

Length and Severity of COVID-19 Surges Varied by Region in 2020 and 2021

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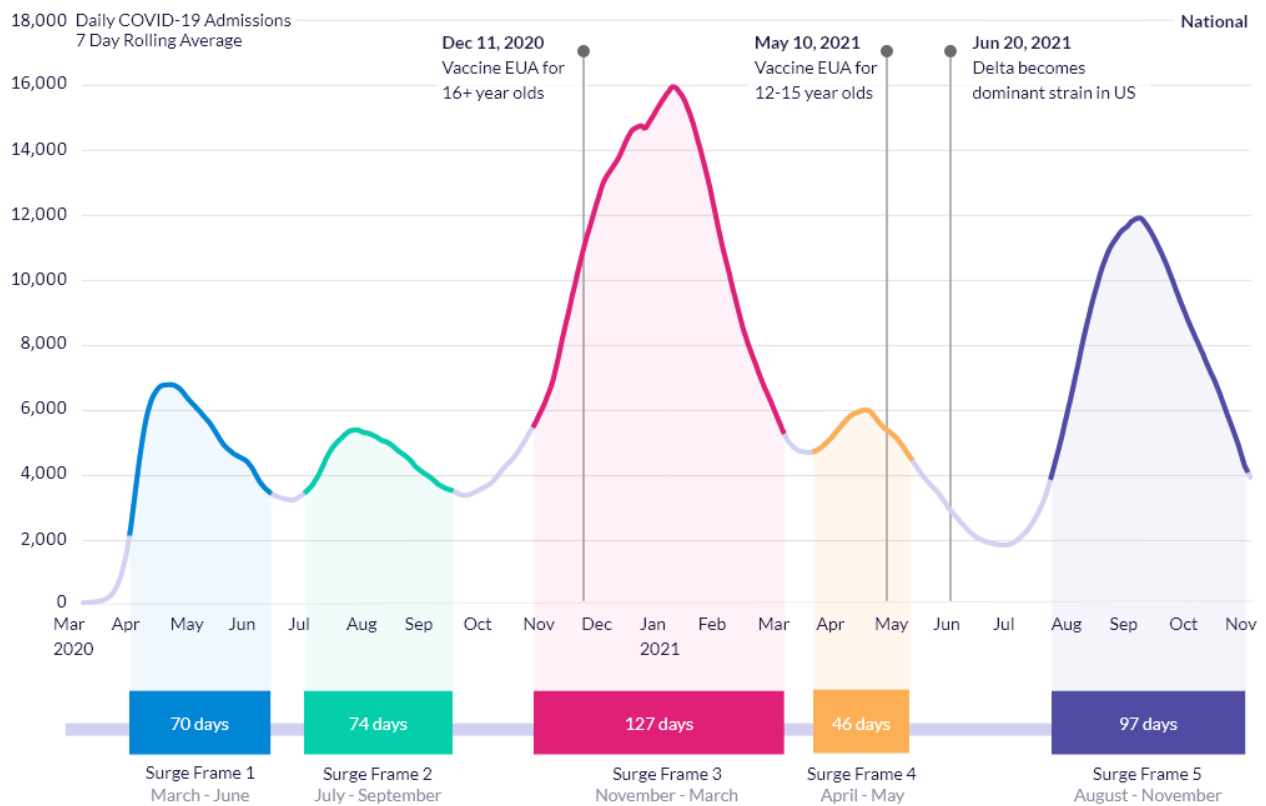
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Last updated 14 February 2022 • Check for updates at EHRN.org

Abstract: The length and magnitude of COVID-19 hospitalization surges in the U.S. vary by geographic region.

Since the start of the pandemic, hospitals have been experiencing capacity issues as COVID-19 infections requiring hospitalization have taken hold. As shown in Figure 1, we identified five distinct surges in COVID hospitalizations across the U.S. between March 2020 and November 2021. In each surge, daily admissions increased at least 10% from the previous average weekly admissions.

COVID-19 Hospital Admissions in the U.S.

