HEALTHCARE COST AND UTILIZATION PROJECT

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Hospital Stays for Stroke and Other Cerebrovascular Diseases, 2005

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Introduction

Acute cerebrovascular disease, or stroke, was the third-leading cause of death for Americans and the leading cause of disability in 2005.[1,2] A stroke occurs when blood flow to part of the brain is hindered by either a blood clot that obstructs an artery in the brain (called an ischemic stroke), or a blood vessel in the brain that breaks (called a hemorrhagic stroke).[3] Other cerebrovascular diseases such as transient cerebral ischemia (involving stroke symptoms that last less that 24 hours, sometimes called a mini-stroke) and occlusion or stenosis of the precerebral arteries (a blockage or narrowing of the arteries outside the brain, e.g. carotid arteries in the neck) may indicate that a stroke will occur in the future. Strokes can limit the amount of oxygen the affected part of the brain receives, killing brain cells and potentially leading to brain damage. Depending on the area of the brain affected and extent of harm, minor to debilitating physical and psychological disabilities can occur, including paralysis, speech difficulties, and cognitive issues. An estimated two-thirds of survivors of stroke will experience some type of disability as a result of their stroke.[4]

This Statistical Brief presents data from the Healthcare Cost and Utilization Project (HCUP) on the hospital treatment of stroke and other cerebrovascular diseases in 2005. The usage and expense of hospital stays for cerebrovascular disease are compared with hospital stays for all conditions.[5] Additionally, the most common types of cerebrovascular diseases resulting in hospital admission are described, and trends in hospitalization rates (from 1997 through 2005) for each type are presented. Variations in hospital utilization across the types of cerebrovascular diseases are illustrated by age and primary payer. The usage of procedures commonly associated with the treatment of cerebrovascular disease is also discussed. All differences between estimates noted in the text are statistically significant at the 0.05 level or better.

[1]Kung HC, Hoyert DL, Xu JQ, Murphy SL. Deaths: Final Data for 2005. National Vital Statistics Reports; Vol. 56 No. 10. National Center for Health Statistics, 2008. http://www.cdc.gov/nchs/data/nvsr/nvsr56/nvsr56_10.pdf (Accessed March 20, 2008).
[2]Stroke 101 Fact Sheet, National Stroke Association, 2007. http://www.stroke.org/site/DocServer/STROKE_101_Fact_Sheet.pdf?docID=4541 (Accessed March 20, 2008).
[3] Types of Stroke, National Stroke Association, 2007. http://www.stroke.org/site/PageServer?pagename=TYPE (Accessed March 20, 2008).
[4] What is Stroke? National Stroke Association, 2007. http://www.stroke.org/site/PageServer?pagename=STROKE (Accessed March 20, 2008).
[5] Hospital stays for maternal and neonatal conditions have been excluded from this analysis.

Highlights

- In 2005, there were an estimated 892,300 hospitalizations for cerebrovascular disease, totaling $8.5 billion in hospital cost.
- More than half of admissions for cerebrovascular disease resulted from acute stroke, including 46.2 percent for ischemic stroke and 12.8 percent for hemorrhagic stroke, while more than one-third were the result of possible stroke precursors, such as transient cerebral ischemia (20.5 percent) and occlusion or stenosis of the precerebral arteries (15.8 percent). These four specific cerebrovascular diseases account for 95 percent of all admissions for cerebrovascular disease.
- Stays for cerebrovascular disease originated in the emergency room more often, were discharged to nursing homes and rehabilitations facilities at a higher rate, and resulted in more in-hospital deaths, as compared with hospital stays for all conditions.
- Patients hospitalized for hemorrhagic stroke are much more likely to die in hospital than those with ischemic stroke (25.1 percent mortality rate compared to 5.9 percent).
- While hospitalizations for hemorrhagic stroke have remained stable between 1997 and 2005, there has been a decline in the hospitalization rate for ischemic stroke, transient cerebral ischemia, and occlusion or stenosis of the precerebral arteries.
- There were nearly 110,000 elective carotid endarterectomies performed in 2005 to prevent stroke in patients with narrowed or blocked precerebral arteries.

