



**Center for Biologics Evaluation and Research  
Office of Biostatistics and Epidemiology**

# **CBER Surveillance Program Biologics Effectiveness and Safety (BEST) Initiative**

**Characterization of hospitalized patients with  
coronavirus disease 2019 (COVID-19) in  
electronic health records databases**

## **Final Report**

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## A Abbreviations

CBER	Center for Biologics Evaluation and Research
CDM	Common Data Model
COVID-19	Coronavirus Disease 2019
EHR	Electronic Health Record
FDA	Food and Drug Administration
FiO <sub>2</sub>	Fraction of Inspired Oxygen
ICD-10-CM	International Classification of Diseases, Tenth Revision, Clinical Modification
ICU	Intensive Care Unit
IP	Inpatient
IQR	Interquartile Range
LOINC	Logical Observation Identifiers Names and Codes
NAAT	Nucleic Acid Amplification Test
NDC	National Drug Code
OHDSI	Observational Health Data Sciences and Informatics
OMOP	Observational Medical Outcomes Partnership
RT-PCR	Reverse Transcriptase Polymerase Chain Reaction
SARS-CoV-2	Severe Acute Respiratory Syndrome Coronavirus 2
SNOMED CT	Systematized Nomenclature of Medicine Clinical Terms
SpO <sub>2</sub>	Oxygen Saturation

## B Background

A total of 2,317,457 U.S. patients were hospitalized with COVID-19 between August 1, 2020 and July 13, 2021 (U.S. CDC, 2021). Understanding the clinical course of Coronavirus disease 2019 (COVID-19) and the characteristics among hospitalized patients informs clinical management and public health strategies.

Pandemic preparedness and response are priorities for the United States (U.S.) Food and Drug Administration (FDA)'s Center for Biologics Evaluation and Research (CBER). As part of this effort, CBER's Biologics Effectiveness and Safety (BEST) Initiative characterized patients who were hospitalized with at least one severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) nucleic acid amplification test (NAAT) based assay – most frequently reverse transcription-polymerase chain reaction (RT-PCR) to detect viral RNA – within 14 days of hospital admission in three U.S. databases of electronic health records (EHRs) from February 5 to November 20, 2020. This study will help inform understanding of the natural course of the disease and associated factors, as well as assist in planning other COVID-19-related studies in EHRs for active surveillance.

## C Study Objectives

**Primary objective:** To describe the demographics, baseline clinical characteristics, treatments, clinical outcomes, and mortality when data are available among SARS-CoV-2 NAAT-confirmed COVID-19 patients admitted for hospitalization.

**Secondary objective:** To improve understanding of clinical coding practices related to hospitalizations associated with COVID-19.

## D Data Sources

The following data sources were used for this study:

- **IBM Explorys** is an aggregated EHR Database of more than 39 health system partners' EHR data, spanning academic centers and community practices. Explorys represents the records of, on average, about 70 million patients annually. The data available in the Explorys EHR Database are limited to structured data elements that include diagnoses, procedures, immunizations, vital signs and biometrics, medical/surgical history, laboratory results, implantable devices, patient-reported outcomes, as well as inpatient drug administrations and ambulatory prescriptions. In the last year, most encounters have been concentrated in Ohio, Louisiana, Georgia, Florida, and New York. Explorys is updated weekly, with a 1- to 7-day data lag, dependent on the provider contributing data to the database. Intensive care unit (ICU) status data were not available in Explorys, as granular bed-level encounter information is typically only available in data systems with direct-EHR connections, such as with the Academic Health System referenced in this report. Mortality data were not available for Explorys, as Explorys is a de-identified data set.
- **An Academic Health System** provides a live EHR connection to a health system that serves patients in the Mid-Atlantic area of the U.S. It provides care through telemedicine eVisit services, physician offices, urgent care centers, regional ambulatory care centers, 10 hospitals, and the region's largest home health agency. The Academic Health System Health network provides EHR data via a Cerner Corporation platform on approximately 6 million patients from 2010 to present, and about 1.5–2 million active patients annually, on average. The EHR data available in the Academic Health System encompass structured and unstructured data elements including diagnoses, procedures, immunizations, vital signs and biometrics, medical/surgical history, laboratory results, implantable devices, patient-reported outcomes, as well as on-premises drug administrations and ambulatory prescriptions. The Academic Health System provides real-time

data, with 1–7 days of data processing time on average. Granular encounter history with timestamps for bed-level patient location was available within the Academic Health System. The data were used to identify ICU status by constructing episode logic similar to the inpatient hospital episode logic. The Academic Health System also provided more granular observation data, which allowed us to assess ventilation status.

- **OneFlorida Clinical Research Consortium** is an EHR consortium spanning across the state of Florida. The OneFlorida Clinical Research Consortium Data Trust is a repository of statewide healthcare data. The Data Trust contains patient-level electronic health record data from public and private health care systems, including diagnoses, procedures, medications, patient demographics, and unique patient identifiers in both the PCORnet Common Data Model (CDM) and Observational Medical Outcomes Partnership (OMOP) CDM. Providers span large integrated health delivery networks, 13 large hospitals, and ambulatory care and primary care facilities. In total, the Data Trust contains EHR data for about 6 million Floridians or about 75% of Floridians from 2012 to present, with about 2–3 million patients annually, on average. OneFlorida's PCORnet CDM, which was used in this study, is updated quarterly, with up to 4 months lag for data processing and linkage across the OneFlorida network. ICU status data were not available for OneFlorida, as granular bed-level encounter information is typically only available in data systems with direct-EHR connections, such as with the Academic Health System.

## E Term Definitions

- **Baseline period:** 365 days prior to the hospital admission date.
- **Hospitalization episode:** Episodes were constructed to capture a patient's distinct hospital admissions by considering subsequent admissions that are within 24 hours of each other as part of the same episode ([Appendix A](#)). Patients with a positive SARS-CoV-2 NAAT within  $\pm 14$  days of their inpatient (IP) hospital admission episode start date were included. SARS-CoV-2 NAATs were identified using Logical Observation Identifiers Names and Codes (LOINC)s ([Appendix B](#)).
- **ICU episode:** Episodes were constructed for patients admitted to the ICU during their IP episode, and defined as the time from the first ICU encounter to the last ICU encounter. New ICU visits occurring  $>24$  hours after the last ICU encounter of the prior were considered as new ICU episodes. Additional details are provided in [Appendix C](#).

## F Methods

### F1 Study Population and Study Period

The study population consisted of patients with COVID-19 confirmed by a positive SARS-CoV-2 NAAT – generally a reverse transcription polymerase chain reaction (RT-PCR) test – within 14 days of hospital admission during the study period of February 5–November 30, 2020. Hospitalized patients were included if they had at least one-day length of stay. The start of the study period was selected given the approval date of the first FDA-approved SARS-CoV-2 NAAT for COVID-19 diagnosis.<sup>1</sup> The study period end date represents the last full month of data available before the first COVID-19 vaccine was given FDA emergency use authorization (EUA) on December 11, 2020. The study population was sampled from the three EHR databases: Explorys, an Academic Health System, and OneFlorida ([Section D](#)).

<sup>1</sup> <https://www.fda.gov/news-events/press-announcements/fda-takes-significant-step-coronavirus-response-efforts-issues-emergency-use-authorization-first>

Had there been patients with multiple hospital admissions within a one-month period, the first eligible IP episode with a positive NAAT within  $\pm 14$  days of and closest to the admission date would have been selected. Had there been patients with multiple hospital admissions over one month apart, more than one eligible IP episode could have been selected with a positive NAAT within  $\pm 14$  days of and closest to each hospital admission date (i.e., a patient could be counted more than once if hospitalization episodes were more than one month apart). However, no patients were found to have had multiple COVID-19 hospitalization episodes during the study period.

## **F2 Data Management**

### **2.a Code List Generation**

Relevant COVID-19 symptoms and comorbidities were grouped based on clinical categories mapped to the International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM codes). Clinical categories were reviewed by clinicians. The selected ICD-10-CM codes were mapped to Systematized Nomenclature of Medicine Clinical Terms (SNOMED-CT) codes using the Observational Health Data Sciences and Informatics (OHDSI) Observational Medical Outcomes Partnership (OMOP) vocabulary mappings ([Appendix D](#)). Similarly, treatment categories were created for concomitant medications of interest and mapped to National Drug Code (NDC), RxNorm, and Cerner Multum codes, with clinician review ([Appendix E](#)).

Laboratory concepts for laboratory values and vitals of interest related to COVID-19 were mapped to Logical Observation Identifiers Names and Codes (LOINC) and Cerner observation codes, and subject to clinician review ([Appendix F](#)). Laboratory values and vitals were assigned a threshold unit and value determined by FDA and IBM clinicians. When possible, observations with a unit that did not match the threshold unit were converted to the matching unit.

### **2.b Harmonization of Laboratory Values and Units**

Laboratory and vitals result categories of interest relevant to COVID-19 were selected by workgroup clinicians and mapped to LOINC and Cerner-based observation codes. In all data sources, laboratory results with a populated value were also associated with a unit of measurement. All laboratory results had a unit that matched the lab and/or vitals' assigned threshold unit or were converted to match the assigned threshold unit, with the exception of fraction of inspired oxygen ( $\text{FiO}_2$ ), which had no laboratory results with a matching threshold unit and could not be converted to match. Laboratory results for venous lactate were not available in the Academic Health System or Explorys, and prothrombin was not available in the Academic Health System. Laboratory results and vital signs captured within  $\pm 14$  days of and closest to the patient's admission date were assessed as part of this analysis. All laboratory results available for a patient's hospitalization episode were captured and considered although no time-based analyses were conducted; instead, assessments were undertaken to determine whether results met the thresholds identified in [Table 1](#).

The laboratory value units and thresholds differed across patients and a stepwise method was utilized to create a laboratory category for this study. The method for determination of the laboratory category grouped laboratory values and units into the following categories: a populated value regardless of unit (most inclusive), a populated value and non-null unit, a populated value and null unit, units that match the threshold unit, a value that is outside of the reference range, a value that is within the reference range, a non-null unit and value but with a null reference range, and a unit and value that meets the threshold unit and value (least inclusive). During each subsequent grouping, results were eliminated if they did not meet the category inclusion criteria.



The duration between admission date and the test result closest to the admission date was reported. The distribution of time between an admission and test result was calculated by subtracting the test result date from the inpatient admission date.

**Table 1. Laboratory and Vital Sign Threshold and Unit Values**

Laboratory Value and/or Vital Sign	Unit and Threshold Value
SpO <sub>2</sub>	≤ 94% on ambient air
PaO <sub>2</sub> /FiO <sub>2</sub> (FiO <sub>2</sub> value)	<300 mmHg
PaO <sub>2</sub> /FiO <sub>2</sub> (PaO <sub>2</sub> value)	<300 mmHg
PaO <sub>2</sub> /FiO <sub>2</sub> (ratio value)	<300 mmHg
Heart rate (beats per minute)	≥100 bpm
White blood cell counts	<4000/μl
Absolute lymphocyte count	<1000/μl
Platelet count	<150,000/μl
Sodium	<130 mmol/Liter
Creatine phosphokinase	>2 times the upper limit of normal
Total bilirubin	≥1.2 mg/dl
Aspartate aminotransferase	>40 U/Liter
Alanine aminotransferase	>40 U/Liter
Venous lactate	>2.2 mmol/Liter
Troponin I	≥0.06 ng/ml
Procalcitonin	>0.25 ng/ml
C-reactive protein	>0.0082 mg/Liter
Ferritin	>300ng/ml
D-dimer	>1mcg/ml
Prothrombin time (PTT)	Time > upper limit of normal
Lactate dehydrogenase (LDH)	>245 U/Liter
Abnormal HbA1c	>5.6%
Brain-type natriuretic peptide	>100 pg/ml

Acronyms: bpm: beats per minute, FiO<sub>2</sub>: fraction of inspired oxygen, HbA1c: glycated hemoglobin; LDH: lactase dehydrogenase, mcg/ml: micrograms per milliliter, mg/dl: milligrams per deciliter, mg/Liter: milligrams per liter, mmHg: millimeter of mercury, mmol/Liter: millimoles per liter, ng/ml: nanograms per milliliter, PaO<sub>2</sub>: partial pressure of oxygen, pg/ml: picograms per milliliter, SpO<sub>2</sub>: oxygen saturation, μl: microliters, U/Liter: Units per liter

### **F3 Observability Assessment**

To assess whether patients had at least one health encounter prior to admission within each respective data network, an analysis was conducted for all data sources to identify gaps in patient care within the system. Almost 100% of patients in the three databases had an encounter within 30 days prior to their first hospital admission. Although a decline was observed in the Academic Health System and OneFlorida for the intervals of 90+ days prior to admission, this can be attributed to the datasets consisting primarily of urgent care encounters, which tend to be less frequent than routine care ([Table 2](#)).

**Table 2. Encounters Prior to Admission of Hospitalized Patients with a Positive SARS-CoV-2 NAAT within 14 days of Admission**

Encounters Prior to Admission <sup>1</sup>	Patients with Positive Test within +/- 14 days of IP Admission, n (%)	Patients with Positive Test within +14 days of IP Admission, n (%)	Patients with Positive Test within -14 days of IP Admission, n (%)
<b>An Academic Health System</b>			
Total patients	4,504 (100%)	2,027 (100%)	2,765 (100%)
Within 30 days	4,504 (100%)	2,027 (100%)	2,765 (100%)
Within 31–90 days	1,402 (31.1%)	652 (32.2%)	890 (32.2%)
Within 91–180 days	1,569 (34.8%)	739 (36.4%)	968 (35.0%)
Within 181–365 days	1,891 (42.0%)	875 (43.2%)	1,170 (42.3%)
<b>Explorys</b>	<b>n (%)</b>	<b>n (%)</b>	<b>n (%)</b>
Total patients	7,492 (100%)	3,676 (100%)	7,119 (100%)
Within 30 days	7,332 (97.9%)	3,664 (99.7%)	6,967 (97.9%)
Within 31–90 days	5,086 (67.9%)	2,671 (72.7%)	4,811 (67.6%)
Within 91–180 days	5,295 (70.7%)	2,771 (75.4%)	5,016 (70.5%)
Within 181–365 days	5,724 (76.4%)	2,970 (80.8%)	5,427 (76.2%)
<b>OneFlorida</b>	<b>n (%)</b>	<b>n (%)</b>	<b>n (%)</b>
Total patients	8,450 (100%)	1,560 (100%)	7,743 (100%)
Within 30 days	8,195 (97.0%)	1,550 (99.4%)	7,497 (96.8%)
Within 31–90 days	2,686 (31.8%)	612 (39.2%)	2,439 (31.5%)
Within 91–180 days	2,895 (34.3%)	621 (39.8%)	2,638 (34.1%)
Within 181–365 days	3,540 (41.9%)	764 (49.0%)	3,233 (41.8%)

Acronyms: IP, inpatient

<sup>1</sup> Proportions are out of all COVID-19 hospitalized patients in the study population for each database. It should be noted that an individual could receive a positive test both 14 days before and after IP admission, so the sum of patients with a positive test within +14 days and -14 days of IP admission may exceed the total number of patients with a positive test within ±14 days of IP admission.

## F4 Covariates

### 4.a Variables at Baseline and Admission

The cohort of hospitalized patients per data source was stratified by patient symptoms and comorbidities at baseline and hospital admission. To capture the symptoms of patients who may have had a COVID-19 infection in an outpatient setting up to 14 days prior to the inpatient admission, relevant COVID-19 symptoms were assessed in a lookback period up to 14 days prior to the inpatient admission date and on the admission date. Comorbidities 365 days prior to the inpatient admission date and separately on the admission date were determined by workgroup clinicians, as described in [Section F2](#). A longer lookback period was used for comorbidities in order to better establish baseline health status, as a shorter period may have missed relevant diagnoses. Meanwhile, symptoms were assessed up to 14 days prior to admission in order to capture infections detected in an outpatient setting prior to hospital admission.

### 4.b Variables during Hospitalization

Outcomes of interest were reported for the study period of March–November 2020 by hospitalization episode. The query period started in March 2020 because no hospitalization with NAAT-confirmed COVID-19 was identified in the three databases until then. Each episode corresponded to a distinct patient as none had multiple COVID-19 hospitalization episodes in each data source. These characteristics included length of hospital stay, concomitant medications (during hospitalization episode and up to 28 days after admission, with censoring at discharge or mortality), hospital discharge status, ICU status (data available in the Academic Health System only), ventilation status (data available in the Academic Health System only), and in-hospital mortality status (data available in the Academic Health System and OneFlorida). The Explorys database includes all discharge statuses except for death, and therefore in-hospital mortality information is not available. All discharge statuses to home, other hospital, or other facilities have been assumed to be discharged alive. Explorys does not provide bed-level data

nor in-hospital mortality data, which prohibits estimation of ICU stays and in-hospital mortality rates. OneFlorida does not provide bed-level data, which prohibits estimation of ICU stays. Ventilation status was defined as any form of ventilation. All concomitant medications were grouped into 14 medication categories per guidance from clinicians in the study workgroup ([Appendix D](#)).