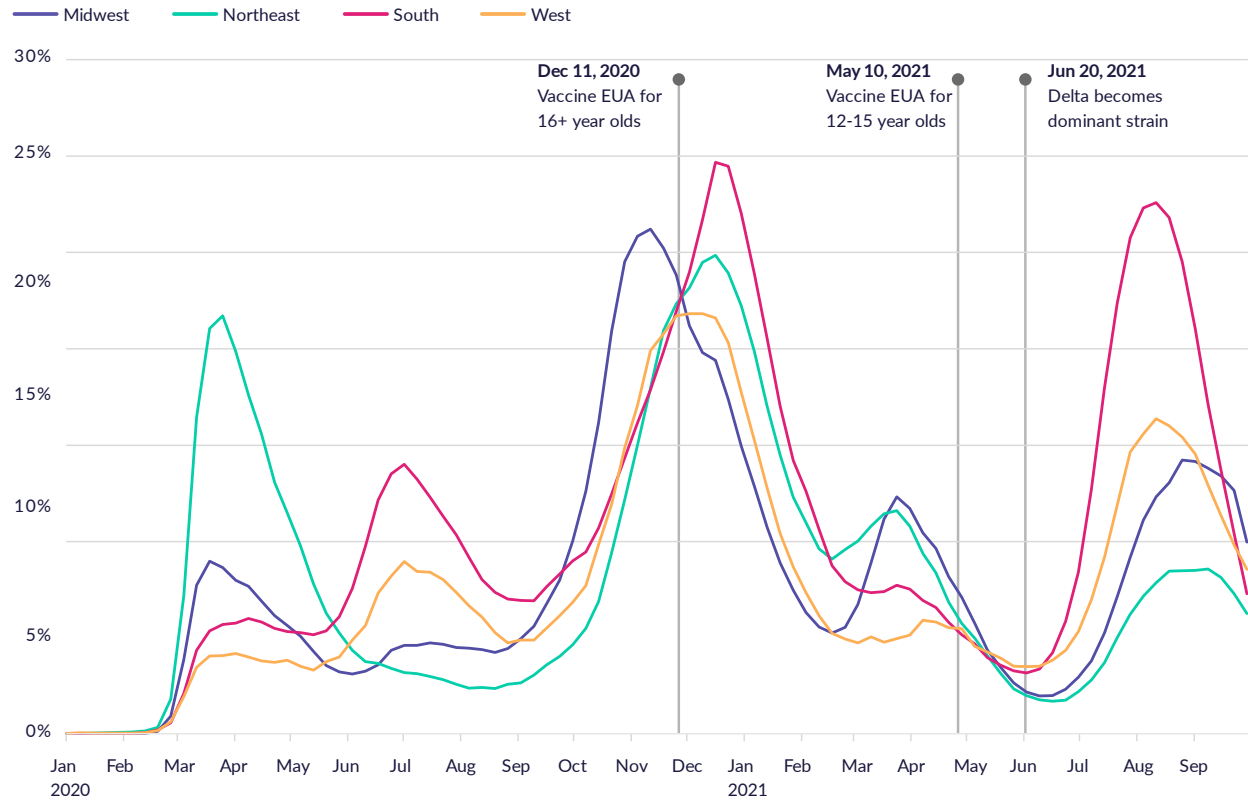


“COVID-19 Hospital Admissions in the U.S.,” 2022. Epic Research (EpicResearch.org)

Figure 1. National surges in COVID hospitalizations from March 2020 to November 2021. Five surge frames were identified at the national level: the first from March to June 2020, the second from July to September 2020, the third from November 2020 to March 2021, the fourth from April to May 2021, and the fifth from August to November 2021.

Each national surge lasted 81 days on average, with the third and fifth surges lasting the longest and seeing the greatest number of admissions. However, the four U.S. census regions experienced differences in both the magnitude and length of the COVID surges in hospitalizations. The third surge, seen in November 2020 to March 2021, had the highest percentage of COVID admissions for all four regions.

COVID-19 Surges by Region



"COVID-19 Surges by Region," 2022. Epic Research (EpicResearch.org)

Figure 2. Percentage of hospitalizations that were related to COVID-19 compared to pre-pandemic admission levels by region.

Northeast Region

The Northeast region was hit hardest by the first surge between March and April 2020, peaking at 22% of admissions for COVID. Concurrently, the Northeast experienced the longest first surge, six days longer than the average. However, the Northeast did not experience the second surge, and all subsequent surges through November 2021 were shorter than the average surge duration.

