H·CUP HEALTHCARE COST AND UTILIZATION PROJECT

AHRQ Agency for Healthcare Research and Quality

Most Frequent Principal Diagnoses for Inpatient Stays in U.S. Hospitals, 2018

STATISTICAL BRIEF #277
July 2021

Kimberly W. McDermott, Ph.D., and Marc Roemer, M.S.

Introduction

Identifying the most frequent primary conditions for which patients are admitted to the hospital is important to the implementation and improvement of healthcare delivery, quality initiatives, and health policy. For example, this information can help establish national health priorities, initiatives, and action plans. Additionally, alternative payment models, such as hospital value-based purchasing programs, often focus on condition-specific metrics.[1] At the hospital level, administrators can use diagnosis-related information to inform planning and resource allocation, such as optimizing subspecialty services or units for the care of high-priority conditions.

This Healthcare Cost and Utilization Project (HCUP) Statistical Brief presents statistics on the most frequent principal diagnoses among nonmaternal, nonneonatal inpatient stays using the 2018 National Inpatient Sample (NIS). First, the number of stays, mean cost per stay, and aggregate costs are presented for the most frequent principal diagnoses. Second, the distribution of stays for the most common diagnoses by select patient and hospital characteristics is shown. Finally, the top principal diagnoses by sex-age group are identified. Because of the large sample size of the NIS data, small differences can be statistically significant. Thus, only differences greater than or equal to 10 percent are discussed in the text.

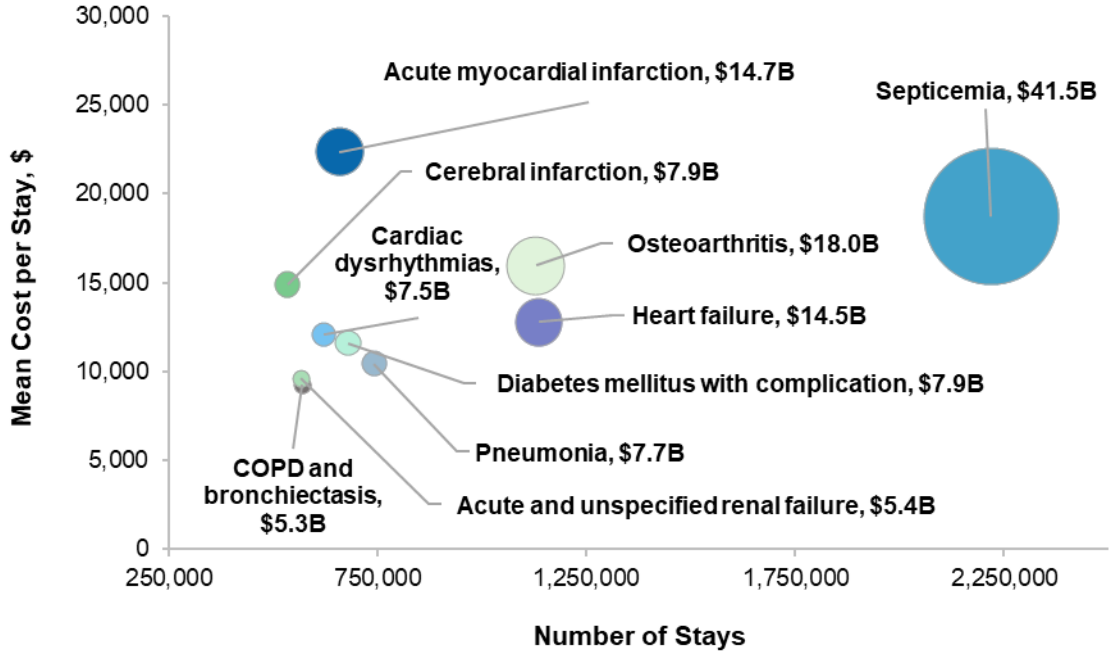
Highlights

- The most frequent principal diagnoses for hospitalizations in the United States in 2018 were septicemia, heart failure, osteoarthritis, pneumonia (except that caused by tuberculosis), and diabetes mellitus with complication.
- Of the 10 most common principal diagnoses in 2018, septicemia was both the most frequent (2,218,800 stays) and the costliest ($41.5 billion in aggregate). Septicemia ranked as the first or second most common diagnosis among adults, both male and female.
- For each of the five most common principal diagnoses, the rate of stays per 100,000 population was highest in rural areas. For four of the five top diagnoses, mean length of stay and mean cost per stay were highest in large central metropolitan areas and generally decreased with rurality.
- Among geographic regions of the United States, the West had the lowest rate of stays for three of the top five diagnoses: heart failure, pneumonia, and diabetes mellitus with complication.
- Mental and/or substance use disorder diagnoses ranked among the top five principal diagnoses for individuals under age 45 years, whereas cardiovascular and musculoskeletal diagnoses ranked among the top five principal diagnoses for those aged 45 years and older.

Findings

Most frequent principal diagnoses among nonmaternal, nonneonatal inpatient stays, 2018
Figure 1 displays the aggregate cost of nonmaternal, nonneonatal inpatient stays for the 10 most frequent principal diagnoses in 2018, as indicated by the size of each circle. The mean cost per stay and total number of stays are shown on the y-axis and x-axis, respectively. Estimates of costs and number of stays are also reported in Table 1.

