



A Local Pandemic

COVID-19 Across Three Hospitals

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Introduction

The Omicron COVID-19 variant marked the fifth major spike in COVID-19 hospitalizations.¹ At its peak, over 150,000 people in the US were hospitalized with COVID-19 and about 17 percent of those patients were in an intensive care unit. Despite the extensive availability of COVID-19 vaccines, this was a higher level of hospitalizations than the previous peak in January 2022, and the peak of the Delta wave in September 2021. Whether an individual hospital saw a large increase in patients from the Omicron wave was largely determined by the characteristics of the surrounding population, including the prevalence of vaccinations and the climate. On January 20, 2022, at the height of the Omicron wave, six mostly cold weather states including Maryland, Rhode Island, Massachusetts, Pennsylvania, Minnesota, and Washington reported hospital capacities at over 85 percent. Only five states reported utilization rates under 70 percent including Missouri, South Dakota, Kansas, Utah, and Wyoming.²

These differences in ICU bed occupancy reflect the continued importance of geography in how hospitals respond to the COVID-19 pandemic. The number of admissions to a hospital is largely driven by the characteristics of the surrounding area, including COVID-19 transmission risk factors, such as local work places, crowded housing, population density, age of the population, and other social determinants of health, as well as local COVID-19 containment rules and regulations.

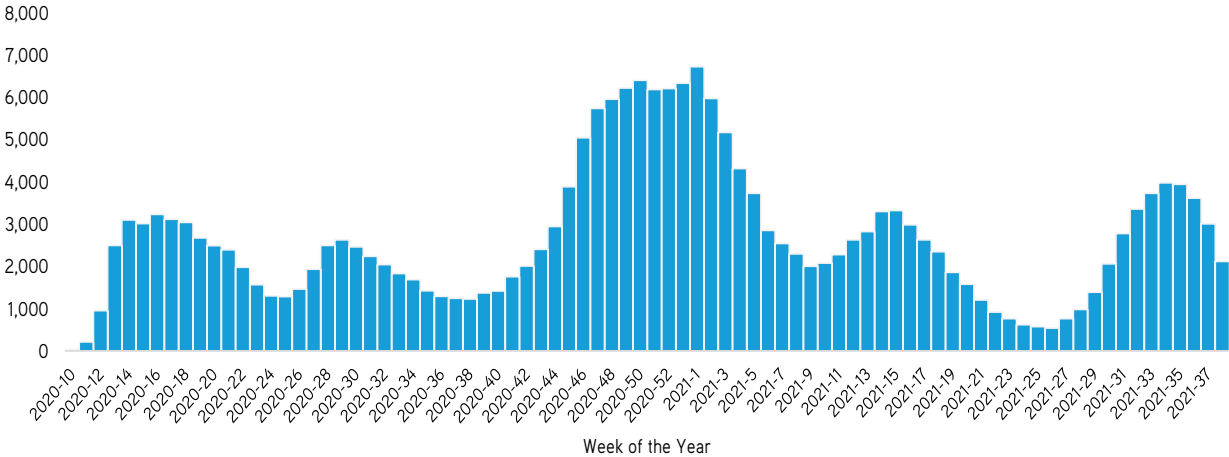
This most recent spike in hospitalizations and deaths unfolded despite the extensive availability of highly effective COVID-19 vaccines and was predominantly driven by unvaccinated individuals³ and the more contagious and infectious Delta and Omicron variants.⁴ In September, 55 percent of the US population was fully vaccinated but that rate ranged from a high of 79.5 percent of Connecticut residents over 18 to a low of 48.2 percent of West Virginia residents over 18.⁵ Differences in vaccine take-up rates across the country added another layer of geographic risk factors to hospital admissions.

In order to understand the importance of geography in COVID-19 hospitalizations in New York, we examine over a year (February 2020–April 2021) of COVID-19 patient admittance data for the three State University of New York (SUNY) hospitals: University Hospital at Downstate⁶ (UHD) located in Brooklyn, Upstate University Hospital⁷ (Upstate) located in Syracuse, and Stony Brook University Hospital⁸ (Stony Brook) located on Long Island. These hospitals differ substantially in their geography and the patients they serve and together provide valuable insight into how the COVID-19 pandemic evolved in New York and how New Yorkers of different ages, races, and ethnicities were affected.

Past Hospitalization Apexes

Nationally, there have been five major spikes in COVID-19 hospitalizations measured as the total number of COVID-19 patients in or admitted to the hospital on a daily or weekly basis (depending on the data source⁹)—May 2020, August 2020, January 2021, and September 2021—with the highest level of hospitalizations in early January 2021 before vaccines were widely available.¹⁰ New York, however, saw a slightly different pattern in hospitalizations than the country as a whole.¹¹ The highest day of hospitalizations occurred early during the first peak on April 12, 2020 with 18,825 patients. There was no spike in August 2020, and the January 2021 and September 2021 peaks were much lower than April 2020 with 9,273 patients on January 19, 2021 and 2,476 patients on September 13, 2021. It should be noted that daily hospitalizations for New York and weekly hospitalizations for the US from COVID-NET, a CDC dataset monitoring hospitalizations, are measured differently. New York reports the total number of persons hospitalized each day according to daily responses from all New York hospitals ([Figure 1b](#)) and the CDC COVID-NET reports weekly hospitalizations based on a nationally representative survey of a subsample of hospitals ([Figure 1a](#)).

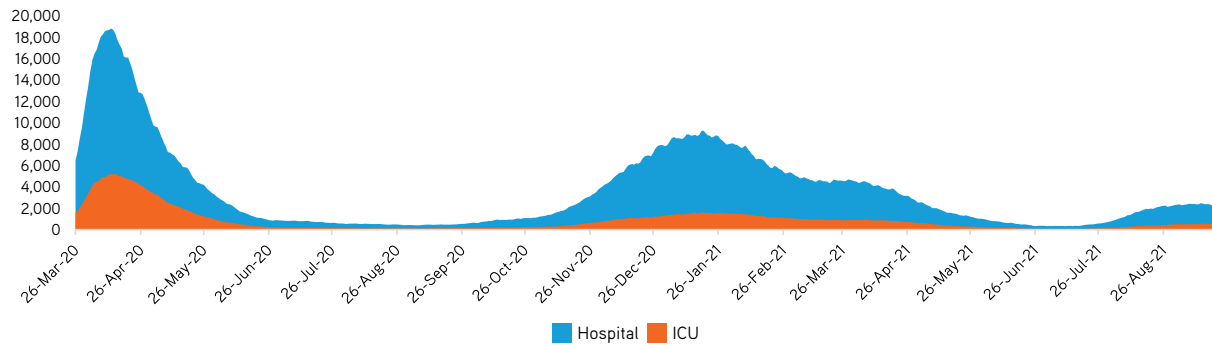
FIGURE 1A. Weekly COVID-19 Hospitalizations in the United States



NOTE: COVID-NET hospitalization data are preliminary and subject to change as more data become available. In particular, case counts and rates for recent hospital admissions are subject to lag. As data are received each week, prior case counts and rates are updated accordingly.

SOURCE: Coronavirus Disease 2019 (COVID-19)-Associated Hospitalization Surveillance Network (COVID-NET).