COVID-19 Hospitalizations in the Northeast

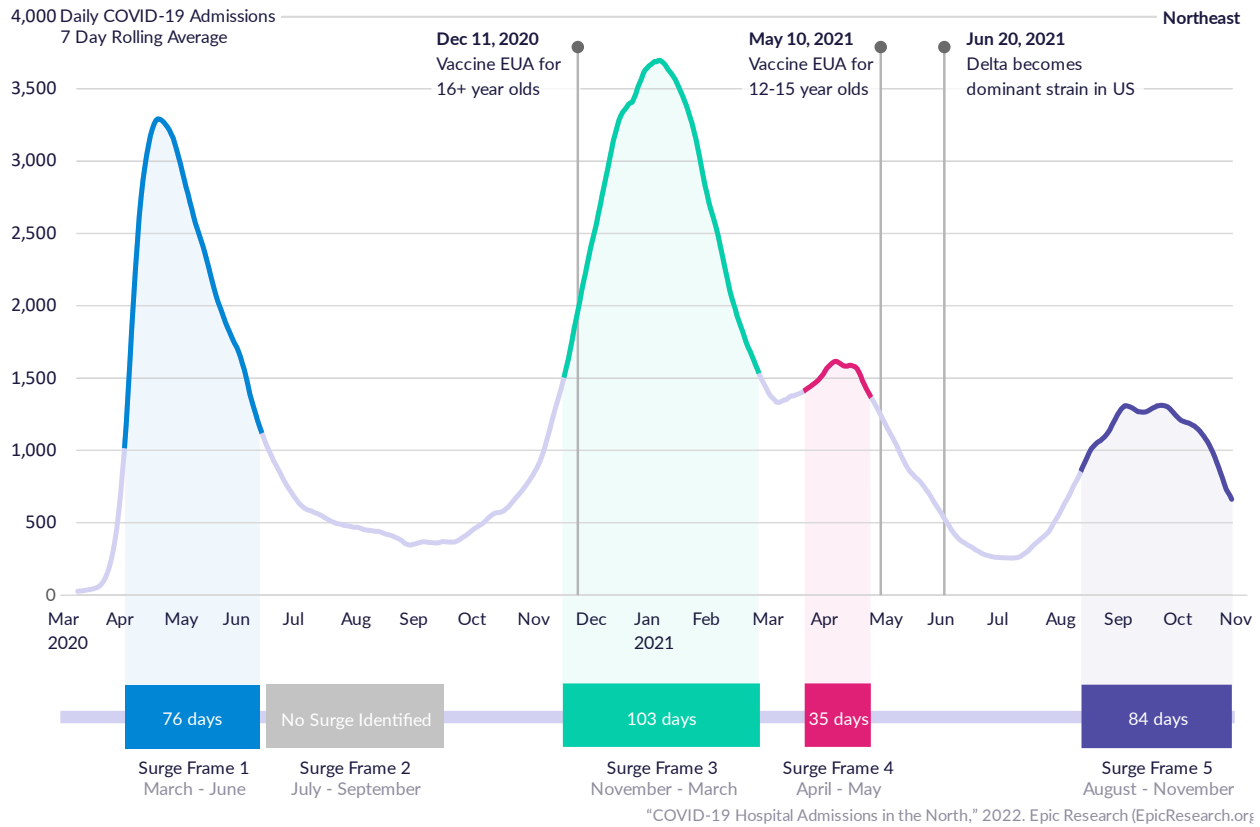


Figure 3. Seven-day rolling average of COVID-19 hospital admissions in the Northeast from March 2020 to November 2021. The Northeast region experienced only four surges, with the July to September 2020 surge not identified, as shown by the gray bar for Surge Frame 2.

South Region

In contrast, the South region experienced the fifth surge at a longer duration (9 days longer than average) and much greater magnitude (25% of total admissions) than any other region. The CDC reports COVID vaccination rates are also lowest in the South.¹