Figure 1. Aggregate cost of nonmaternal, nonneonatal hospital inpatient stays, by mean cost and number of stays, 10 most frequent principal diagnoses, 2018



Abbreviation: B, billion; COPD, chronic obstructive pulmonary disease; ICD-10-CM, International Classification of Diseases, Tenth Revision, Clinical Modification

Notes: Diagnoses were identified using the Clinical Classifications Software Refined (CCSR) for ICD-10-CM Diagnoses. The pneumonia diagnosis group excludes pneumonia caused by tuberculosis.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2018

- **Septicemia, the most common principal diagnosis among nonmaternal, nonneonatal stays in 2018, accounted for $41.5 billion in aggregate costs.**

  Of the 10 most common principal diagnoses among nonmaternal, nonneonatal inpatient stays in 2018, septicemia was the most frequent and accounted for the highest aggregate costs ($41.5 billion). The mean cost per stay was also higher for septicemia than for the other top 10 conditions, with the exception of acute myocardial infarction (AMI).

  Osteoarthritis was the second most costly principal diagnosis among the top 10 diagnoses, with stays totaling $18.0 billion in aggregate costs. Of the 10 most frequent principal diagnoses, osteoarthritis ranked third in terms of both number of stays (after septicemia and heart failure) and mean cost per stay (after AMI and septicemia).

  Two circulatory conditions—heart failure and AMI—ranked in the top 10 principal diagnoses in 2018 and accounted for $14.5 and $14.7 billion in aggregate costs, respectively. Compared with stays for heart failure, stays for AMI were far less common but more expensive on average.

Table 1 presents the 20 most frequent principal diagnoses among nonmaternal, nonneonatal inpatient stays in 2018. Total number of stays, aggregate cost, and mean cost per stay are provided for each diagnosis.

Table 1. Top 20 principal diagnoses among nonmaternal, nonneonatal inpatient stays, 2018

Rank	Principal diagnosis	Number of stays	Percent of stays	Aggregate cost, $ billions	Percent of aggregate cost	Mean cost per stay, $
All nonmaternal/nonneonatal stays		**27,833,500**	**100.0**	**403.6**	**100.0**	**14,500**
Top 20 diagnoses		**13,236,300**	**47.6**	**188.3**	**46.7**	**14,200**
1	Septicemia	2,218,800	8.0	41.5	10.3	18,700
2	Heart failure	1,135,900	4.1	14.5	3.6	12,800
3	Osteoarthritis	1,128,100	4.1	18.0	4.5	16,000
4	Pneumonia (except that caused by tuberculosis)	740,700	2.7	7.7	1.9	10,500
5	Diabetes mellitus with complication	678,600	2.4	7.9	1.9	11,600
6	Acute myocardial infarction	658,600	2.4	14.7	3.6	22,300
7	Cardiac dysrhythmias	620,000	2.2	7.5	1.9	12,100
8	COPD and bronchiectasis	569,600	2.0	5.3	1.3	9,200
9	Acute and unspecified renal failure	565,800	2.0	5.4	1.3	9,600
10	Cerebral infarction	533,400	1.9	7.9	2.0	14,900
11	Skin and subcutaneous tissue infections	529,600	1.9	4.0	1.0	7,600
12	Depressive disorders	525,000	1.9	2.8	0.7	5,400
13	Spondylopathies/ Spondyloarthropathy	519,600	1.9	12.5	3.1	24,000
14	Urinary tract infections	508,700	1.8	3.8	0.9	7,500
15	Respiratory failure; insufficiency; arrest	506,800	1.8	9.1	2.2	17,900
16	Schizophrenia spectrum and other psychotic disorders	399,900	1.4	3.7	0.9	9,300
17	Coronary atherosclerosis and other heart disease	358,900	1.3	8.7	2.2	24,400
18	Biliary tract disease	349,900	1.3	4.5	1.1	13,000
19	Fluid and electrolyte disorders	349,800	1.3	2.7	0.7	7,600
20	Complication of select surgical or medical care, injury, initial encounter*	338,800	1.2	6.0	1.5	17,700

Abbreviations: COPD, chronic obstructive pulmonary disease; ICD-10-CM, International Classification of Diseases, Tenth Revision, Clinical Modification

Notes: Diagnoses were identified using the Clinical Classifications Software Refined (CCSR) for ICD-10-CM Diagnoses. Number of stays is rounded to the nearest hundred. Mean cost per stay is rounded to the nearest $100.

* This includes complications, such as infection, for surgical or medical care other than those from cardiovascular, genitourinary, or internal orthopedic devices or from organ/tissue transplants.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2018

- **The top 20 principal diagnoses constituted nearly half of all nonmaternal, nonneonatal inpatient stays and nearly half of aggregate costs for these stays in 2018.**

  In 2018, there were 27,833,500 nonmaternal, nonneonatal hospital stays in the United States. The 20 most frequent principal diagnoses accounted for 47.6 percent of these stays (13,236,300 stays) and 46.7 percent of aggregate costs for these stays ($188.3 billion).

