

STATISTICAL BRIEF #118

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Hospital Stays for Children, 2009

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Introduction

One out of every six discharges from U.S. hospitals is for children 17 years and younger; the majority of these are newborn infants. This Statistical Brief updates previously published information for 2006 and also provides comparisons with data from 2000. Over the past decade, there were some concerns that hospital care for children might be affected by a number of events, especially the recent economic downturn,¹ which started in 2008, and the H1N1 influenza pandemic in 2009.^{2,3}

This Statistical Brief presents data from the Healthcare Cost and Utilization Project (HCUP) on hospital stays for children in 2009 with comparative information from earlier years. Descriptive analyses were performed on the HCUP Kids' Inpatient Database (KID) which is created every three years. The KID is the only database specifically developed to study hospitalizations of children. All differences between estimates noted in the text are statistically significant at the 0.05 level or better.

Findings

Table 1 provides information on the hospitalization of children compared to all U.S. hospital stays. In 2009, there were nearly 6.4 million hospital stays for children 17 years or younger in the U.S., comprising 16 percent of all hospitalizations. The discharge rate for children was 858 per 10,000 compared to 1,285 per 10,000 for the general population. Total costs for children's hospital stays were \$33.6 billion, about 9 percent of the total costs for all patients.

On average, costs for children's hospitalizations were about half as much as the overall hospital cost. The mean length of stay for children's hospitalizations was about 20 percent shorter than the

¹ Christian P. Impact of the Economic Crisis and Increase in Food Prices on Child Mortality: Exploring Nutritional Pathways. *The Journal of Nutrition*. January 2010;140(1):177S-181S.

² Lister P., Reynolds F., Parslow R., et al. Swine-origin influenza virus H1N1, seasonal influenza virus, and critical illness in children. *The Lancet*. 2009;374(9690):605-607.

³ O'Riordan S., Barton M., Yau Y., Read S.E., Allen U., Tran D. Risk factors and outcomes among children admitted to hospital with pandemic H1N1 influenza. *CMAJ*. January 12, 2010;182(1):39-44.

Highlights

- There were 6.4 million hospital stays for children 17 years and younger in 2009—nearly 17 percent of all hospital stays. About three-quarters of these pediatric hospital stays were for infants under the age of one year.
- Compared with all hospitalizations, stays for children were on average shorter (3.8 days) and less expensive—about half the average cost for stays overall. The aggregate cost for children's stays was \$33.6 billion, or about 9 percent of total hospital costs.
- In 2009, 45 percent of all children's stays were billed to private insurance and 47 percent were billed to Medicaid. This is a shift from 2000 when 55 percent of stays were billed to private insurance and only 37 percent were billed to Medicaid.
- Medicaid's share of aggregate hospital costs for children increased from 40 percent in 2000 (\$10.5 billion, inflation-adjusted) to 49 percent in 2009 (\$16.4 billion). During this same time period, the share covered by private insurers fell from 52 percent to 44 percent.
- The hospital discharge rate for teen pregnancy decreased by nearly one-quarter over the nine-year period, from a high of 28.7 per 10,000 population to 22.0 per 10,000 population in 2009.
- The fourth most common reason for admission to the hospital among children was a mental health condition—mood disorders, which include depression and bipolar disorder.
- The major changes in the ranking of the top 10 specific diagnoses over the last nine years were for skin and subcutaneous tissue infections (from 13th in 2000 to 7th in 2009) and influenza, which ranked 10th in 2009, 56th in 2006, and 65th in 2000, and had the largest increase in hospitalizations over the decade.

overall length of stay—3.8 days versus 4.6 days. The vast majority of children (94.1 percent) experienced routine discharge compared to 72.2 percent of discharges in general. Children experienced fewer transfers to other acute care hospitals or other institutions, fewer discharges to home health care, and fewer discharges against medical advice. The in-hospital death rate for children was one-fifth of the overall death rate (0.4 percent compared to 1.9 percent overall).

Table 1. Characteristics of hospital stays for children, compared to all hospital stays, 2009

	Children, 17 years and younger	All discharges
Discharges		
Total number of discharges	6,393,800	39,435,000
Number of discharges per 10,000 population*	857.7	1,284.5
Aggregate costs (in billions)	\$33.6	\$361.5
Costs, mean	\$5,200	\$9,200
Length of stay, mean (in days)	3.8	4.6
Discharge status		
Routine	94.1%	72.2%
To another hospital	1.8%	2.2%
To another institution (nursing home, rehabilitation)	0.5%	12.6%
Home health care	3.1%	9.9%
Against medical advice	0.1%	1.0%
Died in the hospital	0.4%	1.9%

*Calculated using resident population for July 2009 from the U.S. Bureau of the Census, accessed on February 28, 2011. From: <http://www.census.gov/popest/national/asrh/NC-EST2009-sa.html>.

Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Kids' Inpatient Database (KID), 2009 and Nationwide Inpatient Sample (NIS), 2009

Distribution by age

Figure 1 shows the age distribution for children admitted to the hospital. About 4.6 million discharges (72 percent) were for newborns and infants younger than one year of age. Children ages 1–4 years made up nearly 9 percent of all pediatric discharges, 5–9 and 10–14 year olds comprised 5-6 percent each, and 15–17 year olds accounted for 8 percent of pediatric discharges.

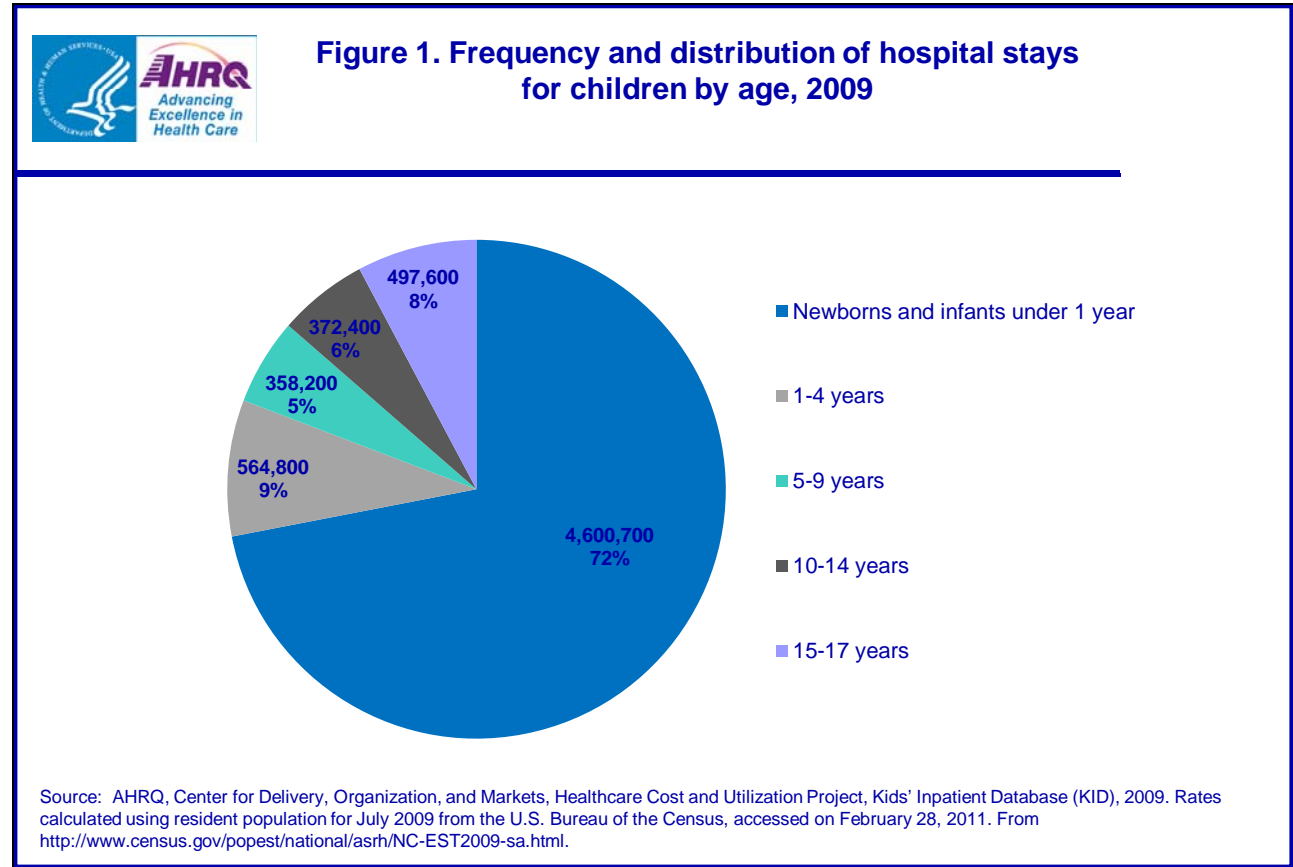
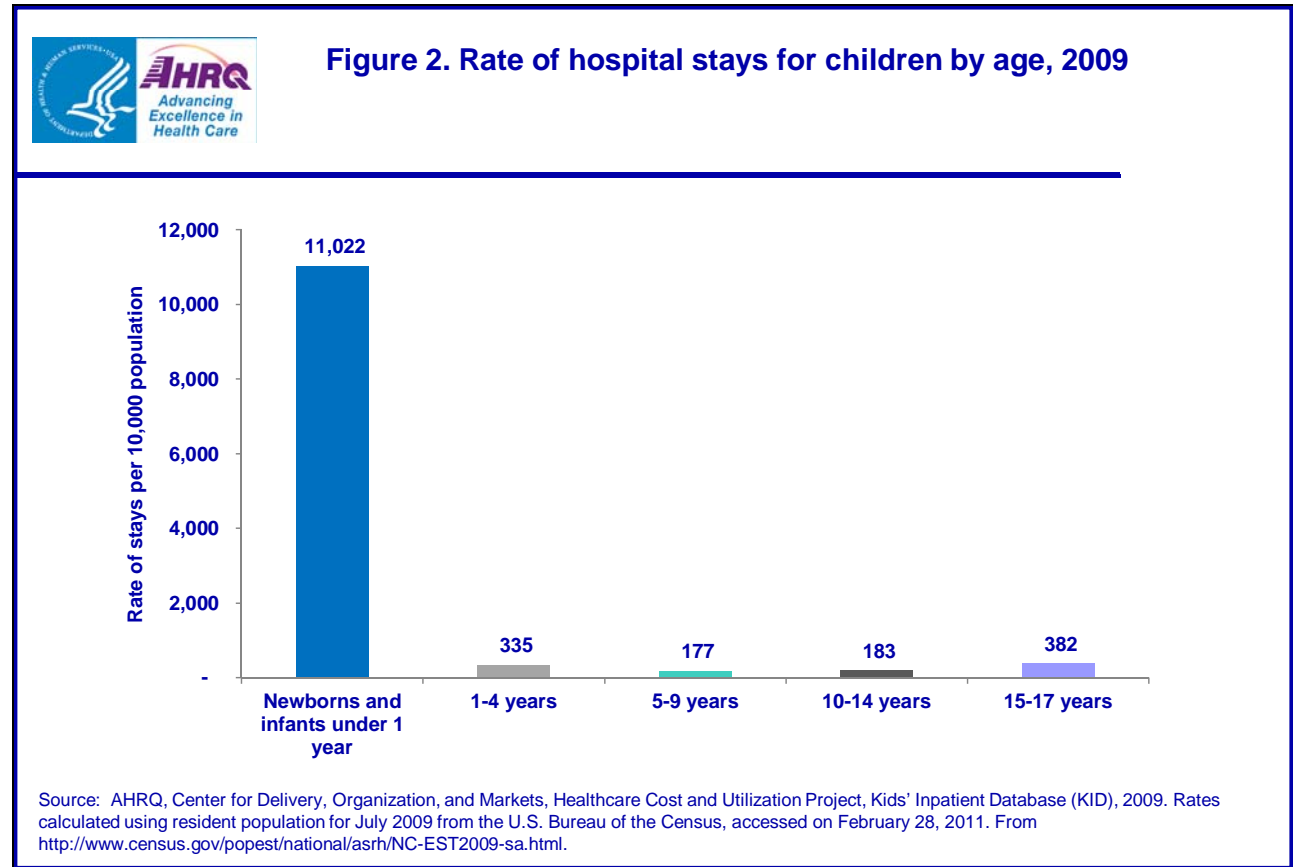