Findings

In 2005, there were an estimated 892,300 hospitalizations for cerebrovascular disease, which represented a hospitalization rate of 77.3 stays per 10,000 persons older than 45 years of age. The total hospital cost for cerebrovascular disease was $8.5 billion—about three percent of the total cost of hospital care in the U.S.

Characteristics of the most common cerebrovascular diseases
Table 1 highlights the hospital utilization characteristics of four specific cerebrovascular diseases that together account for 95 percent of all admissions for cerebrovascular disease. The table also provides the characteristics of all cerebrovascular stays and all hospital stays (excluding maternal and neonatal) for comparison. In 2005, more than half of admissions for cerebrovascular disease resulted from acute stroke, including 46.2 percent for ischemic stroke and 12.8 percent for hemorrhagic stroke. More than one-third of hospitalizations for cerebrovascular disease were the result of possible stroke precursors, such as transient cerebral ischemia (20.5 percent) and occlusion or stenosis of the precerebral arteries without mention of cerebral infarction (15.8 percent).

On average, hospital stays for cerebrovascular disease had similar resource requirements as hospital stays for all conditions given that the length of stay was similar (5.0 days) and the average cost per stay was equal ($9,500). However, there were substantial differences between the common cerebrovascular diseases. Admissions for hemorrhagic stroke were the longest and most costly, averaging 8.4 days and $19,500 per stay. Ischemic stroke had the next highest average length and cost per stay at 5.6 days and $9,100 per stay. Admissions for transient cerebral ischemia and occlusion or stenosis of precerebral arteries were considerably shorter (3.0 and 2.5 days, respectively). However, at an average cost of $8,000 per stay, hospitalizations for occlusion or stenosis of precerebral arteries had the highest average cost per day ($3,200), as compared to other common cerebrovascular diseases.[6]

Table 1 also shows that admissions for cerebrovascular disease originated in the emergency room more often, were discharged to nursing homes and rehabilitations facilities at a higher rate, and resulted in more in-hospital deaths, as compared with hospital stays for all conditions. For example, hospital admissions originating in the emergency department accounted for 65.7 percent of hospital stays for cerebrovascular disease, which was significantly higher than the 54.1 percent of all hospital stays originating in the emergency department. In addition, nearly one-third (29.8 percent) of cerebrovascular disease hospitalizations resulted in discharge to a nursing home or rehabilitation facility—almost twice the percentage of all hospital stays discharged to these facilities. Distinct differences also emerged for in-hospital mortality: 6.2 percent of patients admitted to the hospital for a cerebrovascular disease died in the hospital, which was more than twice the average in-hospital death rate of 2.7 percent.

These characteristics of admissions varied across the common cerebrovascular diseases. The percentage of emergency admissions was highest among transient cerebral ischemia (81.7 percent) and ischemic stroke (78.2 percent). Only 12.1 percent of stays for occlusion or stenosis of precerebral arteries originated in the emergency department, indicating that they were generally admitted for elective treatments. As expected, the rehabilitation and nursing home transfer rate for ischemic and hemorrhagic stroke (44.0 percent and 36.9 percent, respectively) was considerably higher than that for possible stroke precursors, such as transient cerebral ischemia (13.2 percent) and occlusion or stenosis of precerebral arteries (4.8 percent).

Not surprisingly, hemorrhagic strokes accounted for most of the in-hospital deaths due to cerebrovascular diseases. In-hospital deaths occurred in 25.1 percent of stays for hemorrhagic stroke—more than four times the in-hospital death rate for ischemic stroke (5.9 percent). However, the in-hospital mortality rate for transient cerebral ischemia and occlusion or stenosis of precerebral arteries was less than 0.3 percent, consistent with these disorders being precursors to stroke.