- **Septicemia accounted for 8 percent of all nonmaternal, nonneonatal stays in 2018. Heart failure and osteoarthritis each accounted for 4 percent.**

  Inpatient stays with a principal diagnosis of septicemia accounted for 8.0 percent of all nonmaternal, nonneonatal stays (2,218,800 stays) and 10.3 percent of aggregate costs for these stays ($41.5 billion).

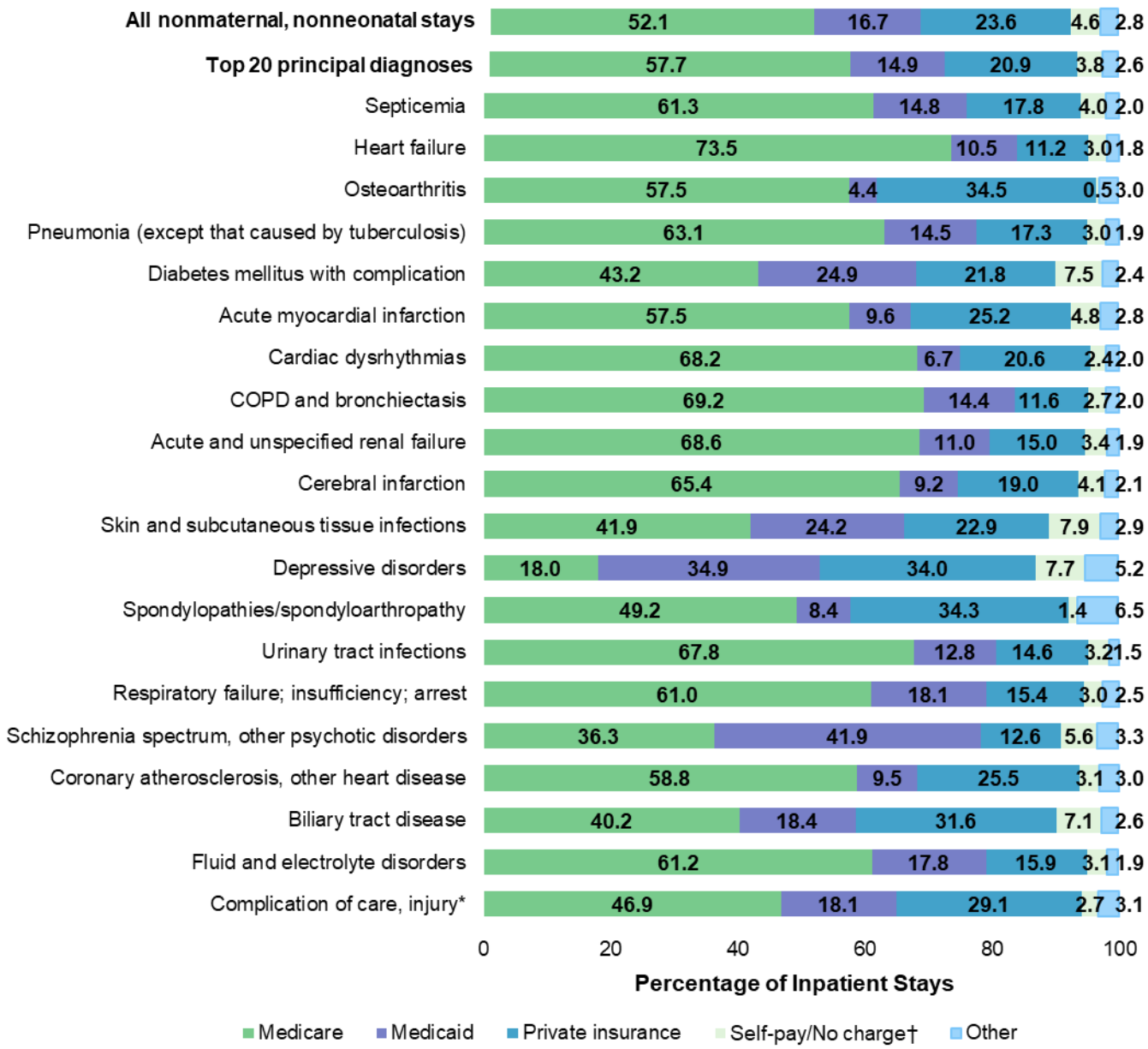
  Five circulatory conditions were among the 20 most common principal diagnoses in 2018: heart failure (1,135,900 stays; $14.5 billion in aggregate costs), AMI (658,600 stays; $14.7 billion), cardiac dysrhythmias (620,000 stays; $7.5 billion), cerebral infarction (533,400 stays; $7.9 billion), and coronary atherosclerosis and other heart disease (358,900 stays; $8.7 billion). Combined, these diagnoses accounted for 11.9 percent of stays and 13.2 percent of aggregate costs. Stays for two of these circulatory diagnoses—coronary atherosclerosis and other heart disease, and AMI—were relatively expensive compared with most other top diagnoses, averaging more than $20,000 per stay.

