H·CUP HEALTHCARE COST AND UTILIZATION PROJECT

AHRQ Agency for Healthcare Research and Quality

Changes in Hospitalizations and In-Hospital Deaths in the Initial Period of the COVID-19 Pandemic (April–September 2020), 13 States

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Introduction

Annually, there are approximately 35.5 million hospitalizations in the United States, including for medical conditions (48 percent), surgeries (20 percent), maternal conditions (11 percent), births and neonatal conditions (11 percent), mental health and substance use conditions (5 percent), and injuries (5 percent).[1] With the COVID-19 pandemic beginning in early 2020, hospital utilization changed considerably, as areas of the country saw spikes in COVID-19 cases and subsequent hospitalizations. Hospitalizations related to COVID-19 varied by State and across time.[2] In addition to changes in the need for hospital care, there were concerns about hospital capacity, as seen by the Centers for Medicare & Medicaid Services (CMS) recommendation that hospitals limit all nonessential planned surgeries and procedures.[3] Little is known, however, about the impact of the initial period of the pandemic on hospitalizations and in-hospital deaths overall.

This Healthcare Cost and Utilization Project (HCUP) Statistical Brief presents data from 13 States on the number of hospitalizations and in-hospital deaths across time periods and States with a focus on the initial impact of the COVID-19 pandemic. The counts are presented overall and by patient characteristics across 13 States from April to September 2020 using quarterly HCUP inpatient data compared with State-level averages from April to September in 2016–2019 using the HCUP State Inpatient Databases (SID). The percentages of all hospitalizations and in-hospital deaths related to COVID-19 during the April–September 2020 timeframe are also provided. Because of the large sample size of the HCUP data, small differences can be statistically significant but not meaningful. Thus, only differences greater than or equal to 10 percent are discussed in the text.

This analysis is limited to discharges for patients treated in community, nonrehabilitation hospitals in 13 States (Colorado, Georgia, Iowa, Kentucky, Maryland, Michigan, Minnesota, Mississippi, Missouri, New Jersey, Ohio, South Carolina, and Vermont) for which HCUP data were available for April–September 2016–2019 and April–September 2020. These States account for 24.7 percent of the resident U.S. population in 2019.[4,5] Information contained in this Statistical Brief was primarily obtained from the HCUP Summary Trend Tables.[6] The Summary Trend Tables, accessed as downloadable tables,

Highlights

- Across 13 States, the average number of hospitalizations in the second quarter of 2020 was 21 percent lower compared with the same quarter in 2016–2019, whereas the average number of in-hospital deaths increased 38 and 23 percent in the second quarter and third quarter, respectively.
- The percentage of hospitalizations and in-hospital deaths related to COVID-19 was 5 and 27 percent, respectively, corresponding to 200,500 hospitalizations and 28,900 in-hospital deaths related to COVID-19 in 13 States between April and September 2020.
- One-third of in-hospital deaths (33 percent) for patients from large metropolitan (metro) areas were COVID-19 related compared with one in five for patients from other areas in April–September 2020 across 13 States.
- The number of in-hospital deaths for Hispanic patients in 13 States more than doubled (135 percent) in April–September 2020 compared with the same months in previous years; over half (57 percent) of these deaths were COVID-19 related.
- Across payers in April–September 2020, the number of hospitalizations decreased for those billed to private insurance and Medicaid (13 percent each) and Medicare (19 percent), while those billed as self-pay/no charge were unchanged compared with 2016–2019.

provide State-specific monthly trends in hospital utilization for the most recent HCUP data available. These tables were also used to create the HCUP Visualization of Inpatient Trends in COVID-19 and Other Conditions[7] and will be updated as more quarterly data become available.

