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Hospitalizations Related to Childbirth, 2008

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Introduction

In 2008, childbirth continued to be the most common reason for hospitalization in U.S. hospitals¹—despite declining to 4.2 million total stays from a high of 4.5 million in 2007. Most of these (67 percent) were delivered vaginally, and the majority of vaginal deliveries (84 percent) occurred without complications or serious procedures.

Over the last several years, there has been a dramatic shift in the utilization of certain obstetric procedures. These changes in the use of certain childbirth-related procedures have garnered media attention and stimulated interest in research on the safety, clinical outcomes, and economic implications of shifts in mode of delivery and utilization of obstetric procedures. Cesarean sections (C-sections) have grown from 21 percent of childbirths in 1997 to 33 percent in 2008.² While some studies have highlighted the maternal benefits of elective C-sections,³ other research indicates that C-sections generally tend to be more costly than vaginal deliveries,⁴ are associated with higher rates of maternal rehospitalization and postpartum medical care utilization.^{5,6} Some research indicates potentially worse neonatal outcomes for C-section deliveries, including elevated risk of mortality.⁷ During this time, vaginal births after C-section (VBAC), which are associated with rare but serious complications including

Highlights

- In 2008, there were 4.2 million maternal childbirth-related hospitalizations (down from 4.5 million in 2007) totaling \$16.1 billion in hospital costs.
- More than half of all maternal childbirth-related hospital stays were billed to private insurance (2.2 million), while 40 percent were billed to Medicaid (1.7 million).
- In 2008, 33 percent of childbirths were by C-section, up from 21 percent in 1997. In fact, C-sections were, overall, the most commonly performed operating room procedures in U.S. hospitals.
- The increase in repeat C-section delivery was coupled with a decrease in the rate of VBACs, which fell to 1 percent of all deliveries in 2008.
- C-sections accounted for 34 percent of all privately insured births, but only 28 percent of uninsured births.
- Reflecting changing practice patterns, there was also a 32 percent decrease in the use of forceps and a 60 percent decrease in episiotomies.

¹ 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.

² MacDorman M.F., Menacker F., Declercq E. Cesarean birth in the United States: epidemiology, trends, and outcomes. *Clinical Perinatology*, 2008; 35:293307.

³ National Institutes of Health. State of the Science Conference Statement. Cesarean delivery on maternal request. *Obstetrics and Gynecology*, 2006; 107: 1386–97.

⁴ Zupancic JAF. The economics of elective Cesarean section. *Clinical Perinatology*, 2008; 35:59199.

⁵ Lui T., Chen C., Lin H. Does elective Cesarean section increase utilization of postpartum maternal medical care? *Medical Care*, 2008; 46(4):44043.

⁶ Declercq E., Barger M., Cabral H.J., Evans S.R., Kotelchuck M., Simon C., Weiss J., Heffner L.J. Maternal outcomes associated with planned primary Cesarean section births compared with planned vaginal births. *Obstetrics and Gynecology*, 2007; 109(3):66977.

⁷ MacDorman M.F., Declercq E., Menacker F., Malloy M.H. Neonatal mortality for primary cesarean and vaginal births to low-risk women: application of an “intention to treat” model. *Birth*, 2008; 35(1):38.

uterine scar rupture,⁸ have declined and further contributed to the growing number of repeat C-sections performed. More recent reviews contend that VBAC is a reasonable and safe choice for the majority of women with a prior C-section.⁹ Additionally, national clinical groups, such as the American College of Obstetrics and Gynecology (ACOG),¹⁰ have recommended against the routine use of episiotomies to assist vaginal births.

In light of the importance of childbirth-related hospitalizations in the health care system, it is important to quantify and understand changing trends in hospital procedures for childbirth. This Statistical Brief presents data from the Healthcare Cost and Utilization Project (HCUP) on childbirths occurring in U.S. community hospitals in 2008. All data are reported from the maternal perspective (i.e., reflecting the experience of the mother, not the newborn). Variations in the utilization and costs associated with childbirth-related hospitalizations are illustrated with a focused look at differences across mode of delivery and payer type. All differences between estimates noted in the text are statistically significant at the 0.05 level or better.

Findings

In 2008, women experienced 4.2 million childbirths in U.S. community hospitals, a decrease from the 4.5 million childbirths in 2007. Still, childbirth remained the most common reason for hospitalization; these stays accounted for 11 percent of all hospital stays. Childbirth-related hospitalizations totaled \$16.1 billion in hospital costs, 4 percent of all inpatient hospital costs.