  Three respiratory diagnoses were also among the top 20 principal diagnoses: pneumonia (740,700 stays; $7.7 billion in aggregate costs), COPD and bronchiectasis (569,600 stays; $5.3 billion), and respiratory failure, insufficiency, or arrest (506,800 stays; $9.1 billion). Together, these diagnoses constituted 6.5 percent of stays and 5.5 percent of aggregate costs. The average cost of stays for respiratory failure, insufficiency, or arrest was relatively high compared with stays for pneumonia and stays for COPD and bronchiectasis ($17,900 vs. $10,500 and $9,200, respectively).

  The two musculoskeletal diagnoses in the top 20 rankings—osteoarthritis (1,128,100 stays; $18.0 billion in aggregate costs) and spondylopathies/spondyloarthropathy (519,600 stays; $12.5 billion)—made up 5.9 percent of stays and 7.6 percent of aggregate costs. Of these two principal diagnoses, osteoarthritis was far more common, accounting for more than twice as many stays as spondylopathies/spondyloarthropathy. However, on average, stays for spondylopathies/spondyloarthropathy were more expensive than stays for osteoarthritis ($24,000 vs. $16,000 per stay).

Figure 2 presents the distribution of nonmaternal, nonneonatal inpatient stays for each of the 20 most common principal diagnoses by primary expected payer. The distribution by payer for all nonmaternal, nonneonatal stays is also presented for comparison.

Figure 2. Top 20 principal diagnoses among nonmaternal, nonneonatal inpatient stays, by primary expected payer, 2018



Abbreviations: COPD, chronic obstructive pulmonary disease; ICD-10-CM, International Classification of Diseases, Tenth Revision, Clinical Modification

Notes: Diagnoses were identified using the Clinical Classifications Software Refined (CCSR) for ICD-10-CM Diagnoses. Primary expected payer was missing for less than 0.3% of stays.

* Complication of select surgical or medical care, injury, initial encounter. This includes complications, such as infection, for surgical or medical care other than those from cardiovascular, genitourinary, or internal orthopedic devices or from organ/tissue transplants.

† 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), National Inpatient Sample (NIS), 2018

- **Medicare was the primary expected payer for nearly 60 percent of inpatient stays involving the 20 most frequent principal diagnoses.**

  Medicare was the primary expected payer for the majority of nonmaternal, nonneonatal stays (52.1 percent of all stays and 57.7 percent of stays for the top 20 diagnoses combined) and the most common primary expected payer for 18 of the top 20 principal diagnoses (all conditions except for depressive disorders and schizophrenia spectrum disorders). The percentage of stays for the 18 common principal diagnoses for which Medicare was the most frequent payer ranged from 40.2 percent for biliary tract disease to 73.5 percent for heart failure.

- **Two mental disorder diagnoses—depressive disorders and schizophrenia spectrum disorders—were among the 20 most common diagnoses, and Medicaid was the primary expected payer for more than one-third of these stays.**

  Among stays for schizophrenia spectrum and other psychotic disorders, Medicaid was the most common primary expected payer (41.9 percent of stays), followed by Medicare (36.3 percent) and private insurance (12.6 percent). Among stays for depressive disorders, Medicaid and private insurance each accounted for approximately one-third of stays (34.9 and 34.0 percent, respectively), with Medicare accounting for 18.0 percent.

- **Self-pay/no charge represented more than 7 percent of discharges for 4 of the top 20 diagnoses.**

  For 4 of the top 20 principal diagnoses, self-pay/no charge accounted for more than 7 percent of stays: skin and subcutaneous tissue infections (7.9 percent), depressive disorders (7.7 percent), diabetes mellitus with complication (7.5 percent), and biliary tract disease (7.1 percent).

Most frequent principal diagnoses by patient and hospital characteristics, 2018

Table 2 presents statistics focusing on the five most frequent principal diagnoses among nonmaternal, nonneonatal stays in the United States by patient location (urbanicity) in 2018. Specifically, the rank of each principal diagnosis within each of the four patient locations is provided, along with the number of stays, rate per 100,000 population, mean length of stay, and mean cost per stay.

Table 2. Frequency and outcomes for the five most common principal diagnoses among nonmaternal, nonneonatal inpatient stays, by patient location, 2018

Rank within United States	Principal diagnosis, patient location	Rank within location category	Number of stays	Rate per 100,000 population	Mean length of stay, days	Mean cost per stay, $
1	Septicemia					
	Large central metropolitan	1	661,000	653.4	7.5	21,500
	Large fringe metropolitan (suburbs)	1	502,300	618.3	7.1	18,500
	Medium and small metropolitan	1	687,700	701.5	7.0	17,100
	Micropolitan and noncore (rural)	1	354,300	768.4	6.6	16,600
2	Heart failure					
	Large central metropolitan	2	326,000	322.3	5.6	14,400
	Large fringe metropolitan (suburbs)	3	267,500	329.3	5.5	13,100
	Medium and small metropolitan	3	341,500	348.3	5.3	11,800
	Micropolitan and noncore (rural)	3	195,000	422.9	4.9	11,300
3	Osteoarthritis					
	Large central metropolitan	3	262,200	259.2	2.1	16,300
	Large fringe metropolitan (suburbs)	2	292,100	359.6	2.0	15,400
	Medium and small metropolitan	2	363,900	371.2	2.0	15,300
	Micropolitan and noncore (rural)	2	208,900	453.0	2.1	17,500
4	Pneumonia (except that caused by tuberculosis)					
	Large central metropolitan	5	178,100	176.1	4.9	11,600
	Large fringe metropolitan (suburbs)	4	168,400	207.3	4.8	10,600
	Medium and small metropolitan	4	225,300	229.8	4.8	9,800
	Micropolitan and noncore (rural)	4	166,600	361.2	4.4	9,900
5	Diabetes mellitus with complication					
	Large central metropolitan	4	212,100	209.7	5.0	12,800
	Large fringe metropolitan (suburbs)	7	148,500	182.9	4.8	11,700
	Medium and small metropolitan	5	205,400	209.5	4.8	10,700
	Micropolitan and noncore (rural)	8	107,600	233.4	4.6	10,600

