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# Burn-Related Hospital Inpatient Stays and Emergency Department Visits, 2013

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## Introduction

Burns are tissue damage caused by heat, sunlight, electricity, chemicals, or nuclear radiation.[1] In the United States approximately 9,000 people died from burn-related injuries in the mid-1970s.[2] At that time, burns covering more than 20 percent of a patient's body were nearly always fatal.[3] Forty years later, the number of burn-related deaths has declined by more than 50 percent and patients with burns covering up to 90 percent of their bodies can survive with appropriate treatment.[4]

Although treatment options and prognoses for burn-related injuries have improved dramatically, the frequency of burn-related injuries and the cost of treatment remain high. The Centers for Disease Control and Prevention reported that 486,000 patients received emergency medical treatment for burns in 2011.[5] Estimated medical costs associated with burn-related injuries in 2010 totaled approximately $1.5 billion, with another nearly $5 billion in costs associated with lost work.[6]

This Healthcare Cost and Utilization Project (HCUP) Statistical Brief updates a previously published Brief[7] and presents data on burn-related hospital inpatient stays and emergency department (ED) visits. Inpatient stays are based on all-listed diagnoses. ED visits are also based on all-listed diagnoses and comprise

[1] National Institute of General Medical Sciences. Burns Fact Sheet. April 2016. http://www.nigms.nih.gov/Education/pages/Factsheet_Burns.aspx. Accessed September 13, 2016.
[2] National Institutes of Health. Burns and Traumatic Injury. Fact Sheet. October 2010. https://report.nih.gov/NIHfactsheets/Pdfs/BurnsandTraumaticInjury%28NIGMS%29.pdf. Accessed September 13, 2016.
[3] Ibid.
[4] Ibid.
[5] Centers for Disease Control and Prevention. National Hospital Ambulatory Medical Care Survey: 2011. Emergency Department Summary Tables. http://www.cdc.gov/nchs/data/ahcd/nhamcs_emergency/2011_ed_web_tables.pdf. Accessed September 13, 2016.
[6] Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. Data & Statistics (WISQARS™): Cost of Injury Reports. Updated September 18, 2014. https://wisqars.cdc.gov:8443/costT/. Accessed September 22, 2016.
[7] Milenkovic M, Russo A, Elixhauser A. Hospital Stays for Burns, 2004. HCUP Statistical Brief #25. January 2007. Agency for Healthcare Research and Quality, Rockville, MD. https://www.hcup-us.ahrq.gov/reports/statbriefs/sb25.jsp. Accessed November 10, 2016.

### Highlights

- The rate of burn-related inpatient stays decreased 34.6 percent between 1993 and 2013. The rate of burn-related emergency department (ED) visits (not admitted to the same hospital) decreased 17.2 percent between 2006 and 2013.
- Infants had the highest rates of burn-related inpatient stays and ED visits (29.6 and 208.9 per 100,000 population, respectively). Males, individuals living in ZIP Codes with low median family income, and those living in rural areas also had relatively high rates of burn-related inpatient stays and ED visits.
- Lower limb was the most common burn site associated with burn-related inpatient stays (38.5 percent), and wrist and hand was the most common burn site associated with burn-related ED visits (38.5 percent).
- Second-degree was the most common burn severity reported for both burn-related inpatient stays (52.9 percent) and ED visits (58.4 percent).
- The most common causes of burn-related inpatient stays and ED visits were accidents caused by hot liquids and steam, or other hot substances.
- Skin graft was the most common procedure associated with burn-related inpatient stays. Wound debridement was the most common procedure associated with burn-related ED visits.
- On average, burn-related inpatient stays were about twice as long and costly as non-burn-related stays.

patients who were treated in the ED and then released from the ED, transferred to another hospital or health facility, or died in the ED. Patients who were treated in the ED and then admitted to the same hospital for inpatient services are included under statistics reported for inpatient stays. This Statistical Brief provides information on the following:

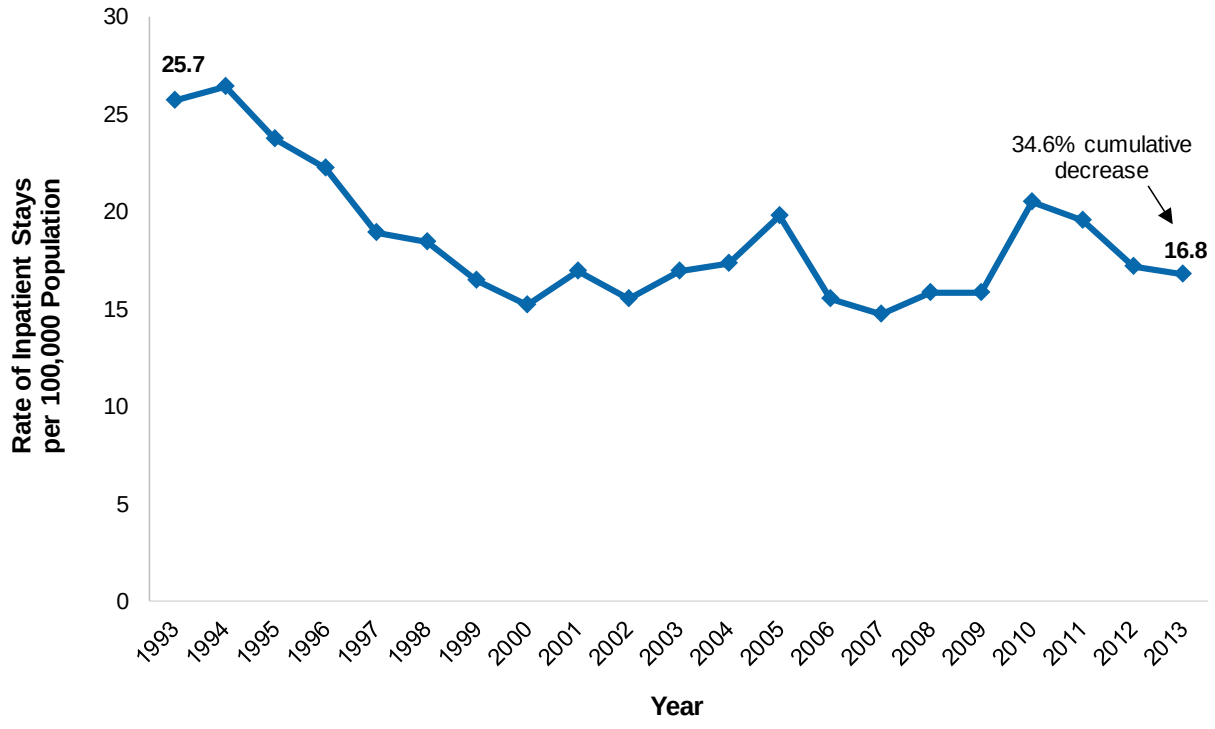
- Trends in the population rate of burn-related inpatient stays and ED visits
- Population rates for burn-related inpatient stays and ED visits in 2013 for select patient characteristics
- Distributions of burn-related inpatient stays and ED visits in 2013 by burn site and severity
- Most common causes and procedures associated with burn-related inpatient stays and ED visits in 2013
- Utilization characteristics of burn-related inpatient stays in 2013

