Rural and Urban Hospital Differences in Inpatient Stays Involving Sepsis, 2019 and 2021

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Introduction

Sepsis is a systemic inflammatory response to infection that results in tissue damage and organ failure and can lead to death.[1] In 2021, there were about 2.5 million inpatient stays in the U.S. related to sepsis, accounting for 9.9 percent of all hospital costs.[2] One in three patients who died in the hospital had sepsis during their hospitalization.[3] Frontline physicians and nurses in hospital settings play a critical role in the timely detection and treatment of sepsis. Differences in standards of care[4] and resources required to detect, triage, and manage sepsis[5] in hospitals contribute to variation in sepsis-related health outcomes. Additionally, the COVID-19 pandemic impacted hospital admissions and risk factors associated with infections that cause sepsis.[6] Understanding variation in the hospital case mix related to sepsis and sepsis outcomes can inform efforts to improve sepsis care in hospitals.

This Healthcare Cost and Utilization Project (HCUP) Statistical Brief presents statistics on inpatient stays related to sepsis using the 2019 and 2021 State Inpatient Databases (SID) for 47 States and the District of Columbia by select hospital characteristics. Based on the hospital perspective, this Statistical Brief presents information on the percentage of stays related to sepsis and outcomes for sepsis stays in community hospitals (4,244 hospitals in 2019 and 4,228 hospitals in 2021). This Statistical Brief excludes data for rehabilitation and long-term acute care facilities. The findings are stratified by the hospital location (rural vs. urban) and diagnosis of COVID-19.

Inpatient stays related to sepsis were identified by any diagnosis of sepsis. These stays include hospitalizations in which sepsis was the reason for the stay (i.e., principal diagnosis) or a co-occurring condition or complication of the stay (i.e., reported as a secondary diagnosis). Outcomes (average length of stay, average hospital cost, and in-hospital mortality rates) are reported only when sepsis was the reason for the hospitalization. For stays in which sepsis was a co-occurring condition or complication of the stay, other conditions such as cancer, pneumonia, or heart failure may be the reason for hospitalization and contribute to increased length of stay or hospital costs. Thus, outcomes for these inpatient stays cannot be attributed solely to sepsis. Additional information on the clinical coding criteria for identifying sepsis and the distribution of hospitals by hospital characteristics is included in the Methods section and Appendix A.

Because of the large sample size of the available data, small differences can be statistically significant but not clinically important. Thus, only differences greater than or equal to 10 percent are discussed in the text.

Highlights

- About 85 percent of sepsis cases were treated in urban hospitals (1.8 million in 2019 and 2.1 million in 2021). The remaining 15 percent of sepsis cases were treated in rural hospitals (338,900 in 2019 and 381,300 in 2021).
- In 2019 and 2021, urban hospitals had a higher percentage of stays related to sepsis than rural hospitals.
- In 2019 and 2021, urban hospitals had a longer average length of stay, a higher average total hospital cost, and a higher in-hospital mortality rate for sepsis stays than rural hospitals.
- In 2021, the percentage of stays related to both sepsis and COVID-19 at urban hospitals was over four times higher than rural hospitals (17.8 vs. 4.1 percent).
- From 2019 to 2021, the in-hospital mortality rate for sepsis stays (not involving COVID-19) in private, for-profit rural hospitals increased by 37.3 percent from 7.5 percent in 2019 to 10.3 percent in 2021. In contrast, private, not-for-profit, and public, non-federal rural hospitals saw little change in their mortality rate.
- In 2021, public, non-federal urban hospitals had an average total hospital cost for sepsis stays (not involving COVID-19) that was 52.0 percent higher than private, for-profit urban hospitals ($29,800 vs. $19,600) and 26 percent higher than private, not-for-profit hospitals ($29,800 vs. $23,700).