Abbreviations: ICD-10-CM, International Classification of Diseases, Tenth Revision, Clinical Modification

Notes: Diagnoses were identified using the Clinical Classifications Software Refined (CCSR) for ICD-10-CM Diagnoses. Number of stays is rounded to the nearest hundred. Mean cost per stay is rounded to the nearest $100.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2018

- **For each of the five most common principal diagnoses in the United States, the rate of stays was highest in rural areas.**

  Rural areas had the highest rate of stays for septicemia, heart failure, osteoarthritis, pneumonia, and diabetes mellitus with complication. For three of these diagnoses—heart failure, osteoarthritis, and pneumonia—the rate of stays consistently increased with rurality. In the case of pneumonia, the rate in rural areas was twice the rate in large central metropolitan areas (361.2 vs. 176.1 per 100,000 population).

- **For four of the five top diagnoses, mean length of stay and mean cost per stay were highest in large central metropolitan areas and generally decreased with rurality.**

  Among stays for septicemia, heart failure, pneumonia, and diabetes mellitus with complication, mean length of stay and mean cost per stay generally decreased with rurality. For example, for septicemia, the mean length of stay and mean cost per stay were 7.5 days and $21,500 in large central metropolitan areas compared with 6.6 days and $16,600 in rural areas.

Table 3 presents statistics for the five most frequent principal diagnoses among nonmaternal, nonneonatal stays by hospital region in 2018. Specifically, the rank of each principal diagnosis in the four regions is presented, along with the number of stays, rate per 100,000 population, mean length of stay, and mean cost per stay.

Table 3. Regional variation in frequency and outcomes for the five most common principal diagnoses among nonmaternal, nonneonatal inpatient stays, 2018

Rank within United States	Principal diagnosis, hospital region	Rank within region	Number of stays	Rate per 100,000 population	Mean length of stay, days	Mean cost per stay, $
1	Septicemia					
	Northeast	1	364,200	646.5	7.7	20,000
	Midwest	1	457,800	671.9	6.6	17,000
	South	1	867,200	698.1	7.3	16,200
	West	1	529,500	680.3	6.8	23,400
2	Heart failure					
	Northeast	3	211,100	374.8	5.9	14,100
	Midwest	3	265,700	389.9	5.3	12,300
	South	2	465,100	374.4	5.4	11,100
	West	3	194,000	249.3	5.0	16,000
3	Osteoarthritis					
	Northeast	2	218,000	387.0	2.1	15,500
	Midwest	2	292,600	429.4	2.0	15,700
	South	3	391,600	315.2	2.2	14,900
	West	2	225,900	290.2	1.9	18,600
4	Pneumonia (except that caused by tuberculosis)					
	Northeast	4	130,000	230.8	4.9	11,100
	Midwest	4	180,900	265.5	4.5	10,100
	South	4	310,800	250.2	4.8	9,400
	West	6	119,100	153.0	4.5	13,200
5	Diabetes mellitus with complication					
	Northeast	6	117,600	208.7	5.4	13,000
	Midwest	8	141,700	208.0	4.5	10,900
	South	5	294,300	236.9	4.9	10,200
	West	5	125,000	160.6	4.5	14,100

Abbreviations: ICD-10-CM, International Classification of Diseases, Tenth Revision, Clinical Modification

Notes: Diagnoses were identified using the Clinical Classifications Software Refined (CCSR) for ICD-10-CM Diagnoses. Number of stays is rounded to the nearest hundred. Mean cost per stay is rounded to the nearest $100.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2018

- **Septicemia was the most common principal diagnosis overall in the United States as well as within each region, with similar rates of stays across regions.**

  The rate of septicemia stays was similar across regions, ranging from 646.5 per 100,000 population in the Northeast to 698.1 per 100,000 population in the South. However, the mean length of septicemia stays was higher in the Northeast (7.7 days) compared with the West and Midwest (6.8 and 6.6 days, respectively). The mean cost per septicemia stay was highest in the West ($23,400), followed by the Northeast ($20,000), with the cost in both regions higher than the cost in the Midwest and South ($17,000 and $16,200, respectively).

- **For three of the five top diagnoses, the rates of stays were lowest in the West compared with other regions.**

  In 2018, the West had the lowest population rate of stays for heart failure, pneumonia, and diabetes mellitus with complication. For example, the rate of stays for heart failure was 249.3 per 100,000 population in the West compared with 374–390 per 100,000 in other regions. In contrast, the West had the highest mean cost per stay for heart failure ($16,000 in the West vs. $11,100–$14,100 in other regions), osteoarthritis ($18,600 vs. $14,900–$15,700), and pneumonia ($13,200 vs. $9,400–$11,100). For diabetes mellitus with complication, the West and Northeast had higher mean costs than the Midwest and South ($14,100 and $13,000 vs. $10,900 and $10,200 per stay, respectively).

