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ISARIC Clinical Data Report issued: 14 July 2021

International Severe Acute Respiratory and emerging Infections Consortium

ISARIC Clinical Characterisation Group*^

*group members, participating institutions and funders are listed at end of report and at https://isaric.org/research/covid-19-clinical-research-resources/covid-19-data-management-hosting/covid-19-clinical-data-contributors-list/

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Abstract

ISARIC (International Severe Acute Respiratory and emerging Infections Consortium) partnerships and outbreak preparedness initiatives enabled the rapid launch of standardised clinical data collection on COVID-19 in Jan 2020. Extensive global uptake of this resource has resulted in a large, standardised collection of comprehensive clinical data from hundreds of sites across dozens of countries. Data are analysed regularly and reported publicly to inform patient care and public health response. This report, our 15th report, is a part of a series and includes the results of data analysis for data captured before 26 May 2021. The report marks a significant milestone – the submission of clinical data from over half a million individuals hospitalised with COVID-19. We thank all of the data contributors for their ongoing support.

Data have been entered for 516,689 individuals from 788 partner institutions and networks, covering 1651 sites across 63 countries. This is an increase of 176,377 case entries and data from an additional 9 countries since our most recent report dated 08 April 2021.

The comprehensive analyses detailed in this report includes hospitalised individuals of all ages:

1. for whom data collection occurred between 30 January 2020 and up to and including 25 May 2021;

AND

2. who have laboratory-confirmed SARS-COV-2 infection or clinically diagnosed COVID-19.

For the 442,643 cases who meet eligibility criteria for this report, selected findings include:

- median age of 60 years, with an approximately equal (50/50) male:female sex distribution
- one third of the cohort are at least 70 years of age, whereas 3% are 0-19 years of age
- the most common symptom combination in this hospitalised cohort is shortness of breath, cough, and history of fever, which has remained constant over time
- the five most common symptoms at admission were shortness of breath, cough, history of fever, fatigue/malaise, and altered consciousness/confusion, which is unchanged from the previous reports
- age-associated differences in symptoms are evident, including the frequency of altered consciousness increasing with age, and fever, respiratory and constitutional symptoms being present mostly in those 40 years and above
- 16% of patients with relevant data available were admitted at some point during their illness into an intensive care unit (ICU), which is slightly lower than previously reported (19%)
- antibiotic use remains very high (61%), although it is lower than previously reported (80%), in those for whom relevant data are available (288,125); in ICU/HDU patients with data available (36,073), 92% received antibiotics
- use of corticosteroids was reported for 25% of patients of all types for whom data were available (288,125); in ICU/HDU patients with data available (36,021), 62% received corticosteroids
- outcomes are known for 411,368 patients and the overall estimated case fatality ratio (CFR) is 25% (95%CI 24.8-25), rising to 38% (95%CI 37.5-38.3) for patients who were admitted to ICU/HDU, demonstrating worse outcomes in those with the most severe disease

To access previous versions of **ISARIC COVID-19 Clinical Data Report** please use the link below:
https://isaric.org/research/covid-19-clinical-research-resources/evidence-reports/

NOTE: This preprint reports new research that has not been certified by peer review and should not be used to guide clinical practice.

ISARIC (International Severe Acute Respiratory and Emerging Infections Consortium)

A global federation of clinical research networks, providing a proficient, coordinated, and agile research response to outbreak-prone infectious diseases

Background

This report describes the clinical presentation, treatment and outcome of a cohort of over half a million patients with COVID-19 hospitalised between January 2020 and June 2021 in 63 countries throughout the world. This has been possible thanks to 788 institutions and their clinical teams contributing to ISARIC (the international severe acute respiratory and emerging infection consortium), a grassroots collaboration https://isaric.org/.

After one-and-a-half years and over 4 million deaths, COVD-19 is clearly showing us how pandemics disrupt populations by stretching healthcare systems, shaking economies. Although clinicians and well-equipped surveillance systems can adapt to health emergencies by implementing new treatments and information systems, clinical research lacks this agility.

The advantages of an international standardised case record form. Novel diseases are, by definition, new; the scientific method is not. By developing consensus on a road map for clinical research methods before a pandemic, we are able to minimise further time defining study types, data collection tools, and potential outputs for evidence summarisation once the pathogen emerges. Using slightly adjusted standardised methods for novel diseases, evidence can be generated quickly.

While small observational studies are easy to conduct, they often record different data, and may record variables in different ways that cannot be collated. This means that findings cannot be compared across studies, or combined to produce a more powerful and accurate representation. In contrast, large international observational studies with a standardised form allow for international data comparisons,improved analytic control of confounders, and therefore enable the acquisition of high levels of evidence.

How we got here with ISARIC. In 2013, ISARIC and WHO implemented the standardised Clinical Characterisation Protocol to evolve clinical data into research evidence during health emergencies.

In January 2020, we launched our case report form when only 846 COVID-19 cases had been reported globally. Today, our partners have collected standardised, in-hospital clinical data from over half a million patients, in almost 800 sites, across more than 60 countries. This partner-fueled growing initiative is to our knowledge the largest COVID-19 in-hospital international database in the world.

In this report, we present the current state of our database, which all our collaborators can access by submitting a statistical analysis plan to our clinical team. We encourage our collaborators to test their

research hypothesis within the framework of ISARIC's collaborative Partner Analysis scheme.[2]The majority of this database is additionally available to external researchers via application to our Data Access Committee at https://www.iddo.org/covid19/data-sharing/accessing-data.

To contribute, please contact ncov@isaric.org.

Methods

The results in this report are produced using data from the ISARIC COVID-19 database of international, prospective observational data on clinical features of patients admitted to hospital with Covid-19. Data collection was structured on the ISARIC/WHO Clinical Characterisation Protocol for Severe Emerging Infections, a standardized protocol for investigation of severe acute infections by pathogens of public health interest [3] and the ISARIC case report forms [4] designed for standardized data collection from the start of an outbreak and rapid dissemination of clinical information [5-9]. Data are collected on Research electronic Data Capture (REDCap, version 8.11.11, Vanderbilt University, Nashville, Tenn.), hosted by the University of Oxford. Additional data, collected using a wide variety of data systems, are submitted by international investigators who are not using the University of Oxford REDCap instance. Data are curated by the Infectious Diseases Data Observatory [10] to the CDISC Study Data Tabulation Model for harmonised analysis [11] The first patient was enrolled on 30 January 2020.

SDTM formatted data are processed in R 4.1.0 (R Core Team 2013). Initial data cleaning includes custom scripts designed to identify results of laboratory SARS-CoV-2 testing, and to standardise nomenclature for comorbidities, symptoms at admission, treatments, and outcomes.

Patients are excluded if they did not have laboratory or clinically confirmed SARS-CoV-2 infection. Patients are considered to be lost to follow up if either a) they were transferred to another facility, or b) they had an unknown outcome and the last date upon which any data was recorded for them was 45 days or before the date of data extraction. Patients with unknown outcome where the last recorded data was less than 45 days old are instead categorised as receiving ongoing care.

Comorbidities, symptoms at admission, and treatments (in both the full population and the intensive care unit (ICU)/high dependency unit (HDU) population) are included in the report only if at least 10% of patients have their presence or absence recorded. Laboratory and vital sign measurements that fall within the top 2.5% and bottom 2.5% of values, in both the <10 year age group and the >= 10 year age group, are taken to be likely mis-entered and changed to missing. Similarly, variables for time durations are converted to missing if their values are either negative or in the top 2.5% of values. Dates are converted to missing where they are before the 1st January 2020 (except for dates of birth and hospital admission) or after the date of data extraction.

The following Covid-19 symptom definitions were used:

- World Health Organization (WHO):
  1. A combination of acute fever and cough,
  Or
  2. A combination of three or more of: fever, cough, general weakness and fatigue, headache, myalgia, sore throat, coryza, dyspnoea, anorexia, nausea and vomiting, diarrhoea, altered mental status
- Centers for Disease Control (CDC), United States:
  1. At least two of: fever, chills (not available), rigors, myalgia, headache, sore throat, new olfactory and taste disorder,
  Or
  2. At least one of: cough, shortness of breath, difficulty breathing (not available)
- Public Health England
  New cough, or temperature 37.8°C, or a loss or change in sense of smell or taste

- European Centre for Disease Prevention and Control
  At least one of: cough, fever, shortness of breath, sudden onset anosmia, ageusia or dysgeusia

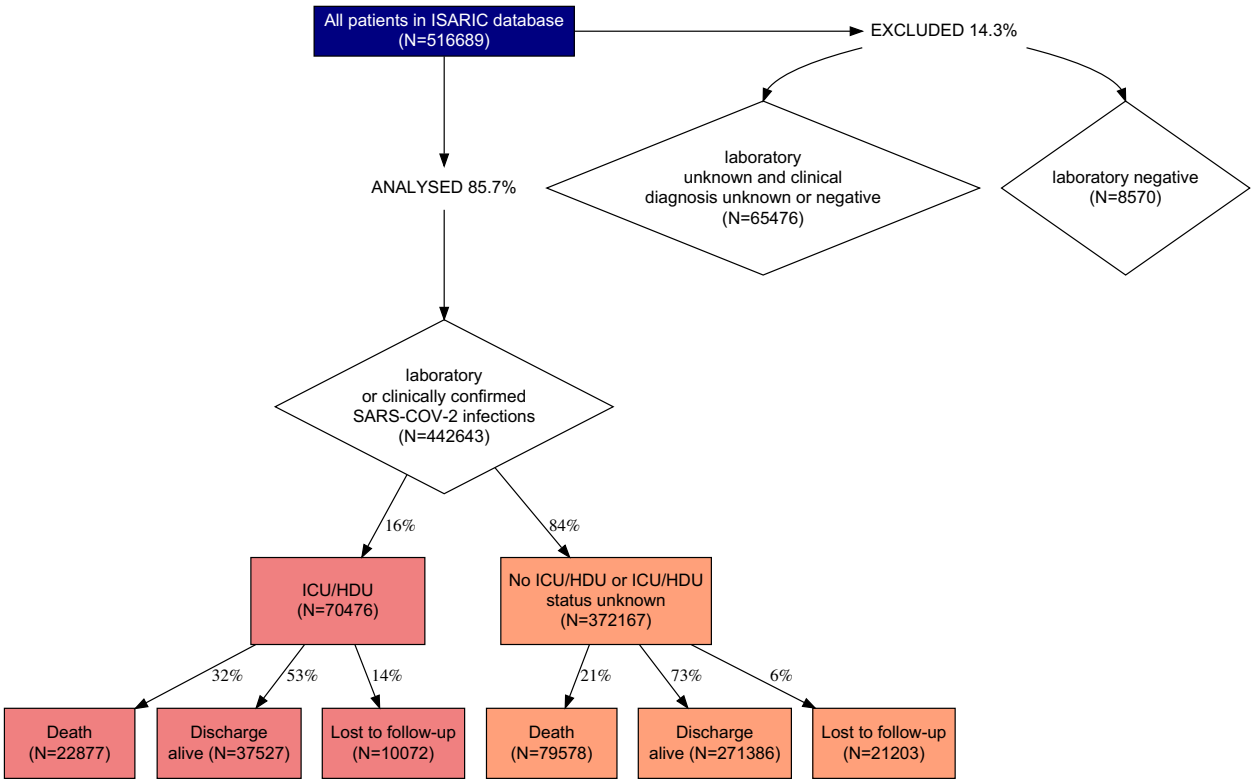
Data manipulation is performed using the tidyverse collection of packages (Wickham et al. 2019), as well as ff (Adler et al. 2020) and dtplyr (Wickham 2021). Data visualisation makes use of ggplot (Wickham 2016) and its extension ggupset (Ahlmann-Eltze 2020). The report is generated using knitr (Xie 2021).

This report only includes individuals for whom data collection commenced on or before 25 May 2021.

Results

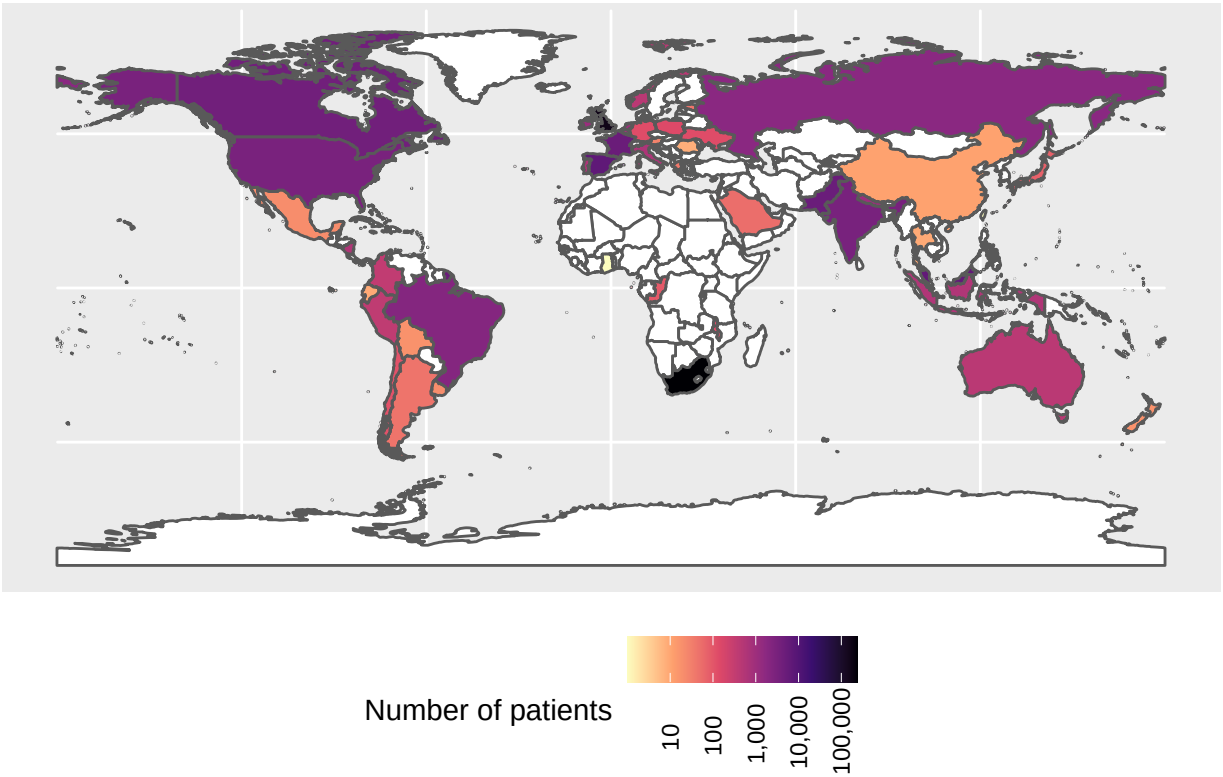
The cohort satisfying the above criteria has **442643** cases. The flow chart (Figure 1) gives an overview of the cohort and outcomes as of 25 May 2021.

Figure 1: Overview of cohort and outcomes as of 25 May 2021.



These data have been contributed to by 788 sites in 63 countries (see Figure 2 and Figure 3). 273999 (53%) of the patients are from low- and middle-income and 242687 (47%) from high-income countries. The two largest contributors to the database are South Africa (47.6%) and the UK (40.4%).

Figure 2: Distribution of patients by country



Demographics

Of these 442643 cases, 221591 are males and 220390 are females – sex is unreported for 662 cases. The median age is 60 years ranging from 0 to 119 years. One-third of the patients are 70 years old and above. Demographics, including age, sex, and outcome, are presented in Table 1 and Figure 4.

Figure 3: Distribution of patients by country

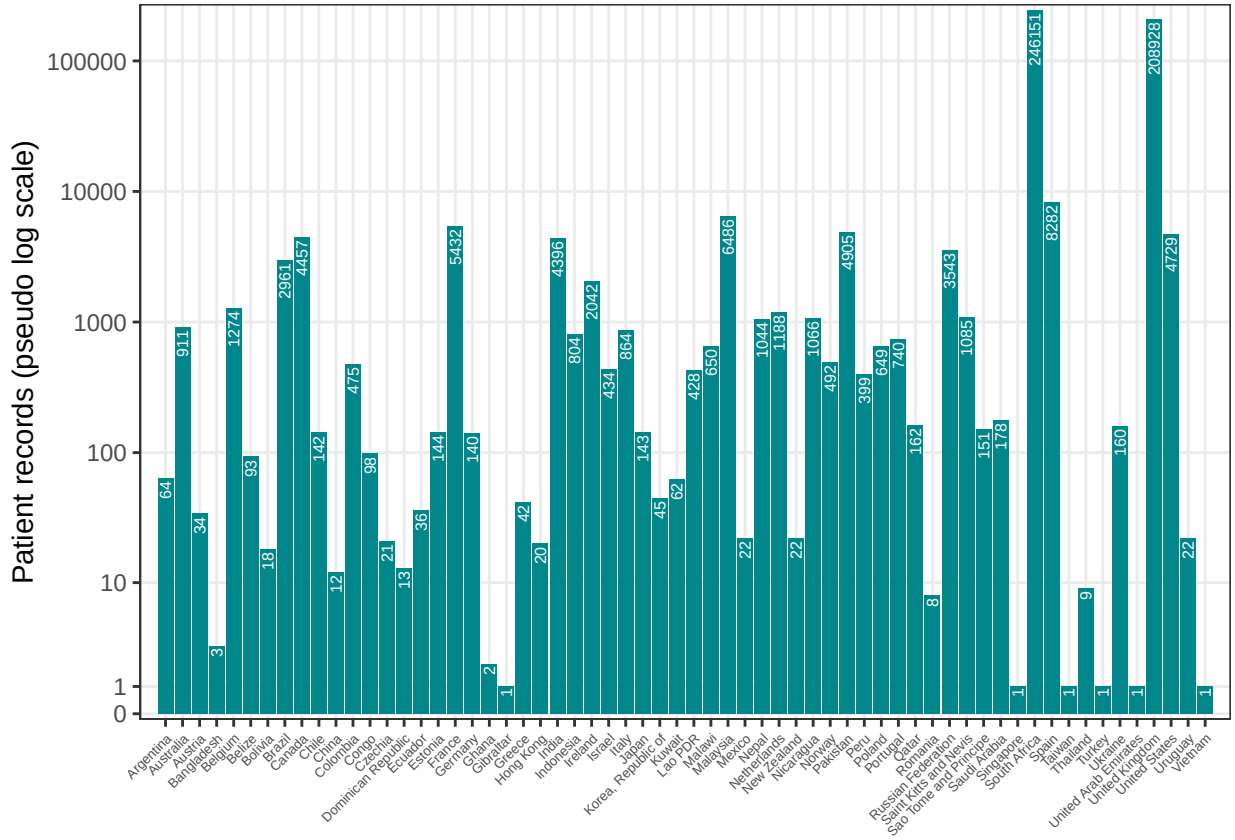


Table 1: Patient Characteristics. Proportions are presented in parentheses, and have been rounded to two decimal places.

Variable	Count (proportion)
Size of cohort	442643
By sex	
Female	220390 (0.5)
Male	221591 (0.5)
Unknown	662 (0)
By outcome status	
Death	102455 (0.23)
Discharge	308913 (0.7)
LTFU	31275 (0.07)
By age group	
0-9	5280 (0.01)
10-19	7319 (0.02)
20-29	22701 (0.05)
30-39	43809 (0.1)
40-49	57672 (0.13)
50-59	81928 (0.19)
60-69	79082 (0.18)
70+	142543 (0.32)
Unknown	2309 (0.01)

Figure 4: Age and sex distribution of patients. Bar fills are outcome (death/discharge/lost to follow-up (LTFU)) at the time of report.

