

STATISTICAL BRIEF #26

February 2007

Hospital Stays for Circulatory Diseases, 2004

C. Allison Russo, M.P.H., Karen Ho, M.H.S., and Anne Elixhauser, Ph.D.

Introduction

Circulatory diseases—conditions including heart disease, stroke, and peripheral vascular diseases such as deep vein thrombosis and varicose veins—are the most common reason for admission to the hospital for both men and women, excluding pregnancy and childbirth. Circulatory diseases often result in acute episodes that require care in emergency rooms and hospitals. As a result, medical care for circulatory diseases is a significant contributor to the number of hospital admissions and total hospital costs in the United States.

This Statistical Brief presents data from the Healthcare Cost and Utilization Project (HCUP) on the hospital treatment of circulatory diseases in 2004. The usage and expense of hospital stays for circulatory diseases are compared with hospital stays for all conditions. Additionally, the most common circulatory diseases resulting in hospital admission are described, and variations in hospital utilization are illustrated by payer. All differences between estimates noted in the text are statistically significant at the 0.05 level or better.

Findings

Characteristics of hospital stays for circulatory diseases

In 2004, Americans experienced almost 6.8 million hospital stays for circulatory system diseases, which accounted for about one in six hospitalizations nationwide. The total hospital cost for circulatory disease was \$71.2 billion, which accounted for one-fourth of the total cost of hospital care in the U.S.

Table 1 describes the general characteristics of hospitalizations for circulatory diseases. On average, hospital stays for diseases of the circulatory system were more costly, originated in the emergency room more often, and resulted in more in-hospital deaths, as compared with hospital stays for all conditions. In 2004, the mean length of stay for the treatment of a circulatory disease was 4.5 days, which was the same as the length of stay for all conditions combined.

However, the average cost per hospitalization for circulatory diseases was about 41 percent higher than the average cost for all

Highlights

- In 2004, about one out of every six hospital stays—almost 6.8 million—resulted from circulatory disease, the most common reason for hospitalization in the U.S. Hospital costs for these conditions totaled \$71.2 billion.
- On average, hospitalizations for circulatory diseases were more costly, originated in the emergency department more often, and resulted in more in-hospital deaths than hospital stays for all conditions combined.
- While the overall rate of emergency admission was 43.1 percent for all hospital stays, 60.7 percent of hospital stays for circulatory disease began in the emergency department.
- Coronary atherosclerosis was the most common circulatory disease causing hospitalization, and one of the most common conditions overall, accounting for 3.1 percent of all hospital stays in 2004.
- Among the 10 most common circulatory diseases, the highest emergency admission rates were for acute cerebrovascular disease (77.8 percent), non-specific chest pain (81.3 percent), and transient cerebral ischemia (82.9 percent).
- The in-hospital death rate for acute myocardial infarction and acute cerebrovascular disease was 7.2 percent and 10.7 percent, respectively. These rates were two to three times higher than the average in-hospital death rate for all circulatory disorders.
- Medicare was billed for more than half of all hospital stays for circulatory diseases.
- About 8.2 percent of hospital admissions for nonspecific chest pain were for uninsured patients.

stays (\$10,800 versus \$7,700). Moreover, hospital admissions originating in the emergency department accounted for 60.7 percent of all hospital stays for circulatory diseases; this figure was also 41 percent higher than the overall rate of 43.1 percent.

Distinct differences also emerge for in-hospital mortality: 3.3 percent of patients admitted to the hospital for a circulatory disease died in the hospital, which was significantly higher than the average in-hospital death rate of 2.1 percent.

Circulatory diseases causing hospitalization

Table 2 highlights the specific circulatory diseases that resulted in hospitalization. In 2004, the top 10 circulatory conditions resulted in nearly 15 percent of all hospitalizations in the United States. Coronary atherosclerosis (hardening of the arteries of the heart) was the most common circulatory disease causing hospitalization, accounting for 3.1 percent of all hospital stays. Congestive heart failure resulted in 2.9 percent of all hospital stays. Three acute heart conditions—nonspecific chest pain, acute myocardial infarction (heart attack), and cardiac dysrhythmias (irregular heart beat)—each comprised about 2 percent of all hospitalizations. These five conditions—coronary atherosclerosis, congestive heart failure, nonspecific chest pain, acute myocardial infarction, and cardiac dysrhythmias—rank among the top 10 conditions treated in U.S. hospitals overall.

Acute cerebrovascular disease (stroke) and transient cerebral ischemia (mini-stroke)—conditions caused by restricted blood flow to the brain—combined accounted for about 2 percent of all hospital stays (1.4 percent and 0.5 percent, respectively). Other common circulatory diseases included hypertension with complications, peripheral and visceral atherosclerosis, and phlebitis.