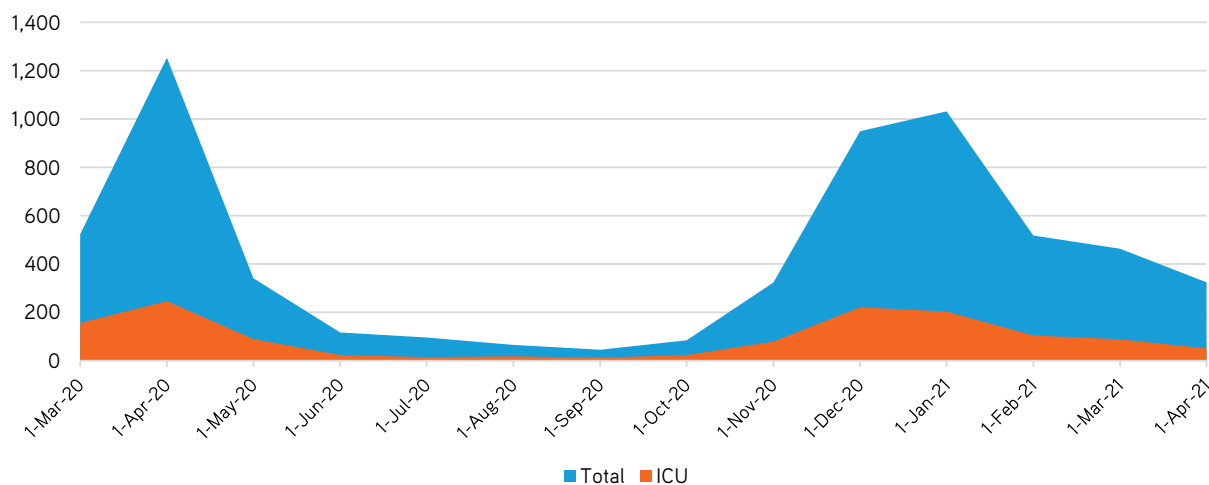
FIGURE 1B. Daily Hospitalizations in New York



SOURCE: “New York Forward COVID-19 Daily Hospitalization Summary by Region,” New York State Department of Health. accessed September 22, 2021, <https://health.data.ny.gov/Health/New-York-Forward-COVID-19-Daily-Hospitalization-Su/qutr-irdf>.

The three SUNY hospitals follow a similar pattern to the entirety of New York State. The highest level of hospitalization was in April 2020 concentrated primarily in the two New York City area hospitals—UHD and Stony Brook—with another slightly lower but longer lasting peak in January 2021. This second peak began earlier at Upstate and was substantial for all three hospitals (although on a per-bed basis, the peak had the strongest effect at Upstate and Stony Brook). These numbers are not directly comparable because they are a count of all new COVID-19 intakes for the month, not the total number of people hospitalized on any single day of the month. Despite this difference in reporting, the patterns remain the same.

FIGURE 2. Monthly Hospitalizations in SUNY Hospitals



SOURCE: New COVID-19 hospitalizations reported by SUNY hospitals to author.

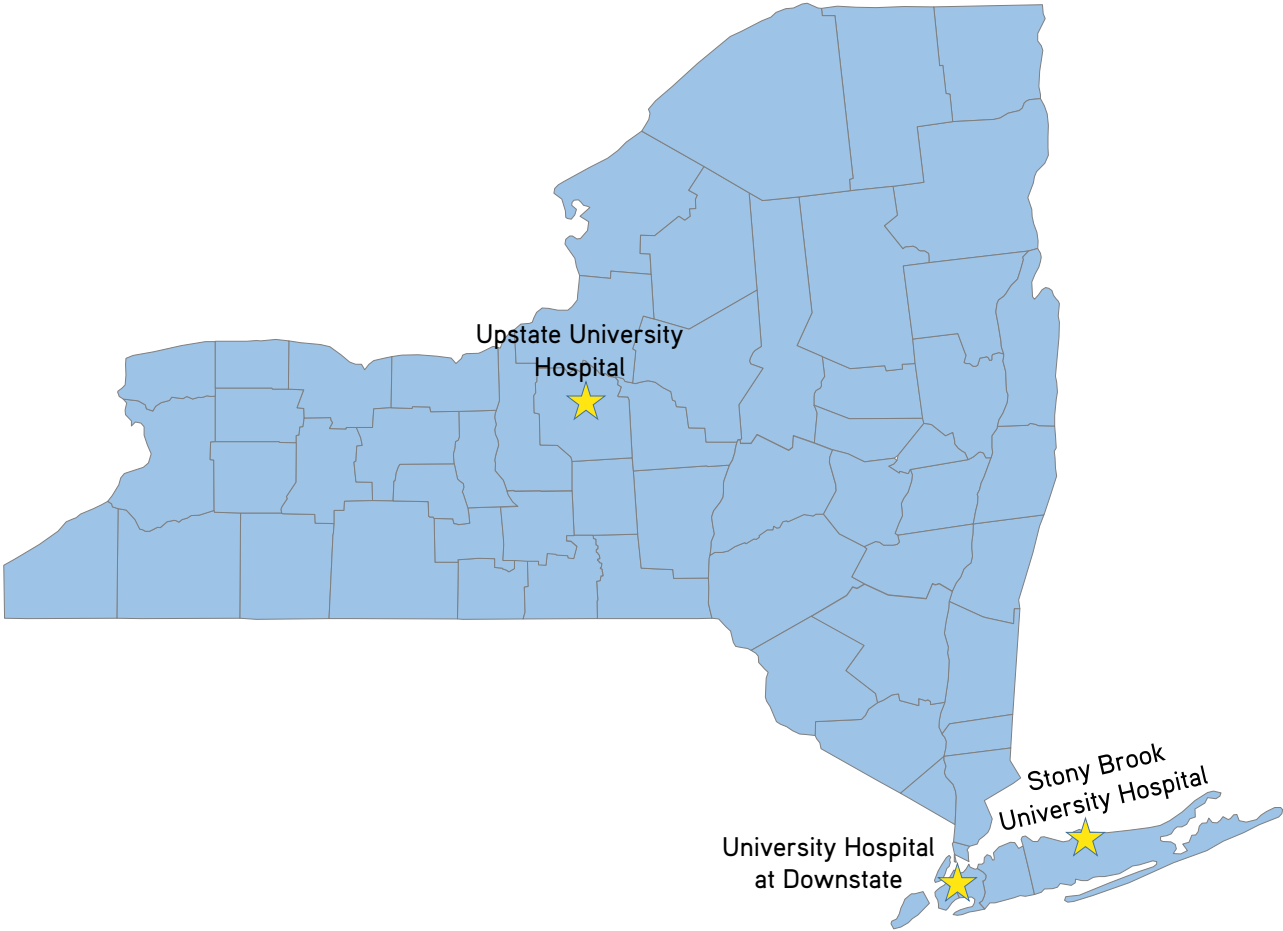
In order to understand how and why these three hospitals experienced different timing and levels of COVID-19 hospitalizations, it is important to understand the patients and communities they serve. The three hospitals differ not just in terms of geography but the age, race, ethnicity, and economic circumstances of their patient base.

The SUNY Hospitals

This analysis focuses on the three main SUNY Hospitals: UHD, Upstate, and Stony Brook. All three hospitals are part of the State University of New York system and as such engage in both medical education and research in addition to health care. Despite their shared position as part of SUNY, all three hospitals are distinct in terms of size, geography, and the populations that they serve. The hospitals also played different roles in the COVID-19 response. UHD was the only hospital in New York designated a COVID-19 only hospital from March 2020–June 2020.

Size

Stony Brook is the largest of the three hospitals with 624 total beds, including 373 medical/surgical beds and 65 intensive care beds. In 2019 (the last year of available data), Stony Brook had 31,454 total discharges accounting for 203,002 patient days. Stony Brook is staffed by nearly 7,000 employees. Upstate is the second largest with about two-thirds the capacity of Stony Brook. Upstate has 420 total beds, including 51 ICU beds, for a total of 24,684 discharges and 143,696 patient days. Finally, UHD is the smallest of the three hospitals at roughly half the size of Stony Brook with 342 total beds, 19 ICU beds, 10,422 patient discharges, and 65,268 patient days. Upstate has 5,278 full-time employees and UHD 2,514.



The hospitals also differ in their utilization and occupancy. In 2019, Stony Brook's reported average total occupancy each night was 92 percent. This is higher than the 87 percent at Upstate and only 52 percent at UHD. For context, during the height of the COVID-19 pandemic an ICU with an occupancy rate of over 90 percent was considered overwhelmed. Occupancy rates are directly reported by the hospitals. It is important to note that the 52 percent bed occupancy at UHD refers to the percentage of licensed beds, not the percentage of staffed beds which was higher.

