Addendum to HCUP Statistical Brief #309: Racial and Ethnic Differences in Inpatient Stays Involving Sepsis, 2016–2021, Addition of 2022 Data

HCUP Statistical Brief #309 Addendum to Include 2022 Data | June 2025

Melissa A. Miller, M.D., M.S., Kimberly Martin, Ph.D., Molly Hensche, M.S., Carrie Goetsch, B.S.

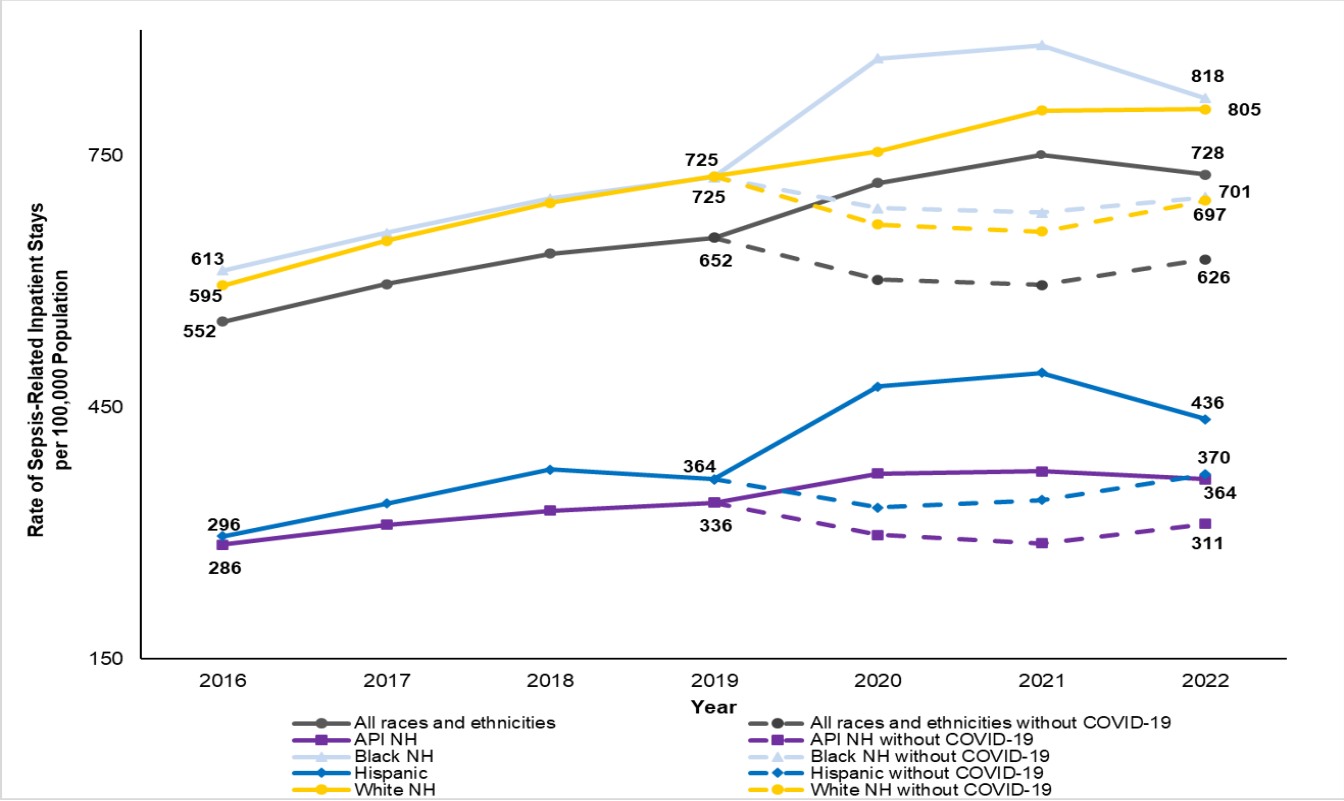
This is an addendum to HCUP Statistical Brief #309, Racial and Ethnic Differences in Inpatient Stays Involving Sepsis, 2016–2021. This addendum updates exhibits to include 2022 data. For trend figures, 2022 data are an additional data point. For all other figures and/or tables, 2022 data replace 2021 data. Please refer to the main Statistical Brief for information related to methodology (i.e., definitions and calculations), suggested citation, and contact information.