Among the 10 most common circulatory diseases, the highest emergency admission rates were for acute cerebrovascular disease (77.8 percent), nonspecific chest pain (81.3 percent), and transient cerebral ischemia (82.9 percent). Among the top 10 circulatory diseases, the in-hospital death rate was highest for acute myocardial infarction (7.2 percent) and acute cerebrovascular disease (10.7 percent). The in-hospital death rate for congestive heart failure was 4.0 percent. The in-hospital death rate associated with a principal diagnosis of cardiac arrest was high (51.6 percent). Although most cardiac arrest is caused by coronary heart disease, other causes include respiratory arrest, drowning, and trauma.

Common circulatory diseases, by payer

Figure 1 shows the distribution of hospital stays by payer for common circulatory diseases. On average, Medicare was billed for more than half of all hospital stays for circulatory diseases, including coronary atherosclerosis, congestive heart failure, acute myocardial infarction, and cardiac dysrhythmias. Hospitalizations for congestive heart failure and cardiac dysrhythmias were billed to Medicare at especially high rates (68.3 percent and 63.4 percent, respectively.) Conversely, hospital stays for nonspecific chest pain were more likely to be billed to private insurance. Hospital admissions for nonspecific chest pain occurred among the uninsured at twice the rate of hospital admissions for all circulatory disease combined in the uninsured population (8.2 percent versus 4.2 percent).

Data Source

The estimates in this Statistical Brief are based on data from the HCUP 2004 Nationwide Inpatient Sample (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 HCUP cost-to-charge ratios based on hospital accounting reports from the Centers for Medicare and Medicaid Services (CMS).¹ 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, 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.

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.² This “clinical grouper” makes it easier to quickly understand patterns of diagnoses and procedures.

For this report, circulatory diseases were defined as CCS categories:

- 96 Heart valve disorders
- 97 Peri-, endo-, and myocarditis, cardiomyopathy
- 98 Essential hypertension
- 99 Hypertension with complications and secondary hypertension
- 100 Acute myocardial infarction
- 101 Coronary atherosclerosis and other heart disease
- 102 Nonspecific chest pain
- 103 Pulmonary heart disease
- 104 Other and ill-defined heart disease
- 105 Conduction disorders
- 106 Cardiac dysrhythmias
- 107 Cardiac arrest and ventricular fibrillation
- 108 Congestive heart failure, nonhypertensive
- 109 Acute cerebrovascular disease
- 110 Occlusion or stenosis of precerebral arteries
- 111 Other and ill-defined cerebrovascular disease
- 112 Transient cerebral ischemia
- 113 Late effects of cerebrovascular disease
- 114 Peripheral and visceral atherosclerosis
- 115 Aortic, peripheral, and visceral artery aneurysms
- 116 Aortic and peripheral arterial embolism or thrombosis

¹HCUP 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

²HCUP CCS. Healthcare Cost and Utilization Project (HCUP). August 2006. U.S. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/toolsoftware/ccs/ccs.jsp

- 117 Other circulatory disease
- 118 Phlebitis, thrombophlebitis, and thromboembolism
- 119 Varicose veins of lower extremity
- 121 Other diseases of veins and lymphatics
- 213 Cardiac and circulatory congenital anomalies

Detailed statistics on “104 Other and ill-defined heart disease,” “111 Other and ill-defined cerebrovascular disease,” “117 Other circulatory disease,” and “121 Other diseases of veins and lymphatics” are not included in this report because these categories comprise a number of infrequent conditions and often include symptoms rather than specific circulatory disorders.

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 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>

Suggested Citation

Russo, C. A. (Thomson Medstat), Ho, K. (AHRQ), and Elixhauser, A.(AHRQ). *Hospital Stays for Circulatory Diseases, 2004*. HCUP Statistical Brief #26. February 2007. Agency for Healthcare Research and Quality, Rockville, MD. <http://www.hcup-us.ahrq.gov/reports/statbriefs/sb26.pdf>

* * *

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. Hospitalizations for circulatory diseases compared to hospitalizations for all conditions, 2004

	Hospital stays for circulatory diseases*	Hospital stays for all conditions
Number of hospital stays (percentage of all hospital stays)	6,799,800 (17.6%)	38,661,800 (100.0%)
Mean length of stay, days	4.5	4.6
Mean hospital cost	\$10,800	\$7,700
Aggregate costs (percentage of total national cost)	\$71.2 billion (24.8%)	\$287.0 billion (100.0%)
Percentage admitted through the emergency department	60.7%	43.1%
Percentage died in hospital	3.3%	2.1%

*Based on principal diagnosis.

