disease requiring hospitalisation and captures the early exponential rise of disease incidence that is now increasingly driven by domestic transmission events in the community.

Furthermore, we can now see 'hot spots' of disease incidence that largely reflect areas of high population density (most notably London) with a few exceptions to this. There are more men than women, consistent with reports from other countries. The proportion of pregnant women affected is broadly in line with the proportion of pregnant women in the general population.

The commonest comorbidity is chronic cardiac disease, reflecting patterns seen in other countries, although nearly a quarter of patients admitted do not have underlying comorbid disease.

Patients documented as being admitted to ICU are mainly 50-75 years old. When interpreting admission to ICU it is important to remember that we are currently unable to capture treatment limiting decisions regarding level of care.

Prof Calum Semple, Professor in Child Health and Outbreak Medicine, University of Liverpool.

Dr Annemarie Docherty, Academic Consultant Intensive Care University of Edinburgh.

Dr Chris Green, Academic Consultant Infectious Disease University of Birmingham.

Prof Ewen Harrison, Director Centre for Medical Informatics, Usher Institute, University of Edinburgh (analysis).

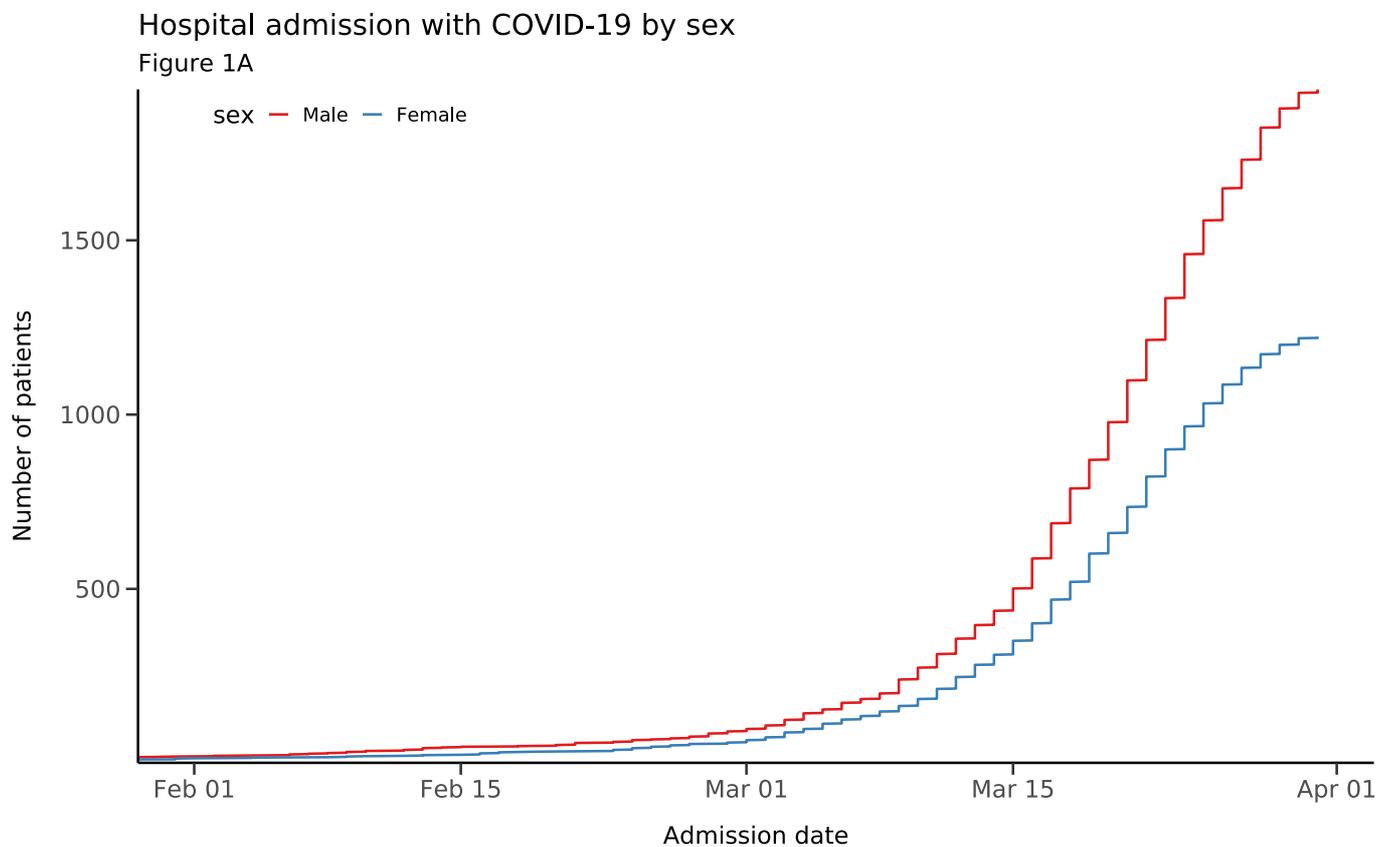
Professor Tom Solomon, Director HPRU Emerging and Zoonotic Infection.

ISARIC Investigators (Prof. Peter Horby, Prof. Peter Openshaw, Dr Gail Carson, and Dr Kenneth Baillie).

Analytics: Lisa Norman, Riinu Pius, Thomas Drake, Cameron Fairfield, Stephen Knight, Kenneth McLean, Katie Shaw.