TABLE 1. SUNY Hospital Statistics Year Ending December 31, 2019

| | UHD | Upstate | Stony Brook |
|---|--------|---------|-------------|
| Inpatient | | | |
| Total Licensed Beds | 342 | 420 | 624 |
| Total Discharges | 10,422 | 24,684 | 31,454 |
| Total Patient Days | 65,268 | 142,696 | 203,002 |
| Total Occupancy | 52% | 87% | 92% |
| Average Length of Stay (days) | 6.3 | 5.8 | 6.4 |
| Outpatient | | | |
| Emergency Room Visits (ER) | 57,485 | 74,156 | 103,992 |
| Number of Admissions from ER | 8,044 | 16,147 | 24,450 |
| Percentage of Admissions from ER Visits | 14% | 22% | 24% |
| Payer Mix (by gross revenue) | | | |
| Medicare (including managed care) | 37% | 41% | 34% |
| Medicaid (including managed care) | 46% | 26% | 13% |
| Medicare and Medicaid | 83% | 67% | 47% |
| Commercial (including managed care, Blue Cross) | 15% | 24% | 48% |
| Other/Self Pay | 2% | 9% | 5% |
| Employment | | | |
| Total FTE Employees | 2,514 | 5,278 | 6,990 |

SOURCE: State University of New York Financial Fact Book for the June 30, 2020 Fiscal Year (Albany: State University of New York, 2020), <https://www.suny.edu/media/suny/content-assets/communication/publicationsreportsdata/FactBookforJune302020FY-Final.pdf>.

Geography and Neighborhood

The three hospitals are geographically distinct and serve as teaching hospitals for different medical schools. Stony Brook is located in Suffolk County on Long Island, UHD is located in Kings County (Brooklyn) in New York City, and Upstate is located in Onondaga County in Syracuse. To provide some context into the neighborhoods surrounding the hospitals we calculated the population characteristics for the surrounding neighborhood (the first three rings of census tracts) and the county as a whole. The first three rings include the census tract the hospital is in, all immediately adjacent tracts, and all adjacent tracts to the immediately adjacent tracts. We chose this method for multiple reasons. Census tracts are fairly small ranging from 1,500 to 8,900 residents in the tracts surrounding the hospitals and especially near a university may not accurately reflect the population served by the hospital because of the proximity of on-campus students. Similarly, using the county as a whole, especially in New York

City, can be too large of a geography—Kings County has over 2.5 million residents—all of which would not necessarily be served by the UHD hospital.

In addition to standard demographic measures of the surrounding population that are generally correlated with health outcomes—race, ethnicity, and household income, we also report three additional risk factors specific to the COVID-19 pandemic based on previous research. Population density and the prevalence of crowded housing (the number of households with more than one resident per room) are both likely to increase the probability of COVID-19 transmission and a larger population over the age of 65 is likely to increase severity and hospitalization from COVID-19 for those who catch it.

TABLE 2. Characteristics of Census Tracts and Counties Surrounding SUNY Hospitals

| | | University Hospital at Downstate (UHD) | Upstate Medical Onondaga | Stony Brook Suffolk |
|--|-----------------|---|-----------------------------|------------------------|
| Population | Adjacent Tracts | 60,679 | 33,314 | 67,608 |
| | County | 2,589,974 | 462,872 | 1,483,832 |
| Population Over 65 | Adjacent Tracts | 15.5% | 6.6% | 18.8% |
| | County | 13.6% | 16.6% | 16.5% |
| Population Density (1,000/sq. mile) | Adjacent Tracts | 43.2 | 6.9 | 2.0 |
| | County | 36.6 | 0.6 | 1.6 |
| Median Household Income | Adjacent Tracts | \$52,924 | \$22,439 | \$137,860 |
| | County | \$65,411 | \$65,956 | \$105,492 |
| Crowded Occupancy | Adjacent Tracts | 1,822 | 326 | 276 |
| | County | 97,731 | 3,037 | 12,483 |
| Percent Below Poverty | Adjacent Tracts | 17.5 | 53.4 | 3.6 |
| | County | 20.0 | 15.5 | 6.8 |

SOURCE: “Planning Database” with 2010 Census and 2014-18 American Community Survey Data, US Census Bureau, <https://www.census.gov/topics/research/guidance/planning-databases.2020.html>.

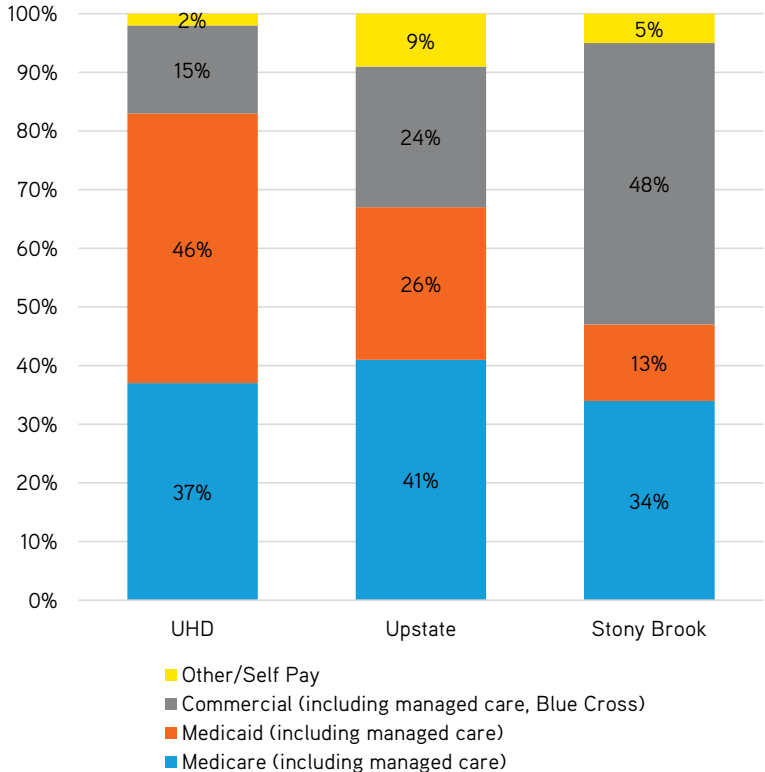
The area surrounding UHD appears to have the population most at risk for COVID-19. The Brooklyn community has the highest population density at 43,000 people per square mile compared to 6,900 per square mile surrounding Upstate and 2,000 people per square mile surrounding Stony Brook. It also has the highest concentration of crowded occupancy housing, the second highest poverty rate, and the second highest percent of the population over 65 years of age.

Both Upstate and Stony Brook are also surrounded by populations with substantial COVID-19 risk factors. Upstate has a very high poverty rate in the immediate neighborhood with 53 percent of residents in surrounding tracts living below the poverty line and a median household income of only \$22,439. Some of that is the direct result of a high student population but even in Onondaga County as a whole the poverty rate is 15 percent and the median income is \$65,000, which is nearly identical to Kings County but much lower than the \$105,000 for Suffolk County. Although Stony Brook is surrounded by a less dense, wealthier population, it does have the oldest population with 19 percent of nearby residents above 65.

Health Insurance of Population Served

The differences in income between the three neighborhoods is also reflected in the payer mix of the hospitals. In 2019, nearly half (46 percent) of UHD’s gross revenue came from Medicaid, the government’s low-income health insurance provider, and an additional 37 percent from Medicare, the public insurance program for older Americans. A total of 83 percent of revenue came from these two public insurance programs and only 17 percent from private or commercial health insurance or self-pay. In contrast, only 13 percent of Stony Brook’s and 26 percent of Upstate’s revenue came from Medicaid. The percent from Medicare is similar across the three hospitals with Upstate receiving 41 percent of revenue from Medicare and Stony Brook 34 percent, roughly equal to UHD’s 37 percent.