#### 4.c COVID-19 Severity within 14 Days of Admission

The severity of COVID-19 based on clinical signs was evaluated on the day of admission, 14 days prior to admission, and 14 days following admission against a standard set of clinical categories based on clinical data available for hospitalized patients. The four clinical criteria categories (mild, moderate, severe and critical) were adapted from the FDA guidance (U.S. Food and Drug Administration, 2020) as summarized in [Table 3](#). Severity categories were based on clinical symptoms and laboratory data available for hospitalized patients. For patients that experienced differing levels of COVID-19 severity over the course of their hospitalization episode, the highest severity level was recorded and retained.

**Table 3. FDA Guidance on Severity of COVID-19 Based on Clinical Signs**

Severity Category	Clinical Criteria
Mild	<ul style="list-style-type: none"> <li>Symptoms of mild illness with COVID-19 that could include fever, cough, sore throat, malaise, headache, muscle pain, nausea, vomiting, diarrhea, and loss of taste or smell, without shortness of breath or dyspnea</li> <li>No clinical signs indicative of Moderate, Severe, or Critical Severity</li> </ul>
Moderate	<ul style="list-style-type: none"> <li>Clinical signs suggestive of moderate illness with COVID-19, such as respiratory rate <math>\geq 20</math> breaths per minute, saturation of oxygen (SpO<sub>2</sub>) <math>&gt; 93\%</math> on room air at sea level, heart rate <math>\geq 90</math> beats per minute.</li> <li>No clinical signs indicative of Severe or Critical Illness Severity</li> </ul>
Severe	<ul style="list-style-type: none"> <li>Clinical signs indicative of severe systemic illness with COVID-19, such as respiratory rate <math>\geq 30</math> per minute, heart rate <math>\geq 125</math> per minute, SpO<sub>2</sub> <math>\leq 93\%</math> on room air at sea level or PaO<sub>2</sub>/FiO<sub>2</sub> <math>&lt; 300</math></li> <li>No criteria for Critical Severity</li> </ul>
Critical	<ul style="list-style-type: none"> <li>Defined by at least one of the following: <ul style="list-style-type: none"> <li>Respiratory failure defined based on resource utilization requiring at least one of the following: <ul style="list-style-type: none"> <li>Endotracheal intubation and mechanical ventilation, oxygen delivered by high-flow nasal cannula (heated, humidified oxygen delivered via reinforced nasal cannula at flow rates <math>&gt; 20</math> L/min with fraction of delivered oxygen <math>\geq 0.5</math>), noninvasive positive pressure ventilation, ECMO, or clinical diagnosis of respiratory failure (i.e., clinical need for one of the preceding therapies, but preceding therapies not able to be administered in setting of resource limitation)</li> </ul> </li> <li>Shock (defined by systolic blood pressure <math>&lt; 90</math> mm Hg, or diastolic blood pressure <math>&lt; 60</math> mm Hg or requiring vasopressors)</li> <li>Multi-organ dysfunction/failure</li> </ul> </li> </ul>

#### F5 Statistical Analyses

All analyses were conducted by each data source separately. Counts and proportions (out of all COVID-19 hospitalizations within the timeframe of the analysis unless otherwise specified) were calculated for categorical variables and the mean, standard deviation, median, percentiles (5<sup>th</sup>–99<sup>th</sup>) and/or the interquartile range (IQR) were calculated for continuous variables, where applicable. All variables were stratified by month in March–November 2020, except for laboratory values.

Covariate and hospitalization measures were evaluated at 7-, 14-, 21-, and 28-day intervals after admission for the following categories: concomitant medication, length of hospital stay, hospital discharge

status, ICU status, ventilation use (defined as any form of ventilation), and in-hospital mortality data. Concomitant medications were also queried at 7-, 14-, 21-, and 28-day intervals prior to admission. Intervals following admission included the admission date. All data described in the study were within and following 14 days of admission (i.e., using a 28-day time interval unless otherwise indicated). Hospital admissions that were missing admission or discharge dates were excluded from analyses, as hospitalization episodes could not be constructed. This exclusion was only relevant to the Explorys database, as no Academic Health System or OneFlorida admissions were missing admission and/or discharge dates. Of the 24,215 NAAT-positive patients with an inpatient encounter within, prior or after, 14 days of a positive test, 17,009 episodes (70.2%) have admission and discharge dates. Of those, 7,492 (44%) have inpatient stays greater than 24 hours.

Hospital discharge status was stratified into five categories: discharged alive, discharged to another hospital, discharged to a long-term care facility, no discharge status, and discharge status other/unknown. Discharged to another hospital and discharged to a long-term care facility were included within the discharged alive category.

## G Results

### G1 Study Population

No hospital admissions were identified until March. There were 4,504, 7,492, and 8,450 hospitalized patients with a positive SARS-CoV-2 NAAT within 14 days of hospital admission in the Academic Health System, Explorys, and OneFlorida, respectively, during the study period ([Section F1](#)). Of these, 2,765 (61.3%), 7,119 (95.0%), and 7,743 (91.6%) had at least one positive test within 14 days prior to admission in the Academic Health System, Explorys, and OneFlorida, respectively. Comparatively, 2,027 (45.0%), 3,676 (49.1%), and 1,560 (18.5%) had at least one positive test within 14 days following admission in the Academic Health System, Explorys, and OneFlorida, respectively. Note that patients could have multiple SARS-CoV-2 NAATs before and after their hospital admissions. An additional 7,206 inpatient admissions within 14 days of a NAAT-positive test were identified in the Explorys database but excluded due to the absence of admission and/or discharge dates.

In each data source, at least 98% of patients were aged 18 years and older. The largest proportion of patients were 50–64 years of age, comprising 29.4%, 27.5%, and 27.9% of patients in the Academic Health System, Explorys, and OneFlorida, respectively. The median patient age and interquartile range (IQR) at the time of admission were reported to be 62 (48–73), 64 (50–75), and 60 (45–73) years in the Academic Health System, Explorys, and OneFlorida, respectively. As presented in [Table 4](#), race and ethnicity of patients, which were self-reported, included 57.8% Black/African American and 79.3% non-Hispanic in the Academic Health System; White/Caucasian (62.3%), Black/African American (30.3%), with 87.4% reporting as non-Hispanic in Explorys; White/Caucasian (44.6%) and Black/African American (28.6%), with 62.1% reporting as non-Hispanic in OneFlorida.

**Table 4. Demographics, Comorbidities, and Other Risk Factors of Hospitalized Patients with a Positive SARS-CoV-2 NAAT within 14 Days of Admission by Data Source, March–November 2020**

Parameter <sup>1</sup>	An Academic Health System (N=4,504)	Explorys (N=7,492)	OneFlorida (N=8,450)
	n (%)	n (%)	n (%)
<b>Age (Years)<sup>2</sup></b>			
Mean (Standard Deviation)	60.1 (18.1)	61.2 (18.9)	58.3 (19.6)
Median (IQR) <sup>3</sup>	62 (48,73)	64 (50,75)	60 (45,73)
0–17	10 (0.2%)	113 (1.5%)	153 (1.8%)
18–29	290 (6.4%)	460 (6.1%)	600 (7.1%)
30–49	963 (21.4%)	1,224 (16.3%)	1,888 (22.3%)
50–64	1,323 (29.4%)	2,060 (27.5%)	2,360 (27.9%)

Parameter <sup>1</sup>	An Academic Health System (N=4,504)	Explorys (N=7,492)	OneFlorida (N=8,450)
	n (%)	n (%)	n (%)
65–74	917 (20.4%)	1,635 (21.8%)	1,563 (18.5%)
75–84	660 (14.7%)	1,243 (16.6%)	1,189 (14.1%)
85+	341 (7.6%)	750 (10%)	697 (8.2%)
Not specified/unknown	0 (0%)	7 (0.1%)	0 (0.0%)
<b>Gender</b>			
Female	2,229 (49.5%)	3,751 (50.1%)	4,217 (49.9%)
Male	2,275 (50.5%)	3,741 (49.9%)	4,233 (50.1%)
Not specified/unknown	0 (0%)	0 (0%)	0 (0%)
<b>Race</b>			
American Indian or Alaska Native	10 (0.2%)	0 (0%)	10 (0.1%)
Asian/Pacific Islander	58 (1.3%)	101 (1.3%)	141 (1.7%)
Black/African American	2,604 (57.8%)	2,272 (30.3%)	2,418 (28.6%)
White/Caucasian	814 (18.1%)	4,664 (62.3%)	3,768 (44.6%)
Other	915 (20.3%)	444 (5.9%)	1,959 (23.2%)
Unknown	103 (2.3%)	92 (1.2%)	154 (1.8%)
<b>Ethnicity</b>			
Hispanic	383 (8.5%)	691 (9.2%)	2,576 (30.5%)
Non-Hispanic	3,570 (79.3%)	6,550 (87.4%)	5,251 (62.1%)
Unknown	551 (12.2%)	272 (3.6%)	623 (7.4%)
<b>Comorbidities and other risk factors 365 days prior to admission<sup>4</sup></b>			
Any diagnosis or problem list entry	4,086 (90.7%)	6,339 (84.6%)	8,124 (96.1%)
Cancer	293 (6.5%)	1,231 (16.4%)	845 (10.0%)
Cardiovascular and respiratory conditions	1,296 (28.8%)	3,542 (47.3%)	4,253 (50.3%)
Diabetes	1,155 (25.6%)	2,575 (34.4%)	3,750 (44.4%)
Immunosuppression	131 (2.9%)	666 (8.9%)	213 (2.5%)
Kidney disease	615 (13.7%)	2,636 (35.2%)	1,592 (18.8%)
Liver disease	140 (3.1%)	422 (5.6%)	391 (4.6%)
Autoimmune disease	194 (4.3%)	1,185 (15.8%)	608 (7.2%)
Obesity	675 (15.0%)	1,764 (23.5%)	2,696 (31.9%)
Smoking	138 (3.1%)	1,833 (24.5%)	402 (4.8%)

<sup>1</sup> Proportions are out of all COVID-19 hospitalized patients in the study population with a positive NAAT within 14 days of admission in each data source (N).

<sup>2</sup> Age measured at time of first hospital admission

<sup>3</sup> IQR: Interquartile range (25<sup>th</sup> percentile, 75<sup>th</sup> percentile)

<sup>4</sup> Comorbidities may equal >100% by data source due to patients having multiple comorbidities.

## G2 Comorbidities and Other Risk Factors

In the Academic Health System, the most common patient comorbidities and risk factors reported up to 365 days prior to admission were in the following categories: history of cardiovascular and respiratory conditions (28.8%), diabetes (25.6%), obesity (15.0%), and kidney disease (13.7%). In Explorys, the most common patient comorbidities and risk factors before admission were history of cardiovascular and respiratory conditions (47.3%), kidney disease (35.2%), diabetes (34.4%), and smoking (24.5%). In OneFlorida, the most common comorbidities and risk factors were cardiovascular and respiratory conditions (50.3%), diabetes (44.4%), obesity (31.9%), and kidney disease (18.8%). Details are provided in [Table 4](#).

For patients in the Academic Health System, the most common comorbidities and risk factors for patients reported on admission were a history of cardiovascular and respiratory conditions (2.3%), diabetes (1.2%), and kidney disease (0.6%) ([Appendix G, Table G1](#)). For Explorys, the most common comorbidities and risk factors for patients on admission were history of cardiovascular and respiratory conditions (42.0%), kidney disease (25.8%), smoking (22.1%), and diabetes (21.0%). OneFlorida patients presented most commonly with history of cardiovascular and respiratory conditions (3.1%), diabetes

(2.1%), kidney disease (1.3%), and obesity (1.3%) ([Appendix G, Table G1](#)). Comorbidities and risk factors were not uniformly recorded upon admission for all EHR data sources. For the Academic Health System and OneFlorida, these data were sparse compared to Explorys ([Appendix G, Table G1](#)). Comparatively, comorbidities and other risk factors recorded in the one-year baseline period prior to hospitalization were populated more frequently across the three databases, where 84.6–96.1% of hospitalized patients had at least one diagnosis or problem recorded in the baseline period prior to their COVID-19-related hospitalization across the three databases.

Composite comorbidities reported up to 365 days prior to admission were further explored to characterize hospitalized patients. Of the Academic Health System patients with diabetes, 84.6% had type 2 diabetes. Hypertension (52.0%) was the most prevalent cardiovascular and respiratory condition, and chronic kidney disease (94.0%) was the most common among those with kidney disease. Of the Explorys patients with kidney disease, 98.1% had chronic disease. Type 2 diabetes (78.4%) was the most prevalent form of diabetes mellitus, although 47.8% also reported unspecified diabetes. Coronary heart disease (42.6%) and hypertension (36.6%) were the most prevalent cardiovascular and respiratory conditions reported. Lastly, among OneFlorida patients, type 2 diabetes accounted for 83.8% of diabetes cases, while hypertension (47.9%) and coronary heart disease (42.6%) were the most prevalent cardiovascular and respiratory conditions reported ([Table 5](#)).

**Table 5. Patient Baseline Comorbidities Prior to Admission by Individual Comorbidity Condition of Hospitalized Patients with a Positive SARS-CoV-2 NAAT within 14 days of Admission by Data Source, March–November 2020**

Baseline comorbidities by category <sup>1</sup>	An Academic Health System (N=4,504)	Explorys (N=7,492)	OneFlorida (N=8,450)
	n (%)	n (%)	n (%)
<b>Cancer</b>	<b>293 (6.5%)</b>	<b>1,231 (16.4%)</b>	<b>845 (10.0%)</b>
<b>Hematopoietic</b>	41 (14.0%)	193 (15.7%)	115 (13.6%)
Solid Tumor excluding non-melanoma skin cancer	261 (89.1%)	1,121 (91.1%)	757 (89.6%)
Non-melanoma skin cancer	10 (3.4%)	127 (10.3%)	23 (2.7%)
<b>Cardiovascular and respiratory conditions</b>	<b>1,296 (28.8%)</b>	<b>3,542 (47.3%)</b>	<b>4,253 (50.3%)</b>
Stroke	152 (11.7%)	412 (11.6%)	306 (7.2%)
Coronary heart disease	536 (41.4%)	1,508 (42.6%)	1,811 (42.6%)
Valvular heart disease	213 (16.4%)	681 (19.2%)	547 (12.9%)
Hypertension	674 (52.0%)	1,298 (36.6%)	2,039 (47.9%)
Arrhythmias	256 (19.8%)	1,073 (30.3%)	781 (18.4%)
Heart failure	412 (31.8%)	1,126 (31.8%)	1,313 (30.9%)
Cardiomyopathy	206 (15.9%)	439 (12.4%)	438 (10.3%)
Asthma	241 (18.6%)	712 (20.1%)	912 (21.4%)
Chronic obstructive pulmonary disease	270 (20.8%)	942 (26.6%)	872 (20.5%)
Obstructive sleep apnea	187 (14.4%)	968 (27.3%)	735 (17.3%)
Other chronic respiratory conditions	61 (4.7%)	563 (15.9%)	359 (8.4%)
<b>Diabetes</b>	<b>1,155 (25.6%)</b>	<b>2,575 (34.4%)</b>	<b>3,750 (44.4%)</b>
Type 1	40 (3.5%)	419 (16.3%)	127 (3.4%)
Type 2	977 (84.6%)	2,019 (78.4%)	3,141 (83.8%)
Unspecified	53 (4.6%)	1,232 (47.8%)	271 (7.2%)
Abnormal glucose (diagnosis)	311 (26.9%)	931 (36.2%)	805 (21.5%)
<b>Immunosuppression</b>	<b>131 (2.9%)</b>	<b>666 (8.9%)</b>	<b>213 (2.5%)</b>
History of organ transplantation	66 (50.4%)	617 (92.6%)	106 (49.8%)
HIV	65 (49.6%)	53 (8%)	109 (51.2%)
<b>Kidney disease</b>	<b>615 (13.7%)</b>	<b>2,636 (35.2%)</b>	<b>1,592 (18.8%)</b>
Chronic	578 (94.0%)	2,587 (98.1%)	1,574 (98.9%)
End-stage	284 (46.2%)	389 (14.8%)	368 (23.1%)
<b>Liver disease</b>	<b>140 (3.1%)</b>	<b>422 (5.6%)</b>	<b>391 (4.6%)</b>
Cirrhosis	60 (42.9%)	170 (40.3%)	145 (37.1%)
End-stage liver disease	43 (30.7%)	248 (58.8%)	161 (41.2%)

Baseline comorbidities by category <sup>1</sup>	An Academic Health System (N=4,504)	Explorys (N=7,492)	OneFlorida (N=8,450)
	n (%)	n (%)	n (%)
Hepatitis	<b>90 (64.3%)</b>	139 (32.9%)	<b>171 (43.7%)</b>
B or C	73 (81.1%)	99 (23.5%)	134 (78.4%)
Alcoholic	12 (13.3%)	15 (3.6%)	10 (5.8%)
Other	39 (43.3%)	91 (21.6%)	96 (56.1%)
<b>Autoimmune disease</b>	<b>194 (4.3%)</b>	<b>1,185 (15.8%)</b>	<b>608 (7.2%)</b>
Rheumatoid arthritis	37 (19.1%)	296 (25%)	153 (25.2%)
Systemic lupus	18 (9.3%)	54 (4.6%)	70 (11.5%)
Multiple sclerosis	13 (6.7%)	50 (4.2%)	33 (5.4%)
Autoimmune- Other	127 (65.5%)	951 (80.3%)	426 (70.1%)
Autoimmune- Inflammatory	62 (32.0%)	325 (27.4%)	165 (27.1%)

<sup>1</sup>Comorbidities may equal >100% by data source due to patients having multiple comorbidities. Proportions are out of all hospitalized patients with a positive NAAT within 14 days of admission in each data source (N), except for comorbidity subcategories for which the proportion is calculated out of total patients with the containing category comorbidity. Only composite comorbidities made up of multiple conditions are included in this table, with a broader list provided in [Table 4](#).