Findings

Trends in the Rate of Sepsis-Related Inpatient Stays per 100,000 Population by Patient Race and Ethnicity

Figure 1 presents national trends from 2016 to 2022 in the rate of sepsis-related inpatient stays per 100,000 population by patient race and ethnicity. For 2020–2022, trends are presented for all sepsis-related inpatient stays as well as stays without COVID-19 to understand the influence of the COVID-19 pandemic.

Figure 1. Trends in the rate of sepsis-related inpatient stays per 100,000 population, by patient race and ethnicity, 2016–2022



Abbreviations: API, Asian and Pacific Islander; NH, Non-Hispanic.

Notes: The rate of sepsis-related inpatient stays per 100,000 population was based on any-listed diagnosis of sepsis. Rates were rounded to the nearest whole number. Patient race and ethnicity information was missing for less than five percent of all sepsis-related inpatient stays in 2016 and less than three percent of stays in 2019 and 2022.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2016–2022

Characteristics of Sepsis-Related Inpatient Stays by Patient Race and Ethnicity, 2019 and 2022

Table 1 presents the rate of sepsis-related inpatient stays per 100,000 population by patient race and ethnicity and other select characteristics in 2019 and 2022. Figure 2 presents the percentage in 2019 and 2022 of sepsis-related inpatient stays by patient race and ethnicity and presence of the most common chronic comorbidities (i.e., the top five comorbidities across all racial and ethnic groups in 2022).

Table 1. Rate of sepsis-related inpatient stays per 100,000 population, by patient characteristics and race and ethnicity, 2019 and 2022

Characteristic	All race and ethnicities	API NH	Black NH	Hispanic	White NH
2019					
All sepsis-related inpatient stays	652	336	725	364	725
Age group, years					
Pediatric (0-17)	112	83	143	105	92
Adult (18-64)	402	163	563	277	406
Adult (65+)	2,314	1,631	2,751	2,110	2,215
Sex					
Male	692	376	771	384	767
Female	614	299	682	344	685
Community-level income					
Low-income	792	405	806	430	949
Middle-income	634	381	663	334	711
High-income	492	286	579	265	541
Patient residence					
Urban	639	336	723	369	718
Rural	736	326	736	297	761
Patient community (social vulnerability† designation)					
Most vulnerable	731	407	795	453	906
Less vulnerable	623	316	677	294	688
2022					
All sepsis-related inpatient stays	728	364	818	436	805
Age group, years					
Pediatric (0-17)	98	70	118	93	79
Adult (18-64)	444	180	626	339	438
Adult (65+)	2,513	1,651	3,046	2,377	2,397
Sex					
Male	779	414	888	470	855
Female	677	318	754	400	756
Community-level income					
Low-income	891	409	918	509	1,054
Middle-income	709	418	752	403	791
High-income	551	323	674	332	603
Patient residence					
Urban	713	365	813	442	795
Rural	821	329	873	352	850
Patient community (social vulnerability† designation)					
Most vulnerable	776	396	868	500	943
Less vulnerable	692	342	741	336	757