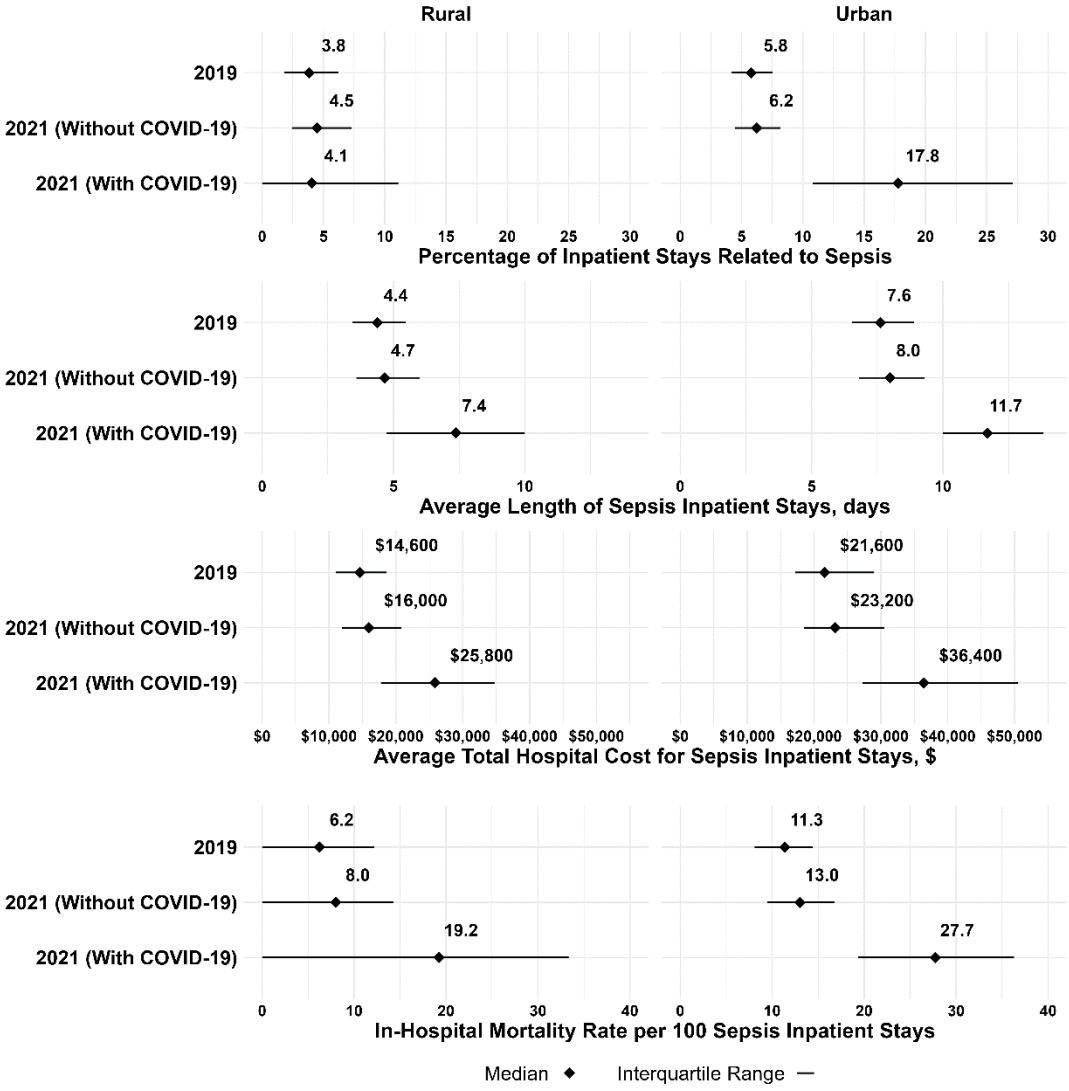
Findings

Variation in the Percentage of Inpatient Stays and Outcomes Related to Sepsis Among Rural and Urban Hospitals, 2019 and 2021

Figure 1 presents the percentage of inpatient stays related to sepsis by hospital urban-rural location and outcomes related to average length of stay, average total hospital cost, and in-hospital mortality rate for sepsis inpatient stays. The data are presented as a distribution. The median is denoted by a diamond. The interquartile range, which represents the 25th and 75th percentiles, is indicated by lines. For 2021, information is presented for sepsis inpatient stays involving and not involving COVID-19. About 7.4 percent of the 33.3 million inpatient stays in 2021 involved a diagnosis of COVID-19.

Slightly more than half (53.3 percent; 2,235 hospitals in 2019 and 2,225 hospitals in 2021) of the community hospitals were in urban areas while less than half (46.6 percent; 2,009 hospitals in 2019 and 2,003 hospitals in 2021) were in rural areas. About 85 percent of sepsis cases were treated in urban hospitals (1.8 million in 2019 and 2.1 million in 2021), and 15 percent of sepsis cases were treated in rural hospitals (338,900 in 2019 and 381,300 in 2021).

Figure 1. Rural and urban hospital variation in outcomes related to sepsis, 2019 and 2021



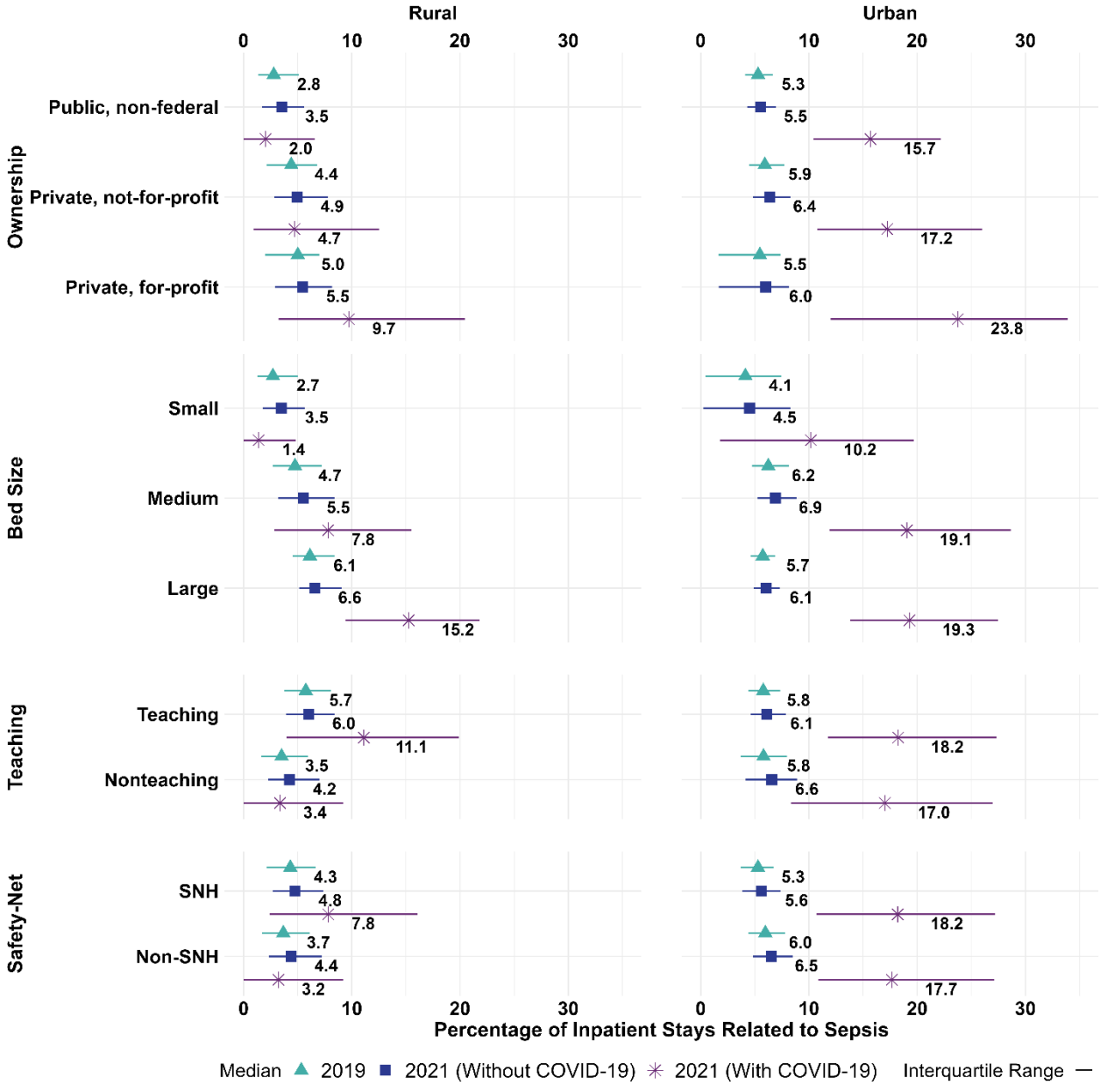
Notes: The percentage of inpatient stays related to sepsis was based on stays with any diagnosis of sepsis. The average length of stay, average total hospital cost, and in-hospital mortality rate were based only on hospitalizations in which the reason for the stay (as indicated by the principal/first-listed diagnosis) was sepsis. Average total hospital cost was rounded to the nearest hundreds. About 7.4 percent of the 33.3 million inpatient stays in 2021 involved a diagnosis of COVID-19. For more information, please see the Definitions section below.
Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), State Inpatient Databases (SID), 47 States and the District of Columbia, 2019 and 2021.