### G3 Concomitant Medications

Across the three data sources, the four most common concomitant medication categories on or 28 days after admission were anticoagulants (81.7% of patients in the Academic Health System; 74.3% in Explorys; 44.5% in OneFlorida), azithromycin (37.4% in the Academic Health System; 28.3% in Explorys; 19.7% in OneFlorida), dexamethasone (26.5% in the Academic Health System; 39.1% in Explorys, 23.9% in OneFlorida), and antiplatelets (28.0% in the Academic Health System; 34.0% in Explorys; 19.6% in OneFlorida). Anticoagulant medication remained the highest prescribed medication throughout the study period in the Academic Health System, with a peak in March (86.7% of patients within that month) and November (83.4%). Anticoagulant medications were the most frequently prescribed throughout the study period in both Explorys — with peaks in April (76.7%) and November (79.9%) — and OneFlorida, with a peak in May (64.2%). An increase in the use of dexamethasone was observed from May to July, in particular for the Academic Health System (6.5% to 48.3%) and Explorys (7.0% to 38.5%). Additionally, the use of hydroxychloroquine/chloroquine peaked in March in all three data sources (Academic Health System: 79.1%, Explorys: 37.7%, and OneFlorida: 46.7%) before decreasing over time. Further details can be found in [Table 6](#).

**Table 6. Concomitant Medications Observed on or up to 28 Days After Admission in Hospitalized Patients with a Positive SARS-CoV-2 NAAT within 14 days of Admission by Data Source, March–November 2020**

Medication/treatment category <sup>1</sup>	Total	Month (2020)								
		March	April	May	June	July	August	September	October	November
		n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
<b>An Academic Health System (N=total hospitalizations)</b>	<b>4,504</b>	<b>249</b>	<b>1,137</b>	<b>960</b>	<b>338</b>	<b>408</b>	<b>361</b>	<b>269</b>	<b>330</b>	<b>452</b>
Angiotensin converting enzyme inhibitors (ACE inhibitors)	481 (10.7%)	17 (6.8%)	113 (9.9%)	98 (10.2%)	29 (8.6%)	51 (12.5%)	48 (13.3%)	26 (9.7%)	41 (12.4%)	58 (12.8%)
Angiotensin II receptor blockers	126 (2.8%)	10 (4.0%)	27 (2.4%)	24 (2.5%)	4 (1.2%)	15 (3.7%)	11 (3.0%)	7 (2.6%)	11 (3.3%)	17 (3.8%)
Anticoagulant	3,679 (81.7%)	216 (86.7%)	981 (86.3%)	784 (81.7%)	259 (76.6%)	315 (77.2%)	278 (77.0%)	209 (77.7%)	260 (78.8%)	377 (83.4%)
Antiplatelet	1,262 (28.0%)	66 (26.5%)	337 (29.6%)	274 (28.5%)	74 (21.9%)	107 (26.2%)	106 (29.4%)	76 (28.3%)	93 (28.2%)	129 (28.5%)
Azithromycin	1,684 (37.4%)	214 (85.9%)	612 (53.8%)	308 (32.1%)	90 (26.6%)	110 (27.0%)	88 (24.4%)	67 (24.9%)	80 (24.2%)	115 (25.4%)
Dexamethasone	1,192 (26.5%)	10 (4.0%)	32 (2.8%)	62 (6.5%)	87 (25.7%)	197 (48.3%)	190 (52.6%)	139 (51.7%)	196 (59.4%)	279 (61.7%)
Glucocorticoids steroid	686 (15.2%)	49 (19.7%)	194 (17.1%)	175 (18.2%)	58 (17.2%)	50 (12.3%)	34 (9.4%)	42 (15.6%)	42 (12.7%)	42 (9.3%)
HIV protease inhibitor (lopinavir, ritonavir)	4 (0.1%)	3 (1.2%)	1 (0.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Other HIV protease inhibitor	9 (0.2%)	2 (0.8%)	0 (0.0%)	2 (0.2%)	1 (0.3%)	0 (0.0%)	2 (0.6%)	1 (0.4%)	0 (0.0%)	1 (0.2%)
Hydroxychloroquine/Chloroquine	747 (16.6%)	197 (79.1%)	532 (46.8%)	4 (0.4%)	2 (0.6%)	1 (0.2%)	4 (1.1%)	5 (1.9%)	1 (0.3%)	1 (0.2%)
IL-1 receptor antagonist	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
IL-6 receptor antagonist	178 (4.0%)	18 (7.2%)	60 (5.3%)	64 (6.7%)	15 (4.4%)	15 (3.7%)	4 (1.1%)	2 (0.7%)	0 (0.0%)	0 (0.0%)
Influenza antiviral	14 (0.3%)	7 (2.8%)	4 (0.4%)	0 (0.0%)	0 (0.0%)	1 (0.2%)	0 (0.0%)	0 (0.0%)	1 (0.3%)	1 (0.2%)
Remdesivir	633 (14.1%)	0 (0.0%)	0 (0.0%)	67 (7.0%)	66 (19.5%)	97 (23.8%)	80 (22.2%)	66 (24.5%)	105 (31.8%)	152 (33.6%)
<b>Explorys (N=total hospitalizations)</b>	<b>7,492</b>	<b>313</b>	<b>537</b>	<b>554</b>	<b>969</b>	<b>1,210</b>	<b>574</b>	<b>389</b>	<b>712</b>	<b>2,234</b>
Angiotensin converting enzyme inhibitors (ACE inhibitors)	1,202 (16.0%)	48 (15.3%)	84 (15.6%)	111 (20.0%)	121 (12.5%)	177 (14.6%)	91 (15.9%)	52 (13.4%)	121 (17%)	397 (17.8%)
Angiotensin II receptor blockers	225 (3.0%)	10 (3.2%)	13 (2.4%)	12 (2.2%)	41 (4.2%)	39 (3.2%)	16 (2.8%)	12 (3.1%)	31 (4.4%)	51 (2.3%)
Anticoagulant	5,570 (74.3%)	218 (69.6%)	412 (76.7%)	411 (74.2%)	674 (69.6%)	879 (72.6%)	405 (70.6%)	261 (67.1%)	524 (73.6%)	1786 (79.9%)
Antiplatelet	2,544 (34.0%)	109 (34.8%)	185 (34.5%)	194 (35.0%)	314 (32.4%)	419 (34.6%)	187 (32.6%)	119 (30.6%)	253 (35.5%)	764 (34.2%)
Azithromycin	2,120 (28.3%)	181 (57.8%)	256 (47.7%)	167 (30.1%)	137 (14.1%)	316 (26.1%)	161 (28.0%)	102 (26.2%)	205 (28.8%)	595 (26.6%)
Dexamethasone	2,931 (39.1%)	22 (7.0%)	25 (4.7%)	39 (7.0%)	154 (15.9%)	466 (38.5%)	260 (45.3%)	160 (41.1%)	376 (52.8%)	1429 (64%)
Glucocorticoids steroid	1,439 (19.2%)	88 (28.1%)	107 (19.9%)	95 (17.1%)	198 (20.4%)	230 (19.0%)	111 (19.3%)	68 (17.5%)	141 (19.8%)	401 (17.9%)
HIV protease inhibitor (lopinavir, ritonavir)	9 (0.1%)	8 (2.6%)	1 (0.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Other HIV protease inhibitor	16 (0.2%)	9 (2.9%)	2 (0.4%)	1 (0.2%)	0 (0.0%)	2 (0.2%)	0 (0.0%)	1 (0.3%)	1 (0.1%)	0 (0.0%)
Hydroxychloroquine/Chloroquine	403 (5.4%)	118 (37.7%)	189 (35.2%)	21 (3.8%)	13 (1.3%)	11 (0.9%)	13 (2.3%)	2 (0.5%)	10 (1.4%)	26 (1.2%)
IL-1 receptor antagonist	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
IL-6 receptor antagonist	148 (2.0%)	27 (8.6%)	42 (7.8%)	27 (4.9%)	17 (1.8%)	25 (2.1%)	2 (0.3%)	1 (0.3%)	4 (0.6%)	3 (0.1%)
Influenza antiviral	52 (0.7%)	25 (8.0%)	2 (0.4%)	3 (0.5%)	3 (0.3%)	5 (0.4%)	2 (0.3%)	2 (0.5%)	1 (0.1%)	9 (0.4%)
Remdesivir	1,842 (24.6%)	4 (1.3%)	0 (0.0%)	55 (9.9%)	109 (11.2%)	234 (19.3%)	133 (23.2%)	74 (19%)	240 (33.7%)	993 (44.4%)
<b>OneFlorida (N=total hospitalizations)</b>	<b>8,450</b>	<b>122</b>	<b>299</b>	<b>234</b>	<b>1,194</b>	<b>2,727</b>	<b>1,328</b>	<b>725</b>	<b>792</b>	<b>1,029</b>
Angiotensin converting enzyme inhibitors (ACE inhibitors)	836 (9.9%)	8 (6.6%)	28 (9.4%)	27 (11.5%)	119 (10.0%)	224 (8.2%)	165 (12.4%)	84 (11.6%)	80 (10.1%)	101 (9.8%)



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Medication/treatment category <sup>1</sup>	Total	Month (2020)									
		March	April	May	June	July	August	September	October	November	
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	
Angiotensin II receptor blockers	109 (1.3%)	2 (1.6%)	7 (2.3%)	2 (0.9%)	13 (1.1%)	29 (1.1%)	13 (1.0%)	11 (1.5%)	10 (1.3%)	22 (2.1%)	
Anticoagulant	3757 (44.5%)	72 (59.0%)	192 (64.2%)	134 (57.3%)	493 (41.3%)	1157 (42.4%)	659 (49.6%)	316 (43.6%)	294 (37.1%)	440 (42.8%)	
Antiplatelet	1660 (19.6%)	22 (18.0%)	79 (26.4%)	51 (21.8%)	194 (16.2%)	471 (17.3%)	335 (25.2%)	152 (21.0%)	137 (17.3%)	219 (21.3%)	
Azithromycin	1663 (19.7%)	66 (54.1%)	112 (37.5%)	53 (22.6%)	253 (21.2%)	555 (20.4%)	230 (17.3%)	108 (14.9%)	126 (15.9%)	160 (15.5%)	
Dexamethasone	2019 (23.9%)	4 (3.3%)	11 (3.7%)	16 (6.8%)	203 (17.0%)	705 (25.9%)	400 (30.1%)	189 (26.1%)	194 (24.5%)	297 (28.9%)	
Glucocorticoids steroid	896 (10.6%)	16 (13.1%)	51 (17.1%)	35 (15.0%)	132 (11.1%)	302 (11.1%)	142 (10.7%)	73 (10.1%)	59 (7.4%)	86 (8.4%)	
HIV protease inhibitor (lopinavir, ritonavir)	2 (0.0%)	0 (0.0%)	1 (0.3%)	1 (0.4%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Other HIV protease inhibitor	15 (0.2%)	1 (0.8%)	1 (0.3%)	3 (1.3%)	2 (0.2%)	5 (0.2%)	1 (0.1%)	1 (0.1%)	1 (0.1%)	0 (0.0%)	
Hydroxychloroquine/Chloroquine	232 (2.7%)	57 (46.7%)	124 (41.5%)	12 (5.1%)	5 (0.4%)	16 (0.6%)	8 (0.6%)	6 (0.8%)	1 (0.1%)	3 (0.3%)	
IL-1 receptor antagonist	6 (0.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (0.2%)	3 (0.4%)	0 (0.0%)	1 (0.1%)	
IL-6 receptor antagonist	449 (5.3%)	16 (13.1%)	45 (15.1%)	15 (6.4%)	89 (7.5%)	209 (7.7%)	47 (3.5%)	22 (3.0%)	5 (0.6%)	1 (0.1%)	
Influenza antiviral	16 (0.2%)	0 (0.0%)	3 (1.0%)	2 (0.9%)	0 (0.0%)	6 (0.2%)	1 (0.1%)	3 (0.4%)	0 (0.0%)	1 (0.1%)	
Remdesivir	1371 (16.2%)	0 (0.0%)	0 (0.0%)	29 (12.4%)	171 (14.3%)	271 (9.9%)	218 (16.4%)	115 (15.9%)	158 (19.9%)	409 (39.7%)	

<sup>1</sup>Concomitant medications may sum to >100% by data source due to patients having multiple concomitant medications. Proportions are out of all hospitalized patients with a positive NAAT within 14 days of admission in each data source (N) by month.

## **G4 Symptoms**

In the Academic Health System, the most frequently reported symptoms within 14 days prior to or on admission were dyspnea (shortness of breath) (36.9%), fever (23.0%), and cough (18.0%) ([Table 7](#)). The three most frequently reported symptoms on admission were the same as 14 days prior to admission: dyspnea (12.8%), fever (4.6%), and cough (2.1%) ([Appendix G, Table G2](#)).

In Explorys, the most frequently reported symptoms within 14 days prior to or on admission were dyspnea (29.7%), cough (21.3%), and fatigue (19.7%). The three most common symptoms on admission were the same as 14 days prior to admission: dyspnea (27.5%), cough (17.4%), and fatigue/respiratory failure (17.1%) ([Appendix G, Table G2](#)). The total number of hospitalizations with a record of symptoms in both data sources decreased over time, though dyspnea, fever, cough, and fatigue remained the most commonly reported symptoms throughout the study period ([Table 7](#)).

The three most frequently reported symptoms before or on admission in OneFlorida were respiratory failure (40.4%), dyspnea (24.5%), and fever (17.2%). Dyspnea and respiratory failure remained consistently high throughout the study period ([Table 7](#)). The proportion of patients presenting with respiratory failure 14 days before admission or on admission in OneFlorida (40.4%) was significantly higher than in the Academic Health System (4.9%) and Explorys (17.9%). However, in the 14-day period after admission, OneFlorida had the smallest proportion of patients diagnosed with respiratory failure (12.0%), compared to the Academic Health System (34.0%) and Explorys (34.4%) ([Appendix G, Table G3](#)). This could be indicative of pre-admission diagnosing determinations for respiratory failure in the OneFlorida network being more precautionary compared to other provider networks, which appear to make determinations of respiratory failure after admission.