COVID-19 Hospitalizations in the South

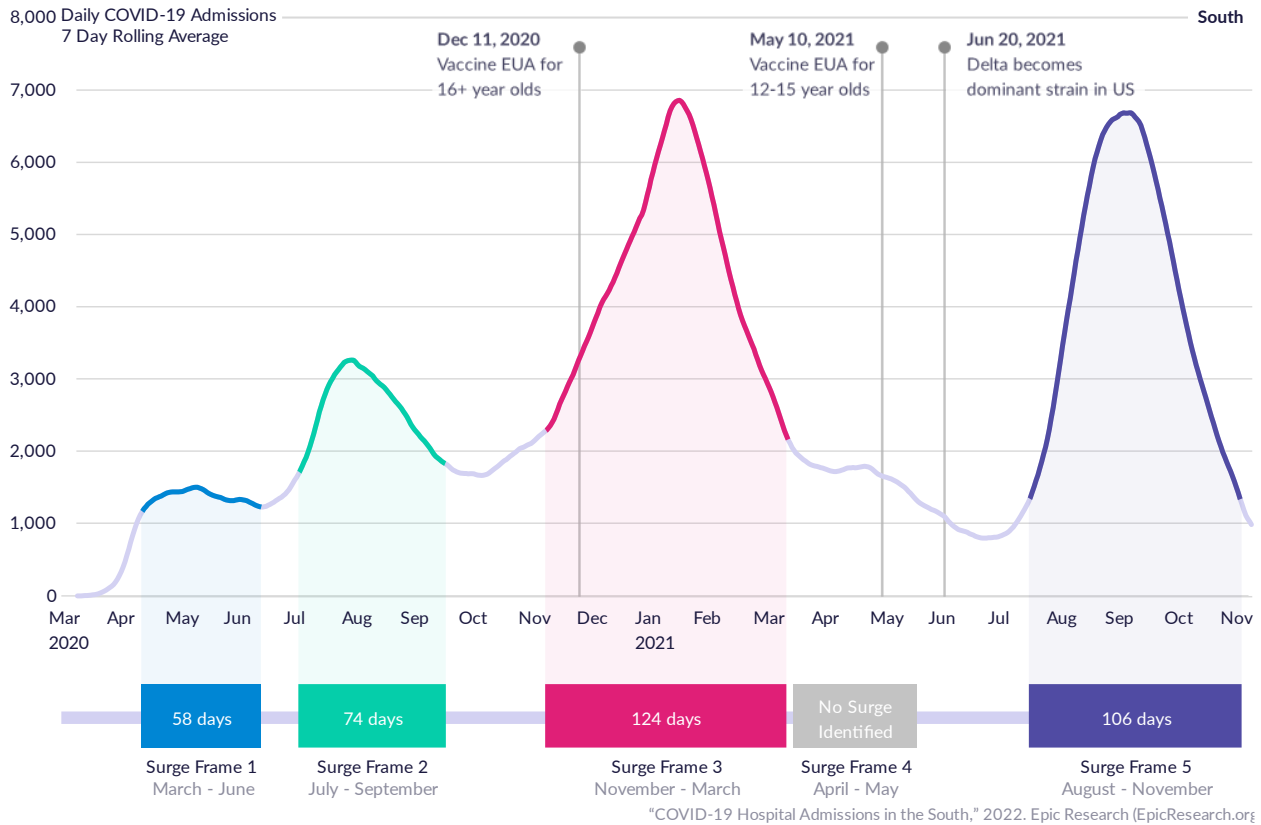


Figure 4. Seven-day rolling average of COVID-19 hospital admissions in the South from March 2020 to November 2021. The South experienced only four surges, with the April to May 2021 surge not identified, as shown by the gray bar for Surge Frame 4.

Midwest Region

The Midwest experienced longer than average surges in the third and fourth surge frames, which were 7 and 17 days longer than average, respectively. However, the second surge frames, from July to September 2020, was 27 days shorter than average.