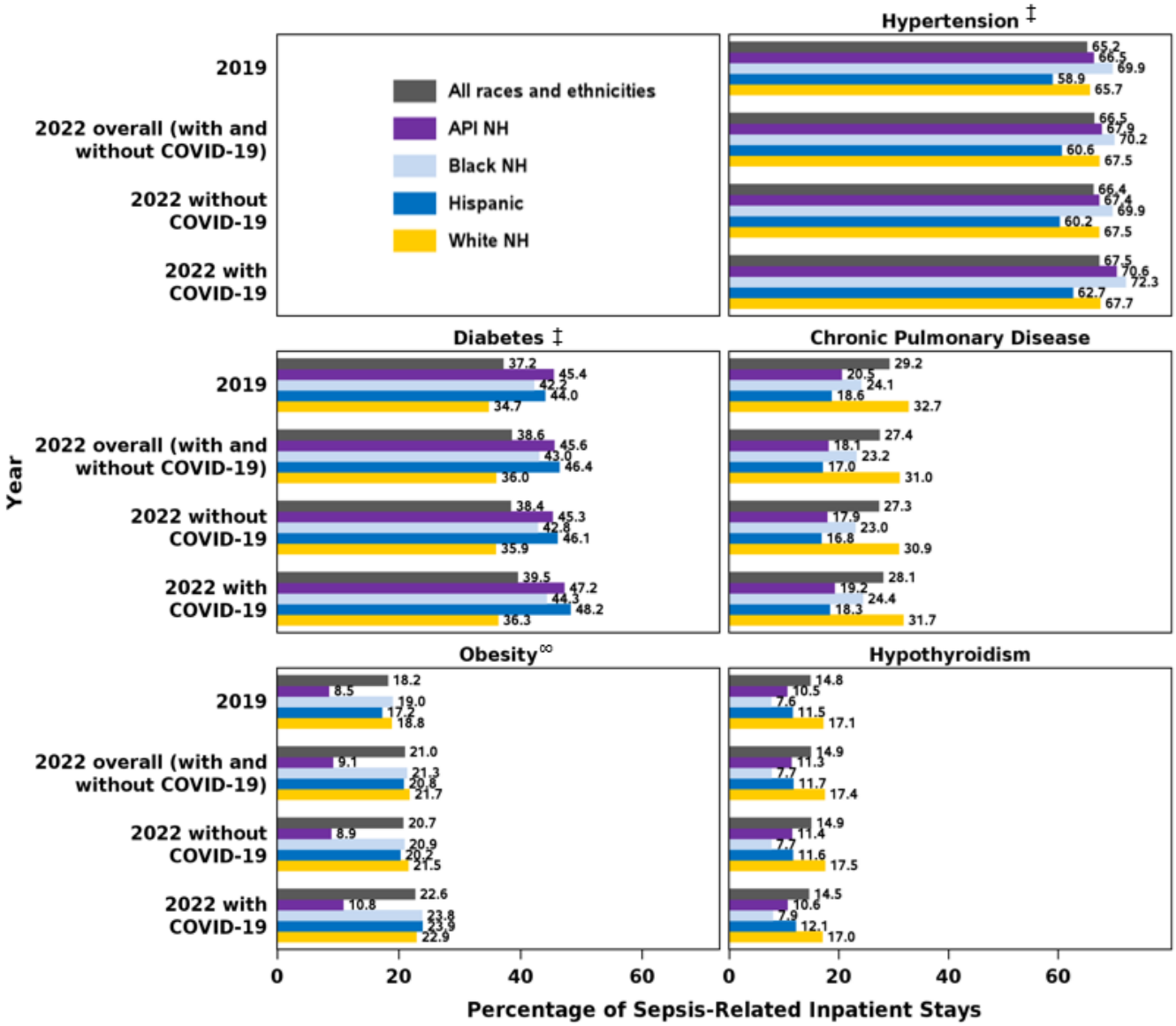
Abbreviations: API, Asian and Pacific Islander; NH, Non-Hispanic.

Notes: The rate of sepsis-related inpatient stays per 100,000 population was based on any-listed diagnosis of sepsis. Rates were rounded to the nearest whole number. Patient race and ethnicity information was missing for less than three percent of all sepsis-related inpatient stays in 2019 and 2022.

†Social vulnerability is based on the Centers for Disease Control and Prevention (CDC)/Agency for Toxic Substances and Disease Registry (ATSDR) Social Vulnerability Index (SVI), which is a measure of a community's ability to prevent human suffering and financial loss during a disaster.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2019 and 2022

Figure 2. Percentage of sepsis-related inpatient stays, by patient race and ethnicity and presence of most common chronic comorbidities, 2019 and 2022



Abbreviations: API, Asian and Pacific Islander; NH, Non-Hispanic.

Notes: The percentage of sepsis-related inpatient stays was based on any-listed diagnosis of sepsis. The identification of chronic comorbidities is based on the Elixhauser Comorbidity Software Refined for ICD-10-CM for the subset of comorbidity measures available on the NIS. Only the top five comorbidities across all racial and ethnic groups in 2022 are included. Comorbidities are not mutually exclusive. Patient race and ethnicity information was missing for less than three percent of all sepsis-related inpatient stays in 2019 and 2022.