Most frequent principal diagnoses among sex-age groups, 2018

Table 4 presents, for each sex-age group, the five most frequent principal diagnoses among nonmaternal, nonneonatal inpatient stays in 2018. The number of stays and the rate per 100,000 population are presented.

Table 4. Top five principal diagnoses among nonmaternal, nonneonatal inpatient stays by sex-age group, 2018

Rank	Males			Rank	Females		
	Principal diagnosis	**Number of stays**	**Rate per 100,000 population**		**Principal diagnosis**	**Number of stays**	**Rate per 100,000 population**
Ages 0–17 years		**772,200**	**2,050.5**	**Ages 0–17 years**		**693,600**	**1,922.1**
1	Acute bronchitis	58,300	154.7	1	Depressive disorders	63,800	176.7
2	Asthma	45,200	120.0	2	Acute bronchitis	40,800	113.1
3	Pneumonia	35,200	93.6	3	Pneumonia	30,600	84.8
4	Epilepsy; convulsions	34,000	90.2	4	Asthma	29,100	80.6
5	Depressive disorders	27,800	74.0	5	Epilepsy; convulsions	28,800	79.8
Ages 18–44 years		**2,285,300**	**3,870.8**	**Ages 18–44 years**		**2,268,400**	**3,931.5**
1	Schizophrenia spectrum, other psychotic disorders	148,300	251.2	1	Septicemia	161,100	279.3
2	Septicemia	142,500	241.3	2	Depressive disorders	128,400	222.5
3	Depressive disorders	115,200	195.0	3	Diabetes mellitus with complication	87,300	151.3
4	Diabetes mellitus with complication	98,300	166.4	4	Bipolar and related disorders	81,900	142.0
5	Alcohol-related disorders	90,500	153.2	5	Obesity	81,300	140.9
Ages 45–64 years		**4,508,200**	**10,967.1**	**Ages 45–64 years**		**4,064,100**	**9,415.7**
1	Septicemia	342,400	832.9	1	Septicemia	310,400	719.0
2	Osteoarthritis	189,100	460.1	2	Osteoarthritis	233,900	542.0
3	Heart failure	172,900	420.6	3	COPD and bronchiectasis	122,000	282.7
4	Acute myocardial infarction	172,700	420.2	4	Spondylopathies/ spondyloarthropathy	112,200	259.9
5	Diabetes mellitus with complication	158,400	385.4	5	Heart failure	103,500	239.7
Ages 65–74 years		**2,873,400**	**20,074.1**	**Ages 65–74 years**		**2,857,100**	**17,546.0**
1	Septicemia	258,100	1,803.1	1	Osteoarthritis	259,800	1,595.3
2	Osteoarthritis	172,500	1,205.0	2	Septicemia	234,000	1,436.8
3	Heart failure	140,400	980.9	3	Heart failure	113,600	697.7
4	Acute myocardial infarction	111,000	775.6	4	COPD and bronchiectasis	94,300	579.1
5	Cardiac dysrhythmias	94,300	659.1	5	Cardiac dysrhythmias	76,900	472.3
Age 75+ years		**3,233,700**	**37,421.6**	**Age 75+ years**		**4,273,700**	**34,090.0**
1	Septicemia	348,500	4,033.3	1	Septicemia	397,500	3,171.1
2	Heart failure	248,700	2,877.7	2	Heart failure	307,000	2,448.5
3	Pneumonia	128,000	1,481.7	3	Urinary tract infections	173,000	1,379.8
4	Acute and unspecified renal failure	106,000	1,226.7	4	Osteoarthritis	159,200	1,270.0
5	Cardiac dysrhythmias	104,600	1,210.5	5	Pneumonia	159,000	1,268.3

Abbreviations: COPD, chronic obstructive pulmonary disease; ICD-10-CM, International Classification of Diseases, Tenth Revision, Clinical Modification

Notes: Diagnoses were identified using the Clinical Classifications Software Refined (CCSR) for ICD-10-CM Diagnoses. The pneumonia diagnosis group excludes pneumonia caused by tuberculosis. Number of stays is rounded to the nearest hundred.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2018

- **Septicemia was the first or second most common diagnosis among both males and females for each adult age group.**

  Septicemia was a very common principal diagnosis for adult males and females regardless of age. However, the population rate of septicemia increased with age and was more than 10 times higher among those aged 75+ years than those aged 18–44 years. The rate of septicemia was 16 percent higher for females than males aged 18–44 years, but the rate was higher for males than females in all older age groups: 16 percent higher for ages 45–64 years and 25 and 27 percent higher for ages 65–74 years and 75+ years, respectively. Septicemia was not among the most common diagnoses for children.