COVID Hospitalizations in the Midwest

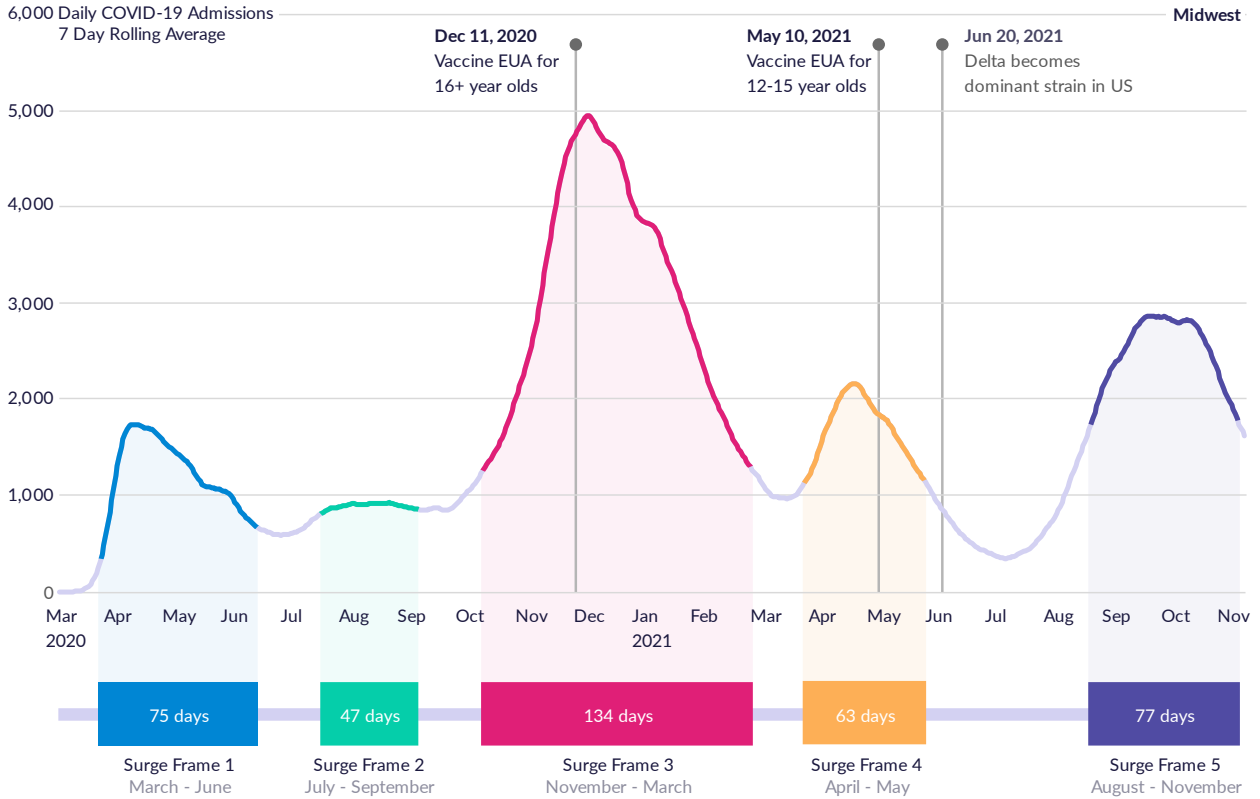


Figure 5. Seven-day rolling average of COVID-19 hospital admissions in the Midwest from March 2020 to November 2021. The Midwest experienced all five surge frames.

West Region

The third and fifth surges were both the greatest duration and magnitude in the West. The region had the lowest level of COVID hospitalization in the first surge from March 2020 to June 2020, with less than 5% of admissions, compared to nearly 18% of admissions during the third surge from November 2020 to March 2021. Like the South, the West has a lower rate of COVID vaccination than the Northeast and Midwest regions.¹