- In both 2019 and 2021, urban hospitals had a higher percentage of stays related to sepsis, longer average length of stay, higher average total hospital cost, and higher in-hospital mortality rate for sepsis stays than rural hospitals.
- From 2019 to 2021, among inpatient stays not involving COVID-19, the following were noted:
  - The percentage of stays related to sepsis in rural hospitals increased by 18.4 percent from 3.8 percent in 2019 to 4.5 percent in 2021. The percentage remained largely unchanged for urban hospitals during this period.
  - The in-hospital mortality rate for sepsis stays in rural hospitals increased by 29.0 percent from 6.2 per 100 sepsis stays in 2019 to 8.0 per 100 sepsis stays in 2021.The in-hospital mortality rate in urban hospitals increased by 15 percent from 11.3 per 100 sepsis stays in 2019 to 13.0 per 100 sepsis stays in 2021.
- In 2021, among inpatient stays not involving COVID-19, the following were noted:
  - The average length of stay for sepsis at urban hospitals was 70.2 percent longer than rural hospitals (8.0 vs. 4.7 days).
  - The average total cost of sepsis stays at urban hospitals was 45.0 percent higher than rural hospitals ($23,200 vs. $16,000).
  - The in-hospital mortality rate for sepsis stays at urban hospitals was 62.5 percent higher than rural hospitals (13.0 vs. 8.0 per 100 sepsis stays).
- In 2021, among inpatient stays involving COVID-19, the following were noted:
  - The percentage of stays related to sepsis at urban hospitals was over four times higher than rural hospitals (17.8 vs. 4.1 percent).
  - The average length of stay for sepsis at urban hospitals was 58.1 percent longer than rural hospitals (11.7 vs. 7.4 days).
  - The average total cost of sepsis stays at urban hospitals was 41.1 percent higher than rural hospitals ($36,400 vs. $25,800).
  - The in-hospital mortality rate for sepsis stays at urban hospitals was 44.3 percent higher than rural hospitals (27.7 vs. 19.2 per 100 sepsis stays).

Variation Among Rural and Urban Hospitals in the Percentage of Inpatient Stays Related to Sepsis, 2019 and 2021

Figure 2 presents the percentage of inpatient stays related to sepsis by select hospital characteristics and hospital urban-rural location. The data are presented as a distribution. The median is denoted by a diamond. The interquartile range, which represents the 25th and 75th percentiles, is indicated by lines. For 2021, information is presented for inpatient stays involving and not involving COVID-19.

Figure 2. Rural and urban hospital variation in the percentage of inpatient stays related to sepsis, by select hospital characteristics, 2019 and 2021