FIGURE 3. SUNY Hospital Payer Mix by Gross Revenue, 2019



SOURCE: State University of New York Financial Fact Book for the June 30, 2020 Fiscal Year (Albany: State University of New York, 2021), <https://www.suny.edu/media/suny/content-assets/communication/publicationsreportsdata/FactBookforJune302020FY-Final.pdf>.

Race and Ethnicity

Due to their geographies, the hospitals also serve very different populations in terms of the race and ethnicity of their patients and the population that lives surrounding the hospitals. COVID-19 has had a disproportionate impact on communities of color in large part due to preexisting disparities in health outcomes and the social determinants

of health.¹² Racial and ethnic differences in where and how people live, the types of jobs they hold, their access to education and information, and their underlying health conditions contribute to COVID-19's higher toll on communities of color.

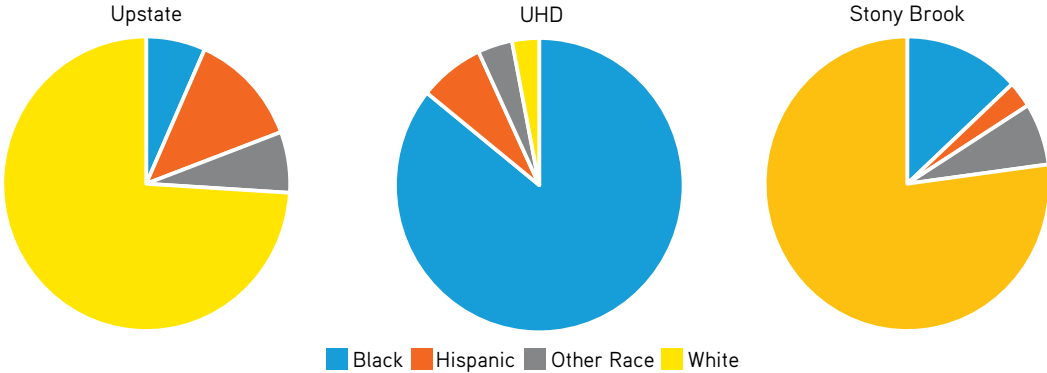
Stony Brook and Upstate both serve largely white populations. In 2019, 77 percent of Stony Brook's discharged patients and 74 percent of Upstate's discharged patients were white. This is in stark contrast to the 3 percent of UHD patients. Upstate also serves a sizable Hispanic population, which accounts for 13 percent of discharges compared to only 3 percent at Stony Brook and 7 percent at UHD. UHD serves a primarily Black population and 86 percent of discharged patients are Black compared to 7 percent and 13 percent for Upstate and Stony Brook, respectively.

TABLE 3. SUNY Hospital Discharges (excluding newborns) by Race and Ethnicity, SPARCS 2017

| Race | Upstate | Stony Brook | UHD | Total |
|--------------|---------------|---------------|--------------|---------------|
| Black | 2,153 | 3,236 | 8,572 | 13,961 |
| Hispanic | 4,081 | 716 | 729 | 5,526 |
| Other Race | 2,164 | 1,681 | 387 | 4,232 |
| White | 23,922 | 18,973 | 304 | 43,199 |
| Total | 32,320 | 24,606 | 9,992 | 66,918 |

SOURCE: "Hospital Inpatient Discharges (SPARCS De-Identified): 2017," New York State Department of Health, accessed November 29, 2021, <https://health.data.ny.gov/dataset/Hospital-Inpatient-Discharges-SPARCS-De-Identified/22g3-z7e7>.

FIGURE 4. SUNY Hospital Discharges (excluding newborns) by Race and Ethnicity, SPARCS 2017



SOURCE: "Hospital Inpatient Discharges (SPARCS De-Identified): 2017," New York State Department of Health, accessed November 29, 2021, <https://health.data.ny.gov/dataset/Hospital-Inpatient-Discharges-SPARCS-De-Identified/22g3-z7e7>.

The stark difference in the racial and ethnic makeup of the hospitals' patients is explained in large part by the demographics of their neighborhoods. Eighty-three percent of residents in the census tracts adjacent to UHD are Black compared to 41 percent at Upstate and 3.2 percent at Stony Brook. While those numbers seem disproportionate compared to the payer base, the makeup of the host counties help explain the discrepancy for the larger Stony Brook and Upstate Hospitals. Onondaga County is only 11 percent Black even though the area directly surrounding the hospital

is 41 percent Black and Suffolk County is 7 percent Black, which is more than twice as high as the area directly surrounding the hospital. As reflected in the payer data, Upstate has the largest surrounding Hispanic population.

TABLE 4. Characteristics of Census Tracts and Counties Surrounding SUNY Hospitals

| | | University Hospital at Downstate (UHD) | Upstate Medical Onondaga | Stony Brook Suffolk |
|---------------------|-----------------|---|-----------------------------|------------------------|
| Population | Adjacent Tracts | 60,679 | 33,314 | 67,608 |
| | County | 2,589,974 | 462,872 | 1,483,832 |
| Black Population | Adjacent Tracts | 82.6% | 41.4% | 3.2% |
| | County | 30.0% | 10.8% | 7.3% |
| Hispanic Population | Adjacent Tracts | 7.7% | 10.5% | 8.6% |
| | County | 19.0% | 4.9% | 19.3% |
| Asian Population | Adjacent Tracts | 7.7% | 10.5% | 8.6% |
| | County | 11.8% | 3.7% | 3.9% |

SOURCE: "Planning Database" with 2010 Census and 2014–18 American Community Survey Data, US Census Bureau, <https://www.census.gov/topics/research/guidance/planning-databases.2020.html>.

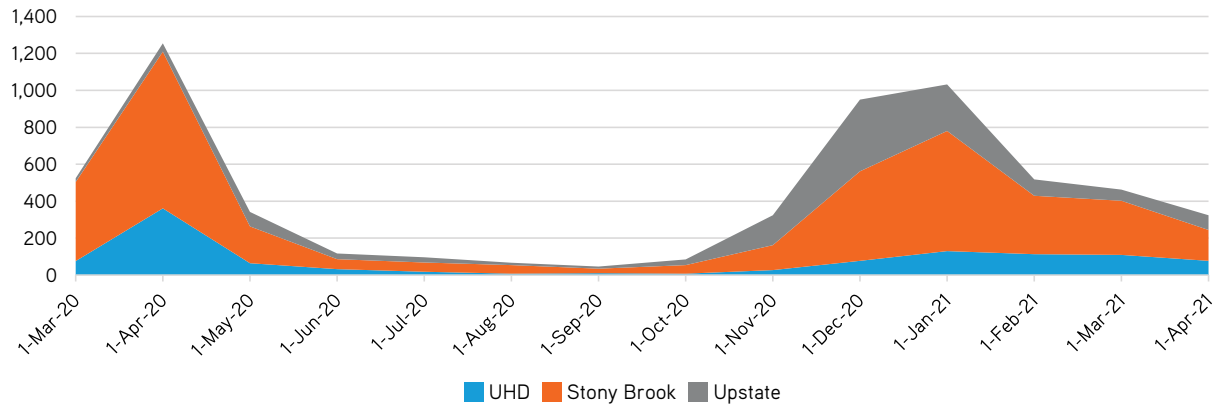
The Pandemic at SUNY Hospitals

The primary data for this project come from hospital admissions records. We have limited the records to those who were initially admitted to the hospital because of COVID-19 or were otherwise symptomatic, which does not include people who tested positive for COVID-19 when in the hospital for other reasons. In cases where there was doubt about whether a hospital patient was a "COVID-19 hospitalization," we asked that hospitals report these admissions to us in the same way that they report them to New York State and the CDC. Each data entry is therefore an individual COVID-19 admission, the month and year (but not exact date) of that admission, the race and ethnicity of the person admitted, the age of the person admitted (with a top-code to prevent identification), and whether the person was placed in the ICU during their stay. Placement in the ICU indicates a particularly severe case of COVID-19 that required substantial medical intervention, such as a respirator. This data is not directly comparable to daily hospital case count data, which measures the total number of people currently hospitalized on any particular day, but the patterns in intake data and daily case count data are largely the same. For patient privacy, we did not link hospitalization data to mortality records and therefore do not know whether hospitalized patients subsequently die or recover.