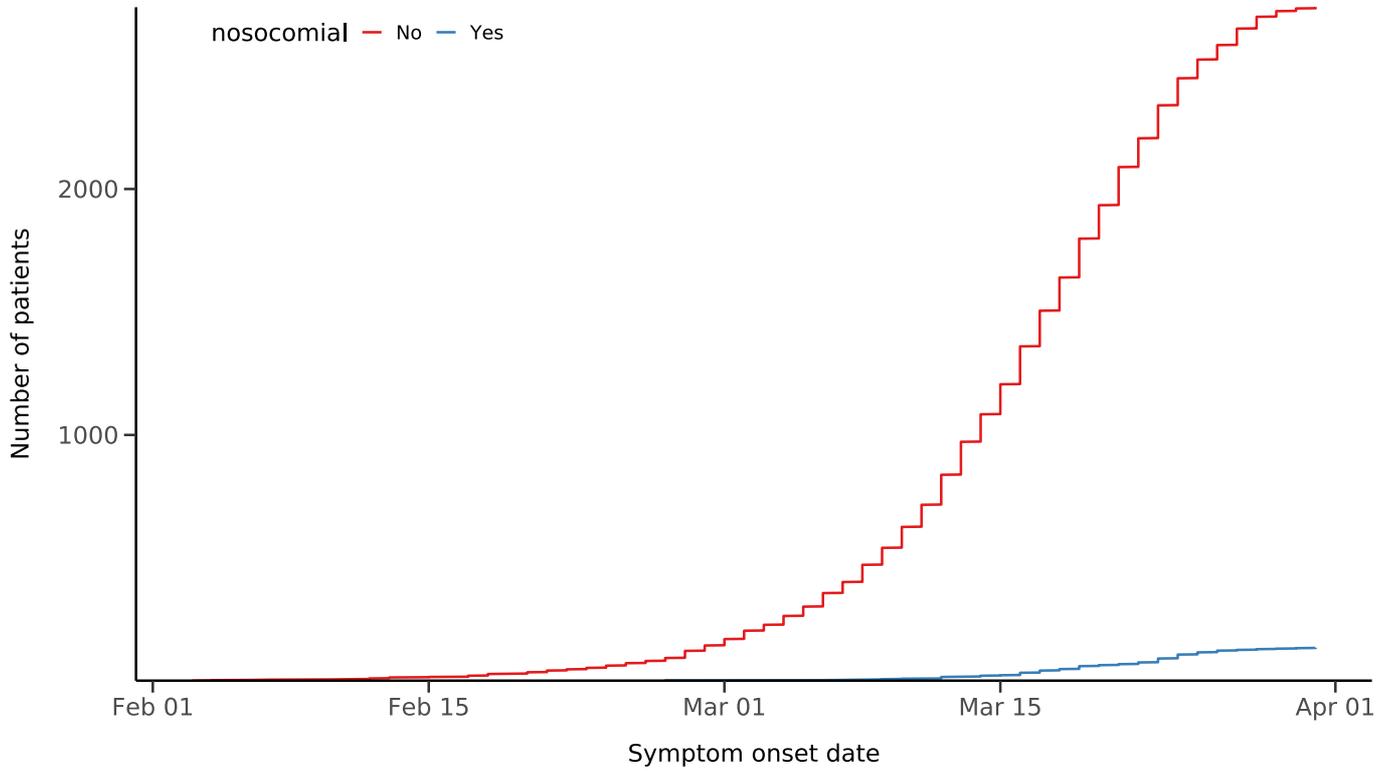
# Admission

Figure 1



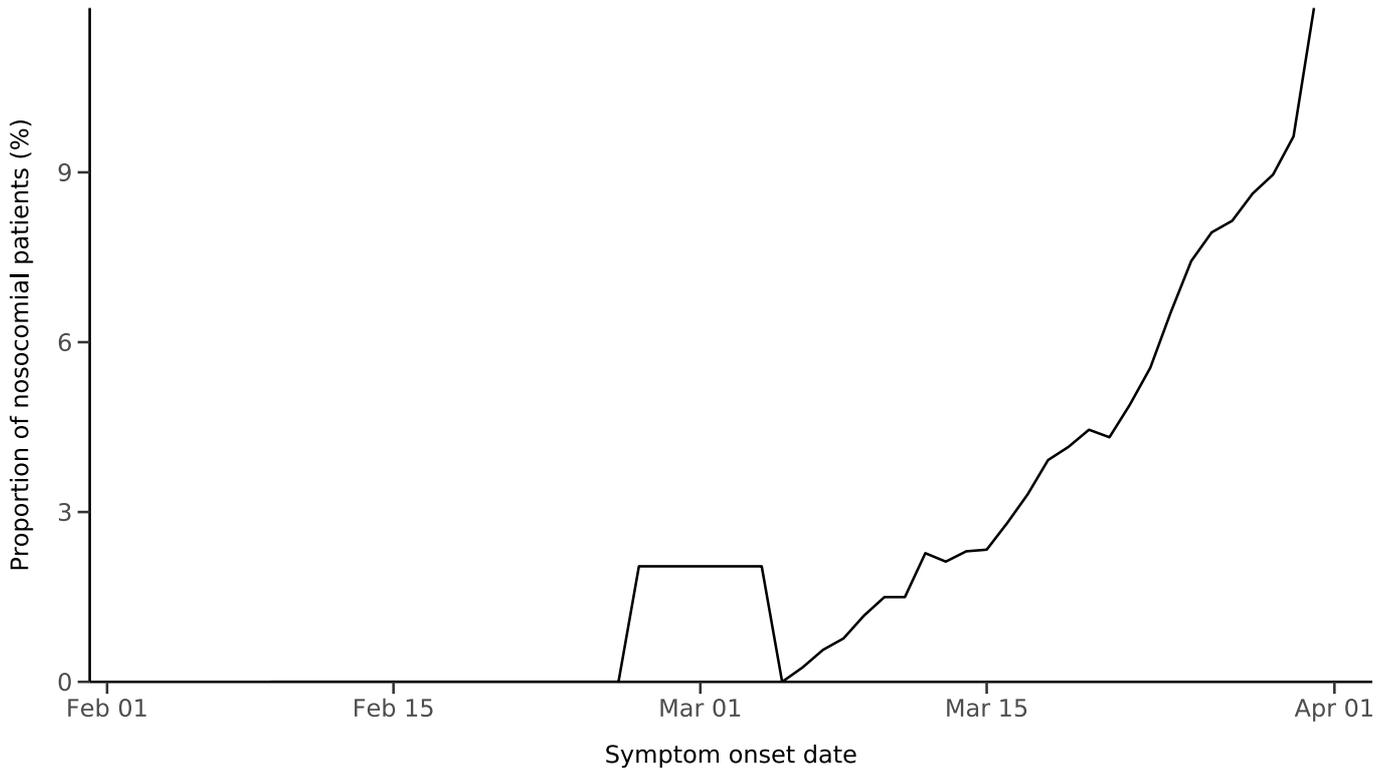
### Nosocomial: symptom onset $\geq 14$ days post admission

Figure 1B



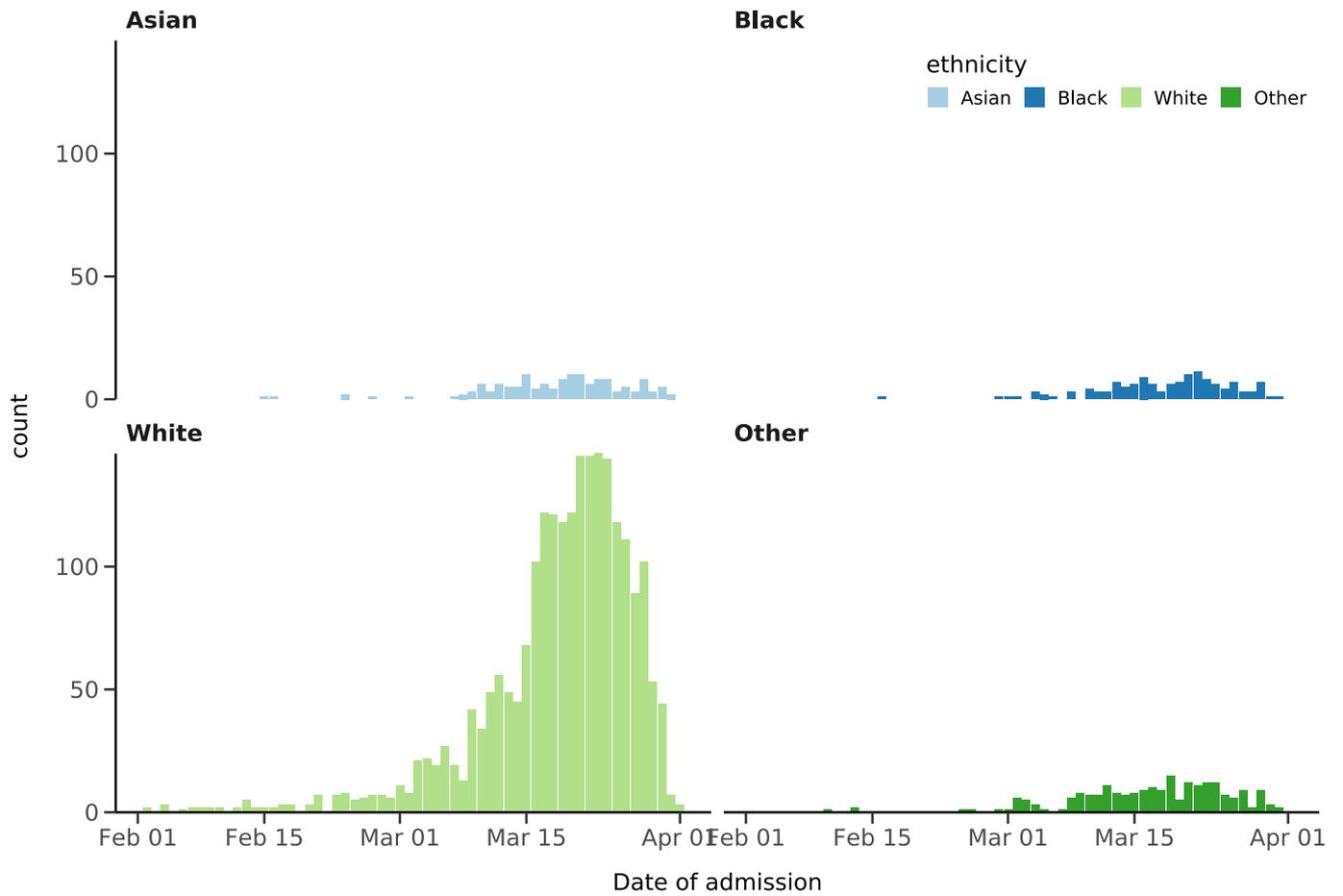
### Proportion with symptom onset $\geq 14$ days after admission