Characteristics of childbirth-related hospitalizations by mode of delivery

Table 1 presents utilization, length of stay (LOS), and cost information for maternal hospitalizations associated with the delivery of infants in U.S. community hospitals by type of delivery. Across all types of delivery, the mean LOS was 2.6 days—it ranged considerably from 2.1 days for vaginal deliveries without complications to 4.5 days for C-sections with complications.

Table 1. Utilization, length of stay, and cost information for childbirth in U.S. community hospitals, by mode of delivery, 2008*

Type of delivery	Number of hospital stays	Mean length of stay (days)	Mean cost per stay	Total cost (in billions)
All types of delivery	4,209,800	2.6	\$3,800	\$16.1
Vaginal delivery without complication	2,387,800	2.1	\$2,900	\$6.9
Vaginal delivery with complication	342,300	2.7	\$3,800	\$1.3
Vaginal delivery with sterilization &/or dilation and curettage (D&C)	101,100	2.4	\$5,000	\$0.5
Vaginal delivery with operating room procedure except sterilization and/or D&C	2,000	3.7	\$8,100	\$0.0
C-section without complication	904,300	3.1	\$4,700	\$4.3
C-section with complication	472,300	4.5	\$6,500	\$3.1

*Hospitalization for childbirth and delivery type identified by DRGs 765–768 and 774–775.

Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2008

⁸ Guise J., Berlin M., McDonagh M., Osterweil P., Chan B., Helfand M. Safety of vaginal birth after Cesarean: A systematic review. *American College of Obstetricians and Gynecologists*, 2004; 103(3):42029.

⁹ Agency for Healthcare Research and Quality. *Vaginal Birth After Cesarean: New Insights*, Structured Abstract. March 2010. Rockville, MD. <http://www.ahrq.gov/clinic/tp/vbacuptp.htm>.

¹⁰ Clinical practice guidelines from the American College of Obstetrics and Gynecology (ACOG) suggest that the best available data do not support the liberal or routine use of episiotomy (ACOG Practice Bulletin; #115, August 2010).

On average, hospital deliveries cost \$3,800 per stay, but the mean cost per stay varied depending on the mode of delivery. C-sections tended to be more costly than vaginal deliveries (\$4,700 versus \$2,900 without complications, and \$6,500 versus \$3,800 with complications, respectively). While uncommon, vaginal delivery with an operating room procedure (such as operative forceps or vacuum delivery) had the highest average cost (\$8,100)—more than double the cost per stay for all types of delivery (\$3,800). In total, vaginal deliveries accounted for 54 percent of annual hospital delivery costs (\$8.7 billion), and C-sections accounted for the remaining 46 percent (\$7.3 billion).

Characteristics of childbirth-related hospitalizations by patient characteristics

Table 2 displays the number of hospital stays, average LOS, and cost information for maternal hospitalizations associated with childbirth by expected primary payer, geographic region, and age. More than half of all maternal childbirth-related hospital stays were billed to private insurance (2.2 million stays), while 40 percent were billed to Medicaid (1.7 million stays). The remaining 8 percent was billed to uninsured individuals, “other” insurance plans, or Medicare.¹¹

Table 2. Utilization, length of stay, and cost information for the delivery of infants in U.S. community hospitals, by patient characteristics, 2008*

	Number of hospital stays for childbirth	Share of stays	Stays per 100 women of childbearing age [†]	Mean length of stay (days)	Mean cost per stay	Total cost (in billions)
Payer						
Medicare [‡]	30,100	1%	NA [§]	3.1	\$4,800	\$0.1
Medicaid	1,698,900	40%	NA [§]	2.6	\$3,800 [¶]	\$6.4
Private insurance	2,213,400	53%	NA [§]	2.7	\$3,900	\$8.5
Uninsured	150,500	4%	NA [§]	2.4	\$3,400	\$0.5
Other insurance	112,900	3%	NA [§]	2.6 [¶]	\$3,700 [¶]	\$0.4
Region						
Northeast	684,200	16%	6.2	2.9	\$4,200	\$2.9
Midwest	951,800	23%	7.1	2.6	\$3,900 [¶]	\$3.7
South	1,499,500	36%	6.5	2.6	\$3,500	\$5.2
West	1,074,200	26%	7.4	2.5	\$4,000 [¶]	\$4.3
Age						
15-17	131,500	3%	2.1	2.6 [¶]	\$3,600	\$0.5
18-44 ^{**}	4,060,000	96%	7.3	2.6	\$3,800	\$15.5

*Hospitalization for childbirth determined by DRGs 765–768 and 774–775. A small number of hospitalizations are missing corresponding payer data.