Geography and Timing

The patterns in COVID-19 hospitalizations and ICU admittance for the three SUNY hospitals are largely consistent with total hospitalizations in New York State. The initial spike in hospitalizations peaked in April 2020 and was largely concentrated in New York City. This is clearly reflected in our data with UHD and Stony Brook having the largest number of COVID-19 patients during this period. By comparison, Upstate had very few COVID-19 patients until May 2020 and did not see a substantial spike until the second wave in winter 2020/2021.

FIGURE 5. Total COVID-19 Hospital Admittances for SUNY Hospitals by Hospital and Month



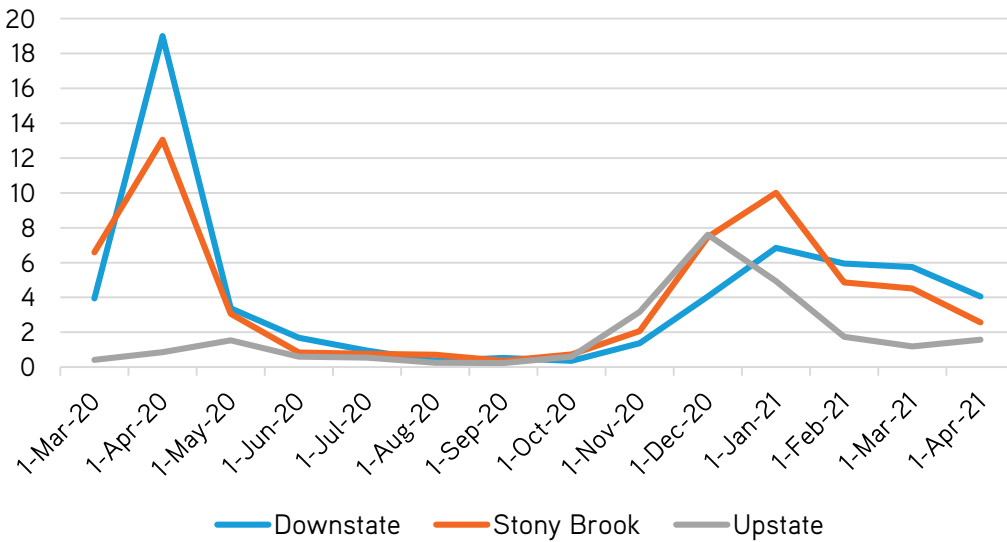
SOURCE: New COVID-19 hospitalizations reported by SUNY hospitals to author.

The differences in timing of COVID-19 admissions for these hospitals highlights the importance of geography in COVID-19 transmission. The earliest increase in cases in New York was concentrated in New York City with spikes in admissions to both Stony Brook and UHD. Admissions in Syracuse at Upstate did not begin until the next month. In contrast, the second wave in winter 2020 began earlier at Upstate with cases beginning to rise in October, whereas Stony Brook did not see a substantial increase until November and UHD not until December and January. It is important to remember that UHD was designated a COVID-19 only hospital during the first wave of the pandemic, which makes it difficult to directly compare the surge in hospitalizations there during April and May 2020 to both other hospitals and other time periods.

These patterns are even clearer when patient admissions are scaled by the size of the hospital. Because the hospitals are different sizes, we scaled COVID-19 admissions as admissions per ICU bed. By this measure, the largest spike in hospitalizations were at UHD in April 2020, which admitted 19 COVID-19 patients for every ICU bed compared to Stony Brook’s 13. This may even underestimate the strain on UHD, which in 2019 only operated at 52 percent capacity compared to Stony Brook’s 92 percent capacity. In other words, the true magnitude of the increase at UHD is likely higher than the ratio of COVID-19 patients to ICU beds would suggest because fewer of those beds were likely occupied before the beginning of the pandemic compared to Stony Brook or Upstate. By this metric, Upstate’s initial May 2020 high appears even less significant with only 1.5 COVID-19 patients admitted per ICU bed. The disproportionate spike in hospitalizations at UHD is largely explained by its status as a COVID-19 only hospital in addition to the hard-hit population it normally serves

During the second wave of winter 2020/2021, all three hospitals saw very similar patterns of COVID-19 admittance per ICU bed as COVID-19 had spread to all parts of New York State. Upstate and Stony Brook had slightly earlier increases in hospitalizations, with both hospitals hitting about 7.5 COVID-19 admissions per ICU bed by December and Stony Brook rising to 10 admissions per bed by January. UHD, no longer a COVID-19 only hospital after June 2020, in contrast was only at four admissions per bed in December and stayed just under seven in January, never quite hitting the level of the other two hospitals. All three hospitals saw substantial declines in hospitalizations (by any metric) following the rollout of vaccines in January 2021.

FIGURE 6. COVID-19 Admissions per ICU Beds



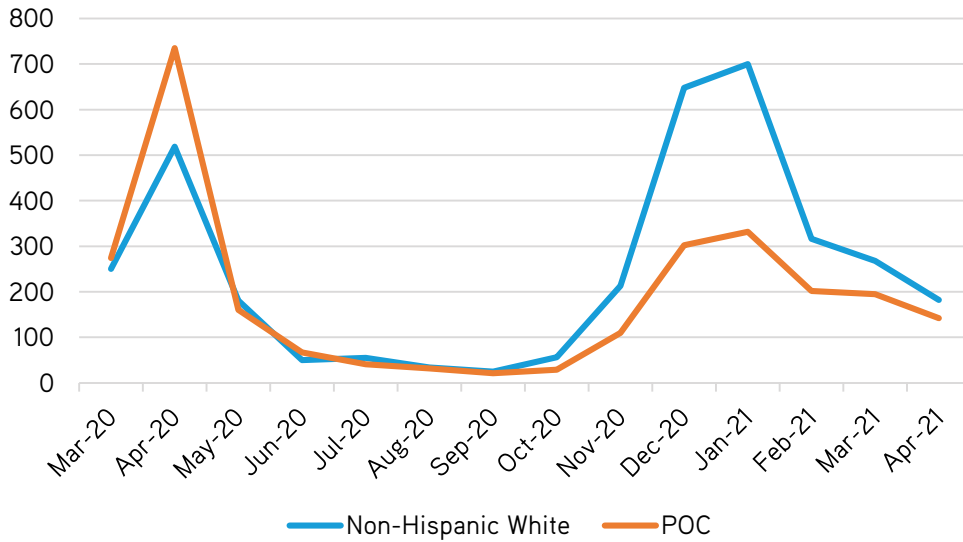
SOURCE: New COVID-19 hospitalizations reported by SUNY hospitals to author.

Hospitalizations by Race, Ethnicity, and Age

The US faces substantial and persistent racial and ethnic disparities in both health outcomes and the social determinants of health. According to the CDC, the social determinants of health include health-care access and quality, education access and quality, social and community context, economic stability, and then neighborhood and build environment.¹³ In previous research, we found that the higher toll that COVID-19 took on communities of color in New York was predicted by many of the social, economic, and medical conditions that existed before the pandemic.¹⁴ New Yorkers of color are more likely to live in dense neighborhoods and crowded housing, more likely to live in a household with a high risk worker, more likely to live below the poverty line, less likely to have health insurance, more likely to live in a household where no one has a college degree, and more likely to have preexisting conditions including diabetes, obesity, and asthma.

