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Costs for Hospital Stays in the United States, 2011

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Introduction

Health care expenditures in the United States account for nearly 18 percent of the Gross Domestic Product (GDP). Importantly, inpatient hospital costs account for nearly one-third of all health care expenses for the civilian noninstitutionalized population in the United States. The Agency for Healthcare Research and Quality provides an annual overview of national statistics on inpatient hospital stays, including their associated costs, using data from the Healthcare Cost and Utilization Project (HCUP). This Statistical Brief provides the most current data on costs for stays in community hospitals in the United States using data from 2011 and compares the results to data from 1997.

The analysis of 2010 data on costs for hospital stays was published in Statistical Brief #146, Costs for Hospital Stays in the United States, 2010. Earlier results from 2005 through 2009 are presented in a series of HCUP Facts and Figures reports.

Statistics on costs are included for stays by age, primary payer, major diagnostic category, and principal diagnosis. All differences between estimates noted in the text are statistically significant at the .001 level or better.

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Findings

*Hospital costs by age, 2011*

In 2011, the aggregate cost for all hospital stays was $387.3 billion—an average of $10,000 per stay. Figure 1 shows the distribution of aggregate hospital costs and stays by age for 2011, and Figure 2 displays the mean cost per hospital stay by age.

Together, adults aged 45–64 years and 65–84 years accounted for nearly two-thirds of aggregate hospital costs and over half of hospital stays in 2011. Adults aged 45–64 years and 65–84 years also had the highest mean costs per stay ($12,500 and $12,600, respectively), which exceeded the average cost for all hospital stays.

Adults aged 18–44 years accounted for 18 percent of aggregate hospital costs and nearly one-quarter of hospital stays. The mean cost per stay for these patients ($7,400) was 35 percent lower than the average cost for all stays.

Infants younger than 1 year accounted for 5 percent of aggregate hospital costs and 11 percent of hospitalizations. The mean cost per stay for infants ($4,500) was less than half of the average for all stays. The mean cost per stay for children aged 1–17 years ($8,400) and adults aged 85 years and older ($9,900) was similar to the overall average cost per stay.

*Figure 1. Distribution of aggregate hospital costs and stays by age, 2011*

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), Nationwide Inpatient Sample (NIS), 2011
Hospital costs by expected primary payer, 2011

Figures 3 and 4 highlight the distribution of aggregate hospital costs and stays by payer and the mean hospital cost per stay by payer in 2011, respectively.

Stays billed to Medicare and Medicaid together accounted for 63 percent of aggregate hospital costs and 60 percent of hospital stays in 2011. Forty-seven percent of aggregate costs were billed to Medicare, and the mean cost for stays billed to Medicare ($11,900) was nearly $2,000 higher than the overall average cost per stay. At $8,000, the mean cost per stay billed to Medicaid was $2,000 less than the average cost for all stays.

Private insurance was the expected primary payer for nearly one-third of aggregate hospital costs and hospital stays in 2011. The mean cost per stay billed to private insurance ($9,200) was similar to that for all stays. Stays billed to the uninsured and other payers each accounted for 4 percent of aggregate hospital costs. The mean cost per stay for stays billed to the uninsured ($8,300) was lower than the overall average cost, and the mean cost for stays billed to other payers ($10,700) was similar to that for all stays.
Figure 3. Distribution of aggregate hospital costs and stays by payer, 2011

![Bar chart showing distribution of hospital costs and stays by payer, 2011. Medicare has the highest costs and stays, followed by Medicaid, Private insurance, Uninsured, and Other.](chart)

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), Nationwide Inpatient Sample (NIS), 2011

Figure 4. Mean hospital cost per stay by payer, 2011

![Bar chart showing mean hospital costs per stay by payer, 2011. Medicare has the highest mean cost, followed by Private insurance, Medicaid, Uninsured, and Other.](chart)

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), Nationwide Inpatient Sample (NIS), 2011

Hospital costs by diagnostic category, 2011

In 2011, 70 percent of aggregate hospital costs were attributable to seven major diagnostic categories (Figure 5). Circulatory conditions accounted for the largest share (18 percent) of hospital costs. Musculoskeletal conditions (14 percent) and respiratory conditions (11 percent) also accounted for large shares of hospital costs. Digestive conditions, nervous system conditions, infectious and parasitic diseases, and pregnancy and childbirth-related conditions each accounted for between 5 and 9 percent of aggregate costs.
Figure 5. Distribution of aggregate hospital costs by diagnostic category,* 2011