**Table 7. Patient Symptoms from 14 Days Prior to or on Admission of Hospitalized Patients with a Positive SARS-CoV-2 NAAT within 14 days of Admission by Data Source and Month, March–November 2020**

Symptoms present up to 14 days prior to or on admission <sup>1,2</sup>	Total	Month (2020)									
	n (%)	March n (%)	April n (%)	May n (%)	June n (%)	July n (%)	August n (%)	September n (%)	October n (%)	November n (%)	
<b>An Academic Health System (N=total hospitalizations)</b>	<b>4,504</b>	<b>249</b>	<b>1,137</b>	<b>960</b>	<b>338</b>	<b>408</b>	<b>361</b>	<b>269</b>	<b>330</b>	<b>452</b>	
Shortness of breath (dyspnea)	1,663 (36.9%)	123 (49.4%)	537 (47.2%)	386 (40.2%)	102 (30.2%)	126 (30.9%)	109 (30.2%)	71 (26.4%)	117 (35.5%)	92 (20.4%)	
Fever	1,036 (23.0%)	111 (44.6%)	359 (31.6%)	204 (21.3%)	55 (16.3%)	93 (22.8%)	70 (19.4%)	48 (17.8%)	51 (15.5%)	45 (10.0%)	
Cough	810 (18.0%)	104 (41.8%)	295 (25.9%)	152 (15.8%)	37 (10.9%)	68 (16.7%)	42 (11.6%)	27 (10.0%)	49 (14.8%)	36 (8.0%)	
Fatigue	454 (10.1%)	18 (7.2%)	87 (7.7%)	114 (11.9%)	43 (12.7%)	42 (10.3%)	45 (12.5%)	31 (11.5%)	39 (11.8%)	35 (7.7%)	
Nausea or vomiting	281 (6.2%)	16 (6.4%)	63 (5.5%)	42 (4.4%)	15 (4.4%)	40 (9.8%)	37 (10.2%)	24 (8.9%)	21 (6.4%)	23 (5.1%)	
Stomach/ abdominal pain	252 (5.6%)	14 (5.6%)	50 (4.4%)	39 (4.1%)	24 (7.1%)	33 (8.1%)	37 (10.2%)	21 (7.8%)	23 (7.0%)	11 (2.4%)	
Chest discomfort/pain	248 (5.5%)	15 (6.0%)	56 (4.9%)	54 (5.6%)	20 (5.9%)	28 (6.9%)	20 (5.5%)	18 (6.7%)	21 (6.4%)	16 (3.5%)	
Respiratory failure	219 (4.9%)	19 (7.6%)	71 (6.2%)	42 (4.4%)	8 (2.4%)	13 (3.2%)	17 (4.7%)	11 (4.1%)	17 (5.2%)	21 (4.6%)	
Diarrhea	165 (3.7%)	12 (4.8%)	34 (3.0%)	34 (3.5%)	9 (2.7%)	20 (4.9%)	16 (4.4%)	11 (4.1%)	16 (4.8%)	13 (2.9%)	
Dizziness/light-headed	113 (2.5%)	12 (4.8%)	23 (2.0%)	18 (1.9%)	8 (2.4%)	16 (3.9%)	14 (3.9%)	5 (1.9%)	7 (2.1%)	10 (2.2%)	
Headache	86 (1.9%)	5 (2.0%)	20 (1.8%)	19 (2.0%)	9 (2.7%)	13 (3.2%)	10 (2.8%)	9 (3.3%)	1 (0.3%)	0 (0.0%)	
Decreased appetite (anorexia)	65 (1.4%)	7 (2.8%)	11 (1.0%)	12 (1.3%)	6 (1.8%)	7 (1.7%)	7 (1.9%)	4 (1.5%)	4 (1.2%)	7 (1.5%)	
Chills	48 (1.1%)	2 (0.8%)	12 (1.1%)	9 (0.9%)	0 (0.0%)	4 (1.0%)	6 (1.7%)	3 (1.1%)	7 (2.1%)	5 (1.1%)	
Multi-organ failure	45 (1.0%)	0 (0.0%)	12 (1.1%)	9 (0.9%)	5 (1.5%)	5 (1.2%)	4 (1.1%)	5 (1.5%)	2 (0.6%)	6 (1.3%)	
Sore throat	36 (0.8%)	2 (0.8%)	7 (0.6%)	12 (1.3%)	2 (0.6%)	3 (0.7%)	2 (0.6%)	2 (0.7%)	3 (0.9%)	3 (0.7%)	
Myalgia	34 (0.8%)	4 (1.6%)	11 (1.0%)	5 (0.5%)	2 (0.6%)	5 (1.2%)	1 (0.3%)	1 (0.4%)	3 (0.9%)	2 (0.4%)	
Loss of smell/taste (anosmia/dysgeusia)	28 (0.6%)	0 (0.0%)	7 (0.6%)	6 (0.6%)	3 (0.9%)	5 (1.2%)	3 (0.8%)	3 (1.1%)	0 (0.0%)	1 (0.2%)	
Palpitations	12 (0.3%)	1 (0.4%)	1 (0.1%)	2 (0.2%)	1 (0.3%)	1 (0.2%)	0 (0.0%)	4 (1.5%)	0 (0.0%)	2 (0.4%)	
<b>Explorys (N=total hospitalizations)</b>	<b>7,492</b>	<b>313</b>	<b>537</b>	<b>554</b>	<b>969</b>	<b>1,210</b>	<b>574</b>	<b>389</b>	<b>712</b>	<b>2,234</b>	
Shortness of breath (dyspnea)	2,228 (29.7%)	125 (39.9%)	202 (37.6%)	179 (32.3%)	222 (22.9%)	324 (26.8%)	177 (30.8%)	101 (26%)	228 (32.0%)	670 (30%)	
Cough	1,595 (21.3%)	134 (42.8%)	163 (30.4%)	126 (22.7%)	109 (11.2%)	232 (19.2%)	112 (19.5%)	59 (15.2%)	140 (19.7%)	520 (23.3%)	
Fatigue	1,478 (19.7%)	67 (21.4%)	112 (20.9%)	100 (18.1%)	126 (13.0%)	230 (19.0%)	106 (18.5%)	74 (19.0%)	153 (21.5%)	510 (22.8%)	
Respiratory failure	1,344 (17.9%)	78 (24.9%)	147 (27.4%)	108 (19.5%)	84 (8.7%)	157 (13.0%)	94 (16.4%)	58 (14.9%)	155 (21.8%)	463 (20.7%)	
Fever	1,322 (17.6%)	114 (36.4%)	129 (24.0%)	94 (17.0%)	149 (15.4%)	245 (20.2%)	84 (14.6%)	57 (14.7%)	115 (16.2%)	335 (15.0%)	
Chest discomfort/pain	1,044 (13.9%)	34 (10.9%)	46 (8.6%)	55 (9.9%)	225 (23.2%)	228 (18.8%)	68 (11.8%)	54 (13.9%)	96 (13.5%)	238 (10.7%)	
Nausea or vomiting	812 (10.8%)	40 (12.8%)	54 (10.1%)	65 (11.7%)	98 (10.1%)	152 (12.6%)	47 (7.0%)	39 (10.0%)	69 (9.7%)	255 (11.4%)	
Diarrhea	725 (9.7%)	46 (14.7%)	73 (13.6%)	51 (9.2%)	81 (8.4%)	117 (9.7%)	40 (7.2%)	35 (9.0%)	62 (8.7%)	213 (9.5%)	
Stomach/abdominal pain	640 (8.5%)	21 (6.7%)	34 (6.3%)	49 (8.2%)	117 (12.1%)	121 (10.0%)	39 (6.8%)	37 (9.5%)	47 (6.6%)	175 (7.8%)	
Multi-organ failure	551 (7.4%)	31 (9.9%)	58 (10.8%)	53 (9.6%)	79 (8.2%)	66 (5.5%)	36 (6.3%)	26 (6.7%)	62 (8.7%)	140 (6.3%)	
Dizziness/light-headed	344 (4.6%)	14 (4.5%)	19 (3.5%)	25 (4.5%)	39 (4.0%)	66 (5.5%)	20 (3.5%)	25 (6.4%)	31 (4.4%)	105 (4.7%)	
Headache	272 (3.6%)	22 (7.0%)	23 (4.3%)	28 (5.1%)	54 (5.6%)	93 (7.7%)	22 (3.8%)	26 (6.7%)	3 (0.4%)	1 (0.0%)	
Decreased appetite (Anorexia)	175 (2.3%)	4 (1.3%)	16 (3.0%)	8 (1.4%)	19 (2.0%)	24 (2.0%)	16 (2.8%)	11 (2.8%)	16 (2.2%)	61 (2.7%)	
Sore throat	152 (2%)	5 (1.6%)	7 (1.3%)	12 (2.2%)	15 (1.5%)	24 (2.0%)	15 (2.6%)	4 (1.0%)	14 (2.0%)	56 (2.5%)	
Myalgia	146 (1.9%)	8 (2.6%)	8 (1.5%)	7 (1.3%)	12 (1.2%)	20 (1.7%)	8 (1.4%)	4 (1.0%)	18 (2.5%)	61 (2.7%)	
Chills	110 (1.5%)	1 (0.3%)	8 (1.5%)	9 (1.6%)	7 (0.7%)	7 (0.6%)	9 (1.6%)	7 (1.8%)	17 (2.4%)	45 (2.0%)	
Palpitations	80 (1.1%)	3 (1.0%)	1 (0.2%)	5 (0.9%)	17 (1.8%)	14 (1.2%)	7 (1.2%)	4 (1.0%)	6 (0.8%)	23 (1.0%)	
Loss of smell/taste (anosmia/dysgeusia)	70 (0.9%)	0 (0.0%)	2 (0.4%)	5 (0.9%)	3 (0.3%)	17 (1.4%)	9 (1.6%)	3 (0.8%)	11 (1.5%)	20 (0.9%)	
Myocarditis	6 (0.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.1%)	0 (0.0%)	0 (0.0%)	1 (0.3%)	2 (0.3%)	2 (0.1%)	
<b>OneFlorida (N=total hospitalizations)</b>	<b>8,450</b>	<b>122</b>	<b>299</b>	<b>234</b>	<b>1,194</b>	<b>2,727</b>	<b>1,328</b>	<b>725</b>	<b>792</b>	<b>1,029</b>	
Respiratory failure	3,413 (40.4%)	55 (45.1%)	147 (49.2%)	78 (33.3%)	420 (35.2%)	1,133 (41.5%)	558 (42.0%)	279 (38.5%)	323 (40.8%)	420 (40.8%)	
Shortness of breath (dyspnea)	2,074 (24.5%)	29 (23.8%)	104 (34.8%)	70 (29.9%)	240 (20.1%)	735 (27.0%)	332 (25.0%)	173 (23.9%)	154 (19.4%)	237 (23.0%)	
Fever	1,450 (17.2%)	28 (23.0%)	86 (28.8%)	52 (22.2%)	233 (19.5%)	523 (19.2%)	212 (16.0%)	96 (13.2%)	100 (12.6%)	120 (11.7%)	
Multi-organ failure	1,160 (13.7%)	22 (18.0%)	82 (27.4%)	45 (19.2%)	137 (11.5%)	378 (13.9%)	184 (13.9%)	102 (14.1%)	105 (13.3%)	105 (10.2%)	
Cough	966 (11.4%)	24 (19.7%)	61 (20.4%)	32 (13.7%)	120 (10.1%)	376 (13.8%)	147 (11.1%)	64 (8.8%)	65 (8.2%)	77 (7.5%)	
Chest discomfort/pain	887 (10.5%)	9 (7.4%)	34 (11.4%)	28 (12.0%)	135 (11.3%)	290 (10.6%)	167 (12.6%)	65 (9.0%)	71 (9.0%)	88 (8.6%)	
Diarrhea	766 (9.1%)	20 (16.4%)	45 (15.1%)	25 (10.7%)	106 (8.9%)	242 (8.9%)	129 (9.7%)	56 (7.7%)	62 (7.8%)	81 (7.9%)	
Fatigue	764 (9.0%)	4 (3.3%)	30 (10.0%)	27 (11.5%)	95 (8.0%)	283 (10.4%)	130 (9.8%)	50 (6.9%)	66 (8.3%)	79 (7.7%)	
Stomach/ abdominal pain	625 (7.4%)	5 (4.1%)	25 (8.4%)	33 (14.1%)	77 (6.4%)	208 (7.6%)	94 (7.1%)	48 (6.6%)	67 (8.5%)	68 (6.6%)	
Nausea or vomiting	494 (5.8%)	5 (4.1%)	22 (7.4%)	21 (9.0%)	65 (5.4%)	180 (6.6%)	79 (5.9%)	37 (5.1%)	43 (5.4%)	42 (4.1%)	
Myalgia	315 (3.7%)	9 (7.4%)	16 (5.4%)	13 (5.6%)	42 (3.5%)	112 (4.1%)	57 (4.3%)	19 (2.6%)	19 (2.4%)	28 (2.7%)	
Headache	252 (3.0%)	3 (2.5%)	3 (1.0%)	11 (4.7%)	50 (4.2%)	109 (4.0%)	51 (3.8%)	22 (3.0%)	1 (0.1%)	2 (0.2%)	
Dizziness/light-headed	146 (1.7%)	3 (2.5%)	2 (0.7%)	6 (2.6%)	25 (2.1%)	53 (1.9%)	26 (2.0%)	2 (0.3%)	12 (1.5%)	17 (1.7%)	
Decreased appetite (anorexia)	120 (1.4%)	5 (4.1%)	10 (3.3%)	8 (3.4%)	10 (0.8%)	37 (1.4%)	19 (1.4%)	7 (1.0%)	8 (1.0%)	16 (1.6%)	
Sore throat	84 (1.0%)	2 (1.6%)	3 (1.0%)	5 (2.1%)	15 (1.3%)	27 (1.0%)	12 (0.9%)	7 (1.0%)	6 (0.8%)	7 (0.7%)	
Palpitations	68 (0.8%)	0 (0.0%)	5 (1.7%)	2 (0.9%)	11 (0.9%)	17 (0.6%)	17 (1.3%)	5 (0.7%)	5 (0.6%)	6 (0.6%)	
Loss of smell/taste (anosmia/dysgeusia)	58 (0.7%)	1 (0.8%)	4 (1.3%)	1 (0.4%)	5 (0.4%)	22 (0.8%)	12 (0.9%)	3 (0.4%)	3 (0.4%)	7 (0.7%)	
Myocarditis	26 (0.3%)	0 (0.0%)	2 (0.7%)	1 (0.4%)	2 (0.2%)	8 (0.3%)	5 (0.4%)	4 (0.6%)	3 (0.4%)	1 (0.1%)	
Chills	37 (0.4%)	0 (0.0%)	1 (0.3%)	1 (0.4%)	3 (0.3%)	17 (0.6%)	8 (0.6%)	2 (0.3%)	2 (0.3%)	3 (0.3%)	

<sup>1</sup> Symptoms may equal >100% by data source due to patients having multiple symptoms. Proportions are out of all hospitalized patients with a positive NAAT within 14 days of admission in each data source (N) by month.

<sup>2</sup> The same list of symptoms was queried for each database. Symptoms with zero results for a specific database were excluded to limit table size. Rows are sorted by frequency.

## G5 Laboratory Measures & Vital Signs

In Explorys and the Academic Health System, the two most common vital signs with a value that met the unit and value threshold ([Table 1](#)) within 14 days before or after admission ([Table 8](#)) were oxygen saturation (SpO<sub>2</sub>) ≤ 94% (on ambient air) (71.0% and 80.5%, respectively) and heart rate (56.4% and 87.5%, respectively). Other common laboratory measures with values meeting thresholds of interest in the Academic Health System included: >245 units/Liter lactate dehydrogenase (LDH) (55.5%), ferritin >300ng/ml (53.9%), aspartate aminotransferase >40 units/liter (53.3%), and an absolute lymphocyte count <1000/μl (53.2%). Laboratory measures reported for over 38% of patients in Explorys included: absolute lymphocyte count <1000/μl (48.6%), C-reactive protein >0.0082 mg/L (42.7%), and ferritin >300ng/ml (38.7%).

OneFlorida patient vital signs indicated 43.2% had SpO<sub>2</sub> ≤94% (on ambient air) and 56.8% met unit threshold measurements for heart rate (≥100 beats per minute). The top three most common laboratory values in the OneFlorida patient population were sodium <130 mmol/liter (91.3%), total bilirubin ≥ 1.2mg/dl (90.1%), and platelet count < 150,000/μl (76.9%). Other common laboratory measures with values meeting thresholds of interest in OneFlorida include C-reactive protein > 0.0082 mg/L (76.7%), absolute lymphocyte count <1000/μl (74.6%), aspartate aminotransferase >40 U/Liter (72.7%), and alanine aminotransferase > 40 U/Liter (72.5%).

