

STATISTICAL BRIEF #25

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Hospital Stays for Burns, 2004

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Introduction

Burns consist of tissue damage resulting from scalds, fires, and flammable liquids, or other causes such as sunlight, chemicals, and nuclear radiation. According to the American Burn Association, approximately one million burns requiring outpatient or inpatient medical intervention occur annually in the U.S. In recent years, medical advances have contributed to improvements in skin grafting, wound cleaning, and infection prevention.¹

This Statistical Brief presents data from the Healthcare Cost and Utilization Project (HCUP) on the treatment of burns in U.S. hospitals in 2004. Hospital utilization and costs for the treatment of burns are compared with hospital stays for all non-maternal, non-birth conditions. Additionally, trends in hospital stays for burns and differences in the distribution of burn stays by various patient characteristics are examined. Finally, common causes of burn injuries resulting in admission, as well as the procedures performed on hospitalized burn patients, are described. All differences between estimates noted in the text are statistically significant at the 0.05 level or better.

Findings

In 2004, burns were noted as a diagnosis in 52,400 hospital stays. For about two-thirds of these stays (32,500), a burn was the principal reason for admission, accounting for nearly \$573 million in hospital costs in that year. Between 1994 and 2000, the number of hospital admissions principally for burns decreased by about 44 percent, from 48,100 to 26,700. However, since 2000, stays for burns have been on the rise, increasing by nearly 22 percent from 26,700 to 32,500 (figure 1). Trends for all-listed diagnoses of burns showed a comparable pattern.

General characteristics of hospital stays for burns

Table 1 compares the general characteristics of hospitalizations for burns with the characteristics of all non-maternal, non-birth hospitalizations in 2004. Compared with the average hospital stay, admissions for burns were nearly twice as long and costly. The mean

Highlights

- In 2004, 32,500 hospital stays were principally for the treatment of burns, totaling nearly \$573 million in hospital costs.
- Between 1994 and 2000, hospital stays principally for burns decreased by about 44 percent; since 2000, hospital stays for burns have increased by nearly 22 percent.
- Compared with hospitalizations other than maternal stays and births, stays for burns were nearly twice as long and costly, and more likely to occur among younger patients and males and to result in death.
- Nearly two out of three hospitalizations for burns occurred among patients younger than 45 years of age. Patients younger than 18 accounted for 26.8 percent of burn admissions while 18 to 44 year olds accounted for 38.0 percent.
- Even though patients older than 65 accounted for the smallest proportion of burn patients (12.3 percent or about 4,000 patients), the death rate among elderly patients was the highest (15.3 percent).
- The rate of hospitalization for burns was highest in the South (15.6 stays per 100,000 population) and among patients living in low-income areas (15.6 stays per 100,000 population) and patients living in rural areas (17.1 stays per 100,000 population).
- The most frequent causes of burns requiring hospitalization were accidents caused by hot liquids or vapors and ignition of highly flammable material.
- Skin grafts were performed in nearly one out of three burn hospitalizations.

¹National Institute of General Medical Sciences. *Fact Sheet: Trauma, Shock, Burn, and Injury: Facts and Figures*. August 10, 2006. http://publications.nigms.nih.gov/factsheets/trauma_burn_facts.html (Accessed October 16, 2006)

length of stay for the treatment of burns was 8.9 days, compared with 5.1 days for all stays. The average cost of a burn-related hospitalization was \$17,300 versus \$9,000 for all stays.

Admissions for burns were more likely to occur in younger patients and males, and more likely to result in death. On average, patients admitted for the treatment of burns were 34.9 years old—22.5 years younger than the average hospitalized patient. While males accounted for only 45.8 percent of all hospitalizations, they accounted for 69.9 percent of hospital stays for burns.

The emergency admission rate for burns was comparable to the emergency admission rate for all hospital stays (56.1 percent versus 55.3 percent). However, the percentage of hospital stays for burns resulting in death was significantly higher than the in-hospital mortality rate for all hospital stays (4.1 percent versus 2.7 percent).

