

STATISTICAL BRIEF #17

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Hospital Stays among Patients with Diabetes, 2004

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Introduction

In 2004, 14.7 million Americans were diagnosed with diabetes.¹ Diabetes is a disease in which the body does not produce or properly use insulin. This disorder is marked by high levels of blood glucose that can lead to serious complications and premature death. Without high-quality primary and preventive care, individuals with diabetes are at a higher risk for renal, visual, neurological, and circulatory disorders, and can experience serious complications such as lower-limb amputations. These chronic and debilitating complications make diabetes an important source of hospital-based medical care and costs.

This Statistical Brief presents data from the Healthcare Cost and Utilization Project (HCUP) on hospital stays among patients with diabetes in 2004. The utilization and costs of hospital care are compared for patients with diabetes and those without. Variation in hospital utilization among patients with diabetes is illustrated by principal reason for hospitalization and by expected primary source of payment. Lower-limb amputations among patients hospitalized with diabetes are also described. All differences between estimates noted in the text are statistically significant at the 0.05 level or better.

Findings

In 2004, nearly 6.3 million hospital stays occurred among patients with diabetes (i.e., diabetes was the principal reason for hospitalization or was a coexisting condition). This figure resulted in a hospitalization rate of 427.9 stays per 1,000 people with diagnosed diabetes—a slight decrease from 1997, when the hospitalization rate was 444.3 stays per 1,000 people with diagnosed diabetes (figure 1).² These counts may include multiple hospitalizations by the same individuals, which is common among patients with diabetes.³ Hospital stays for patients principally admitted for

¹Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, National Diabetes Surveillance System, 2004. <http://www.cdc.gov/diabetes/statistics/index.htm#prevalence> (Accessed on October 24, 2006)

²The denominator is the total number of persons diagnosed with diabetes in the United States in 2004, which was approximately 14.7 million people (CDC, 2004).

³Jiang HJ, Stryer D, Friedman B, Andrews R. Multiple Hospitalizations for Patients with Diabetes. *Diabetes Care* 26(5):1421-26, 2003.

Highlights

- In 2004, there were almost 6.3 million hospitalizations for patients with diabetes, which translates to 427.9 hospital stays for every 1,000 persons with diabetes in the U.S.
- The hospitalization of patients with a principal diagnosis of diabetes cost \$3.9 billion in 2004, but stays with any mention of diabetes totaled \$57.8 billion; thus, 20 percent of hospital costs involved diabetes as either a principal or coexisting condition.
- Compared with all non-diabetes hospital stays, hospitalizations among patients with diabetes were longer, more costly, more likely to originate in the emergency department, and more likely among Medicare-insured patients and males.
- Hospital stays principally for treating diabetes were more likely to be uninsured compared with stays reporting any mention of diabetes. Diabetes was the principal diagnosis for 23.7 stays per 1,000 uninsured hospitalizations compared with 9.3 per 1,000 privately insured stays and 15.0 per 1,000 Medicaid-covered stays.
- Diabetes was a coexisting condition for 40.1 percent of stays for congestive heart failure, 32.8 percent of stays for coronary atherosclerosis, 30.2 percent of stays for acute myocardial infarction, and 28.2 percent of stays for acute cerebrovascular disease.
- The number of lower-limb amputations per 1,000 hospital stays for patients with diabetes was about twice as high among the uninsured than among insured patients, and more than two times higher for males than for females.

diabetes cost \$3.9 billion, but stays with any mention of diabetes as either a principal or coexisting condition totaled \$57.8 billion in hospital costs in 2004 (table 1). In total, 20 percent of hospital costs in the United States involved diabetes.

General characteristics of hospital stays among patients with diabetes

Table 1 shows that, on average, patients hospitalized with diabetes were nearly 21 years older than patients without diabetes (64.6 years versus 43.8 years). Males accounted for 46.0 percent of all hospitalizations of patients with diabetes, while non-diabetes stays were 39.8 percent male. In 2004, the mean length of stay for hospitalizations among patients with diabetes was 5.5 days, which was one day longer than non-diabetes stays. The average cost per hospitalization among patients with diabetes was about 29 percent higher than the average cost for all non-diabetes stays (\$9,400 versus \$7,300). Moreover, hospital admissions originating in the emergency department accounted for 59.1 percent of all hospital stays for patients with diabetes compared with 40.0 percent for non-diabetes stays.