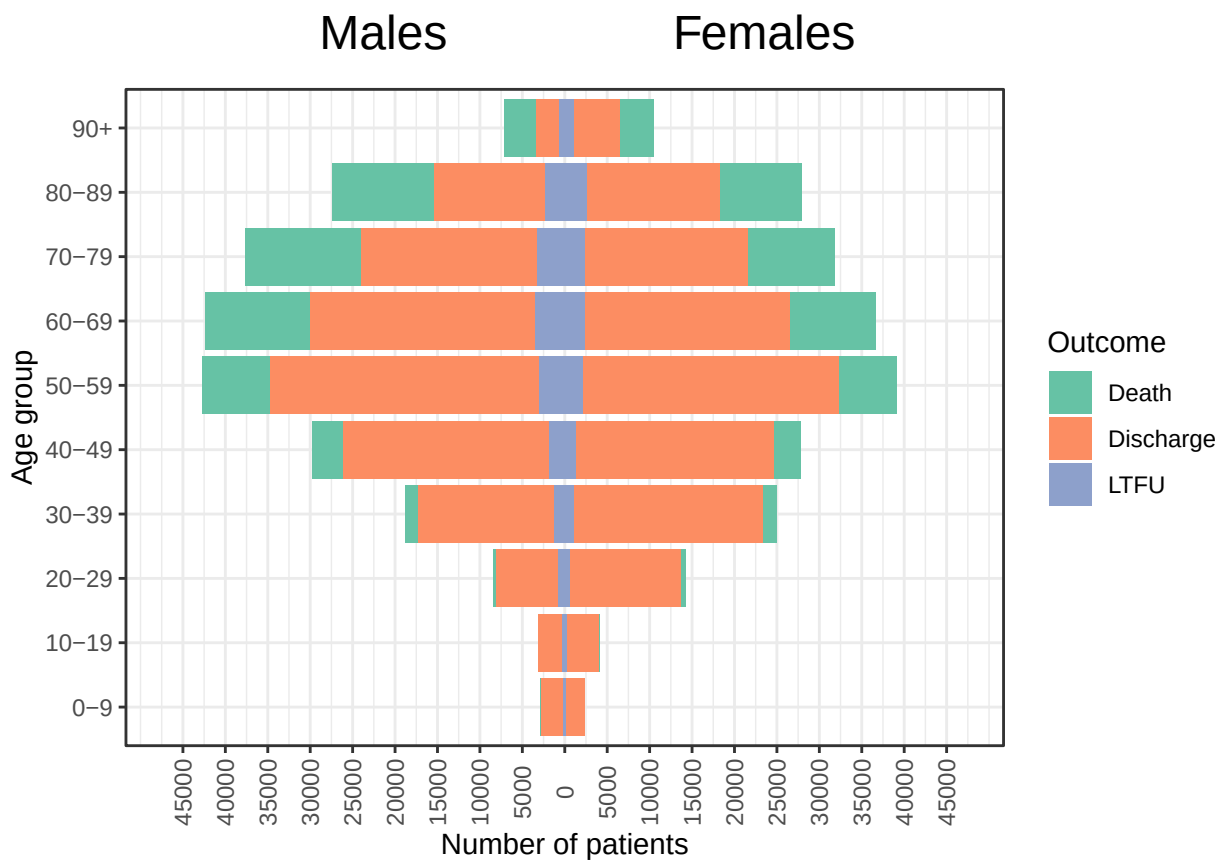


Table 2: Outcome by age and sex. Proportions are calculated using the column total as the denominator.

Variable	Death	Discharge	LTFU	Case fatality ratio
Age				
0-9	170 (0.03)	4792 (0.91)	318 (0.06)	0.03
10-19	223 (0.03)	6579 (0.9)	517 (0.07)	0.03
20-29	1020 (0.04)	20340 (0.9)	1341 (0.06)	0.05
30-39	3171 (0.07)	38325 (0.87)	2313 (0.05)	0.08
40-49	6915 (0.12)	47577 (0.82)	3180 (0.06)	0.13
50-59	14899 (0.18)	61901 (0.76)	5128 (0.06)	0.19
60-69	22512 (0.28)	50722 (0.64)	5848 (0.07)	0.31
70+	53370 (0.37)	76961 (0.54)	12212 (0.09)	0.41
Sex				
Female	46553 (0.21)	159872 (0.73)	13965 (0.06)	0.23
Male	55758 (0.25)	148714 (0.67)	17119 (0.08)	0.27

Presenting symptoms

The observed mean number of days from (first) symptom onset to hospital admission was 7.1, with a standard deviation (SD) of 13.2 days and a median of 3 days.

A detailed analysis of patients' symptoms has been reported in a previous publication [12]. The prevalence of symptoms on admission to the hospital is summarised in Table 3 and Figure 5a. Information is available on more than half of patients for shortness of breath, cough, fever, vomiting/nausea, diarrhoea, altered consciousness/confusion, fatigue/malaise, muscle aches/joint pain, headache. The five most common symptoms at admission are shortness of breath, cough, history of fever, fatigue/malaise, and altered consciousness/confusion, accounting for 57.8%, 56%, 53.1%, 37.7%, 20.2% of patients with symptom recorded.

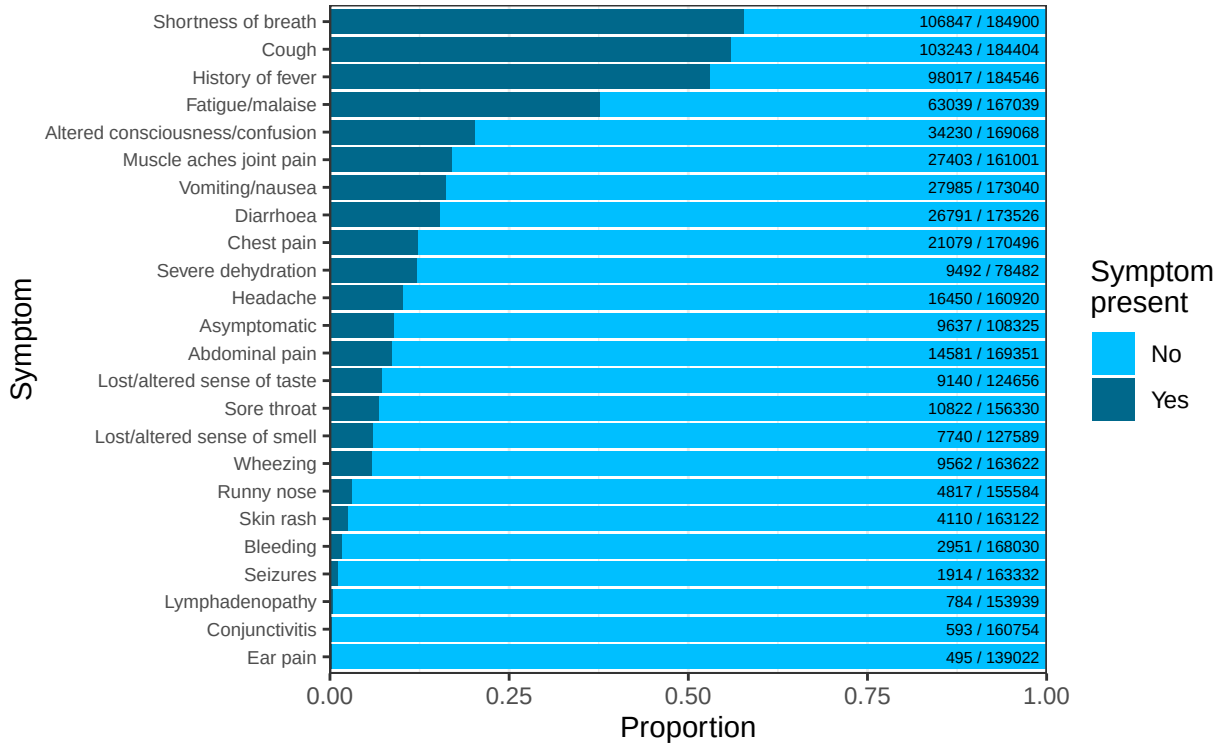
Clusters of symptoms are presented in Figure 5b and 5c. The most common symptom combination is shortness of breath, cough, and history of fever.

Table 3: Prevalence of symptoms.

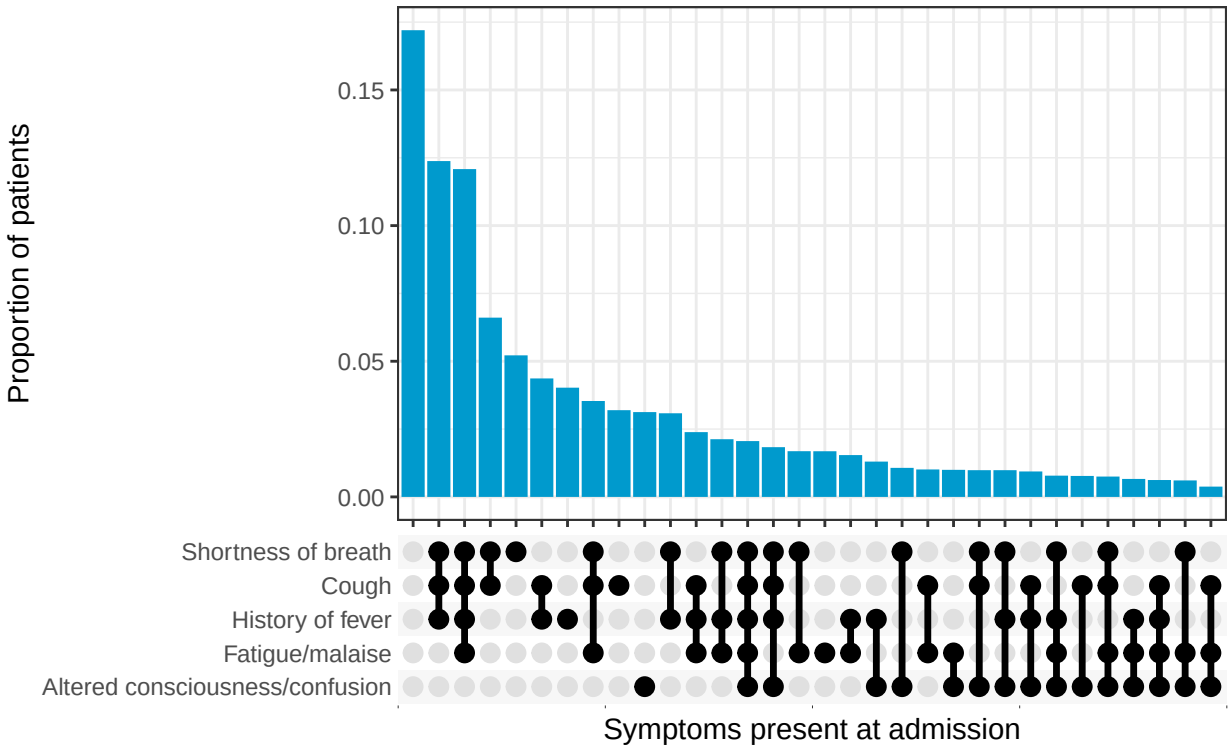
Symptoms	Present	Absent	Unknown
Shortness of breath	106847 (0.24)	78053 (0.18)	257743 (0.58)
Cough	103243 (0.23)	81161 (0.18)	258239 (0.58)
History of fever	98017 (0.22)	86529 (0.2)	258097 (0.58)
Fatigue/malaise	63039 (0.14)	104000 (0.23)	275604 (0.62)
Altered consciousness/confusion	34230 (0.08)	134838 (0.3)	273575 (0.62)
Vomiting/nausea	27985 (0.06)	145055 (0.33)	269603 (0.61)
Muscle aches joint pain	27403 (0.06)	133598 (0.3)	281642 (0.64)
Diarrhoea	26791 (0.06)	146735 (0.33)	269117 (0.61)
Chest pain	21079 (0.05)	149417 (0.34)	272147 (0.61)
Headache	16450 (0.04)	144470 (0.33)	281723 (0.64)
Abdominal pain	14581 (0.03)	154770 (0.35)	273292 (0.62)
Sore throat	10822 (0.02)	145508 (0.33)	286313 (0.65)
Asymptomatic	9637 (0.02)	98688 (0.22)	334318 (0.76)
Wheezing	9562 (0.02)	154060 (0.35)	279021 (0.63)
Severe dehydration	9492 (0.02)	68990 (0.16)	364161 (0.82)
Lost/altered sense of taste	9140 (0.02)	115516 (0.26)	317987 (0.72)
Lost/altered sense of smell	7740 (0.02)	119849 (0.27)	315054 (0.71)
Runny nose	4817 (0.01)	150767 (0.34)	287059 (0.65)
Skin rash	4110 (0.01)	159012 (0.36)	279521 (0.63)
Bleeding	2951 (0.01)	165079 (0.37)	274613 (0.62)
Seizures	1914 (0)	161418 (0.36)	279311 (0.63)
Lymphadenopathy	784 (0)	153155 (0.35)	288704 (0.65)
Conjunctivitis	593 (0)	160161 (0.36)	281889 (0.64)
Ear pain	495 (0)	138527 (0.31)	303621 (0.69)

Figure 5: Clinical symptoms of patients at admission

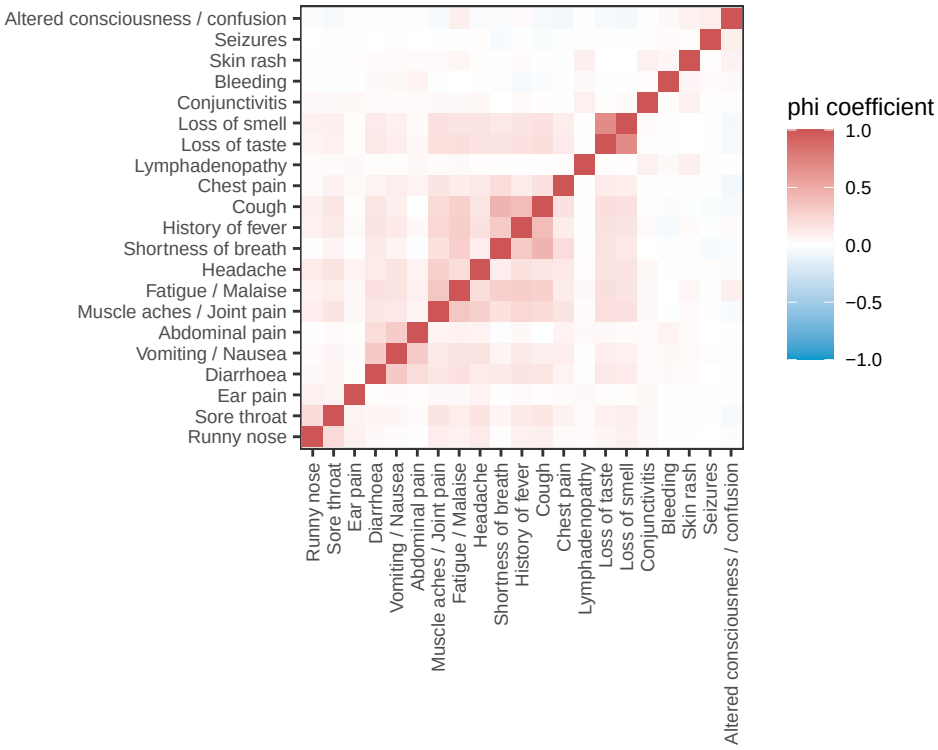
(a) Frequency of symptoms seen at admission amongst COVID-19 patients. Bars are annotated with a fraction representing the number of patients presenting with this symptom over the number of patients for whom presence or absence of this symptom was recorded.



(b) The distribution of combinations of the five most common symptoms, amongst all patients for whom these data were recorded. Filled and empty circles below the x-axis indicate the presence or absence of each comorbidity.

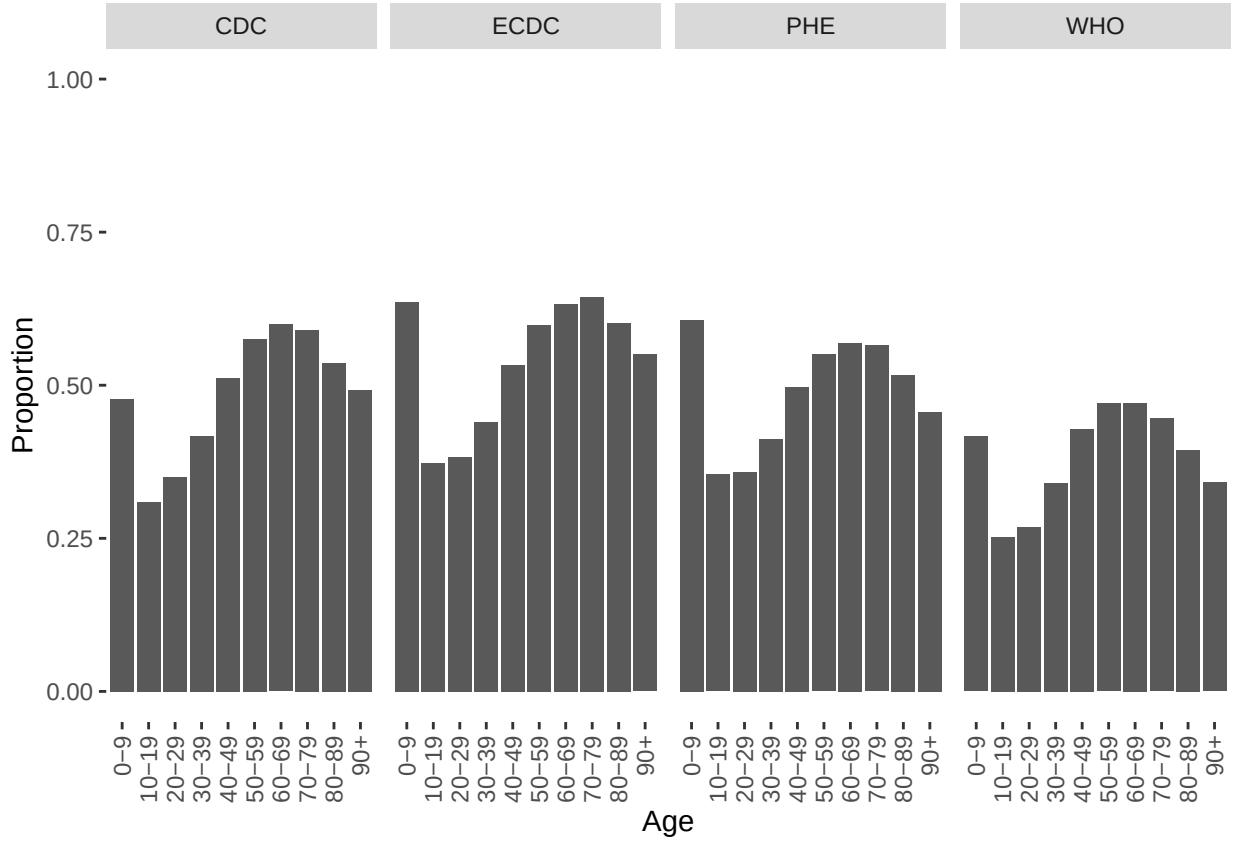


(c) Heatmap for correlation between symptoms. Fill colour is the phi correlation coefficient for each pair of symptoms, calculated amongst patients with recorded presence or absence of both.