‡ Related comorbid conditions were grouped together for reporting. Hypertension includes hypertension with and without complications. Diabetes includes diabetes with and without chronic complications.

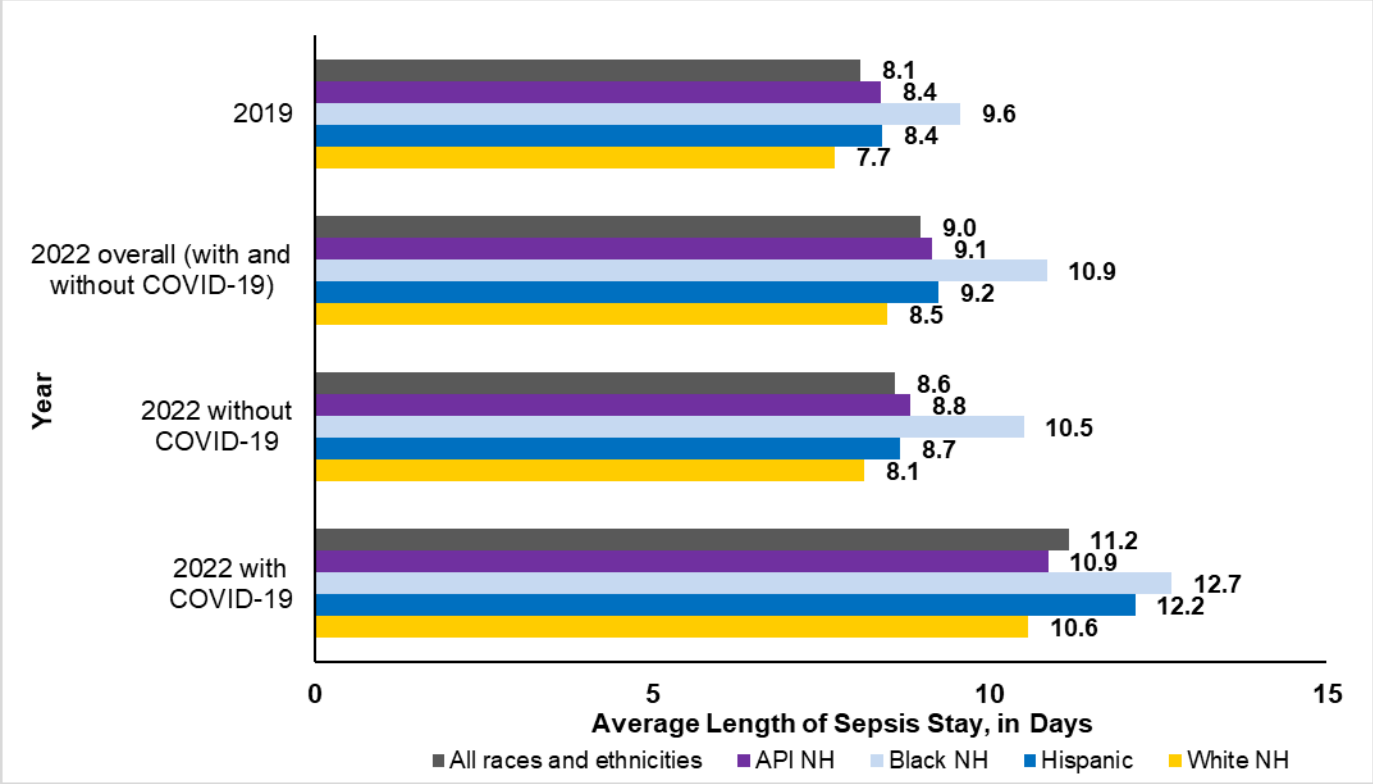
∞Diagnosis codes indicating obesity are likely underreported in HCUP data.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2019 and 2022

Average Length of Stay, Average Total Hospital Cost, In-hospital Mortality Rate, and Discharge Disposition for Inpatient Stays for Sepsis by Patient Race and Ethnicity, 2019 and 2022

Figures 3, 4, and 5 present the average length of stay, average total hospital cost, and in-hospital mortality rate for sepsis stays (i.e., sepsis is the principal diagnosis), respectively, in 2019 and 2022 by patient race and ethnicity. For 2022, information is presented with and without COVID-19. Figure 6 presents the distribution of inpatient stays for sepsis by patient race and ethnicity and discharge disposition in 2019 and 2022.