Figure 1C - 7-day rolling percentage



## Hospital admission with COVID-19 by ethnicity

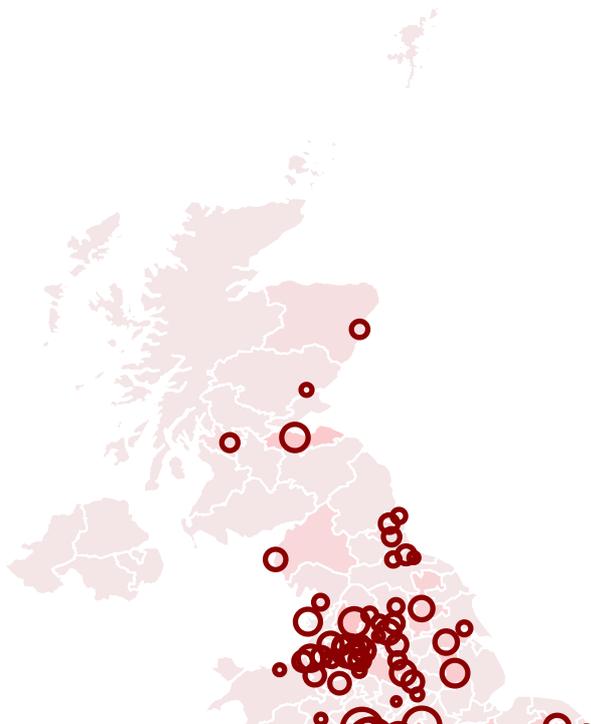
Figure 1D



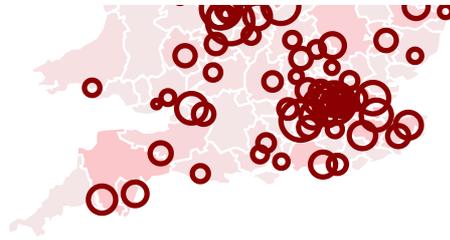
## Location by CCG / Healthboard

Figure 2

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



n = 3882

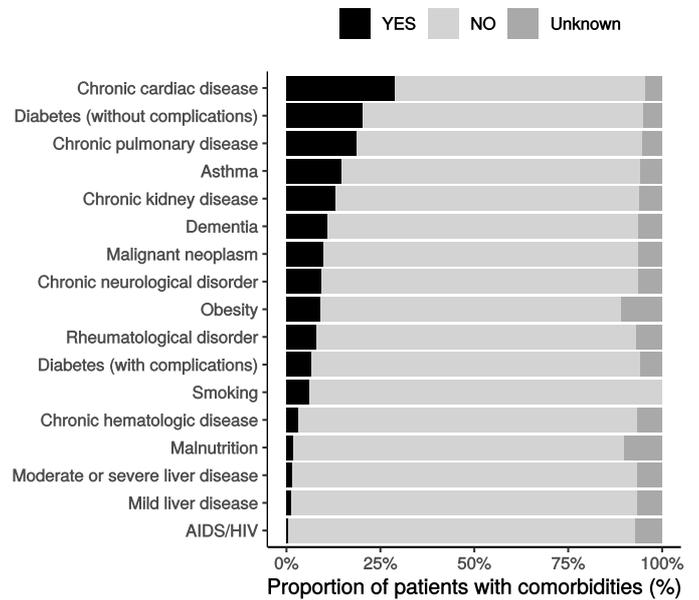
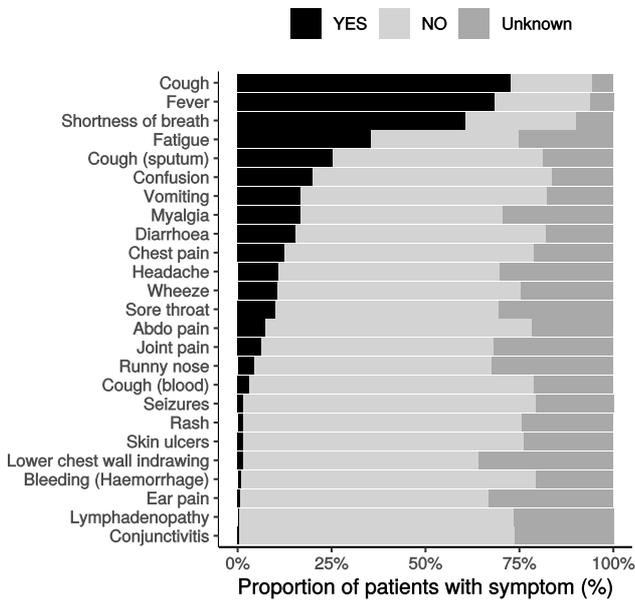


# Symptoms and comorbidity

Figure 3

Symptoms on presentation to hospital (% patients, n = 2958)  
Figure 3A

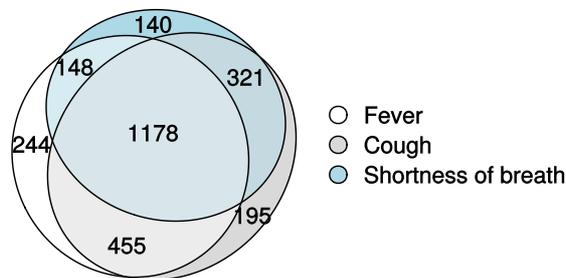
Comorbidity (% patients, n = 3005)  
Figure 3B