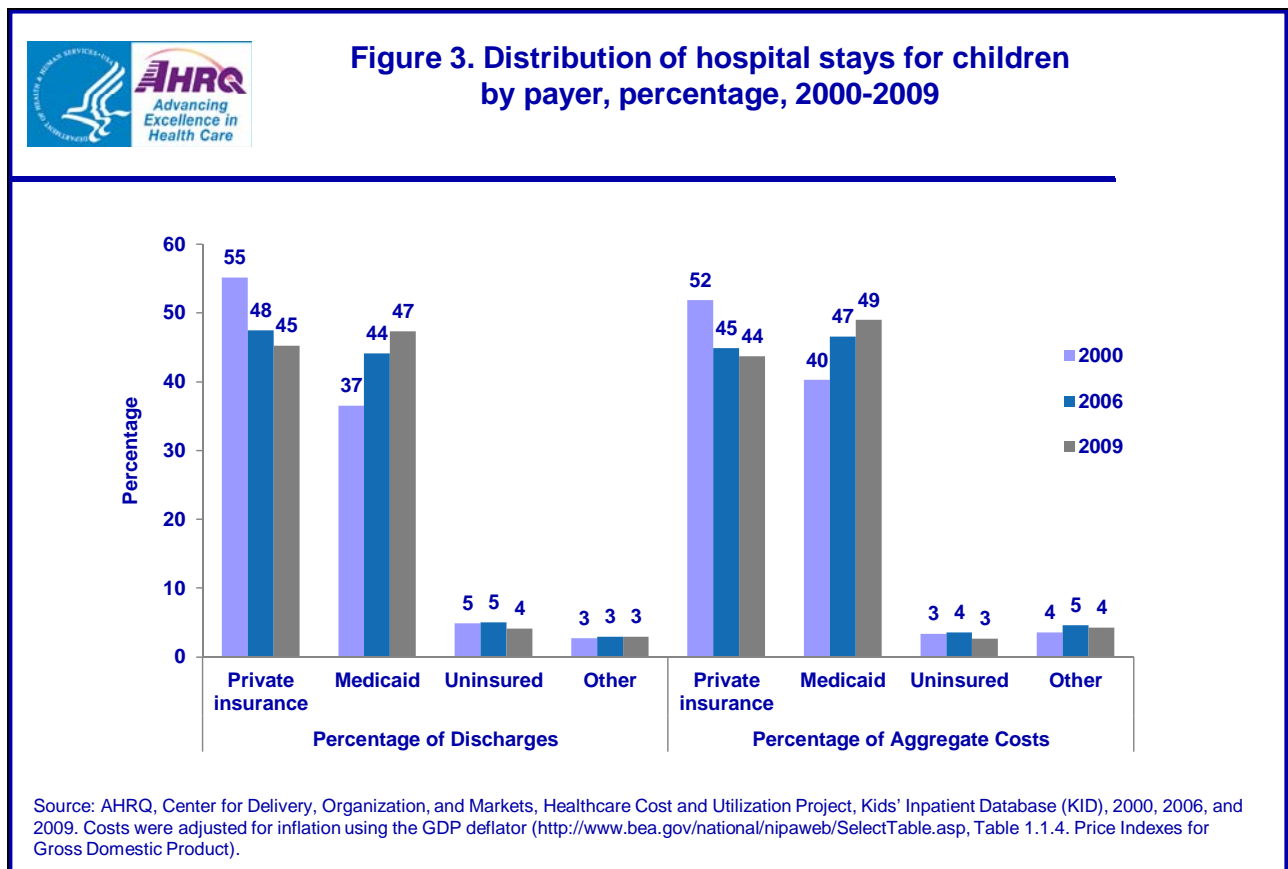
Figure 2 shows the rate of hospitalizations by age. Since nearly all infants are born in the hospital, the rate for newborns and infants was the highest. Adolescents 15-17 years old had the next highest rate of hospitalization at 382 per 10,000 population. Children 5-9 and 10-14 years old had the lowest rate of hospitalization at 177 and 183 per 10,000 population, respectively.



Distribution by payer

Figure 3 shows the distribution of children’s stays in hospitals by primary expected payer, comparing 2009 to 2000 and 2006. Approximately 55 percent of all hospital stays for children 17 years and younger were covered by private insurance in 2000, but by 2006 this decreased to 48 percent and in 2009 only 45 percent of children were covered by private insurance. Medicaid was the expected payer for 37 percent of all stays in 2000, but this increased to 47 percent in 2009. There were no differences between 2000, 2006, and 2009 in the percentage of hospitalized children who were uninsured or covered by “other” payers such as other State government programs.

Figure 3 also shows the percentage of total hospital costs by primary expected payer. In 2009, hospital stays covered by Medicaid cost \$16.4 billion (nearly half of aggregate costs for children), a significant increase since 2000 when Medicaid incurred \$10.5 billion in costs (40 percent of aggregate hospital costs for children). Between 2000 and 2009, aggregate costs paid by private insurers fell from over half (52 percent) to 44 percent.