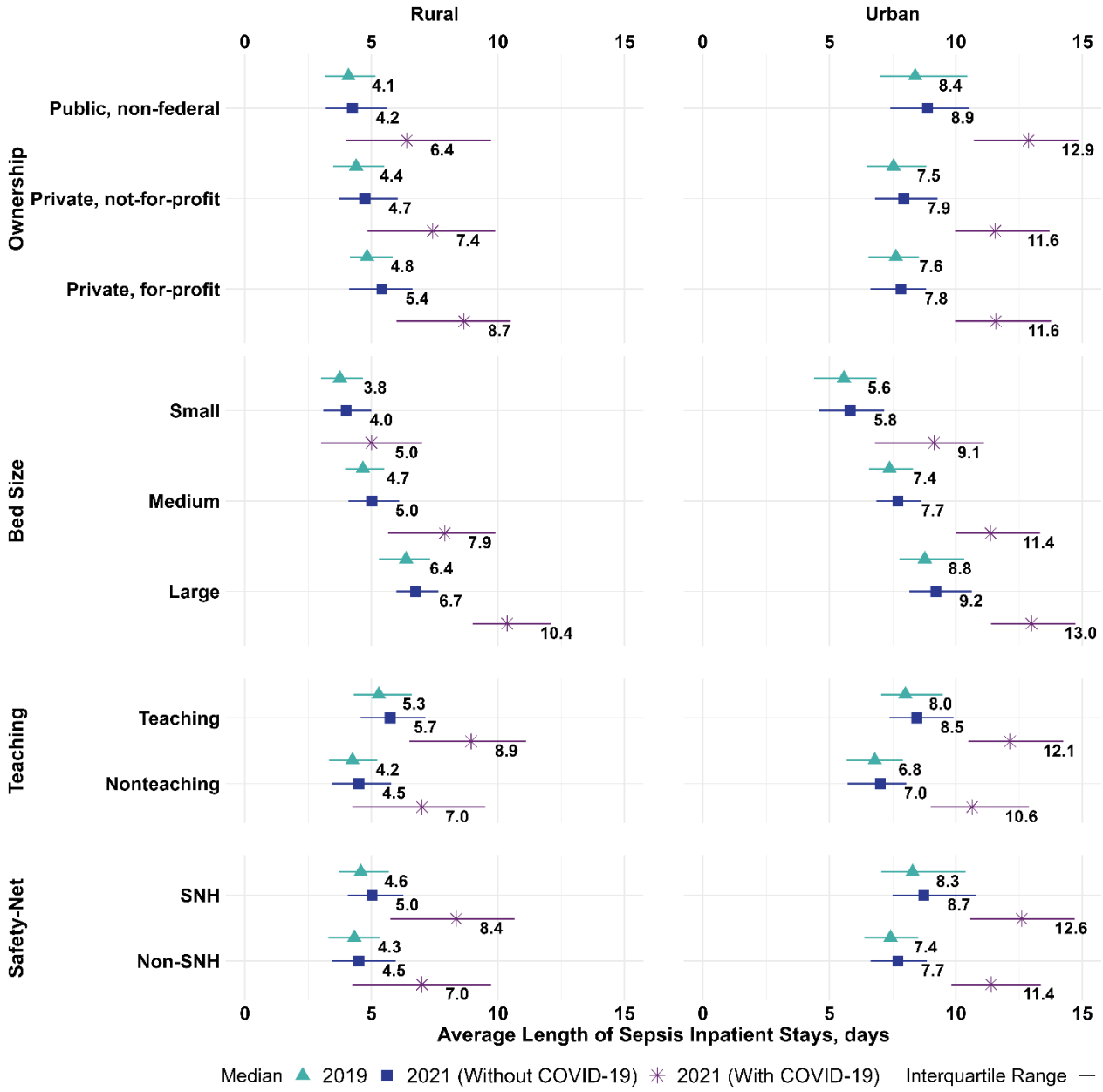
Abbreviation: SNH, safety-net hospital
Note: Sepsis-related inpatient stays were identified by any diagnosis of sepsis. About 7.4 percent of the 33.3 million inpatient stays in 2021 involved a diagnosis of COVID-19. Less than one percent of records for rural hospitals were missing safety-net status. Bed size definitions vary for rural and urban hospitals. For more information, please see the Definitions section below.
Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), State Inpatient Databases (SID), 47 States and the District of Columbia, 2019 and 2021.

- From 2019 to 2021, among inpatient stays not involving COVID-19, the percentage of stays related to sepsis in public, non-federal rural hospitals increased by 25.0 percent from 2.8 percent in 2019 to 3.5 percent in 2021. The percentage remained largely unchanged for public, non-federal urban hospitals during this period.
- In 2021, among inpatient stays not involving COVID-19 in rural hospitals, the following were noted:
    - Private, for-profit hospitals had the highest percentage of inpatient stays related to sepsis, which was 57.1 percent higher than public, non-federal rural hospitals (5.5 vs. 3.5 percent).
- Large hospitals (100 or more beds) had the highest percentage of inpatient stays related to sepsis, which was nearly two times higher than small rural hospitals (1–25 beds) (6.6 vs. 3.5 percent).
  In 2021, among inpatient stays involving COVID-19, urban hospitals of all types had a higher percentage of stays related to sepsis than rural hospitals. Notably, almost one in four stays involving COVID-19 at private, for-profit urban hospitals was related to sepsis (23.8 percent).
  In 2021, among inpatient stays involving COVID-19, the following were noted:
    - The percentage of stays related to sepsis at private, for-profit rural hospitals was nearly five times higher than public, non-federal rural hospitals (9.7 vs. 2.0 percent).
    - The percentage of inpatient stays related to sepsis at large rural hospitals was over ten times higher than small rural hospitals (15.2 vs.1.4 percent).
    - Safety-net rural hospitals had the highest percentage of inpatient stays related to sepsis, which was over two times higher than non-safety-net rural hospitals (7.8 vs. 3.2 percent).

Variation Across Rural and Urban Hospitals in the Average Length of Stay, Average Total Hospital Cost, and In-Hospital Mortality Rate for Sepsis Stays, 2019 and 2021

Figures 3, 4, and 5 present the average length of stay, average total hospital cost, and in-hospital mortality rate of inpatient stays for sepsis (i.e., sepsis is the principal diagnosis) among urban and rural hospitals by select hospital characteristics. The data are presented as a distribution. The median is denoted by a diamond. The interquartile range, which represents the 25th and 75th percentiles, is indicated by lines. For 2021, information is presented for inpatient stays involving and not involving COVID-19.