## Symptoms (diagnostic criteria)

Figure 4A

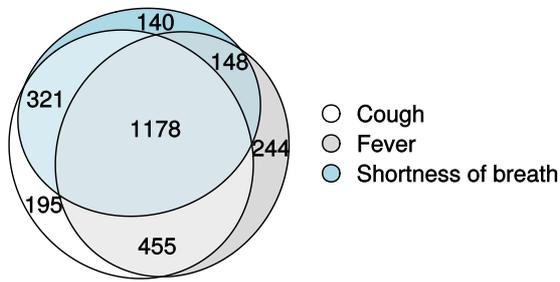
n = 2958



## Symptoms (most common)

Figure 4B

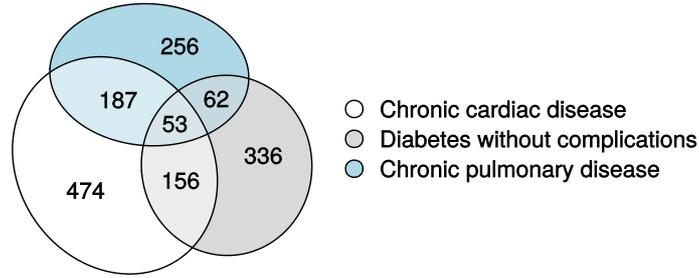
n = 2958



## Comorbidity (most common)

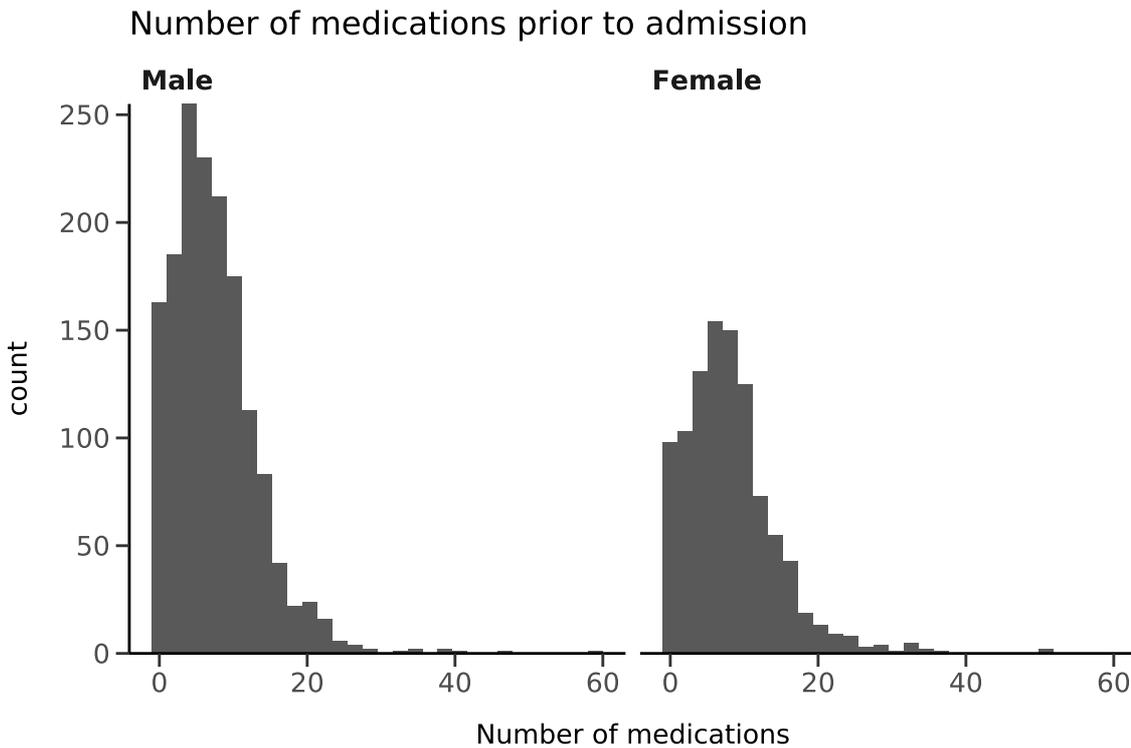
Figure 4C

n = 3005



## Medication prior to illness

Figure 5

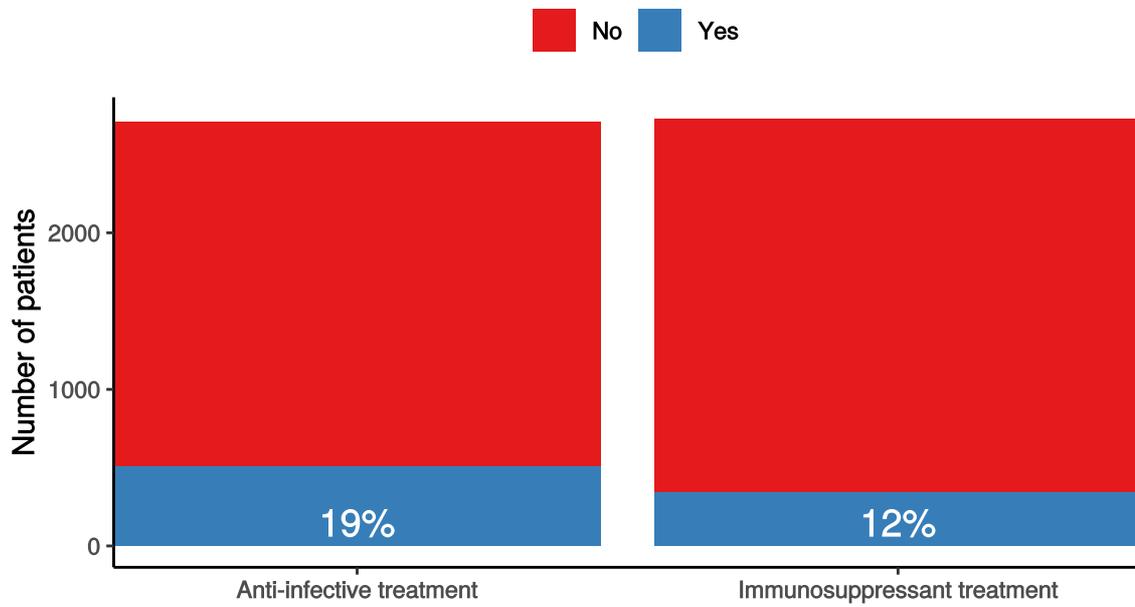


## Preadmission treatment

Figure 6

## Pre-admission treatment

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

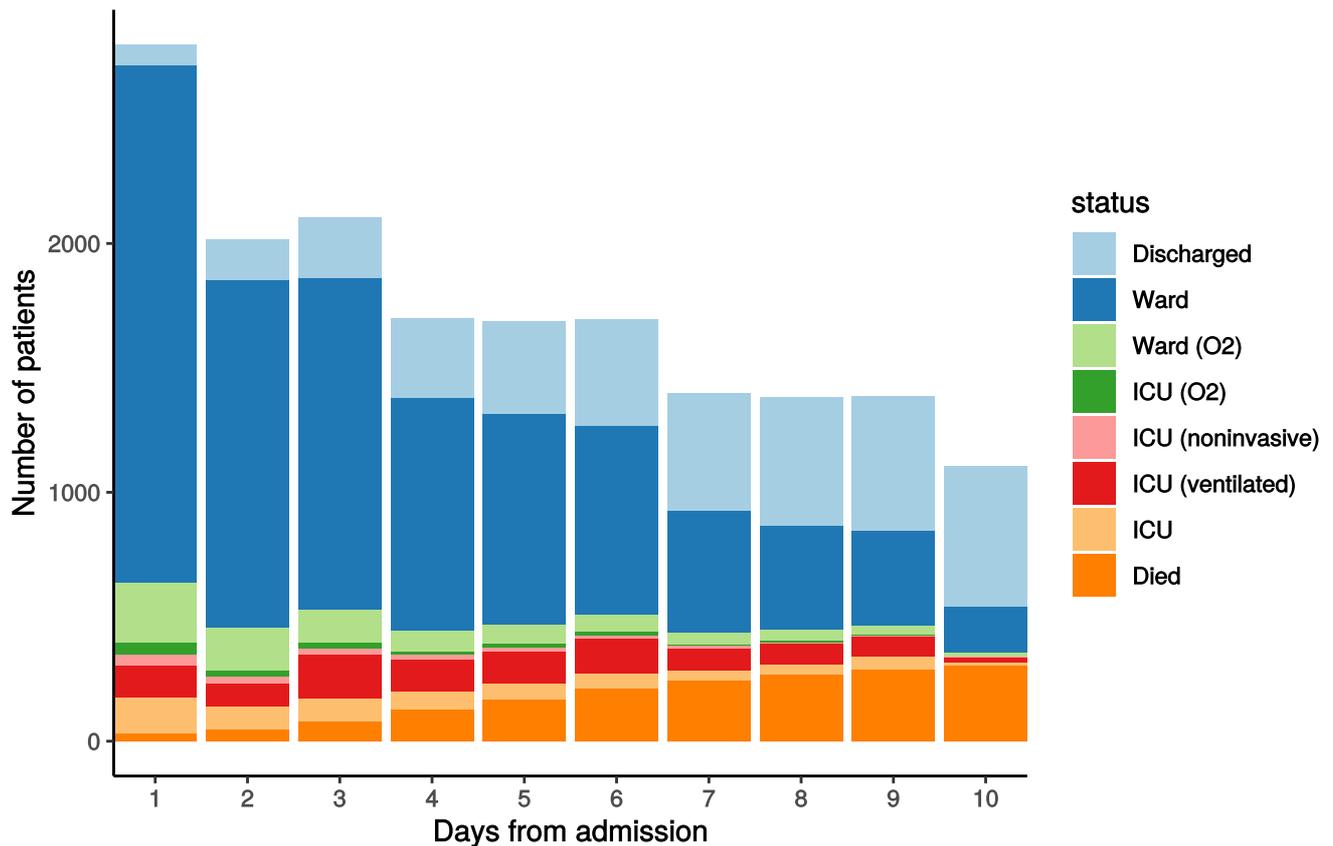


## Patient flow

Figure 7

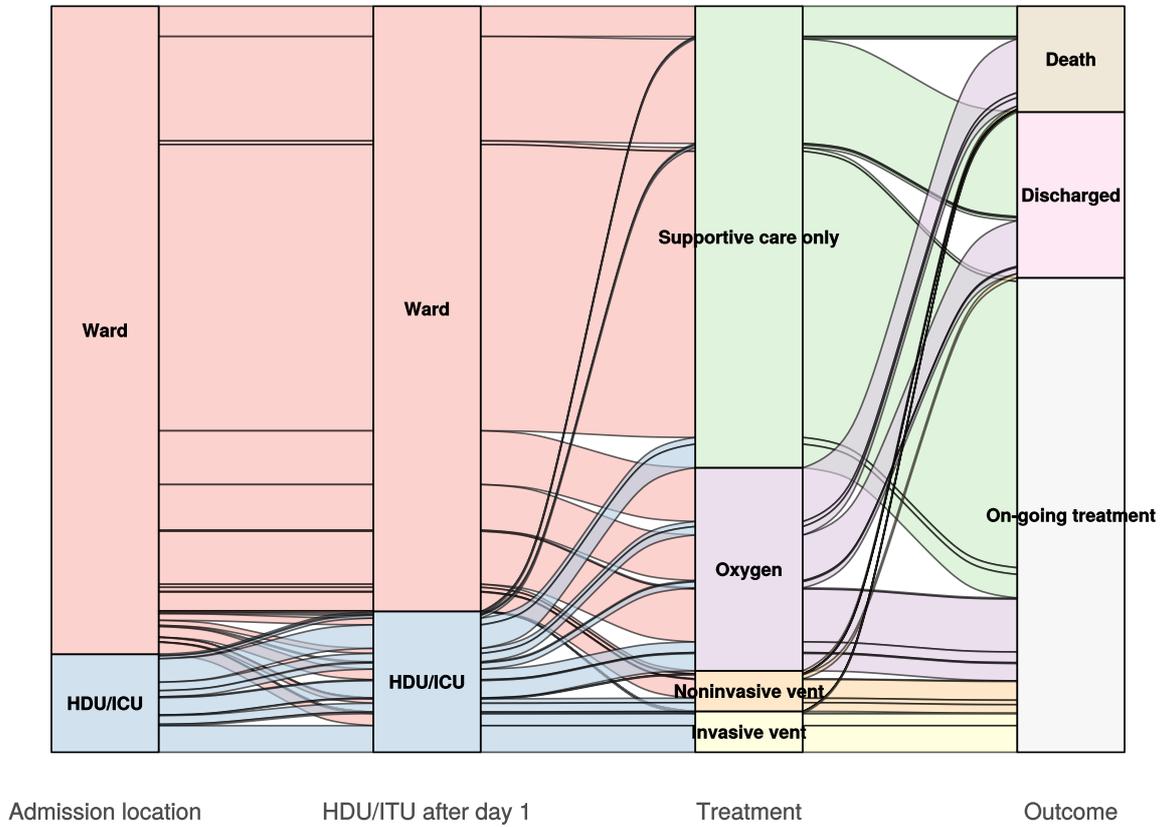
### Patient status by day

Cumulative for discharge/death



## Oxygen requirement

Figure 8

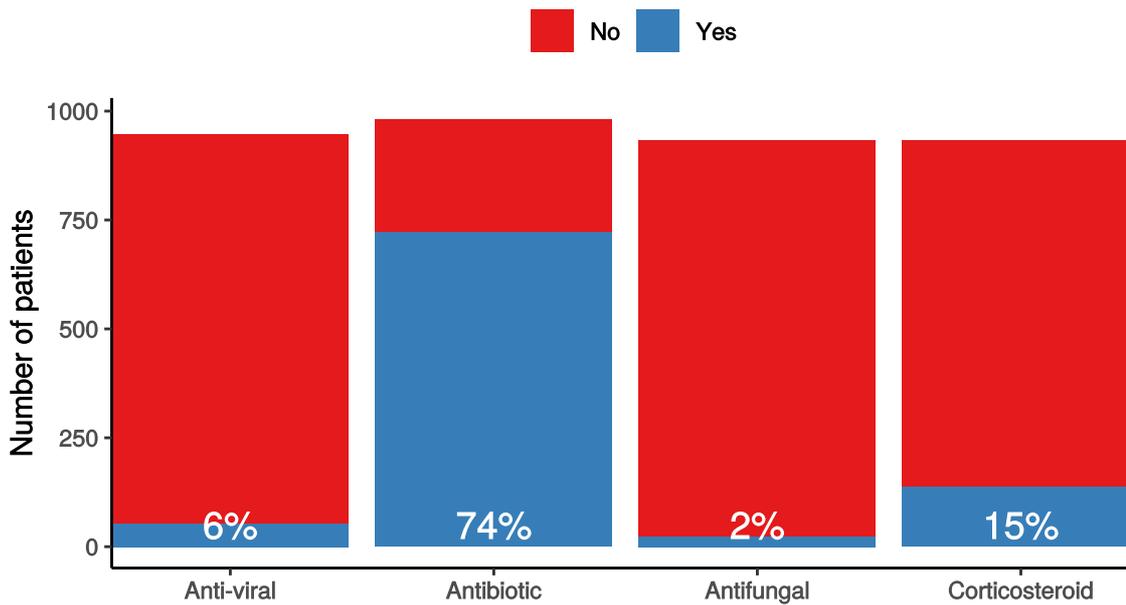


## In-hospital treatment

Figure 9

### In-hospital treatment

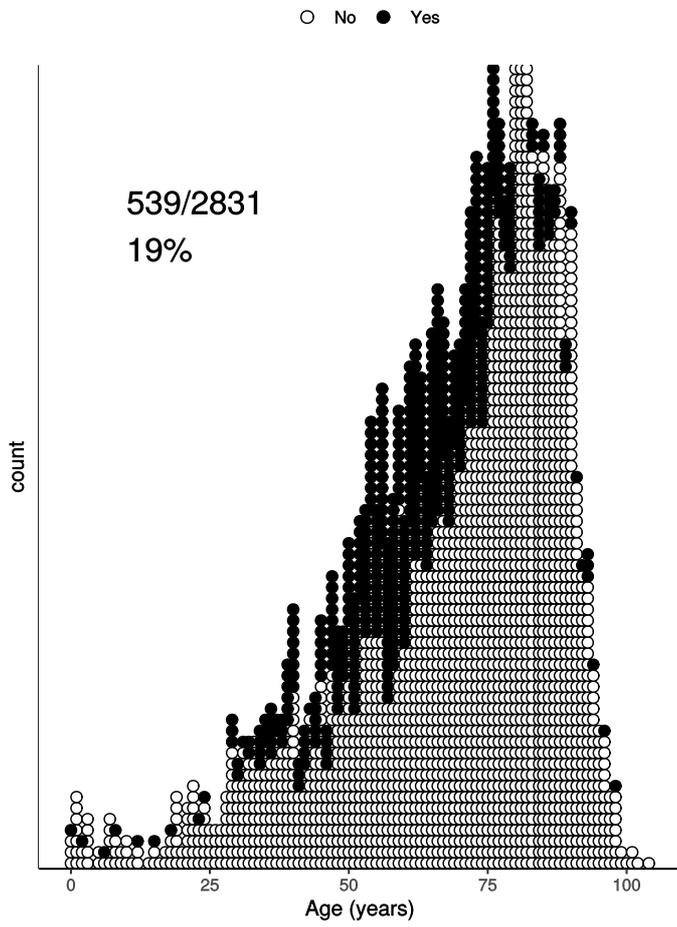
Anti-virals, antibiotics, corticosteroids, and anti-fungals for patients who have coi