Most common major diagnostic categories for children’s admissions

The most common pediatric hospital stays were for newborns. In 2009 there were 4,164,000 newborn hospital stays, down from 4,279,000 in 2006. In 2000, there were 4,033,000 newborn stays (data not shown).

Figure 4 depicts reasons for hospital stays based on the most frequent major diagnostic categories (MDCs) for the 2.2 million non-newborn pediatric stays. In 2009, respiratory conditions were the most frequent reason for admission to the hospital among non-newborns, accounting for 510,000 hospitalizations, or nearly 1 in 4 non-newborn stays (23 percent). Digestive conditions made up about 266,000 cases, or 1 in 8 non-newborn stays (12 percent). Disorders of the nervous system accounted for 172,000 hospital stays—8 percent of non-newborn stays.

In 2009, there were 155,000 hospital stays involving adolescent pregnancy, which accounted for 7 percent of all non-newborn pediatric stays.

There were 144,000 pediatric stays for mental health disorders, making this the fifth most common major reason for hospitalization. Mental health; endocrine/metabolic; ear, nose, mouth, and throat; and musculoskeletal disorders each accounted for about 6 percent of non-newborn stays.

Skin disorders, infectious and parasitic disease, and kidney disorders each made up about 4 percent of non-newborn hospitalizations. Blood and circulatory disorders each accounted for nearly 3 percent of non-newborn stays. Injuries (including poisonings, multiple trauma, and burns) and neoplasms each accounted for about 2 percent of non-newborn stays.