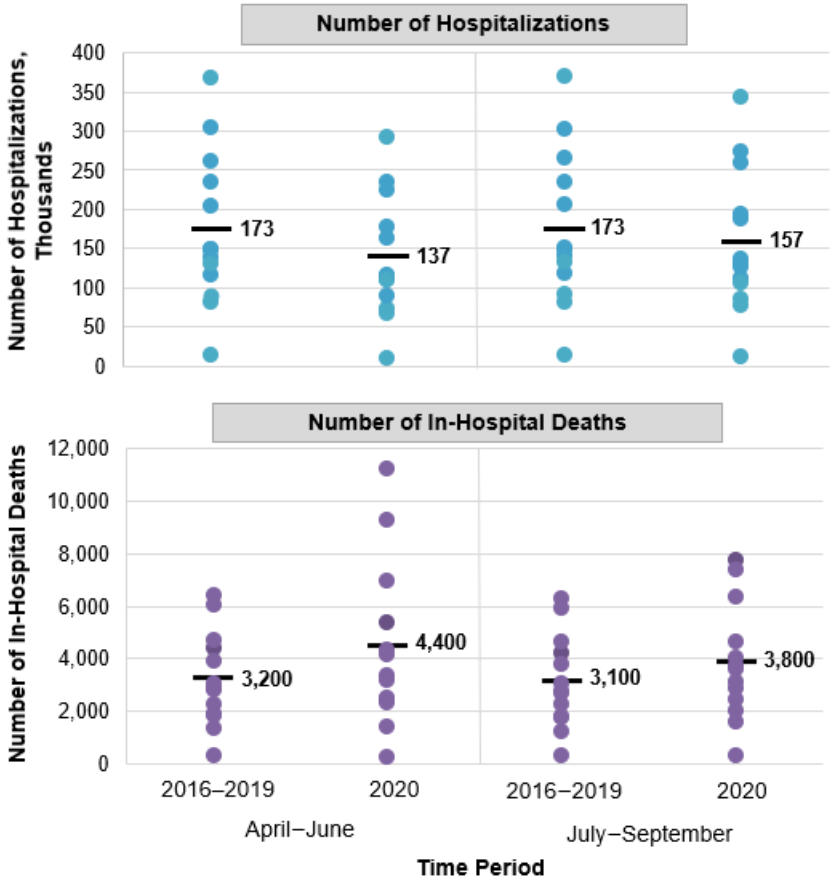
Findings

State-level hospitalizations and in-hospital deaths, 2016–2019 and 2020
Figure 1 displays the number of hospitalizations and in-hospital deaths for each of the 13 States in April–September 2016–2019 and 2020. Each dot in the figure represents the State-specific number of hospitalizations or in-hospital deaths. The average number of hospitalizations and in-hospital deaths across these 13 States is also presented.

- The decrease in the average *number of all hospitalizations* in the 13 States examined was largest in the second quarter (April–June; 20.8 percent decrease) of 2020 versus the same quarters in 2016–2019.

- On average, the *number of all-cause in-hospital deaths* in the 13 States examined increased 37.5 and 22.6 percent in the second (April–June; 4,400 deaths) and third (July–September; 3,800 deaths) quarters of 2020, respectively, versus the same quarters in 2016–2019 (3,200 and 3,100 deaths, respectively).

Figure 1. Number of hospitalizations (in thousands) and in-hospital deaths in April–September 2020 compared with the average of April–September 2016–2019, by quarter, 13 States



Notes: Number of in-hospital deaths is rounded to the nearest hundred. Counts for 2016–2019 represent the mean number of hospitalizations or in-hospital deaths during April–September across these 4 years.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), 2016–2019 State Inpatient Databases (SID) and 2020 quarterly data from 13 States (CO, GA, IA, KY, MD, MI, MN, MO, MS, NJ, OH, SC, and VT) (available as of March 2021)

Figure 2 presents the number of hospitalizations and in-hospital deaths by State, comparing April–September 2020 with the average from April–September 2016–2019. The percentage of all hospitalizations and in-hospital deaths related to COVID-19 in April–September 2020 is also presented. States are listed in alphabetical order within U.S. census regions.

- The *number of all hospitalizations* decreased 14.9 percent, on average, in April–September 2020 compared with the average in April–September 2016–2019 for all 13 States examined (from 345,700 to 294,300). New Jersey had the largest decrease of 22.1 percent fewer hospitalizations (from 469,300 to 365,800).

  On average across 13 States, 5.2 percent of all hospitalizations were related to COVID-19 in April–September 2020, ranging from 0.6 percent in Vermont to 9.7 percent in New Jersey.

- The *number of all-cause in-hospital deaths* increased 30.2 percent, on average, in April–September 2020 versus the average in April–September 2016–2019 (from 6,300 to 8,200 deaths). In-hospital deaths increased for 11 of the 13 States examined, whereas Vermont had a 16.7 percent decrease in in-hospital deaths (from 600 to 500 deaths). The increase was largest in New Jersey, where the number of in-hospital deaths increased by nearly two-thirds (63.4 percent; 9,300 to 15,200 deaths), while the in-hospital deaths in Missouri increased 13.0 percent (7,700 to 8,700 deaths).

  Across the 13 States, 27.2 percent of in-hospital deaths were related to COVID-19 in April–September 2020. More than half of all in-hospital deaths in New Jersey (51.0 percent) and more than one-third of in-hospital deaths in Mississippi (34.4 percent) were related to COVID-19.