Trends in hospitalization rates for common cerebrovascular diseases
There has been a decline in the hospitalization rate for different types of cerebrovascular disease between 1997 and 2005, with the exception of hemorrhagic stroke. Between 1997 and 2005, the hospitalization rate for ischemic stroke decreased by 34 percent, from 54.4 to 35.9 stays per 10,000 persons (figure 1). The hospitalization rate for transient cerebral ischemia also fell about 23

[6]As noted later in this brief, the high cost per day is likely related to the high percentage of patients with this condition that are admitted for elective surgery on the carotid arteries to prevent future strokes.

percent during this period, with the decline occurring after 2000 (decreasing by about 26 percent, from 21.3 to 15.8 stays per 10,000 persons between 2000 and 2005). Similarly, the hospitalization rate for occlusion or stenosis of precerebral arteries steadily decreased by 30 percent between 1997 and 2005, from 18.4 to 12.8 stays per 10,000 persons. In contrast, the hospitalization rate for hemorrhagic stroke remained relatively stable during this time period.

Hospital stays for cerebrovascular diseases by age and payer

As shown in figure 2, patients hospitalized for the most common cerebrovascular diseases were, on average, around 71 years of age. However, just over 40 percent of all stays for hemorrhagic stroke occurred among patients younger than 65 years old, resulting in a mean age that was about four years younger (66.6 years). More than two-thirds (68.3 percent) of all stays for occlusion or stenosis of precerebral arteries occurred among patients aged 65 to 84 years, while this age group accounted for just over half (51.2 percent) of hospitalizations for ischemic stroke and for transient cerebral ischemia. Moreover, hospital stays for ischemic stroke and transient cerebral ischemia had the highest concentration of patients aged 85 years and older (20.4 percent and 18.4 percent, respectively). Although patients hospitalized for occlusion or stenosis of precerebral arteries had a mean age (71.3 years) similar to those hospitalized for ischemic stroke (71.9 years) and transient cerebral ischemia (71.1 years), only 7.5 percent of these stays occurred among patients aged 85 years and older.

Figure 3 shows the distribution of hospital stays by primary payer for common cerebrovascular diseases. On average, Medicare was billed for more than two-thirds of all hospital stays for ischemic stroke, transient cerebral ischemia, and occlusion or stenosis of precerebral arteries, with private insurance accounting for around 20 percent of these stays. Hospitalizations for hemorrhagic stroke were billed to Medicare at a lower rate (57.8 percent), reflecting the findings that a higher proportion of patients younger than 65 years old were hospitalized for hemorrhagic stroke. Furthermore, hospital stays for hemorrhagic stroke were more likely to be billed to private insurance (24.8 percent) and Medicaid (8.2 percent) or to be uninsured (6.6 percent), as compared to hospital stays for other common cerebrovascular conditions. In fact, the percentage of uninsured hospitalizations for hemorrhagic stroke was 53 percent higher than that for ischemic stroke (6.6 percent versus 4.3 percent), and 84 percent higher than the percentage of uninsured stays for occlusion or stenosis of precerebral arteries (6.6 percent versus 3.6 percent). Hospitalizations for transient cerebral ischemia had the lowest percentage of uninsured stays (1.4 percent).

Selected procedures associated with specific cerebrovascular diseases

Table 2 notes selected procedures associated with the diagnosis and/or treatment of specific cerebrovascular diseases. Cerebral arteriography, a procedure in which a catheter is used to inject dye into the major arteries of the head and neck in order to view obstructions and abnormalities, was performed in 15.9 percent of hospitalizations for hemorrhagic stroke and 15.3 percent of stays for occlusion or stenosis of precerebral arteries. This diagnostic procedure was performed less often in patients hospitalized for ischemic stroke and transient cerebral ischemia (7.4 percent and 4.7 percent, respectively). Although used in substantially fewer cases, the injection or infusion of thrombolytics, or clot-busters, was utilized in 1.9 percent of hospitalizations for ischemic stroke.[7] As clinically appropriate, this procedure was rarely used to treat patients hospitalized for other common cerebrovascular diseases. The vast majority (77.5 percent) of hospitalizations for occlusion or stenosis of precerebral arteries involved carotid endarterectomy, a surgical procedure that removes plaque from the lining of the carotid artery in an effort to prevent a stroke. Only 1.1 percent of stays for ischemic stroke noted this procedure.