**Table 8. Laboratory Measures and Vital Signs of Hospitalized Patients with a Positive SARS-CoV-2 NAAT +/-14 days within Admission, March–November 2020**

Laboratory value and/or vital sign	Unit and threshold value	An Academic Health System		Explorys		OneFlorida	
		n patients with complete lab results (% of hospitalizations) <sup>1</sup>	n patients meeting unit and threshold value (% of hospitalizations)	n patients with complete lab results (% of hospitalizations)	n patients meeting unit and threshold value (% of hospitalizations)	n patients with complete lab results (% of hospitalizations)	n patients meeting unit and threshold value (% of hospitalizations)
SpO <sub>2</sub>	≤ 94% on ambient air	3,993 (88.7%)	3,627 (80.5%)	6,918 (92.3%)	5,322 (71.0%)	3,672 (43.5%)	3,653 (43.2%)
PaO <sub>2</sub> /FI <sub>O</sub> <sub>2</sub> (FI <sub>O</sub> <sub>2</sub> value)	<300 mmHg	0 (0.0%)	0 (0.0%)	0 (0.0%)	(0.0%)	0 (0.0%)	0 (0.0%)
PaO <sub>2</sub> /FI <sub>O</sub> <sub>2</sub> (PaO <sub>2</sub> value)	<300 mmHg	1,297 (28.8%)	1,283 (28.5%)	1,261 (16.8%)	1,252 (16.7%)	1,976 (23.4%)	2,055 (24.3%)
PaO <sub>2</sub> /FI <sub>O</sub> <sub>2</sub> (ratio value)	<300 mmHg	1,003 (22.3%)	1,003 (22.3%)	0 (0.0%)	(0.0%)	81 (1.0%)	0 (0.0%)
Heart rate	≥100 bpm	3,998 (88.8%)	3,940 (87.5%)	6,940 (92.6%)	4,224 (56.4%)	6,904 (81.7%)	4,796 (56.8%)
White blood cell counts	<4000/μl	4,045 (89.8%)	1,002 (22.3%)	6,269 (83.7%)	1,696 (22.6%)	6,684 (79.1%)	1,602 (19.0%)
Absolute lymphocyte count	<1000/μl	4,026 (89.4%)	2,395 (53.2%)	6,066 (81.0%)	3,638 (48.6%)	6,319 (74.8%)	6,307 (74.6%)
Platelet count	<150,000/μl	4,045 (89.8%)	1,252 (27.8%)	6,317 (84.3%)	1,752 (23.4%)	6,685 (79.1%)	6,500 (76.9%)
Sodium	<130 mmol/Liter	3,944 (87.6%)	874 (19.4%)	6,348 (84.7%)	616 (8.2%)	7,927 (93.8%)	7,714 (91.3%)
Creatine phosphokinase	>2 times the upper limit of normal	2341 (52%)	693 (15.4%)	1,918 (25.6%)	218 (2.9%)	3,085 (36.5%)	686 (8.1%)
Total bilirubin	≥1.2 mg/dl	4 (0.1%)	3 (0.07%)	6,005 (80.2%)	593 (7.9%)	7,824 (92.6%)	7,613 (90.1%)
Aspartate aminotransferase	>40 U/Liter	3,722 (82.6%)	2,399 (53.3%)	6,042 (80.6%)	2,440 (32.6%)	6,281 (74.3%)	6,146 (72.7%)
Alanine aminotransferase	>40 U/Liter	3,735 (82.9%)	1,994 (44.3%)	6,003 (80.1%)	1,922 (25.7%)	6,281 (74.3%)	6,130 (72.5%)
Venous lactate	>2.2 mmol/Liter	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1,590 (18.8%)	1,580 (18.7%)
Troponin I	≥0.06 ng/ml	3,258 (72.3%)	951 (21.1%)	3,600 (48.1%)	489 (6.5%)	5,724 (67.7%)	5,553 (65.7%)
Procalcitonin	>0.25 ng/ml	1,490 (33.1%)	709 (15.7%)	237 (3.2%)	82 (1.1%)	5,442 (64.4%)	5,414 (64.1%)
C-reactive protein	>0.0082 mg/Liter	3,233 (71.8%)	1,994 (44.3%)	3,197 (42.7%)	3,197 (42.7%)	6,508 (77.0%)	6,481 (76.7%)
Ferritin	>300ng/ml	3,215 (71.4%)	2,427 (53.9%)	4,048 (54.0%)	2,898 (38.7%)	5,900 (69.8%)	4,120 (48.6%)
D-dimer	>1mcg/ml	3,128 (69.4%)	2243 (49.8%)	108 (1.4%)	11 (0.1%)	4,692 (55.5%)	4,646 (55.0%)
Prothrombin time (PTT)	Time > upper limit of normal	0 (0.0%)	0 (0%)	3,730 (49.8%)	499 (6.7%)	4,868 (57.6%)	4,785 (56.6%)
Lactate dehydrogenase (LDH)	>245 U/Liter	3,014 (66.9%)	2,501 (55.5%)	8 (0.1%)	5 (0.1%)	195 (2.3%)	56 (0.7%)
Abnormal HbA1c	>5.6%	1,480 (32.9%)	1,238 (27.5%)	1,073 (14.3%)	869 (11.6%)	3,050 (36.1%)	2,966 (35.1%)
Brain-type natriuretic peptide	>100 pg/ml	1,862 (41.3%)	1,222 (27.1%)	580 (7.7%)	457 (6.1%)	2,750 (32.5%)	2,119 (25.1%)

<sup>1</sup> Proportions are out of all hospitalized patients with a positive NAAT within 14 days of admission in each data source (N).

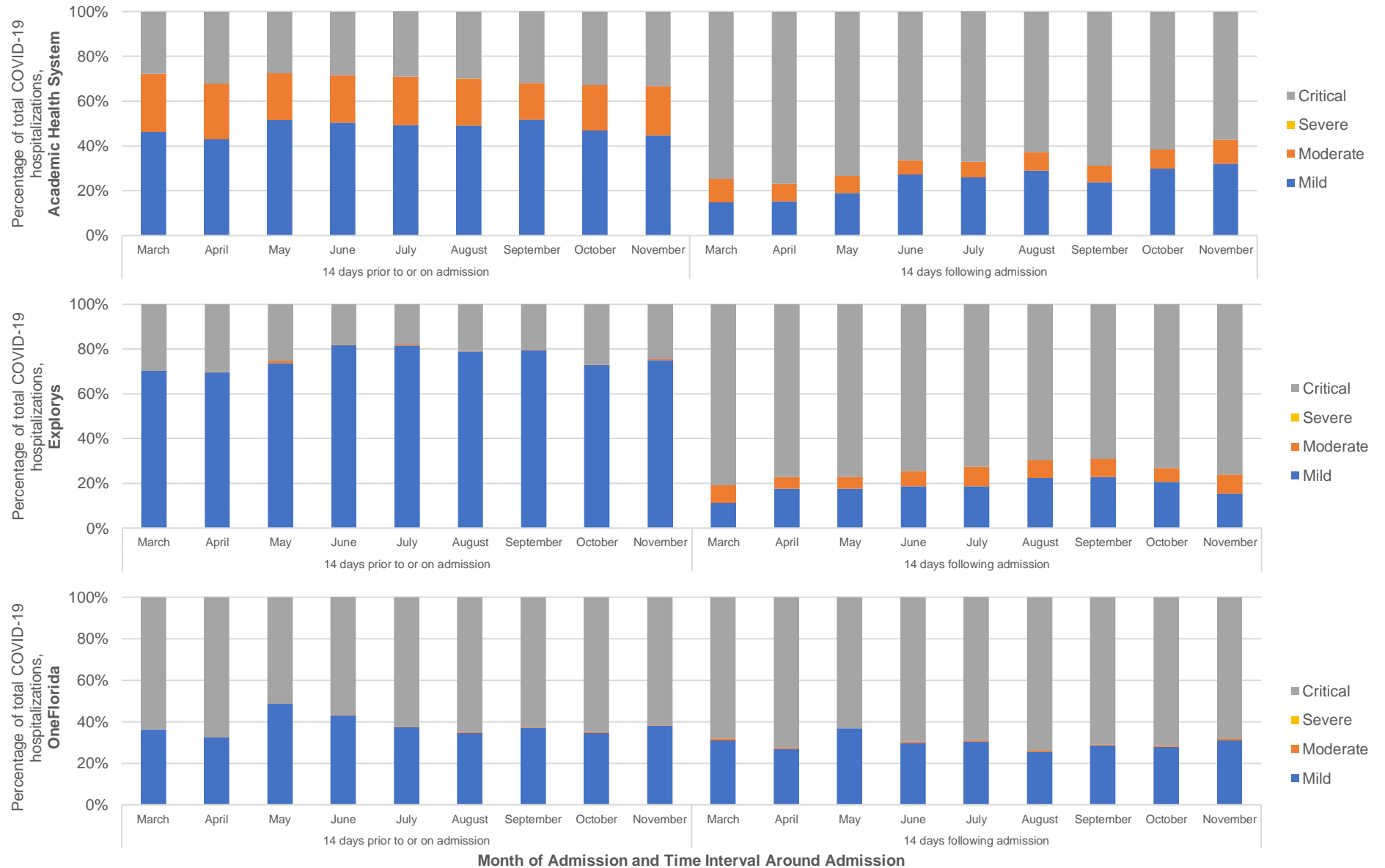
## **G6 Severity of COVID-19 Based on Clinical Signs**

The severity of symptoms presenting on or 14 days prior to admission within the Academic Health System remained relatively constant throughout the study period, with patients meeting mild criteria (42.9–51.7%) or critical clinical criteria (27.5–33.2%). The severity classification in the Academic Health System was substantially different post-admission with the predominant proportion of hospitalizations being in the critical category (57.3–76.8%), primarily due to diagnosis of acute respiratory failure with hypoxia or critically low blood pressure indicating shock. However, a steady decline in the proportion of hospitalizations with critical severity was observed from the peak in April through the end of the study period in November 2020.

The severity of COVID-19 based on clinical signs presenting on admission or 14 days prior to admission within Explorys remained relatively constant throughout the study period, with patients meeting mild criteria (69.6–81.7%) or critical clinical criteria (17.9–30.2%) ([Figure 1](#)). The severity classification in Explorys was substantially different post-admission, although it remained relatively constant throughout the study period, with the predominant proportion of hospitalizations being in the critical category (69.2–80.8%), primarily due to diagnosis of acute respiratory failure with hypoxia or multi-organ failure, or critically low blood pressure indicating shock. In OneFlorida, the majority of COVID-19 patients were classified as being critical on or 14 days prior to admission (51.3–67.6%) and 14 days after admission (63.2–74.0%) across calendar months in the study period. In the 14 days prior to or on admission, the critical severity classification in OneFlorida was primarily due to diagnosis of acute respiratory failure with hypoxia or multi-organ failure. However, in the 14 days after admission the critical severity classifications in OneFlorida were primarily due to critically low blood pressure indicating shock.

It is important to note that severity categories on or prior to admission may be misclassified due to a lack of recorded evidence in the EHRs for hospitalized patients. If there was a lack of evidence to place a patient's hospitalization episode in more severe categories, then the hospitalization episode was classified as having "mild" severity from the four clinical severity categories.

**Figure 1. Distribution of COVID-19 Severity of Hospitalized Patients with a Positive SARS-CoV-2 NAAT within 14 days of Admission by Data Source and Time Periods by Month, March–November 2020**



## **G7 Hospitalization Measures**

The median inpatient hospital length of stay was 6 days in the Academic Health System (5<sup>th</sup> percentile: 1 day, 95<sup>th</sup> percentile: 32 days), 4 days in Explorys (5<sup>th</sup> percentile: 1 day, 95<sup>th</sup> percentile: 22 days) and 5 days in OneFlorida (5<sup>th</sup> percentile: 1 day, 95<sup>th</sup> percentile: 28 days) ([Figure 2](#)). The median length of hospitalization in both OneFlorida and Explorys peaked in April, while median inpatient length of stay in the Academic Health System peaked in March, exhibiting a steady decrease afterward.

All data sources reported that over 85% of patients were discharged alive with a length of stay less than or equal to 28 days: 85.3% of patients in the Academic Health System, 94.3% of Explorys patients, and 91.2% of OneFlorida patients. Among patients in the Academic Health System with a hospitalization length of stay less than or equal to 28 days, 4.5% were discharged to another hospital at the end of their observable stay. This proportion was higher than, but relatively close to, Explorys (2.0%) and OneFlorida (0.8%). Only 4.6% of patients were observed with a readmission to an inpatient hospital after their discharge during the study period in the Academic Health System, compared to 13.6% of patients in Explorys and 9.3% of patients in OneFlorida. Readmissions were considered as any inpatient readmission; no patients in the three databases were readmitted with a positive NAAT within the study period.

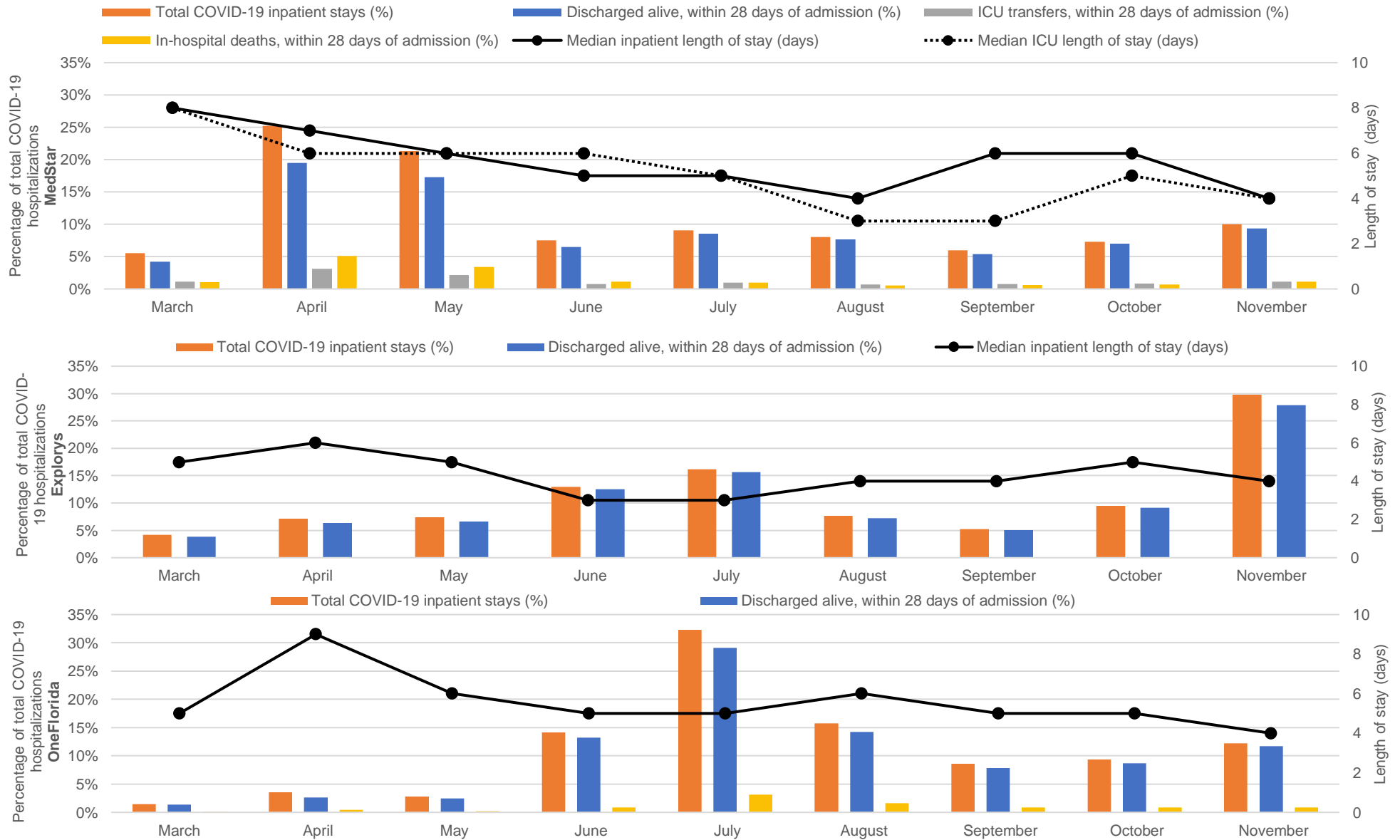
Hospital discharges in OneFlorida were highest between June and August, coinciding with the period with the highest proportions of hospitalizations. Explorys had relatively constant proportions of hospitalizations and discharges throughout the study period except for two peaks: one in July, and the largest peak in November. Hospitalization and discharge trends were similar to length of stay in the Academic Health System, with a peak in April and May, and decrease over the remainder of the study period ([Figure 2](#)).

In the Academic Health System, where data on ICU stays are available, the median ICU length of stay among patients requiring ICU admission was 5 days (5<sup>th</sup> percentile: <1 day [stay less than 24 hours], 95<sup>th</sup> percentile: 29 days). Among patients with an ICU stay, the median non-ICU length of stay, between inpatient admission and ICU transfer, was less than one day, indicating a transfer within 24 hours of admission (5<sup>th</sup> percentile: <1 day, 95<sup>th</sup> percentile: 10 days). The median length of ICU stay during the study period decreased by 50% from 8 days in March to 4 days in November. The median length of ICU stay and ICU transfers decreased over the study period, with a slight increase in August, although other hospitalization measures did not increase ([Figure 2](#)). Of all hospitalized patients, 34.7% (n=1,565) had an ICU stay at any time within their inpatient stay (either as transfers or direct admits to the ICU), with 88.4% (n=1,384) of patients with an ICU stay being discharged from the ICU within 28 days of admission. Of patients with an inpatient stay of less than or equal to 28 days, 11.5% (n=485) were transferred to an ICU unit from a non-ICU unit.

In the Academic Health System, ventilator use was observed in 85.9% (n=3,867) of patients at any point during their hospitalization. The median number of days when a patient was on a ventilator was 6 days (5<sup>th</sup> percentile: <1 day, 95<sup>th</sup> percentile 32 days), with 75% of the patients receiving ventilation for 11 days or less. Of all hospitalized patients, 34.7% (n=1,565) also had an ICU stay at any time within their inpatient stay, of which 91.8% (n=1,436) were on a ventilator at any time during their ICU stay, and 82.5% (n=1,291) were on a ventilator both during and outside of their ICU stay. Of hospitalized patients, 53.5% (n=2,411) were on a ventilator without any record of an ICU stay.

In the Academic Health System and OneFlorida, 14.7% and 8.8% of patients were deceased within 28 days of their inpatient stay, respectively. Among patients in the Academic Health System who had an inpatient length of stay less than or equal to 28 days, the in-hospital mortality was highest (3.2–4.8%) in the beginning of the study period (April–May) relative to the rest of the study period, when a mortality rate of less than 1% per month was observed ([Figure 2](#)). The availability of data elements for each data source can be found in [Section F4](#).

**Figure 2. Distribution of Hospitalization Measures Over Time in Hospitalized Patients with a Positive SARS-CoV-2 NAAT within 14 days of Admission by Data Source, March–November 2020**





## G8 Distribution of Time between Admission and NAAT Results

The distribution of time between admission and the nearest SARS-CoV-2 NAAT results differed across the three data sources. The median time in both Explorys and the Academic Health System remained between -1 and 0 throughout the study period. Meanwhile, in OneFlorida, the median time between admission and the closest test results during March and April was -12 and -10 days (i.e., prior to admission), respectively. All other months exhibited a median distribution of time of 0 days (IQR: -5–0). In Explorys, time from admission to the nearest NAAT result did not surpass one day after admission in the 95<sup>th</sup> percentile. OneFlorida saw a 95<sup>th</sup> percentile of 13 days after admission in May, although the time between admission and the nearest NAAT result decreased throughout the study period. ([Table 9](#)).