[†]Includes women age 15–44 years old.

[‡]Medicare provides health insurance for a limited number of individuals with disabilities or with end-stage renal disease under the age of 65.

[§]Not applicable: due to differences in the way that HCUP and the Census Current Population Survey determine insurer, we cannot accurately determine stays per female population of childbearing age.

[¶]Differences from private insurance, Northeast, and age group 18–44, respectively, not statistically significant at p < 0.05.

^{||}Less than 1 percent of hospitalizations for childbirth were for girls 14 or younger.

^{**}Less than 1 percent of hospitalizations for childbirth were for women 45 or older.

Sources: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2008

U.S. Census Bureau, Population Division, Annual Estimates of the Resident Population by Single-Year of Age and Sex for the United States and States: April 1, 2000 to July 1, 2009, last accessed February 17, 2011.

¹¹ Medicare provides health insurance for a limited number of individuals with disabilities or end-stage renal disease under the age of 65.

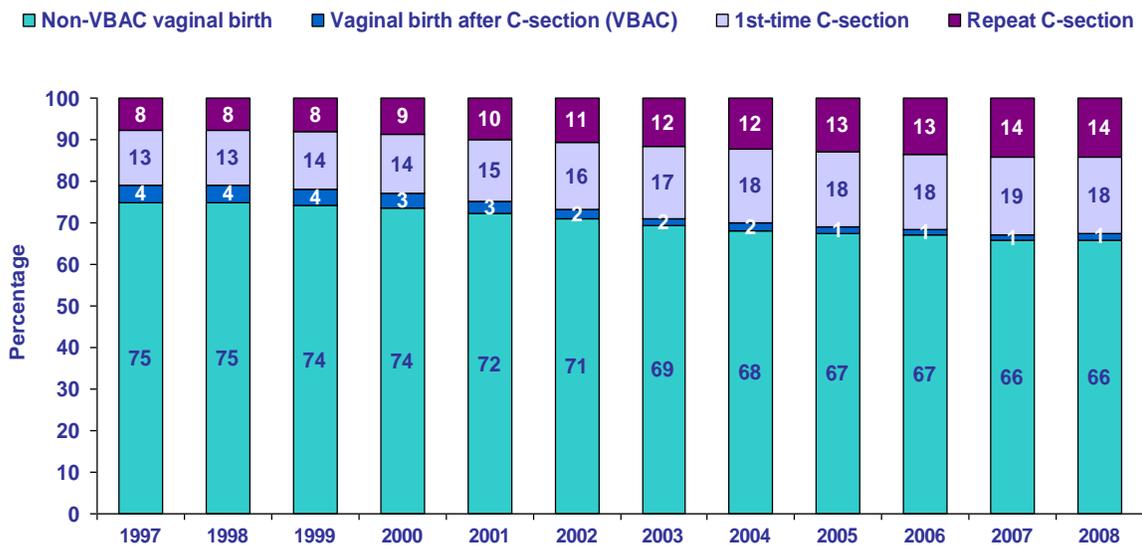
The rate of maternal childbirth-related hospital stays per women of childbearing age (15–44 years old) was similar across regions, ranging from 6.2 per 100 women to 7.4 per 100 women. Maternal childbirth-related hospital stays were highly concentrated among women age 18–44 (96 percent) with just 3 percent of stays for women 17 or younger and less than 1 percent of stays for women 45 older.

Utilization of specific obstetrical procedures: C-sections, vaginal birth after C-section (VBAC), episiotomies, and use of forceps

Of the 4.2 million childbirths that occurred in U.S. hospitals in 2008, a third of cases (32.6 percent) were delivered via C-section—a 72 percent increase from 1997, when about a fifth of deliveries were performed via C-section (figure 1). In addition, the rate of repeat C-sections nearly doubled, from 8 percent in 1997 to 14 percent in 2008. During this time, the rate of VBACs dropped from 4 percent to 1 percent. As a result in 2008, nearly all childbirths after a previous C-section (91 percent) were repeat C-sections. In 1997, 65 percent of childbirths after previous C-sections were repeat C-sections and 35 percent were VBAC.