As discussed above, the three SUNY hospitals serve very different populations in terms of the age, race, ethnicity, and economics of the surrounding area and pre-COVID patients. Looking at all the hospitals together, it is clear that the first wave of hospitalizations was dominated by people of color (POC) who were predominantly Black and Hispanic and the second wave by white people. One reason for this difference is that the initial increase in COVID-19 cases was concentrated in New York City, which is only 32 percent non-Hispanic white¹⁵ compared to the state as a whole, which is 55.3 percent non-Hispanic white.¹⁶

FIGURE 7. COVID-19 Admissions to SUNY Hospitals by Race

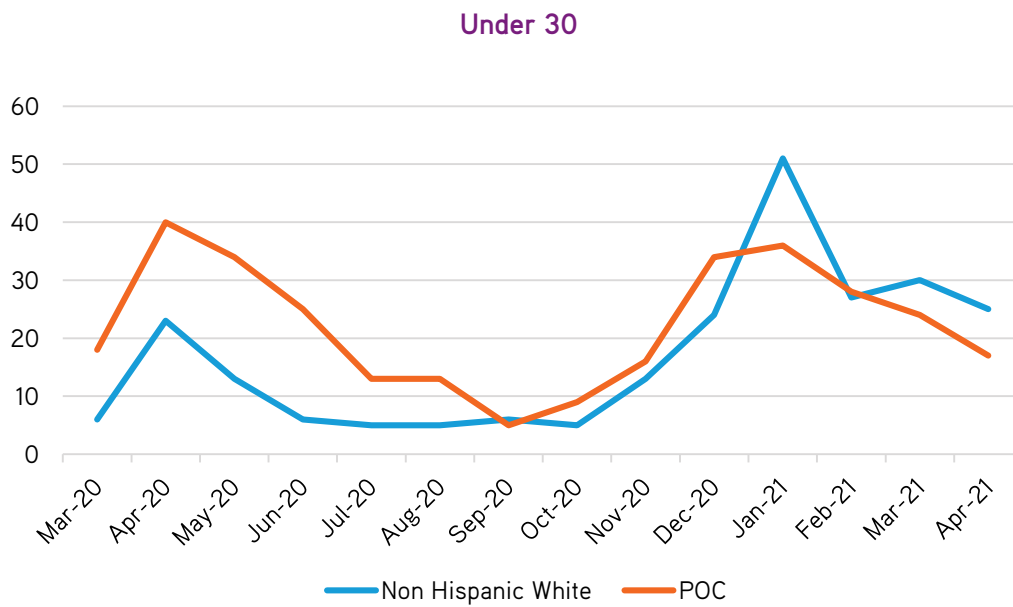
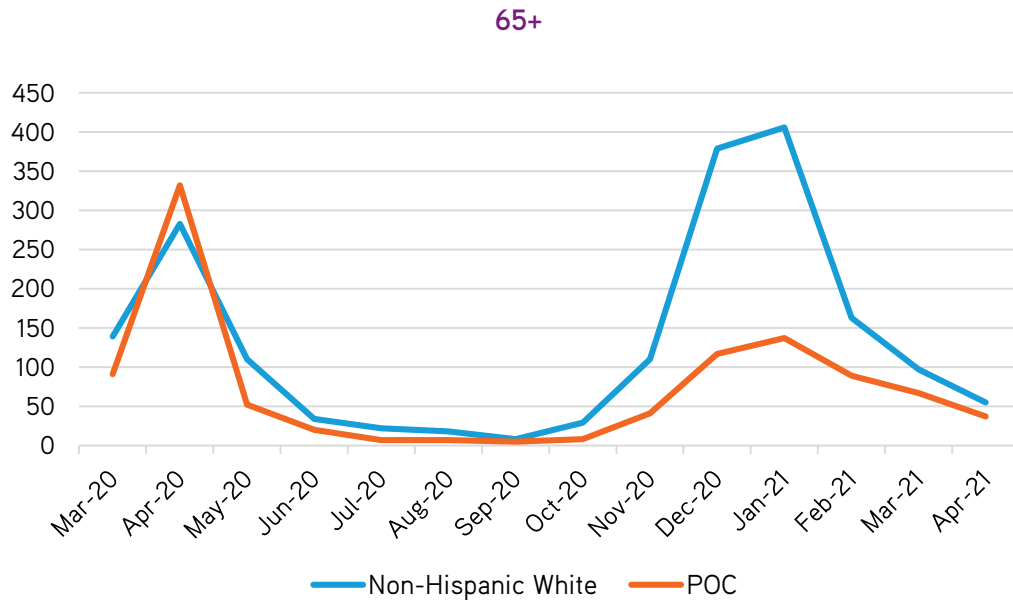


SOURCE: New COVID-19 hospitalizations reported by SUNY hospitals to author.

There are also substantially different patterns by race and ethnicity when the numbers are broken out by age. Age is one of the most important risk factors in COVID-19 hospitalization. To examine differences by age, we look at two groups: a high-risk group of those 65 and older and a low-risk group of those under 30. In the data for these three hospitals, 47 percent of the hospitalizations are people 65 and older (high risk) and only 9 percent are under 30 (low risk). However, there are racial and ethnic differences for these age groups. In the first wave of hospitalizations, the rate of white admittance and POC admittance was roughly on par for patients over 65. However, there were substantially more admissions of people of color in the lower-risk age group during the first wave and admissions were high again during the second wave. Hospitalizations under the age of 30 were predominantly young Hispanic patients. Hispanic patients were, on average, much younger than other patients and were a disproportionate percentage of patients under 30 compared to both all COVID-19 patients of any age and compared to pre-COVID-19 admissions.

These results for younger patients of color are largely consistent with the fact that they were much more likely to be working a high-risk essential job at the beginning of the pandemic. These jobs involved close contact with others and exposure to disease pathogens. In the later spike, the racial difference in admittance for those over 65 was largely consistent with the difference in population but young people of color were still overrepresented in hospitals.

FIGURE 8. COVID-19 Admissions for Patients 65+ and Under 30 by Race



SOURCE: New COVID-19 hospitalizations reported by SUNY hospitals to author.

In general, Hispanic COVID-19 patients are the youngest in our data with an average age of 50. Almost one-third of all Hispanic patients were under 40 and 93 percent of those Hispanic under 40 patients were seen at Stony Brook. An astounding 78 percent of all Hispanic patients were under the age of 65 compared to only 45 percent of white and 51 percent of Black patients. In general, the New York City area patients (Stony Brook and UHD) were younger than those hospitalized at Upstate. The average age of patients is also inversely related to the total number of COVID-19 hospitalizations. In New York, summer 2020 had the lowest levels of COVID-19 hospitalizations but also the lowest average age and highest percentage under 30.

TABLE 5. Age Distribution of Hospitalizations by Race and Ethnicity

| | Total | Average Age | Percent Under 65 | Percent Under 40 |
|-----------------|-------|-------------|------------------|------------------|
| Unknown | 329 | 54 | 63% | 25% |
| Black | 1,449 | 61 | 51% | 16% |
| Hispanic | 999 | 50 | 78% | 29%* |
| Asian | 161 | 57 | 64% | 17% |
| American Indian | 33 | 59 | 52% | 18% |
| White | 3,168 | 64 | 45% | 12% |

* 93% of those Hispanic <40 were seen at Stony Brook, 6% at Upstate, <1% at UHD.

SOURCE: New COVID-19 hospitalizations reported by SUNY hospitals to author.