Figure 3. Average length of sepsis stay, by patient race and ethnicity, 2019 and 2022

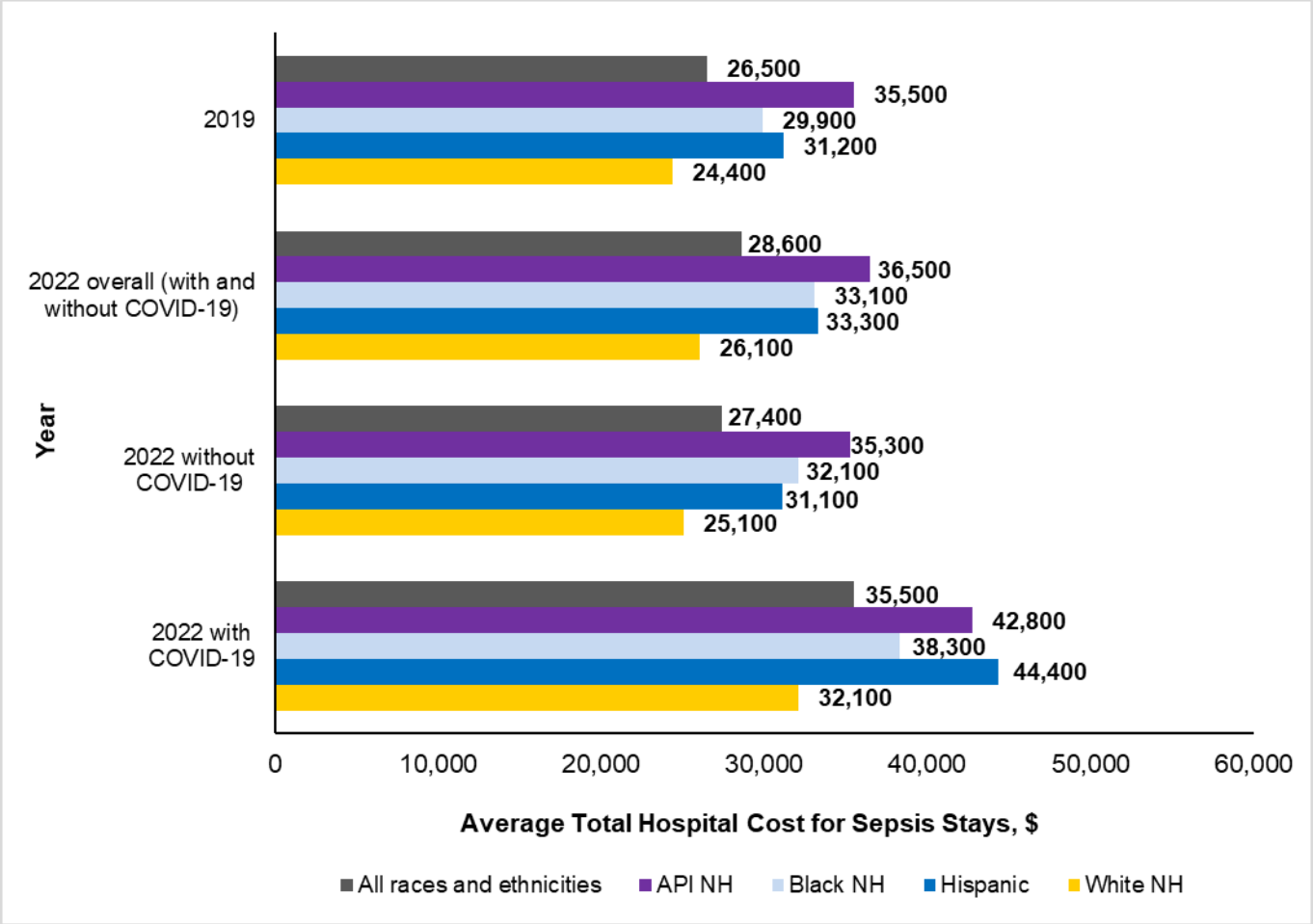


Abbreviations: API, Asian and Pacific Islander; NH, Non-Hispanic.