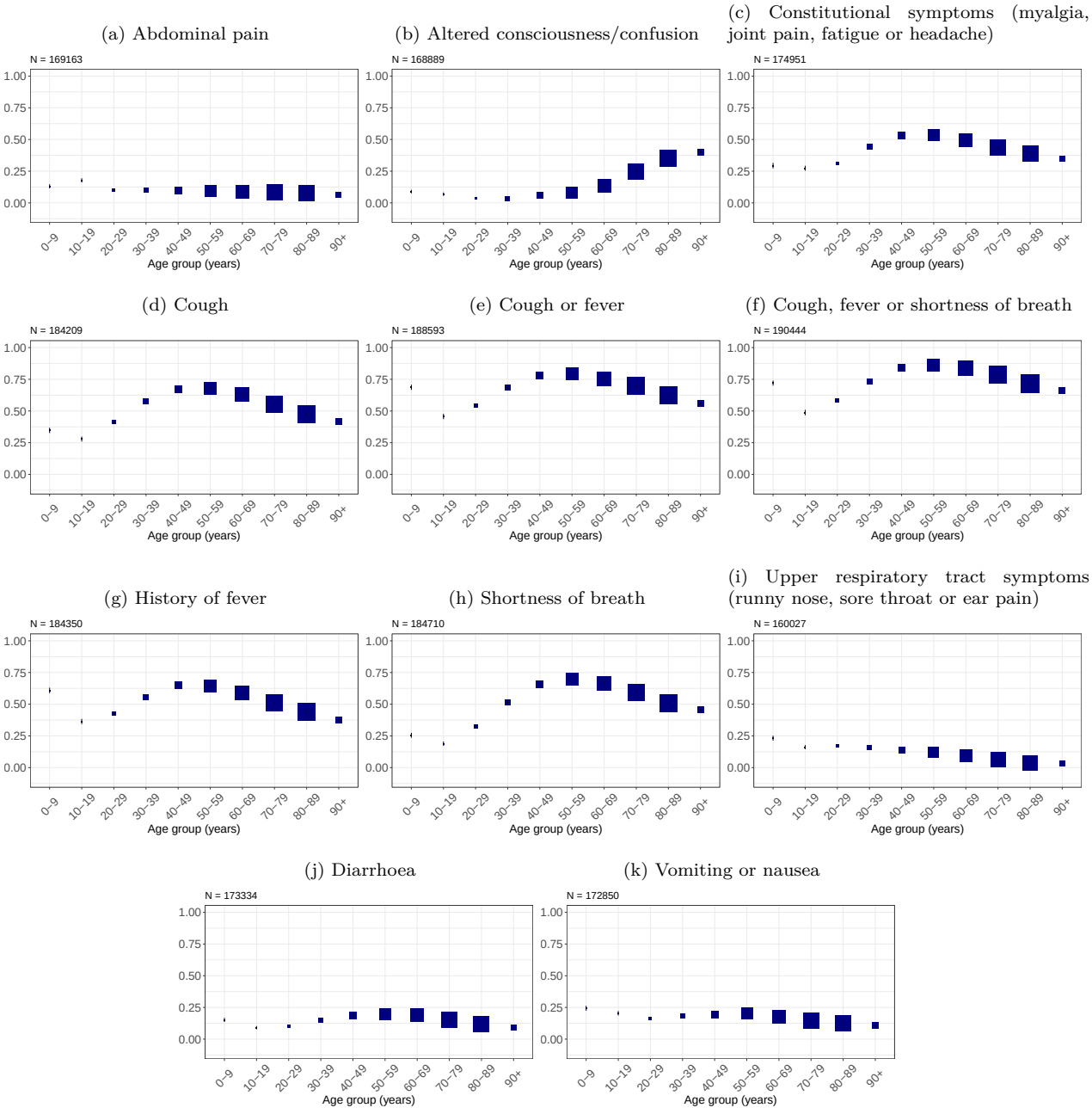
The observed symptoms on admission partly represent case definitions and policies for hospital admission, which may change as time passes. The most common case definitions are met by few patients in our dataset, which varies by age (Figure 6).

Figure 6: Proportion of patients that meet the 4 most common COVID-19 symptom case definitions by age



The frequency of presenting symptoms varies with age (Figure 7). Altered consciousness increases with age. Fever, respiratory and constitutional symptoms are mostly present in patients aged 40 and above. The presence of gastro-intestinal symptoms appears to be age-independent.

Figure 7: Symptoms recorded at hospital presentation stratified by age group. Boxes show the proportion of individuals with each symptom, with error bars showing 95% confidence intervals. The size of each box is proportional to the number of individuals represented. N is the number of individuals included in the plot (this varies between plots due to data completeness).



Comorbidities and other concomitant conditions at admission

Information is available on at least 75% of cases for diabetes, chronic pulmonary disease, chronic kidney disease, asthma, malignant neoplasm, cardiac chronic disease, HIV/AIDS, and hypertension (Table 4). Conditions present in at least 10% of cases are hypertension (41% of those reported), smoking (35%), diabetes (28%), cardiac chronic disease (17%), obesity (12%), dementia, chronic neurological disease and rheumatological disease (each 10%). (Figure 8a). Combinations of the five most prevalent conditions are presented in Figure 8b.

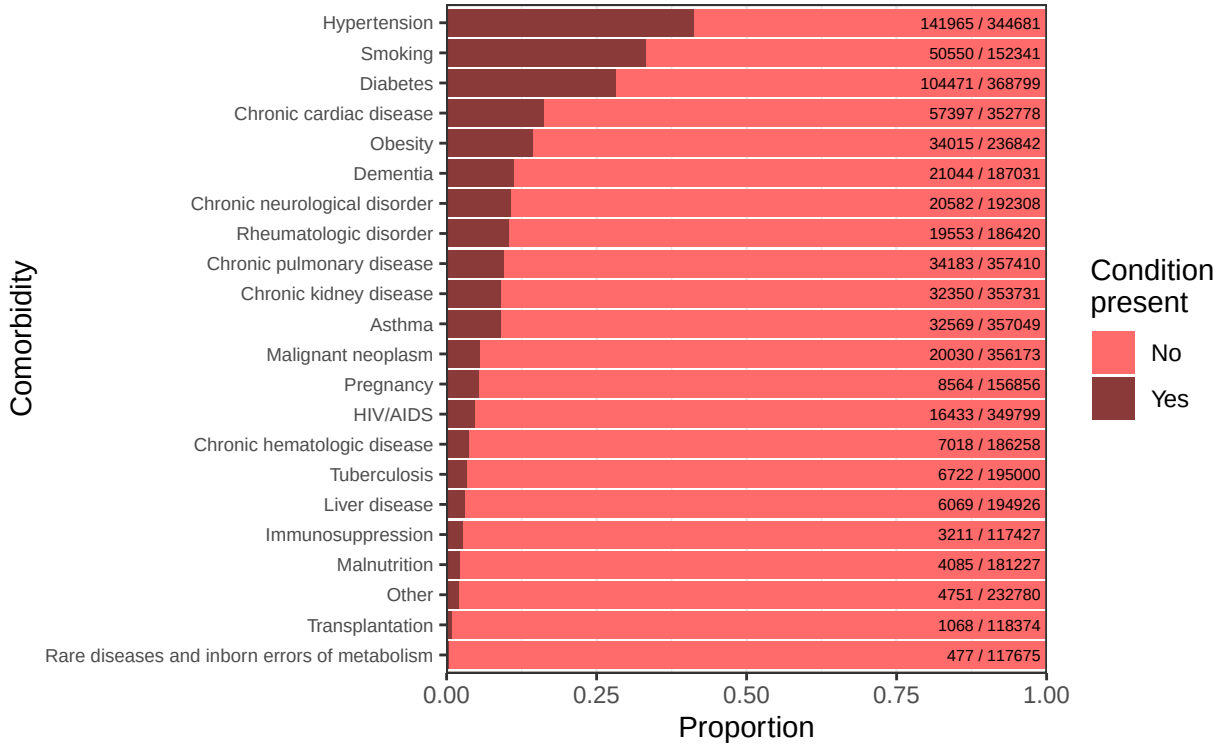
Table 4: Prevalence of comorbidities.

Comorbidities	Present	Absent	Unknown
Hypertension	141965 (0.32)	202716 (0.46)	97962 (0.22)
Diabetes	104471 (0.24)	264328 (0.6)	73844 (0.17)
Chronic cardiac disease	57397 (0.13)	295381 (0.67)	89865 (0.2)
Smoking	50550 (0.11)	101791 (0.23)	290302 (0.66)
Chronic pulmonary disease	34183 (0.08)	323227 (0.73)	85233 (0.19)
Obesity	34015 (0.08)	202827 (0.46)	205801 (0.46)
Asthma	32569 (0.07)	324480 (0.73)	85594 (0.19)
Chronic kidney disease	32350 (0.07)	321381 (0.73)	88912 (0.2)
Dementia	21044 (0.05)	165987 (0.37)	255612 (0.58)
Chronic neurological disorder	20582 (0.05)	171726 (0.39)	250335 (0.57)
Malignant neoplasm	20030 (0.05)	336143 (0.76)	86470 (0.2)
Rheumatologic disorder	19553 (0.04)	166867 (0.38)	256223 (0.58)
HIV/AIDS	16433 (0.04)	333366 (0.75)	92844 (0.21)
Pregnancy	8564 (0.02)	148292 (0.34)	285787 (0.65)
Chronic hematologic disease	7018 (0.02)	179240 (0.4)	256385 (0.58)
Tuberculosis	6722 (0.02)	188278 (0.43)	247643 (0.56)
Liver disease	6069 (0.01)	188857 (0.43)	247717 (0.56)
Other	4751 (0.01)	228029 (0.52)	209863 (0.47)
Malnutrition	4085 (0.01)	177142 (0.4)	261416 (0.59)
Immunosuppression	3211 (0.01)	114216 (0.26)	325216 (0.73)
Transplantation	1068 (0)	117306 (0.27)	324269 (0.73)
Rare diseases and inborn errors of metabolism	477 (0)	117198 (0.26)	324968 (0.73)

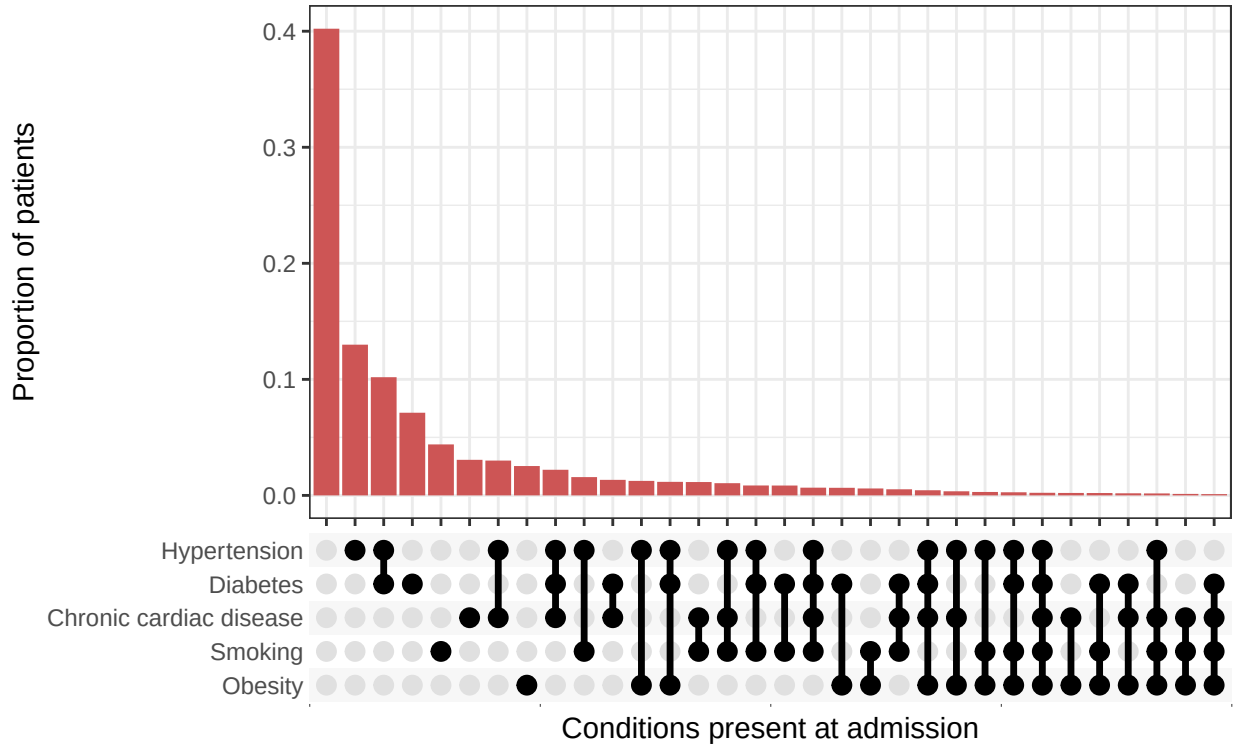
The age distribution of the most frequent concomitant conditions is presented In Figure 9. Dementia and hypertension increase with age.

Figure 8: Comorbidities and other concomitant conditions

(a) Frequency of comorbidities or other concomitant conditions seen at admission amongst COVID-19 patients. Bars are annotated with a fraction representing the number of patients presenting with this comorbidity over the number of patients for whom presence or absence of this comorbidity was recorded.



(b) The distribution of combinations of the five most common such conditions, amongst all patients for whom these data were recorded. Filled and empty circles below the x-axis indicate the presence or absence of each comorbidity.



Vital signs

Oxygen saturation was recorded for 182941 patients at admission. Of these, 36.1% were on oxygen therapy, and 63.9% were not. At admission, the median oxygen saturation of those who were on oxygen therapy was 95%, whereas the median was 96% for those who were not on oxygen therapy (Figure 10 provides a breakdown of oxygen saturation by age and oxygen therapy status). Among those who were on oxygen therapy at admission (N = 66031), 34.8% had oxygen saturation <94, and among those who were not on oxygen therapy at admission (N = 116910), 25.3% had oxygen saturation <94. All vital signs are presented in Figure 10 by age.

Figure 9: Comorbidities recorded at hospital presentation stratified by age group. Boxes show the proportion of individuals with each symptom, with error bars showing 95% confidence intervals. The size of each box is proportional to the number of individuals represented. N is the number of individuals included in the plot (this varies between plots due to data completeness)

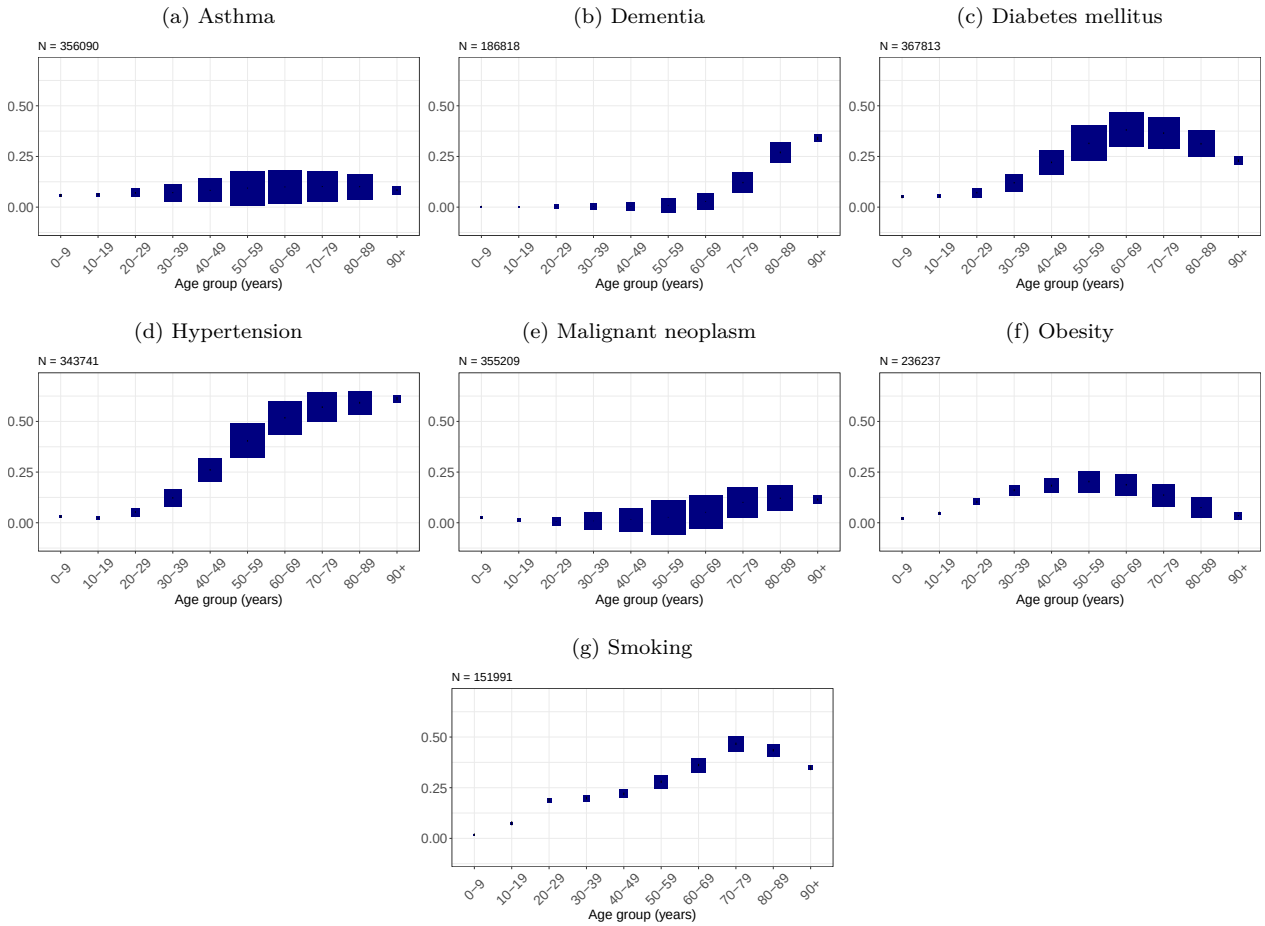
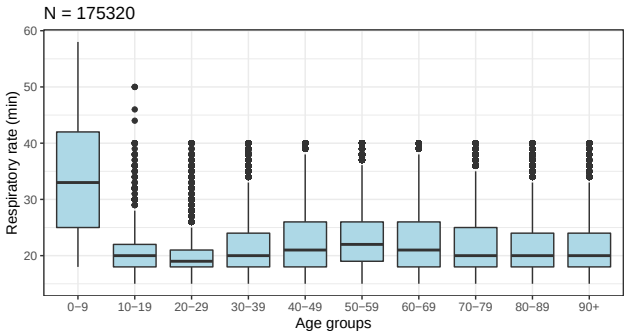
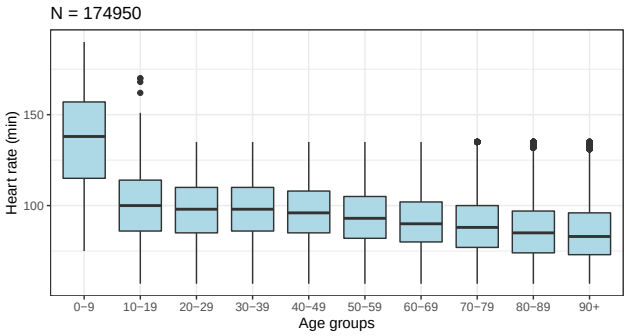


Figure 10: Box and whisker plots for observations at hospital presentation stratified by age group. Outliers are omitted. N is the number of individuals included in the plot (this varies between plots due to data completeness).