<table>
<thead>
<tr>
<th>Diagnostic Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circulatory system</td>
<td>18%</td>
</tr>
<tr>
<td>Musculoskeletal system</td>
<td>14%</td>
</tr>
<tr>
<td>Respiratory system</td>
<td>11%</td>
</tr>
<tr>
<td>Digestive system</td>
<td>9%</td>
</tr>
<tr>
<td>Nervous system</td>
<td>7%</td>
</tr>
<tr>
<td>Infectious and parasitic diseases</td>
<td>6%</td>
</tr>
<tr>
<td>Pregnancy and childbirth</td>
<td>5%</td>
</tr>
<tr>
<td>All other conditions</td>
<td>30%</td>
</tr>
</tbody>
</table>

Total aggregate costs: $387.3 billion

* Based on principal diagnosis, which was defined by major diagnostic category

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), Nationwide Inpatient Sample (NIS), 2011

Hospital costs by diagnosis, 2011

Table 1 shows the 20 specific principal diagnoses for stays with the highest aggregate hospital costs in 2011. Hospital costs for all diagnoses increased 63 percent between 1997 and 2011 from $237.2 billion to $387.3 billion, an annual increase of 3.6 percent. During this period, overall prices as measured by the Gross Domestic Product price index increased 34 percent, or 2.1 percent annually.5

Stays with septicemia had the highest aggregate hospital costs in 2011 ($20.3 billion), which more than quadrupled since 1997 (an 11.5 percent annual increase). Costs for stays with septicemia were ranked 9th in 1997, fell to 13th in 2000, moved to 8th in 2004, 3rd by 2007, and have been ranked as the most expensive condition since 2008 (data for intermediate years not shown).

Cardiovascular conditions accounted for five of the specific diagnoses for stays with the highest aggregate costs: acute myocardial infarction, congestive heart failure, coronary atherosclerosis, acute cerebrovascular disease, and cardiac dysrhythmias. When combined, costs for stays with these five cardiovascular conditions accounted for 13 percent of aggregate costs in 2011. The aggregate cost for stays with coronary atherosclerosis decreased 34 percent between 1997 and 2011 (3 percent annually), but the cost per stay increased 52 percent during this time period.

The mean cost for stays with eight principal diagnoses was more than 50 percent higher than the overall mean cost for stays in 2011 ($10,000): septicemia ($18,600), osteoarthritis ($15,400), complication of device ($18,500), acute myocardial infarction ($18,900), spondylosis ($16,800), coronary atherosclerosis ($17,200), respiratory failure ($21,700), and hip fracture ($15,400).

The aggregate cost for stays with acute and unspecified renal failure more than quadrupled from $1.0 billion in 1997 to $4.7 billion in 2011 (an 11.4 percent average annual increase). During this period, the change in rank for costs for stays with renal failure was gradual: these costs ranked 54th in 1997, 43rd by 2002, jumped to 34th in 2003, were 19th by 2007, fell to 23rd in 2010, and then rose to 20th in 2011 (data for intermediate years not shown).

Hospital stays with complications of device and complications of surgical procedures or medical care as principal diagnoses accounted for $19.7 billion in aggregate costs. These principal diagnoses ranked as the 3rd and 13th most expensive conditions, and aggregate costs increased about 6 percent annually.

Table 1. Aggregate costs for hospital stays by principal diagnosis, 1997 and 2011

