

## STATISTICAL BRIEF #72

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# Nationwide Frequency and Costs of Potentially Preventable Hospitalizations, 2006

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### Introduction

Hospital care represents the largest component of overall health care expenditures.<sup>1</sup> Some hospitalizations can be potentially prevented with timely and effective ambulatory care. High admission rates for these potentially preventable conditions may indicate a need for improvements in access to ambulatory care and in the quality of care provided, as well as in patient adoption of healthy lifestyles and active self-management of chronic conditions. Thus, reducing the frequency of potentially preventable hospitalizations would be an effective strategy for lowering costs while improving quality of care and patient outcomes.<sup>2</sup>

This Statistical Brief presents national data from the Healthcare Cost and Utilization Project (HCUP) on rates and total costs of potentially preventable hospitalizations. Distribution of the total costs by payer is also examined. Lastly, comparisons of potentially preventable hospitalization rates by median income level of patient's ZIP Code are presented. The Agency for Healthcare Research and Quality (AHRQ)'s Prevention Quality Indicators (PQIs)<sup>3</sup> are used to identify hospitalizations for select chronic and acute conditions in adults and children for 2006. All differences between estimates noted in the text are statistically significant at the 0.05 level or better.

### Findings

In 2006, nearly 4.4 million hospital admissions, totaling \$30.8 billion in hospital costs, could have been potentially preventable with timely and effective ambulatory care or adequate patient self-

### Highlights

- In 2006, hospital costs for potentially preventable conditions totaled nearly \$30.8 billion—one of every 10 dollars of total hospital expenditures. As many as 4.4 million hospital stays could possibly have been prevented with better ambulatory care, improved access to effective treatment, or patient adoption of healthy behaviors.
- Congestive heart failure and bacterial pneumonia were the two most common reasons for potentially preventable hospitalizations, accounting for half of the total hospital costs (\$8.4 billion and \$7.2 billion, respectively) for all preventable hospitalizations.
- One in five (18 percent) Medicare admissions was for a potentially preventable condition. In fact, Medicare patients contributed to \$20.1 billion (67 percent) of total hospital costs for potentially preventable hospitalizations among adults.
- Hospitalization rates for potentially preventable conditions were highest among residents in poorer communities but lowest among residents from wealthier communities. This disparity was particularly evident for diabetes without complications, where the admission rate in the poorest communities was more than 400 percent higher than the rate in the wealthiest communities.

<sup>1</sup> *Trends in Health Care Costs and Spending*. Online. September 2007. Kaiser Family Foundation <http://www.kff.org/insurance/upload/7692.pdf>

<sup>2</sup> To better assist health care decision makers in implementing this strategy, AHRQ has developed a tool for mapping the frequency of potentially preventable hospitalization for a state, by county, and estimating the cost savings associated with reducing the level of these hospitalizations. <http://www.qualityindicators.ahrq.gov/mappingtool.htm>

<sup>3</sup> *AHRQ Quality Indicators—Guide to Prevention Quality Indicators: Hospital Admissions for Ambulatory Care Sensitive Conditions*. Online. March 12, 2007. U.S. Agency for Healthcare Research and Quality [http://www.qualityindicators.ahrq.gov/downloads/pqi/pqi\\_guide\\_v31.pdf](http://www.qualityindicators.ahrq.gov/downloads/pqi/pqi_guide_v31.pdf)

management of the condition. Hospital costs for potentially preventable hospitalizations represented about one of every 10 dollars of total hospital expenditures in 2006. Compared to 2004, there was no substantial change in the total number of admissions or total hospital costs for these potentially preventable conditions.<sup>4</sup>

#### *Potentially preventable hospitalizations among adults and children*

Table 1 displays the number of admissions and total hospital costs for potentially preventable conditions among adults and children. There were nearly 4.1 million admissions (1,825 admissions per 100,000 population) for potentially preventable conditions among adults, which totaled \$30.1 billion in hospital costs. Children accounted for about 276,000 potentially preventable hospitalizations, totaling \$737 million in hospital costs.