Differences in hospital stays for burns, by age and payer

Figure 2 illustrates that nearly two out of three hospitalizations for burns occurred among patients younger than 45 years of age, with patients 18 to 44 years old accounting for 38.0 percent of burn admissions. Patients younger than 18 accounted for 26.8 percent of burn hospitalizations. Patients 65 and older constituted the smallest proportion of burn patients—only 12.3 percent of burn hospitalizations, or about 4,000 stays.

Figure 3 shows that private insurance and Medicaid were the most common sources of payment for charges related to hospital stays for burns. Private insurance was billed for one-third (33.0 percent) of burn admissions, and Medicaid was billed for 28.4 percent. In contrast, Medicare, a government insurance program that largely provides insurance for the elderly, was billed for only 14.5 percent of burn hospitalizations. Uninsured patients comprised 11.4 percent of hospital stays principally for burns—more than two times the percentage of uninsured stays for all conditions.

Differences in hospital stays for burns, by region, income, and patient location

When adjusted for the population in each region, hospitalizations for burns were most likely to occur in the South, at a rate of 15.6 hospital stays per 100,000 population (figure 4). The second highest rate of hospitalization occurred in the Midwest (11.1 hospital stays per 100,000 population). Rates of hospitalization were lowest in the West and the Northeast, at 8.0 and 6.6 hospital stays per 100,000 population, respectively.

Figure 4 also illustrates that burn hospitalizations occurred most often among patients living in low-income areas, at a rate of 15.6 stays per 100,000 population. This rate was about 77 percent higher than the rate of burn admissions among patients living in higher income areas (8.8 hospital stays per 100,000 population).

Similarly, burn hospital stays were most likely to occur among patients living in rural areas, at a rate of 17.1 hospital stays per 100,000 population. This rate was nearly 73 percent higher than the rate of burn stays among patients living in large urban areas and about 64 percent higher than among those living in small urban areas (9.9 and 10.4 hospital stays per 100,000 population, respectively).

In-hospital deaths related to burns

While the in-hospital mortality rate for burns was nearly twice the rate for all hospital stays (4.1 percent versus 2.7 percent), these rates were especially high among elderly patients hospitalized for burns (figure 5). The in-hospital death rate was 2.3 percent for patients ages 18 to 44 and 4.7 percent for patients ages 45 to 64. However, among burn patients 65 and older, the in-hospital death rate was 15.3 percent.

Common causes of burns and procedures related to burns

Table 2 lists the most frequent causes of burn injuries requiring hospitalization. About 18.4 percent of hospital stays for burns resulted from hot liquids or vapors, while 12.9 percent of all burn admissions were caused by the ignition of a highly flammable material. About 9.7 percent of all hospital stays for burns were caused by other hot substances or objects, 5.3 percent by hot (boiling) tap water, and 3.7 percent by caustic and corrosive substances.

Table 3 lists the procedures most commonly related to hospital stays during which a burn was the principal reason for admission. The most common procedure performed on burn patients was debridement of the wound (42.8 percent). Skin grafts were performed in nearly one out of three burn

hospitalizations (32.1 percent). Other common procedures performed on burn patients, and typically associated with very serious illness, include respiratory intubation and mechanical ventilation (10.3 percent), blood transfusion (5.4 percent), and tracheostomy (2.8 percent).

Data Source

The estimates in this Statistical Brief are based on data from the HCUP 2004 Nationwide Inpatient Sample (NIS). Historical data were drawn from the 1994–2003 NIS. Supplemental sources included data on regional population estimates from Table 8: Annual Estimates of the Population for the United States, Regions, and Divisions: April 1, 2000 to July 1, 2005 (NST-EST2005-08), Population Division, U.S. Census Bureau, Release date: December 22, 2005 (<http://www.census.gov/popest/states/tables/NST-EST2005-08.xls>); urban-rural classification based on 2000 Census estimates from the Economic Research Service of the U.S. Department of Agriculture (<http://www.ers.usda.gov/Briefing/Rurality/UrbanInf/>); and ZIP Code median income estimates from the 2004 Claritas Zip Code Demographic File.