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

Table 2. Circulatory diseases that cause hospitalizations, 2004

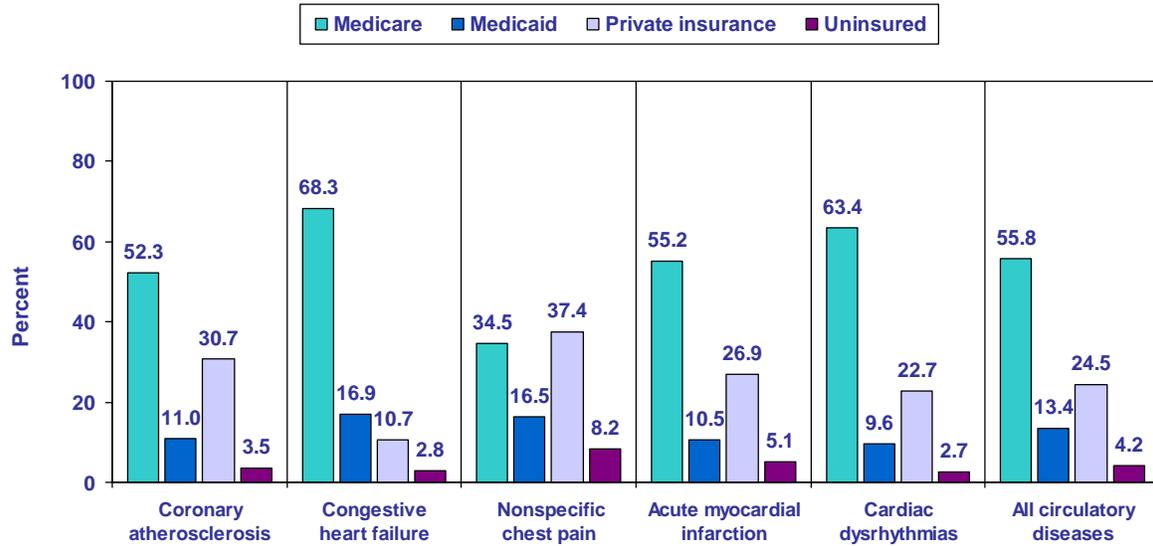
	Principal diagnosis	Total number of stays	Percent of all hospital stays	Mean length of stay	Mean cost	Aggregate cost (in millions)	Percent admitted through the ED	Percent died in the hospital	Mean age
1	Coronary atherosclerosis	1,192,400	3.1%	3.4	\$13,200	\$15,738	40.5%	0.6%	65
2	Congestive heart failure	1,104,400	2.9%	5.5	\$9,400	\$10,426	71.4%	4.0%	73
3	Nonspecific chest pain	845,700	2.2%	1.9	\$4,100	\$3,458	81.3%	0.1%	58
4	Acute myocardial infarction (heart attack)	695,100	1.8%	5.4	\$16,200	\$11,260	64.2%	7.2%	68
5	Cardiac dysrhythmias	693,700	1.8%	3.5	\$8,700	\$6,045	61.1%	1.2%	70
6	Acute cerebrovascular disease (stroke)	546,000	1.4%	6.3	\$11,100	\$6,055	77.8%	10.7%	71
7	Hypertension with complications	226,100	0.6%	5.3	\$9,900	\$2,221	65.6%	2.4%	63
8	Transient cerebral ischemia	187,900	0.5%	3.0	\$5,000	\$939	82.9%	0.2%	71
9	Peripheral and visceral atherosclerosis	174,300	0.5%	5.7	\$12,800	\$2,219	33.2%	4.8%	69
10	Phlebitis, thrombophlebitis and thromboembolism	155,900	0.4%	5.2	\$6,400	\$993	52.4%	1.1%	63
11	Occlusion or stenosis of precerebral arteries	142,100	0.4%	2.6	\$7,700	\$1,086	13.5%	0.4%	71
12	Pulmonary heart disease	135,100	0.3%	6.4	\$9,900	\$1,333	70.2%	4.7%	63
13	Heart valve disorders	89,500	0.2%	8.8	\$31,300	\$2,791	19.6%	4.0%	68
14	Aortic, peripheral, and visceral artery aneurysms	83,600	0.2%	7.5	\$24,700	\$2,067	24.8%	9.2%	70
15	Peri-, endo-, and myocarditis, cardiomyopathy	78,900	0.2%	7.1	\$15,400	\$1,220	56.9%	4.5%	56
16	Essential hypertension	73,600	0.2%	2.8	\$4,400	\$325	74.4%	0.1%	61
17	Conduction disorders	68,800	0.2%	3.3	\$13,900	\$957	44.9%	1.5%	72
18	Cardiac and circulatory congenital anomalies	46,500	0.1%	8.2	\$29,600	\$1,368	10.6%	2.6%	20
19	Aortic and peripheral arterial embolism or thrombosis	37,100	0.1%	6.9	\$15,700	\$583	40.9%	5.1%	67
20	Late effects of cerebrovascular disease	19,700	0.1%	9.8	\$8,300	\$164	51.7%	4.7%	71
21	Cardiac arrest and ventricular fibrillation	16,200	0.0%	4.9	\$16,700	\$270	69.2%	51.6%	65
22	Varicose veins of lower extremity	5,900	0.0%	5.9	\$6,700	\$40	34.5%	*	64

*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.



Figure 1. The distribution of hospital stays for the most frequent circulatory diseases, by payer, 2004 *



*Based on principal diagnosis.

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