Notes: Average length of sepsis stay was based on stays in which sepsis was the reason for the stay (i.e., the principal diagnosis). Patient race and ethnicity information was missing for less than three percent of all sepsis-related inpatient stays in 2019 and 2022.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2019 and 2022

Figure 4. Average total hospital cost for sepsis stays, by patient race and ethnicity, 2019 and 2022

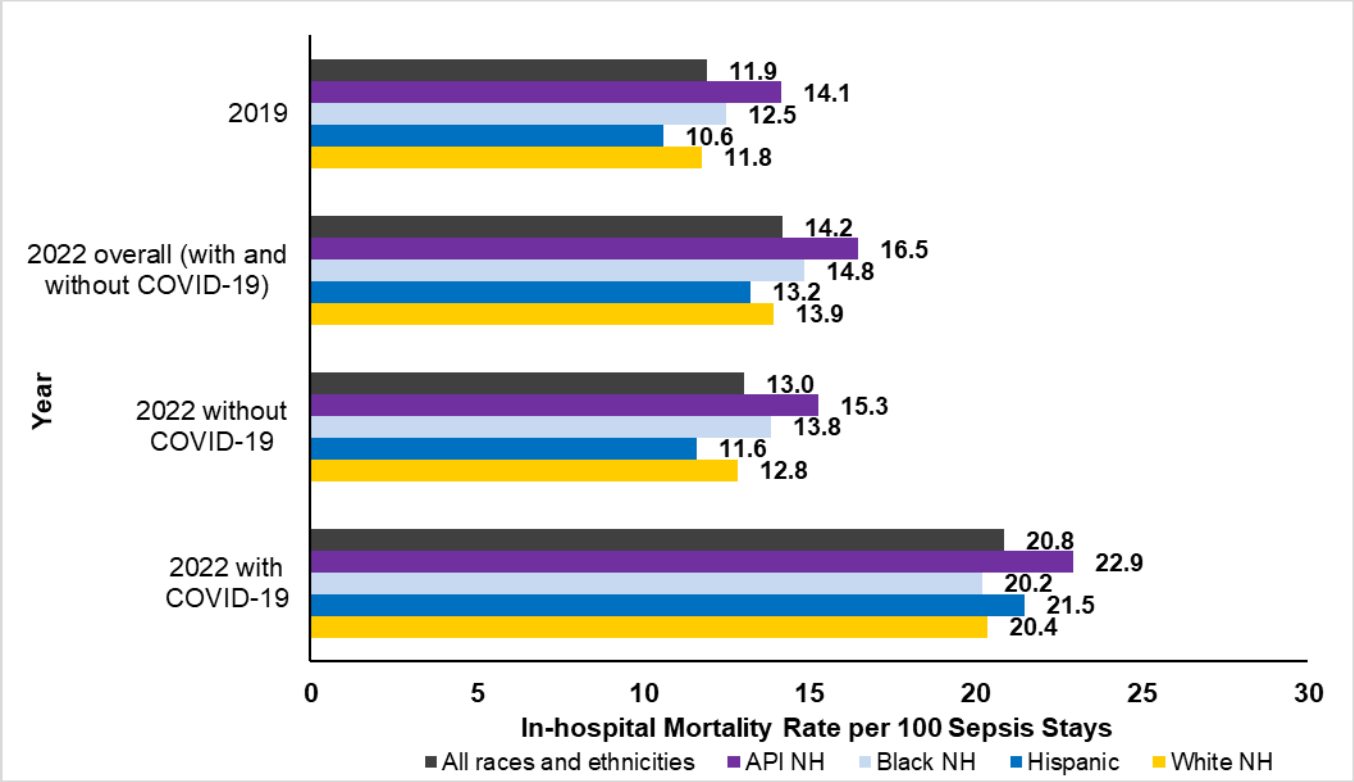


Abbreviations: API, Asian and Pacific Islander; NH, Non-Hispanic.