Congestive heart failure and bacterial pneumonia were the two most common reasons for potentially preventable hospitalizations. Together, they contributed to half of the total hospital costs (\$8.4 billion and \$7.2 billion, respectively) for all potentially preventable hospitalizations. Among children, pediatric asthma was the most costly potentially preventable condition (\$293 million), but pediatric gastroenteritis accounted for the highest number of potentially preventable hospitalizations (133 million admissions, or 183 admissions per 100,000 population).

#### *Share of total hospital costs by expected primary payer*

Figure 1 compares the distribution of total hospital costs by payer between potentially preventable hospitalizations and all other non-obstetric hospitalizations. Among adults, Medicare patients contributed to 67 percent (\$20.1 billion) of the total hospital costs for potentially preventable hospitalizations, which is much higher than the 50 percent share of total hospital costs for all other non-obstetric hospitalizations. In fact, potentially preventable conditions accounted for nearly one in five (18 percent) non-obstetric Medicare admissions—significantly higher than the percentage for any other payer (figure 2).

In contrast, patients with private insurance accounted for only 16 percent (\$4.7 billion) of the total cost for potentially preventable admissions, as compared to 30 percent of the hospital costs for all other non-obstetric admissions. As shown in figure 2, only 7 percent of all privately insured admissions were for potentially preventable conditions—nearly half the percentage for all payers combined (13 percent).

The percent of total hospital costs attributable to patients with Medicaid and the uninsured was similar between potentially preventable hospital stays and all other non-obstetric hospitalizations (11 percent versus 12 percent for Medicaid patients, and 5 percent versus 5 percent for the uninsured). However, 12 percent of uninsured hospitalizations were potentially preventable, significantly higher than the 9 percent of Medicaid hospitalizations.

#### *Differences in preventable hospitalization rates by community income level*

Table 2 compares the admission rate for potentially preventable conditions by community income level. Patients living in the poorest communities (the lowest median income quartile) were disproportionately more likely than those living in the wealthiest communities (the highest median income quartile) to be hospitalized with a potentially preventable condition. The difference in admission rates between the poorest and wealthiest communities ranged from 130 percent to more than 400 percent across individual diseases.

These disparities in admission rates were especially evident for chronic conditions, where potentially preventable admission rates in the poorest communities were two to four times higher than those in the wealthiest communities. The disparity in admission rates was highest for diabetes without complications: patients from the poorest communities were hospitalized at a rate of 41.4 admissions per 100,000 populations—4.2 times higher than the admission rate for this condition in the wealthiest communities.

<sup>4</sup> Russo, C. A., Jiang, H. J. and Barrett, M. *Trends in Potentially Preventable Hospitalizations among Adults and Children, 1997-2004*. HCUP Statistical Brief #36. August 2007. Agency for Healthcare Research and Quality, Rockville, MD. <http://www.hcup-us.ahrq.gov/reports/statbriefs.jsp>

Similarly, patients from the poorest communities were hospitalized for diabetes with short-term complications at a rate of 91.6 admissions per 100,000 population, which was 2.7 times higher than the admission rate in wealthier communities. However, this variation was markedly lower for acute conditions, where admission rates in the poorest communities were 30 to 60 percent higher than those in the wealthiest communities.

## Data Source

The estimates in this Statistical Brief are based upon data from 2006 Nationwide Inpatient Sample (NIS). Population bases for rates were obtained from Claritas, a vendor that compiles data from the U.S. Census Bureau. Claritas uses intra-census methods to estimate population subgroups.