Diabetes was the principal reason for hospitalization in 8 percent (512,500) of all hospital stays among patients with diabetes. Patients admitted principally for the treatment of diabetes were nearly 12 years younger than all patients hospitalized with diabetes. Hospital stays principally for the treatment of diabetes were also slightly shorter and less costly than all hospital stays among patients with diabetes. However, admissions principally for diabetes were more likely to originate in the emergency department than all hospitalizations among patients with diabetes (67.4 percent and 59.1 percent, respectively).

The percentage of stays covered by Medicare was lower when diabetes was the principal reason for admission (35.9 percent), as compared with all diabetes stays (53.5 percent). It is also worth noting that the percentage of uninsured hospitalizations was nearly three times higher for hospital stays principally for treating diabetes than for all stays among patients with diabetes (9.1 percent versus 3.3 percent).

Hospital stays principally for diabetes, by payer

Figure 2 shows the number of hospitalizations principally for diabetes per 1,000 stays for each payer. Hospital stays principally for treating diabetes were more likely to be uninsured. There were 23.7 diabetes stays per 1,000 uninsured hospitalizations. On the other hand, diabetes was the principal reason for admission for 15.0 stays per 1,000 Medicaid stays, 14.4 stays per 1,000 Medicare stays, and 9.3 stays per 1,000 privately insured hospitalizations.

Most common principal reasons for the hospitalization of patients with diabetes

Table 2 illustrates that diabetes was the most common principal reason for hospital admission among patients with diabetes. However, nearly a quarter of all stays for patients with diabetes were principally for the treatment of six circulatory disorders: congestive heart failure, coronary atherosclerosis (hardening of the arteries), acute myocardial infarction (heart attack), nonspecific chest pain, acute cerebrovascular disease (stroke), and cardiac dysrhythmias. Pneumonia, complication of medical devices, and skin and subcutaneous tissue infections were also common reasons for hospitalization among patients with diabetes.

Diabetes was a coexisting condition for 40.1 percent of stays for congestive heart failure, 32.8 percent of stays for coronary atherosclerosis, and 30.2 percent of stays for acute myocardial infarction. Diabetes was also present in more than one-fourth of all hospitalizations for acute cerebrovascular disease (28.2 percent), skin and subcutaneous infections (27.6 percent), and complications of medical devices (26.3 percent).

Amputations among patients hospitalized with diabetes

Long-term peripheral circulatory problems caused by diabetes can lead to gangrene and necrosis of the muscle and skin in the legs; often, these complications will lead to amputation of the toes, feet, or legs. Lower-limb amputations suggest poor control of diabetes. In 2004, lower-limb amputations among patients hospitalized for diabetes varied significantly by expected source of payment and by gender (figure 3). The number of amputations per 1,000 hospital stays for patients with diabetes was twice as high among the uninsured (12.7), as compared with hospital stays covered by Medicare (5.7), private insurance (6.2), and Medicaid (6.7). In addition, males hospitalized with diabetes had more than twice as many amputations (9.2 per 1,000 stays) as females (4.0 amputations per 1,000 hospital stays).

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 1997, 1998, 1999, 2000, 2001, 2002, and 2003 NIS.

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.

Costs and charges

Total hospital charges were converted to costs using cost-to-charge ratios based on hospital accounting reports from the Centers for Medicare and Medicaid Services (CMS).⁴ 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 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, Procedures, 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. All-listed procedures include all procedures performed during the hospital stay.

ICD-9-CM is the International Classification of Diseases, Ninth Revision, Clinical Modification, which assigns numeric codes to diagnoses and procedures. There are about 12,000 ICD-9-CM diagnosis codes and 3,500 procedure codes.

CCS categorizes ICD-9-CM diagnoses and procedures into 260 clinically meaningful categories.⁵ This "clinical grouper" makes it easier to quickly understand patterns of diagnoses and procedures.

⁴HCUP 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

⁵HCUP 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

For this Statistical Brief, diabetes hospitalizations were identified using ICD-9-CM diagnosis codes in the range of 250.00–250.93, 790.2–790.29, 791.5–791.6, V45.85, V53.91, and V65.46. Lower-limb amputations were identified using all-listed ICD-9-CM procedure codes in the range of 84.10-84.19 and exclude amputations related to trauma.