Figure 2. Number of hospitalizations, in-hospital deaths, and percentage of each related to COVID-19 in April–September 2020 compared with the average of all hospitalizations in April–September 2016–2019, 13 States

Time period: Apr–Sep, 2016–2019 Apr–Sep, 2020

Region	State	Number of hospitalizations	Apr–Sep, 2020 percent related to COVID-19	Number of in-hospital deaths	Apr–Sep, 2020 percent related to COVID-19
13-State average		345,700 294,300	5.2%	6,300 8,200	27.2%
North-east	NJ	469,300 365,800	9.7%	9,300 15,200	51.0%
	VT	26,900 22,200	0.6%	600 500	3.0%
Mid-west	IA	163,300 143,700	4.4%	2,500 3,000	22.3%
	MI	606,400 507,700	4.7%	11,900 15,600	26.3%
	MN	299,700 252,300	3.3%	4,500 4,700	15.3%
	MO	409,400 357,700	3.4%	7,700 8,700	17.4%
	OH	736,300 635,500	3.1%	12,600 14,300	16.2%
South	GA	528,000 483,000	7.8%	8,600 13,100	30.6%
	KY	278,800 237,700	2.9%	6,100 7,000	12.9%
	MD	297,000 244,700	6.8%	5,500 7,200	32.6%
	MS	181,300 158,000	8.2%	3,600 5,600	34.4%
	SC	263,400 215,700	6.2%	5,600 6,700	26.3%
West	CO	233,900 201,400	3.3%	3,600 4,500	18.2%

Notes: Number of hospitalizations and in-hospital deaths is rounded to the nearest hundred. Counts for 2016–2019 represent the mean number of hospitalizations or in-hospital deaths during April–September across these 4 years.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), 2016–2019 State Inpatient Databases (SID) and 2020 quarterly data from 13 States (CO, GA, IA, KY, MD, MI, MN, MO, MS, NJ, OH, SC, and VT) (available as of March 2021)

Patient characteristics associated with hospitalizations and in-hospital deaths, 2016–2019 and 2020
Figure 3 presents the number of hospitalizations and in-hospital deaths in 13 States combined by location of patient residence (large metro, medium/small metro, and rural), comparing April–September 2020 with the average from April–September 2016–2019. The percentage of hospitalizations and in-hospital deaths related to COVID-19 in April–September 2020 is also presented.

- The *number of all hospitalizations* decreased approximately 15 percent in April–September 2020 compared with the average in April–September 2016–2019 in all three patient locations across 13 States.

  At the beginning of the pandemic, across the 13 States with available data, the percentage of hospitalizations related to COVID-19 was nearly 50 percent higher for patients residing in large metro versus rural areas (6.2 vs. 4.2 percent).

- The *number of all-cause in-hospital deaths* for patients from large metro areas increased by 39.5 percent (39,500 to 55,100 deaths), compared with an increase of 21.1 percent among patients from medium/small metro areas (23,700 to 28,700 deaths) and 19.1 percent among patients from rural areas (18,800 to 22,400 deaths) in April–September 2020 versus the average in April–September 2016–2019.

  Nearly one-third (32.8 percent) of in-hospital deaths among hospitalizations for patients residing in large metro areas had a COVID-19 diagnosis in April–September 2020, compared with about one in five among patients from medium/small metro areas (21.8 percent) and rural areas (20.4 percent).

Figure 3. Number of hospitalizations, in-hospital deaths, and percentage of each related to COVID-19 by location of patient residence in April–September 2020 compared with the average of all hospitalizations in April–September 2016–2019, 13 States

Patient location	Time period	Number of hospitalizations	Apr–Sep, 2020 percent related to COVID-19	Number of in-hospital deaths	Apr–Sep, 2020 percent related to COVID-19
Large metro	Apr–Sep, 2016–2019	2,270,000		39,500	
	Apr–Sep, 2020	1,932,300	6.2%	55,100	32.8%
Medium/ small metro	Apr–Sep, 2016–2019	1,278,100		23,700	
	Apr–Sep, 2020	1,100,200	4.4%	28,700	21.8%
Rural	Apr–Sep, 2016–2019	940,900		18,800	
	Apr–Sep, 2020	790,600	4.2%	22,400	20.4%

Notes: Number of hospitalizations and in-hospital deaths is rounded to the nearest hundred. Counts for 2016–2019 represent the mean number of hospitalizations or in-hospital deaths during April–September across these 4 years.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), 2016–2019 State Inpatient Databases (SID) and 2020 quarterly data from 13 States (CO, GA, IA, KY, MD, MI, MN, MO, MS, NJ, OH, SC, and VT) (available as of March 2021)

Figure 4 presents the number of hospitalizations and in-hospital deaths in 13 States combined by patient race/ethnicity, comparing April–September 2020 with the average from April–September 2016–2019. The percentage of hospitalizations and in-hospital deaths related to COVID-19 in April–September 2020 is also presented.