Differences in estimates of 10 percent or greater are noted in the text.

## Findings

*Trends in burn-related hospital inpatient stays and ED visits*
Figure 1 provides information on the trend in the population rate of hospital inpatient stays involving burns from 1993 through 2013.

**Figure 1. Population rate of burn-related hospital inpatient stays, 1993–2013**




Note: Inpatient stays are based on all-listed diagnoses.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), National (Nationwide) Inpatient Sample (NIS), 1993–2013

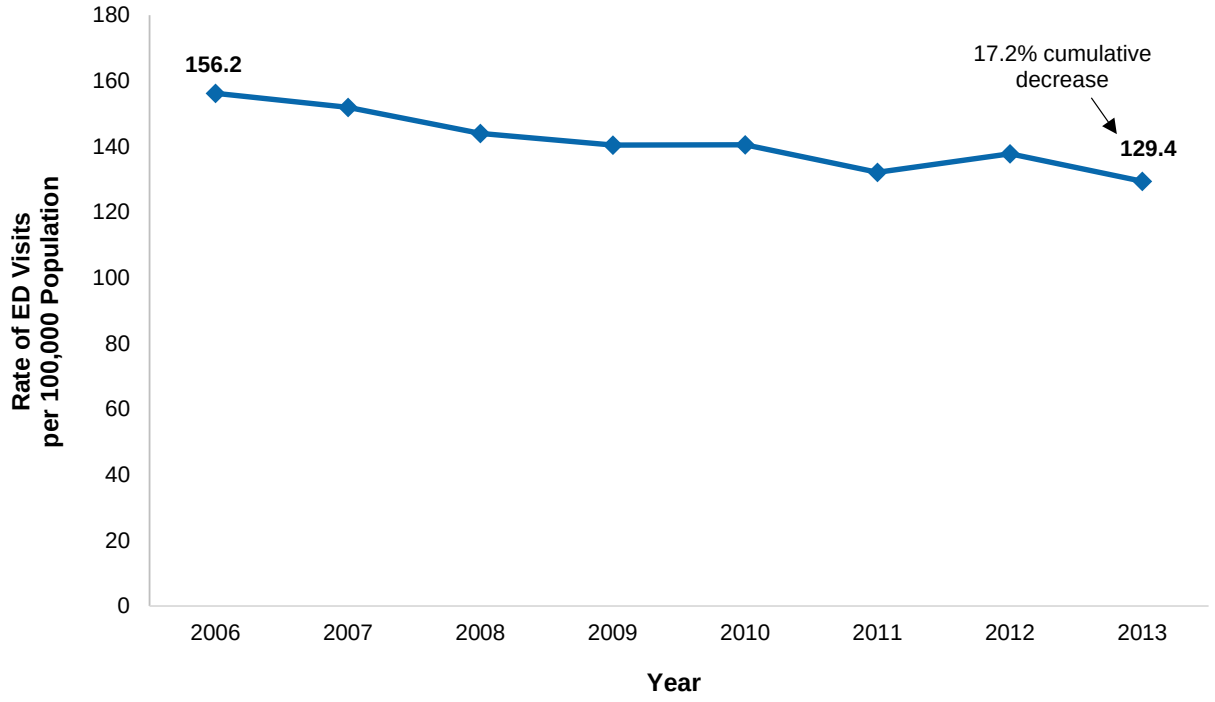
- **The rate of burn-related inpatient stays decreased between 1993 and 2013.**

  Over the 20-year period between 1993 and 2013, there was a 34.6 percent cumulative decrease in the rate of burn-related inpatient stays, from 25.7 to 16.8 per 100,000 population. Between 2006 and 2013 (the years for which ED rates are available, see Figure 2), the rate of inpatient stays involving

burns remained relatively stable between 15 and 20 stays per 100,000 population. Apparent peaks in burn-related hospital stays occurred in 2005 and 2010.

Figure 2 provides information on the trend in the population rate of ED visits involving burns from 2006 through 2013.

**Figure 2. Population rate of burn-related emergency department visits, 2006–2013**




Abbreviation: ED, emergency department

Note: ED visits are based on all-listed diagnoses and comprise patients who were treated in the ED and then released from the ED, transferred to another hospital or health facility, or died in the ED. Patients who were treated in the ED and then admitted to the same hospital for inpatient services were not included.