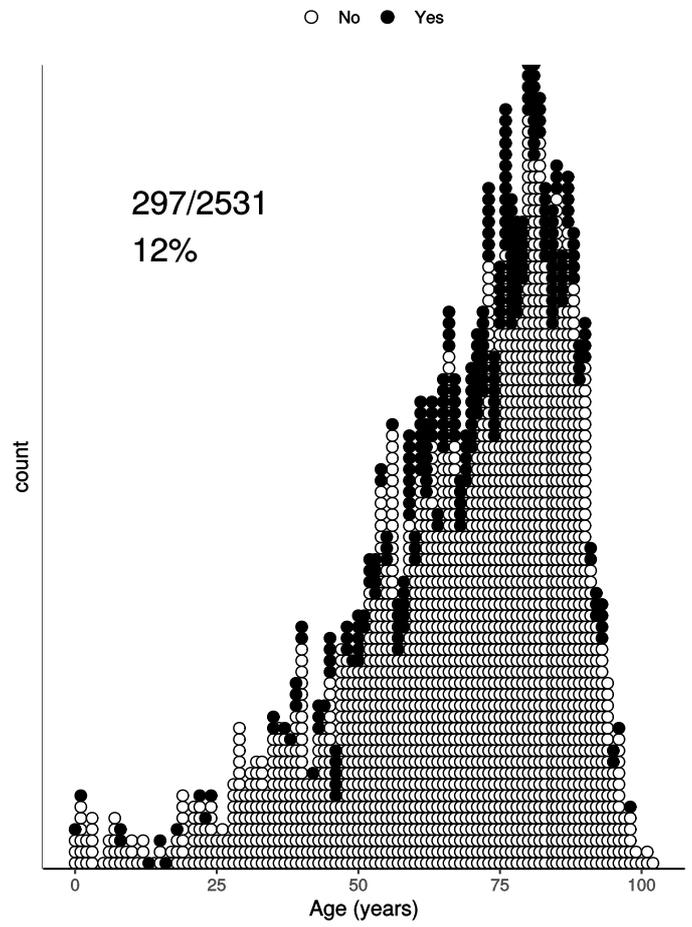
## Outcomes

Figure 10

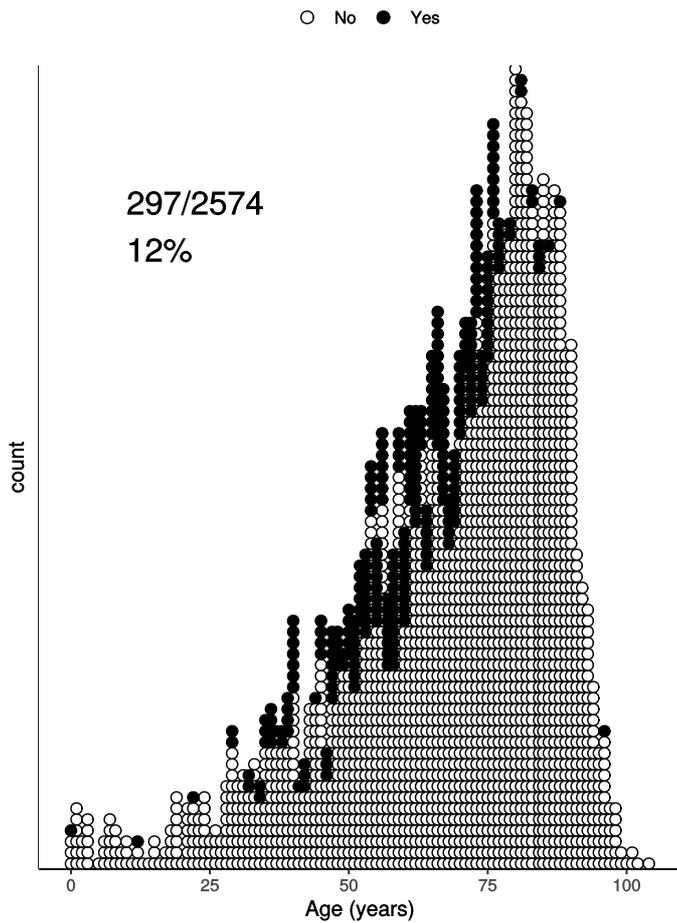
ICU/HDU admission  
Figure 10A



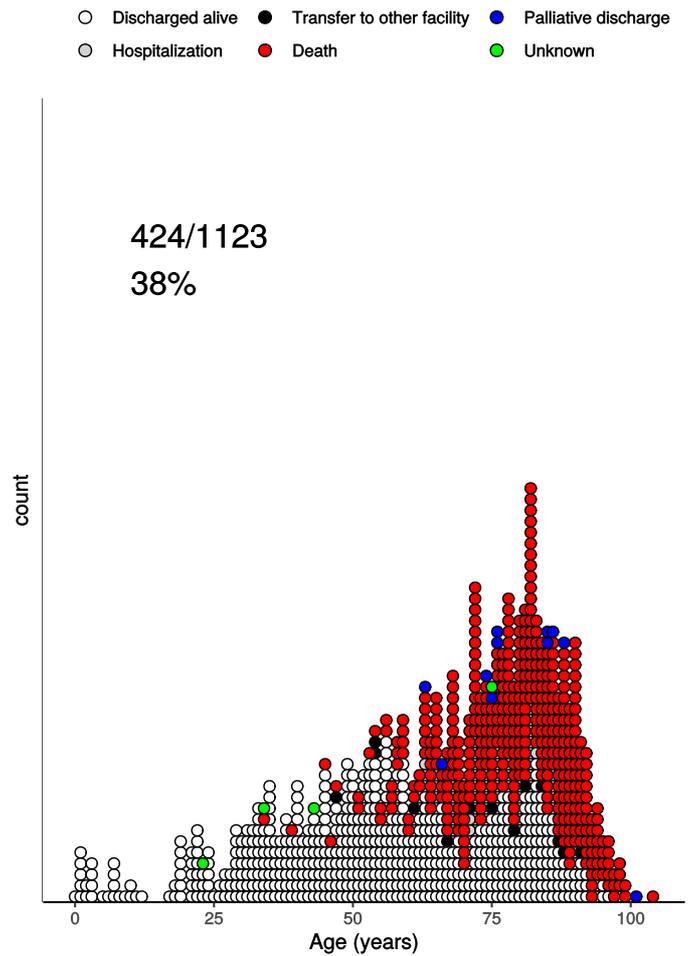
Noninvasive ventilation  
Figure 10B



Invasive ventilation  
Figure 10C



Death (all patients)  
Figure 10D



# Predictors of death

## Multivariable model

Dependent: death		No	Yes	OR (univariable)	OR (multivariable)
Age on admission (years)	Mean (SD)	57.1 (21.5)	79.1 (11.0)	1.08 (1.07-1.10, p<0.001)	1.08 (1.07-1.10, p<0.001)
Sex at Birth	Male	393 (59.1)	272 (40.9)	•	•
	Female	277 (63.5)	159 (36.5)	0.83 (0.65-1.06, p=0.141)	0.75 (0.53-1.07, p=0.111)
Asthma	NO	517 (60.5)	338 (39.5)	•	•
	YES	108 (66.7)	54 (33.3)	0.76 (0.53-1.09, p=0.138)	0.91 (0.56-1.47, p=0.689)
Chronic cardiac disease	NO	509 (70.6)	212 (29.4)	•	•
	YES	116 (38.5)	185 (61.5)	3.83 (2.89-5.09, p<0.001)	1.47 (1.02-2.11, p=0.038)
Chronic pulmonary disease	NO	550 (65.7)	287 (34.3)	•	•
	YES	74 (40.0)	111 (60.0)	2.87 (2.08-4.00, p<0.001)	1.97 (1.31-2.99, p=0.001)