- The *number of all hospitalizations* decreased by at least 10 percent in April–September 2020 versus the average in April–September 2016–2019 for all race/ethnicity groups, except Hispanic patients, with the largest decrease (17.4 percent) for non-Hispanic White patients (3.1 to 2.6 million hospitalizations).

  In April–September 2020, the percentage of hospitalizations related to COVID-19 ranged from 3.5 percent for non-Hispanic White patients to 12.3 percent for Hispanic patients.

- The *number of all-cause in-hospital deaths* increased in April–September 2020 versus the average in April–September 2016–2019 for all race/ethnicity groups. The smallest increase (15.2 percent) was for non-Hispanic White patients (60,600 to 69,800 deaths), while the number of in-hospital deaths for Hispanic patients more than doubled (134.8 percent; 2,300 to 5,400 deaths). The number of in-hospital deaths for non-Hispanic Black patients increased 59.9 percent (14,200 to 22,700 deaths).

  More than half (57.3 percent) of in-hospital deaths for Hispanic patients were related to COVID-19 in April–September 2020 across 13 States.

Figure 4. Number of hospitalizations, in-hospital deaths, and percentage of each related to COVID-19 by patient race/ethnicity in April–September 2020 compared with the average of all hospitalizations in April–September 2016–2019, 13 States

Patient race/ ethnicity	Time period	Number of hospitalizations	Apr–Sep, 2020 percent related to COVID-19	Number of in-hospital deaths	Apr–Sep, 2020 percent related to COVID-19
White NH	Apr–Sep, 2016–2019	3,088,700		60,600	
	Apr–Sep, 2020	2,552,000	3.5%	69,800	20.3%
Black NH	Apr–Sep, 2016–2019	846,000		14,200	
	Apr–Sep, 2020	744,700	8.9%	22,700	37.7%
Hispanic	Apr–Sep, 2016–2019	216,700		2,300	
	Apr–Sep, 2020	210,800	12.3%	5,400	57.3%
Other NH	Apr–Sep, 2016–2019	172,900		2,400	
	Apr–Sep, 2020	154,400	8.0%	4,300	44.3%

Abbreviation: NH, non-Hispanic

Notes: Number of hospitalizations and in-hospital deaths is rounded to the nearest hundred. Counts for 2016–2019 represent the mean number of hospitalizations or in-hospital deaths during April–September across these 4 years.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), 2016–2019 State Inpatient Databases (SID) and 2020 quarterly data from 13 States (CO, GA, IA, KY, MD, MI, MN, MO, MS, NJ, OH, SC, and VT) (available as of March 2021)

Figure 5 presents the number of hospitalizations and in-hospital deaths in 13 States combined by primary expected payer, comparing April–September 2020 with the average from April–September 2016–2019. The percentage of hospitalizations and in-hospital deaths related to COVID-19 in April–September 2020 is also presented.

- The *number of all hospitalizations* decreased in April–September 2020 versus the average in April–September 2016–2019 for all expected payers except self-pay/no charge, ranging from a 13.4 percent decrease for expected payers of private insurance and Medicaid to an 18.6 percent decrease for Medicare.

  In April–September 2020, the percentage of hospitalizations related to COVID-19 was highest for stays with Medicare as an expected payer (6.3 percent) and lowest for stays with Medicaid as an expected payer (3.2 percent).

- The *number of all-cause in-hospital deaths* increased in April–September 2020 versus the average in April–September 2016–2019 for all expected payers, ranging from a 23.0 percent increase for stays with an expected payer of private insurance (15,200 to 18,700 deaths) to a 55.6 percent increase for those with an expected payer of self-pay/no charge (2,700 to 4,200 deaths).

  The percentage of in-hospital deaths related to COVID-19 in April–September 2020 ranged from 19.8 percent for stays with Medicaid as an expected payer to 28.9 percent for stays with Medicare as an expected payer.