## 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.

### *Prevention Quality Indicators*

The Prevention Quality Indicators (PQIs) are part of a set of AHRQ Quality Indicators (QIs) developed by investigators at Stanford University and the University of California under a contract with AHRQ. The PQIs are a set of measures that can be used with hospital inpatient discharge data to identify quality of care for "ambulatory care-sensitive conditions." These are conditions for which good outpatient care can potentially prevent the need for hospitalization or for which early intervention can prevent complications or more severe disease. PQI rates can also be affected by other factors, such as disease prevalence.

Further information on the AHRQ QIs, including documentation and free software downloads, is available at <http://www.qualityindicators.ahrq.gov>. This Web site includes information on the newest version of the PQIs, Version 3.2.

### *Diagnoses and ICD-9-CM*

PQI admission rates are based on principal diagnosis for all measures except diabetes-related lower-extremity amputations. For this PQI, counts are included in the numerator if the condition of interest is indicated in any diagnosis field. 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.

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.

### *Populations for calculating admission rates*

The populations used to calculate admission rates vary by type of condition. PQIs for adult diabetes, circulatory diseases, chronic respiratory diseases, and acute diseases include individuals 18 years and older. Pediatric short-term diabetes complications include children between 6 and 17 years of age; pediatric asthma includes children between 2 and 17 years of age; and pediatric gastroenteritis and bacterial pneumonia include children ages 3 months to 17 years. Denominator populations for all PQIs in

this Brief are derived from Claritas year-specific U.S. population data. All PQIs are adjusted for age and gender using the total U.S. population for the year 2000 as the standard population.

#### *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).<sup>5</sup> Costs will tend to reflect the actual costs of production, while charges represent what the hospital billed for the case. For each 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 hundred.

#### *Median community income level*

Median community income level is the median household income of the patient's ZIP Code of residence. The cut-offs for the quartile designation is determined using ZIP Code demographic data obtained from Claritas. The income quartile value is missing for homeless and foreign patients.

#### *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 more general groups:

- Medicare includes fee-for-service and managed care Medicare patients.
- Medicaid includes fee-for-service and managed care Medicaid patients. Patients covered by the State Children's Health Insurance Program (SCHIP) may be included here. Because most state data do not identify SCHIP patients specifically, it is not possible to present this information separately.
- Private insurance includes Blue Cross, commercial carriers, and private HMOs and 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."

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.

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

**California** Office of Statewide Health Planning and Development

**Colorado** Hospital Association

**Connecticut** Hospital Association

**Florida** Agency for Health Care Administration

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<sup>5</sup> HCUP Cost-to-Charge Ratio Files (CCR). Healthcare Cost and Utilization Project (HCUP). 2001–2005. U.S. Agency for Healthcare Research and Quality, Rockville, MD. [www.hcup-us.ahrq.gov/db/state/costtocharge.jsp](http://www.hcup-us.ahrq.gov/db/state/costtocharge.jsp).

**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  
**Maine** Health Data Organization  
**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** Department of Health and Human Services  
**New Hampshire** Department of Health & Human Services  
**New Jersey** Department of Health and Senior Services  
**New York** State Department of Health  
**North Carolina** Department of Health and Human Services  
**Ohio** Hospital Association  
**Oklahoma** State Department of Health  
**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 and Family Services

## 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 about 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.

## For More Information

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

For additional HCUP statistics, visit HCUPnet, our interactive query system, at [www.hcup.ahrq.gov](http://www.hcup.ahrq.gov).

For information on other hospitalizations in the U.S., download *HCUP Facts and Figures: Statistics on Hospital-Based Care in the United States in 2006*, located at <http://www.hcup-us.ahrq.gov/reports.jsp>.

For a detailed description of HCUP, 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.