Finally, intracranial aneurysms—an abnormal bulging of the arteries of the brain often detected only after they have ruptured and caused a hemorrhagic stroke—can be treated using surgical or endovascular methods. Among hospitalizations for hemorrhagic stroke, the surgical treatment of intracranial aneurysms was performed more often than the minimally invasive endovascular methods (4.7 percent versus 4.0 percent, respectively). Endovascular treatment of intracranial aneurysms was noted in a very small percentage (0.1 percent) of stays for ischemic stroke and occlusion or stenosis of precerebral arteries.

After an acute stroke, acute respiratory failure may require the use of mechanical ventilation. Mechanical ventilation was most commonly noted in 25.9 percent of stays for hemorrhagic stroke, while necessary in only 3.4 percent of ischemic stroke hospitalizations.

[7] It is possible that the low percentage of thrombolytic provision was due to underreporting this procedure in hospital discharge data.

Data Source

The estimates in this Statistical Brief are based upon data from the HCUP 2005 Nationwide Inpatient Sample (NIS). Historical data were drawn from the 1997, 1998, 1999, 2000, 2001, 2002, 2003, and 2004 NIS. Supplemental source included data on regional population estimates from Table 2: Annual Estimates of the Population by Selected Age Groups and Sex for the United States: April 1, 2000 to July 1, 2006 (NC-EST2006-02), Population Division, U.S. Census Bureau, Release date: May 17, 2007 (http://www.census.gov/popest/national/asrh/NC-EST2006/NC-EST2006-02.xls).

Definitions

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. 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. There are about 12,000 ICD-9-CM diagnosis codes.

CCS categorizes ICD-9-CM diagnoses and procedures into clinically meaningful categories.[8] This "clinical grouper" makes it easier to quickly understand patterns of diagnoses and procedures.

Case Definition
The ICD-9-CM codes defining cerebrovascular diseases include diagnoses in the following range: 430–438.9.

For this report, specific types of cerebrovascular disease diagnoses were defined as codes:

Ischemic stroke
- 433.01, 433.11, 433.21, 433.31, 433.81, 433.91: Occlusion and stenosis of precerebral artery with cerebral infarction
- 434.00–434.91: Occlusion of cerebral arteries
- 436: Acute, but ill-defined, cerebrovascular disease

Hemorrhagic stroke
- 430: Subarachnoid hemorrhage
- 431: Intracerebral hemorrhage
- 432.0–432.9: Other and unspecified intracranial hemorrhage

Transient cerebral ischemia
- 435.0–435.9: Transient cerebral ischemia

Occlusion or stenosis of precerebral arteries
- 433.00, 433.10, 433.20, 433.30, 433.80, 433.90: Occlusion and stenosis of precerebral arteries without mention of cerebral infarction

Specific procedures associated with cerebrovascular disease were defined as codes:

Cerebral angiography
- 88.41: Arteriography of cerebral arteries

Injection or infusion of thrombolytics
- 99.10: Injection or infusion of thrombolytic agent

Carotid endarterectomy
- 38.12: Endarterectomy of carotid artery or jugular vein

Surgical treatment of intracranial aneurysm
- 39.51: Clipping of aneurysm

[8] HCUP 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

Endovascular treatment of intracranial aneurysm
– 39.52: Repair of aneurysm by coagulation, electrocoagulation, filipuncture, methyl methacrylate, suture, wiring, or wrapping
– 39.72: Endovascular repair or occlusion of head and neck vessels
– 39.79: Other endovascular repair of aneurysm of other vessels

Mechanical ventilation
– 96.70: Continuous mechanical ventilation of unspecified duration
– 96.71: Continuous mechanical ventilation for less than 96 consecutive hours
– 96.72: Continuous mechanical ventilation for 96 consecutive hours or more

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).[9] 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
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.

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.

Discharge status
Discharge status indicates the disposition of the patient at discharge from the hospital, and includes the following six categories: routine (to home), transfer to another short-term hospital, other transfers (including skilled nursing facility, intermediate care, and another type of facility such as a nursing home), home health care, against medical advice (AMA), or died in the hospital.