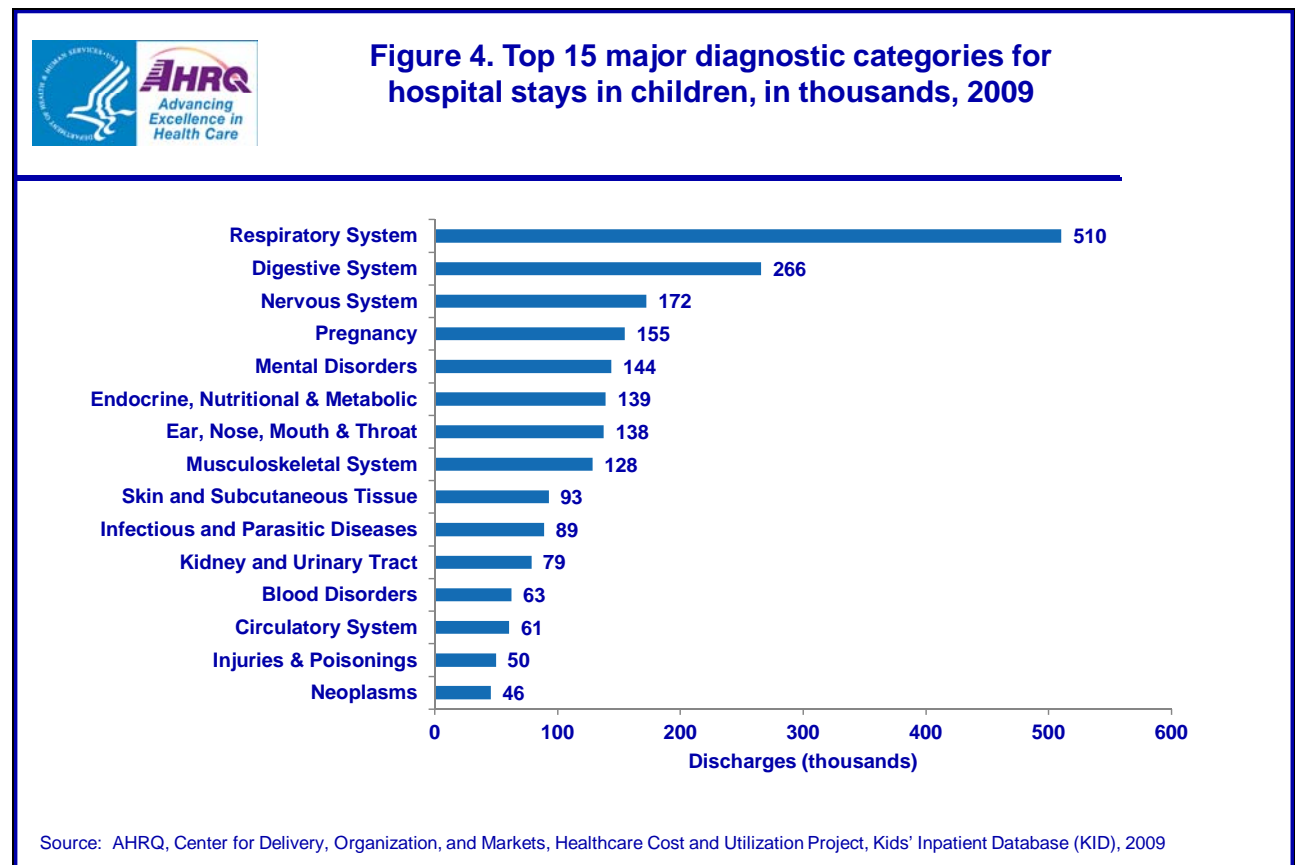


Figure 5 compares discharge rates by body system for non-newborns for 2000, 2006, and 2009 for the 15 most common MDCs. The hospitalization rate for respiratory conditions was consistently ranked as #1 for each of the three years, and there were no significant changes over this time frame.

There were significant declines in hospital discharge rates for five MDCs during the decade. Diseases