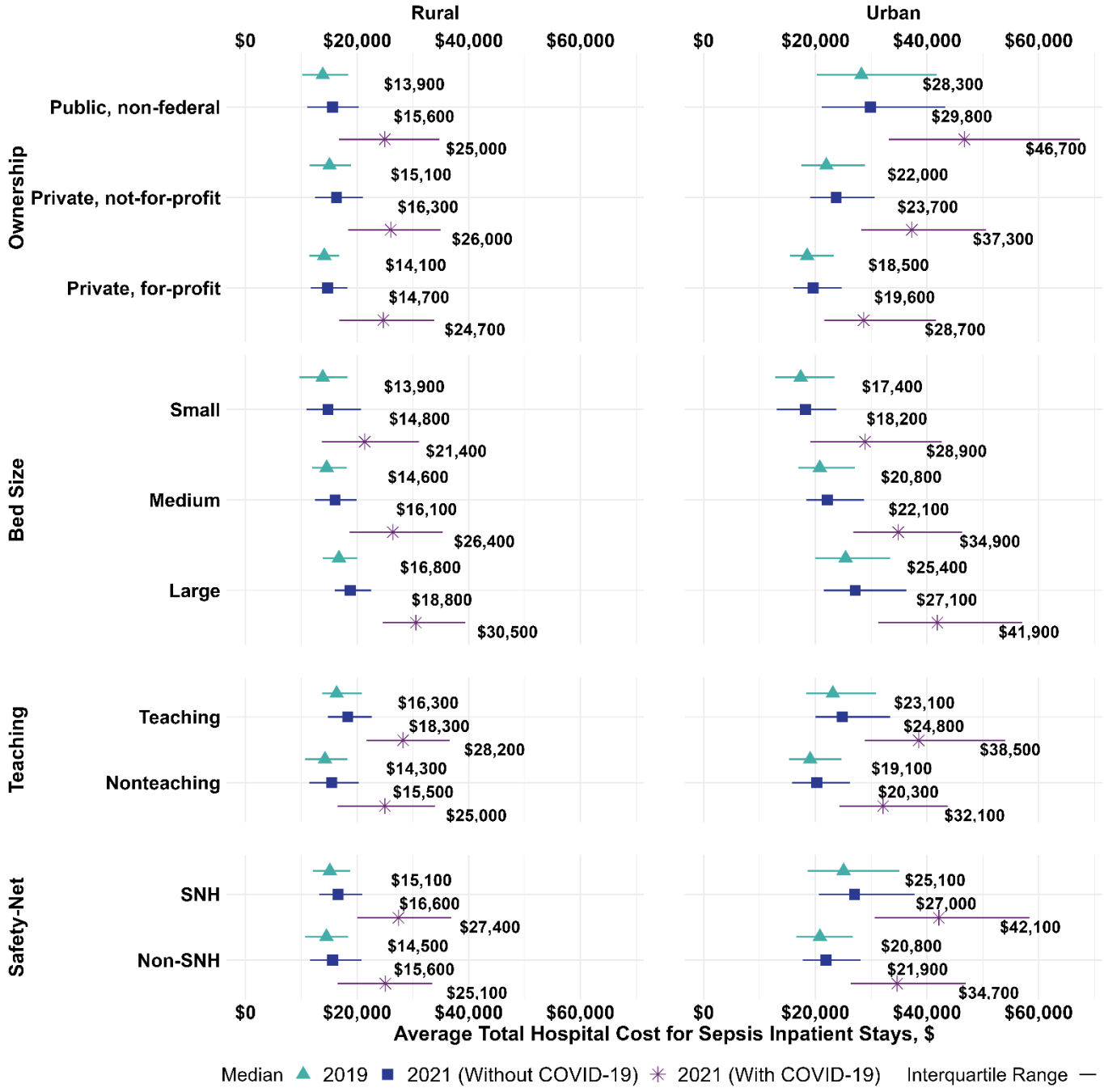
Figure 3. Rural and urban hospital variation in the average length of sepsis stays, by select hospital characteristics, 2019 and 2021



Abbreviation: SNH, safety-net hospital
Note: Average length of sepsis stay was calculated for inpatient stays where sepsis was the reason for the stay (i.e., principal diagnosis). About 7.4 percent of the 33.3 million inpatient stays in 2021 involved a diagnosis of COVID-19. Less than one percent of records for rural hospitals were missing safety-net status. Bed size definitions vary for rural and urban hospitals. For more information, please see the Definitions section below.
Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), State Inpatient Databases (SID), 47 States and the District of Columbia, 2019 and 2021.

- In both 2019 and 2021, urban hospitals of all types had a longer average length of stay for sepsis than rural hospitals.
- In 2021, among inpatient stays not involving COVID-19, the following were noted:
  - The average length of stay for sepsis was 67.5 percent longer for large rural hospitals (100 or more beds) than small rural hospitals (1–25 beds) (6.7 vs. 4.0 days).
  - Similarly, the average length of stay for sepsis was 58.6 percent longer for large urban hospitals (300 or more beds) than small urban hospitals (1–99 beds) (9.2 vs. 5.8 days).
  - The average length of stay for sepsis at rural teaching hospitals was 26.7 percent higher than rural nonteaching hospitals (5.7 vs. 4.5 days).
  - Similarly, the average length of stay for sepsis at urban teaching hospitals was 21.4 percent higher than urban nonteaching hospitals (8.5 vs. 7.0 days).
- In 2021, among inpatient stays involving COVID-19, the following were noted:
  - The average length of stay for sepsis was longer at private, for-profit rural hospitals than public, non-federal and not-for-profit rural hospitals (8.7 days vs. 6.4 and 7.4 days, respectively).
  - In contrast, the average length of stay for sepsis was longer at public, non-federal urban hospitals than private, for-profit and not-for-profit urban hospitals (12.9 vs. 11.6 days).