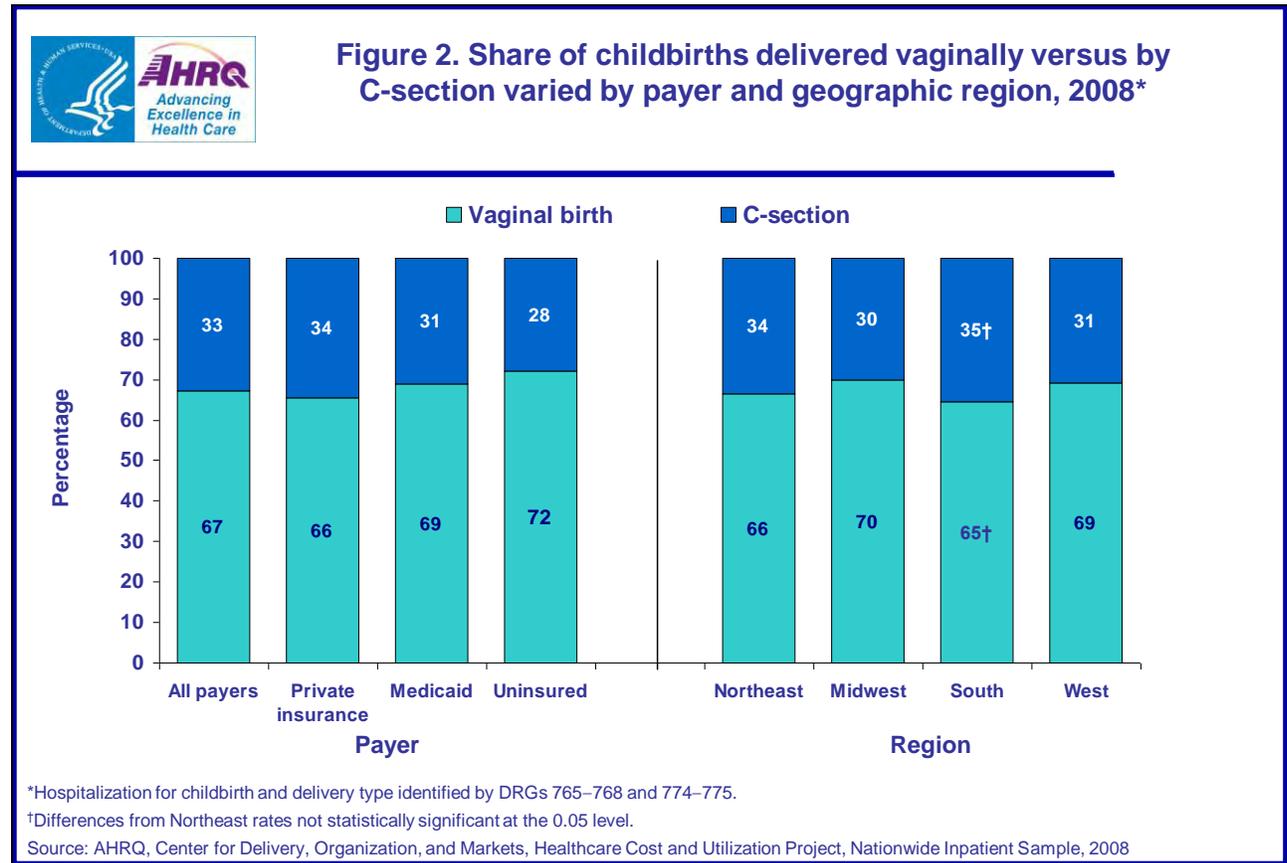
Figure 1. From 1997 to 2008, the rate of C-sections and repeat C-sections grew while the rate of vaginal births and VBACs decreased*