**Table 9. Distribution of Time (in Days) Between Admission and Nearest NAAT Result of Hospitalized Patients with a Positive SARS-CoV-2 NAAT within 14 days of Admission by Month, March–November 2020**

Time Period	Admission to Nearest NAAT Result Distribution (Days)						
	Median	Percentiles					
		5 <sup>th</sup>	10 <sup>th</sup>	25 <sup>th</sup>	75 <sup>th</sup>	90 <sup>th</sup>	95 <sup>th</sup>
<b>An Academic Health System</b>							
<b>Overall</b>	0.0	-6.0	-2.0	0.0	0.0	1.0	3.0
March	0.0	-7.9	-4.7	-1.0	0.0	0.0	0.0
April	0.0	-5.0	-1.0	0.0	0.0	0.0	2.0
May	0.0	-4.0	-2.0	0.0	0.0	0.0	2.0
June	0.0	-6.0	-3.0	0.0	0.0	2.0	3.4
July	0.0	-2.0	-1.0	0.0	0.0	0.0	2.0
August	0.0	-10.4	-7.0	0.0	0.0	1.0	4.0
September	0.0	-6.8	-5.0	-1.0	0.0	1.0	2.0
October	0.0	-11.0	-6.0	0.0	0.0	1.0	2.5
November	0.0	-2.9	-1.0	0.0	0.0	1.0	4.0
<b>Explorys</b>							
<b>Overall</b>	0.0	-7.0	-2.0	-1.0	0.0	0.0	1.0
March	-1.0	-9.0	-4.0	-2.0	0.0	0.0	0.0
April	0.0	-6.0	-2.0	-1.0	0.0	0.0	0.0
May	0.0	-9.0	-4.0	-1.0	0.0	1.0	1.0
June	0.0	-7.0	-2.0	-1.0	0.0	0.0	0.0
July	0.0	-6.0	-2.0	-1.0	0.0	0.0	0.0
August	0.0	-4.0	-1.0	-1.0	0.0	0.0	1.0
September	0.0	-10.0	-5.0	-1.0	0.0	0.0	0.0
October	0.0	-11.0	-6.0	-1.0	0.0	0.0	1.0
November	0.0	-7.0	-2.0	-1.0	0.0	1.0	1.0
<b>OneFlorida</b>							
<b>Overall</b>	0.0	-11.0	-11.0	-5.0	0.0	2.0	8.0
March	-12.0	-12.0	-12.0	-12.0	-2.0	-1.0	0.0
April	-10.0	-11.0	-11.0	-11.0	-4.0	0.0	9.0
May	0.0	-7.0	-7.0	-7.0	10.0	12.0	13.0
June	0.0	-12.0	-9.0	-1.0	0.0	1.0	5.0
July	0.0	-7.0	-2.0	0.0	0.0	3.0	6.0
August	0.0	-7.0	-5.0	-1.0	0.0	1.0	6.0
September	0.0	-5.0	-1.0	0.0	0.0	1.0	3.0
October	0.0	-5.0	-2.0	0.0	0.0	2.0	5.0
November	0.0	-3.0	-3.0	0.0	0.0	1.0	2.9

## H Discussion

COVID-19 hospitalization measures and resource utilization are critical aspects for understanding the COVID-19 pandemic and its impact on the health care and hospital system, as well as patient risk factors.

Previous studies have examined COVID-19 resource utilization and hospital measures within EHR systems throughout the pandemic (Myers, 2020; Richardson et al., 2020; Suleyman et al., 2020). Past studies have suggested that older adults, males, non-Hispanic black and Hispanic individuals, and those experiencing homelessness make up a disproportionate segment of the population hospitalized for COVID-19 (Hsu et al., 2020; Huang et al., 2021). Further, comorbidities such as diabetes, hypertension, cardiovascular disease, smoking, and obesity have also been associated with an increased risk of hospitalization (Huang et al., 2021; Killerby et al., 2020). This study described demographics, clinical characteristics, and hospitalization measures in time intervals around hospital admission in the study period of March–November 2020 across three large U.S. EHR systems covering different geographic locations. This study advances the understanding of symptomatic COVID-19 infection at the beginning of the pandemic and provides insight into hospital utilization trends over time. Furthermore, it provides a granular view of the clinical progression and changes in characteristics of COVID-19 patients through the first nine months of the pandemic.

The demographics of COVID-19 patients who were hospitalized did not differ significantly across the data sources, with a nearly even split between males and females and a median patient age ranging from 60 to 64 years across data sources. This is relatively consistent with previous studies. In the U.S., a study of 257 patients admitted to two New York hospitals with critical COVID-19 illness reported a median age of 62 years (IQR 51–72), with males representing 67% of the population (Cummings et al., 2020). Another U.S. study used the HCA Healthcare system (with EHR data from 21 states) to assess COVID-19 hospitalizations from March to June 2020, reporting that 50.8%–52.9% of the patient population was male, and mean age ranged from 56.3 to 62.0 years across the months of study (Sands et al., 2021). Administrative claims-based studies from Germany and France reported median ages of 72 and 68 years, respectively, among the population hospitalized with COVID-19 (Karagiannidis et al., 2020; Piroth et al., 2021).

Diabetes, along with cardiovascular (including hypertension) and respiratory conditions were the most prevalent comorbidities in all data sources, especially in OneFlorida, where 50.3% reported a history of cardiovascular and respiratory conditions prior to hospital admission. Prevalence of these comorbidities was similar to findings from previous studies (Kalyanaraman et al., 2020; Kim et al., 2021; Suleyman et al., 2020). For example, a German study examining administrative claims data for 10,021 patients hospitalized for COVID-19 reported that the most common comorbidities were hypertension (56%) and diabetes (28%) (Karagiannidis et al., 2020).

The medications most commonly prescribed within 28 days of hospital admission included anticoagulants (44.5–81.7% across data sources), azithromycin (19.7–37.4% across data sources), dexamethasone (23.9–39.1% across data sources), and antiplatelets (19.6–34.0% across data sources). Other common medications included remdesivir (14.1–24.6% across data sources), glucocorticoid steroids (10.6–19.2% across data sources), ACE inhibitors (9.9–16.0% across data sources), hydroxychloroquine (2.7–16.6% across data sources), and IL-6 receptor antagonists (2.0–5.3% across data sources). A previous U.S. EHR study reported that approximately 40% of patients hospitalized for COVID-19 between March and June 2020 received treatment with tocilizumab (an IL-6 receptor antagonist, reported in 0.4–8.2% of patients across months of study), remdesivir (0.6–21.3% across months of study), or steroids (15.9–34.0% across months of study) (Sands et al., 2021). Temporal analyses of concomitant medications showed that remdesivir and dexamethasone use increased substantially during the study period (especially June–July) and hydroxychloroquine/chloroquine exhibited a marked decrease in March–April which was sustained throughout the study period; this is consistent with an earlier study of medication use among COVID-19 patients hospitalized in California in March–December, 2010 (Watanabe et al., 2021).

Fever, cough, and dyspnea were frequently reported symptoms across all data sources, consistent with clinical expectations and prior epidemiological findings (da Rosa Mesquita et al., 2021). Among laboratory observations, absolute lymphocyte count of less than 1000/ $\mu$ l was common among patients across all data sources; this was a frequent laboratory finding in COVID-19 patients as previously reported in the literature (Illg, Muller, Mueller, Nippert, & Allen, 2021).

The trends of COVID-19 clinical severity categories remained stable within all data sources over the study period but differed when stratified by 14 days prior to and on admission, and 14 days following admission date. The majority of patients were characterized as having mild disease at admission, which could have been due to a lack of recorded information at admission necessary to classify severity. Across data sources, 23.0–62.1% of patients hospitalized for COVID-19 were categorized as critically ill 14 days prior to and on admission. This is higher than what was reported in a prior U.S. study, which reported that 22% of patients hospitalized for COVID-19 in New York were critically ill at admission (Cummings et al., 2020). The difference in the proportion of critically ill patients 14 days prior to or on admission could be due to varying severity levels observed in different geographic areas, compared to the proportions reported in New York in the study by Cummings and colleagues. Conversely, a high patient load in New York during the study period used by Cummings and colleagues could have led to an under-reporting of symptoms in the electronic medical records of the patient population. The proportion of critically ill patients was higher in all data sources for the 14 days following admission (69.2–80.8% in Explorys; 63.2–74.0% in OneFlorida; 57.3–76.8% in the Academic Health System) than the 14 days prior to and on admission (17.9–30.2% in Explorys; 51.3–67.6% in OneFlorida; 27.5–33.2% in the Academic Health System), suggesting that disease progression continued after admission to hospital. This is consistent with past studies reporting clinical progression following admission, caused by an approximate 14-day lag between illness onset and clinical deterioration generally associated with reduced oxygenation and other severe organ failure (Liu et al., 2021).

Data in the Academic Health System suggested that, of all hospitalized patients, 34.7% (n=1,565) also had an ICU stay at any time during their inpatient stay, and a median length of ICU stay of 5 days. The median length of ICU stay and rate of ICU admission observed in the Academic Health System were within the range reported by other studies, which were 5-7 days and 14.5–39%, respectively, across studies referenced (Chishinga et al., 2020; Gold et al., 2020; Hsu et al., 2020; Kim et al., 2021). The 28-day in-hospital mortality rate among hospitalized patients in the Academic Health System and OneFlorida was 14.7% and 8.8%, respectively. This is consistent with previous U.S. studies that have reported patient mortality rates of 3.6–17.1% (Gavin et al., 2021; Gold et al., 2020; Hsu et al., 2020; Kim et al., 2021; Sands et al., 2021).

This study provides a descriptive analysis of the clinical characteristics and resource utilization associated with COVID-19-related hospitalizations. Few studies have examined patient-level data for NAAT-positive patients across time within multiple EHR systems covering large patient populations, and this study adds valuable insight into the course of infection and potential risk factors for severe COVID-19 outcomes.

This study has some limitations that should be considered in interpreting the results. First, the identification of laboratory-confirmed COVID-19 may be limited due to a few factors, including test shortages and the prioritization of immediate management of symptoms over testing. Furthermore, results of SARS-CoV-2 tests conducted outside of facilities covered by the EHR system may not have been captured in the study data. Therefore, the study may underestimate the prevalence of COVID-19 patients within the EHR system. The severity of COVID-19 may have been similarly underestimated given the availability of data necessary to classify patients. Further, there may have been some limitations in the observability of data over 90 days prior to admission in the Academic Health System and OneFlorida, since the majority of encounters were urgent care and in-hospital visits which could have impacted assessment of comorbidities, unlike the more frequent care apparent in Explorys. However, the observability assessment noted that over 97% of patients experienced an encounter within 30 days of admission and a high proportion of patients still exhibited at least one comorbidity in the baseline period so the risk of misclassification may be low.

It should also be noted that the majority of hospitalizations in Explorys did not have an IP admission and discharge date, so a hospitalization episode could not be defined. This resulted in an underestimate of the number of COVID-19 hospitalizations occurring among Explorys patients as only those with IP admission and discharge dates could be included in this study, 49% of inpatient admissions identified were excluded from the analysis. Characteristics of the patient populations observed across the three databases may also have been confounded by the characteristics of the population served by the relevant EHR systems so findings such as those related to race and ethnicity may not be generalizable to

the broader U.S. population. Additionally, hospitalization measures were not stratified by patient demographics and covariates which would provide a more complete clinical picture of COVID-19 patients. Lastly, the reliability and validity of some characteristics may have been limited by the use of ICD-10-CM codes. For example, reporting of smoking and obesity was dependent on the use of relevant ICD-10-CM codes, whereas clinicians may not have reported these comorbidities in the structured EHR data, thereby leading to an underestimation of the proportion of patients exhibiting these comorbidities. All comparisons were meant to be descriptive, and no calculations of statistical significance were conducted.

The objective of this study was to describe U.S. patients admitted to hospital with a positive NAAT result for COVID-19. Additional studies are required to assess relationships between population characteristics and severe COVID-19 outcomes.

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## Appendix A – Inpatient Hospital Episode Logic

Step	Description	Approach
1	IP Episode Start Date	An IP episode's start date is identified as the admission date of a patient's first inpatient admission
2	Subsequent IP Admissions	Subsequent IP admissions are considered part of the same episode if they are within 24 hours of the patient's previous IP discharge date
3	IP Episode End	An IP episode's end date is identified as the discharge date of the patient's last IP stay <ul style="list-style-type: none"><li>Last IP stay = patient's last IP discharge date or where their subsequent IP admission is within &gt; 24 hours</li></ul>

## Appendix B – LOINC Codes for Identification of SARS-CoV-2 NAATs<sup>1</sup>

LOINC	Long Common Name
94745-7	SARS-CoV-2 (COVID-19) RNA [Cycle Threshold #] in Respiratory specimen by NAA with probe detection
94746-5	SARS-CoV-2 (COVID-19) RNA [Cycle Threshold #] in Unspecified specimen by NAA with probe detection
94819-0	SARS-CoV-2 (COVID-19) RNA [Log #/volume] (viral load) in Unspecified specimen by NAA with probe detection
94565-9	SARS coronavirus 2 RNA [Presence] in Nasopharynx by NAA with non-probe detection
94759-8	SARS-CoV-2 (COVID-19) RNA [Presence] in Nasopharynx by NAA with probe detection
94500-6	SARS coronavirus 2 RNA [Presence] in Respiratory specimen by NAA with probe detection
94845-5	SARS-CoV-2 (COVID-19) RNA [Presence] in Saliva (oral fluid) by NAA with probe detection
94660-8	SARS-CoV-2 (COVID-19) RNA [Presence] in Serum or Plasma by NAA with probe detection
94309-2	SARS Coronavirus 2 RNA [Presence] in Unspecified specimen Qualitative by NAA with probe detection
41458-1	SARS coronavirus RNA [Presence] in Unspecified specimen by NAA with probe detection
94534-5	SARS coronavirus 2 RdRp gene [Presence] in Respiratory specimen by NAA with probe detection
95608-6	SARS-CoV-2 (COVID-19) RNA [Presence] in Respiratory specimen by NAA with non-probe detection
94533-7	SARS-CoV-2 (COVID19) N gene [Presence] in Respiratory specimen by NAA with probe detection
94640-0	SARS coronavirus 2 S gene [Presence] in Respiratory specimen by NAA with probe detection
94559-2	SARS coronavirus 2 ORF1ab region [Presence] in Respiratory specimen by NAA with probe detection
94502-2	SARS-related coronavirus RNA [Presence] in Respiratory specimen by NAA with probe detection
95423-0	Influenza virus A + B and SARS-CoV-2 (COVID-19) identified in Respiratory specimen by NAA with probe detection
95409-9	SARS coronavirus 2 (COVID19) N gene [Presence] in Nose by NAA with probe detection
95425-5	SARS-CoV-2 (COVID-19) N gene [Presence] in Saliva (oral fluid) by NAA with probe detection
94760-6	SARS coronavirus 2 N gene [Presence] in Nasopharynx by NAA with probe detection
95406-5	SARS-CoV-2 (COVID19) RNA [Presence] in Nose by NAA with probe detection
94758-0	SARS-related coronavirus E gene [Presence] in Respiratory specimen by NAA with probe detection
96091-4	SARS-CoV-2 (COVID-19) RdRp gene [Presence] in Saliva (oral fluid) by NAA with probe detection
94316-7	SARS-CoV-2 (COVID-19) N gene [Presence] in Specimen by NAA with probe detection

<sup>1</sup> Source: Centers for Disease Control and Prevention. LOINC In Vitro Diagnostic (LIVD) Test Code Mapping for SARS-CoV-2 Tests. (Accessed April 1, 2021, at <https://www.cdc.gov/csels/dls/sars-cov-2-livd-codes.html>.)



### Appendix C – ICU Status and Episode Logic in the Academic Health System

Step	Description	Approach
1	Encounter History Detail	Begin with the “encounter history detail” table, which contains a more granular view of patient encounters by displaying the different beds/rooms/units that a patient visited during their encounter.
2	Identify ICUs	To identify which bed/room/unit within an encounter were in an ICU: <ol style="list-style-type: none"> <li>1. Map the historical encounter’s Cerner location code to the “Critical Care Unit” lookup table, which contains a list of all the designated ICUs since the start of the pandemic.</li> <li>2. Map the historical encounter’s Cerner location code and datetime to the “Common Nurse Units” table, which contains a list of all the ICUs active during a specific datetime</li> </ol>
3	ICU Episode Start Date	An ICU episode’s start date is identified as the start date of a patient’s first ICU encounter
4	Subsequent ICU Encounters	A patient’s subsequent ICU encounters are considered part of the same episode if they were within 24 hours of the previous ICU encounter’s end date
5	ICU Episode End	An ICU episode’s end date is identified as the end of a patient’s last ICU encounter <ul style="list-style-type: none"> <li>• Last ICU encounter = patient’s last ICU end date or where their subsequent ICU encounter is within &gt; 24 hours</li> </ul>
6	Patients with an ICU Stay during IP Episode	For patients in our study population, we identify the patients with an ICU episode that started/ended during their IP episode

## **Appendix D – Symptoms and Comorbidities Codelist**

Refer to the enclosed Excel file titled “symptom\_comorbidity\_codelist” for a list of SNOMEDs and ICD-10-CMs for each symptom and comorbidity.