*Introduction to the HCUP Nationwide Inpatient Sample, 2006*. Online. May 14, 2008. U.S. Agency for Healthcare Research and Quality. [http://www.hcup-us.ahrq.gov/db/nation/nis/2006NIS\\_INTRODUCTION.pdf](http://www.hcup-us.ahrq.gov/db/nation/nis/2006NIS_INTRODUCTION.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>

For more information on the AHRQ Quality Indicators and preventable hospitalizations, see the following publications:

*AHRQ Quality Indicators—Guide to Prevention Quality Indicators: Hospital Admissions for Ambulatory Care Sensitive Conditions*. Online. March 12, 2007. U.S. Agency for Healthcare Research and Quality [http://www.qualityindicators.ahrq.gov/downloads/pqi/pqi\\_guide\\_v31.pdf](http://www.qualityindicators.ahrq.gov/downloads/pqi/pqi_guide_v31.pdf)

Kruzikas D. T., Jiang H. J., Remus D., et al. *Preventable Hospitalizations. Window Into Primary and Preventive Care, 2000*. HCUP Fact Book No. 5. Online. September 2004. U.S. Agency for Healthcare Research and Quality. <http://www.ahrq.gov/data/hcup/factbk5/factbk5.pdf>

### Suggested Citation

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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](mailto:hcup@ahrq.gov) or send a letter to the address below:

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Center for Delivery, Organization, and Markets  
Agency for Healthcare Research and Quality  
540 Gaither Road  
Rockville, MD 20850

**Table 1. Hospital admissions and costs for potentially preventable conditions, 2006**

| <b>Preventable conditions</b>                               | <b>Total number of admissions<br/>(in thousands)</b> | <b>Number of admissions per<br/>100,000<br/>population</b> | <b>Total hospital costs<br/>(in millions)</b> |
|---|--|--|---|
| <b>Adults</b>   |  |  |   |
| <b>Total<sup>a</sup></b>                                    | <b>4,094</b>   | <b>1,825</b>   | <b>\$30,055</b>                               |
| <i>Diabetes</i>   |  |  |   |
| Uncontrolled diabetes without complications                 | 49   | 22   | \$227   |
| Short-term diabetes complications                           | 133  | 59   | \$904   |
| Long-term diabetes complications                            | 295  | 131  | \$2,990                                       |
| Diabetes-related lower extremity amputations                | 83   | 37   | \$1,636                                       |
| <i>Circulatory diseases</i>                                 |  |  |   |
| Angina without procedure                                    | 80   | 36   | \$380   |
| Congestive heart failure                                    | 1,047  | 466  | \$8,381                                       |
| Hypertension  | 119  | 53   | \$606   |
| <i>Chronic respiratory diseases</i>                         |  |  |   |
| Asthma  | 283  | 126  | \$1,663                                       |
| Chronic obstructive pulmonary disease                       | 465  | 207  | \$3,269                                       |
| <i>Acute diseases</i>                                       |  |  |   |
| Bacterial pneumonia   | 928  | 414  | \$7,216                                       |
| Dehydration   | 248  | 110  | \$1,320                                       |
| Urinary tract infection                                     | 413  | 184  | \$2,372                                       |
| <b>Children</b>   |  |  |   |
| <b>Total</b>  | <b>276</b>   | <b>---<sup>b</sup></b>                                     | <b>\$737</b>                                  |
| Short-term diabetes complications (age 6 years to 17 years) | 16   | 32   | \$67  |
| Pediatric asthma (age 2 years to 17 years)                  | 94   | 144  | \$293   |
| Pediatric gastroenteritis (age 3 months to 17 years)        | 133  | 183  | \$269   |
| Urinary tract infection (age 3 months to 17 years)          | 33   | 45   | \$108   |

<sup>a</sup>The total for adults excludes those lower extremity amputations that are also reported under short-term or long-term diabetes complications, as to avoid double counting.

<sup>b</sup>Due to differences in the age criterion for individual pediatric conditions, the total number of admissions per 100,000 children is not estimated.

Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2006 and AHRQ Quality Indicators, version 3.1

**Table 2. Hospital admission rates for potentially preventable conditions, by median income of patient ZIP Code, 2006**

| Preventable conditions                                     | Median income of patient ZIP Code                          |                 |                |                                  |   |
|--|--|-----------------|----------------|----------------------------------|---|
|  | First quartile (lowest income)                             | Second quartile | Third quartile | Fourth quartile (highest income) | Ratio of the highest to the lowest rates <sup>a</sup> |
|  | (Number of admissions per 100,000 population) <sup>b</sup> |                 |                |                                  |   |
| <b>Adults</b>  |  |                 |                |                                  |   |
| <i>Diabetes</i>  |  |                 |                |                                  |   |
| Uncontrolled diabetes without complications                | 41.4   | 22.3            | 14.5           | 9.9                              | 4.2   |
| Short-term diabetes complications                          | 91.6   | 65.5            | 49.4           | 34.5                             | 2.7   |
| Long-term diabetes complications                           | 193.4  | 133.2           | 102.6          | 86.4                             | 2.2   |
| Diabetes-related lower extremity amputations               | 52.7   | 38.2            | 29.8           | 23.0                             | 2.3   |
| <i>Circulatory diseases</i>                                |  |                 |                |                                  |   |
| Angina without procedure                                   | 54.3   | 36.2            | 25.9           | 23.0                             | 2.4   |
| Congestive heart failure                                   | 613.7  | 444.0           | 385.2          | 356.1                            | 1.7   |
| Hypertension   | 86.3   | 51.2            | 38.8           | 33.5                             | 2.6   |
| <i>Chronic respiratory diseases</i>                        |  |                 |                |                                  |   |
| Asthma   | 198.7  | 125.4           | 99.2           | 81.8                             | 2.4   |
| Chronic obstructive pulmonary disease                      | 292.4  | 214.1           | 166.4          | 132.2                            | 2.2   |
| <i>Acute diseases</i>                                      |  |                 |                |                                  |   |
| Bacterial pneumonia  | 504.7  | 426.3           | 356.7          | 314.3                            | 1.6   |
| Dehydration  | 128.4  | 108.3           | 93.7           | 97.5                             | 1.3   |
| Urinary tract infection                                    | 223.3  | 180.7           | 159.4          | 155.8                            | 1.4   |
| <b>Children</b>  |  |                 |                |                                  |   |
| Short-term diabetes complications (age 6 years to 17years) | 42.6   | 35.8            | 30.2           | 19.7                             | 2.2   |
| Pediatric asthma (age 2 years to 17 years)                 | 223.8  | 142.6           | 111.0          | 96.8                             | 2.3   |
| Pediatric gastroenteritis (age 3 months to 17 years)       | 231.9  | 190.1           | 153.2          | 144.0                            | 1.6   |
| Urinary tract infection (age 3 months to 17 years)         | 62.6   | 50.1            | 37.2           | 29.3                             | 2.1   |

<sup>a</sup>The fourth quartile (highest income) serves as the reference for comparison and statistical testing.