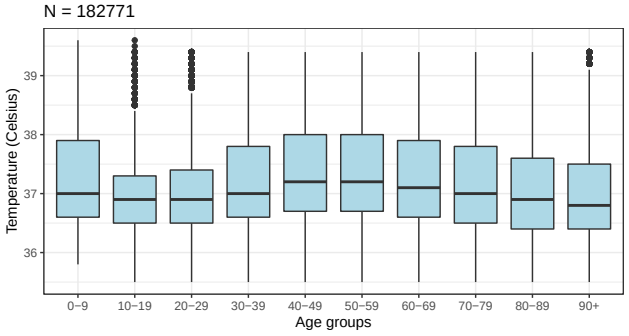
(a) Respiratory rate



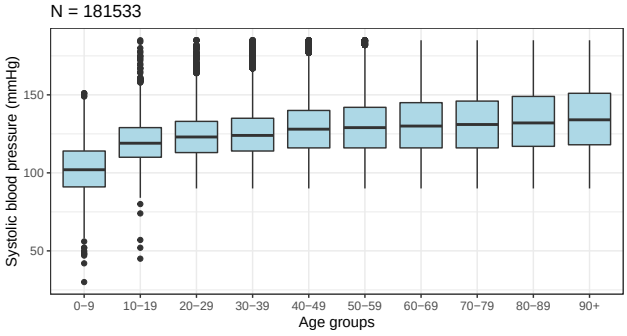
(b) Heart rate



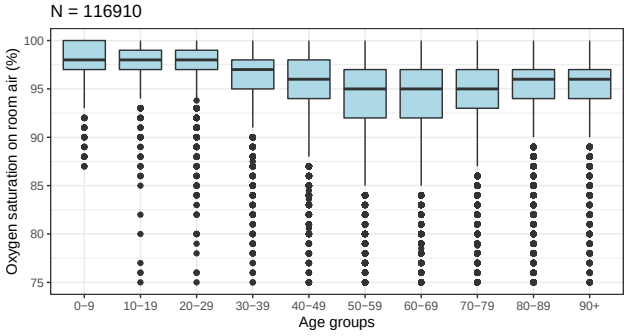
(c) Temperature



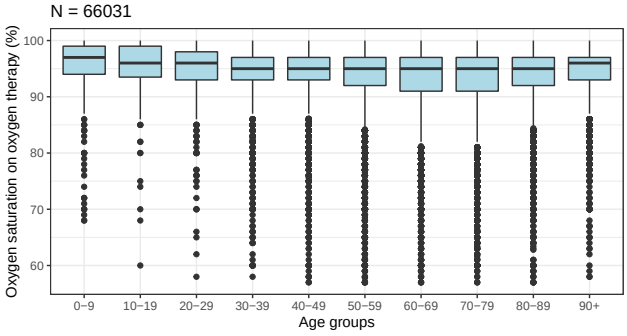
(d) Systolic blood pressure



(e) Oxygen saturation on room air



(f) Oxygen saturation on oxygen therapy

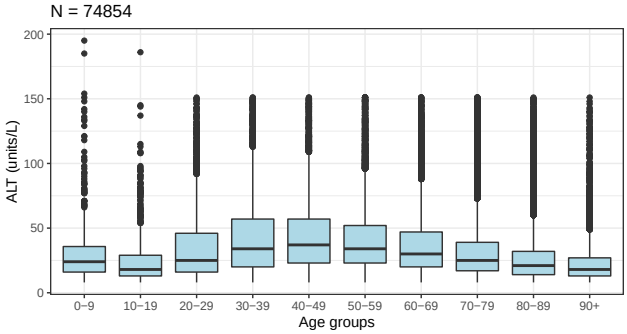


Laboratory values

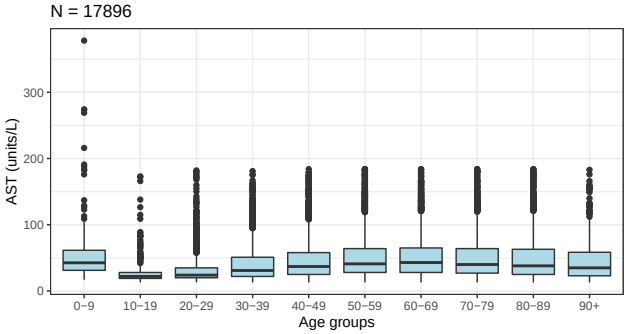
Laboratory tests results are available for a minority of patients. They are summarised in Figure 11.

Figure 11: Box and whisker plots for laboratory results within 24 hours of hospital presentation stratified by age group. Outliers are omitted. N is the number of individuals included in the plot (this varies between plots due to data completeness).

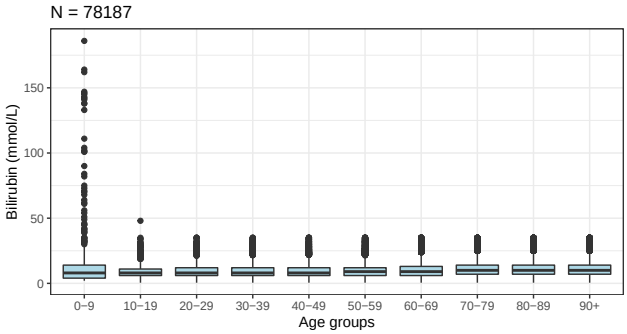
(a) Alanine transaminase (ALT)



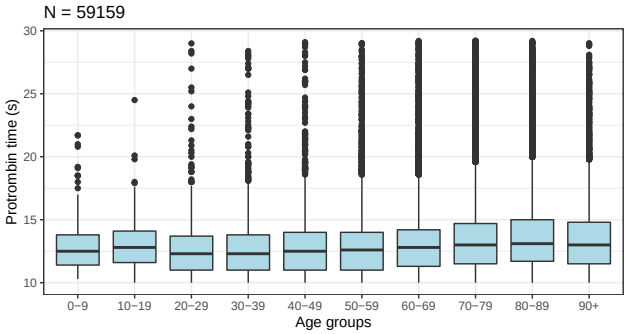
(b) Aspartate transaminase (AST)



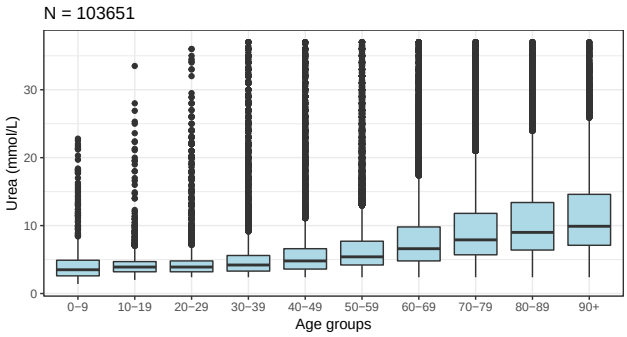
(c) Bilirubin



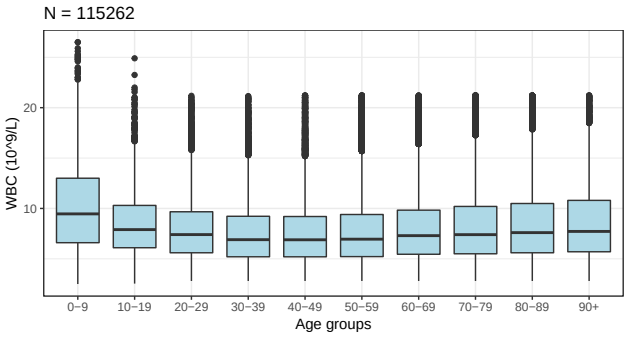
(d) Protrombin time



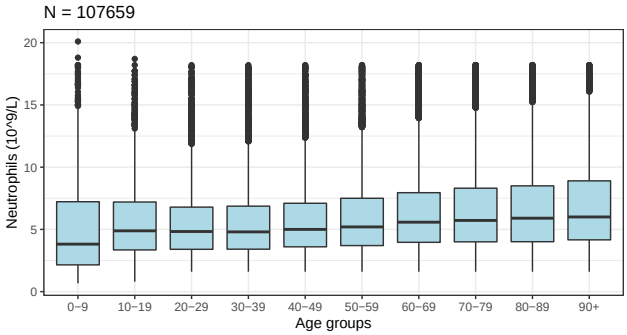
(e) Urea



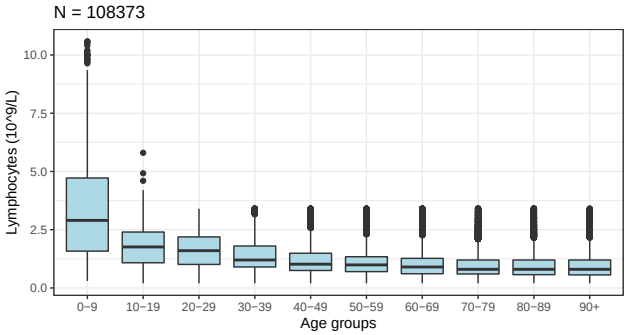
(f) White blood cell count (WCC)



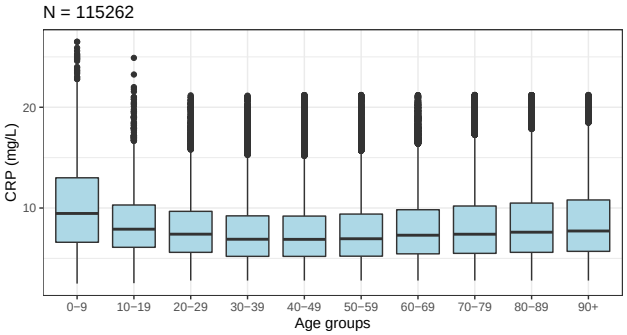
(g) Neutrophils



(h) Lymphocytes



(i) C-reactive protein (CRP)



Treatment

Antibiotics were given to 177103/288125 (61.5%) patients, and 38749/416567 (9.3%) received antivirals. These treatment categories are not mutually exclusive since some patients receive multiple treatments - the denominators differ due to data completeness. Of 368138 patients with data available on oxygen supplementation within 24 hours from admission,109669(29.8%) received supplemental oxygen and 258469(70.2%) did not. 96422/437378 (22%) patients received some degree of oxygen supplementation during hospitalisation: of these, 32379/300739 (10.8%) receive NIV and 32693/433942 (7.5%) IMV.

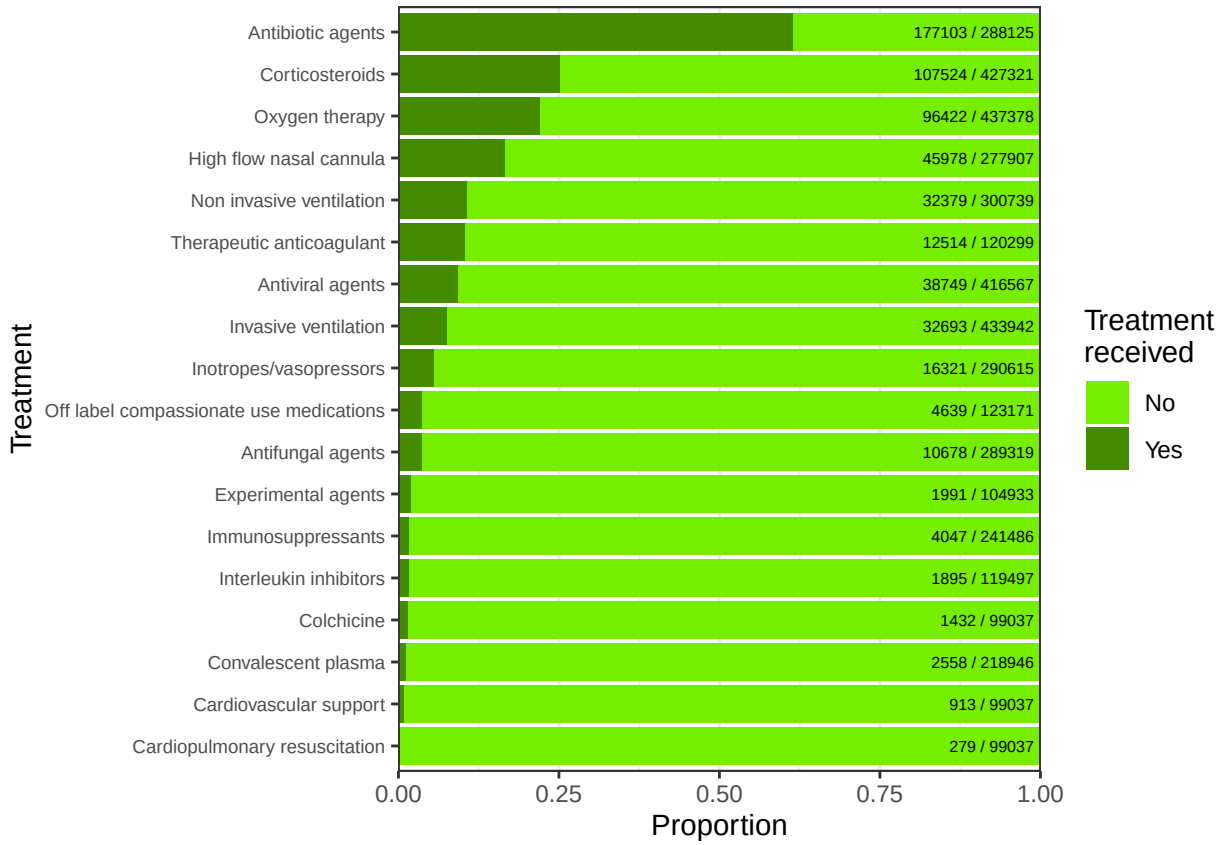
Corticosteroids were administered to 107524/427321 (25.2%) patients. This includes 16808/31761 (52.9%) of those who received IMV, 38319/62078 (61.7%) of those who had oxygen therapy but not IMV, and 51926/332395 (15.6%) of those who had no oxygen therapy. On 16 June, results for dexamethasone were released for the RECOVERY randomized controlled trial [13,14]. This trial found that dexamethasone reduced deaths for patients receiving IMV and oxygen therapy, but not among patients not receiving respiratory support. Of patients admitted since 16 June 2020, corticosteroids were given to 11394/17870 (63.8%) of those who received IMV, and 41798/216121 (19.3%) of those with no oxygen therapy.

Table 5: Treatment use. The counts presented for treatments include all cases, not only cases with complete details of treatments (as expressed in the summary).

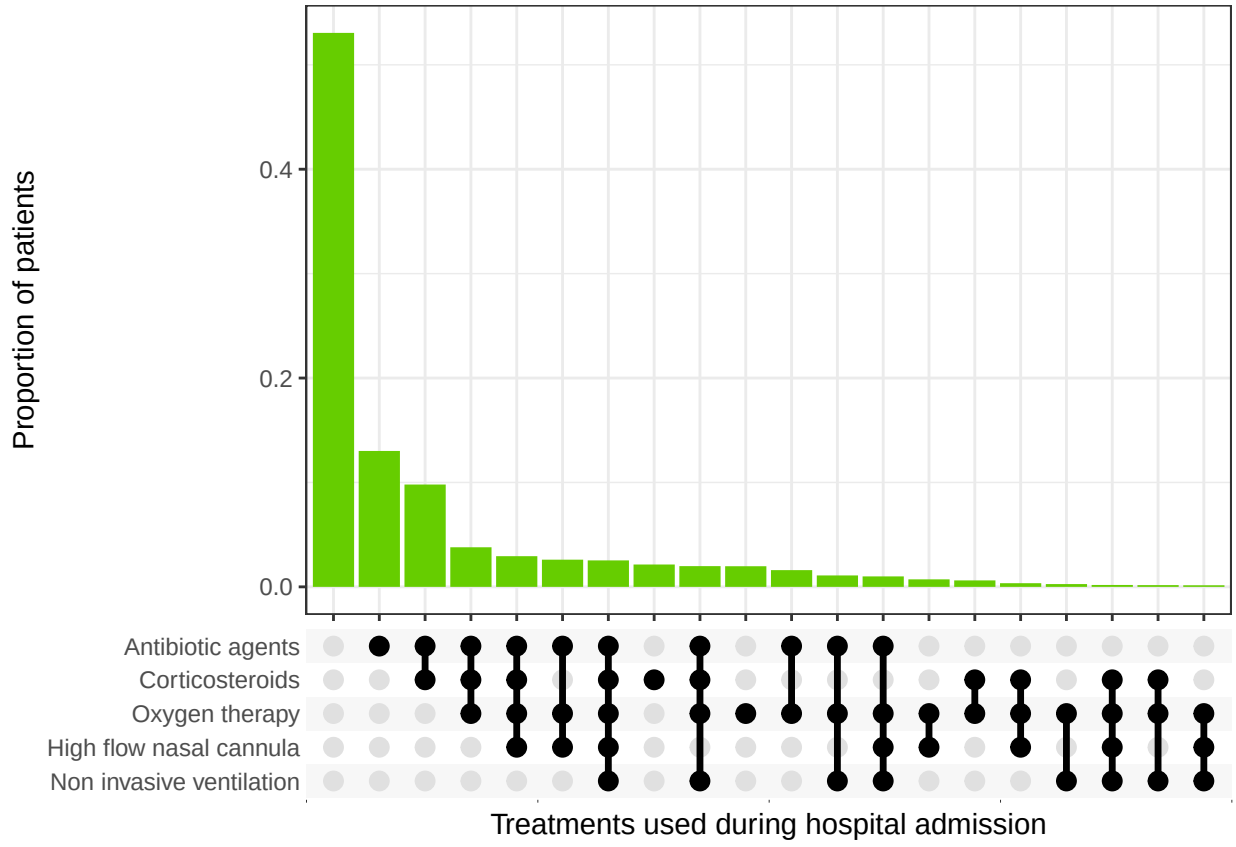
Treatments	Present	Absent	Unknown
Antibiotic agents	177103 (0.4)	111022 (0.25)	154518 (0.35)
Corticosteroids	107524 (0.24)	319797 (0.72)	15322 (0.03)
Oxygen therapy	96422 (0.22)	340956 (0.77)	5265 (0.01)
High flow nasal cannula	45978 (0.1)	231929 (0.52)	164736 (0.37)
Antiviral agents	38749 (0.09)	377818 (0.85)	26076 (0.06)
Invasive ventilation	32693 (0.07)	401249 (0.91)	8701 (0.02)
Non invasive ventilation	32379 (0.07)	268360 (0.61)	141904 (0.32)
Inotropes/vasopressors	16321 (0.04)	274294 (0.62)	152028 (0.34)
Therapeutic anticoagulant	12514 (0.03)	107785 (0.24)	322344 (0.73)
Antifungal agents	10678 (0.02)	278641 (0.63)	153324 (0.35)
Off label/compassionate use medications	4639 (0.01)	118532 (0.27)	319472 (0.72)
Immunosuppressants	4047 (0.01)	237439 (0.54)	201157 (0.45)
Convalescent plasma	2558 (0.01)	216388 (0.49)	223697 (0.51)
Experimental agents	1991 (0)	102942 (0.23)	337710 (0.76)
Interleukin inhibitors	1895 (0)	117602 (0.27)	323146 (0.73)
Colchicine	1432 (0)	97605 (0.22)	343606 (0.78)
Cardiovascular support	913 (0)	98124 (0.22)	343606 (0.78)
Cardiopulmonary resuscitation	279 (0)	98758 (0.22)	343606 (0.78)

Figure 12: Treatments in the entire population

(a) Proportions of patients receiving each treatment. Bars are annotated with a fraction indicating the number of individuals receiving each treatment over the number for which this information was non-missing.



(b) Distribution of combinations of antimicrobial treatments and steroids administered during hospital stay, across all patients with completed hospital stay and recorded treatment data.



Intensive Care and High Dependency Unit Treatments

Of the 442643 patients with data on ward admissions available, a total of 70476 (15.9%) were admitted at some point of their illness into an intensive care unit (ICU) or high dependency unit (HDU), among which, 21511 (30.5%) on the day of admission.