Definitions

Types of hospitals included in HCUP

HCUP is based on data from community hospitals, defined as short-term, non-Federal, general and other hospitals, excluding hospital units of other institutions (e.g., prisons). HCUP data include OB-GYN, ENT, orthopedic, cancer, pediatric, public, and academic medical hospitals. They exclude long-term care, rehabilitation, psychiatric, and alcoholism and chemical dependency hospitals, but these types of discharges are included if they are from community hospitals.

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 one year will be counted each time as a separate "discharge" from the hospital.

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

Median income

Median income is the median household income of the patient's ZIP Code of residence. This is a proxy measure of a patient's socioeconomic status. For 2003 and 2004, the definition of very low income was the lowest quartile, which was less than \$36,000.

Patient location

Location indicates whether the patient's county of residence is in a metropolitan area ("urban") or non-metropolitan area ("rural"), as defined by an adaptation of the 2003 Urban Influence Codes (UIC). UICs group metropolitan and non-metropolitan counties according to the official metro status announced by the Office of Management and Budget (OMB) in June 2003, based on population and commuting data from the 2000 Census.

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 and Medicaid Services (CMS).² Costs will tend to reflect the actual costs of production, while charges represent what the hospital billed for the case. For each

²HCUP Cost-to-Charge Ratio Files (CCR). Healthcare Cost and Utilization Project (HCUP). 2001–2003. U.S. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/db/state/costtocharge.jsp

hospital, a hospital-wide cost-to-charge ratio is used because detailed charges are not available across all HCUP States. Hospital charges reflect the amount the hospital charged for the entire hospital stay and does not include professional (physician) fees. For the purposes of this Statistical Brief, costs are reported to the nearest hundreds.

Payer

Up to two payers can be coded for a hospital stay in HCUP data. When this occurs, the following hierarchy is used:

- If either payer is listed as Medicaid, the payer is “Medicaid.”
- For non-Medicaid stays, if either payer is listed as Medicare, the payer is “Medicare.”
- For stays that are neither Medicaid nor Medicare, if either payer is listed as private insurance, the payer is “private insurance.”
- For stays that are not Medicaid, Medicare or private insurance, if either payer is some other third-party payer, the payer is “other,” which consists of Worker’s Compensation, TRICARE/CHAMPUS, CHAMPVA, Title V, and other government programs.
- For stays that have no third-party payer and the payer is listed as “self-pay” or “no charge,” the payer is “uninsured.”

Diagnoses, ICD-9-CM, 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 that develop during the stay. All-listed diagnoses include the principal diagnosis plus these additional secondary conditions. For this brief, we examined both principal and all-listed diagnoses, and the pattern of findings did not significantly differ between the two.

ICD-9-CM is the International Classification of Diseases, Ninth Revision, Clinical Modification, which assigns numeric codes to diagnoses. There are about 12,000 ICD-9-CM diagnosis codes.

CCS categorizes ICD-9-CM diagnoses into 260 clinically meaningful categories.³ This “clinical grouper” makes it easier to quickly understand patterns of diagnoses and procedures.

The following ICD-9-CM diagnosis codes are included in the CCS category 240 (burns):

- 906.5 Late effect of burn of eye, face, head, and neck
- 906.6 Late effect of burn of wrist and hand
- 906.7 Late effect of burn of other extremities
- 906.8 Late effect of burns of other specified sites
- 906.9 Late effect of burn of unspecified site
- 940.0-940.9 Burn confined to eye and adnexa
- 941.00-941.59 Burn of face, head, and neck
- 942.00-942.59 Burn of trunk
- 943.00-943.59 Burn of upper limb, except wrist and hand
- 944.00-944.58 Burn of wrist(s) and hand(s)
- 945.00-945.59 Burn of lower limb(s)
- 946.0-946.5 Burns of multiple specified sites
- 947.0-947.9 Burn of internal organs
- 949.0-949.5 Burn, unspecified

Cause of injury

The cause of injury is determined by the External Cause of Injury Codes (commonly referred to as E-codes), which supplement the ICD-9-CM diagnosis codes. These codes designate the cause of injury. Multiple E-codes may be present on a single hospital record, but not all records for patients with burns included E codes.