## **Appendix E – Concomitant Medication Codes and Categories**

Refer to the enclosed Excel file titled “concomitant\_medications\_codelist” for a list of RxNorm and NDC codes for each concomitant medication of interest.

## **Appendix F – Labs and Vitals LOINC Codelist**

Refer to the enclosed Excel file titled “LOINC\_labs\_vitals\_codelist” for a list of LOINC codes for each laboratory category of interest.

## Appendix G – Supplementary Analyses

**Table G1. Patient Baseline Comorbidities on Admission by Individual Comorbidity Condition of Hospitalized Patients with a Positive SARS-CoV-2 NAAT within 14 Days of Admission by Data Source, March–November 2020**

Baseline comorbidities by category <sup>1</sup>	An Academic Health System (N=4,504)	Explorys (N=7,492)	OneFlorida (N=8,450)
	n (%)	n (%)	n (%)
<b>Cancer</b>	<b>19 (0.4%)</b>	<b>478 (6.4%)</b>	<b>55 (0.7%)</b>
Hematopoietic	1 (5.3%)	103 (21.5%)	13 (23.6%)
Solid tumor excluding non-melanoma skin cancer	18 (94.7%)	400 (83.7%)	46 (83.6%)
Non-melanoma skin cancer	0 (0.0%)	7 (1.5%)	1 (1.8%)
<b>Cardiovascular and respiratory conditions</b>	<b>103 (2.3%)</b>	<b>3,150 (42.0%)</b>	<b>260 (3.1%)</b>
Stroke	19 (18.4%)	135 (4.3%)	9 (3.5%)
Coronary heart disease	35 (34.0%)	741 (23.5%)	105 (40.4%)
Valvular heart disease	4 (3.9%)	133 (4.2%)	22 (8.5%)
Hypertension	35 (34.0%)	711 (22.6%)	137 (52.7%)
Arrhythmias	7 (6.8%)	328 (10.4%)	43 (16.5%)
Heart failure	20 (19.4%)	706 (22.4%)	87 (33.5%)
Cardiomyopathy	3 (2.9%)	117 (3.7%)	24 (9.2%)
Asthma	9 (8.7%)	394 (12.5%)	45 (17.3%)
Chronic obstructive pulmonary disease	9 (8.7%)	517 (16.4%)	65 (25.0%)
Obstructive sleep apnea	2 (1.9%)	272 (8.6%)	33 (12.7%)
Other chronic respiratory conditions	2 (1.9%)	1,221 (38.8%)	17 (6.5%)
<b>Diabetes</b>	<b>53 (1.2%)</b>	<b>1,573 (21.0%)</b>	<b>179 (2.1%)</b>
Type 1	3 (5.7%)	94 (6.0%)	6 (3.4%)
Type 2	47 (88.7%)	1,429 (90.8%)	168 (93.9%)
Unspecified	0 (0.0%)	494 (31.4%)	2 (1.1%)
Abnormal glucose (diagnosis)	3 (5.7%)	279 (17.7%)	22 (12.3%)
<b>Immunosuppression</b>	<b>3 (0.1%)</b>	<b>266 (3.6%)</b>	<b>15 (0.2%)</b>
History of organ transplantation	2 (66.7%)	231 (86.8%)	5 (33.3%)
HIV	1 (33.3%)	37 (13.9%)	10 (66.7%)
<b>Kidney disease</b>	<b>26 (0.6%)</b>	<b>1,933 (25.8%)</b>	<b>106 (1.3%)</b>
Chronic	23 (88.5%)	1,848 (95.6%)	103 (97.2%)
End-stage	10 (38.5%)	289 (15.0%)	39 (36.8%)
<b>Liver disease</b>	<b>12 (0.3%)</b>	<b>160 (2.1%)</b>	<b>28 (0.3%)</b>
Cirrhosis	2 (16.7%)	65 (40.6%)	8 (28.6%)
End-stage liver disease	7 (58.3%)	89 (55.6%)	12 (42.9%)
Hepatitis	3 (25.0%)	40 (25.0%)	10 (35.7%)
B or C	1 (33.3%)	28 (17.5%)	9 (90.0%)
Alcoholic	2 (66.7%)	8 (5.0%)	0 (0.0%)
Other	0 (0.0%)	19 (11.9%)	6 (60.0%)
<b>Autoimmune disease</b>	<b>4 (0.1%)</b>	<b>1,374 (18.3%)</b>	<b>31 (0.4%)</b>
Rheumatoid arthritis	1 (25.0%)	55 (4.0%)	8 (25.8%)
Systemic lupus	0 (0.0%)	28 (2.0%)	7 (22.6%)
Multiple sclerosis	1 (25.0%)	26 (1.9%)	3 (9.7%)
Autoimmune – Other	3 (75.0%)	1,274 (92.7%)	20 (64.5%)
Autoimmune – Inflammatory	1 (25.0%)	125 (9.1%)	12 (38.7%)
<b>Obesity</b>	<b>9 (0.2%)</b>	<b>746 (10.0%)</b>	<b>107 (1.3%)</b>
<b>Smoking</b>	<b>2 (0.0%)</b>	<b>1,653 (22.1%)</b>	<b>21 (0.2%)</b>

<sup>1</sup> Comorbidities may equal >100% by data source due to patients having multiple comorbidities. Proportions are out of all hospitalized patients with a positive NAAT within 14 days of admission in each data source (N), except for comorbidity subcategories for which the proportion is calculated out of total patients with the containing category comorbidity.

**Table G2. Patient Symptoms on Admission of Hospitalized Patients with a Positive SARS-CoV-2 NAAT within 14 Days of Admission by Data Source and Month, March–November 2020**

Symptoms present on admission <sup>1,2</sup>	Total n (%)	Month (2020)									
		March n (%)	April n (%)	May n (%)	June n (%)	July n (%)	August n (%)	September n (%)	October n (%)	November n (%)	
<b>An Academic Health System (total hospitalizations)</b>	<b>4,504</b>	<b>249</b>	<b>1,137</b>	<b>960</b>	<b>338</b>	<b>408</b>	<b>361</b>	<b>269</b>	<b>330</b>	<b>452</b>	
Shortness of breath (dyspnea)	575 (12.8%)	42 (16.9%)	182 (16.0%)	132 (13.8%)	38 (11.2%)	46 (11.3%)	41 (11.4%)	29 (10.8%)	39 (11.8%)	26 (5.8%)	
Fever	205 (4.6%)	29 (11.6%)	76 (6.7%)	36 (3.8%)	6 (1.8%)	17 (4.2%)	13 (3.6%)	14 (5.2%)	8 (2.4%)	6 (1.3%)	
Cough	96 (2.1%)	17 (6.8%)	39 (3.4%)	14 (1.5%)	3 (0.9%)	8 (2.0%)	5 (1.4%)	4 (1.5%)	5 (1.5%)	1 (0.2%)	
Fatigue	93 (2.1%)	2 (0.8%)	10 (0.9%)	25 (2.6%)	9 (2.7%)	8 (2.0%)	14 (3.9%)	11 (4.1%)	9 (2.7%)	5 (1.1%)	
Respiratory failure	61 (1.4%)	10 (4.0%)	21 (1.8%)	9 (0.9%)	0 (0.0%)	1 (0.2%)	2 (0.6%)	3 (1.1%)	7 (2.1%)	8 (1.8%)	
Stomach/abdominal pain	55 (1.2%)	0 (0.0%)	10 (0.9%)	8 (0.8%)	3 (0.9%)	9 (2.2%)	9 (2.5%)	8 (3.0%)	5 (1.5%)	3 (0.7%)	
Nausea or vomiting	30 (0.7%)	3 (1.2%)	6 (0.5%)	8 (0.8%)	3 (0.9%)	4 (1.0%)	2 (0.6%)	2 (0.7%)	2 (0.6%)	0 (0.0%)	
Chest discomfort/pain	29 (0.6%)	1 (0.4%)	4 (0.4%)	4 (0.4%)	4 (1.2%)	4 (1.0%)	3 (0.8%)	2 (0.7%)	3 (0.9%)	4 (0.9%)	
Dizziness/light-headed	17 (0.4%)	1 (0.4%)	0 (0.0%)	3 (0.3%)	2 (0.6%)	4 (1.0%)	0 (0.0%)	2 (0.7%)	2 (0.6%)	3 (0.7%)	
Diarrhea	16 (0.4%)	1 (0.4%)	4 (0.4%)	5 (0.5%)	1 (0.3%)	0 (0.0%)	3 (0.8%)	1 (0.4%)	0 (0.0%)	1 (0.2%)	
Multi-organ failure	8 (0.2%)	0 (0.0%)	2 (0.2%)	3 (0.3%)	0 (0.0%)	1 (0.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (0.4%)	
Chills	4 (0.1%)	0 (0.0%)	1 (0.1%)	1 (0.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.4%)	0 (0.0%)	1 (0.2%)	
Sore throat	4 (0.1%)	1 (0.4%)	0 (0.0%)	2 (0.2%)	1 (0.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Headache	4 (0.1%)	0 (0.0%)	2 (0.2%)	0 (0.0%)	2 (0.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Decreased appetite (Anorexia)	4 (0.1%)	1 (0.4%)	0 (0.0%)	2 (0.2%)	1 (0.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Myalgia	1 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Palpitations	1 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
<b>Explorys (total hospitalizations)</b>	<b>7,492</b>	<b>313</b>	<b>537</b>	<b>554</b>	<b>969</b>	<b>1,210</b>	<b>574</b>	<b>389</b>	<b>712</b>	<b>2,234</b>	
Shortness of breath (dyspnea)	2,057 (27.5%)	119 (38.0%)	188 (35.0%)	163 (29.4%)	198 (20.4%)	308 (25.5%)	165 (28.7%)	92 (23.7%)	209 (29.4%)	615 (27.5%)	
Cough	1,301 (17.4%)	115 (36.7%)	140 (26.1%)	108 (19.5%)	86 (8.9%)	202 (16.7%)	88 (15.3%)	50 (12.9%)	101 (14.2%)	411 (18.4%)	
Respiratory failure	1,282 (17.1%)	73 (23.3%)	146 (27.2%)	101 (18.2%)	75 (7.7%)	149 (12.3%)	88 (15.3%)	54 (13.9%)	147 (20.6%)	449 (20.1%)	
Fatigue	1,278 (17.1%)	62 (19.8%)	96 (17.9%)	87 (15.7%)	113 (11.7%)	205 (16.9%)	90 (15.7%)	59 (15.2%)	128 (18.0%)	438 (19.6%)	
Fever	1,131 (15.1%)	100 (31.9%)	104 (19.4%)	85 (15.3%)	135 (13.9%)	211 (17.4%)	70 (12.2%)	48 (12.3%)	97 (13.6%)	281 (12.6%)	
Chest discomfort/pain	995 (13.3%)	34 (10.9%)	42 (7.8%)	51 (9.2%)	219 (22.6%)	222 (18.3%)	67 (11.7%)	49 (12.6%)	92 (12.9%)	219 (9.8%)	
Nausea or vomiting	707 (9.4%)	36 (11.5%)	45 (8.4%)	59 (10.6%)	89 (9.2%)	136 (11.2%)	38 (6.6%)	32 (8.2%)	56 (7.9%)	216 (9.7%)	
Diarrhea	625 (8.3%)	42 (13.4%)	63 (11.7%)	41 (7.4%)	71 (7.3%)	106 (8.8%)	39 (6.8%)	31 (8.0%)	52 (7.3%)	180 (8.1%)	
Stomach/abdominal pain	576 (7.7%)	17 (5.4%)	29 (5.4%)	47 (8.5%)	108 (11.1%)	114 (9.4%)	34 (5.9%)	33 (8.5%)	37 (5.2%)	157 (7.0%)	
Multi-organ failure	508 (6.8%)	27 (8.6%)	55 (10.2%)	51 (9.2%)	75 (7.7%)	61 (5.0%)	30 (5.2%)	25 (6.4%)	54 (7.6%)	130 (5.8%)	
Dizziness/light-headed	316 (4.2%)	13 (4.2%)	17 (3.2%)	23 (4.2%)	38 (3.9%)	59 (4.9%)	17 (3.0%)	23 (5.9%)	29 (4.1%)	97 (4.3%)	
Headache	226 (3.0%)	20 (6.4%)	18 (3.4%)	22 (4.0%)	47 (4.9%)	79 (6.5%)	16 (2.8%)	23 (5.9%)	0 (0.0%)	1 (0.0%)	
Decreased appetite (Anorexia)	137 (1.8%)	3 (1.0%)	13 (2.4%)	8 (1.4%)	12 (1.2%)	15 (1.2%)	14 (2.4%)	9 (2.3%)	9 (1.3%)	54 (2.4%)	
Myalgia	108 (1.4%)	7 (2.2%)	8 (1.5%)	6 (1.1%)	8 (0.8%)	19 (1.6%)	8 (1.4%)	2 (0.5%)	14 (2.0%)	36 (1.6%)	
Sore throat	102 (1.4%)	2 (0.6%)	6 (1.1%)	10 (1.8%)	13 (1.3%)	21 (1.7%)	11 (1.9%)	2 (0.5%)	8 (1.1%)	29 (1.3%)	
Chills	78 (1.0%)	1 (0.3%)	7 (1.3%)	6 (1.1%)	5 (0.5%)	5 (0.4%)	9 (1.6%)	5 (1.3%)	11 (1.5%)	29 (1.3%)	
Palpitations	66 (0.9%)	3 (1.0%)	1 (0.2%)	4 (0.7%)	12 (1.2%)	13 (1.1%)	6 (1.0%)	2 (0.5%)	5 (0.7%)	20 (0.9%)	
Loss of smell/taste (anosmia/dysgeusia)	45 (0.6%)	0 (0.0%)	1 (0.2%)	3 (0.5%)	2 (0.2%)	13 (1.1%)	6 (1.0%)	2 (0.5%)	5 (0.7%)	13 (0.6%)	
Myocarditis	6 (0.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.1%)	0 (0.0%)	0 (0.0%)	1 (0.3%)	2 (0.3%)	2 (0.1%)	
<b>OneFlorida (total hospitalizations)</b>	<b>8,450</b>	<b>122</b>	<b>299</b>	<b>234</b>	<b>1,194</b>	<b>2,727</b>	<b>1,328</b>	<b>725</b>	<b>792</b>	<b>1,029</b>	
Respiratory failure	178 (2.1%)	2 (1.6%)	27 (9.0%)	6 (2.6%)	27 (2.3%)	82 (3.0%)	34 (2.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Shortness of breath (dyspnea)	160 (1.9%)	4 (3.3%)	15 (5.0%)	12 (5.1%)	29 (2.4%)	67 (2.5%)	30 (2.3%)	3 (0.4%)	0 (0.0%)	0 (0.0%)	
Fever	116 (1.4%)	2 (1.6%)	16 (5.4%)	6 (2.6%)	26 (2.2%)	44 (1.6%)	19 (1.4%)	2 (0.3%)	1 (0.1%)	0 (0.0%)	
Chest discomfort/pain	84 (1.0%)	0 (0.0%)	1 (0.3%)	4 (1.7%)	23 (1.9%)	36 (1.3%)	16 (1.2%)	3 (0.4%)	1 (0.1%)	0 (0.0%)	
Multi-organ failure	74 (0.9%)	1 (0.8%)	23 (7.7%)	5 (2.1%)	16 (1.3%)	23 (0.8%)	5 (0.4%)	1 (0.1%)	0 (0.0%)	0 (0.0%)	
Cough	63 (0.7%)	2 (1.6%)	4 (1.3%)	4 (1.7%)	15 (1.3%)	27 (1.0%)	9 (0.7%)	1 (0.1%)	1 (0.1%)	0 (0.0%)	
Fatigue	49 (0.6%)	0 (0.0%)	5 (1.7%)	2 (0.9%)	6 (0.5%)	23 (0.8%)	12 (0.9%)	1 (0.1%)	0 (0.0%)	0 (0.0%)	
Diarrhea	45 (0.5%)	2 (1.6%)	9 (3.0%)	3 (1.3%)	7 (0.6%)	17 (0.6%)	4 (0.3%)	3 (0.4%)	0 (0.0%)	0 (0.0%)	
Stomach/abdominal pain	43 (0.5%)	1 (0.8%)	2 (0.7%)	5 (2.1%)	6 (0.5%)	21 (0.8%)	7 (0.5%)	1 (0.1%)	0 (0.0%)	0 (0.0%)	
Nausea or vomiting	31 (0.4%)	0 (0.0%)	1 (0.3%)	2 (0.9%)	6 (0.5%)	17 (0.6%)	5 (0.4%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Dizziness/light-headed	16 (0.2%)	0 (0.0%)	0 (0.0%)	1 (0.4%)	3 (0.3%)	8 (0.3%)	3 (0.2%)	0 (0.0%)	1 (0.1%)	0 (0.0%)	
Headache	12 (0.1%)	0 (0.0%)	0 (0.0%)	1 (0.4%)	5 (0.4%)	5 (0.2%)	1 (0.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Myalgia	10 (0.1%)	0 (0.0%)	1 (0.3%)	1 (0.4%)	1 (0.1%)	5 (0.2%)	2 (0.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Decreased appetite (Anorexia)	10 (0.1%)	0 (0.0%)	4 (1.3%)	1 (0.4%)	2 (0.2%)	2 (0.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Loss of smell/taste (anosmia/dysgeusia)	4 (0.0%)	0 (0.0%)	1 (0.3%)	0 (0.0%)	0 (0.0%)	2 (0.1%)	1 (0.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Palpitations	4 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.4%)	2 (0.2%)	0 (0.0%)	1 (0.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	

Final Report: Characterization of COVID-19 Hospitalizations in EHR Data  
February 2022

Symptoms present on admission <sup>1,2</sup>	Total n (%)	Month (2020)								
		March n (%)	April n (%)	May n (%)	June n (%)	July n (%)	August n (%)	September n (%)	October n (%)	November n (%)
Sore throat	3 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.4%)	0 (0.0%)	2 (0.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Myocarditis	2 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.4%)	0 (0.0%)	1 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Chills	1 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

<sup>1</sup> Symptoms may equal >100% by data source due to patients having multiple symptoms. Proportions are out of all hospitalized patients with a positive NAAT within 14 days of admission in each data source (N) by month.