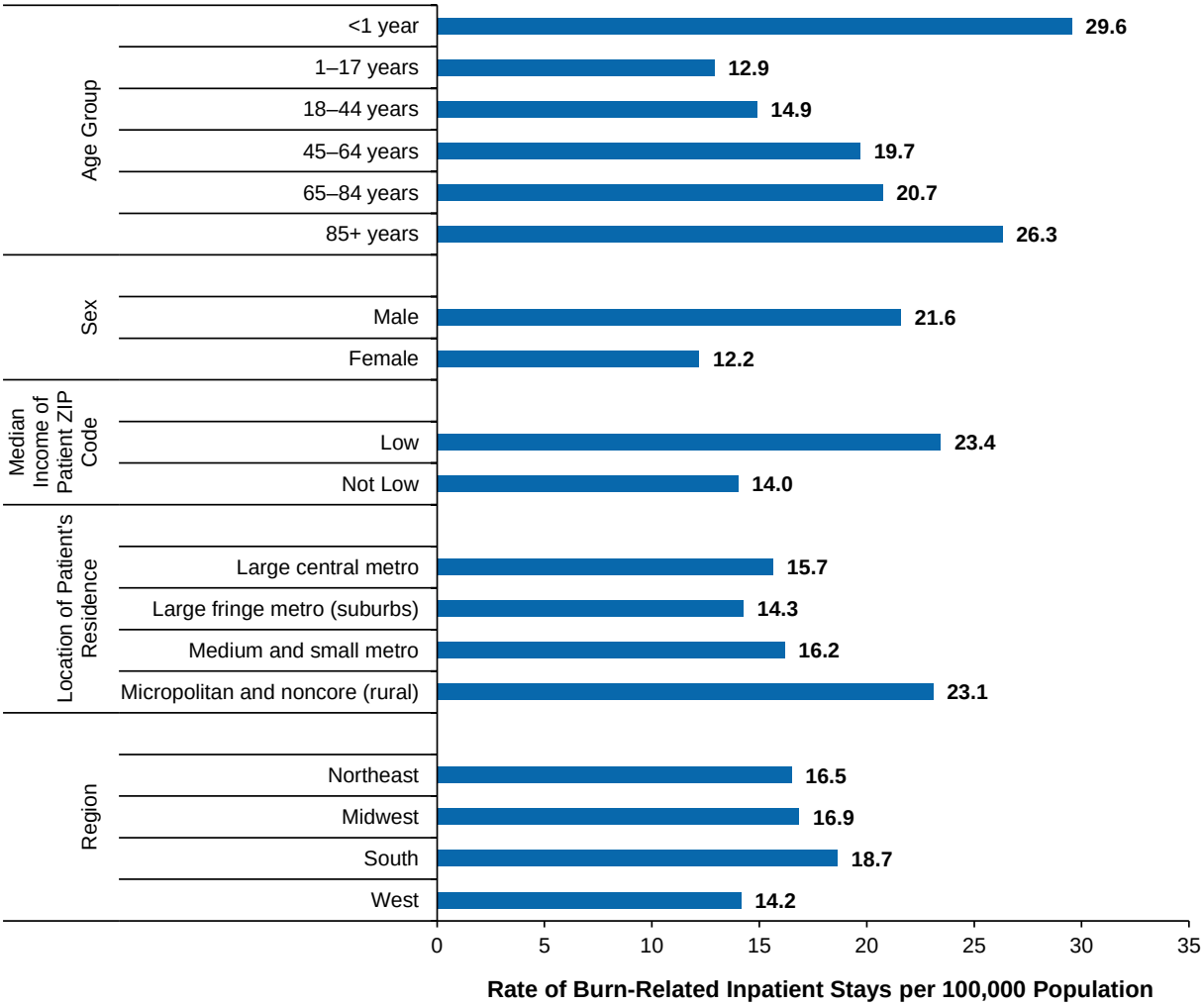
Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), Nationwide Emergency Department Sample (NEDS), 2006–2013

- **The rate of burn-related ED visits decreased between 2006 and 2013.**

  Between 2006 and 2013, the rate of ED visits involving burns decreased by 17.2 percent, from 156.2 to 129.4 per 100,000 population.

*Patient characteristics of burn-related hospital inpatient stays and ED visits, 2013*
Figure 3 presents the population rate of burn-related hospital inpatient stays by select patient characteristics in 2013.

**Figure 3. Rate of burn-related hospital inpatient stays per 100,000 population, by patient characteristics, 2013**




Note: Inpatient stays are based on all-listed diagnoses.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2013

- **The rate of burn-related inpatient stays was highest among infants and the oldest adults and lowest among children and younger adults.**

  In 2013, the rate of burn-related hospital stays was highest for infants aged younger than 1 year (29.6 per 100,000 population) and adults aged 85 years and older (26.3 per 100,000 population). The lowest rate of burn-related inpatient stays was among children and adolescents aged 17 years and younger (12.9 per 100,000 population) and younger adults aged 18–44 years (14.9 per 100,000 population).

- **Males had a higher rate of burn-related inpatient stays than females.**

  The rate of burn-related inpatient stays was nearly twice as high for males as for females (21.6 vs. 12.2 per 100,000 population).

- **The rate of inpatient stays for burn-related injuries was highest among individuals living in low-income ZIP Codes, rural areas, and the southern United States.**

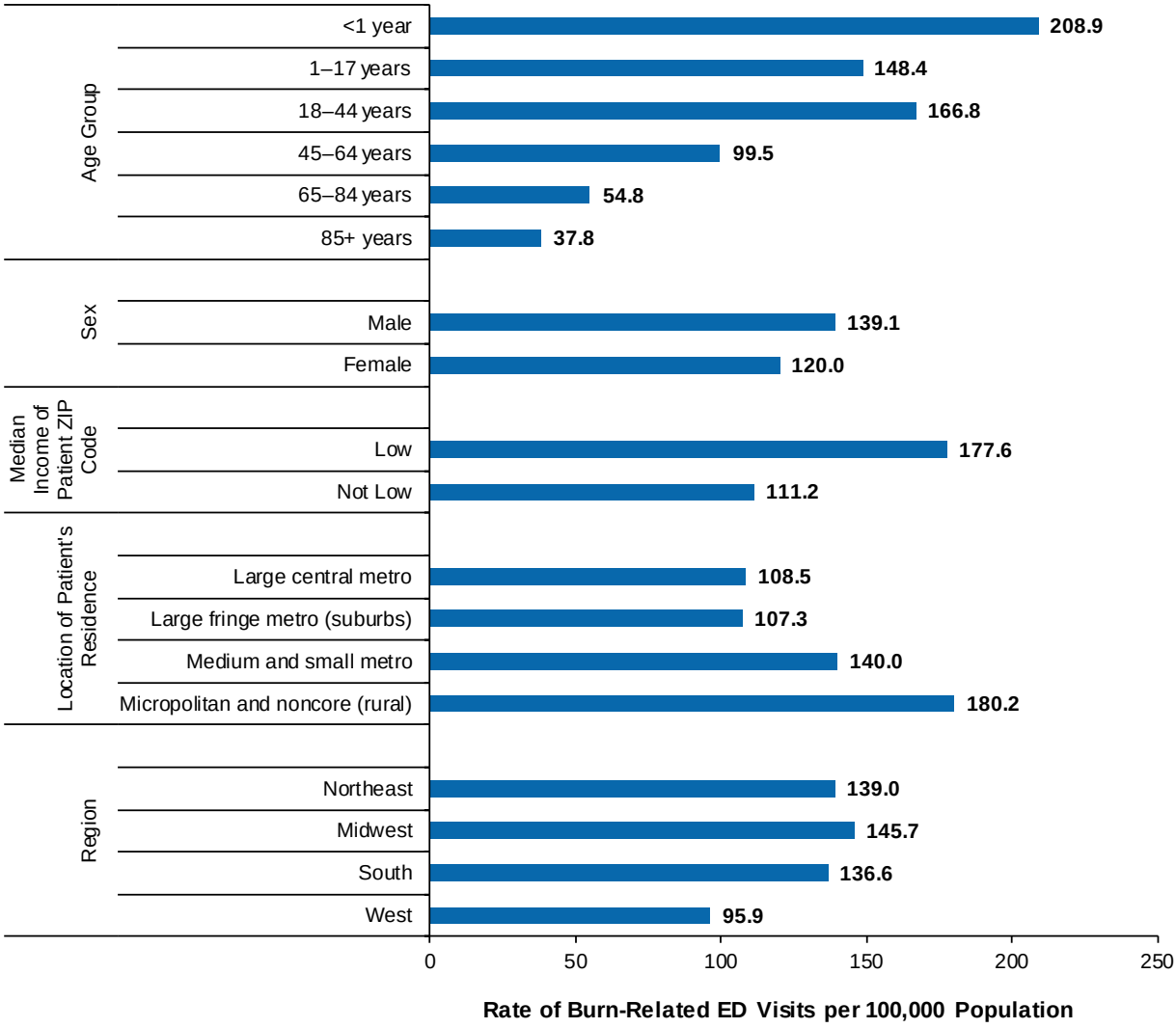
  The rate of burn-related inpatient stays for individuals living in ZIP Codes with low median household income was higher than the rate among residents of ZIP Codes with higher median income (23.4 vs. 14.0 per 100,000 population).