- **In 2018, mental and/or substance use disorders were among the top five principal diagnoses for the youngest age groups, 0–17 and 18–44 years.**

  Although the order varied, the top five principal diagnoses were the same for both males and females aged 17 years and younger. These included three respiratory conditions (acute bronchitis, asthma, and pneumonia), epilepsy, and depressive disorders. Among this age group, the rate of stays for depressive disorders was more than twice as high for females as for males.

  Depressive disorders were also among the most common diagnoses for individuals aged 18–44 years. Several other mental and/or substance use disorders also ranked in the top five diagnoses for this age group: schizophrenia spectrum and other psychotic disorders and alcohol-related disorders for males and bipolar and related disorders for females.

- **For adults in the older age groups (45–64, 65–74, and 75+ years), cardiovascular and musculoskeletal diagnoses were among the top principal diagnoses by sex-age group.**

  Heart failure ranked in the top five diagnoses for both males and females in each of the older age groups: 45–64, 65–74, and 75+ years. The population rate of heart failure increased with age and was always higher for males than for females, but the difference between the sexes narrowed with increasing age, from 75 percent higher for males versus females aged 45–64 years to 18 percent higher for males versus females aged 75+ years.

  Osteoarthritis was another common principal diagnosis among older adults, occurring in the top five diagnoses for both males and females in each of the three older age groups (with the exception of males aged 75+ years). The population rate of osteoarthritis was always higher for females than for males: 18 percent higher for females versus males aged 45–64 years, 32 percent higher for females versus males aged 65–74 years, and 17 percent higher for females versus males aged 75+ years (rate not shown in table for males aged 75+ years).

References

[1] Centers for Medicare & Medicare Services. The Hospital Value-Based Purchasing (VBP) Program. Updated February 18, 2021. www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/Value-Based-Programs/HVBP/Hospital-Value-Based-Purchasing. Accessed March 5, 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 2018 National Inpatient Sample (NIS). Supplemental sources included population denominator data for use with HCUP databases, derived from information available from Claritas, a vendor that produces population estimates and projections based on data from the U.S. Census Bureau.[a]

Definitions

Diagnoses, ICD-10-CM, Clinical Classifications Software Refined (CCSR) for ICD-10-CM Diagnoses, diagnosis-related groups (DRGs), and major diagnostic categories (MDCs)
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.

The CCSR aggregates ICD-10-CM diagnosis codes into a manageable number of clinically meaningful categories.[b] The CCSR is intended to be used analytically to examine patterns of healthcare in terms of cost, utilization, and outcomes; rank utilization by diagnoses; and risk-adjust by clinical condition. The CCSR capitalizes on the specificity of the ICD-10-CM coding scheme and allows ICD-10-CM codes to be classified in more than one category. Approximately 10 percent of diagnosis codes are associated with more than one CCSR category because the diagnosis code documents either multiple conditions or a condition along with a common symptom or manifestation. For this Statistical Brief, the principal diagnosis code is assigned to a single default CCSR based on clinical coding guidelines, etiology and pathology of diseases, and standards set by other Federal agencies. The assignment of the default CCSR for the principal diagnosis is available starting with version v2020.2 of the software tool. ICD-10-CM coding definitions for each CCSR category presented in this Statistical Brief can be found in the *CCSR reference file*, available at www.hcup-us.ahrq.gov/toolssoftware/ccsr/ccs_refined.jsp#download. For this Statistical Brief, v2021.2 of the CCSR was used.

DRGs comprise a patient classification system that categorizes patients into groups that are clinically coherent and homogeneous with respect to resource use. DRGs group patients according to diagnosis, type of treatment (procedure), age, and other relevant criteria. Each hospital stay has one assigned DRG.

---

[a] Claritas. Claritas Demographic Profile by ZIP Code. https://claritas360.claritas.com/mybestsegments/. Accessed January 22, 2021.
[b] Agency for Healthcare Research and Quality. HCUP Clinical Classifications Software Refined (CCSR) for ICD-10-CM Diagnoses. Healthcare Cost and Utilization Project (HCUP). Agency for Healthcare Research and Quality. Updated November 2020. https://hcup-us.ahrq.gov/toolssoftware/ccsr/dxccsr.jsp. Accessed June 22, 2021.

MDCs assign ICD-10-CM principal diagnosis codes to 1 of 25 general diagnosis categories. In this Statistical Brief, nonneonatal and nonmaternal hospitalizations are identified using the MDCs that are not equal to 14 (Pregnancy, Childbirth and the Puerperium) or 15 (Newborns and Other Neonates with Conditions Originating in the Perinatal Period).

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.

Population rates
Rates of stays per 100,000 population were calculated using 2018 hospital discharge totals in the numerator and Claritas[c] estimates of the corresponding 2018 U.S. population (e.g., the population for a specific sex-age group) in the denominator. Individuals hospitalized multiple times are counted more than once in the numerator.

$$\text{Population rate of stays} = \left(\frac{\text{number of stays among individuals in group}}{\text{number of residents in group}}\right) \times 100{,}000$$

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).[d] *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 the purposes of this Statistical Brief, missing charges were imputed as the mean charge for the DRG before converting charges to costs. Costs are reported to the nearest hundred.