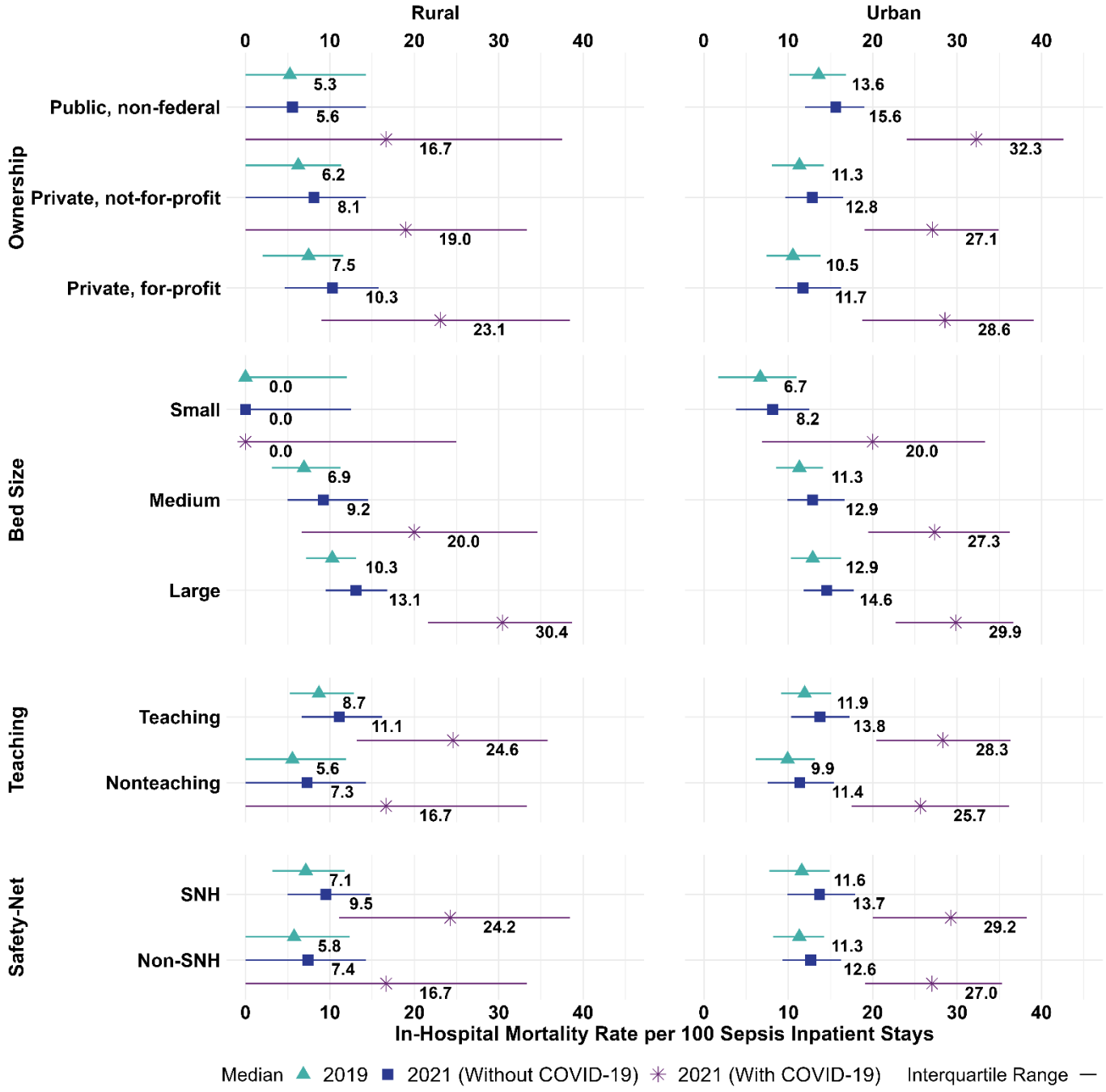
Figure 4. Rural and urban hospital variation in average total hospital cost for sepsis inpatient stays, by select hospital characteristics, 2019 and 2021



Abbreviation: SNH, safety-net hospital
Note: Average total hospital cost for sepsis inpatient stays was calculated for stays where sepsis was the reason for the stay (i.e., principal diagnosis). Charges were imputed to account for missing information prior to conversion to hospital costs. Hospital costs were adjusted to the base year of 2021. Average total hospital cost was rounded to the nearest hundreds. About 7.4 percent of the 33.3 million inpatient stays in 2021 involved a diagnosis of COVID-19. Less than one percent of records for rural hospitals were missing safety-net status. Bed size definitions vary for rural and urban hospitals. For more information, please see the Definitions section below.
Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), State Inpatient Databases (SID), 47 States and the District of Columbia, 2019 and 2021.

- In both 2019 and 2021, urban hospitals of all types had a higher average total hospital cost for sepsis stays than rural hospitals.
- In 2021, among inpatient stays not involving COVID-19, the following were noted:
  - Public, non-federal urban hospitals had an average total hospital cost for sepsis stays that was 52.0 percent higher than private, for-profit urban hospitals ($29,800 vs. $19,600) and 26 percent higher than private, not-for-profit hospitals ($29,800 vs. $23,700).
  - The average cost for sepsis stays at large urban hospitals was 48.9 percent higher than small urban hospitals ($27,100 vs. $18,200).
- In 2021, among inpatient stays involving COVID-19, the following were noted:
  - The average total hospital cost for sepsis stays at public, non-federal urban hospitals was 62.7 percent higher than private, for-profit urban hospitals ($46,700 vs. $28,700) and 25 percent higher than private, not-for-profit hospitals ($46,700 vs. $37,300).
  - The average cost for sepsis stays at large urban hospitals (300 or more beds) was 45.0 percent higher than small urban hospitals (1–99 beds) ($41,900 vs. $28,900).
  - The average cost for sepsis stays at urban safety-net hospitals was 21.3 percent higher than urban non-safety-net hospitals ($42,100 vs. $34,700).

Figure 5. Rural and urban hospital variation in in-hospital mortality rate for sepsis inpatient stays, by select hospital characteristics, 2019 and 2021



Abbreviation: SNH, safety-net hospital
Note: In-hospital mortality rate for sepsis inpatient stays was calculated for stays where sepsis was the reason for the stay (i.e., principal diagnosis). The median in-hospital mortality rate for small, rural hospitals was zero, likely due to the low number of sepsis inpatient admissions. Many sepsis inpatient patient admissions resulted in a transfer to other hospitals. Additionally, small, rural hospitals may treat less severe cases of sepsis, contributing to lower mortality rates. About 7.4 percent of the 33.3 million inpatient stays in 2021 involved a diagnosis of COVID-19. Less than one percent of records for rural hospitals were missing safety-net status. Bed size definitions vary for rural hospitals and urban hospitals. For more information, please see the Definitions section below.
Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), State Inpatient Databases (SID), 47 States and the District of Columbia, 2019 and 2021.