  Individuals living in rural areas had the highest rate of inpatient stays involving burns (23.1 per 100,000 population) compared with those living in metropolitan locations (range: 14.3–16.2 per 100,000 population).

  The rate of burn-related stays was highest in the South (18.7 per 100,000 population) and lowest in the West (14.2 per 100,000 population).

Figure 4 presents the rate of burn-related ED visits per 100,000 population by select patient characteristics in 2013.

**Figure 4. Rate of burn-related emergency department visits per 100,000 population, by patient characteristics, 2013**




Abbreviation: ED, emergency department

Note: ED visits are based on all-listed diagnoses and comprise patients who were treated in the ED and then released from the ED, transferred to another hospital or health facility, or died in the ED. Patients who were treated in the ED and then admitted to the same hospital for inpatient services were not included.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), Nationwide Emergency Department Sample (NEDS), 2013

- **The rate of burn-related ED visits was highest among infants, children, and younger adults.**

  The rate of ED visits involving burns was highest among infants aged younger than 1 year, at 208.9 per 100,000 population, similar to the pattern for inpatient stays (Figure 3). This was 2 to 5 times the rate among adults aged 45 years and older. The rate of burn-related ED visits also was high among children and adolescents aged 1–17 years and younger adults aged 18–44 years (148.4 and 166.8 per 100,000 population, respectively). Unlike for inpatient stays, the rate of burn-related ED visits was lowest among patients aged 65 years and older, suggesting that, among the oldest patients, burns required hospitalization more frequently.

- **Males were more likely than females to have a burn-related ED visit.**

  Similar to the pattern for inpatient stays, the rate of ED visits involving burns was higher for males than females (139.1 vs. 120.0 per 100,000 population), although the difference was not as pronounced, suggesting that among males, burns required hospitalization more frequently.

- **The rate of ED visits involving burn-related injuries was highest among those living in low-income ZIP Codes and in rural areas, and lowest in the western United States.**

  Similar to the pattern for inpatient stays, the rate of burn-related ED visits for individuals living in ZIP Codes with low median household income was higher than the rate among residents of ZIP Codes with higher median income (177.6 vs. 111.2 per 100,000 population).

  Individuals living in rural areas had the highest rate of ED visits involving burns, at 180.2 per 100,000 population, compared with those living in metropolitan locations (range: 107.3–140.0 per 100,000 population).

  In addition, similar to the rate for inpatient stays, the rate of burn-related ED visits was lowest in the western region of the United States, at 95.9 per 100,000 population. However, unlike the pattern for inpatient stays, the rate of burn-related ED visits in the South was no different from that in the Northeast and Midwest.

*Characteristics, causes, and procedures among burn-related hospital inpatient stays and ED visits, 2013*
Table 1 categorizes burn-related hospital inpatient stays and ED visits according to burn site and burn severity in 2013.

**Table 1. Burn characteristics for hospital inpatient stays and emergency department visits, 2013**

| Characteristic | Inpatient stays | | ED visits | |
|---|---|---|---|---|
| | n | % | n | % |
| **Burn site** | | | | |
| Total burn-related stays/visits[a] | 53,220 | 100.0 | 409,183 | 100.0 |
| Eye, face, head, or neck | 14,015 | 26.3 | 75,451 | 18.4 |
| Trunk | 17,515 | 32.9 | 57,272 | 14.0 |
| Upper limb except wrist and hand | 16,605 | 31.2 | 90,095 | 22.0 |
| Wrist and hand | 14,995 | 28.2 | 157,497 | 38.5 |
| Lower limb | 20,500 | 38.5 | 94,906 | 23.2 |
| Multiple specific sites, internal organs | 1,775 | 3.3 | 8,035 | 2.0 |
| Unspecified site | 400 | 0.8 | 4,720 | 1.2 |
| Late effects of burn | 4,145 | 7.8 | 2,413 | 0.6 |
| **Burn severity** | | | | |
| Total burn-related stays/visits with indicator of burn severity[b] | 48,140 | 100.0 | 385,570 | 100.0 |
| First degree | 4,070 | 8.5 | 84,086 | 21.8 |
| Second degree | 25,480 | 52.9 | 225,297 | 58.4 |
| Third degree | 11,055 | 23.0 | 8,647 | 2.2 |
| Unspecified degree | 7,535 | 15.7 | 67,540 | 17.5 |

Abbreviation: ED, emergency department

Notes: Inpatient stays and ED visits are based on all-listed diagnoses. ED visits comprise patients who were treated in the ED and then released from the ED, transferred to another hospital or health facility, or died in the ED. Patients who were treated in the ED and then admitted to the same hospital for inpatient services are included under statistics reported for inpatient stays.