<sup>2</sup> The same list of symptoms was queried for each database. Symptoms with zero results for a specific database were excluded to limit table size. Rows are sorted by frequency.

**Table G3. Patient Symptoms within 14 Days Following Admission of Hospitalized Patients with a Positive SARS-CoV-2 NAAT within 14 Days of Admission by Data Source and Month, March–November 2020**

Symptoms present up to 14 days following admission <sup>1,2</sup>	Total n (%)	Month (2020)								
		March n (%)	April n (%)	May n (%)	June n (%)	July n (%)	August n (%)	September n (%)	October n (%)	November n (%)
<b>An Academic Health System (total hospitalizations)</b>	<b>4,504</b>	<b>249</b>	<b>1,137</b>	<b>960</b>	<b>338</b>	<b>408</b>	<b>361</b>	<b>269</b>	<b>330</b>	<b>452</b>
Respiratory failure	1,531 (34.0%)	84 (33.7%)	474 (41.7%)	377 (39.3%)	106 (31.4%)	137 (33.6%)	103 (28.5%)	80 (29.7%)	86 (26.1%)	84 (18.6%)
Shortness of breath (dyspnea)	460 (10.2%)	40 (16.1%)	131 (11.5%)	113 (11.8%)	28 (8.3%)	41 (10.0%)	28 (7.8%)	27 (10.4%)	25 (7.6%)	26 (5.8%)
Diarrhea	379 (8.4%)	22 (8.8%)	95 (8.4%)	83 (8.6%)	21 (6.2%)	48 (11.8%)	31 (8.6%)	37 (13.8%)	23 (7.0%)	19 (4.2%)
Multi-organ failure	337 (7.5%)	25 (10.0%)	118 (10.4%)	88 (9.2%)	21 (6.2%)	25 (6.1%)	19 (5.3%)	18 (6.7%)	14 (4.2%)	9 (2.0%)
Fever	250 (5.6%)	29 (11.6%)	90 (7.9%)	52 (5.4%)	17 (5.0%)	15 (3.7%)	10 (2.8%)	8 (3.0%)	20 (6.1%)	9 (2.0%)
Fatigue	157 (3.5%)	8 (3.2%)	38 (3.3%)	37 (3.9%)	13 (3.8%)	18 (4.4%)	15 (4.2%)	10 (3.7%)	9 (2.7%)	9 (2.0%)
Cough	130 (2.9%)	19 (7.6%)	43 (3.8%)	26 (2.7%)	7 (2.1%)	13 (3.2%)	6 (1.7%)	7 (2.6%)	7 (2.1%)	2 (0.4%)
Nausea or vomiting	121 (2.7%)	5 (2.0%)	35 (3.1%)	21 (2.2%)	7 (2.1%)	17 (4.2%)	12 (3.3%)	7 (2.6%)	11 (3.3%)	6 (1.3%)
Chest discomfort/pain	110 (2.4%)	9 (3.6%)	19 (1.7%)	35 (3.6%)	11 (3.3%)	4 (1.0%)	7 (1.9%)	6 (2.2%)	12 (3.6%)	7 (1.5%)
Stomach/abdominal pain	104 (2.3%)	2 (0.8%)	22 (1.9%)	22 (2.3%)	9 (2.7%)	9 (2.2%)	13 (3.6%)	15 (5.6%)	8 (2.4%)	4 (0.9%)
Loss of smell/taste (anosmia/dysgeusia)	84 (1.9%)	0 (0.0%)	18 (1.6%)	21 (2.2%)	7 (2.1%)	16 (3.9%)	7 (1.9%)	3 (1.1%)	4 (1.2%)	8 (1.8%)
Headache	54 (1.2%)	6 (2.4%)	12 (1.1%)	9 (0.9%)	6 (1.8%)	8 (2.0%)	6 (1.7%)	7 (2.6%)	0 (0.0%)	0 (0.0%)
Decreased appetite (Anorexia)	51 (1.1%)	6 (2.4%)	14 (1.2%)	11 (1.1%)	1 (0.3%)	4 (1.0%)	6 (1.7%)	5 (1.9%)	2 (0.6%)	2 (0.4%)
Dizziness/light-headed	31 (0.7%)	0 (0.0%)	5 (0.4%)	7 (0.7%)	3 (0.9%)	4 (1.0%)	6 (1.7%)	3 (1.1%)	1 (0.3%)	2 (0.4%)
Myocarditis	17 (0.4%)	3 (1.2%)	4 (0.4%)	2 (0.2%)	1 (0.3%)	2 (0.5%)	0 (0.0%)	2 (0.7%)	3 (0.9%)	0 (0.0%)
Myalgia	16 (0.4%)	2 (0.8%)	3 (0.3%)	4 (0.4%)	2 (0.6%)	1 (0.2%)	2 (0.6%)	1 (0.4%)	0 (0.0%)	1 (0.2%)
Sore throat	12 (0.3%)	3 (1.2%)	4 (0.4%)	1 (0.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (0.7%)	1 (0.3%)	1 (0.2%)
Palpitations	11 (0.2%)	0 (0.0%)	3 (0.3%)	4 (0.4%)	1 (0.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (0.9%)	0 (0.0%)
Chills	1 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.4%)	0 (0.0%)	0 (0.0%)
<b>Explorys (total hospitalizations)</b>	<b>7,492</b>	<b>313</b>	<b>537</b>	<b>554</b>	<b>969</b>	<b>1,210</b>	<b>574</b>	<b>389</b>	<b>712</b>	<b>2,234</b>
Respiratory failure	2,579 (34.4%)	143 (45.7%)	249 (46.4%)	195 (35.2%)	176 (18.2%)	359 (29.7%)	172 (30.0%)	103 (26.5%)	262 (36.8%)	920 (41.2%)
Shortness of breath (dyspnea)	1,288 (17.2%)	69 (22.0%)	126 (23.5%)	101 (18.2%)	160 (16.5%)	200 (16.5%)	96 (16.7%)	64 (16.5%)	117 (16.4%)	355 (15.9%)
Fatigue	859 (11.5%)	34 (10.9%)	82 (15.3%)	63 (11.4%)	70 (7.2%)	132 (10.9%)	68 (11.8%)	43 (11.1%)	82 (11.5%)	285 (12.8%)
Multi-organ failure	755 (10.1%)	56 (17.9%)	84 (15.6%)	87 (15.7%)	115 (11.9%)	113 (9.3%)	48 (8.4%)	27 (6.9%)	68 (9.6%)	157 (7.0%)
Fever	679 (9.1%)	63 (20.1%)	74 (13.8%)	52 (9.4%)	97 (10.0%)	126 (10.4%)	32 (5.6%)	21 (5.4%)	63 (8.8%)	151 (6.8%)
Diarrhea	589 (7.9%)	34 (10.9%)	63 (11.7%)	47 (8.5%)	67 (7.0%)	98 (8.1%)	31 (5.4%)	34 (8.7%)	48 (6.7%)	166 (7.4%)
Chest discomfort/pain	584 (7.8%)	14 (4.5%)	30 (5.6%)	32 (5.8%)	95 (9.8%)	129 (10.7%)	47 (8.2%)	29 (7.5%)	63 (8.8%)	145 (6.5%)
Cough	510 (6.8%)	43 (13.7%)	63 (11.7%)	34 (6.1%)	42 (4.3%)	87 (7.2%)	23 (4.0%)	21 (5.4%)	48 (6.7%)	149 (6.7%)
Stomach/abdominal pain	429 (5.7%)	14 (4.5%)	20 (3.7%)	28 (5.1%)	76 (7.8%)	78 (6.4%)	28 (4.9%)	25 (6.4%)	31 (4.4%)	129 (5.8%)
Nausea or vomiting	415 (5.5%)	22 (7.0%)	22 (4.1%)	37 (6.7%)	58 (6.0%)	77 (6.4%)	35 (6.1%)	17 (4.4%)	36 (5.1%)	111 (5.0%)
Dizziness/light-headed	195 (2.6%)	8 (2.6%)	10 (1.9%)	19 (3.4%)	19 (2.0%)	36 (3.0%)	14 (2.4%)	16 (4.1%)	12 (1.7%)	61 (2.7%)
Headache	132 (1.8%)	8 (2.6%)	14 (2.6%)	22 (4%)	25 (2.6%)	39 (3.2%)	14 (2.4%)	10 (2.6%)	0 (0.0%)	0 (0.0%)
Decreased appetite (Anorexia)	103 (1.4%)	0 (0.0%)	14 (2.6%)	9 (1.6%)	14 (1.4%)	15 (1.2%)	11 (1.9%)	4 (1.0%)	6 (0.8%)	30 (1.3%)
Palpitations	74 (1.0%)	1 (0.3%)	1 (0.2%)	2 (0.4%)	21 (2.2%)	15 (1.2%)	5 (0.9%)	2 (0.5%)	2 (0.3%)	25 (1.1%)
Myalgia	65 (0.9%)	5 (1.6%)	5 (0.9%)	2 (0.4%)	6 (0.6%)	6 (0.5%)	3 (0.5%)	4 (1.0%)	5 (0.7%)	29 (1.3%)
Loss of smell/taste (anosmia/dysgeusia)	52 (0.7%)	1 (0.3%)	6 (1.1%)	3 (0.5%)	9 (0.9%)	12 (1.0%)	2 (0.3%)	4 (1%)	2 (0.3%)	13 (0.6%)
Sore throat	43 (0.6%)	2 (0.6%)	2 (0.4%)	3 (0.5%)	4 (0.4%)	4 (0.3%)	4 (0.7%)	3 (0.8%)	6 (0.8%)	15 (0.7%)
Chills	30 (0.4%)	2 (0.6%)	3 (0.6%)	1 (0.2%)	6 (0.6%)	4 (0.3%)	1 (0.2%)	1 (0.3%)	3 (0.4%)	9 (0.4%)
Myocarditis	18 (0.2%)	1 (0.3%)	0 (0.0%)	1 (0.2%)	6 (0.6%)	1 (0.1%)	1 (0.2%)	1 (0.3%)	2 (0.3%)	5 (0.2%)
<b>OneFlorida (total hospitalizations)</b>	<b>8,450</b>	<b>122</b>	<b>299</b>	<b>234</b>	<b>1,194</b>	<b>2,727</b>	<b>1,328</b>	<b>725</b>	<b>792</b>	<b>1,029</b>
Respiratory failure	1,011 (12.0%)	13 (10.7%)	52 (17.4%)	21 (9.0%)	102 (8.5%)	389 (14.3%)	215 (16.2%)	74 (10.2%)	92 (11.6%)	53 (5.2%)
Shortness of breath (dyspnea)	477 (5.6%)	7 (5.7%)	21 (7.0%)	19 (8.1%)	78 (6.5%)	185 (6.8%)	73 (5.5%)	43 (5.9%)	25 (3.2%)	26 (2.5%)
Multi-organ failure	290 (3.4%)	5 (4.1%)	32 (10.7%)	10 (4.3%)	35 (2.9%)	99 (3.6%)	56 (4.2%)	20 (2.8%)	20 (2.5%)	13 (1.3%)
Chest discomfort/pain	220 (2.6%)	1 (0.8%)	5 (1.7%)	11 (4.7%)	32 (2.7%)	72 (2.6%)	52 (3.9%)	17 (2.3%)	11 (1.4%)	19 (1.8%)
Fever	217 (2.6%)	6 (4.9%)	20 (6.7%)	11 (4.7%)	53 (4.4%)	63 (2.3%)	30 (2.3%)	12 (1.7%)	14 (1.8%)	8 (0.8%)
Fatigue	176 (2.1%)	1 (0.8%)	14 (4.7%)	4 (1.7%)	22 (1.8%)	63 (2.3%)	32 (2.4%)	16 (2.2%)	11 (1.4%)	13 (1.3%)
Stomach/abdominal pain	165 (2.0%)	0 (0.0%)	8 (2.7%)	10 (4.3%)	21 (1.8%)	52 (1.9%)	22 (1.7%)	26 (3.6%)	12 (1.5%)	14 (1.4%)
Cough	157 (1.9%)	2 (1.6%)	15 (5.0%)	7 (3.0%)	28 (2.3%)	63 (2.3%)	18 (1.4%)	12 (1.7%)	6 (0.8%)	6 (0.6%)
Diarrhea	147 (1.7%)	2 (1.6%)	16 (5.4%)	4 (1.7%)	22 (1.8%)	47 (1.7%)	26 (2.0%)	15 (2.1%)	9 (1.1%)	6 (0.6%)
Nausea or vomiting	131 (1.6%)	2 (1.6%)	8 (2.7%)	11 (4.7%)	17 (1.4%)	41 (1.5%)	20 (1.5%)	16 (2.2%)	9 (1.1%)	7 (0.7%)
Headache	55 (0.7%)	1 (0.8%)	1 (0.3%)	4 (1.7%)	11 (0.9%)	20 (0.7%)	11 (0.8%)	6 (0.8%)	1 (0.1%)	0 (0.0%)
Myalgia	36 (0.4%)	0 (0.0%)	2 (0.7%)	2 (0.9%)	6 (0.5%)	2 (0.3%)	8 (0.6%)	2 (0.3%)	2 (0.3%)	1 (0.1%)
Dizziness/light-headed	34 (0.4%)	1 (0.8%)	2 (0.7%)	0 (0.0%)	5 (0.4%)	7 (0.3%)	8 (0.6%)	5 (0.7%)	3 (0.4%)	3 (0.3%)
Decreased appetite (Anorexia)	30 (0.4%)	0 (0.0%)	3 (1.0%)	1 (0.4%)	7 (0.6%)	6 (0.2%)	6 (0.5%)	3 (0.4%)	4 (0.5%)	0 (0.0%)



Final Report: Characterization of COVID-19 Hospitalizations in EHR Data  
February 2022

Symptoms present up to 14 days following admission <sup>1,2</sup>	Total n (%)	Month (2020)								
		March n (%)	April n (%)	May n (%)	June n (%)	July n (%)	August n (%)	September n (%)	October n (%)	November n (%)
Palpitations	15 (0.2%)	0 (0.0%)	1 (0.3%)	1 (0.4%)	3 (0.3%)	3 (0.1%)	3 (0.2%)	3 (0.4%)	0 (0.0%)	1 (0.1%)
Sore throat	9 (0.1%)	0 (0.0%)	0 (0.0%)	1 (0.4%)	1 (0.1%)	5 (0.2%)	1 (0.1%)	0 (0.0%)	1 (0.1%)	0 (0.0%)
Myocarditis	9 (0.1%)	0 (0.0%)	0 (0.0%)	1 (0.4%)	0 (0.0%)	2 (0.1%)	2 (0.2%)	2 (0.3%)	2 (0.3%)	0 (0.0%)
Loss of smell/taste (anosmia/dysgeusia)	6 (0.1%)	0 (0.0%)	2 (0.7%)	0 (0.0%)	2 (0.2%)	1 (0.0%)	1 (0.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Chills	3 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.0%)	1 (0.1%)	0 (0.0%)	0 (0.0%)	1 (0.1%)

<sup>1</sup> Symptoms may equal >100% by data source due to patients having multiple symptoms. Proportions are out of all hospitalized patients with a positive NAAT within 14 days of admission in each data source (N) by month.

<sup>2</sup> The same list of symptoms was queried for each database. Symptoms with zero results for a specific database were excluded to limit table size. Rows are sorted by frequency.