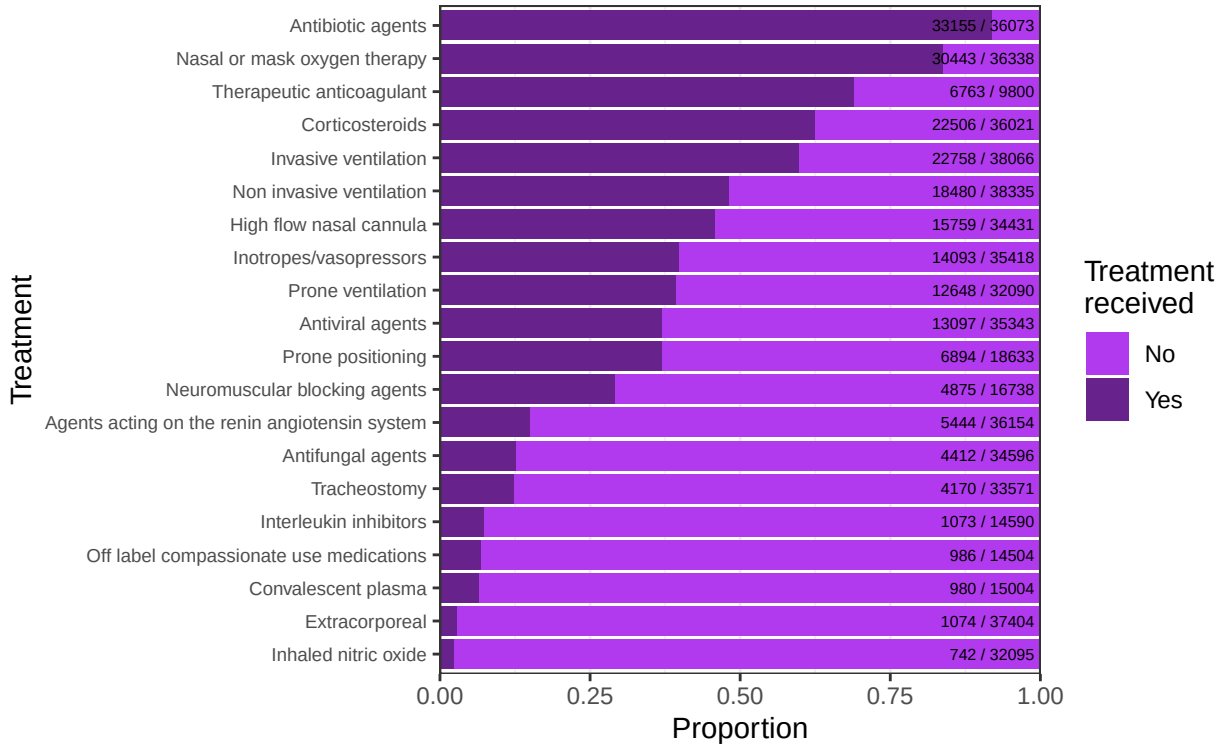
The range of treatments received whilst in ICU/HDU is presented in Figure 13 a and b. Of the patients admitted into ICU/HDU, 33155/36073 (91.9%) received antibiotics and 13097/35343 (37.1%) antivirals. 33628/38569 (87.2%) received some degree of oxygen supplementation, of which, 18480/38335 (48.2%) received NIV and 22745/38061 (59.8%) IMV.

A total of 32379 patients received non-invasive mechanical ventilation (NIV). The mean and median durations from admission to receiving NIV were 2.3 days and 1 days respectively (SD: 3.6 days) – estimated from records on cases with complete records on dates of hospital admission and NIV onset (N = 21542). The mean and median durations for NIV were 3.6 days and 2 days respectively (SD: 3.2 days) – estimated based on only those cases which have complete NIV duration records (N = 5104).

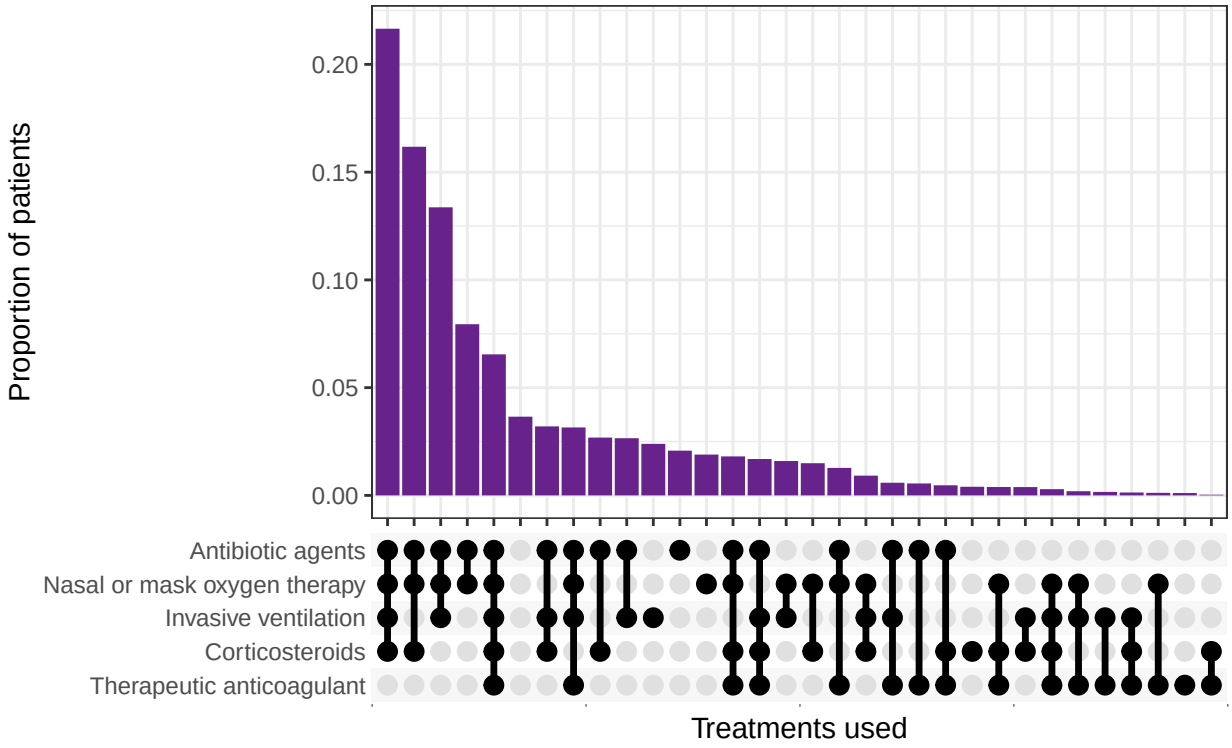
A total of 32693 patients received invasive mechanical ventilation (IMV). The mean and median durations from admission to receiving IMV were 3.2 days and 1 days respectively (SD: 4.6 days) – estimated from records on cases with complete records on dates of hospital admission and IMV onset (N = 15111). The mean, median and SD for the duration of IMV – estimated based on all 22826 cases with complete records on IMV stays – were 9.8 days, 7 days and 9.1 days respectively.

Figure 13: Treatments in the ICU/HDU population

(a) Proportions of patients receiving each treatment. Bars are annotated with a fraction indicating the number of individuals receiving each treatment over the number for which this information was non-missing.



(b) Distribution of combinations of treatments administered during ICU/HDU stay. Filled and empty circles below the x-axis indicate treatments that were and were not administered respectively.



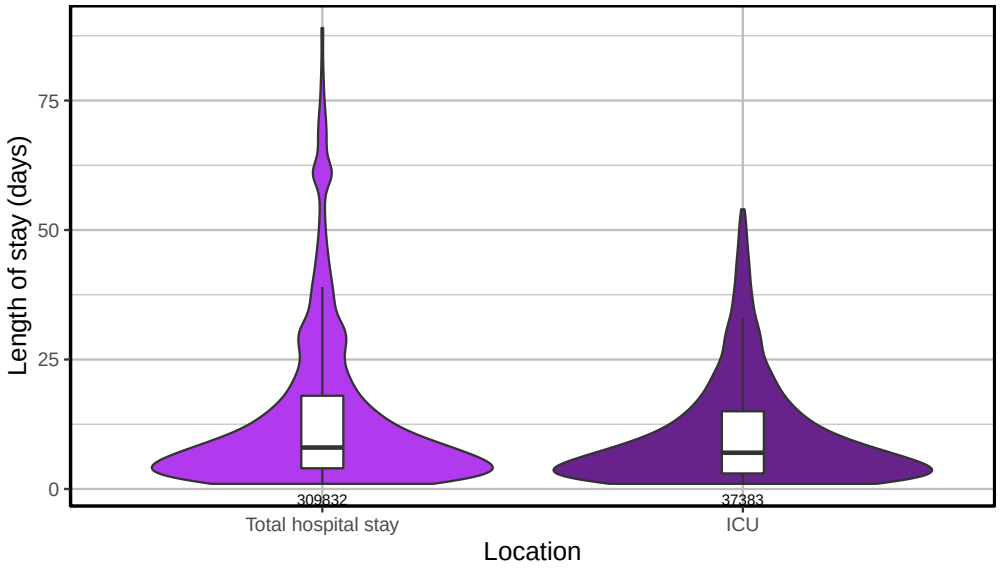
Key time variables

The key time variables are presented in Table 6. Patients tend to come to the hospital relatively early into their illness with a mean of 7 days and a median of 3 days from symptoms onset. 52.9% of ICU/HDU admissions occur within the first day at the hospital. The mean and median duration of hospital stay are 18.1 and 9 days, respectively. The duration of stay in ICU/HDU had a mean of 10 days and a median of 7 (SD: 10.3 days) – estimated on only those cases with complete records for ICU/HDU duration or ICU/HDU start/end dates (N = 40167).

Table 6: Key time variables. SD: Standard deviation; IQR: Interquartile range. Outliers (values greater than 120) were excluded prior to the computation of estimates.

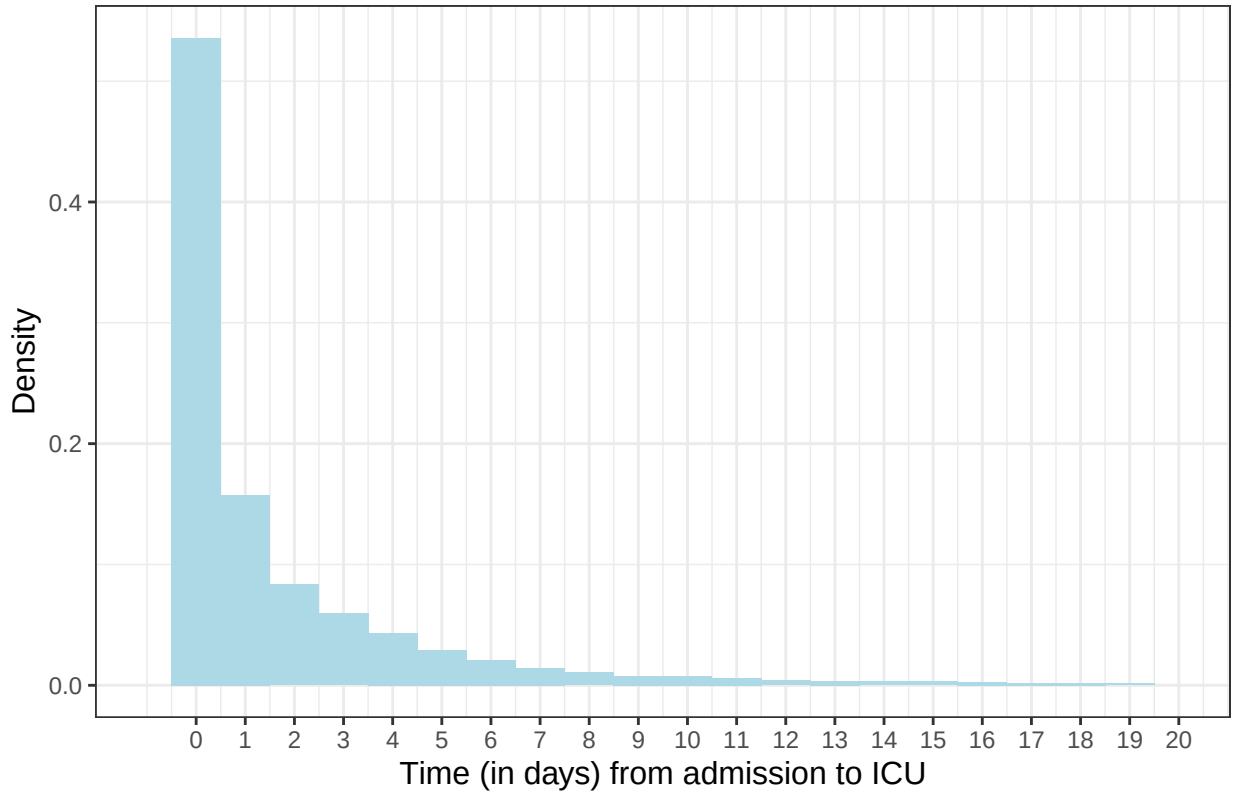
Time (in days)	Mean (observed)	SD (observed)	Median (observed)	IQR (observed)
Length of hospital stay	18.3	26.6	8	16
Symptom onset to admission	7.1	13.2	3	7
Admission to ICU entry	2.0	4.1	0	2
Duration of ICU	10.0	10.3	7	11
Admission to IMV	3.2	4.6	1	5
Duration of IMV	10.0	9.2	7	11
Admission to NIV	2.3	3.6	1	3
Duration of NIV	3.5	3.1	2	4

Figure 14: Distribution of lengths of stay for patients who were admitted to ICU/HDU: total length of stay for this group and length of stay within intensive care. This only includes cases with reported completed stays. The coloured areas indicate the kernel probability density of the observed data and the box plots show the median and interquartile range of the variable of interest.



The distribution of the number of days from admission to ICU admission is shown in Figure 15.

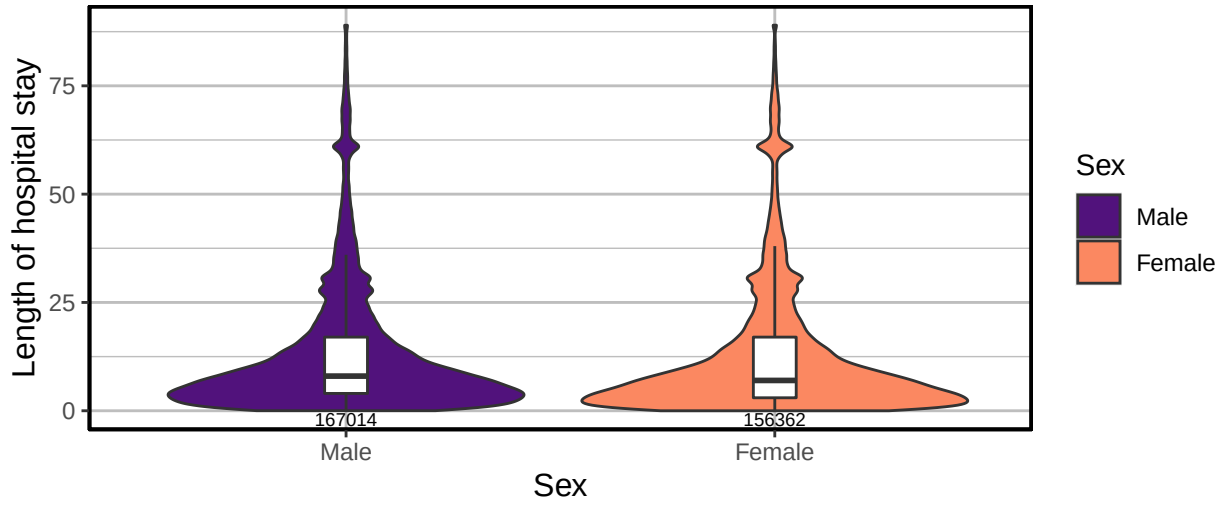
Figure 15: Distribution of time (in days) from hospital admission to ICU admission. The figure displays data on only those cases with a reported ICU start date.



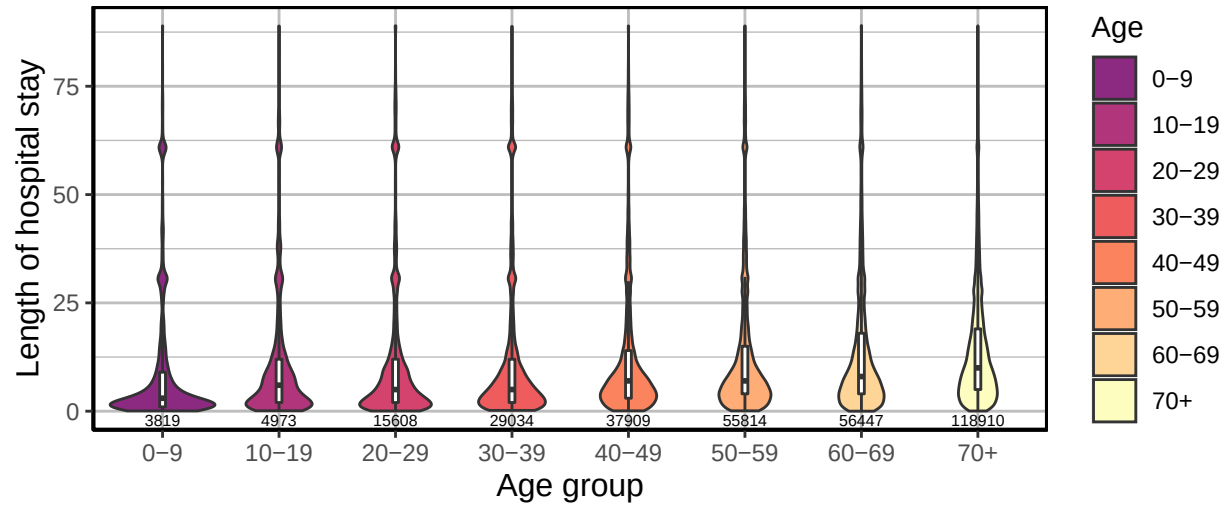
The observed mean duration for the number of days from hospital admission to outcome (death or discharge) was 18.3, with SD 26.9 days and a median of 8 days. These estimates are based on all cases which have complete records on length of hospital stay (N = 319891).The distributions of length of hospital stay are presented In Figure 16a according to sex and 16b by patient age group.

Figure 16: Distribution of length of hospital stay. This only includes cases with reported outcomes. The coloured areas indicate the kernel probability density of the observed data and the box plots show the median and interquartile range of the variable of interest.

(a) Distribution of length of hospital stay, according to sex.



(b) Distribution of length of hospital stay, according to age.



Outcomes

Outcomes are recorded for 411368 patients (92.9%), consisting of 308913 recoveries and 102455 deaths. Outcome records are unavailable for 31275 patients.

The overall estimated case fatality ratio (CFR) is 24.9% (95%CI 24.8-25) and is 37.9% (95%CI 37.5-38.3) for patients admitted to ICU/HDU - calculated out of those with data on outcome.

Figure 17: The distribution of patient status by number of days after admission. Patients with 'unknown' status have left the site at the time of report but have unknown outcomes due to missing data.