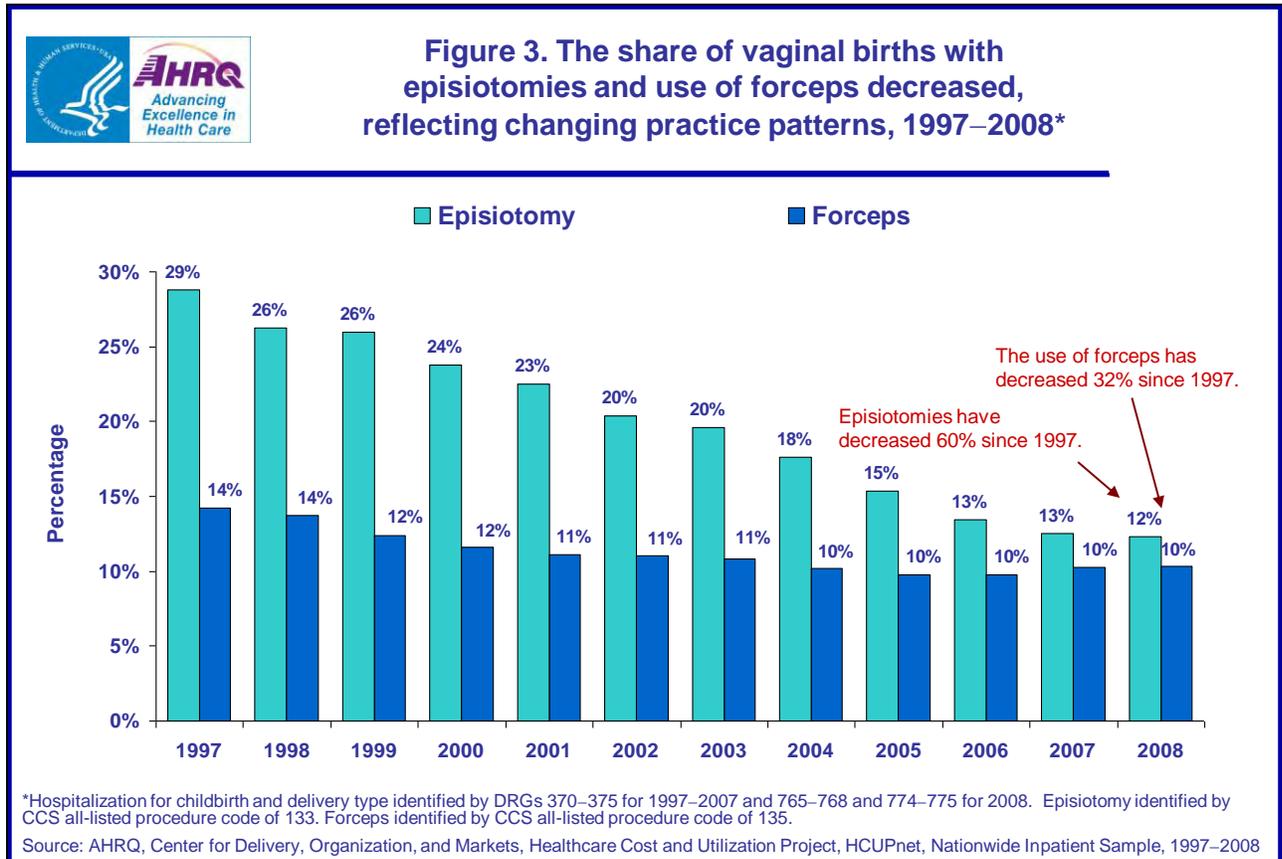
*Hospitalization for childbirth and delivery type identified by DRGs 370–375 for 1997–2007 and 765–768 and 774–775 for 2008. Previous C-section identified by ICD-9-CM all-listed diagnosis code of 654.20, 654.21, or 654.23.

Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 1997–2008

As shown in figure 2, the share of childbirths delivered by C-section varied by payer and by geographic region. Private insurance had the highest share of C-sections (34 percent) versus vaginal deliveries while uninsured individuals had the lowest share (28 percent). C-sections accounted for 31 percent of childbirth-related hospitalizations billed to Medicaid. The South had the greatest share of C-sections (35 percent), while the Midwest had the lowest share (30 percent).



The use of two obstetrical procedures associated with vaginal births has significantly declined (figure 3). Episiotomy is a surgical incision made into the perineum—the region between the vagina and the anus—to widen the vaginal opening for delivery. Forceps are used to aid in the delivery of the fetus by applying traction to the fetal head. From 1997 to 2008, the use of forceps decreased by 32 percent, and there were 60 percent fewer episiotomies.



Data Source

The estimates in this Statistical Brief are based upon data from the HCUP 2008 Nationwide Inpatient Sample (NIS). Historical data were drawn from the 1997–2007 NIS. Some statistics were generated from HCUPnet, a free, online query system that provides users with immediate access to largest set of publicly available, all-payer national, regional, and State-level hospital care databases from HCUP.