[9]HCUP 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.

About HCUP

HHCUP 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 & Human Services
California Office of Statewide Health Planning & Development
Colorado Hospital Association
Connecticut Integrated Health Information (Chime, Inc.)
Florida Agency for Health Care Administration
Georgia Hospital Association
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 Health and Human Services
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
Oklahoma Health Care Information Center for Health Statistics
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

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 HCUPnet

HCUPnet is an online query system that offers instant access to the largest set of all-payer health care databases that are 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 U.S. HCUPnet generates statistics using data from HCUP's Nationwide Inpatient Sample (NIS), the Kids' Inpatient Database (KID), the State Inpatient Databases (SID) and the State Emergency Department Databases (SEDD).

For More Information

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

For additional HCUP statistics, visit HCUPnet, our interactive query system, at 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 2005*, 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.

Design of the HCUP Nationwide Inpatient Sample, 2005. Online. June 13, 2007. U.S. Agency for Healthcare Research and Quality.
http://www.hcup-us.ahrq.gov/db/nation/nis/reports/NIS_2005_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 RL, Elixhauser A. *Using the HCUP Nationwide Inpatient Sample to Estimate Trends. (Updated for 1988-2004)*. HCUP Methods Series Report #2006-05 Online. August 18, 2006. U.S. Agency for Healthcare Research and Quality.
http://www.hcup-us.ahrq.gov/reports/2006_05_NISTrendsReport_1988-2004.pdf

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AHRQ welcomes questions and comments from readers of this publication who are interested in obtaining more information about access, cost, use, financing, and quality of health care in the United States. We also invite you to tell us how you are using this Statistical Brief and other HCUP data and tools, and to share suggestions on how HCUP products might be enhanced to further meet your needs. Please e-mail us at hcup@ahrq.gov or send a letter to the address below:

Irene Fraser, Ph.D., Director
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Agency for Healthcare Research and Quality
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Rockville, MD 20850

Table 1. Hospital stays for all conditions and common cerebrovascular diseases, 2005*

	All conditions**	All cerebrovascular disease***	Stroke		Potentially pre-stroke	
			Ischemic stroke	Hemorrhagic stroke	Transient cerebral ischemia	Occlusion or stenosis of precerebral arteries
Total number of stays	29,970,600	892,300	411,900	114,300	182,600	141,100
Percentage of cerebrovascular stays	NA	100.0%	46.2%	12.8%	20.5%	15.8%
Mean length of stay, days	5.1	5.0	5.6	8.4	3.0	2.5
Mean cost per hospitalization	$9,500	$9,500	$9,100	$19,500	$5,200	$8,000
Mean cost per day	$1,900	$1,900	$1,600	$2,300	$1,700	$3,200
Aggregate costs	$285.2 billion	$8.5 billion	$3.7 billion	$2.2 billion	$1.0 billion	$1.1 billion
Percentage admitted through the emergency department	54.1%	65.7%	78.2%	68.1%	81.7%	12.1%
Percentage discharged to nursing home or rehabilitation facility	15.8%	29.8%	44.0%	36.9%	13.2%	4.8%
Percentage died in hospital	2.7%	6.2%	5.9%	25.1%	0.2%	0.3%
Percentage of stays for females	53.8%	53.6%	54.6%	50.5%	59.6%	43.3%