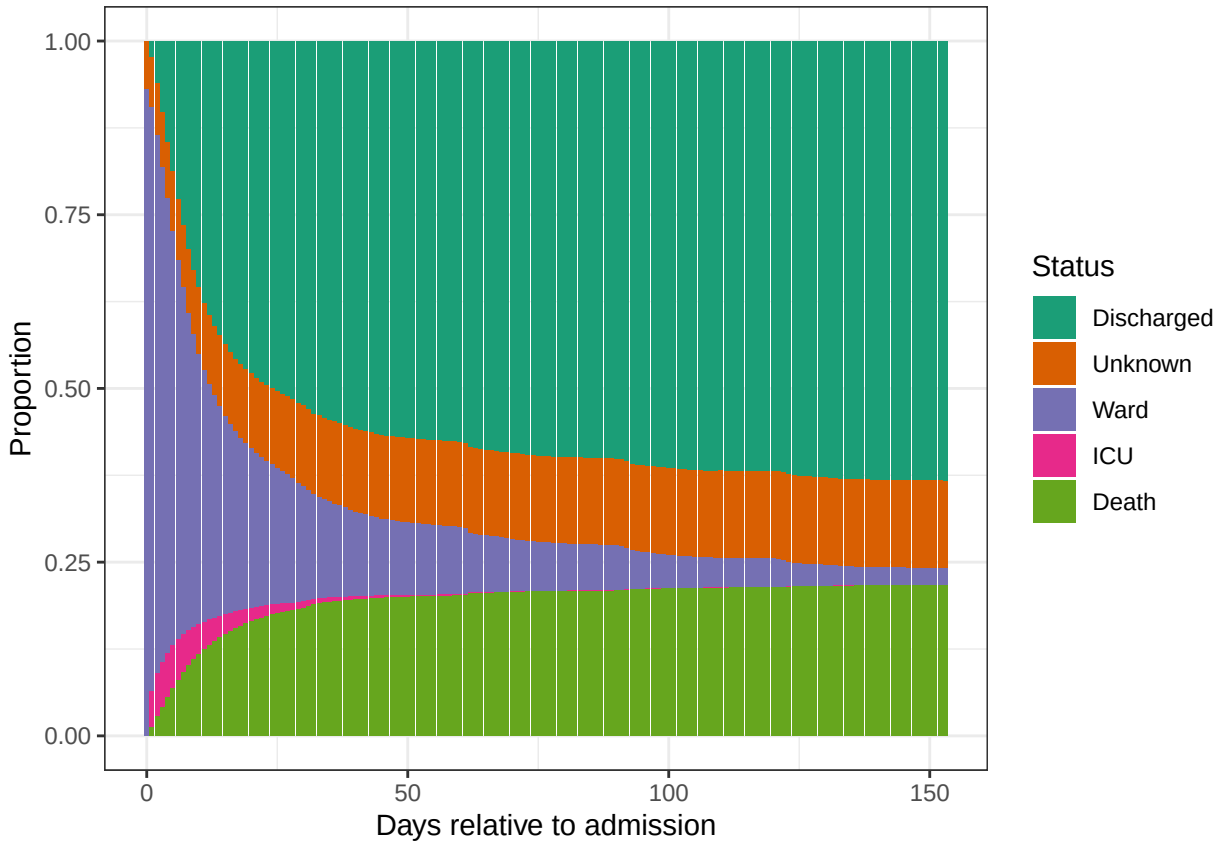
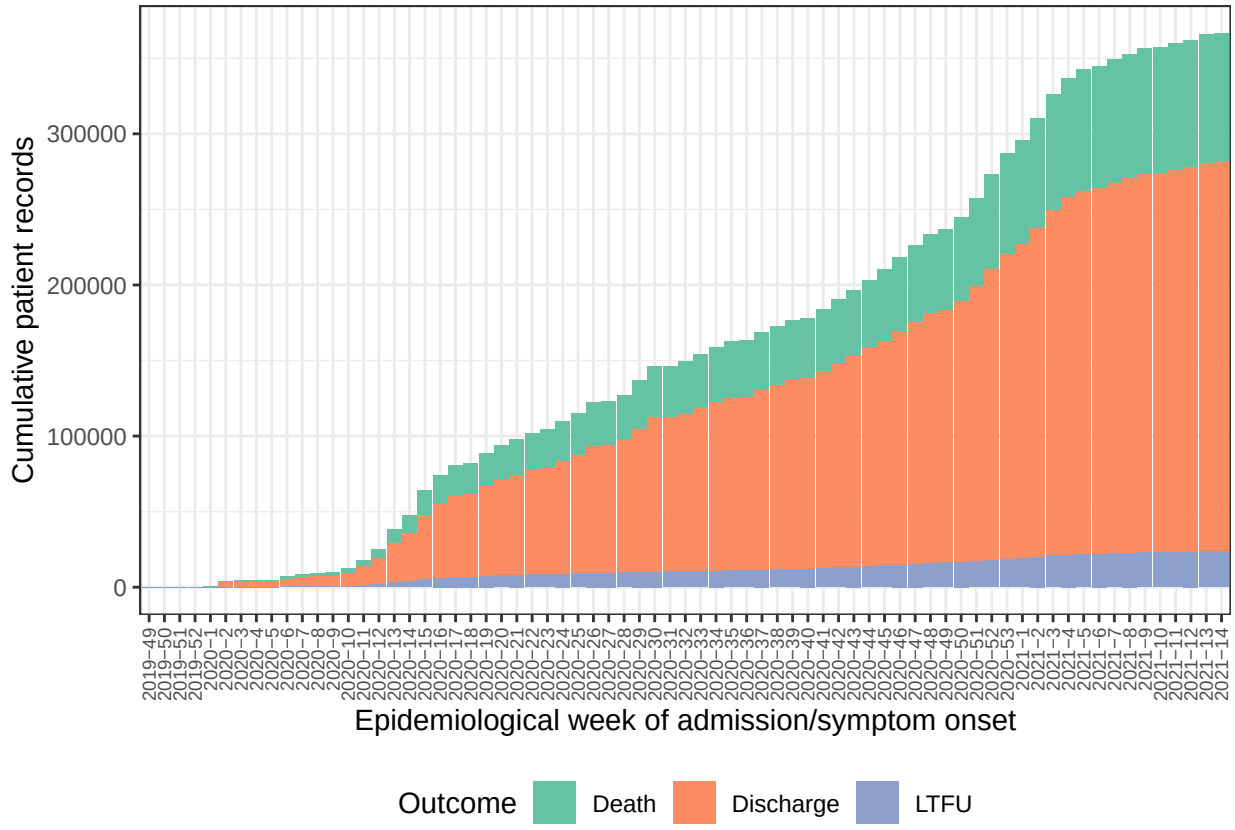


Figure 18: Cumulative patient numbers and outcomes by epidemiological week (of 2020) of admission (or, for patients infected in hospital, of symptom onset).



Discussion and conclusions

COVID-19 has tested the effectiveness of ISARIC's operating model: a global, open-source, collaborative approach set up 10 years ago to prevent illness and deaths from infectious disease outbreaks.

In January 2020, ISARIC launched its COVID-19 Clinical Characterisation Protocol (CCP) [https://isaric.org/research/covid-19-clinical-research-resources/clinical-characterisation-protocol-ccp/] and Case Report Form (CRF) [https://isaric.org/research/covid-19-clinical-research-resources/covid-19-crf/] as well as a free data management platform for researchers to upload their clinical data, globally. The ISARIC COVID-19 CCP database was open and publicly accessible from late January 2020, when less than a thousand COVID-19 cases had been reported globally; by mid-February 2020, the first patient record was successfully uploaded the platform; by mid-March 2020, the platform had ten thousand records.

Now, 18 months into the pandemic, with more than half-a-million records, the ISARIC clinical data platform has grown to become the largest international individual patient dataset of COVID-19 hospitalised cases. ISARIC is a model of global peer-to-peer collaboration, with contributions by just under 800 sites in about 60 countries, with similar representations of patients from high-income and low- and middle-income countries.

This report describes the features of COVID-19 patients in the entire cohort, made from cases accrued over 18 months with different contributions from various countries. Everyone can trace the evolution over time of the database through 14 previous versions of this report [https://isaric.org/research/covid-19-clinical-research-resources/evidence-reports/]. In addition, specific questions regarding clinical presentations, risks factors for outcomes, and trends are addressed through ad-hoc analyses.

Partners can submit ad-hoc request to perform analyses, to access the half-a-million case-based dataset, by using our Statistical Analysis Plan form (SAP; https://isaric.org/research/isaric-partner-analysis-frequently-asked-questions/). Once a SAP has been submitted, our statistical team assesses the plan for quality of research and feasibility of data analysis. Then, our clinical team provides feedback on clinical relevance and overlap with other analyses. Once this process has been completed, the SAP is sent to all ISARIC collaborators for the opportunity to review. This initial peer review process ensures that research is of the utmost quality and it helps encourage a truly participatory approach.

All ISARIC contributors are invited to participate in analyses through review and input on the SAP and the resulting publication. The outputs of our joint work are disseminated as widely as possible to inform patient care and public health policy. ISARIC aims to include the names of all those who contribute data in the cited authorship of publications, subject to the submission of contact details and confirmation of acceptance of the final manuscript within the required timelines, per ICMJE policies and the ISARIC publication policy.

What have our partners achieved Using the ISARIC and ISARIC4C databases, our partners have produced a broad range of evidence. More than 50 reports and manuscripts have been published to date, and a further 25 are in progress or under peer-review. https://isaric.org/document-library/ , https://isaric4c.net/outputs/ and https://isaric.org/research/covid-19-clinical-research-resources/accessing-covid-19-clinical-data/approved-uses-of-platform-data/.

True international collaboration during a pandemic is key to putting data into action. ISARIC partners have achieved this objective, and the results are shown in this special issue with half a million patient records.

Acknowledgement

This report is made possible through the efforts and expertise of the staff collecting data at our partner institutions across the globe, and the ISARIC Team. For a list of partners and team members, please visit rg/research/covid-19-clinical-research-resources/covid-19-data-management-hosting/covid19-clinical-data-contributors-list/.

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Romain; Basri, Muhammad Fadhli Hassin; Bastos Porto, Diego; Bastos, Diego; Battaglini, Denise; Bauer, Jules; Bautista Rincon, Diego Fernando; Bazan Dow, Denisse; Beane, Abigail; Bedossa, Alexandra; Bee, Ker Hong; Behilill, Sylvie; Beishuizen, Albertus; Beljantsev, Aleksandr; Bellemare, David; Beltrame, Anna; Beluze, Marine; Benech, Nicolas; Benjiman, Lionel Eric; Benkerrou, Dehbia; Bennett, Suzanne; Bento, Luís; Berdal, Jan-Erik; Bergeaud, Delphine; Bernal Sobrino, José Luis; Bertoli, Giulia; Bertolino, Lorenzo; Bessis, Simon; Betz, Adam; Bevilcaqua, Sybille; Bezulier, Karine; Bhatt, Amar; Bhavsar, Krishna; Bianchi, Isabella; Bianco, Claudia; Bidin, Farah Nadiah; Bikram Singh, Moirangthem; Bin Humaid, Felwa; Bin Kamarudin, Mohd Nazlin; Bissuel, François; Biston, Patrick; Bitker, Laurent; Blanco-Schweizer, Pablo; Blier, Catherine; Bloos, Frank; Blot, Mathieu; Blumberg, Lucille; Bobkova, Polina; Boccia, Filomena; Bodenes, Laetitia; Bogaarts, Alice; Bogaert, Debby; Boivin, Anne-Hélène; Bolze, Pierre-Adrien; 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O'Neil, Conar; Ong, David S.Y.; Ong, Jee Yan; Oosthuyzen, Wilna; Opavsky, Anne; Openshaw, Peter; Orakzai, Saijad; Orozco-Chamorro, Claudia Milena; Orquera, Andrés; Ortoleva, Jamel; Osatnik, Javier; Othman, Siti Zubaidah; Ouamara, Nadia; Ouissa, Rachida; Owyang, Clark; Oziol, Eric; Pabasara, H M Upulee; Pagadoy, Maïder; Pages, Justine; Palacios, Mario; Palmarini, Massimo; Palmieri, Carlo; Panarello, Giovanna; Panda, Prasan Kumar; Panda, Prasan; Paneru, Hem; Pang, Lai Hui; Panigada, Mauro; Pansu, Nathalie; Papadopoulos, Aurélie; Parke, Rachael; Parker, Melissa; Parra, Briseida; Parrini, Vieri; Pasha, Taha; Pasquier, Jérémie; Pastene, Bruno; Patauner, Fabian; Patel, Drashti; Patel, Junaid; Pathmanathan, Mohan Dass; Patrão, Luís; Patricio, Patricia; Patrier, Juliette; Patterson, Lisa; Pattnaik, Rajyabardhan; Paul, Christelle; Paul, Mical; Pauley, Ellen; Paulos, Jorge; Paxton, William A.; Payen, Jean-François; Peariasamy, Kalaiarasu; Pearse, India; Pedrera Jiménez, Miguel; Peek, Giles J.; Peelman, Florent; 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Contributing Sites

Argentina

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Australia

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Bolivia

Caja Nacional De Salud, Trinidad.

Brazil

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Canada

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Chile

Clinica Alemana DeSantiago, Santiago; Clinica Las Condes, Santiago; Instituto Nacional Del Tórax, Santiago.

China

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Colombia

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Dominican Republic

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All India Institute of Medical Sciences, Rishikesh; Apollo Hospitals Chennai, Chennai; Critical Care Asia Site A-AA-001-001, Chennai; Critical Care Asia Site A-AA-004-001, Chennai; Critical Care Asia Site A-AA-011-001, Rourkela; Critical Care Asia Site A-AA-052-011, Trivandrum; Critical Care Asia Site A-AA-005-001, Kerala; Critical Care Asia Site A-AA-007-001, Chennai; Critical Care Asia Site A-AA-015-001, Chennai; Long COVID India - Terna Specialty Hospital and Research Centre, Mumbai; Critical Care Asia Site A-AA-002-001, Chennai; Critical Care Asia Site A-AA-003-001, Chennai; Critical Care Asia Site A-AA-010-001, Bhuvaneshwar; Critical Care Asia Site A-AA-010-002, Bhuvaneshwar; Critical Care Asia Site A-AA-012-001, Jaipur; Critical Care Asia Site A-AA-014-001, Chennai; Critical Care Asia Site A-AA-053-001, Kochi.

Indonesia

Fatmawati Hospital, Jakarta; PICU Saiful Anwar Hospital, Malang; Adult ICU Saiful Anwar Hospital, Malang; National Cardiovascular Center Harapan Kita Jakarta Indonesia, Jakarta; Persahabatan Hospital, Jakarta; Hasan Sadikin Hospital, Bandung; Prof Dr R. D. Kandou Central Hospital (Paediatric), Manado; Prof Dr R. D. Kandou Central Hospital (Adult), Manado; Dr Sardjito Government Hospital (Paediatric), Yogyakarta; University Airlangga Hospital (Paediatric), Surabaya; Sanglah General Hospital (Paediatric), Bali; RSUD Dr. Soetomo, Surabaya; RSPI Prof Dr Sulianti Saroso, Jakarta.

Ireland

University Hospital - Limerick, Limerick; University Hospital - Waterford, Waterford; Connolly Hospital Blanchardstown, Dublin; Bon Secours Hospital, Cork; St Vincents University Hospital, Dublin; Galway University Hospital, Galway; Beaumont Hospital, Dublin; Tallaght University Hospital, Dublin; Children's Health Ireland, Dublin; St James's Hospital, Dublin; Beacon Hospital, Dublin; Sligo University Hospital, Sligo; Cork University Hospital, Cork; Mater Misericordiae University, Dublin; Mercy Hospital, Cork; University Hospital, Kerry; Our lady of Lourdes Drogheda, Drogheda; Wexford General Hospital, Wexford.

Israel

Rambam Hospital, Haifa; The Baruch Padeh Medical Center Poriya, Tiberias.

Italy

Ospedale Niguarda, Milan; University of Padua, Padua; University of Brescia, Brescia; Monaldi Hospital, Napoli; Ospedale Sacro Cuore Don Calabria, Negrar Di Valpolicella; Policlinicodi Orsola Universitàdi Bologna, Bologna; Azienda Ospedaliero Universitario Pisana, Pisa; Azienda Provinciale per i Servizi Sanitari della Provincia Autonoma di Trento, Arco; Ospedale San Paolo, Milan; San Martino Hospital, Genoa; Fondazione IRCCS Ca, Milan; Fondazione Policlinico Universitario Agostino Gemelli IRCCS, Rome; Ospedale Molinette, Torino; Ospedale San Gerardo, Monza; Policlinico of Padova, Padova; Istituto Mediterraneo per i Trapianti e Terapie ad Alta Specializzazione, Palermo; Borgo San Lorenzo Hospital, Trento; Ospedale Papa Giovanni XXIII - Bergamo, Bergamo; University Hospital Policlinico Paolo Giaccone, Palermo.

Japan

Kyoto Medical Centre, Kyoto; Hiroshima University, Hiroshima; Hyogo Prefectural Kakogawa Medical Center, Hyogo; Kimitsu Chuo Hospital, Chiba; Rinku General Medical Center, Osaka; Fujieda Municipal General Hospital, Fujieda; Kyoto Prefectural University of Medicine, Kyoto; Tohoku Medical and Pharmaceutical University, Sendai; Fukuoka University, Fukuoka; Yokohama City University Medical Center, Yokohama; Nagoya University Hospital, Nagoya; Kouritu Tousei Hospital, Seto City; Hokkaido University Hospital, Hokkaido; Chiba University Hospital, Chiba; Saiseikai Senri Hospital, Tochigi; Teine Keijinkai Hospital, Sapporo; Saiseikai Utsunomiya Hospital, Tochigi; St. Marianna University School of Medicine, Kawasaki; Tokyo Metropolitan Tama Medical Center, Tokyo; Shizuoka Children's Hospital, Shizuoka; Obihiro-Kosei General Hospital, Obihiro; Tohoku University, Sendai.

Kuwait

Al-Amiri & Jaber Al-Ahmed Hospitals, Kuwait City; Al-Adan Hospital, Hadiya.

Laos

Lao-Oxford-Mahosot Hospital-Wellcome Trust Research Unit, Vientiane; Salavan Provincial Hospital, Salavan; Xieng Khouang Provincial Hospital, Phonsavan; Luang Namtha Provincial Hospital, Luang Namtha.

Malawi

Malawi-Liverpool Wellcome Trust, Lilongwe.

Malaysia

National Institutes of Health (NIH), Ministry of Health Malaysia, Setia Alam; Critical Care Asia Site A-AD-001-001, Pahang; Kluang Hospital, Johor; Kuala Lumpur Hospital, WPKL; Lahad Datu Hospital, Sabah; Melaka Hospital, Melaka; Pulau Pinang Hospital, Pulau Pinang; Permai Hospital, Johor; Queen Elizabeth Hospital, Sabah; Raja Permaisuri Bainun Hospital, Perak; Raja Perempuan Zainab II Hospital, Kelantan; Sultanah Aminah Hospital, Johor; Sultanah Bahiyah Hospital, Kedah; Sultanah Nur Zahirah Hospital, Terengganu; Sungai Buloh Hospital, Selangor; Tawau Hospital, Sabah; Tengku Ampuan Afzan Hospital, Pahang; Tuanku Fauziah Hospital, Perlis; Tuanku Ja'afar, Negeri Sembilan; Sarawak General Hospital, Sarawak; Sunway Medical Centre, Selangor; Critical Care Asia Site A-AD-003-002, Kota Bharu; Critical Care Asia Site A-AD-046-001, Kuala Lumpur; Critical Care Asia Site A-AD-003-001, Kota Bharu.

Mayotte

Centre Hospitalier de Mayotte, Mamoudzou.

Mexico

Hospitales Puerta de Hierro, Jalisco; University of Guadalajara Health Sciences Center, Guadalajara.

Nepal

Critical Care Asia Site A-AE-001-001, Lalitpur; Critical Care Asia Site A-AE-002-001, Kathmandu; Critical Care Asia Site A-AE-003-001, Kathmandu; Critical Care Asia Site A-AE-004-001, Kathmandu; Critical Care Asia Site A-AE-048-011, Chitwan; Critical Care Asia Site A-AE-001-002, Lalitpur; Critical Care Asia Site A-AE-002-002, Kathmandu; Critical Care Asia Site A-AE-050-001, Kathmandu; Critical Care Asia Site A-AE-049-001, Lalitpur; Critical Care Asia Site A-AE-048-012, Chitwan.