of the digestive system had the second highest hospital discharge rate in each of the three years with a rate of 37.7 per 10,000 children in 2009, a significant decrease from 44.5 per 10,000 children in 2006.

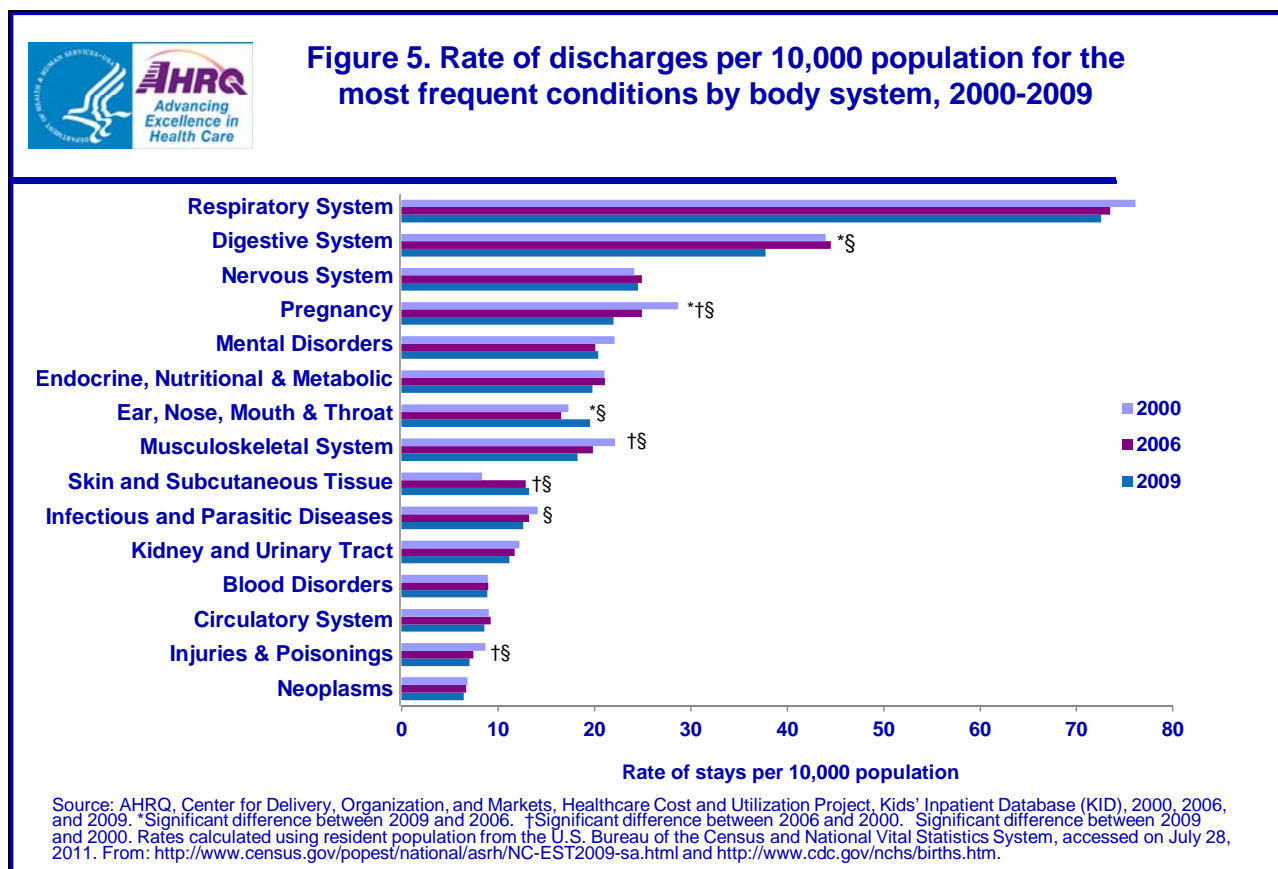
The hospital discharge rate for teen pregnancy decreased by nearly one-quarter over the nine-year period, from a high of 28.7 per 10,000 children in 2000 to 24.9 in 2006 to 22.0 in 2009.