Admission source

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.

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.

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.

References

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., 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

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 or send a letter to the address below:

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Table 1. Hospital stays of patients with diabetes compared to all non-diabetes hospital stays, 2004

	Principal diagnosis of diabetes	All-listed diagnosis of diabetes*	All non-diabetes hospital stays
Total number of discharges	512,500	6,290,000	32,371,800
Mean age	52.9	64.6	43.8
Percent male	50.6%	46.0%	39.8%
Mean length of stay, days	5.3	5.5	4.5
Mean cost of hospitalization	\$7,600	\$9,400	\$7,300
Aggregate costs for U.S. (in billions)	\$3.9	\$57.8	\$231.1
Percentage admitted through the emergency department	67.4%	59.1%	40.0%
Payer:			
Medicare	35.9%	53.5%	29.2%
Medicaid	28.1%	20.6%	25.6%
Private Insurance	24.2%	20.4%	37.2%
Uninsured	9.1%	3.3%	5.0%

*All-listed diabetes includes hospital stays with diabetes listed as the principal diagnosis or as a secondary diagnosis.

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

Table 2. Top 10 most common principal reasons for hospitalization among patients with diabetes, 2004*

Rank	Principal diagnosis	Number of hospital stays among patients with diabetes (percentage of all diabetes stays)*	Percentage of hospital stays with diabetes as a coexisting condition**
1	Diabetes	512,500 (8.1%)	N/A
2	Congestive heart failure, non-hypertensive	442,400 (7.0%)	40.1%
3	Coronary atherosclerosis (hardening of the arteries)	391,400 (6.2%)	32.8%
4	Pneumonia	261,000 (4.1%)	21.5%
5	Acute myocardial infarction (heart attack)	209,700 (3.3%)	30.2%
6	Nonspecific chest pain	202,500 (3.2%)	23.9%
7	Complication of device, implant or graft	158,200 (2.5%)	26.3%
8	Acute cerebrovascular disease (stroke)	153,800 (2.4%)	28.2%
9	Cardiac dysrhythmias	146,100 (2.3%)	21.1%
10	Skin and subcutaneous tissue infections	139,300 (2.2%)	27.6%

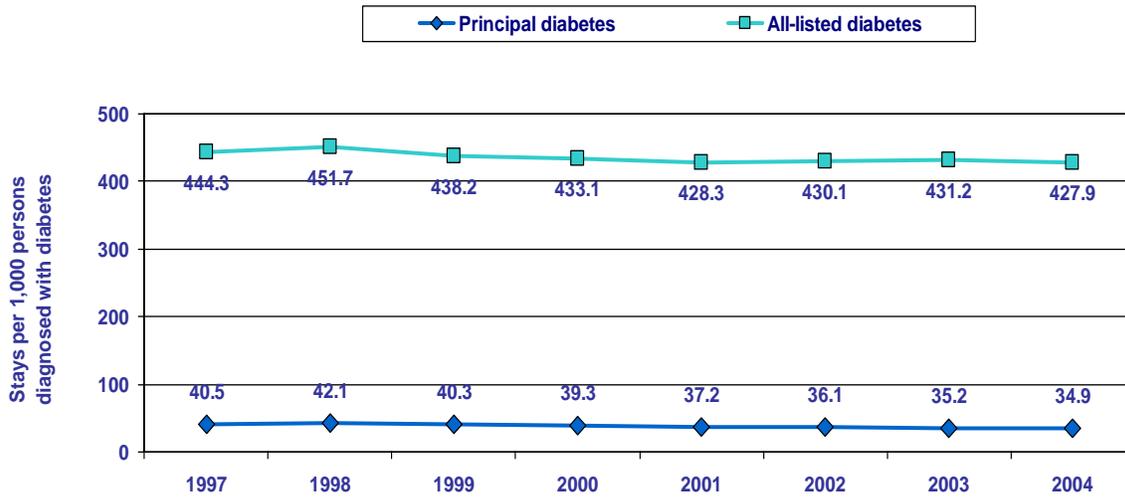
*Based on all-listed diagnoses.