<table>
<thead>
<tr>
<th>Principal Clinical Classifications Software (CCS) diagnosis</th>
<th>Aggregate inflation-adjusted hospital costs in billions, 2011 dollars</th>
<th>Mean cost per stay, inflation-adjusted 2011 dollars</th>
<th>Average annual change in aggregate costs, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>All diagnoses</td>
<td>237.2</td>
<td>6,800</td>
<td>10,000</td>
</tr>
<tr>
<td>Septicemia (except in labor)</td>
<td>4.4</td>
<td>10,600</td>
<td>18,600</td>
</tr>
<tr>
<td>Osteoarthritis</td>
<td>5.1</td>
<td>12,200</td>
<td>15,400</td>
</tr>
<tr>
<td>Complication of device, implant or graft</td>
<td>6.0</td>
<td>12,200</td>
<td>18,500</td>
</tr>
<tr>
<td>Liveborn (newborn infant)</td>
<td>8.6</td>
<td>2,300</td>
<td>3,300</td>
</tr>
<tr>
<td>Acute myocardial infarction</td>
<td>9.9</td>
<td>13,500</td>
<td>18,900</td>
</tr>
<tr>
<td>Spondylosis, intervertebral disc disorders, other back problems</td>
<td>3.7</td>
<td>6,900</td>
<td>16,800</td>
</tr>
<tr>
<td>Pneumonia (except that caused by tuberculosis and sexually transmitted diseases)</td>
<td>9.7</td>
<td>7,800</td>
<td>9,500</td>
</tr>
<tr>
<td>Congestive heart failure, nonhypertensive</td>
<td>7.2</td>
<td>7,300</td>
<td>10,900</td>
</tr>
<tr>
<td>Coronary atherosclerosis</td>
<td>15.9</td>
<td>11,300</td>
<td>17,200</td>
</tr>
<tr>
<td>Respiratory failure, insufficiency, arrest (adult)</td>
<td>3.6</td>
<td>18,000</td>
<td>21,700</td>
</tr>
<tr>
<td>Acute cerebrovascular disease</td>
<td>5.9</td>
<td>9,500</td>
<td>14,000</td>
</tr>
<tr>
<td>Cardiac dysrhythmias</td>
<td>3.8</td>
<td>6,700</td>
<td>9,600</td>
</tr>
<tr>
<td>Complications of surgical procedures or medical care</td>
<td>3.1</td>
<td>8,900</td>
<td>13,000</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease and bronchiectasis</td>
<td>3.6</td>
<td>6,500</td>
<td>7,800</td>
</tr>
<tr>
<td>Rehabilitation care, fitting of prostheses, and adjustment of devices</td>
<td>4.1</td>
<td>10,400</td>
<td>13,100</td>
</tr>
<tr>
<td>Diabetes mellitus with complications</td>
<td>3.0</td>
<td>7,300</td>
<td>9,600</td>
</tr>
<tr>
<td>Biliary tract disease</td>
<td>3.6</td>
<td>7,900</td>
<td>11,000</td>
</tr>
<tr>
<td>Fracture of neck of femur (hip)</td>
<td>3.5</td>
<td>10,400</td>
<td>15,400</td>
</tr>
<tr>
<td>Mood disorders</td>
<td>3.4</td>
<td>5,200</td>
<td>5,400</td>
</tr>
<tr>
<td>Acute and unspecified renal failure</td>
<td>1.0</td>
<td>10,500</td>
<td>9,400</td>
</tr>
</tbody>
</table>

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), Nationwide Inpatient Sample (NIS), 1997 and 2011
Cost factors accounting for change in hospital costs by diagnosis, 1997–2011

Figure 6 shows the average annual percentage change in aggregate hospital costs between 1997 and 2011 for the 20 principal diagnoses with the highest aggregate costs in 2011.

Aggregate inflation-adjusted costs for all hospital stays increased 3.6 percent annually between 1997 and 2011. Across all diagnoses, intensity of services provided during the hospital stay (cost per stay) increased 2.8 percent annually, population grew 1.0 percent annually, and the number of stays per 10,000 population remained stable.

The hospitalization rate (stays per population) was the most important factor in cost growth for 4 of the 20 diagnoses that ranked among the most costly stays: acute and unspecified renal failure, septicemia, osteoarthritis, and adult respiratory failure.

Higher intensity of services (increased cost per stay) accounted for a large portion of growth in hospital costs for stays with eight principal diagnoses: back problems, both complication diagnoses, cardiac dysrhythmias, newborns, biliary tract disease, diabetes, and rehabilitation care.

For stays with a principal diagnosis of chronic obstructive pulmonary disease, growth in the hospitalization rate and intensity of services contributed equally to average annual aggregate cost growth.

For six diagnoses, growth in cost per stay was offset by a decline in the hospitalization rate. This included four of the five cardiovascular conditions that were among the most expensive stays in 2011 as well as hip fracture and pneumonia.
Figure 6. Average annual percentage change* and components of change in inflation-adjusted aggregate hospital costs by principal diagnosis, 1997–2011

* Bar segments depict the portion of change attributable to each of the factors listed in the key. The net average annual percentage change is noted in the axis label.