Definitions

Procedures, Diagnoses, ICD-9-CM, Clinical Classifications Software (CCS), and Diagnosis-Related Groups (DRGs)

The principal procedure is the procedure that was performed for definitive treatment rather than performed for diagnostic or exploratory purposes (i.e., the procedure that was necessary to take care of a complication). If two procedures appear to meet this definition, the procedure most related to the principal diagnosis was selected as the principal procedure. All-listed procedures include all procedures performed during the hospital stay.

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 13,600 ICD-9-CM diagnosis codes.

CCS categorizes ICD-9-CM diagnoses into a manageable number of clinically meaningful categories.¹² This "clinical grouper" makes it easier to quickly understand patterns of diagnoses and procedures. DRGs comprise a patient classification system that categorizes patients into groups that are clinically coherent and homogeneous with respect to resource use. DRGs group patients according to diagnosis, type of treatment (procedures), age, and other relevant criteria. Each hospital stay has one DRG assigned to it.

Case definition

For this report, the following codes were used to identify childbirth-related diagnoses and procedures:

- Childbirth-related hospitalization: DRGs 370–375 (1997–2007) and 765–768 and 774–775 (2008) (DRG numbering system changed in 2008)
- Vaginal birth: DRG codes 372–375 (1997–2007) and 767–768 and 774–775 (2008)
- C-section: DRG codes 370–375 (1997–2007) and 765–766 (2008) or CCS all-listed procedure code of 134
- Previous C-section: ICD-9-CM all-listed diagnosis code of 654.20, 654.21, or 654.23
- Episiotomy: CCS all-listed procedure code of 133
- Use of forceps: CCS all-listed procedure code of 135

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. Excluded are long-term care, rehabilitation, psychiatric, and alcoholism and chemical dependency hospitals. Please note, a discharge of this nature will be included in the NIS if it occurred in a community hospital.

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).¹³ 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.

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.

¹² HCUP CCS. Healthcare Cost and Utilization Project (HCUP). December 2009. U.S. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp.

¹³ HCUP Cost-to-Charge Ratio Files (CCR). Healthcare Cost and Utilization Project (HCUP). 2001–2008. U.S. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/db/state/costtocharge.jsp.

- 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.

Region

Region is one of the four regions defined by the U.S. Census Bureau:

- Northeast: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, and Pennsylvania
- Midwest: Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas
- South: Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma, and Texas
- West: Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Washington, Oregon, California, Alaska, and Hawaii

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
Georgia Hospital Association
Hawaii Health Information Corporation
Illinois Department of Public Health
Indiana Hospital Association
Iowa Hospital Association
Kansas Hospital Association
Kentucky Cabinet for Health and Family Services
Louisiana Department of Health and Hospitals
Maine Health Data Organization
Maryland Health Services Cost Review Commission
Massachusetts Division of Health Care Finance and Policy
Michigan Health & Hospital Association
Minnesota Hospital Association
Missouri Hospital Industry Data Institute
Montana MHA – An Association of Montana Health Care Providers

Nebraska Hospital Association
Nevada Department of Health and Human Services
New Hampshire Department of Health & Human Services
New Jersey Department of Health and Senior Services
New Mexico Health Policy Commission
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
Pennsylvania Health Care Cost Containment Council
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 Services
Wyoming Hospital Association

About the NIS

The HCUP Nationwide Inpatient Sample (NIS) is a nationwide database of hospital inpatient stays. The NIS is nationally representative of all community hospitals (i.e., short-term, non-Federal, 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 95 percent of all discharges in the United States. The vast size of the NIS allows the study of topics at both the national and regional levels for specific subgroups of patients. In addition, NIS data are standardized across years to facilitate ease of use.

About the HCUPnet

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

For More Information

For more information about HCUP, visit 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 2008*, 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:

Barrett M., Hunter K., Coffey R., Levit K. *Population Denominator Data for Use with the HCUP Databases (Updated with 2009 Population Data)*. HCUP Methods Series Report # 2010-02. Online April 12, 2010. U.S. Agency for Healthcare Research and Quality. <http://www.hcup-us.ahrq.gov/reports/methods/methods.jsp>.

Introduction to the HCUP Nationwide Inpatient Sample, 2008. Online. May 2010. U.S. Agency for Healthcare Research and Quality. http://hcup-us.ahrq.gov/db/nation/nis/NIS_2008_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/methods/CalculatingNISVariances200106092005.pdf>.

Houchens R.L., 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/methods/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:

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