Chronic neurological disorder	NO	575 (62.8)	340 (37.2)	•	•
	YES	37 (42.0)	51 (58.0)	2.33 (1.50-3.66, p<0.001)	2.30 (1.30-4.15, p=0.005)
Obesity	NO	535 (62.6)	320 (37.4)	•	•
	YES	44 (53.7)	38 (46.3)	1.44 (0.91-2.28, p=0.114)	2.23 (1.25-4.00, p=0.007)

Number in dataframe = 3392, Number in model = 878, Missing = 2514, AIC = 849.6, C-statistic = 0.833, H&L = Chi-sq(8) 22.88 (p=0.004)

**Figure 11 - Adjusted odds ratio plot**

### Death

Age on admission (years)	-	1.08 (1.07-1.10, p<0.001)
Sex at Birth	Female	0.75 (0.53-1.07, p=0.111)
Asthma	YES	0.91 (0.56-1.47, p=0.689)
Chronic cardiac disease	YES	1.47 (1.02-2.11, p=0.038)
Chronic pulmonary disease	YES	1.97 (1.31-2.99, p=0.001)
Chronic neurological disorder	YES	2.30 (1.30-4.15, p=0.005)
Obesity	YES	2.23 (1.25-4.00, p=0.007)

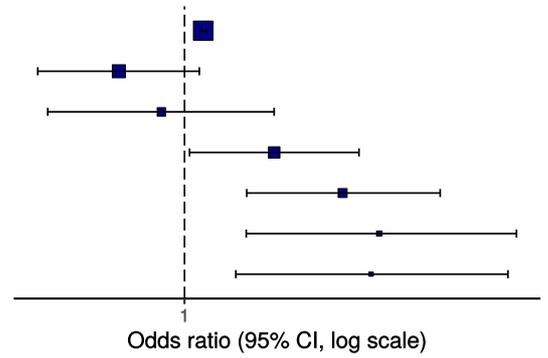


Figure 12 - ROC

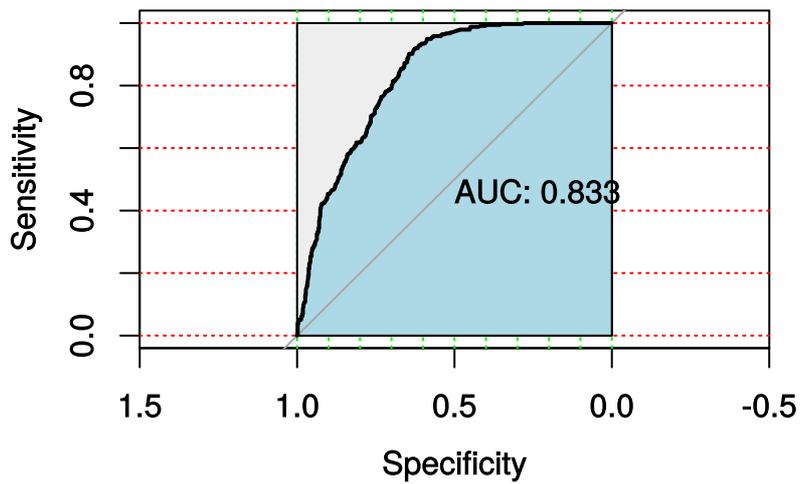


Figure 13 - Death by severity on admission

# Number of deaths by NEWS score at admission

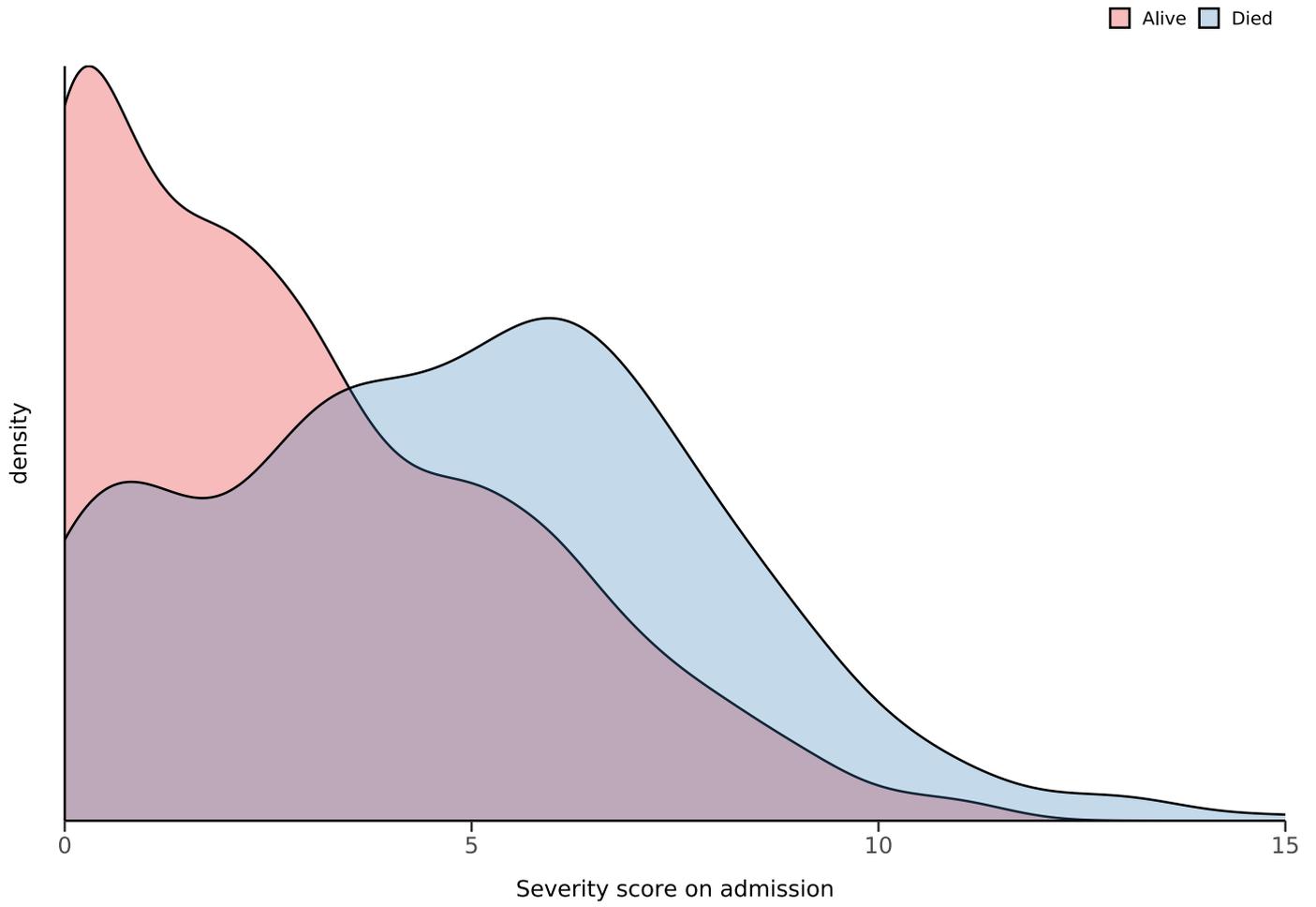
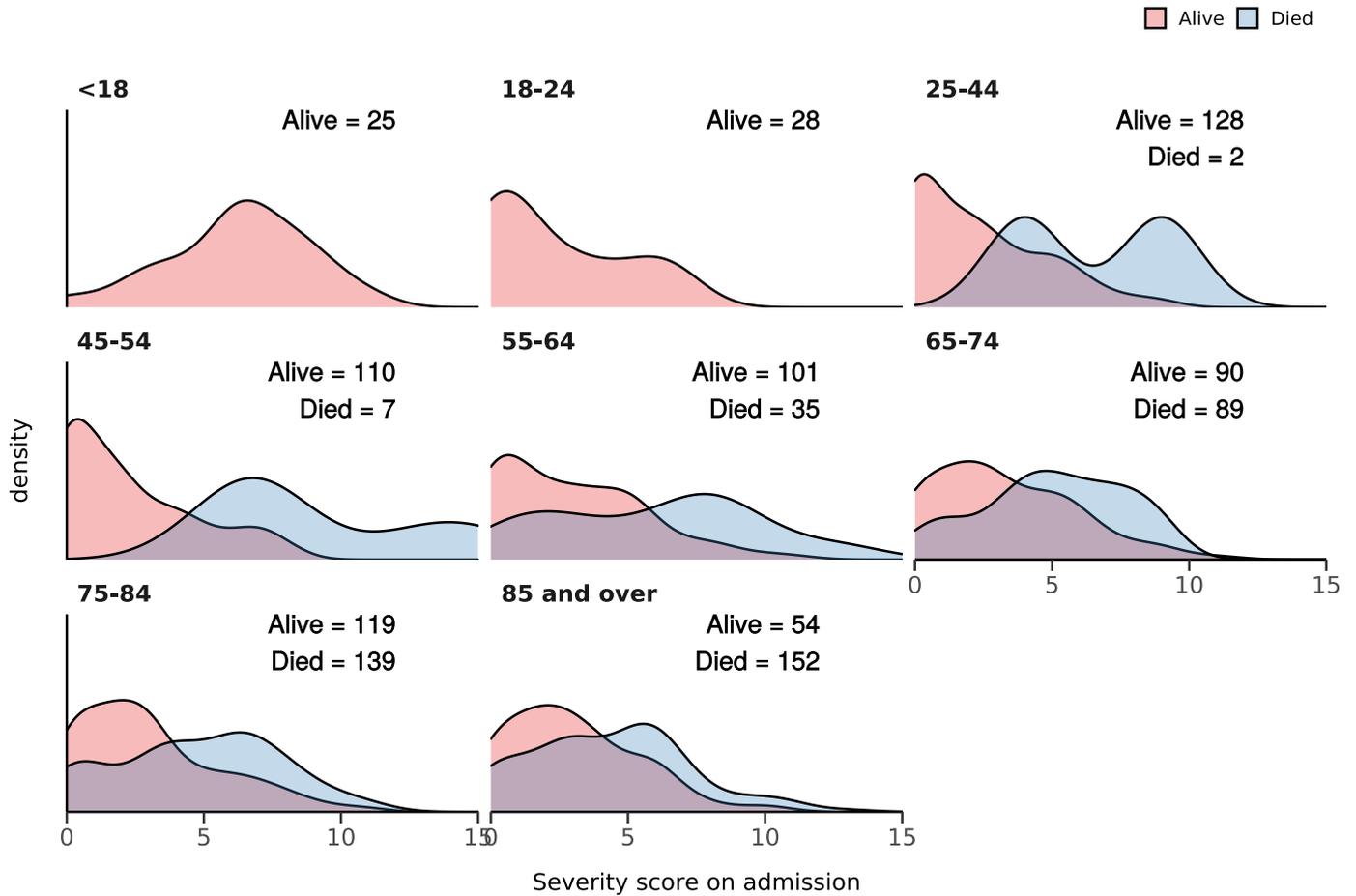