Emergency admission

Admission source indicates where the patient was located prior to admission to the hospital. Emergency admission indicates the patient was admitted to the hospital through the emergency department.

³HCUP CCS. Healthcare Cost and Utilization Project (HCUP). August 2006. U.S. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp

Discharge status

Discharge status indicates 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 the NIS

The HCUP 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, non-rehabilitation hospitals). The NIS is a sample of hospitals and includes all patients from each hospital, regardless of payer. It is drawn from a sampling frame that contains hospitals comprising 90 percent of all discharges in the United States. The vast size of the NIS allows the study of topics at both the national and regional levels for specific subgroups of patients. In addition, NIS data are standardized across years to facilitate ease of use.

About HCUP

HCUP is a family of powerful health care databases, software tools, and products for advancing research. Sponsored by the Agency for Healthcare Research and Quality (AHRQ), HCUP includes the largest all-payer encounter-level collection of longitudinal health care data (inpatient, ambulatory surgery, and emergency department) in the United States, beginning in 1988. HCUP is a Federal-State-Industry Partnership that brings together the data collection efforts of many organizations—such as State data organizations, hospital associations, private data organizations, and the Federal government—to create a national information resource.

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

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

Arizona Department of Health Services
Arkansas Department of Health & Human Services
California Office of Statewide Health Planning & Development
Colorado Health & Hospital Association
Connecticut Integrated Health Information (Chime, Inc.)
Florida Agency for Health Care Administration
Georgia GHA: An Association of Hospitals & Health Systems
Hawaii Health Information Corporation
Illinois Health Care Cost Containment Council and Department of Public Health
Indiana Hospital & Health Association
Iowa Hospital Association
Kansas Hospital Association
Kentucky Cabinet for Health and Family Services
Maryland Health Services Cost Review Commission
Massachusetts Division of Health Care Finance and Policy
Michigan Health & Hospital Association
Minnesota Hospital Association
Missouri Hospital Industry Data Institute
Nebraska Hospital Association
Nevada Division of Health Care Financing and Policy, Department of Human Resources
New Hampshire Department of Health & Human Services
New Jersey Department of Health & Senior Services
New York State Department of Health
North Carolina Department of Health and Human Services
Ohio Hospital Association
Oregon Office for Oregon Health Policy and Research and Oregon Association of Hospitals and Health Systems
Rhode Island Department of Health
South Carolina State Budget & Control Board
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 & Family Services

For additional HCUP statistics, visit HCUPnet, our interactive query system at www.hcup.ahrq.gov.

For More Information

For a detailed description of HCUP and more information on the design of the NIS and methods to calculate estimates, please refer to the following publications:

Steiner, C., Elixhauser, A., Schnaier, J. The Healthcare Cost and Utilization Project: An Overview. *Effective Clinical Practice* 5(3):143–51, 2002.

Design of the HCUP Nationwide Inpatient Sample, 2004. Online. August 8, 2006. U.S. Agency for Healthcare Research and Quality. http://www.hcup-us.ahrq.gov/db/nation/nis/reports/NIS_2004_Design_Report.pdf

Houchens, R., Elixhauser, A. *Final Report on Calculating Nationwide Inpatient Sample (NIS) Variances, 2001*. HCUP Methods Series Report #2003-2. Online. June 2005 (revised June 6, 2005). U.S. Agency for Healthcare Research and Quality. <http://www.hcup-us.ahrq.gov/reports/CalculatingNISVariances200106092005.pdf>

Houchens R. L., and Elixhauser, A. *Using the HCUP Nationwide Inpatient Sample to Estimate Trends*. (Updated for 1988-2004). HCUP Methods Series Report #2006-05. Online. August 18, 2006. U.S. Agency for Healthcare Research and Quality. http://www.hcup-us.ahrq.gov/reports/2006_05_NISTrendsReport_1988-2004.pdf