** The change in cost per stay and stays per population for mood disorders was not statistically significant between 1997 and 2011.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), Nationwide Inpatient Sample (NIS), 1997 and 2011
Data Source

The estimates in this Statistical Brief are based upon data from the Healthcare Cost and Utilization Project (HCUP) 2011 Nationwide Inpatient Sample (NIS). Historical data were drawn from the 1997 Nationwide Inpatient Sample (NIS). The 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. Data on average costs per stay and total aggregate costs were not available in HCUPnet for 1997–2006; these statistics were separately calculated using the HCUP 1997–2006 NIS. Supplemental sources included population denominator data for use with HCUP databases.6

Many hypothesis tests were conducted for this Statistical Brief. Thus, to decrease the number of false-positive results, we reduced the significance level to .001 for individual tests.

Definitions

Average Annual Percentage Change
Average annual percentage change is calculated using the following formula:

\[
\text{Average annual percentage change} = \left(\frac{\text{End value}}{\text{Beginning value}}\right)^{\frac{1}{\text{change in years}}}-1\right) \times 100
\]

In this Statistical Brief, 1997 and 2011 were the base years used to calculate the average annual percentage change in aggregate hospital costs, cost per stay, population, and stays per 10,000 population. Average annual percentage change was calculated over 14 years:

\[
\text{Average annual percentage change} = \left(\frac{2011 \text{ value}}{1997 \text{ value}}\right)^{\frac{1}{14}}-1\right) \times 100
\]

Diagnoses, ICD-9-CM Clinical Classifications Software (CCS), 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 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.

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

CCS categorizes ICD-9-CM diagnoses into a manageable number of clinically meaningful categories.7 This "clinical grouper" makes it easier to quickly understand patterns of diagnoses. CCS categories identified as "Other" typically are not reported; these categories include miscellaneous, otherwise unclassifiable diagnoses that may be difficult to interpret as a group.

DRGs constitute 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 (procedures), age, and other relevant criteria.


MDCs are broad groups of DRGs that relate to an organ or a system and not to an etiology (for example, MDC 06, Diseases and Disorders of the Digestive System). Each hospital stay has one DRG and one MDC assigned to it.

**Types of hospitals included in HCUP**

HCUP 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). HCUP data include obstetrics and gynecology, otolaryngology, orthopedic, cancer, pediatric, public, and academic medical hospitals. Excluded are long-term care, rehabilitation, psychiatric, and alcoholism and chemical dependency hospitals. However, if a patient received long-term care, rehabilitation, or treatment for psychiatric or chemical dependency conditions in a community hospital, the discharge record for that stay will be included in the Nationwide Inpatient Sample (NIS).

**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.

**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). Costs will 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, costs are reported to the nearest hundred.

**Payer**

Payer is the expected primary payer for the hospital stay. To make coding uniform across all HCUP data sources, payer combines detailed categories into general groups:

- Medicare: includes patients covered by fee-for-service and managed care Medicare
- Medicaid: includes patients covered by fee-for-service and managed care Medicaid
- Private Insurance: includes Blue Cross, commercial carriers, and private health maintenance organizations (HMOs) and preferred provider organizations (PPOs)
- Other: includes Worker's Compensation, TRICARE/CHAMPUS, CHAMPVA, Title V, and other government programs
- Uninsured: includes an insurance status of "self-pay" and "no charge."

Encounters billed to the State Children’s Health Insurance Program (SCHIP) may be classified as Medicaid, Private Insurance, or Other, depending on the structure of the State program. Because most State data do not identify SCHIP patients specifically, it is not possible to present this information separately.

When more than one payer is listed for a hospital discharge, the first-listed payer is used.

**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.

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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
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  Health Policy and Research
Pennsylvania  Health Care Cost Containment Council
Rhode Island  Department of Health
South Carolina  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 Services
Wyoming  Hospital Association

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, nonrehabilitation
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 constituting more than 95 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 HCUPnet

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

For More Information

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

For additional HCUP statistics, visit HCUPnet, our interactive query system, at http://hcupnet.ahrq.gov/.

For information on other hospitalizations in the United States, refer to the following HCUP Statistical Briefs located at http://www.hcup-us.ahrq.gov/reports/statbriefs/statbriefs.jsp:

- Statistical Brief #144, Overview of Hospital Stays in the United States, 2010
- Statistical Brief #146, Costs for Hospital Stays in the United States, 2010
- Statistical Brief #148, Most Frequent Conditions in U.S. Hospitals, 2010
- Statistical Brief #149, Most Frequent Procedures Performed in U.S. Hospitals, 2010

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


Suggested Citation

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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Agency for Healthcare Research and Quality
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Rockville, MD 20850