- From 2019 to 2021, the in-hospital mortality rate for non-COVID-19 sepsis stays in private, for-profit rural hospitals increased by 37.3 percent from 7.5 percent in 2019 to 10.3 percent in 2021. In contrast, private, not-for-profit, and public, non-federal rural hospitals saw little change in their mortality rate.
- In both 2019 and 2021, urban hospitals of all types had a higher in-hospital mortality rate for sepsis stays not involving COVID-19 than rural hospitals.
- In 2021, among inpatient stays not involving COVID-19 in urban hospitals, the following were noted:
    - The in-hospital mortality rate for sepsis stays was highest in public, non-federal hospitals compared with private, not-for-profit and for-profit hospitals (15.6 vs. 12.8 and 11.7 per 100 sepsis stays, respectively).
    - The in-hospital mortality rate was highest among private, for-profit rural hospitals compared with private, not-for-profit and public, non-federal rural hospitals (10.3 vs. 8.1 and 5.6 per 100 sepsis stays, respectively).
    - Large hospitals (300 or more beds) had the highest in-hospital mortality rates for sepsis stays in 2021, which was 78.0 percent higher than small hospitals (1–99 beds) (14.6 vs. 8.2 per 100 stays).
- In 2021, among inpatient stays involving COVID-19, safety-net rural hospitals had a higher in-hospital mortality rate for sepsis stays than non-safety-net rural hospitals (24.2 vs. 16.7 per 100 stays).

References

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Data Source

This Statistical Brief uses data from the HCUP 2019 and 2021 State Inpatient Databases (SID) for 47 States and the District of Columbia. States include Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.

Population Studied

This analysis focused on inpatient stays with any-listed ICD-10-CM diagnosis of sepsis. Although this analysis focused on all inpatient stays related to sepsis, the clinical criteria for defining sepsis varied across patient populations. The ICD-10-CM diagnoses codes used to identify a sepsis infection are included in Appendix A, Table A.1. The ICD-10-CM diagnoses codes used to identify organ dysfunction are included in Appendix A, Table A.2. The ICD-10-CM/PCS codes used to identify a maternal case are included in Appendix A, Table A.3. Table 1 provides the clinical criteria used to define mutually exclusive patient populations for sepsis-related inpatient stays. Table 2 provides statistics on the number of rural and urban hospitals by hospital characteristic in 2019 and 2021.

Table 1. Clinical Coding Criteria for Identifying Sepsis-Related Inpatient Stays for Mutually Exclusive Patient Populations

Population	Maternal	Age Criteria	Sepsis Criteria
Maternal	Yes – Any DX indicating a maternal condition as identified by QI setname MDC14PRINDX*	Any age	Any ICD-10-CM diagnosis of the following: • Septic shock** • Severe sepsis*** • Any other diagnosis indicating sepsis *with* at least one diagnosis indicating organ dysfunction (including maternal "O" organ dysfunction codes)
Adult	No	Age 18 years and older****	Any ICD-10-CM diagnosis of the following: • Septic shock** • Severe sepsis***

			• Any other diagnosis indicating sepsis *with* at least one diagnosis indicating organ dysfunction
Pediatric	No	Age 0 with age in days > 27 days *or* age 1–17 years	Any ICD-10-CM diagnosis of the following: • Septic shock[**] • Severe sepsis[***] • Any other diagnosis indicating sepsis (no requirement to have indication of organ dysfunction)
Neonatal	No	Age in days of 0–27	Any ICD-10-CM diagnosis of the following: • Septic shock[**] • Severe sepsis[***] • Any other diagnosis indicating sepsis (no requirement to have indication of organ dysfunction)

[*] AHRQ Prevention Quality Indictor (PQI), Appendix F: MDC 14 and MDC 15 Principal Diagnosis Codes, v2023 (https://qualityindicators.ahrq.gov/Downloads/Modules/PQI/V2023/TechSpecs/PQI_Appendix_F.pdf). Accessed November 10, 2023.
[**] Septic shock identified by ICD-10-CM diagnoses R6521 and T8112XA.
[***] Severe sepsis identified by ICD-10-CM diagnosis R6520.
[****] The adults aged 18 years and older group included a small percentage of records (less than 0.02 percent) of sepsis-related inpatient stays missing patient age information. Records missing patient age information were included in this group because it was the largest of the patient populations.

Table 2. Number of rural and urban hospitals by hospital characteristic, 2019 and 2021

Hospital Characteristic	Rural Hospitals		Urban Hospitals	
	2019	2021	2019	2021
All	2,009	2,003	2,235	2,225
Ownership				
Public, non-federal	668	653	194	192
Private, not-for-profit	1,153	1,168	1,565	1,574
Private, for-profit	188	182	476	459
Bed Size				
Small	1,095	1,104	498	500
Medium	665	658	1,020	1,005
Large	249	241	717	720
Teaching Status				
Teaching	246	284	1,416	1,431
Nonteaching	1,763	1,719	819	794
Safety-Net Designation				
Safety-net	441	440	595	634
Non-safety-net	1,567	1,561	1,640	1,591

Note: Less than one percent of records for rural hospitals were missing safety-net status. Bed size definitions vary for rural and urban hospitals. For more information, please see the Definitions section below.
Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), State Inpatient Databases (SID), 47 States and the District of Columbia, 2019 and 2021.

Sepsis as the reason for the inpatient stay

For this Statistical Brief, outcomes (in-hospital mortality rate, average total hospital cost, and average length of stay) are reported only when sepsis was the reason for the inpatient stay (i.e., principal diagnosis). Outcomes for stays when sepsis was a co-occurring condition or complication of the stay (i.e., only reported as a secondary diagnosis) are not examined in this Statistical Brief. For stays in which sepsis was a co-occurring condition or complication of the stay, other conditions such as cancer, pneumonia, or heart failure may be the reason for the inpatient stay and contribute to increased length of stay or hospital costs. Thus, outcomes for these inpatient stays cannot be attributed solely to sepsis.