Figure 5. Number of hospitalizations, in-hospital deaths, and percentage of each related to COVID-19 by primary expected payer in April–September 2020 compared with the average of all hospitalizations in April–September 2016–2019, 13 States

Primary expected payer	Time period	Number of hospitalizations	Apr–Sep, 2020 percent related to COVID-19	Number of in-hospital deaths	Apr–Sep, 2020 percent related to COVID-19
Private insurance	Apr–Sep, 2016–2019	1,298,200		15,200	
	Apr–Sep, 2020	1,124,600	4.8%	18,700	27.7%
Medicare	Apr–Sep, 2016–2019	1,888,400		52,000	
	Apr–Sep, 2020	1,536,600	6.3%	66,400	28.9%
Medicaid	Apr–Sep, 2016–2019	989,100		8,100	
	Apr–Sep, 2020	856,300	3.2%	10,500	19.8%
Self-pay/ No charge*	Apr–Sep, 2016–2019	179,600		2,700	
	Apr–Sep, 2020	181,000	6.1%	4,200	23.0%

Notes: Number of hospitalizations and in-hospital deaths is rounded to the nearest hundred. Counts for 2016–2019 represent the mean number of hospitalizations or in-hospital deaths during April–September across these 4 years.

* Self-pay/No charge: includes self-pay, no charge, charity, and no expected payment.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), 2016–2019 State Inpatient Databases (SID) and 2020 quarterly data from 13 States (CO, GA, IA, KY, MD, MI, MN, MO, MS, NJ, OH, SC, and VT) (available as of March 2021)

Figure 6 presents the number of hospitalizations and in-hospital deaths in 13 States combined by community-level income, comparing April–September 2020 with the average from April–September 2016–2019. The percentage of hospitalizations and in-hospital deaths related to COVID-19 in April–September 2020 is also presented.

- The *number of all hospitalizations* decreased 16.7 percent for patients from the highest income quartile in April–September 2020 versus the average in April–September 2016–2019 (840,700 to 700,000 hospitalizations).

  In April–September 2020, the percentage of hospitalizations related to COVID-19 was highest for patients residing in the lowest income quartile (5.9 percent).

- The *number of all-cause in-hospital deaths* increased in April–September 2020 versus the average in April–September 2016–2019 for all income quartiles. The increase was largest in the lowest income quartile (34.7 percent; 27,700 to 37,300 deaths) and smallest for those in the middle-income quartiles (25.4 percent; 38,600 to 48,400 deaths).

  Across 13 States, the percentage of in-hospital deaths related to COVID-19 in April–September 2020 was highest in the top income quartile (32.1 percent) and lowest in the middle-income quartiles (24.7 percent).

Figure 6. Number of hospitalizations, in-hospital deaths, and percentage of each related to COVID-19 by community-level income in April–September 2020 compared with the average of all hospitalizations in April–September 2016–2019, 13 States

Community-level income	Time period	Number of hospitalizations	Apr–Sep, 2020 percent related to COVID-19	Number of in-hospital deaths	Apr–Sep, 2020 percent related to COVID-19
Lowest (Q1)	Apr–Sep, 2016–2019	1,439,200		27,700	
	Apr–Sep, 2020	1,241,600	5.9%	37,300	27.9%
Middle (Q2–Q3)	Apr–Sep, 2016–2019	2,173,000		38,600	
	Apr–Sep, 2020	1,852,500	4.8%	48,400	24.7%
Highest (Q4)	Apr–Sep, 2016–2019	840,700		14,900	
	Apr–Sep, 2020	700,000	5.3%	19,500	32.1%

Abbreviation: Q, quartile

Notes: Number of hospitalizations and in-hospital deaths is rounded to the nearest hundred. Counts for 2016–2019 represent the mean number of hospitalizations or in-hospital deaths during April–September across these 4 years. Quartile is based on the national distribution of community-level income.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), 2016–2019 State Inpatient Databases (SID) and 2020 quarterly data from 13 States (CO, GA, IA, KY, MD, MI, MN, MO, MS, NJ, OH, SC, and VT) (available as of March 2021)

References

[1] Agency for Healthcare Research and Quality. HCUP Fast Stats – Trends in Inpatient Stays. Healthcare Cost and Utilization Project (HCUP). www.hcup-us.ahrq.gov/faststats/NationalTrendsServlet. Accessed August 27, 2021.

[2] Healthcare Cost and Utilization Project (HCUP) Statistical Briefs Series on COVID-19-Related Hospitalizations in 13 States (HCUP Statistical Briefs #273–276*)*. June 2021. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/reports/statbriefs/statbriefs.jsp. Accessed August 29, 2021.

[3] Centers for Medicare & Medicaid Services. CMS Adult Elective Surgery and Procedures Recommendations: Limit All Non-essential Planned Surgeries and Procedures, Including Dental, Until Further Notice. April 7, 2020. www.cms.gov/files/document/covid-elective-surgery-recommendations.pdf. Accessed August 27, 2021.

[4] U.S. Census Bureau, Population Division. Annual Estimates of the Resident Population by Sex, Race, and Hispanic Origin for the United States: April 1, 2010 to July 1, 2019 (NC-EST2019-SR11H). June 2020. www.census.gov/newsroom/press-kits/2020/population-estimates-detailed.html. Accessed July 26, 2021.