Conditions of the musculoskeletal system declined from 2000 (22.1 per 10,000) to 2006 (19.8 per 10,000) and 2009 (18.2 per 10,000), but the change from 2006 to 2009 was not significant.

Similarly, injuries and poisonings declined from 2000 (8.7 per 10,000) to 2006 (7.5 per 10,000) and 2009 (7.1 per 10,000) but the change from 2006 to 2009 was not significant.

The hospital discharge rate for infectious and parasitic diseases declined from 2000 (14.1 per 10,000) to 2009 (12.6 per 10,000), but the changes from 2000 to 2006 and 2006 to 2009 were not significant.

Among the top 15 hospital discharge rates, there were two significant increases. The rate of hospital discharges for ear, nose, mouth, and throat conditions increased from 16.6 per 10,000 children in 2006 to 19.6 per 10,000 in 2009. The hospital discharge rate for skin and subcutaneous tissue also significantly increased from 2000 to 2006 and 2009, but not between 2006 and 2009.



Most common specific conditions for children's admissions

Table 2 shows the most common reasons for admission to the hospital based on more specific diagnosis information and again excludes conditions related to newborns. The top three conditions were related to the respiratory system—pneumonia, asthma, and acute bronchitis. The fourth most common reason for admission to the hospital among children was a mental health condition—mood disorders, which include depression and bipolar disorder. The fifth most common condition is a surgical diagnosis—appendicitis. The sixth ranked condition—dehydration—is often a complication of gastroenteritis. Epilepsy is also among the top 10 conditions, ranking eighth. Five of the top 10 conditions are infections—pneumonia, bronchitis, skin infections, urinary tract infections, and influenza.

The major changes in the ranking of diagnoses over the last nine years were for (1) skin and subcutaneous tissue infections, which increased from 13th in 2000 to 7th in 2009, and (2) influenza, which ranked 65th in 2000 and 56th in 2006, but was ranked 10th in 2009.

Table 2. Most common specific reasons for admission to the hospital, 2009*

Principal diagnosis	Number of discharges	Rate of discharges per 10,000 population †
1. Pneumonia	167,600	22.5
2. Asthma	137,200	18.4
3. Acute bronchitis	123,700	16.6
4. Mood disorders	95,500	12.8
5. Appendicitis	84,100	11.3
6. Dehydration	81,400	10.9
7. Skin and subcutaneous tissue infections	71,900	9.6
8. Epilepsy	70,200	9.4
9. Urinary tract infections	48,100	6.5
10. Influenza	39,900	5.4

* Excludes newborn conditions.

† Calculated using resident population for July 2009 from the U.S. Bureau of the Census, accessed on February 28, 2011. From: <http://www.census.gov/popest/national/asrh/NC-EST2009-sa.html>.

Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Kids' Inpatient Database (KID), 2009

Most common hospital procedures received by children

Table 3 presents the most common all-listed procedures received by children in U.S. hospitals, including principal and secondary non-diagnostic, therapeutic, or operative procedures. The most common procedure received by children and infants in the hospital was prophylactic vaccination, which consisted primarily of hepatitis B vaccine, given to over 1.3 million infants. The second most common procedure was circumcision, which was performed on over 1.1 million male infants. Ranking third, but with far fewer cases, was respiratory intubation and mechanical ventilation, which was received by about 226,700 cases.

Enteral and parenteral nutrition (tube feeding) and blood transfusion were the fourth and fifth most common procedures, respectively. Appendectomy was ranked sixth, and was the only non-obstetric major operating room procedure that fell into the top 10. Repair of obstetric laceration—a procedure received by adolescents giving birth, was ranked seventh. Cancer chemotherapy and artificial rupture of membranes to assist in delivery were ranked eighth and ninth, respectively. Incision and drainage of skin and subcutaneous tissue—conducted primarily for infections—ranked 10th. Overall, the rankings of procedures in 2009 were very similar to those in 2000 (data not shown).