[a] The sum across burn sites is larger than the total number of stays or visits because a patient could have more than one burn site identified on the same stay or visit record.

[b] Certain types of burns cannot be classified by severity (e.g., burns of the eye, internal organs). Burn severity is presented for those stays and visits for which a burn-related severity code was possible. If more than one burn severity is indicated on the record, the worst level (highest degree) of burn is reported.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2013, and Nationwide Emergency Department Sample (NEDS), 2013

- **Lower limb was the most common location for burns associated with inpatient stays. Wrist and hand was the most common location for burns associated with ED visits.**

  For burn-related inpatient stays, the most common burn sites were lower limb, trunk, and upper limb except wrist and hand (38.5, 32.9, and 31.2 percent of burn-related stays, respectively). For ED visits, the wrist and hand was the most common site for burns (38.5 percent), followed by lower limb (23.2 percent) and upper limb except wrist and hand (22.0 percent).

- **Second-degree was the most common burn severity level among both inpatient stays and ED visits related to burns.**

  Ninety percent of burn-related inpatient stays and 94 percent of burn-related ED visits included information on burn severity. Among these, more than half of burn-related inpatient stays (52.9 percent) and ED visits (58.4 percent) involved a second-degree burn. In terms of more severe burns, third-degree burns occurred in almost one-fourth of burn-related inpatient stays (23.0 percent) but were relatively rare among burn-related ED visits (2.2 percent). Conversely, first-degree burns were more common among burn-related ED visits (21.8 percent) than among burn-related inpatient stays (8.5 percent).

Tables 2 and 3 list the most common causes of burns among hospital inpatient stays (Table 2) and ED visits (Table 3) in 2013.

About 86 percent of burn-related inpatient stay records included information about causes, based on the presence of external causes of injury and poisoning E codes.

**Table 2. Common causes of burn-related inpatient stays, 2013**

| Rank | Cause[a] | N | % |
|---|---|---|---|
| **All burn-related inpatient stays** | | **53,220** | **100.0** |
| **Accidents caused by hot or caustic substances, or explosives** | | **19,570** | **36.8** |
| 1 | Hot liquids and vapors, including steam | 8,055 | 15.1 |
| 2 | Other hot substance or object | 6,835 | 12.8 |
| 3 | Hot (boiling) tap water | 2,815 | 5.3 |
| 4 | Caustic and corrosive substances | 1,740 | 3.3 |
| 5 | Explosive gases | 640 | 1.2 |
| **Accidents caused by fire and flames** | | **12,145** | **22.8** |
| 1 | Ignition of highly inflammable material | 4,220 | 7.9 |
| 2 | Unspecified fire | 2,270 | 4.3 |
| 3 | Controlled fire not in building or structure | 1,270 | 2.4 |
| 4 | Burning caused by conflagration in private dwelling | 1,035 | 1.9 |
| 5 | Other smoke and fumes from conflagration in private dwelling | 1,020 | 1.9 |
| **Other causes** | | **21,220** | **39.9** |
| 1 | Late effects of other accidents | 1,020 | 1.9 |
| 2 | Radiological procedure and radiotherapy as the cause of abnormal reaction of patient, or of later complication | 930 | 1.7 |
| 3 | Suicide and self-inflicted injury by burns, fire | 875 | 1.6 |
| 4 | Late effects of accident caused by fire | 930 | 1.7 |
| 5 | Other specified misadventures during medical care | 480 | 0.9 |

Notes: Inpatient stays are based on all-listed diagnoses. Inpatient stays may include more than one E code to describe the external cause of an event. All E codes were considered in this analysis, so the same stay may be reported in more than one cause category.

[a] Causes include all E codes, with the exception of E000, External cause status; E001–E030, Activity; and E849, Place of occurrence.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2013

- **Accidents caused by hot or caustic substances, explosives, and fire and flames were among the most common causes of burns for burn-related inpatient stays.**

  Accidents involving hot or caustic substances or explosives were the cause of more than one-third of burn-related inpatient stays, with accidents involving hot liquids or vapors (15.1 percent of all burn-related stays) and other hot substances or objects (12.8 percent of stays) being the most common. Accidents caused by fire and flames accounted for 22.8 percent of burn-related inpatient stays, with ignition of highly inflammable material being the most common (7.9 percent of stays).

Table 3 lists the most common causes of burns among ED visits in 2013. About 92 percent of burn-related ED visit records included information about causes, based on the presence of external causes of injury and poisoning E codes.

**Table 3. Common causes of burn-related emergency department visits, 2013**

| Rank | Cause[a] | N | % |
|---|---|---|---|
| **All burn-related visits** | | **409,183** | **100.0** |
| **Accidents caused by hot or caustic substances, or explosives** | | **274,967** | **67.2** |
| 1 | Hot liquids and vapors, including steam | 104,531 | 25.5 |
| 2 | Other hot substance or object | 104,280 | 25.5 |
| 3 | Caustic and corrosive substances | 30,098 | 7.4 |
| 4 | Hot (boiling) tap water | 24,684 | 6.0 |
| 5 | Unspecified hot substance or object | 9,172 | 2.2 |
| **Accidents caused by fire and flames** | | **56,551** | **13.8** |
| 1 | Unspecified fire | 21,111 | 5.2 |
| 2 | Ignition of highly inflammable material | 10,727 | 2.6 |
| 3 | Controlled fire not in building or structure | 8,016 | 2.0 |
| 4 | Other burning materials | 5,478 | 1.3 |
| 5 | Controlled fire in private dwelling | 3,656 | 0.9 |
| **Other causes** | | **73,009** | **17.8** |
| 1 | Unspecified accident | 4,810 | 1.2 |
| 2 | Other motor vehicle traffic accident involving collision with motor vehicle injuring driver of motor vehicle other than motorcycle | 4,367 | 1.1 |
| 3 | Injury by burns or fire, undetermined whether accidentally or purposely inflicted | 2,598 | 0.6 |
| 4 | Accident caused by domestic wiring and appliances | 1,952 | 0.5 |
| 5 | Fall from other slipping, tripping, or stumbling | 1,747 | 0.4 |

Abbreviation: ED, emergency department

Notes: ED visits are based on all-listed diagnoses and comprise patients who were treated in the ED and then released from the ED, transferred to another hospital or health facility, or died in the ED. Patients who were treated in the ED and then admitted to the same hospital for inpatient services were not included. ED visits may include more than one E code to describe the external cause of an event. All E codes were considered in this analysis, so the same visit may be reported in more than one cause category.