[5] U.S. Census Bureau, Population Division. Annual Estimates of the Resident Population by Sex, Race, and Hispanic Origin for Colorado, Georgia, Iowa, Kentucky, Maryland, Michigan, Minnesota, Mississippi, Missouri, New Jersey, Ohio, South Carolina, and Vermont: April 1, 2010 to July 1, 2019 (NC-EST2019-SR11H-nn). June 2020. www.census.gov/data/tables/time-series/demo/popest/2010s-state-detail.html. Accessed July 26, 2021.

[6] Agency for Healthcare Research and Quality. HCUP Summary Trend Tables. Healthcare Cost and Utilization Project (HCUP). Updated December 2020. www.hcup-us.ahrq.gov/reports/trendtables/summarytrendtables.jsp. Accessed February 10, 2021.

[7] Agency for Healthcare Research and Quality. HCUP Visualization of Inpatient Trends in COVID-19 and Other Conditions. Healthcare Cost and Utilization Project (HCUP). June 2021. www.hcup-us.ahrq.gov/datavisualizations/covid-19-inpatient-trends.jsp. Accessed July 26, 2021.

About Statistical Briefs

Healthcare Cost and Utilization Project (HCUP) Statistical Briefs provide basic descriptive statistics on a variety of topics using HCUP administrative healthcare data. Topics include hospital inpatient, ambulatory surgery, and emergency department use and costs, quality of care, access to care, medical conditions, procedures, and patient populations, among other topics. The reports are intended to generate hypotheses that can be further explored in other research; the reports are not designed to answer in-depth research questions using multivariate methods.

Data Source

The estimates in this Statistical Brief are based upon data from the HCUP 2016–2019 State Inpatient Databases (SID) and 2020 quarterly inpatient data. Information based on quarterly data should be considered preliminary, as additional quarterly data may become available over time. This analysis is limited to patients treated in community, nonrehabilitation hospitals in 13 States (Colorado, Georgia, Iowa, Kentucky, Maryland, Michigan, Minnesota, Mississippi, Missouri, New Jersey, Ohio, South Carolina, and Vermont) for which HCUP data were available for April–September 2016–2019 and April–September 2020. These States account for the following percentages of the resident U.S. population: 24.7 percent of the total population, 28.0 percent of the non-Hispanic White population, 32.7 percent of the non-Hispanic Black population, 11.9 percent of the Hispanic population, and 18.0 percent of the other non-Hispanic population, including but not limited to American Indian, Alaska Native, Asian, Native Hawaiian, and other Pacific Islander.[1,2] All of the information contained in this Statistical Brief can be found in the HCUP Summary Trend Tables at www.hcup-us.ahrq.gov/reports/trendtables/summarytrendtables.jsp.

The HCUP inpatient data contain the universe of the inpatient discharge abstracts in the participating HCUP States, translated into a uniform format to facilitate multistate comparisons and analyses. The inpatient data encompass more than 95 percent of all U.S. community hospital discharges. The inpatient data can be used to investigate questions unique to one State, to compare data from two or more States,

to conduct market-area variation analyses, and to identify State-specific trends in inpatient care utilization, access, charges, and outcomes.

Types of hospitals included in HCUP State Inpatient Databases (and quarterly inpatient data)
This analysis used SID and quarterly inpatient data limited to information from community hospitals, which are defined as short-term, non-Federal, general, and other hospitals, excluding hospital units of other institutions (e.g., prisons). Community hospitals include obstetrics and gynecology, otolaryngology, orthopedic, cancer, pediatric, public, and academic medical center hospitals. Excluded for this analysis are long-term care facilities such as rehabilitation, psychiatric, and alcoholism and chemical dependency hospitals. However, if a patient received long-term care, rehabilitation, or treatment for a psychiatric or chemical dependency condition in a community hospital, the discharge record for that stay was included in the analysis.

Definitions

Diagnoses and ICD-10-CM
The *principal diagnosis* is that condition established after study to be chiefly responsible for the patient's admission to the hospital. *Secondary diagnoses* are conditions that coexist at the time of admission that require or affect patient care treatment received or management, or that develop during the inpatient stay. *All-listed diagnoses* include the principal diagnosis plus the secondary conditions.

ICD-10-CM is the International Classification of Diseases, Tenth Revision, Clinical Modification. There are over 70,000 ICD-10-CM diagnosis codes.