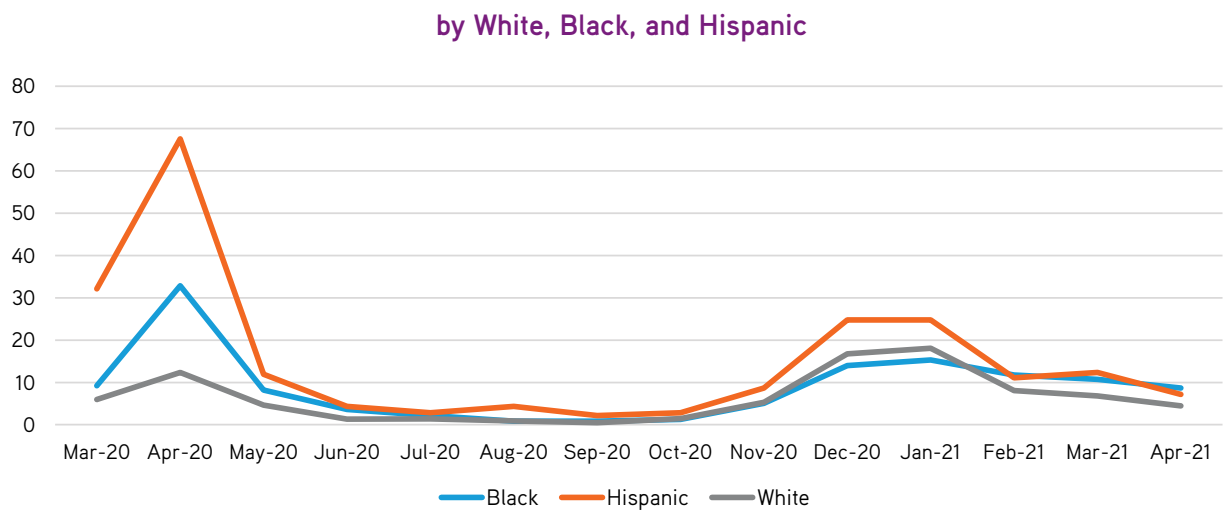
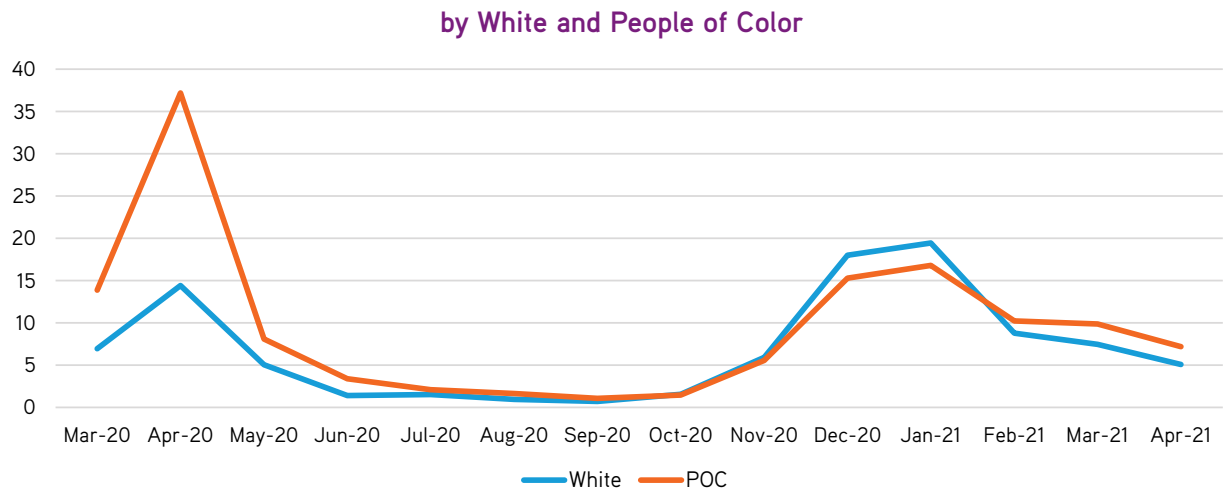
Comparing COVID-19 Admissions to Admissions Prepandemic

One method to estimate whether there was a disproportionate level of COVID-19 hospitalization by race and ethnicity is to scale the COVID-19 admissions by non-COVID admissions in earlier years. This allows us to control for the fact that the three hospitals serve very different populations and compare differences in COVID-19 admissions between racial and ethnic groups to past differences in general admissions between the same racial and ethnic groups.¹⁷

In order to compare COVID-19 admissions by race and ethnicity to previous admissions by race and ethnicity, we use the SPARCS hospital data reporting system. In 2017, the most recent year for data, Stony Brook reported 32,320 total admissions (excluding newborns), Upstate 24,606 admissions, and UHD 9,992 admissions averaging 2,693, 2,051, and 833 per month respectively. We break admissions out by racial and ethnic category to non-Hispanic white, Black, and Hispanic (no other racial and ethnic groups are available in SPARCS). For each racial and ethnic group, we calculate the percent of prepandemic average monthly admissions for that group that would be equivalent to each month’s COVID-19 admissions. For example, in April 2020, COVID-19 admissions for POC were equal to 36 percent of total prepandemic monthly admissions for POC and white COVID-19 admissions were equal to only 13 percent. For context, influenza admissions in 2017 accounted for only one quarter of one percent of total admissions, dramatically lower than the 21.5 percent of average monthly admissions equal to the COVID-19 admissions of April 2020.

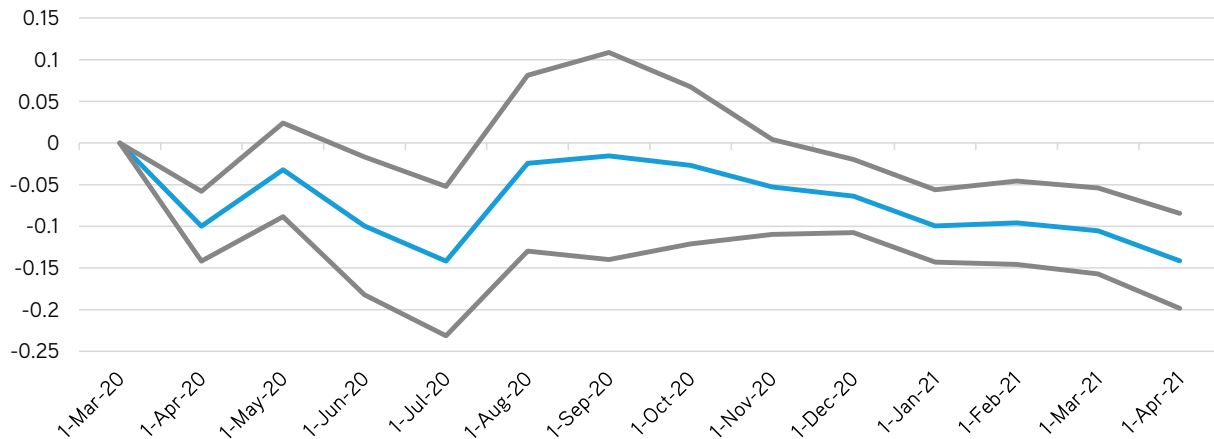
By this estimation, the COVID-19 pandemic radically disproportionately affected people of color in the first wave, even controlling for the hospitals that we used. In April 2020, POC admissions at the three hospitals were over 36 percent of average monthly hospitalizations of 2017 more than twice the 14.4 percent for white admittances. Breaking it down even more, Hispanic was 67.2 and Black 32.4 and white only 12.36. Hispanic hospitalization levels stays elevated most of the pandemic.

FIGURE 9. COVID-19 Hospitalizations as Percent of Average Monthly Hospitalizations in 2017



SOURCE: "Laboratory Confirmed COVID-19-Associate Hospitalizations," COVID-NET, US Centers for Disease Control and Prevention, accessed on 30 September 2021 https://gis.cdc.gov/grasp/covidnet/COVID19_5.html.

FIGURE 10. Probability of ICU Admissions Relative to March 2020



SOURCE: New COVID-19 hospitalizations reported by SUNY hospitals to author.

Measures of Severity: ICU Utilization

Most of this piece has measured the severity of the COVID-19 pandemic for the three SUNY hospitals through fluctuations in all COVID-19 admissions. Hospitalizations are, however, not the only measure of intensity because not all COVID-19 hospital admissions are the same. The most severe cases—generally those that require life support such as assisted breathing through intubation and a ventilator—are admitted into the ICU during their hospital stay.