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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:

Irene Fraser, Ph.D., Director
Center for Delivery, Organization, and Markets
Agency for Healthcare Research and Quality
540 Gaither Road
Rockville, MD 20850

Table 1. Hospital stays for burns compared with hospitalizations for all conditions, 2004

	Hospital stays for burns*	All hospital stays†
Total number of discharges	32,500	29,449,800
Mean length of stay, days	8.9	5.1
Mean cost per hospitalization	\$17,300	\$9,000
Mean cost per day	\$1,900	\$1,800
Aggregate costs	\$572.9 million	\$260.2 billion
Mean age	34.9	57.4
Percentage male	69.9%	45.8%
Percentage admitted through the emergency department	56.1%	55.3%
Percentage died in hospital	4.1%	2.7%

*Based on principal diagnosis.

†Excludes stays related to maternal and neonatal conditions.

Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2004.

Table 2. Causes of burn injuries that resulted in hospitalization,* 2001

Mechanism of injury†	Total number of stays	Percentage of burn stays
Accident caused by hot liquids and vapors, including steam	5,979	18.4%
Ignition of highly flammable material (e.g., gasoline)	4,187	12.9%
Accident caused by other hot substance or object	3,158	9.7%
Accident caused by hot (boiling) tap water	1,712	5.3%
Accident cause by caustic and corrosive substances	1,195	3.7%

*Based on principal diagnosis.

†Based on external cause of injury codes. Not all burn discharges have an associated external cause of injury code.

Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2004.

Table 3. Procedures commonly associated with hospital stays for burns, 2004*

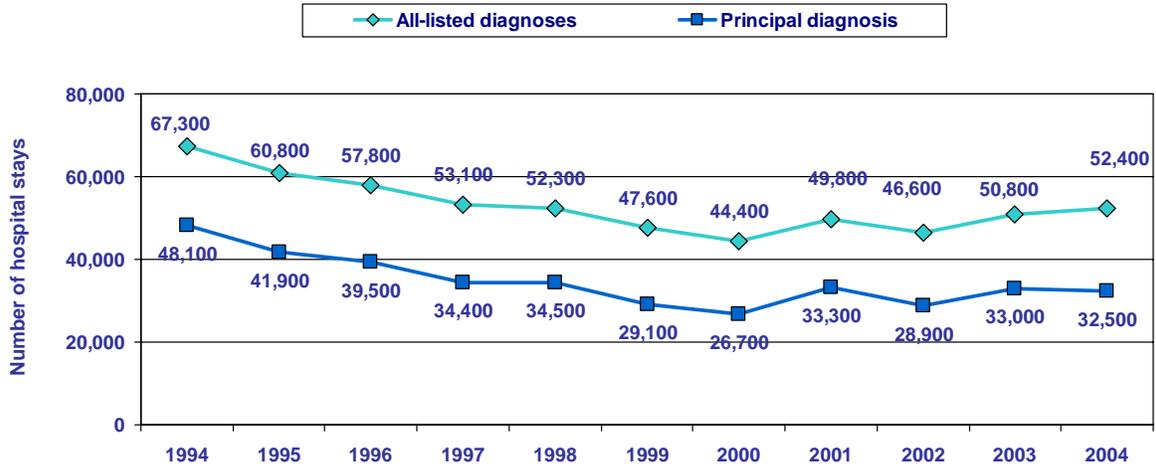
All-listed procedures	Number of hospital stays with this procedure	Percentage of burn stays with this procedure
Debridement of wound	13,900	42.8%
Skin graft	10,400	32.1%
Traction; splints; and other wound care	4,900	15.2%
Respiratory intubation and mechanical ventilation	3,400	10.3%
Other vascular catheterization; not heart	2,500	7.8%
Blood transfusion	1,800	5.4%
Other therapeutic procedures	1,600	4.8%
Physical therapy exercises; manipulation; and other procedures	1,400	4.4%
Excision of skin lesion	1,100	3.4%
Tracheostomy; temporary and permanent	900	2.8%

*Based on principal diagnosis.

Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2004.



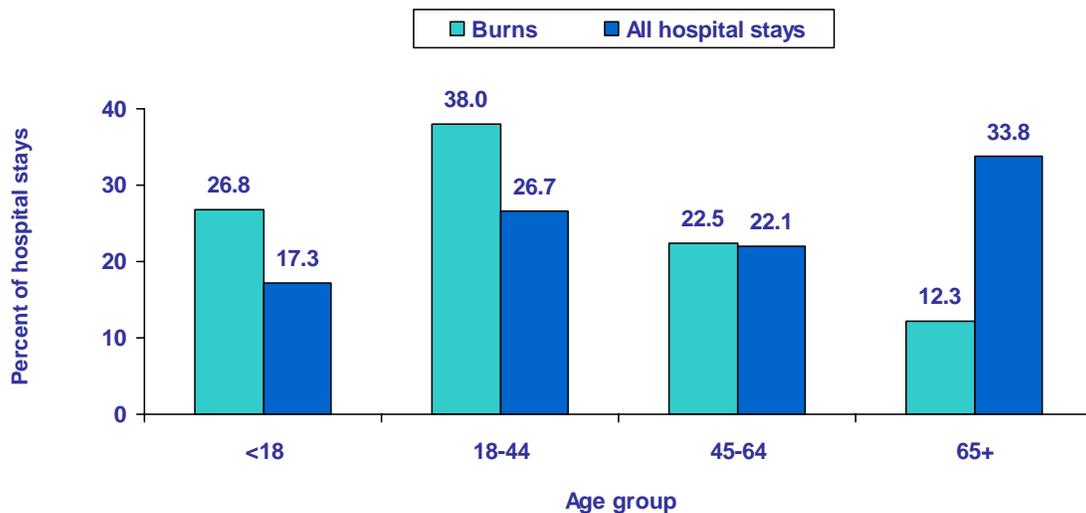
Figure 1. Trends in hospitalizations for burns, all-listed diagnoses versus principal diagnosis, 1994–2004



Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2004.



Figure 2. Distribution of hospitalizations for burns, by age group, 2004*

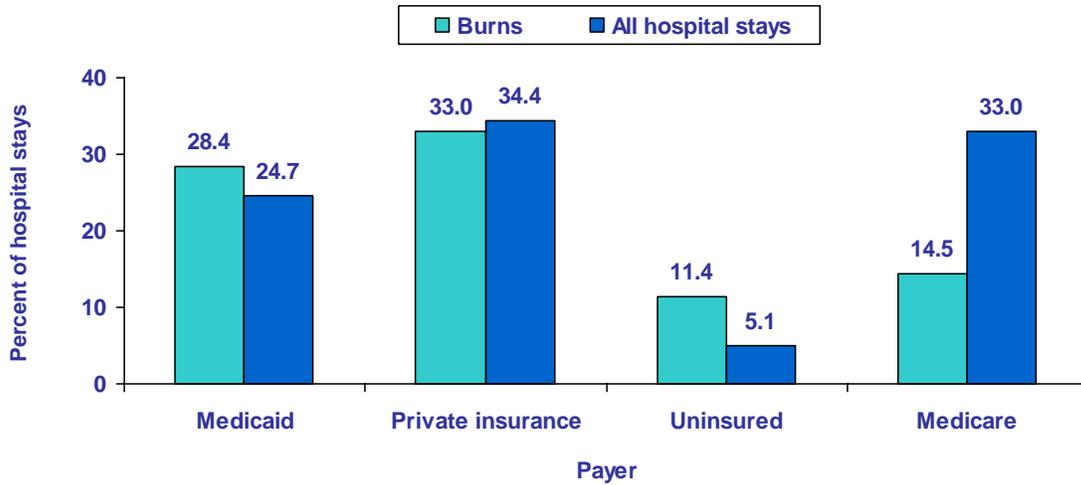


*Based on principal diagnosis.

Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2004.