[a] Causes include all E codes, with the exception of E000, External cause status; E001–E030, Activity; and E849, Place of occurrence.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), Nationwide Emergency Department Sample (NEDS), 2013

- **Accidents caused by hot or caustic substances, explosives, and fire and flames were among the most common causes of burns for burn-related ED visits.**

  Accidents involving hot or caustic substances or explosives were the cause of more than two-thirds of burn-related ED visits, with accidents involving hot liquids or vapors (25.5 percent of all burn-related ED visits) and other hot substances or objects (25.5 percent of visits) being the most common. Accidents caused by fire and flames accounted for 13.8 percent of burn-related ED visits, with unspecified fire being the most common (5.2 percent of visits).

Table 4 lists the procedures most commonly performed during burn-related hospital inpatient stays and ED visits in 2013. Approximately 71 percent of inpatient stay records and 92 percent of ED visit records specified at least one procedure.

**Table 4. Common procedures associated with burn-related hospital inpatient stays and emergency department visits, 2013**

| Rank | All-listed procedures | N | % |
|---|---|---|---|
| **All burn-related inpatient stays** | | **53,220** | **100.0** |
| 1 | Skin graft | 15,625 | 29.4 |
| 2 | Debridement of wound, infection or burn | 15,505 | 29.1 |
| 3 | Traction, splints and other wound care | 6,470 | 12.2 |
| 4 | Respiratory intubation and mechanical ventilation | 5,585 | 10.5 |
| 5 | Blood transfusion | 3,045 | 5.7 |
| **All burn-related ED visits** | | **409,183** | **100.0** |
| 1 | Debridement of wound, infection or burn | 102,471 | 25.0 |
| 2 | Traction, splints and other wound care | 66,159 | 16.2 |
| 3 | Prophylactic vaccinations and inoculations | 63,478 | 15.5 |
| 4 | Medications (injections, infusions and other forms) | 48,058 | 11.7 |
| 5 | Laboratory services – chemistry and hematology | 35,052 | 8.6 |

Abbreviation: ED, emergency department

Notes: Inpatient stays and ED visits are based on all-listed diagnoses. ED visits comprise patients who were treated in the ED and then released from the ED, transferred to another hospital or health facility, or died in the ED. Patients who were treated in the ED and then admitted to the same hospital for inpatient services are included under statistics reported for inpatient stays. All-listed procedures were considered in this analysis, so the same stay or visit may include more than one procedure.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), National (Nationwide) Inpatient Sample (NIS), 2013 and Nationwide Emergency Department Sample (NEDS), 2013

- **Skin graft and wound debridement were the procedures most commonly associated with burn-related hospital inpatient stays.**

  Skin graft and wound debridement procedures were each associated with nearly 30 percent of burn-related inpatient stays (29.4 percent and 29.1 percent, respectively). Other common procedures associated with burn-related inpatient stays included traction, splints and other wound care (12.2 percent of stays), respiratory intubation and mechanical ventilation (10.5 percent of stays), and blood transfusion (5.7 percent of stays).

- **Wound debridement was the most common procedure associated with burn-related ED visits.**

  The most common procedure associated with burn-related ED visits was wound debridement (25.0 percent of visits). Although they occurred less frequently, the other most common procedures associated with burn-related ED visits included traction, splints and other wound care (16.2 percent of visits) and prophylactic vaccinations and inoculations (15.5 percent of visits).

*Utilization characteristics of burn-related hospital inpatient stays, 2013*
Table 5 compares utilization among burn-related inpatient stays with all other (non-burn-related) inpatient stays in 2013. Comparable utilization characteristics were not applicable or were unavailable for ED visits.

**Table 5. Utilization of hospital inpatient stays involving burns compared with all other hospitalizations, 2013**

| Characteristic | Burn-related stays | All other (non-burn-related) stays |
|---|---|---|
| Total number of stays | 53,220 | 35,544,572 |
| Mean length of stay, days | 8.1 | 4.5 |
| Mean cost per stay, $ | 24,000 | 10,700 |
| Aggregate costs, million $ | 1,278.3 | 381,249.9 |
| Admitted from ED, % | 55.3 | 49.3 |
| Disposition at discharge, % | | |
| Discharged | | |
| Home or self-care | 68.0 | 70.2 |
| Home health care | 14.1 | 11.2 |
| Against medical advice | 1.2 | 1.0 |
| Transferred | | |
| Short-term hospital | 2.5 | 2.0 |
| Other type of facility | 11.8 | 13.7 |
| Died in hospital | 2.2 | 1.9 |
| Destination unknown or missing disposition | 0.1 | 0.1 |

Abbreviation: ED, emergency department

Notes: Inpatient stays are based on all-listed diagnoses.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2013

- **On average, burn-related inpatient stays were nearly twice as long and more than twice as costly as stays that did not involve burns.**

  The average length of stay among burn-related inpatient stays was 8.1 days—1.8 times the average length of non-burn-related stays (4.5 days). The average cost of burn-related stays was more than double the average cost of other stays ($24,000 vs. $10,700).

- **Burn-related inpatient stays were more likely to involve admission from the ED, release to home health care, and in-hospital death compared with all other stays.**

  Burn-related inpatients stays were more likely to have originated in the ED than were non-burn-related stays (55.3 vs. 49.3 percent of stays). Compared with stays that did not involve a burn, burn-related stays also differed in disposition, with a higher proportion of burn-related stays resulting in release to home health care (14.1 vs. 11.2 percent) or in-hospital death (2.2 vs. 1.9 percent).