Notes: Average total hospital cost for sepsis stays were based on stays in which sepsis was the reason for the stay (i.e., the 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 2022. Average hospital costs were rounded to the nearest hundreds. Patient race and ethnicity information was missing for less than three percent of all sepsis-related inpatient stays in 2019 and 2022.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2019 and 2022

Figure 5. In-hospital mortality rate per 100 sepsis stays, by patient race and ethnicity, 2019 and 2022

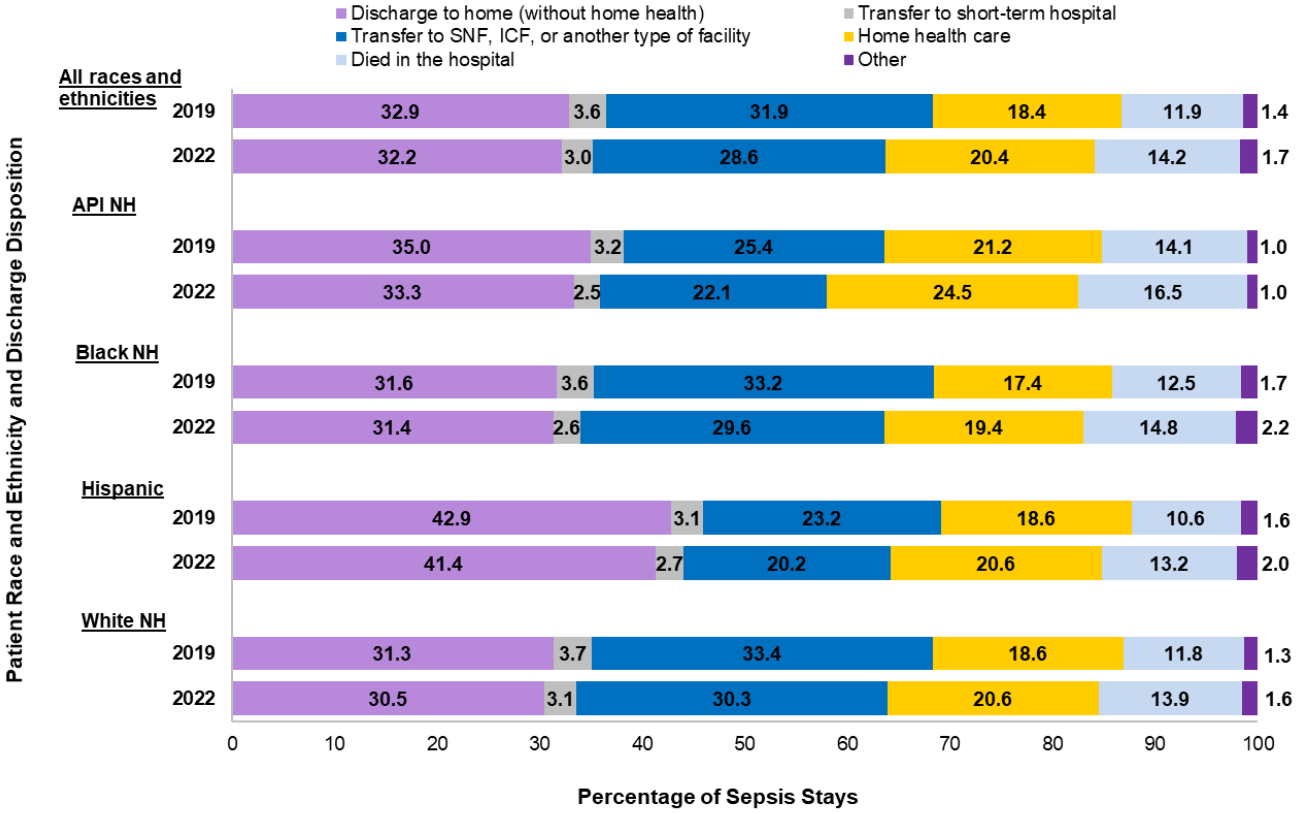


Abbreviations: API, Asian and Pacific Islander; NH, Non-Hispanic.