Figure 3. Distribution of hospitalizations for burns, by payer, 2004*

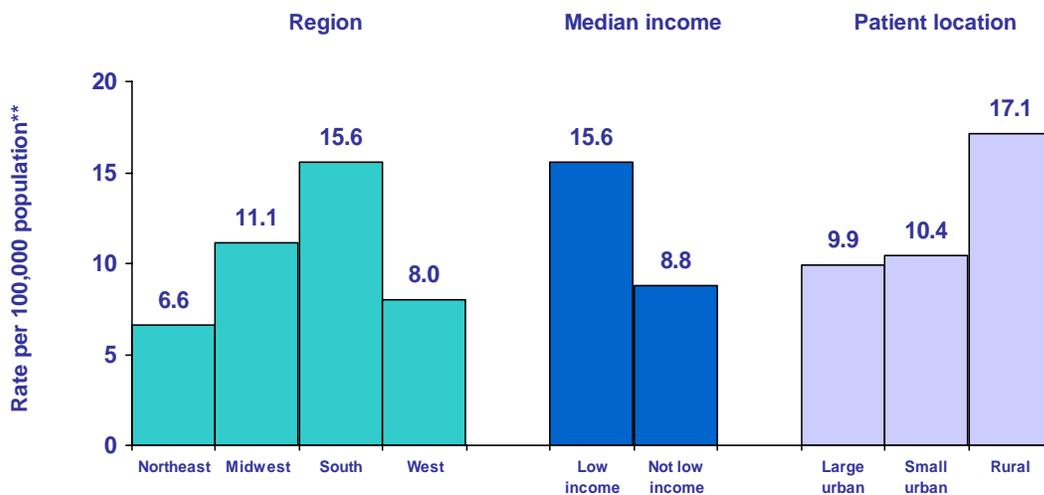


*Based on principal diagnosis.

Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2004.



Figure 4. Rates of hospitalization for burns, by region, median income, and patient location, 2004*



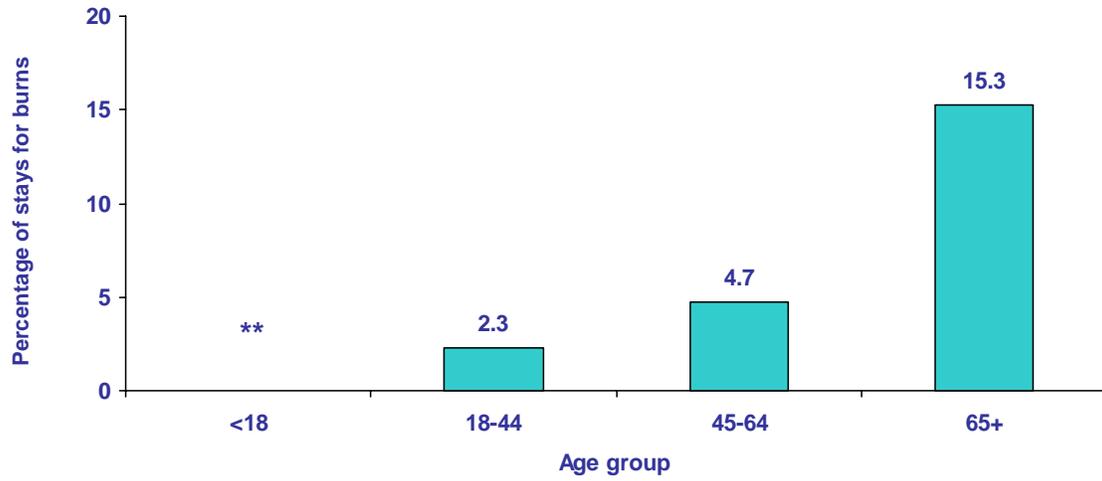
*Based on principal diagnosis.

**The denominator is the entire U.S. population for each region, median income, patient location. U.S. Census Bureau, Population Division, Census 2000 and 2004; Claritas, 2004.

Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2004.



Figure 5. In-hospital death rates for burns, by age group, 2004*



*Based on principal diagnosis.

**Too few cases to report with statistical reliability.

Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2004.