The general consensus is that older people are more likely to have severe complications from COVID-19 and that is generally borne out by the data: 46 percent of recorded hospitalizations are among those 65 and older when that group only makes up 13 percent to 17 percent of the population surrounding the three hospitals. Despite this disparity in hospitalization by age, given that a patient has been hospitalized whether they are admitted to the ICU does not appear determined by age. The average age for a non-ICU patient is 60.5 and the average age for an ICU patient is 60.1 and the difference is not statistically significant. In fact, once a patient is hospitalized there is no significant correlation between age and ICU admittance.¹⁸

Overall, the percent of patients admitted to the ICU has ranged from a high of 30 percent in March 2020 to a low of 16 percent in July 2020 and April 2021. It is, however, important to note that there were far fewer COVID-19 admissions during summer 2020, so the percent admitted to the ICU has a higher variance. Comparing all months after March 2020 to that month's ICU percentage high of 30 percent, the percent of COVID-19 patients admitted to the ICU is only statistically significantly lower for the month of July 2020 and then again for December 2020 and continues to statistically significantly drop through the end of our study period in April 2021. It is impossible to determine whether this reduction in ICU admissions was driven by increased availability of vaccines. However, it does correspond with the vaccine rollout that began in December 2020 and when New York made vaccines available to all residents 30 years old and older on April 1, 2021.

Lessons for the Study of Health Disparities

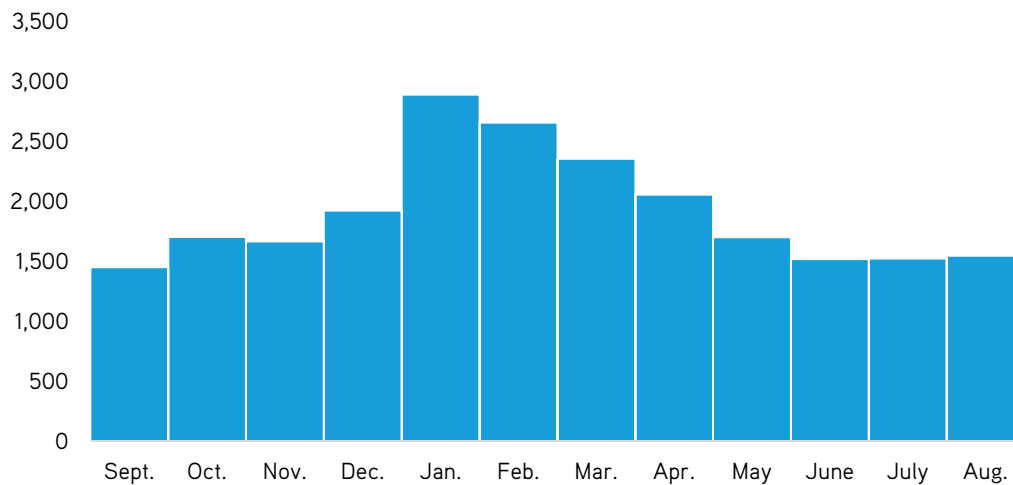
There are a number of lessons that can be learned from the first two waves of COVID-19 hospitalizations in New York and the snapshot into who was hospitalized and when provided by the three SUNY hospitals. The first is the importance of geography. Hospitals have service areas and generally admit patients from the immediate vicinity.¹⁹ This localness is especially important during a pandemic or mass casualty event when patients need to be admitted as soon as possible before additional injury is incurred. It does however create a situation in which two hospitals only 250 miles from each other can experience a pandemic very differently. In April 2020, both UHD and Stony Brook were already overwhelmed by COVID-19 patients admitting 19 and 13 patients per ICU bed respectively. In the same month, Upstate admitted less than one COVID-19 patient per ICU bed. While UHD was designated COVID-19 only and Stony Brook was not, they both saw significant increases.

A similar pattern played out during the second wave of hospitalizations. While all three hospitals were hit more or less equally eventually, the two hospitals outside of the five boroughs—Upstate and Stony Brook—saw their hospitalizations rise faster both in terms of overall admitted patients and more COVID-19 patients per ICU bed during that period than UHD.

The second important lesson is that not all hospitals serve the same type of population so when examining racial and ethnic disparities in COVID-19 hospitalizations using data from a single hospital, group of hospitals, or single geographic area, it is crucial to scale estimates by the population generally served by hospitals in the data. In a naive examination of how hospitalizations changed over time, it appears that the initial hospitalization spike disproportionately affected POC and the second disproportionately affected white people. However, much of that was driven by the fact that there were very few hospitalizations at one of the two majority white hospitals in the first wave. When POC COVID-19 hospitalizations are compared to non-COVID POC hospitalizations in prepandemic years at each hospital, a very different pattern emerged. The POC COVID-19 hospitalization increase was more than twice as large as the white increase during the first wave and stayed about the same in the second wave.

Even more striking than that distinction is that when broken out by ethnicity, the increase in Hispanic hospitalizations was more than five times the white increase and remained nearly double in the second wave. This difference is likely because there were far more young Hispanic COVID-19 hospitalizations with 29 percent of Hispanic COVID-19 patients under 40, which is twice the rate of Black and white hospitalizations. Strikingly, 93 percent of these young Hispanic patients were admitted to Stony Brook and were also more likely to be admitted outside of the hospitalization peaks. Previous research suggests this is likely due to younger Hispanic New Yorkers working more at-risk jobs.

FIGURE 11. Flu Deaths in New York, 2015-19



NOTE: Compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program.

SOURCE: "About Underlying Cause of Death, 1999-2019," US Centers for Disease Control and Prevention, National Center for Health Statistics, accessed October 29, 2021, <http://wonder.cdc.gov/ucd-icd10.html>.

Finally, there is suggestive evidence that the increased availability of vaccines reduced both the total number of COVID-19 hospitalizations and the probability of admittance to the ICU once hospitalized. There is no way to directly test this in our data because we do not know if or when patients or medical staff at the three SUNY hospitals were vaccinated. However, the decline does coincide with New York's age-based vaccine rollout and our data ends before changes in indoor dining and masking policies were announced. It is possible that the decline was simply weather—respiratory illnesses tend to diminish in the spring—but the statistically significant decline in ICU admissions began in December, which is still the height of "flu season" and total hospitalizations were cut nearly in half between January and February. Pooling New York influenza and pneumonia deaths from 2015–19, seasonal flu deaths increase substantially from December to January and decline only slightly each month until May. On average, influenza deaths decrease only 8 percent from January to February, not the nearly 50 percent decline in COVID-19 hospitalizations we observed.

Even as the initial Omicron wave of COVID-19 hospitalizations has receded in New York and mask mandates have largely disappeared, the pandemic is likely far from over. The emergence of the Omicron subvariant BA.2 in Europe could potentially trigger another wave of hospitalizations for New York hospitals. Even as we look forward to the end of flu season and some of the lowest hospitalization and case levels of the past two years, it is still crucial to plan both for new potential variants and the increase in COVID-19, cold, and flu cases that usually begins around Thanksgiving each year.



ENDNOTES

Endnotes

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- 14 Wedenoja, *Measuring Disparities in the Social Determinants of Health in Relation to the COVID-19 Pandemic in New York State*.
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- 16 “Quick Facts: New York,” US Census Bureau, Estimates as of July 1, 2019, <https://www.census.gov/quickfacts/NY>.
- 17 $\text{RaceScaled_mr} = (\text{COVID_mr} / \text{SPARCS_2017r}) * 100$ where r = black, white, Hispanic; m=month.
- 18 We do not know if a patient dies before they can be admitted into the ICU, so a lack of ICU admissions could mean the patient does not have severe enough symptoms to be admitted or that they die before admission. From anecdotal discussions with the hospital the first scenario is much more likely.
- 19 “Hospital Service Area File,” US Centers for Medicare and Medicaid Services, last updated November 22, 2021, <https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Hospital-Service-Area-File>.



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