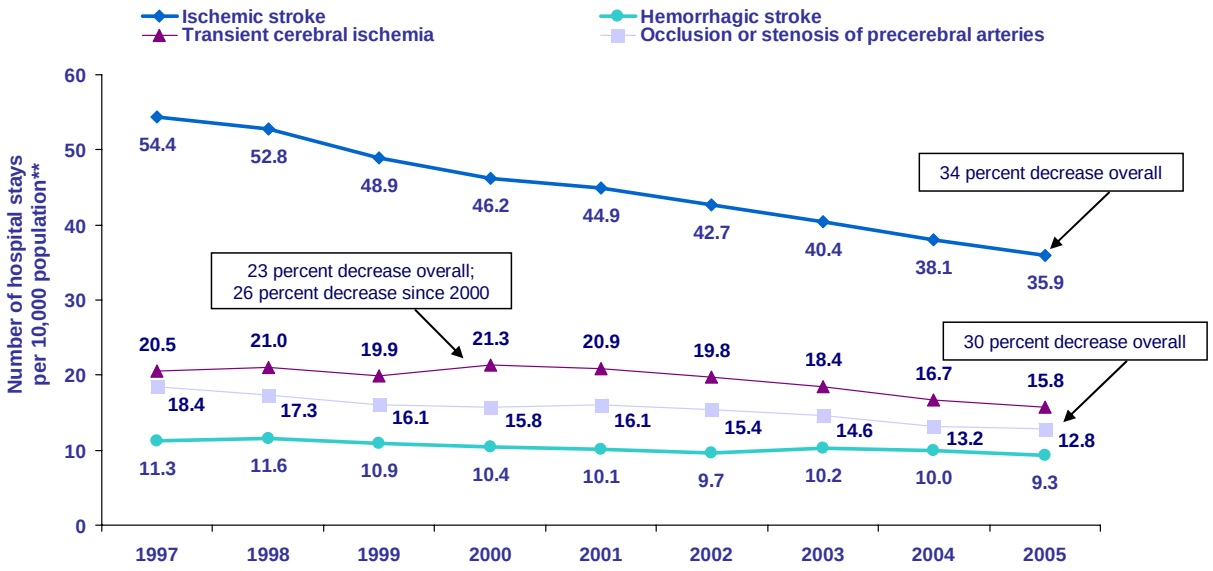
* Based on principal diagnosis.
** Hospital stays for maternal and neonatal conditions have been excluded.
*** In addition to the specific cerebrovascular diseases listed, the all cerebrovascular diseases category includes about 43,000 hospitalizations for other and ill-defined cerebrovascular disease and late effects of cerebrovascular disease.
NA is "not applicable."
Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample (NIS), 2005.

Table 2. Selected procedures associated with hospital stays for cerebrovascular diseases, 2005*

All-listed procedure	Stroke		Potentially pre-stroke	
	Ischemic stroke	Hemorrhagic stroke	Transient cerebral ischemia	Occlusion or stenosis of precerebral arteries
	Number of hospital stays with this procedure (percentage of disease-specific stays)**			
Cerebral angiography	30,430 7.4%	18,110 15.9%	8,640 4.7%	21,590 15.3%
Injection or infusion of thrombolytics	7,660 1.9%	490 0.4%	120 0.1%	250 0.2%
Carotid endarterectomy	4,630 1.1%	-- --	830 0.5%	109,310 77.5%
Surgical treatment of intracranial aneurysm	-- --	5,330 4.7%	-- --	-- --
Endovascular treatment of intracranial aneurysm	350 0.1%	4,590 4.0%	-- --	140 0.1%
Mechanical ventilation	13,910 3.4%	29,550 25.9%	340 0.2%	1,230 0.9%