Notes: In-hospital mortality rate per 100 sepsis stays was based on stays in which sepsis was the reason for the stay (i.e., the principal diagnosis). Patient race and ethnicity information was missing for less than three percent of all sepsis-related inpatient stays in 2019 and 2022.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2019 and 2022

Figure 6. Distribution of sepsis stays, by patient race and ethnicity and discharge disposition, 2019 and 2022



Abbreviations: API, Asian and Pacific Islander; ICF, intermediate care facility; NH, Non-Hispanic; SNF, skilled nursing facility.

Notes: The Other category includes dispositions of against medical advice, discharged alive, missing, and invalid. The distribution of the number of inpatient stays for sepsis by discharge disposition was based on stays in which sepsis was the reason for the stay (i.e., the principal diagnosis). Patient race and ethnicity information was missing for less than three percent of all sepsis-related inpatient stays in 2019 and 2022.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2019 and 2022

Data Source

This Statistical Brief uses data from the HCUP 2016–2022 National Inpatient Sample (NIS). For additional information about the HCUP NIS, see: https://hcup-us.ahrq.gov/db/nation/nis/nisdbdocumentation.jsp.

Population Studied

This analysis focused on inpatient stays with any ICD-10-CM diagnosis of sepsis. Although the maximum number of diagnoses varies in the 2016–2022 NIS (30 diagnoses in the 2016 NIS and 40 diagnoses in 2017–2022), this analysis used all available diagnoses in the data year. Within each year, the number of diagnoses in the individual State Inpatient Databases (SID) used to create the NIS vary and may be different than the maximum retained in the NIS. No more than one percent of records have diagnoses excluded from the NIS in any given year.

The unit of analysis is the hospital discharge (i.e., the inpatient stay), not a person or patient. 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.

Case definition of sepsis by patient populations
Consistent with the Third International Consensus Definitions Task Force definition of Sepsis-3, the identification of inpatient stays related to sepsis was based on ICD-10-CM diagnoses indicating sepsis and organ dysfunction.[a] Patients were divided into five mutually exclusive categories for the identification of inpatient stays related to sepsis with varying age and sepsis criteria: 1) maternal regardless of age, 2) adults 18 years and older, 3) pediatrics aged 28 days–17 years, and 4) neonates aged 0–27 days (Table 2).

The ICD-10-CM diagnoses codes used to identify sepsis 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 2. 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	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***

Population	Maternal	Age Criteria	Sepsis Criteria
			• 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.

Sepsis as the reason for the inpatient stay

For this Statistical Brief, outcomes (average length of stay, average total hospital cost, in-hospital mortality rate, and discharge disposition) 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.

Table 3 presents the number of inpatient stays related to sepsis by patient race and ethnicity. Information is presented for 2019 and with and without COVID-19 for 2021. Additionally, information is presented separately for sepsis as the reason for the stay versus a co-occurring condition or complication of the stay.

Table 3. Number of Inpatient Stays Related to Sepsis by Patient Race and Ethnicity, 2019 and 2022

Patient race and ethnicity	2019	2022 overall (with and without COVID-19)	2022 with COVID-19	2022 without COVID-19
Sepsis was the reason for the inpatient stay				
All races and ethnicities	1,543,065	1,775,605	260,685	1,514,920
API NH	46,475	54,935	8,585	46,350
Black NH	204,185	241,750	37,680	204,070
Hispanic	149,925	195,835	31,765	164,070
White NH	1,056,695	1,180,470	166,435	1,014,035
Sepsis was a co-occurring condition or complication of the stay				
All races and ethnicities	598,670	649,125	76,140	572,985
API NH	19,660	21,185	2,530	18,655
Black NH	94,270	102,460	11,855	90,605
Hispanic	70,090	81,440	10,100	71,340
White NH	374,375	399,495	46,550	352,945

Abbreviations: API, Asian and Pacific Islander; NH, Non-Hispanic.

Notes: Patient race and ethnicity information was missing for less than three percent of all sepsis-related inpatient stays in 2019 and 2022.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2019 and 2022

Please refer to Statistical Brief #309 for information related to methodology (i.e., definitions and calculations), suggested citation, and contact information.

This Statistical Brief was posted online on June 11, 2025.