Figure 14 - Death by severity on admission stratified by age

## Number of deaths by NEWS score at admission Stratified by age

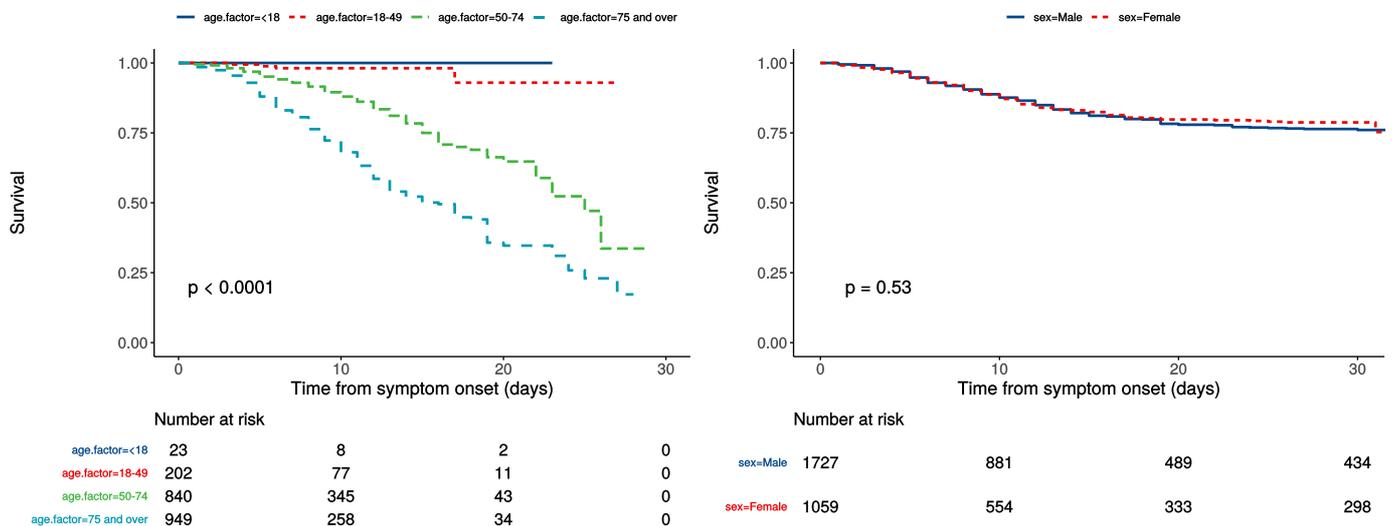


## Survival

### Kaplan-Meier plots for survival stratified by age (left) and sex (right)

Figure 15

P-value is log-rank test.



## Healthcare workers

Healthcare worker		NO	YES	p
Total N (%)		2841 (96.4)	106 (3.6)	
NEWS score on admission	Median (IQR)	3.0 (5.0)	3.0 (5.0)	0.013
Death	No	543 (57.4)	39 (97.5)	<0.001
	Yes	403 (42.6)	1 (2.5)	

## Admission (detail)

Table 1

label	levels	all
Total N (%)		4653 (100.0)
Age on admission (years)	Mean (SD)	67.8 (18.9)
Sex at Birth	Male	2083 (44.8)
	Female	1309 (28.1)
	Not specified	6 (0.1)
	(Missing)	1255 (27.0)
Healthcare worker	YES	106 (2.3)
	NO	2841 (61.1)
	N/A	254 (5.5)
	(Missing)	1452 (31.2)
Microbiology lab worker	YES	7 (0.2)
	NO	2938 (63.1)
	N/A	258 (5.5)
	(Missing)	1450 (31.2)
Onset to admission (days)	Mean (SD)	2.8 (14.5)
Transfer from other facility	Yes-facility is a study site	54 (1.2)
	Yes-facility is not a study site	176 (3.8)
	No	2874 (61.8)

<b>label</b>	<b>levels</b>	<b>all</b>
	N/A	49 (1.1)
	(Missing)	1500 (32.2)
Travel in 14 d prior to symptoms	Yes	301 (6.5)
	No	2299 (49.4)
	N/A	358 (7.7)
	(Missing)	1695 (36.4)
Country	Austria	11 (0.2)
	Barbados	4 (0.1)
	Bulgaria	2 (0.0)
	China	2 (0.0)
	Cyprus	5 (0.1)
	Czechia	1 (0.0)
	Dominican Republic	1 (0.0)
	Egypt	2 (0.0)
	France	17 (0.4)
	Germany	6 (0.1)
	Ghana	1 (0.0)
	India	2 (0.0)
	Indonesia	1 (0.0)
	Iran	5 (0.1)
	Ireland	1 (0.0)
	Italy	65 (1.4)
	Japan	2 (0.0)
	Malaysia	2 (0.0)
	Morocco	1 (0.0)
	Netherlands	4 (0.1)
	New Zealand	1 (0.0)