Case definition
COVID-19-related hospitalizations are identified by any-listed ICD-10-CM code of U07.1 (2019 novel coronavirus disease) on the discharge record. Per coding guidelines,[a] the use of U07.1 is based on documentation by the provider or documentation of a positive COVID-19 test result. The ICD-10-CM code for COVID-19 was implemented beginning April 1, 2020. As such, there may be some measurement error in the identification of cases.

Unit of analysis
The unit of analysis is the hospital discharge (i.e., the hospital stay), not a person or patient. This means that a person who is admitted to the hospital multiple times in 1 year will be counted each time as a separate discharge from the hospital.

Location of patients' residence
Place of residence is based on the urban-rural classification scheme for U.S. counties developed by the National Center for Health Statistics (NCHS) and based on the Office of Management and Budget (OMB) definition of a metropolitan service area as including a city and a population of at least 50,000 residents. For this Statistical Brief, we collapsed the NCHS codes into the following three categories:

Large metropolitan (metro) area:

- Large Central Metropolitan: Counties in a metropolitan area with 1 million or more residents that satisfy at least one of the following criteria: (1) containing the entire population of the largest principal city of the metropolitan statistical area (MSA), (2) having their entire population contained within the largest principal city of the MSA, or (3) containing at least 250,000 residents of any principal city in the MSA
- Large Fringe Metropolitan: Counties in a metropolitan area with 1 million or more residents that do not qualify as large central metropolitan counties

[a] Centers for Disease Control and Prevention, National Center for Health Statistics. ICD-10-C Official Guidelines for Coding and Reporting FY 2021 (October 1, 2020 - September 30, 2021). www.cdc.gov/nchs/data/icd/10cmguidelines-FY2021.pdf. Accessed March 18, 2021.

Medium/small metro area:

- Medium Metropolitan: Counties in a metropolitan area of 250,000–999,999 residents
- Small Metropolitan: Counties in a metropolitan area of 50,000–249,999 residents

Rural area:

- Micropolitan: Counties in a nonmetropolitan area of 10,000–49,999 residents
- Noncore: Counties in a nonmetropolitan and nonmicropolitan area

Reporting of race and ethnicity
Data on Hispanic ethnicity are collected differently among the States and also can differ from the census methodology of collecting information on race (White, Black, Asian/Pacific Islander, American Indian/Alaska Native, Other [including mixed race]) separately from ethnicity (Hispanic, non-Hispanic). State data organizations often collect Hispanic ethnicity as one of several categories that include race. Therefore, for multistate analyses, HCUP creates the combined categorization of race and ethnicity for data from States that report ethnicity separately. When a State data organization collects Hispanic ethnicity separately from race, HCUP uses Hispanic ethnicity to override any other race category to create a Hispanic category for the uniformly coded race/ethnicity data element, while also retaining the original race and ethnicity data. This Statistical Brief reports race/ethnicity for the following categories: Hispanic, non-Hispanic White, non-Hispanic Black, and non-Hispanic Other (Asian/Pacific Islander, American Indian/Alaska Native, Other).

Expected payer
To make coding uniform across all HCUP data sources, the primary expected payer for the hospital stay combines detailed categories into general groups:

- Medicare: includes fee-for-service and managed care Medicare
- Medicaid: includes fee-for-service and managed care Medicaid
- Private insurance: includes commercial nongovernmental payers, regardless of the type of plan (e.g., private health maintenance organizations [HMOs], preferred provider organizations [PPOs])
- Self-pay/No charge: includes self-pay, no charge, charity, and no expected payment
- Other payers: includes other Federal and local government programs (e.g., TRICARE, CHAMPVA, Indian Health Service, Black Lung, Title V) and Workers' Compensation

Due to variability in coding in "other" payer by State (from 1.6 to 7.4 percent) and difficulty with interpretation, estimates of "other" expected payers were excluded from the Statistical Brief. Less than 0.01 percent of discharges were missing information on expected payer.

Prior to 2017, hospital stays that were expected to be billed to the State Children's Health Insurance Program (SCHIP) may be classified as Medicaid or Other, depending on the structure of the State program. Because most State data do not identify SCHIP as a separate expected payer, it is not possible to present this information separately. Beginning with 2017 data, hospital stays that were expected to be billed to SCHIP are included under Medicaid.

For this Statistical Brief, when more than one payer is listed for a hospital discharge, the first-listed payer is used.

Community-level income
Community-level income is based on the median household income of the patient's ZIP Code of residence. Quartiles are defined so that the total U.S. population is evenly distributed. Cut-offs for the quartiles are determined annually using ZIP Code demographic data obtained from Claritas, a vendor that produces population estimates and projections based on data from the U.S. Census Bureau.[b] The value ranges for the income quartiles vary by year. Patients in the first quartile are designated as having the *lowest* income, patients in the middle two quartiles are designated as having *middle* income, and patients

[b] Claritas. Claritas Demographic Profile by ZIP Code. claritas360.claritas.com/mybestsegments/. Accessed June 27, 2021.

in the highest quartile are designated as having the *highest* income. The income quartile is missing for patients who are homeless or foreign.