Netherlands

Medisch Spectrum Twente, Intensive Care Center, Zutphen; Beatrix ziekenhuis, Gorinchem; Reinier de Graaf Gasthuis, Delft; Canisius Wilhelmina Ziekenhuis, Nijmenjen; Tergooi Hospital, Hilversum; Franciscus Gasthuis & Vlietland, Rotterdam; Meander Medical Centre, Amersfoort; Flevoziekenhuis, Almere; Spaarne Gasthuis, Haarlem; Ziekenhuisgroep Twente, Hengelo; Noordwest-Ziekenhuisgroep, DenHelder; Leiden University Medical Center, Leiden; Co, Amsterdam; University Medical Center Groningen, Groningen; Alrijne Hospital, Leiden; Gelre Hospitals, Zutphen; Erasmus Medical Centre, Rotterdam; Catharina Ziekenhuis, Eindhoven; Adrz, Goes; Maastricht University Medical Centre, Maastricht.

New Zealand

Waikato Hospital, Hamilton; Auckland City Hospital (CVICU), Auckland; Auckland City Hospital (DCCM 82), Auckland; Middlemore Hospital, Otahuhu; Wellington Regional Hospital, Wellington; Waitemata District Health Board, Auckland; Dunedin Public Hospital, Dunedin; Nelson Hospital, Nelson.

Norway

University Hospital of North Norway, Tromso; Oslo University Hospital, Oslo; Akershus University Hospital, Nordbyhagen; Drammen Hospital, Drammen; Baerum Sykehus, Gjettum.

Pakistan

Critical Care Asia Site A-AF-001-001, Karachi; Critical Care Asia Site A-AF-001-002, Karachi; Critical Care Asia Site A-AF-001-003, Karachi; Critical Care Asia Site A-AF-001-004, Karachi; Critical Care Asia Site A-AF-002-001, Islamabad; Critical Care Asia Site A-AF-002-003, Islamabad; Critical Care Asia Site A-AF-003-001, Karachi; Critical Care Asia Site A-AF-003-003, Karachi; Critical Care Asia Site A-AF-004-002, Peshawar; Critical Care Asia Site A-AF-004-003, Peshawar; Critical Care Asia Site A-AF-004-004, Peshawar; Critical Care Asia Site A-AF-005-001, Karachi; Critical Care Asia Site A-AF-005-004, Karachi; Critical Care Asia Site A-AF-007-001, Lahore; Critical Care Asia Site A-AF-007-002, Lahore; Critical Care Asia Site A-AF-009-002, Lahore; Critical Care Asia Site A-AF-010-001, Karachi; Critical Care Asia Site A-AF-010-002, Karachi; Critical Care Asia Site A-AF-011-001, Peshawar; Critical Care Asia Site A-AF-011-002, Peshawar; Critical Care Asia Site A-AF-011-003, Peshawar; Critical Care Asia Site A-AF-011-004, Peshawar; Critical Care Asia Site A-AF-012-002, Karachi; Critical Care Asia Site A-AF-012-003, Karachi; Critical Care Asia Site A-AF-015-002, Karachi; Critical Care Asia Site A-AF-016-004, Lahore; Critical Care Asia Site A-AF-017-001, Lahore; Critical Care Asia Site A-AF-018-003, Lahore; Critical Care Asia Site A-AF-020-001, Karachi; Critical Care Asia Site A-AF-020-003, Karachi; Critical Care Asia Site A-AF-020-004, Karachi; Critical Care Asia Site A-AF-024-002, Islamabad; Critical Care Asia Site A-AF-024-003, Islamabad; Critical Care Asia Site A-AF-026-002, Rahim yar Khan; Critical Care Asia Site A-AF-028-001, Lahore; Critical Care Asia Site A-AF-029-001; Critical Care Asia Site A-AF-030-001, Karachi; Critical Care Asia Site A-AF-004-001, Peshawar; Critical Care Asia Site A-AF-004-005, Peshawar; Critical Care Asia Site A-AF-004-006, Peshawar; Critical Care Asia Site A-AF-006-003, Karachi; Critical Care Asia Site A-AF-011-005, Peshawar; Critical Care Asia Site A-AF-020-005, Karachi; Critical Care Asia Site A-AF-022-001, Hyderabad; Critical Care Asia Site A-AF-026-001, Rahim yar Khan; Critical Care Asia Site A-AF-028-002, Lahore; Critical Care Asia Site A-AF-030-003, Karachi; Critical Care Asia Site A-AF-062-001, Sukkar; Critical Care Asia Site A-AF-064-001, Islamabad; Critical Care Asia Site A-AF-006-001, Karachi; Critical Care Asia Site A-AF-065-001, Lahore; Critical Care Asia Site A-AF-063-001, Karachi; Critical Care Asia Site A-AF-030-002, Karachi; Critical Care Asia Site A-AF-020-002, Karachi; Critical Care Asia Site A-AF-018-002, Lahore; Critical Care Asia Site A-AF-018-001, Lahore; Critical Care Asia Site A-AF-017-002, Lahore; Critical Care Asia Site A-AF-015-001, Karachi; Critical Care Asia Site A-AF-009-001, Lahore; Critical Care Asia Site A-AF-008-001, Karachi; Critical Care Asia Site A-AF-006-004, Karachi; Critical Care Asia Site A-AF-006-002, Karachi; Critical Care Asia Site A-AF-005-003, Karachi; Critical Care Asia Site A-AF-005-002, Karachi.

Peru

Clínica Internacional, Lima; Hospital Emergencia Ate Vitarte, Lima.

Poland

Institute of TB and Lung Diseases, Warsaw; Department of Children's Infectious Diseases, Medical University of Warsaw, Regional Hospital of Infectious Diseases, Warsaw; University Hospital in Krakow, Krakow; Consortium IMGEN, Piaseczno.

Portugal

Centro Hospital e Universitário de Coimbra, Coimbra; Hospital de Curry Cabral - Infectious Diseases, Lisbon; Hospital de Curry Cabral - Internal Medicine, Lisbon; Hospital Vila Franca de Xira, Lisbon; Unidade Local de Sa, Porto; Centro Hospitalar de Leiria, Leiria; Hospital Curry Cabral - Intensive Care Unit - UCIP7, Lisbon; Hospital Santa Maria, Centro Hospitalar Universitário Lisboa Norte, Amadora; Hospital Da Luz, Lisbon; Hospital de São José -U.U.M., Lisbon; Unidade Local de Sa, Viana Do Castelo; Centro Hospitalar Universitário do Porto (CHUP), Porto; São João Hospital Centre, Porto; Hospital São Francisco

Xavier, Lisbon; Centro Hospitalar Vila Nova de Gaia/Espinho, Espinho; Hospital Espírito Santo de Évora, Évora; Hospital Egas Moniz, Lisboa; Centro Hospitalar de Tondela-Viseu, Viseu; Hospital de Abrantes - ICU, Abrantes; Hospital Professor Doutor Fernando Fonseca, Amadora; Hospital Garcia de Orta, Almada; Hospital Beatriz Ângelo, Loures; Centro Hospitalar Universitário do Algarve, Portimão.

Qatar

Hamad General Hospital, Doha.

Réunion

Centre Hospitalier Félix-Guyon, Saint-Denis; Centre Hospitalier Universitaire de Saint-Pierre, Saint-Pierre.

Romania

National Institute for Infectious Diseases Matei Bals, Bucharest; Grigore T Popa University of Medicine and Pharmacy, Bucharest.

Russia

Sechenov University, Moscow.

Saint Martin

Centre Hospitalier Universitaire de Martinique, Fort-de-France.

Saudi Arabia

King Abdulaziz Medical City, Riyadh; King Faisal Hospital Research Center, Riyadh.

Singapore

National University Hospital, Singapore.

South Africa

Groote Schuur Hospital, Cape Town; Netcare Unitas ECMO Centre; National Institute for Communicable Diseases, South Africa, Johannesburg; Aberdeen Hospital; Adelaide Hospital; Aliwal North Hospital; All Saints Hospital; Andries Vosloo Hospital; Aurora Hospital; Aurora Rehabilitation Hospital; Bambisana Hospital; Bedford Hospital; Bisho Hospital; Burgersdorp Hospital; Butterworth Hospital; Cala Hospital; Canzibe Hospital; Care Cure Queenstown; Cathcart Hospital; Cecilia Makiwane Hospital; Cloete Joubert Hospital; Cofimvaba Hospital; Cradock Hospital; Dora Nginza Hospital; Dordrecht Hospital; Dr Malizo Mpehle Hospital; Elizabeth Donkin Hospital; Elliot Hospital; Empilisweni Hospital; Empilweni Hospital; Fort Beaufort Hospital; Fort England Hospital; Frere Hospital; Frontier Hospital; Glen Grey Hospital- Lady Frere; Greenville Hospital; Grey Hospital; Hewu Hospital; Holy Cross Hospital; Humansdorp Hospital; Indwe Hospital; Isilimela Hospital; Isivivana Private Hospital; Jamestown Hospital; Jose Pearson TB Hospital; Kareedouw Hospital; Khotsong TB Hospital; Komani Hospital; Komga Hospital; Lady Grey Hospital; Life Beacon Bay Private Hospital; Life East London Private Hospital; Life Hunters Craig Hospital; Life Queenstown Private Hospital; Life St Dominic's Hospital; Life St George's Hospital; Livingstone Hospital; Maclear Hospital; Madwaleni Hospital; Madzikane Ka Zulu Memorial Hospital; Martjie Venter Hospital; Matatiele Private Hospital; Mercantile Private Hospital; Midland Hospital; Mjanyana Hospital; Molteno Hospital; Mount Ayliff Hospital; Mthatha Private Hospital; Nelson Mandela Academic Hospital; Nessie Knight Hospital; Netcare Cuyler Hospital; Netcare Greenacres Hospital; Nkqubela Chest Hospital; Nompumelelo Hospital; Nurture Queenstown; Nurture Sunnyside; Orsmond TB Hospital; Port Alfred Hospital; Rev Dr Elizabeth Mamisa Chabula-Nxiweni Field Hospital; Sawas Hospital; Settlers Hospital PPP; Sipetu Hospital; SS Gida Hospital; St Barnabas Hospital (Ntlaza); St Elizabeth Hospital; St Francis Hospital (aliwal North); St Lucy's Hospital; St Mary's Hospital - Umtata; St Patrick's Hospital; Sterkstroom Hospital; Steynsburg Hospital; Stutterheim Hospital; Sundays Valley Hospital; Tafalofefe Hospital; Tayler Bequest Hospital (matatiele); Taylor Bequest Hospital (mount Fletcher); Tower Psychiatric Hospital; Uitenhage Hospital; Umlamli Hospital; Umtata General Hospital; Victoria Hospital (alice); Wilhelm Stahl Hospital; Willowmore Hospital; Winterberg Tb Hospital; Zithulele hospital; 3 Military Hospital; Albert Nzula District Hospital; Bloemcare Psychiatric Hospital; Boitumelo Hospital; Bongani Nurses' Dormitory Surge Facility; Bongani Regional

Hospital; Botshabelo Hospital; Busamed Bram Fischer International Airport Hospital; Busamed Harrismith Private Hospital; Cairnhall Hospital; Corona Sub-Acute Hospital; Diamant Hospital; Dihlabeng Hospital; Dr Js Moroka Hospital; Elizabeth Ross Hospital; EmoyaMed Private Hospital; Fezi Ngubentombi Provincial Hospital; Hillandale Health Care Centre; House Idahlia Critical Care Surge Facility; Itemoheng Hospital; John Daniel Newsberry Hospital; Katleho Hospital; Life Pasteur Hospital; Life Rosepark Hospital; Mafube Hospital; Manapo Hospital; MANCOVS Surge Facility; Mediclinic Bloemfontein; Mediclinic Hoogland; Mediclinic Welkom; Mohau Hospital; Nala Hospital; National District Hospital; Netcare Kroon Hospital; Netcare Pelonomi Private Hospital; Netcare Vaalpark Clinic; Nketoana District Hospital; Nurture Woodlands (Mental Health Institution); Parys Hospital; Pelonomie Hospital; Phekolong Hospital; Phumelela Hospital; Phuthuloha Hospital; RH Matjhabeng Hospital; Riemland Clinic; Senorita Ntlabathi District Hospital; St Helena GM Hospital; Stoffel Coetzee Hospital; Thebe Hospital; Thusanong Hospital; Tokollo Hospital; Universitas Hospital; Universitas Private Hospital; Universitas Underground Parking Surge Facility; Winburg Hospital; Arwyp Medical Centre; Bertha Gxowa Hospital; Bheki Mlangeni Hospital; Botshelong Empilweni Hospital; Botshilu Private Hospital; Bronkhorstspruit Hospital; Bryanston Subacute; Busamed Modderfontein Private Hospital Orthopaedic and Oncology Centre; Carletonville Hospital; Charlotte Maxeke Hospital; Chris Hani Baragwanath Hosp; Clinix Naledi Nkanyezi Hospital; Clinix Solomon Stix Morewa Hospital; Cullinan Rehabilitation Hospital; Daxina Hospital; Donald Gordon Medical Centre; Dr George Mukhari Hospital; Dr S K Matseke Memorial Hospital; Dr Yusaf Dadoo Hospital; Edenvale Hospital; Eskom Academy of Learning Quarantine Site; Esselenpark School of Excellence Quarantine Site; Far East Rand Hospital; Fisha wellness Hospital; Heidelberg Hospital; Helen Joseph Hospital; Jubilee Hospital; Kalafong Hospital; Kopanong Hospital; Lenmed Ahmed Kathrada Hospital; Lenmed Randfontein Private Hospital; Lenmed Zamokuhle Private Hospital; Leratong Hospital; Life Bedford Gardens Hospital; Life Brackenview; Life Brenthurst Hospital; Life Carstenhof Hospital; Life Carstenview Hospital; Life Dalview Hospital; Life Eugene Marais Hospital; Life Flora Hospital; Life Fourways Hospital; Life Genesis Clinic Saxonwold; Life Glynnview Hospital; Life Groenkloof Hospital; Life Health Care (Faerie Glen); Life Poortview Hospital; Life Riverfield Rehab Centre; Life Robinson Pvt Hospital; Life Roseacres Hospital; Life Springs Parkland Hospital; Life Suikerbosrand Hospital; Life The Glynnwood Hospital; Life Wilgeheuwel Hospital; Life Wilgers Hospital; Louis Pasteur Private Hospital; Lynnmed Clinic; Mamelodi Hospital; Medforum Private Hospital; Mediclinic emfuleni; Mediclinic Gynaecological Hospital; Mediclinic Heart Hospital; Mediclinic kloof; Mediclinic Legae; Mediclinic Midstream; Mediclinic Morningside; Mediclinic Muelmed; Mediclinic Sandton; Mediclinic Vereeniging; Midvaal Private Hospital; Morehill Clinic Physical rehab; N17 Hospital; Nasrec Quarantine Site; Netcare Akasia Hospital; Netcare Bougainville Hospital; Netcare Clinton; Netcare Femina Hospital; Netcare Garden City Hospital; Netcare Jakaranda Hospital; Netcare Krugersdorp Hospital; Netcare Lakeview Hospital; Netcare Linksfield Hospital; Netcare Linkwood Hospital; Netcare Linmed Hospital; Netcare Milpark Hospital; Netcare Montana Hospital; Netcare Moot Hospital; Netcare Mulbarton Hospital; Netcare Olivedale Hospital; Netcare Optiklin Hospital; Netcare Pinehaven Hospital; Netcare Pretoria-East Hospital; Netcare Rehabilitation Hospital; Netcare Rosebank Hospital; Netcare Sunninghill Hospital; Netcare Sunward Park Hospital; Netcare Union Hospital; Netcare Unitas Hospital; Netcare Waterfall Hospital; New Kensington Clinic (Life); Nurture Rynmed; Nurture Vereeniging; ODI Community Hospital; Park Lane Clinic; Pholosong Hospital; Pretoria Eye Institute Arcadia; Pretoria Urology Hospital; Pretoria West Hospital; Rahima Moosa Mother And Child Hospital; RH Rand Hospital; Sebokeng Hospital; Sizwe Tropical Diseases Hosp; South Rand Hospital; Sterkfontein Hospital; Steve Biko Academic Hospital; Sunshine Hospital; Tambo Memorial Hospital; Tara H Moross Hospital; Telkom Learning Centre Quarantine Site; Tembisa Hospital; The Fountain Private Hospital; Thelle Mogoerane Regional Hospital; Tshepo-Themba Private Hospital; Tshwane District Hospital; Tshwane Rehabilitation Hospital; Vista Clinic; Weskoppies Hospital; Zuid Afrikaans Hospital; AbaQulusi Private Hospital; Addington Hospital; Ahmed Al-Kadi Private Hospital; Benedictine Hospital; Bethesda Hospital; Busamed Gateway Private Hospital; Busamed Hillcrest Private Hospital; Capital hospital; Catherine Booth Hospital; Ceza Hospital; Charles Johnson Memorial District Hospital; Christ The King Hospital; Clairwood Hospital; Daymed private hospital; Doris Goodwin Hospital; Dundee Hospital; Durdoc hospital; East Griqualand & Usher Memorial Hospital; Eden Gardens Private Hospital; Edendale Hospital; Ekombe Hospital; Emmaus Hospital; Eshowe Hospital; Estcourt Hospital; Fort Napier Hospital; General Justice Gizenga Mpanza Hospital; Gj Crooke's Hospital; Grey's Hospital; Greytown Hospital; Greytown Specialized TB Hospital; Hibiscus Cato Ridge Private Hospital; Hibiscus private hospital; Highway Sub-Acute; Hillcrest Hospital; Hlabisa Hospital; Inkosi Albert Luthuli Hospital; Itshelejuba Hospital; JMH