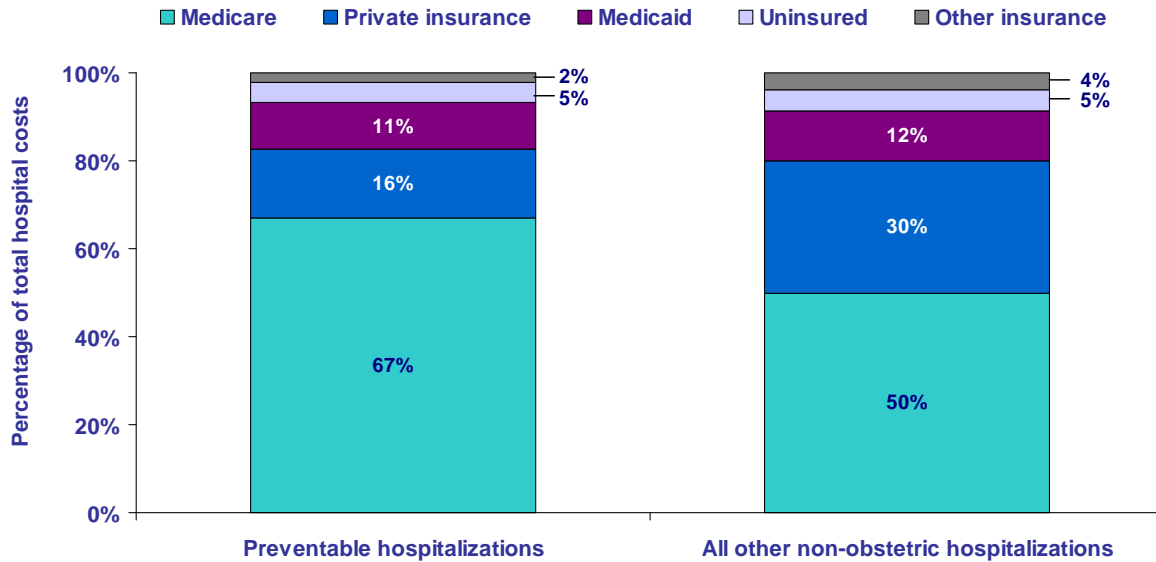
<sup>b</sup>Rates are adjusted by age and gender using the total U.S. population for 2000 as the standard population.

Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2006 and AHRQ Quality Indicators, version 3.1





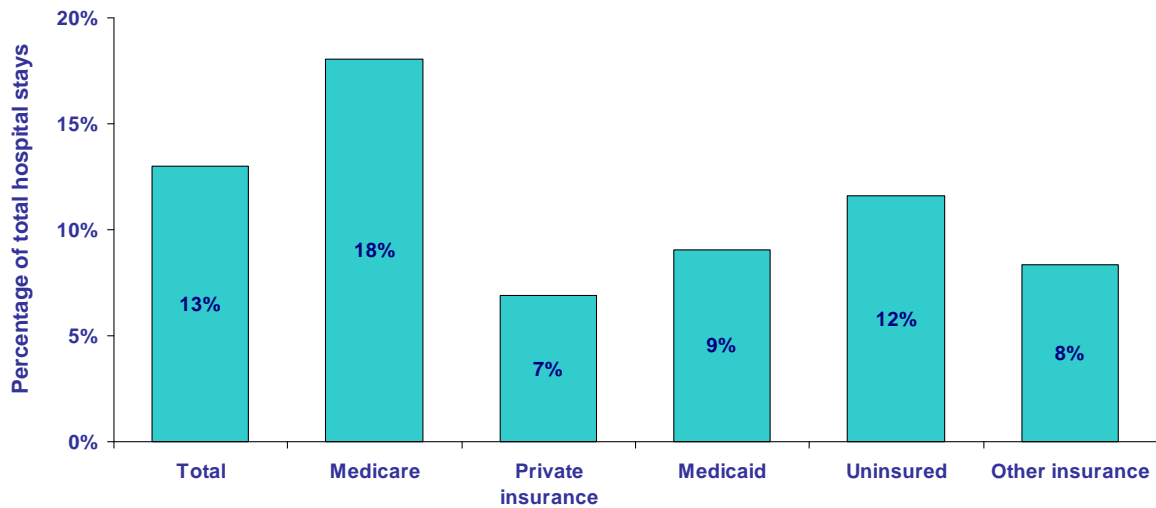
**Figure 1. Medicare patients contributed to 67 percent of total hospital costs for potentially preventable hospitalizations—significantly higher than the 50 percent share of costs for all other hospitalizations, 2006\***



\* Includes total hospital costs for adult hospitalizations only  
 Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2006 and AHRQ Quality Indicators, version 3.1



**Figure 2. Potentially preventable hospitalizations accounted for one in five Medicare stays (18 percent), as compared to only 7 percent of privately insured stays, 2006\***



\*Includes adult non-obstetric hospitalizations only  
 Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2006 and AHRQ Quality Indicators, version 3.1