<b>label</b>	<b>levels</b>	<b>all</b>
	Nigeria	1 (0.0)
	Norway	1 (0.0)
	Philippines	2 (0.0)
	Poland	2 (0.0)
	Portugal	7 (0.2)
	Romania	3 (0.1)
	Singapore	5 (0.1)
	South Africa	1 (0.0)
	Spain	55 (1.2)
	Switzerland	7 (0.2)
	Thailand	2 (0.0)
	Turkey	4 (0.1)
	United Arab Emirates	4 (0.1)
	United Kingdom	49 (1.1)
	Yemen	1 (0.0)
	(Missing)	4373 (94.0)
Country 2	Antigua and Barbuda	1 (0.0)
	Aruba	1 (0.0)
	Australia	2 (0.0)
	Austria	3 (0.1)
	Bulgaria	1 (0.0)
	Canada	1 (0.0)
	Czechia	1 (0.0)
	Egypt	1 (0.0)
	France	7 (0.2)
	Germany	1 (0.0)
	India	1 (0.0)

<b>label</b>	<b>levels</b>	<b>all</b>
	Italy	11 (0.2)
	Netherlands	1 (0.0)
	Portugal	1 (0.0)
	Qatar	1 (0.0)
	Spain	8 (0.2)
	Switzerland	1 (0.0)
	Turkey	3 (0.1)
	United Arab Emirates	1 (0.0)
	(Missing)	4606 (99.0)
Animal, raw meat, insect bites 14 d prior	Yes	24 (0.5)
	No	1189 (25.6)
	Unknown	1651 (35.5)
	N/A	142 (3.1)
	(Missing)	1647 (35.4)
Animal / insect	Bee Sting	1 (4.8)
	Bird (pet)	1 (4.8)
	Cat (pet)	1 (4.8)
	chicken & beef	1 (4.8)
	Chickens	1 (4.8)
	COWS	1 (4.8)
	cows, rabbits, pigs goats	1 (4.8)
	dog	1 (4.8)
	Dog	2 (9.5)
	Dog, domestic animla living in their home.	1 (4.8)
	Dogs at home	1 (4.8)
	Domestic pet dog	1 (4.8)
	Domestic animals living in home	1 (4.8)

label	levels	all
	domestic dog	1 (4.8)
	Domestic Pet	2 (9.5)
	Domestic pets	1 (4.8)
	pet dog	1 (4.8)
	Prepared raw chicken	1 (4.8)
	she has a cat	1 (4.8)

## Symptoms (detail)

Table 2

Stratified: all		all
Total N (%)		4653 (100.0)
Fever	YES	2037 (43.8)
	NO	747 (16.1)
	Unknown	184 (4.0)
	(Missing)	1685 (36.2)
Cough	YES	2161 (46.4)
	NO	648 (13.9)
	Unknown	164 (3.5)
	(Missing)	1680 (36.1)
Cough (sputum)	YES	741 (15.9)
	NO	1637 (35.2)
	Unknown	549 (11.8)
	(Missing)	1726 (37.1)
Cough (blood)	YES	94 (2.0)
	NO	2209 (47.5)
	Unknown	616 (13.2)

<b>Stratified: all</b>		<b>all</b>
	(Missing)	1734 (37.3)
Sore throat	YES	294 (6.3)
	NO	1726 (37.1)
	Unknown	886 (19.0)
	(Missing)	1747 (37.5)
Runny nose	YES	124 (2.7)
	NO	1839 (39.5)
	Unknown	942 (20.2)
	(Missing)	1748 (37.6)
Ear pain	YES	20 (0.4)
	NO	1917 (41.2)
	Unknown	966 (20.8)
	(Missing)	1750 (37.6)
Wheeze	YES	310 (6.7)
	NO	1878 (40.4)
	Unknown	717 (15.4)
	(Missing)	1748 (37.6)
Chest pain	YES	359 (7.7)
	NO	1939 (41.7)
	Unknown	619 (13.3)
	(Missing)	1736 (37.3)
Muscle ache	YES	489 (10.5)
	NO	1562 (33.6)
	Unknown	858 (18.4)
	(Missing)	1744 (37.5)
Joint pain	YES	183 (3.9)
	NO	1792 (38.5)

<b>Stratified: all</b>		<b>all</b>
	Unknown	925 (19.9)
	(Missing)	1753 (37.7)
Fatigue	YES	1031 (22.2)
	NO	1145 (24.6)
	Unknown	734 (15.8)
	(Missing)	1743 (37.5)
Shortness of breath	YES	1789 (38.4)
	NO	876 (18.8)
	Unknown	295 (6.3)
	(Missing)	1693 (36.4)
Lower chest wall indrawing	YES	42 (0.9)
	NO	1814 (39.0)
	Unknown	1045 (22.5)
	(Missing)	1752 (37.7)
Headache	YES	317 (6.8)
	NO	1704 (36.6)
	Unknown	879 (18.9)
	(Missing)	1753 (37.7)
Confusion	YES	584 (12.6)
	NO	1856 (39.9)
	Unknown	475 (10.2)
	(Missing)	1738 (37.4)
Seizures	YES	48 (1.0)
	NO	2256 (48.5)
	Unknown	605 (13.0)
	(Missing)	1744 (37.5)
Abdominal pain	YES	218 (4.7)

<b>Stratified: all</b>		<b>all</b>
	NO	2059 (44.3)
	Unknown	635 (13.6)
	(Missing)	1741 (37.4)
Nausea/vomiting	YES	490 (10.5)
	NO	1912 (41.1)
	Unknown	518 (11.1)
	(Missing)	1733 (37.2)
Diarrhoea	YES	444 (9.5)
	NO	1941 (41.7)
	Unknown	525 (11.3)
	(Missing)	1743 (37.5)
Conjunctivitis	YES	12 (0.3)
	NO	2123 (45.6)
	Unknown	766 (16.5)
	(Missing)	1752 (37.7)
Skin rash	YES	46 (1.0)
	NO	2148 (46.2)
	Unknown	710 (15.3)
	(Missing)	1749 (37.6)
Skin ulcers	YES	43 (0.9)
	NO	2167 (46.6)
	Unknown	696 (15.0)
	(Missing)	1747 (37.5)
Lymphadenopathy	YES	15 (0.3)
	NO	2111 (45.4)
	Unknown	773 (16.6)
	(Missing)	1754 (37.7)

<b>Stratified: all</b>		<b>all</b>
Bleeding (Haemorrhage)	YES	24 (0.5)
	NO	2278 (49.0)
	Unknown	598 (12.9)
	(Missing)	1753 (37.7)
If Bleeding (others)	YES	49 (1.1)
	NO	2198 (47.2)
	Unknown	634 (13.6)
	(Missing)	1772 (38.1)

## Comorbidity (detail)

Table 3

<b>Stratified: all</b>		<b>all</b>
Total N (%)		4653 (100.0)
Chronic cardiac disease	YES	871 (18.7)
	NO	2007 (43.1)
	Unknown	137 (2.9)
	(Missing)	1638 (35.2)
Chronic pulmonary disease	YES	558 (12.0)
	NO	2303 (49.5)
	Unknown	155 (3.3)
	(Missing)	1637 (35.2)
Asthma	YES	437 (9.4)
	NO	2401 (51.6)
	Unknown	173 (3.7)
	(Missing)	1642 (35.3)
Chronic kidney disease	YES	395 (8.5)

<b>Stratified: all</b>		<b>all</b>
	NO	2432 (52.3)
	Unknown	180 (3.9)
	(Missing)	1646 (35.4)
Moderate/severe liver disease	YES	44 (0.9)
	NO	2762 (59.4)
	Unknown	197 (4.2)
	(Missing)	1650 (35.5)
Mild Liver disease	YES	43 (0.9)
	NO	2755 (59.2)
	Unknown	201 (4.3)
	(Missing)	1654 (35.5)
Chronic neurological disorder	YES	283 (6.1)
	NO	2527 (54.3)
	Unknown	194 (4.2)
	(Missing)	1649 (35.4)
Malignancy	YES	297 (6.4)
	NO	2517 (54.1)
	Unknown	189 (4.1)
	(Missing)	1650 (35.5)
Chronic hematologic disease	YES	92 (2.0)
	NO	2712 (58.3)
	Unknown	197 (4.2)
	(Missing)	1652 (35.5)
AIDS/HIV	YES	10 (0.2)
	NO	2781 (59.8)
	Unknown	213 (4.6)
	(Missing)	1649 (35.4)

<b>Stratified: all</b>		<b>all</b>
Obesity	YES	266 (5.7)
	NO	2382 (51.2)
	Unknown	326 (7.0)
	(Missing)	1679 (36.1)
Diabetes with complications	YES	202 (4.3)
	NO	2635 (56.6)
	Unknown	173 (3.7)
	(Missing)	1643 (35.3)
Diabetes without complications	YES	611 (13.1)
	NO	2253 (48.4)
	Unknown	152 (3.3)
	(Missing)	1637 (35.2)
Rheumatologic disorder	YES	236 (5.1)
	NO	2552 (54.8)
	Unknown	206 (4.4)
	(Missing)	1659 (35.7)
Dementia	YES	327 (7.0)
	NO	2480 (53.3)
	Unknown	192 (4.1)
	(Missing)	1654 (35.5)
Malnutrition	YES	53 (1.1)
	NO	2627 (56.5)
	Unknown	301 (6.5)
	(Missing)	1672 (35.9)
Smoking	YES	145 (3.1)
	NO	2237 (48.1)
	(Missing)	2271 (48.8)