How HCUP estimates of costs differ from National Health Expenditure Accounts
There are a number of differences between the costs cited in this Statistical Brief and spending as measured in the National Health Expenditure Accounts (NHEA), which are produced annually by CMS.[e] The largest source of difference comes from the HCUP coverage of inpatient treatment only in contrast to the NHEA inclusion of outpatient costs associated with emergency departments and other hospital-based outpatient clinics and departments as well. The outpatient portion of hospitals' activities has been growing steadily and may exceed half of all hospital revenue in recent years. On the basis of the American Hospital Association Annual Survey, 2018 outpatient gross revenues (or charges) were about 49 percent of total hospital gross revenues.[f]

Smaller sources of differences come from the inclusion in the NHEA of hospitals that are excluded from HCUP. These include Federal hospitals (Department of Defense, Veterans Administration, Indian Health Services, and Department of Justice [prison] hospitals) as well as psychiatric, substance abuse, and long-term care hospitals. A third source of difference lies in the HCUP reliance on billed charges from hospitals to payers, adjusted to provide estimates of costs using hospital-wide cost-to-charge ratios, in contrast to the NHEA measurement of spending or revenue. HCUP costs estimate the amount of money required to produce hospital services, including expenses for wages, salaries, and benefits paid to staff as well as utilities, maintenance, and other similar expenses required to run a hospital. NHEA spending or revenue measures the amount of income received by the hospital for treatment and other services

[c] Claritas. Claritas Demographic Profile by ZIP Code. https://claritas360.claritas.com/mybestsegments/. Accessed January 22, 2021.
[d] Agency for Healthcare Research and Quality. HCUP Cost-to-Charge Ratio (CCR) Files. Healthcare Cost and Utilization Project (HCUP). 2001–2017. Agency for Healthcare Research and Quality. Updated September 2020. www.hcup-us.ahrq.gov/db/state/costtocharge.jsp. Accessed January 22, 2021.
[e] For additional information about the NHEA, see Centers for Medicare & Medicaid Services (CMS). National Health Expenditure Data. CMS website. Updated December 17, 2019. www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/index.html?redirect=/NationalHealthExpendData/. Accessed January 22, 2021.
[f] American Hospital Association. TrendWatch Chartbook, 2020. Table 4.2. Distribution of Inpatient vs. Outpatient Revenues, 1995–2018. www.aha.org/system/files/media/file/2020/10/TrendwatchChartbook-2020-Appendix.pdf. Accessed January 22, 2021.

provided, including payments by insurers, patients, or government programs. The difference between revenues and costs includes profit for for-profit hospitals or surpluses for nonprofit hospitals.

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:

- 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
- Medium and Small Metropolitan: Counties in a metropolitan area of 50,000–999,999 residents
- Micropolitan and Noncore: Counties in a nonmetropolitan area of 10,000–49,999 residents or a nonmetropolitan and nonmicropolitan area

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

Hospital stays that were expected to be billed to the State Children's Health Insurance Program (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.

Region
Region is one of the four regions defined by the U.S. Census Bureau:

- Northeast: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, and Pennsylvania
- Midwest: Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas
- South: Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma, and Texas
- West: Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Washington, Oregon, California, Alaska, and Hawaii

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

About the NIS

The HCUP National (Nationwide) Inpatient Sample (NIS) is a nationwide database of hospital inpatient stays. The NIS is nationally representative of all community hospitals (i.e., short-term, non-Federal, nonrehabilitation hospitals). The NIS includes all payers. It is drawn from a sampling frame that contains hospitals comprising more than 95 percent of all discharges in the United States. The vast size of the NIS allows the study of topics at the national and regional levels for specific subgroups of patients. In addition, NIS data are standardized across years to facilitate ease of use. Over time, the sampling frame for the NIS has changed; thus, the number of States contributing to the NIS varies from year to year. The NIS is intended for national estimates only; no State-level estimates can be produced. The unweighted sample size for the 2018 NIS is 7,105,498 (weighted, this represents 35,527,481 inpatient stays).

For More Information

For other information on hospital inpatient stays, refer to the HCUP Statistical Briefs located at www.hcup-us.ahrq.gov/reports/statbriefs/sb_hospoverview.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 National Inpatient Sample (NIS), please refer to the following database documentation:

Agency for Healthcare Research and Quality. Overview of the National (Nationwide) Inpatient Sample (NIS). Healthcare Cost and Utilization Project (HCUP). Rockville, MD: Agency for Healthcare Research and Quality. Updated December 2020. www.hcup-us.ahrq.gov/nisoverview.jsp. Accessed January 22, 2021.

Suggested Citation

McDermott KW (IBM Watson Health), Roemer M (AHRQ). Most Frequent Principal Diagnoses for Inpatient Stays in U.S. Hospitals, 2018. HCUP Statistical Brief #277. July 2021. Agency for Healthcare Research and Quality, Rockville, MD. https://www.hcup-us.ahrq.gov/reports/statbriefs/sb277-Top-Reasons-Hospital-Stays-2018.pdf.

Acknowledgments

The authors would like to acknowledge the contributions of Nils Nordstrand of IBM Watson Health.

* * *

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:

Joel W. Cohen, Ph.D., Director
Center for Financing, Access and Cost Trends
Agency for Healthcare Research and Quality
5600 Fishers Lane
Rockville, MD 20857

This Statistical Brief was posted online on July 13, 2021.