Table 3. Most common all-listed procedures received by children in U.S. hospitals, 2009*

All-listed procedure	Number of procedures	Rate of discharges per 10,000 population†
1. Prophylactic vaccinations	1,329,600	1,783.5
2. Circumcision	1,147,700	1,539.5
3. Respiratory intubation and mechanical ventilation	226,700	304.1
4. Enteral and parenteral nutrition	165,100	221.5
5. Blood transfusion	109,400	146.8
6. Appendectomy	89,800	120.5
7. Repair of obstetric laceration	54,600	73.2
8. Cancer chemotherapy	47,900	64.3
9. Artificial rupture of membranes to assist in delivery	35,700	47.9
10. Incision and drainage of skin and subcutaneous tissue	35,600	47.8

* Excludes diagnostic testing.

† Calculated using resident population for July 2009 from the U.S. Bureau of the Census, accessed on February 28, 2011. From: <http://www.census.gov/popest/national/asrh/NC-EST2009-sa.html>.

Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Kids' Inpatient Database (KID), 2009

Data Source

The estimates in this Statistical Brief are based on data from HCUP's Kids' Inpatient Database (KID) for 2009, 2006, and 2000 and the Nationwide Inpatient Sample (NIS) for 2009. The statistics were generated from HCUPnet, a free, online query system that provides users with *immediate access* to the largest set of publicly available, all-payer national, regional, and State-level hospital care databases. Population denominators were based on the resident population for July 2009 from the U.S. Bureau of the Census, accessed on February 28, 2011. From: <http://www.census.gov/popest/national/asrh/NC-EST2009-sa.html>.

Definitions

Diagnoses, ICD-9-CM, Clinical Classifications Software (CCS), and Major Diagnostic Categories (MDC)

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.

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.⁴ This "clinical grouper" makes it easier to quickly understand patterns of diagnoses and procedures.

Procedures and Clinical Classifications Software (CCS)

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.

CCS categorizes procedure codes into clinically meaningful categories.⁴ This "clinical grouper" makes it easier to quickly understand patterns of procedure use.

Major Diagnostic Categories (MDCs)

MDCs are derived from the Diagnosis Related Groups reimbursement system. A patient's hospital record is assigned a single MDC that designates the body system (e.g., respiratory system) or etiology (e.g., trauma) of the principal diagnosis for that hospital stay.

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 that 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).⁵ 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.

⁴ HCUP CCS. Healthcare Cost and Utilization Project (HCUP). December 2009. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp

⁵ HCUP Cost-to-Charge Ratio Files (CCR). Healthcare Cost and Utilization Project (HCUP). 2001–2008. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/db/state/costtocharge.jsp

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 Workers’ 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.

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, or died in the hospital.

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 KID

The HCUP Kids' Inpatient Database (KID) is a nationwide database of hospital inpatient stays. The KID is the only dataset on hospital use, outcomes, and charges designed to study children's use of hospital services in the United States. The KID is a sample of discharges from all community, non-rehabilitation hospitals in States participating in HCUP. The target universe includes pediatric discharges from community, non-rehabilitation hospitals in the United States. Pediatric discharges are defined as all discharges where the patient was age 20 or less at admission. For the 1997 KID, hospital discharges for patients aged 18 years or less were included in the database. The KID's large sample size enables analyses of rare conditions, such as congenital anomalies and uncommon treatments, such as organ transplantation. It can be used to study a wide range of topics including the economic burden of pediatric conditions, access to services, quality of care and patient safety, and the impact of health policy changes. The KID is produced every three years; databases are available for 1997, 2000, 2003, 2006, and 2009.

About 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 KID, and methods to calculate estimates, please refer to the following publications:

Calculating Kids' Inpatient Database (KID) Variances. HCUP Methods Series Report #2005-5. Online. December 2005. U.S. Agency for Healthcare Research and Quality. <http://www.hcup-us.ahrq.gov/db/nation/kid/reports/CalculatingKIDVariances.pdf>

Introduction to the HCUP Kids' Inpatient Database, 2009. Online. June 2011. U.S. Agency for Healthcare Research and Quality. <http://www.hcup-us.ahrq.gov/db/nation/kid/kiddbdocumentation.jsp>.

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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