**Based on records with diabetes as a secondary diagnosis.

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



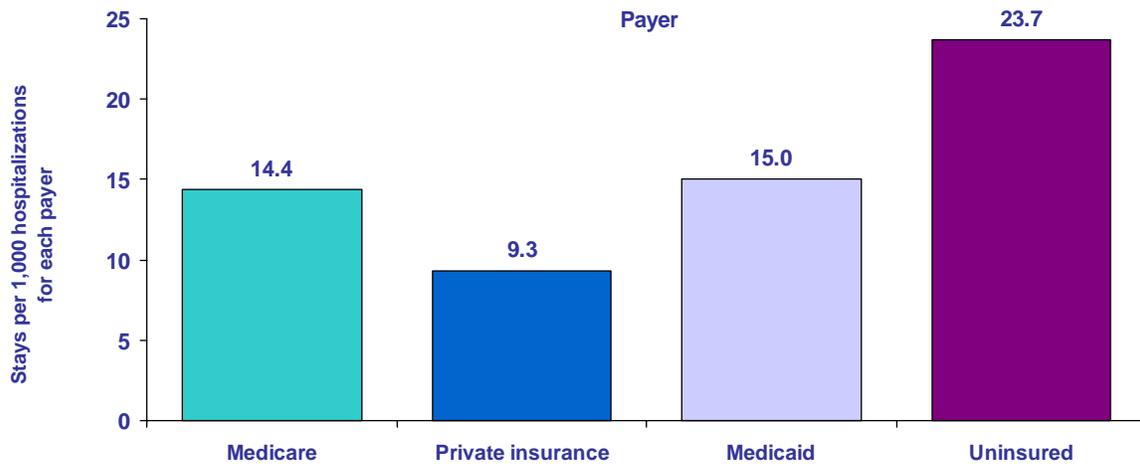
Figure 1. Hospitalization rates for persons diagnosed with diabetes, 1997–2004*



*The number of persons diagnosed with diabetes is based on data from the National Center for Chronic Disease Prevention and Health Promotion's National Diabetes Surveillance System (CDC, 2004).
 Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2004.



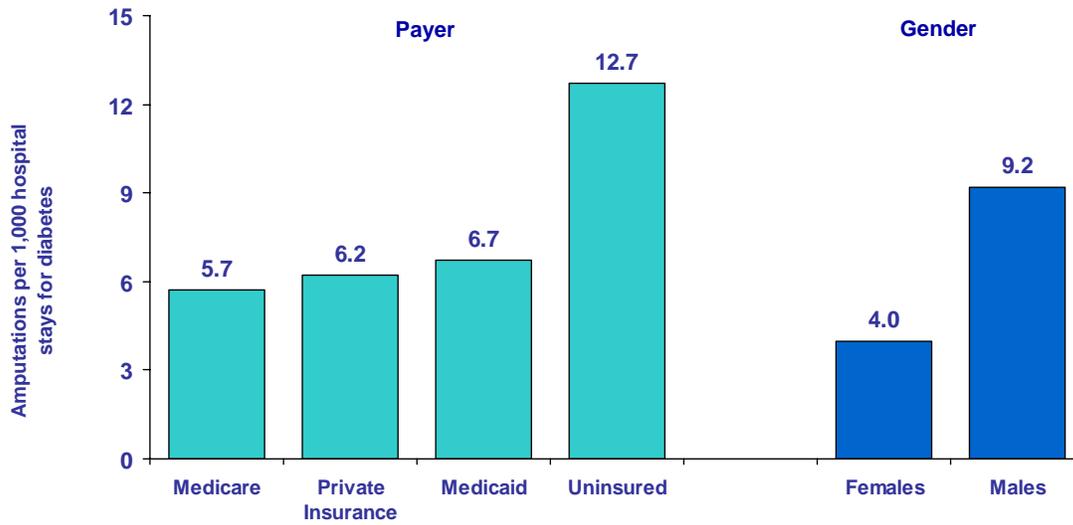
Figure 2. Hospitalizations principally for diabetes, by payer, 2004*



*Based on principal diagnosis.
 Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2004.



Figure 3. Lower-limb amputations among patients hospitalized with diabetes, by payer and gender, 2004*



*Based on all-listed diagnoses and all-listed procedures.

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