## Data Source

The estimates in this Statistical Brief are based upon data from the Healthcare Cost and Utilization Project (HCUP) 2013 National Inpatient Sample (NIS) and Nationwide Emergency Department Sample (NEDS). Historical data were drawn from the 1993–2012 Nationwide Inpatient Sample (NIS) and the 2006–2012 Nationwide Emergency Department Sample (NEDS). Some statistics were generated from HCUPnet, a free, online query system that provides users with immediate *access* to the largest set of publicly available, all-payer national, regional, and State-level hospital care databases from HCUP.[8] Supplemental sources included population denominator data for use with HCUP databases, derived from information available from the Bureau of the Census.[9]

## Definitions

*Diagnoses, procedures, ICD-9-CM, Current Procedural Terminology (CPT®), and Clinical Classifications Software (CCS)*
The *principal diagnosis* is that condition established after study to be chiefly responsible for the patient's admission to the hospital. *Secondary diagnoses* are concomitant conditions that coexist at the time of admission or develop during the stay. *All-listed diagnoses* include the principal diagnosis plus these additional secondary conditions.

*All-listed procedures* include all procedures performed during the hospital stay, whether for definitive treatment or for diagnostic or exploratory purposes.

ICD-9-CM is the International Classification of Diseases, Ninth Revision, Clinical Modification, which assigns numeric codes to diagnoses and procedures. There are approximately 14,000 ICD-9-CM diagnosis codes and 4,000 ICD-9-CM procedure codes.

CPT assigns numeric codes to procedures. There are approximately 9,600 CPT procedure codes.

CCS categorizes ICD-9-CM diagnosis codes and ICD-9-CM and CPT procedure codes into a manageable number of clinically meaningful categories.[10] This clinical grouper makes it easier to quickly understand patterns of diagnoses and procedure use. CCS categories identified as Other typically are not reported; these categories include miscellaneous, otherwise unclassifiable diagnoses and procedures that may be difficult to interpret as a group.

*Case definition*
For this Statistical Brief, burn-related inpatient stays and emergency department (ED) visits were identified by all-listed CCS diagnosis category 240 (Burns), which includes the ICD-9-CM diagnosis codes listed in Table 6. Those codes that were included in the analysis of burn site and burn severity are also indicated in the table.

[8] Agency for Healthcare Research and Quality. HCUPnet Web site. http://hcupnet.ahrq.gov/. Accessed February 17, 2016.
[9] Barrett M, Hickey K, Coffey R, Levit K. Population Denominator Data for Use with the HCUP Databases (Updated with 2014 Population Data). HCUP Methods Series Report #2015-07. September 1, 2015. U.S. Agency for Healthcare Research and Quality. http://www.hcup-us.ahrq.gov/reports/methods/2015-07.pdf. Accessed February 17, 2016.
[10] Agency for Healthcare Research and Quality. HCUP Clinical Classifications Software (CCS) for ICD-9-CM. Healthcare Cost and Utilization Project (HCUP). Rockville, MD: Agency for Healthcare Research and Quality. Updated October 2016. http://www.hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp. Accessed November 18, 2016.

**Table 6. ICD-9-CM diagnosis codes defining CCS diagnosis category 240, Burns**

| Code | Description | Burn site[a] | Burn severity[b] |
|---|---|---|---|
| 906.5–906.9 | Late effect of burn | X | |
| 940.0–5,9 | Burn confined to eye | X | |
| 941.0–5 | Burn of face, head, and neck | X | X |
| 942.0–5 | Burn of trunk | X | X |
| 943.0–5 | Burn of upper limb, except wrist and hand | X | X |
| 944.0–5 | Burn of wrist(s) and hand(s) | X | X |
| 945.0–5 | Burn of lower limb(s) | X | X |
| 946.0–5 | Burn of multiple specified sites | X | X |
| 947.0–4,8,9 | Burn of internal organs | X | |
| 948.0–9 | Extent of body surface involved | | |
| 949.0–5 | Burn, unspecified | X | X |

Abbreviation: CCS, Clinical Classifications Software; ICD-9-CM, International Classification of Diseases, Ninth Revision, Clinical Modification

[a] For analysis of burn site, ICD-9-CM codes 940.xx and 941.xx were grouped into a single "eye, face, head, or neck" category, and codes 946.xx and 947.xx were grouped into a single "multiple specified sites, internal organs" category.

[b] For analysis of burn severity, the worst level (highest degree) of burn on the stay or visit record was reported.

The most common causes of burn-related inpatient stays and ED visits were identified using all ICD-9-CM external cause of injury codes (E codes) except E000, External cause status; E001–E030, Activity; and E849, Place of occurrence. We examined inpatient stay and ED visit records that included E849 to identify the most common locations where burn-related injuries occurred; however, only about half of the records included this E code, so we did not report the results because of the large number of records missing this information. Similarly, because only about 10 percent of burn-related inpatient stay and ED visits records included activity codes, E001–E030, we did not report on activities associated with burn-related stays and visits.

The most common procedures associated with burn-related inpatients stays and ED visits were identified using CCS procedure categories.

*Types of hospitals included in the HCUP National (Nationwide) Inpatient Sample*
The National (Nationwide) Inpatient Sample (NIS) is based on 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). The NIS includes obstetrics and gynecology, otolaryngology, orthopedic, cancer, pediatric, public, and academic medical hospitals. Excluded are long-term care facilities such as rehabilitation, psychiatric, and alcoholism and chemical dependency hospitals. Beginning in 2012, long-term acute care hospitals are also excluded. 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 will be included in the NIS.

*Types of hospitals included in the HCUP Nationwide Emergency Department Sample*
The Nationwide Emergency Department Sample (NEDS) is based on 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). The NEDS includes specialty, pediatric, public, and academic medical hospitals. Excluded are long-term care facilities such as rehabilitation, psychiatric, and alcoholism and chemical dependency hospitals. Hospitals included in the NEDS have hospital-owned emergency departments and no more than 90 percent of their ED visits resulting in admission.

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

In this Statistical Brief, ED visits comprise patients who are treated in the ED and not admitted to the same hospital for further treatment. Patients may be released home from the ED, be referred to home health care, be transferred to another acute care facility, go to another type of long-term or intermediate care facility (nursing home or psychiatric treatment facility), leave against medical advice, die, or be released alive but the destination is unknown.