Ascot Park Hospital; JMH City Hospital; JMH Isipingo Hospital; King Dinuzulu Hospital; King Edward VIII Hospital; Kokstad Private Hospital; KwaDukuza Private Hospital; Kwa-Magwaza Hospital; La Verna private hospital; Ladysmith Hospital; Lenmed Ethekwini Hospital and Heart Centre; Life Chatsmed Garden Hospital; Life empangeni private hospital; Life Entabeni Hospital; Life hilton private hospital; Life Mt Edgecombe Hospital; Life the Crompton hospital; Life westville hospital; Madadeni Hospital; Mahatma Gandhi Memorial Hospital; Manguzi Hospital; Mbongolwane Hospital; Mccords Hospital; Mediclinic Howick; Mediclinic pietermaritzburg; Mediclinic Victoria; Medicross Procare; Medicross Richards Bay Day Theatre; Medicross Wembley House; Melomed Richardsbay HOSPITAL; Midlands Medical Centre Private Hospital; Montebello Hospital; Mosvold Hospital; Mseleni Hospital; Murchison Hospital; Netcare Alberlito Hospital; Netcare Kingsway Hospital; Netcare Margate Hospital; Netcare Parklands Hospital; Netcare St Anne's Hospital; Netcare St Augustine Hospital; Netcare The Bay Hospital; Netcare Umhlanga Hospital; Newcastle Hospital; Newcastle Private Hospital; Ngwelezana Hospital; Nkandla Hospital; Nkonjeni Hospital; Nurture Ilembe; Osindisweni Hospital; Othobothini CHC; Port Shepstone Hospital; Prince Cyril Zulu Cdc; Prince Mshiyeni Hospital; Queen Nandi Regional Hospital; Richmond Hospital; Rietvlei Hospital; RK Khan Hospital; Shelly Beach Private Hospital; Shifa private hospital; St Aidan's Mission Hospital; St Andrews Hospital; St Apollinaris Hospital; St Margarets Hospital; St Mary's Hospital; Thulasizwe Hospital; Town Hill Hospital; Umphumulo Hospital; Untunjambili Hospital; Vryheid Hospital; Wentworth Hospital; Botlokwa Hospital; Cn Phatudi Hospital; Dilokong Hospital; Donald Fraser Hospital; Elim Hospital; Ellisras Hospital; Evuxakeni Hospital; FH Odendaal Hospital; George Masebe Hospital; Groblersdal Hospital; Hayani Psychiatric Hospital; Helene Franz Hospital; Jane Furse Hospital; Kgapane Hospital; Lebowakgomo Hospital; Letaba Hospital; Louis Trichardt Hospital; Malamulele Hospital; Mankweng Hospital; Maphuta L Malatji Hospital; Matlala Hospital; Mecklenburg Hospital; Mediclinic Lephalale; Mediclinic Limpopo; Mediclinic Thabazimbi; Mediclinic tzaneen; Medleb; Messina Hospital; Modimolle MDR TB Hospital; Mokopane Hospital; Netcare pholoso hospital; Nkhensani Hospital; Philadelphia Hospital; Polokwane Hospital; Sekororo Hospital; Seshego Hospital; Siloam Hospital; St Rita's Hospital; Thabamoopo Psychiatric Hosp; Thabazimbi Hospital; Tshilidzini Hospital; Van Velden Hospital; Voortrekker Hospital; Warmbaths Hospital; WF Knobel Hospital; Witpoort Hospital; Zebediela Hospital; Zoutpansberg Private Hospital; Amajuba Memorial Hospital; Barberton Hospital; Belfast Hospital (HA Grove); Bethal Hospital; Carolina Hospital; Elsie Ballot Hospital; Emalahleni Private Hospital; Embhuleni Hospital; Ermelo Provincial Hospital; Evander Hospital; Kiaat Private hospital; Kwamhlanga Hospital; Life Cosmos Hospital; Life Midmed Hospital; Lydenburg Hospital; Mapulaneng Hospital; Matibidi Hospital; Matikwana Hospital; Mediclinic Ermelo; Mediclinic Highveld; Middelburg Hospital; Mmametlhake Hospital; Nelspruit Medi Clinic; Piet Retief Hospital; RH Phodiclinic; RH Piet Retief Hospital; Rob Ferreira Hospital; Sabie Hospital; Shongwe Hospital; Standerton Hospital; Standerton Tb Hospital; Tb Specialised Hospital (barberton); Themba Hospital; Tintswalo Hospital; Tonga Hospital; Waterval-boven Hospital; Witbank Hospital; Beethoven Recovery Centre; Brits Hospital; Duff Scott Memorial Hospital; Ganyesa Community Hospital; Job Shimankana Tabane Hospital; Joe Morolong Memorial Hospital; Klerksdorp Hospital; Life Anncron Hospital; Life Peglerae Hospital(pty)ltd; Mahikeng Provincial Hospital; Maseve Filed - Royal Bafokeng (priv); Medicare private hospital; Mediclinic Brits; Mediclinic potchefstroom; Mooimed Private Hospital; Netcare ferncrest hospital; Potchefstroom Hospital; Schweizer Reneke Hospital; Sunningdale Hospital; Taung Hospital; Tshepong Hospital; Victoria Private Hospital; Vryburg private hospital; West Vaal Hospital; Wilmed Park Private Hospital; Abraham Esau Hospital; Bill Pickard Hospital; De Aar Hospital; Douglas CHC; Dr Harry Surtie Hospital; Fritz Visser Hospital; Hopetown Hospital; Kakamas Hospital; Kathu private hospital; Keimoes Hospital; KimMed Private Hospital; Kuruman Hospital; Lenmed Bokamoso Private Hospital; Lenmed Royal Hospital and Heart Centre; Mani Dipico Hospital; Mediclinic Gariep; Mediclinic Kimberley; Mediclinic Upington; Medicross Upington Day Theatre; Postmasburg Hospital; Prieska Hospital; Prof ZK Matthews Hospital; Robert Mangaliso Sobukwe Hospital; Springbok Hospital; 2 Military Hospital; Alan Blyth Hospital; Alexandra Hospital; Bayview Private Hopital (Life); Beaufort West Hospital; Brackengate Intermediate Care; Brewelskloof Hospital; Brooklyn Chest Hospital; Busamed - Paardevlei private hospital; Caledon Hospital; Cape Gate Mediclinic; Carewell Sub-Acute Hospital; Ceres Hospital; Citrusdal Hospital; Clanwilliam Hospital; Crescent Clinic; CTICC COVID Intermediate Care; DP Marais Santa Centre; Eerste River Hospital; False Bay Hospital; George Hospital; Groote Schuur Hospital; Hanover Park Clinic Wc Par; Harry Comay Hospital Wc Hch; Heideveld Cdc Wc Hvp; Heideveld Emergency Centre; Helderberg Hospital; Helderberg Village, Somerset West; Hermanus Hospital; Karl Bremer Hospital; Khayelitsha Dist Hospital; Knysna Hospital;

Knysna Private Hospital Wc Kvh; Laingsburg Hospital; Lapa Munnik Hospital; Lentegeur Hospital; Life Kingsbury Hospital; Life Vincent Pallotti Hospital; Life Westcoast Private Hospital; Malmesbury Infectious Disease Hosp Wc Mid; Mediclinic Cape Town; Mediclinic Constantiaberg; Mediclinic Durbanville; Mediclinic Geneva; Mediclinic george hospital; Mediclinic Hermanus; Mediclinic Klein Karoo; Mediclinic Louis Leipoldt; Mediclinic Milnerton; Mediclinic Paarl; Mediclinic Panorama; Mediclinic Plettenberg Bay; Mediclinic Stellenbosch; Mediclinic Vergelegen; Mediclinic Winelands Orthopaedic Hospital; Mediclinic Worcester; Medicross Cape Town Foreshore Theatre; Medicross langeberg; Melomed bellville; Melomed Gatesville; Melomed Mitchell's Plain; Melomed Tokai Private Clinic; Mitchell's Plain Covid Field Intermediate Care; Mitchell's Plain District Hosp; Montagu Hospital; Mossel Bay Hospital; Mowbray Maternity Hospital; Murraysburg Hospital; Netcare Blaauwberg Hospital; Netcare Ceres Hospital; Netcare Christiaan Barnard Memorial Hospital; Netcare Kuils River Hospital; Netcare N1 City Hospital; New Somerset Hospital; Nurture Cape View; Nurture Newlands; Otto Du Plessis Hospital; Oudtshoorn Hospital; Paarl Hospital; Prince Albert Hospital; Radie Kotze Hospital; Red Cross Childrens Hospital; Riversdale Hospital; Robertson Hospital; Rondebosch medical centre; Sonstraal Hospital; Stellenbosch Hospital; Stikland Psychiatric Hospital; Swartland Hospital; Swellendam Hospital; Tygerberg Hospital; Uct Private Academic Hospital; Uniondale Hospital; Valkenberg Hospital; Victoria Hospital; Vredenburg Hospital; Vredendal Hospital; Wesfleur Hospital; Western Cape Rehabilitation Centre; Worcester Hospital Wc Woc; National Institute for Communicable Diseases, South Africa, Johannesburg.

South Korea

Keimyung University Dong San Hospital, Daegu; Seoul National University Bundang Hospital, Seoul; Chonnam National University Hospital, Dong-gu; Severance Hospital, Seoul; Kyung Pook National University Chilgok Hospital, Daegu.

Spain

Hospital del Mar, Barcelona; La Paz Hospital, Madrid; University Hospital Virgen del Rocío / Institute of Biomedicine of Seville, Seville; Hospital Ramon y Cajal, Madrid; Reina Sofia University Hospital, Cordoba; Hospital Puerta de Hierro Majadahonda, Madrid; Hospital Universitario Virgen de Valme, Seville; Hospital Universitario Dr Negrín, Las Palmas; Hospital Nuestra Señora de Gracia, Zaragoza; Rio Hortega University Hospital, Valladolid; Hospital Universitari Sant Joan D'Alacant, Alicante; Hospital Universitari Sagrat Cor, Barcelona; San Pedro de Alcantara Hospital, Cáceres; Hospital Clinic, Barcelona; Hospital 12 de Octubre, Madrid; Hospital Vall d'Hebron, Barcelona; Hospital Verge de la Cinta, Tortosa; Hospital Universitario de Alava, Araba.

Taiwan

National Taiwan University Hospital, Taipei City.

Thailand

Siriraj Piyamaharajkarun Hospital (SiPH), Bangkok.

Turkey

Marmara University Hospital, Istanbul.

Ukraine

Lugansk State Medical University - Department of Internal Medicine No2, Lugansk; Kharkiv Regional Clinical Infectious Diseases Hospital, Kharkiv.

United Kingdom

ISARIC4C; ISARIC Global Support Centre, Oxford; Airedale General Hospital; Alder Hey Children's NHS Foundation Trust; Royal Gwent Hospital; St Peter's Hospital; Blackberry Hill Hospital; Queen's Hospital; Barnsley Hospital; The Royal London Hospital; Basildon University Hospital; Bedford Hospital; Bedford Hospital South Wing; Luton & Dunstable Hospital; Bryn Beryl Hospital; Cefni Hospital; Chirk Community Hospital; Colwyn Bay Community Hospital; Deeside Community Hospital; Denbigh Community Hospital; Dolgellau & Barmouth District Hospital Site; Eryri Hospital; Holywell Community Hospital; Llandudno

General Hospital Site; Mold Community Hospital; Ruthin Community Hospital; Wrexham Maelor Hospital; Ysbyty Alltwen; Ysbyty Glan Clwyd; Ysbyty Gwynedd; Ysbyty Penrhos Stanley; B1 BSMHT HQ; Moseley Hall Hospital; Birmingham Children's Hospital; Penn Hospital; Blackpool Victoria Hospital; Royal Bolton Hospital; Lynfield Mount Hospital; Bradford Royal Infirmary; Princess Royal Hospital; Royal Sussex County Hospital; Stoke Mandeville Hospital; Wycombe Hospital; Huddersfield Royal Infirmary; Addenbrooke's Hospital; CUH at Basildon University Hospital; Fulbourn Hospital; Noahs Ark Childrens Hospital for Wales; University Hospital of Wales; Chelsea & Westminster Hospital; West Middlesex University Hospital; Bowmere Hospital; Countess of Chester Hospital; Chesterfield Royal Hospital; Trengweath; Darlington Memorial Hospital; University Hospital of North Durham; Caludon Centre; Croydon University Hospital; St Nicholas Hospital (Newcastle Upon Tyne); Prince Charles Hospital Site; The Royal Glamorgan Hospital; Ysbyty Cwm Cynon; Ysbyty Cwm Rhondda; Darent Valley Hospital; Derbyshire Healthcare NHS Foundation Trust; Wonford House; Bassetlaw Hospital; Doncaster Royal Infirmary; Dorset County Hospital; Alderney Hospital; Blandford Community Hospital; Bridport Community Hospital; Victoria Hospital W'Borne; Westminster Memorial Hospital; Weymouth Community Hospital; Lister Hospital; Macclesfield District General Hospital; Kent & Canterbury Hospital; Queen Elizabeth The Queen Mother Hospital; William Harvey Hospital (Ashford); Royal Blackburn Hospital; Broomfield Hospital; Colchester General Hospital; Ipswich Hospital; Conquest Hospital; Eastbourne District General Hospital; St Helier Hospital; Frimley Park Hospital; Wexham Park Hospital; Queen Elizabeth Hospital; George Eliot Hospital - Acute Services; Charlton Lane Site; Cirencester Hospital; Dilke Memorial Hospital; Stroud General Hospital; Tewkesbury General Hospital; Wotton Lawn Hospital; Gloucestershire Royal Hospital; Great Ormond Street Hospital Central London Site; The Great Western Hospital; St Thomas' Hospital; Basingstoke and North Hampshire Hospital; Royal Hampshire County Hospital; Harrogate District Hospital; Trust Head Office; Homerton University Hospital; Urgent Care Centre; Castle Hill Hospital; Hull Royal Infirmary; Trust Headquarters; Bronglais General Hospital; Glangwili Hospital Child Health Section; Prince Philip Hospital; Withybush General Hospital; Charing Cross Hospital; Hammersmith Hospital; St Mary's Hospital (HQ); St Mary's Hospital; James Paget University Hospital; Beech House; Kettering General Hospital; King's College Hospital (Denmark Hill); Kingston Hospital; Lantern Centre; Royal Preston Hospital; The Mount; Stockdale House; Leeds General Infirmary; St James's University Hospital; Community Rehabilitation Team (East); Leicestershire Partnership NHS Trust Mental Health Services; Queen Elizabeth Hospital; University Hospital Lewisham; Lincolnshire Community Health Services Unit 11; Lincolnshire Partnership NHS Foundation Trust; Liverpool Heart and Chest Hospital NHS Trust HQ; Royal Liverpool University Hospital; University Hospital Aintree; Walton Hospital; Liverpool Womens Hospital; Central Middlesex Hospital; Ealing Hospital; Northwick Park Hospital; St Marks Hospital; The Maidstone Hospital; The Tunbridge Wells Hospital; Manchester Royal Infirmary; Royal Manchester Children's Hospital; Trafford General Hospital; Wythenshawe Hospital; Medway Maritime Hospital; Ashworth Hospital; Southend Hospital; Leighton Hospital; Pinderfields General Hospital; St George's Hospital; Milton Keynes Hospital; University Hospital Ayr; University Hospital Crosshouse; Borders General Hospital; Dumfries & Galloway Royal Infirmary; Adamson Hospital; Cameron Hospital; Glenrothes Hospital; Victoria Hospital; Forth Valley Royal Hospital; Aberdeen Royal Infirmary; Queen Elizabeth University Hospital; Caithness General Hospital; Campbeltown Hospital; Cowal Community Hospital; Lorn and Islands Hospital; Raigmore Hospital; Rni Community Hospital; Hairmyres Hospital; Monklands District General Hospital; Wishaw General Hospital; Royal Hospital for Sick Children (Edinburgh); Royal Infirmary of Edinburgh at Little France; St John's Hospital; Western General Hospital; Golden Jubilee National Hospital; Ninewells Hospital; Amherst Court; Livewell Southwest; Norfolk & Norwich University Hospital; Hellesdon Hospital; Norwich Community Hospital; Southmead Hospital; Cockermouth Hospital; Copeland Unit; Cumberland Infirmary; Keswick Hospital; Penrith Hospital; West Cumberland Hospital; North Middlesex Hospital; Harplands Hospital; University Hospital of North Tees; Hinchingbrooke Hospital; Peterborough City Hospital; Hollins Park; Northampton General Hospital (Acute); North Devon District Hospital; Diana, Princess of Wales Hospital; Scunthorpe General Hospital; North Tyneside General Hospital; Northumbria Specialist Emergency Care Hospital; Wansbeck Hospital; Nottingham University Hospitals NHS Trust - City Campus; Nottingham University Hospitals NHS Trust - Queen's Medical Centre Campus; John Radcliffe Hospital; Fairfield General Hospital; North Manchester General Hospital; Royal Oldham Hospital; Poole General Hospital; Queen Alexandra Hospital; Doncaster - Tickhill Road Site; North Lincs - Great Oaks Inpatient Unit; Rotherham Older People's Mental Health Services; Royal Berkshire Hospital; Harefield Hospital; Royal Brompton Hospital; Royal Cornwall Hospital (Treliske); Royal Devon & Exeter

Hospital (Wonford); Barnet Hospital; Royal Free Hospital; Royal Papworth Hospital (Papworth Everard); Royal Surrey County Hospital; Royal United Hospital; Salford Royal; Poole General Hospital; Salisbury District Hospital; City Hospital; Sandwell General Hospital; Sheffield Children's Hospital; Forest Close; Forest Lodge; Grenoside Grange; Michael Carlisle Centre; The Longley Centre; Northern General Hospital; Royal Hallamshire Hospital; King's Mill Hospital; Royal Shrewsbury Hospital; Shropshire Community Health NHS Trust HQ; St Mary's Health Campus; Western Community Hospital; Musgrove Park Hospital; The James Cook University Hospital; South Tyneside District Hospital; Sunderland Royal Hospital; Warwick Hospital; Springfield University Hospital; Fieldhead Hospital; Southern Health & Social Care Trust; Moorgreen Hospital; Southport & Formby District General Hospital; St George's Hospital (Tooting); Whiston Hospital; Stepping Hill Hospital; Abraham Cowley Unit; East Surrey Hospital; Brighton General Hospital; Trust Headquarters; Morriston Hospital; Tameside General Hospital; Tees, Esk, Wear Valley NHS Trust (Durham); The Christie; Clatterbridge Cancer Centre -Wirral; Russells Hall Hospital; Hillingdon Hospital; The Royal Victoria Infirmary; Princess Alexandra Hospital; The Queen Elizabeth Hospital; Robert Jones & Agnes Hunt Orthopaedic Hospital; Rotherham District General Hospital; Royal Bournemouth General Hospital; The Royal Marsden Hospital (London); The Royal Marsden Hospital (Surrey); Royal Orthopaedic Hospital; New Cross Hospital; The Walton Centre NHS Foundation Trust; Torbay Hospital; Grantham & District Hospital; Lincoln County Hospital; Pilgrim Hospital; University College Hospital; University College London Hospitals NHS Foundation Trust HQ; Southampton General Hospital; Queen Elizabeth Hospital; Bristol Royal Hospital for Children; Bristol Royal Infirmary; St Michael's Hospital; Weston General Hospital; University Hospital Coventry; Royal Bournemouth Hospital Bcsc; Burton Hospital; Royal Derby Hospital; Leicester Royal Infirmary; Furness General Hospital; Royal Lancaster Infirmary; Westmorland General Hospital; County Hospital; Royal Stoke University Hospital; Derriford Hospital; Manor Hospital; Warrington Hospital; Watford General Hospital; West Suffolk Hospital; Midhurst Community Hospital; St Richard's Hospital; Worthing Hospital; The Whittington Hospital; Arrowe Park Hospital; Worcestershire Royal Hospital; Kings Court 2; Royal Albert Edward Infirmary; Hereford County Hospital; Yeovil District Hospital; Scarborough General Hospital; York Hospital; Follow Up Study Working Group.

United States of America

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Shadyside; Temple University Hospital; Wake Forest Baptist Health; University of Virginia MC; Virginia Commonwealth University; University of Kentucky; Medical University of South Carolina; Intermountain Medical Center; University of Utah HSC; Vanderbilt University MC; University MC (LSU); Duke University MC; Harborview MC; University of Washington MC; Swedish Hospital First Hill; Swedish Hospital Cherry Hill; Oregon Health and Science University; Cedars-Sinai MC, Los Angeles; University of Oklahoma Health Sciences Center, Oklahoma; The Christ Hospital, Ohio; University of Utah, Salt Lake City; Mount Sinai Medical Center, Miami, FL; University of Maryland, Baltimore, MD; St Christopher's Hospital for Children, Philadelphia, PA; Cleveland Clinic, Ohio, Ohio, OH; Northwell Health, New York; Sentara Norfolk General Hospital, Norfolk; University of Washington Medical Center - Northwest, Seattle; Brooke Army Medical Centre, San Antonio; MedStar Washington Hospital Centre, Washington; Nationwide Children's Hospital, Columbus; Mayo Clinic School of Medicine, Arizona; Houston Methodist Hospital, Texas; Rochester General Hospital, New York.

Viet Nam

Hospital for Tropical Diseases, Ho Chi Minh City.

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