About HCUP

The Healthcare Cost and Utilization Project (HCUP, pronounced "H-Cup") is a family of healthcare databases and related software tools and products developed through a Federal-State-Industry partnership and sponsored by the Agency for Healthcare Research and Quality (AHRQ). HCUP databases bring together the data collection efforts of State data organizations, hospital associations, and private data organizations (HCUP Partners) and the Federal government to create a national information resource of encounter-level healthcare data. HCUP includes the largest collection of longitudinal hospital care data in the United States, with all-payer, encounter-level information beginning in 1988. These databases enable research on a broad range of health policy issues, including cost and quality of health services, medical practice patterns, access to healthcare programs, and outcomes of treatments at the national, State, and local market levels.
HCUP would not be possible without the contributions of the following data collection Partners from across the United States:

Alaska Department of Health and Social Services
Alaska State Hospital and Nursing Home Association
Arizona Department of Health Services
Arkansas Department of Health
California Office of Statewide Health Planning and Development
Colorado Hospital Association
Connecticut Hospital Association
Delaware Division of Public Health
District of Columbia Hospital Association
Florida Agency for Health Care Administration
Georgia Hospital Association
Hawaii Laulima Data Alliance
Hawaii University of Hawai'i at Hilo
Illinois Department of Public Health
Indiana Hospital Association
Iowa Hospital Association
Kansas Hospital Association
Kentucky Cabinet for Health and Family Services
Louisiana Department of Health
Maine Health Data Organization
Maryland Health Services Cost Review Commission
Massachusetts Center for Health Information and Analysis
Michigan Health & Hospital Association
Minnesota Hospital Association
Mississippi State Department of Health
Missouri Hospital Industry Data Institute
Montana Hospital Association
Nebraska Hospital Association
Nevada Department of Health and Human Services
New Hampshire Department of Health & Human Services
New Jersey Department of Health
New Mexico Department of Health
New York State Department of Health
North Carolina Department of Health and Human Services
North Dakota (data provided by the Minnesota Hospital Association)
Ohio Hospital Association
Oklahoma State Department of Health
Oregon Association of Hospitals and Health Systems
Oregon Office of Health Analytics
Pennsylvania Health Care Cost Containment Council
Rhode Island Department of Health
South Carolina Revenue and Fiscal Affairs Office
South Dakota Association of Healthcare Organizations
Tennessee Hospital Association
Texas Department of State Health Services
Utah Department of Health
Vermont Association of Hospitals and Health Systems
Virginia Health Information
Washington State Department of Health
West Virginia Department of Health and Human Resources, West Virginia Health Care Authority
Wisconsin Department of Health Services
Wyoming Hospital Association

For More Information

For information on COVID-19 resources at AHRQ, refer to the AHRQ COVID-19 Resources page: www.ahrq.gov/coronavirus/index.html. For other information on COVID-19 healthcare utilization, refer to the HCUP Statistical Briefs located at www.hcup-us.ahrq.gov/reports/statbriefs/sb_covid.jsp.

For additional HCUP statistics, visit:

- HCUP Fast Stats at www.hcup-us.ahrq.gov/faststats/landing.jsp for easy access to the latest HCUP-based statistics for healthcare information topics
- HCUPnet, HCUP's interactive query system, at www.hcupnet.ahrq.gov/
- HCUP Summary Trend Tables at www.hcup-us.ahrq.gov/reports/trendtables/summarytrendtables.jsp for monthly information on hospital utilization

For more information about HCUP, visit www.hcup-us.ahrq.gov/.

For a detailed description of HCUP and more information on the design of the State Inpatient Databases (SID), please refer to the following database documentation:

Agency for Healthcare Research and Quality. Overview of the State Inpatient Databases (SID). Healthcare Cost and Utilization Project (HCUP). Rockville, MD: Agency for Healthcare Research and Quality. Updated October 2020. www.hcup-us.ahrq.gov/sidoverview.jsp. Accessed January 22, 2021.

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AHRQ welcomes questions and comments from readers of this publication who are interested in obtaining more information about access, cost, use, financing, and quality of healthcare in the United States. We also invite you to tell us how you are using this Statistical Brief and other HCUP data and tools, and to share suggestions on how HCUP products might be enhanced to further meet your needs. Please email us at hcup@ahrq.gov or send a letter to the address below:

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