*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).[11] *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, mean 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.[12] 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, 2012 outpatient gross revenues (or charges) were about 44 percent of total hospital gross revenues.[13]

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 provided, including payments by insurers, patients, or government programs. The difference between revenues and costs include 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). For this Statistical Brief, we classified the NCHS categories as follows:

Urban:

- Large Central Metropolitan: includes metropolitan areas with 1 million or more residents
- Large Fringe Metropolitan: includes counties of metropolitan areas with 1 million or more residents
- Medium and Small Metropolitan: includes areas with 50,000 to 999,999 residents

[11] Agency for Healthcare Research and Quality. HCUP Cost-to-Charge Ratio (CCR) Files. Healthcare Cost and Utilization Project (HCUP). 2001–2013. Rockville, MD: Agency for Healthcare Research and Quality. Updated November 2015. http://www.hcup-us.ahrq.gov/db/state/costtocharge.jsp. Accessed February 17, 2016.
[12] For additional information about the NHEA, see Centers for Medicare & Medicaid Services (CMS). National Health Expenditure Data. CMS Web site May 2014. http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/index.html?redirect=/NationalHealthExpendData/. Accessed February 17, 2016.
[13] American Hospital Association. TrendWatch Chartbook, 2014. Table 4.2. Distribution of Inpatient vs. Outpatient Revenues, 1992–2012. http://www.aha.org/research/reports/tw/chartbook/2014/table4-2.pdf. Accessed February 17, 2016.

Rural:

- Micropolitan and Noncore: includes nonmetropolitan counties (i.e., counties with no town greater than 50,000 residents).

*Median community-level income*
Median community-level income is the median household income of the patient's ZIP Code of residence. Income levels are separated into population-based quartiles with cut-offs determined using ZIP Code demographic data obtained from the Nielsen Company. Patients in the first quartile are designated as having *low* income, and patients in the upper three quartiles are designated as having *not low* income**.** The income quartile is missing for patients who are homeless or foreign.

*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

*Discharge status*
Within the HCUP NIS, discharge status reflects the disposition of the patient at discharge from the hospital and includes the following six categories: routine (to home); transfer to another short-term hospital; other transfers (including skilled nursing facility, intermediate care, and another type of facility such as a nursing home); home health care; against medical advice (AMA); or died in the hospital.

## About HCUP

The Healthcare Cost and Utilization Project (HCUP, pronounced "H-Cup") is a family of health care 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 health care 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 health care 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** 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
**District of Columbia** Hospital Association
**Florida** Agency for Health Care Administration
**Georgia** Hospital Association
**Hawaii** Health Information Corporation

**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 and Hospitals
**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** Department of Health
**Missouri** Hospital Industry Data Institute
**Montana** MHA - An Association of Montana Health Care Providers
**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** Health Care Authority
**Wisconsin** Department of Health Services
**Wyoming** Hospital Association

## About Statistical Briefs

HCUP Statistical Briefs are descriptive summary reports presenting statistics on hospital inpatient, ambulatory surgery, and emergency department use and costs, quality of care, access to care, medical conditions, procedures, patient populations, and other topics. The reports use HCUP administrative health care data.

## 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 2012 NIS was redesigned to optimize national estimates. The redesign incorporates two critical changes:

- Revisions to the sample design—starting with 2012, the NIS is now a *sample of discharge records from all HCUP-participating hospitals*, rather than a sample of hospitals from which all discharges were retained (as is the case for NIS years before 2012).

- Revisions to how hospitals are defined—the NIS now uses the *definition of hospitals and discharges supplied by the statewide data organizations* that contribute to HCUP, rather than the definitions used by the American Hospital Association (AHA) Annual Survey of Hospitals.

The new sampling strategy is expected to result in more precise estimates than those that resulted from the previous NIS design by reducing sampling error: for many estimates, confidence intervals under the new design are about half the length of confidence intervals under the previous design. The change in sample design for 2012 necessitates recomputation of prior years' NIS data to enable analyses of trends that use the same definitions of discharges and hospitals.

### About the NEDS

The HCUP Nationwide Emergency Department Database (NEDS) is a unique and powerful database that yields national estimates of ED visits. The NEDS was constructed using records from both the HCUP State Emergency Department Databases (SEDD) and the State Inpatient Databases (SID). The SEDD capture information on ED visits that do not result in an admission (i.e., treat-and-release visits and transfers to another hospital); the SID contain information on patients initially seen in the emergency department and then admitted to the same hospital. The NEDS was created to enable analyses of ED utilization patterns and support public health professionals, administrators, policymakers, and clinicians in their decisionmaking regarding this critical source of care. The NEDS is produced annually beginning in 2006. Over time, the sampling frame for the NEDS has changed; thus, the number of States contributing to the NEDS varies from year to year. The NEDS is intended for national estimates only; no State-level estimates can be produced.

### About HCUPnet

HCUPnet is an online query system that offers instant access to the largest set of all-payer health care databases that are publicly available. HCUPnet has an easy step-by-step query system that creates tables and graphs of national and regional statistics as well as data trends for community hospitals in the United States. HCUPnet generates statistics using data from HCUP's National (Nationwide) Inpatient Sample (NIS), the Kids' Inpatient Database (KID), the Nationwide Emergency Department Sample (NEDS), the Nationwide Readmissions Database (NRD), the State Inpatient Databases (SID), and the State Emergency Department Databases (SEDD).

### For More Information

For other information on hospitalizations involving injury and poisoning, including burns, refer to the HCUP Statistical Briefs located at http://www.hcup-us.ahrq.gov/reports/statbriefs/sb_injurypoisoning.jsp.

For additional HCUP statistics, visit:

- HCUP Fast Stats at http://www.hcup-us.ahrq.gov/faststats/landing.jsp for easy access to the latest HCUP-based statistics for health information topics
- HCUPnet, HCUP's interactive query system, at http://hcupnet.ahrq.gov/

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

For a detailed description of HCUP and more information on the design of the National (Nationwide) Inpatient Sample (NIS) and the Nationwide Emergency Department Sample (NEDS), 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 November 2015. http://www.hcup-us.ahrq.gov/nisoverview.jsp. Accessed February 17, 2016.

Agency for Healthcare Research and Quality. Overview of the Nationwide Emergency Department Sample (NEDS). Healthcare Cost and Utilization Project (HCUP). Rockville, MD: Agency for Healthcare Research and Quality. Updated January 2016. http://www.hcup-us.ahrq.gov/nedsoverview.jsp. Accessed February 17, 2016.

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AHRQ welcomes questions and comments from readers of this publication who are interested in obtaining more information about access, cost, use, financing, and quality of health care 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 e-mail us at hcup@ahrq.gov or send a letter to the address below:

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