The proportion of inpatient stays in which sepsis was the reason for the inpatient stay varies by patient population partially because of ICD-10-CM clinical coding guidelines. As such, these guidelines are important to consider in the development of the case definition for sepsis.

The unit of analysis is a hospital with summary statistics calculated on the hospital discharges (i.e., the hospital stay), not individual persons or patients. This means that a person who is admitted to the hospital multiple times in one year will be counted each time as a separate discharge from the hospital.

Definitions

Diagnoses

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 or management or that develop during the inpatient stay. *All-listed diagnoses* include the principal diagnosis plus the secondary conditions.

ICD-10-CM Coding System

ICD-10-CM is the *International Classification of Diseases, Tenth Revision, Clinical Modification*. There are over 70,000 ICD-10-CM diagnosis codes. In October 2015 (Fiscal Year 2016), ICD-10-CM replaced the *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM) diagnosis coding system for use with medical records.

Types of hospitals included in HCUP SID

This analysis used SID limited to data 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 hospitals. Long-term care facilities such as rehabilitation, psychiatric, and alcoholism and chemical dependency hospitals are excluded from this analysis. 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.

Urban-rural location of hospital

Hospital urban-rural location is based on the Health Resources and Services Administration (HRSA) Federal Office of Rural Health Policy (FORHP) definition of rurality. For this Statistical Brief, rural hospitals were categorized based on rural ZIP Codes identified in the FORHP ZIP files.[a] Hospitals not categorized as rural were defined as urban hospitals.

Hospital ownership

Data on hospital ownership was obtained from the American Hospital Association (AHA) Annual Survey of Hospitals. Hospital ownership/control includes categories for government, non-federal (public), private, not-for-profit (voluntary), and private, investor-owned (proprietary).

Hospital bed size

Hospital bed size categories are based on number of hospital beds and are specific to the hospital's location (see Table 3 below). Bed size assesses the number of short-term acute beds in a hospital. Hospital information was obtained from the AHA Annual Survey of Hospitals.

Table 3. Hospital bed size categories

Size	Rural Hospitals	Urban Hospitals
Small	1–25 beds	1–99 beds
Medium	26–99 beds	100–299 beds
Large	100 or more beds	300 or more beds

Teaching hospital

A hospital is considered a teaching hospital if it has one or more Accreditation Council for Graduate Medical Education (ACGME) approved residency programs, is a member of the Council of Teaching Hospitals (COTH), or has a ratio of full-time equivalent interns and residents to beds of 0.25 or higher.

Safety-net hospital

Using data from the SID for all community hospitals except for rehabilitation and long-term acute care hospitals, the number of discharges expected to be billed to Medicaid, self-pay, or no charge was divided by the total number of discharges at each hospital. Certain expected payers were recategorized from the HCUP category for Other payer (e.g., indigent care programs) to self-pay/no charge. Hospitals were ranked within the state by this percentage, and those hospitals falling in the top 25 percent were defined as safety-net hospitals. The remaining hospitals were defined as non-safety-net hospitals.

Length of stay

The length of stay is calculated as the difference of the discharge date and the admission date. A patient admitted and discharged on the same day has a length of stay of zero days.

Total hospital costs and charges

Total hospital charges were converted to costs using HCUP Cost-to-Charge Ratios based on hospital accounting reports from the Centers for Medicare & Medicaid Services (CMS).[b] *Costs* reflect the actual expenses incurred in the production of hospital services, such as wages, supplies, and utility costs. *Charges* represent the amount a hospital billed for the case. For each hospital, a hospital-wide cost-to-charge ratio is used. Hospital charges reflect the amount the hospital billed for the entire hospital stay and do not include professional (physician) fees. For this Statistical Brief, hospital costs are reported to the nearest hundred dollars. Further information on the HCUP Cost-to-Charge Ratio can be found at: https://hcup-us.ahrq.gov/db/ccr/costtocharge.jsp.

Annual hospital costs were inflation-adjusted using the Gross Domestic Product (GDP) Price Index from the U.S. Department of Commerce, Bureau of Economic Analysis (BEA), with 2021 as the index base.[c] All hospital costs are expressed in 2021 dollars.

Calculations

Mortality rate

The mortality rate per 100 sepsis inpatient stays is calculated as follows:

- Numerator of sepsis-related inpatient stays in which the patient died in the hospital.
- Denominator of sepsis-related inpatient stays (any discharge status).

Imputation of missing charges and hospital costs

The 47 States and District of Columbia SIDs were missing information on total hospital charges for less than one percent of records in 2019 and 2021. The missing charges were imputed using the average total hospital charges for the Diagnosis Related Group (DRG) calculated using the SID for the same data year. The imputation of total hospital charges occurred prior to the calculation of total hospital costs. The imputation of missing charges and the calculation of hospital costs were performed per discharge prior to the calculation of average and aggregate hospital costs within and across years.

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. For more information about HCUP, see: https://hcup-us.ahrq.gov/.

HCUP would not be possible without the contributions of the following data collection Partners from across the United States:

Alaska Department of Health
Alaska Hospital and Healthcare Association
Arizona Department of Health Services
Arkansas Department of Health
California Department of Health Care Access and Information
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 Health Authority
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
Wisconsin Department of Health Services
Wyoming Hospital Association

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For More Information

For more information on this and other topics, please visit our HCUP Statistical Briefs topic area page located at www.hcup-us.ahrq.gov/reports/statbriefs/sbtopic.jsp.

For additional HCUP statistics, visit:

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

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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[c] BEA Interactive Data query tool, National Data, GDP & Personal Income, Section 1 Domestic Product and Income, Table 1.1.4. Price Indexes for Gross Domestic Product. Accessed November 15, 2023.