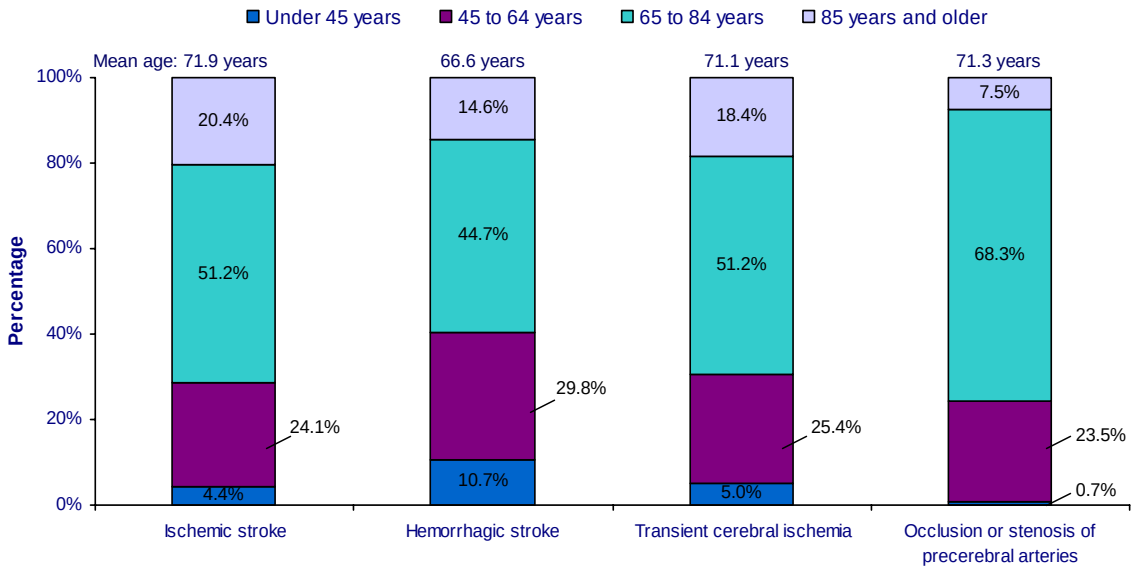
* Cerebrovascular disease hospitalizations based on principal diagnosis.
**The number of hospital stays has been rounded to the nearest ten. Cells with too few cases to report with statistical reliability have been left blank.
Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2005.

Figure 1. Rate of hospitalization for cerebrovascular diseases among patients 45 years and older, 1997-2005*



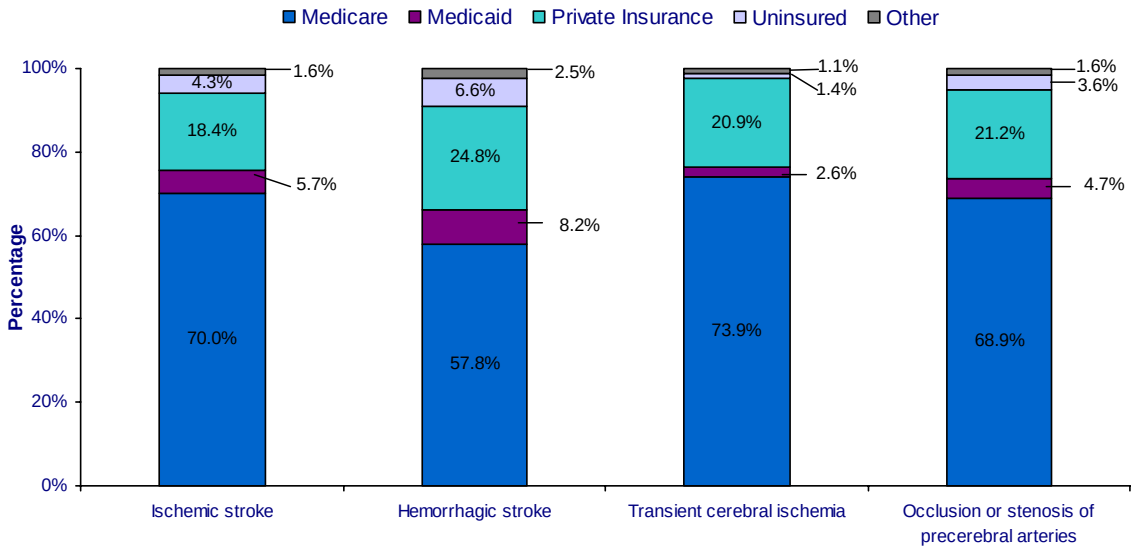
*Based on principal diagnosis.
**Population estimates for individuals older than 45 years of age. U.S. Census Bureau, 2005.
Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample (NIS), 2005.

Figure 2. Distribution of hospitalizations for cerebrovascular diseases, by age, 2005*



*Based on principal diagnosis.
Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample (NIS), 2005.

Figure 3. Distribution of hospitalizations for cerebrovascular diseases, by primary payer, 2005*



*Based on principal diagnosis.
Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample (NIS), 2005.

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