COVID Hospitalizations in the West

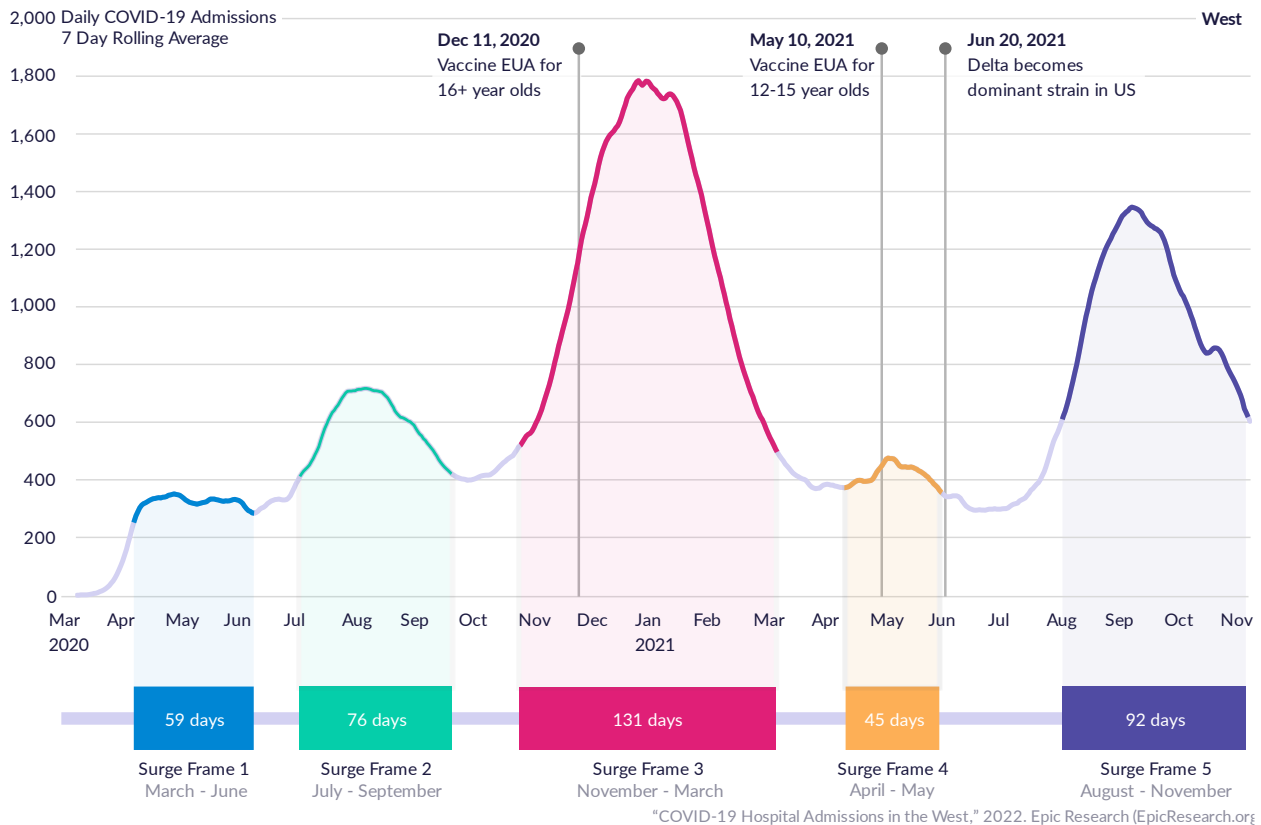


Figure 6. Seven-day rolling average of COVID-19 hospital admissions in the West from March 2020 to November 2021. The West experienced all five surge frames.

While the national trends of COVID surges provide meaningful assessments of the overall pandemic, these differences in regional trends help to highlight how healthcare systems, healthcare workers, and individuals have likely experienced COVID surges differently based on their location.

These data come from Cosmos, a HIPAA-defined Limited Data Set of more than 120 million patients from 141 Epic organizations including 832 hospitals and 13,421 clinics, serving patients in all 50 states. This study was completed by two teams, each composed of a clinician and research scientists who worked independently. The two teams came to similar conclusions.

References

1. The Centers for Disease Control and Prevention. COVID-19 Vaccinations in the United States. https://covid.cdc.gov/covid-data-tracker/#vaccinations_vacc-total-admin-rate-total. Accessed on January 7, 2022.

Data Definitions

Term	Definition
National Surge Frame	One of five date ranges in which the national COVID admission counts rose and fell.
Regional Surge Peak	Within each National Surge Frame, this is the day with the highest admission count for a U.S. census region.
Regional Surge Baseline	Within each National Surge Frame for a U.S. census region, this is the higher of the lowest admission count before and after the Regional Surge Peak.
Regional Surge Length	Within each National Surge Frame for a U.S. census region, this is the number of days between when admission rates were last below 10% of the rise from the baseline to the peak until when they subsequently returned to below 10% of the rise.
COVID-19 Start Date	<p>The earlier of:</p> <ol style="list-style-type: none"> 1. The earliest positive SARS-CoV-2 lab collection date. 2. The earliest COVID-19 diagnosis documented as an encounter diagnosis or a final billing diagnosis. <p>* If an inpatient encounter began in the seven days prior to the earliest of the dates above, the encounter start date is used instead.</p>
COVID-19-Related Admission	<p>A hospital admission during which the patient has a positive SARS-CoV-2 lab test or COVID-19 diagnosis, OR a hospital admission with any respiratory diagnosis which happens within 14 days of the patient's COVID-19 Start Date.</p> <p>Respiratory Diagnosis Codes: J00-J99 (ICD-10)</p>
Northeast Region	Connecticut, Delaware, Maine, Massachusetts, Pennsylvania, New Hampshire, New Jersey, New York, Rhode Island, Vermont
Midwest Region	Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin
South Region	Alabama; Arkansas; Florida; Georgia; Kentucky; Louisiana; Maryland; Mississippi; North Carolina; Oklahoma; South Carolina; Tennessee; Texas; Virginia; Washington, D.C.; West Virginia
West Region	Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming