HEALTHCARE COST AND UTILIZATION PROJECT

Agency for Healthcare Research and Quality

STATISTICAL BRIEF #16

October 2006

Hospital Stays for Influenza, 2004

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Introduction

Influenza (flu) is a contagious respiratory disease caused by a virus that, on average, afflicts 5 to 20 percent of the population and results in more than 36,000 deaths in the U.S. every year.[1] The virus is spread through human-to-human contact, and the most common symptoms include high fever, headache, extreme fatigue, muscle aches, cough, sore throat, and nasal congestion. The elderly, young children, and individuals with certain health conditions are especially vulnerable to more severe symptoms of influenza and are more likely to require hospitalization.

This Statistical Brief presents data from the Healthcare Cost and Utilization Project (HCUP) on the treatment of influenza in U.S. hospitals in 2004.[2] Hospital utilization and costs for the treatment of influenza are compared with hospital stays for all conditions. Additionally, differences in hospital utilization, emergency admissions, and in-hospital deaths related to this condition are examined. All differences between estimates noted in the text are statistically significant at the 0.05 level or better.

Findings

In 2004, more than 37,300 hospitalizations occurred in which influenza was noted during the hospital stay. For more than half of these hospital stays (21,100), influenza was listed as the principal reason for admission. There is annual volatility in the number of hospitalizations due to influenza. In 2004, the number of hospital admissions that were principally for influenza was 62 percent lower than in 2003, but twice the number of admissions in 2001 (figure 1).

Highlights

- In 2004, there were over 37,000 hospitalizations in which influenza was noted during the hospital stay, and more than 21,100 hospital admissions resulted principally from influenza—a 62 percent decrease from 2003, but twice the number of hospitalizations in 2001.
- Hospital stays for influenza were slightly longer (5.3 days versus 4.6 days) and somewhat less costly ($6,900 versus $7,700) than the average hospital stay.
- The elderly were more likely than any other age group to be hospitalized for this condition—27.9 hospital stays per 100,000 population for ages 65 and above—compared with 8.1 stays per 100,000 for those younger than 18, 1.7 stays for 18–44 year olds, and 4.4 stays per 100,000 for 45–64 year olds.
- In 2004, hospitalizations for influenza were most likely to occur in the Midwest, with 11.1 hospital stays per 100,000 people, compared with 2.8 stays per 100,000 in the West, 7.1 in the South, and 8.1 in the Northeast.
- Nearly 67 percent of all admissions for influenza originated in the emergency department, but the elderly were most likely to be admitted for influenza through the emergency department, at a rate of 74 percent.
- The in-hospital death rate for patients 85 years and older with influenza was more than twice the in-hospital death rate for influenza patients between 65 and 84 years of age (7.9 percent versus 3.3 percent).

[1] Centers for Disease Control and Prevention. Key Facts about Influenza and the Influenza Vaccine. August 30, 2006. http://www.cdc.gov/flu/pdf/keyfacts.pdf

[2] Influenza hospitalizations represent one component of the monitoring conducted by the Centers for Disease Control (CDC) for influenza-like illness (ILI) using a combination of sentinel laboratory and provider surveillance and are only a portion of the total burden of influenza. CDC's provider surveillance involves approximately 1,200 health care providers around the country who report the total number of patients seen and the number of those patients with ILI by age group. For this system, ILI is defined as fever (temperature of ≥100°F [37.8°C]) and a cough and/or a sore throat in the absence of a known cause other than influenza. CDC estimates that approximately 200,000 hospitalizations for "flu complications" occur each year. The estimates in this publication focus on only those hospitalizations that were explicitly coded as influenza in the discharge summary. More information about CDC's method can be found at http://www.cdc.gov/flu/weekly/fluactivity.htm

The aggregate hospital costs for stays with influenza as a principal diagnosis totaled about $146 million in 2004.

General characteristics of hospital stays for influenza

Table 1 compares the general characteristics of hospitalizations for influenza with the characteristics of all hospitalizations in 2004. The mean length of stay for the treatment of influenza was 5.3 days—0.7 days longer than for all hospital stays. The mean cost of a hospital stay for influenza was lower than the mean cost for hospital stays overall ($6,900 versus $7,700). Consequently, influenza resulted in a mean hospital cost per day that was about one-third less than the mean cost per day for all hospital stays ($1,300 versus $1,700).

Differences in hospital stays for influenza, by age

The majority of patients hospitalized for influenza were concentrated in two groups—children and the elderly. Although the elderly represented only 13 percent of the population in 2004, they accounted for 48 percent of all hospitalizations for influenza. Patients 18–64 years old comprised about 60 percent of the U.S. population yet accounted for 24 percent of all influenza hospitalizations in 2004. While children younger than 18 comprised about 25 percent of the total population, they accounted for 28 percent of influenza stays.

When adjusted for population differences, the elderly were more likely to be hospitalized for influenza than any other age group (figure 2). They were hospitalized at a rate of 27.9 admissions per 100,000 population, while children younger than 18 years were hospitalized for influenza at a rate of 8.1 admissions per 100,000 population. Among 18–44 year olds, there were only 1.7 stays per 100,000; and among 45–64 year olds, there were 4.4 stays per 100,000.

Differences in hospital stays for influenza, by region

When adjusted for the population in each region, hospitalizations for influenza were most likely to occur in the Midwest at a rate of 11.1 hospital stays per 100,000 population (figure 3). The second highest rate of hospitalization occurred in the Northeast (8.1 hospital stays per 100,000 population). Rates of hospitalization were lowest in the South and the West, at 7.1 and 2.8 hospital stays per 100,000 population, respectively.

Emergency admissions for influenza

Hospital stays for influenza originated in the emergency department more often than hospital stays for all conditions. Table 1 shows that the emergency admission rate for influenza was about 55 percent higher than the emergency rate for all hospital stays (66.7 percent versus 43.1 percent).

However, the rate of emergency admission for influenza varied by age (figure 4). While emergency admissions accounted for slightly more than half of all influenza admissions among children, 74 percent of influenza hospitalizations originated in the emergency department for patients 65 and older. About two-thirds of hospital stays for influenza among patients 18–64 originated in the emergency department.

In-hospital deaths related to influenza

Despite the high percentage of emergency admissions, patients hospitalized for influenza had a similar rate of in-hospital death compared with patients hospitalized for all conditions—2.5 percent versus 2.1 percent (table 1). However, larger differences were noted among the older segment of the elderly population for in-hospital deaths. Specifically, among influenza patients 65 years and older, the in-hospital death rate was 3.3 percent; this rate increased to 7.9 percent for patients 85 and older.

Data Source

The estimates in this Statistical Brief are based on data from the HCUP 2004 Nationwide Inpatient Sample (NIS). Historical data were drawn from the 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, and 2003 NIS. Supplemental sources included data on regional population estimates from Table 8: Annual Estimates of the Population for the United States, Regions, and Divisions: April 1, 2000 to July 1, 2005 (NST-EST2005-08) (http://www.census.gov/popest/states/tables/NST-EST2005-08.xls) and data on age group 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, 2005 (NC-EST2005-02)

(http://www.census.gov/popest/national/asrh/NC-EST2005/NC-EST2005-02.xls) from the Population Division, U.S. Census Bureau, Release date: December 22, 2005.

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.

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

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).[3] 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.

Diagnoses and ICD-9-CM

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 12,000 ICD-9-CM diagnosis codes.

The ICD-9-CM codes defining influenza include the following:
– 487.0 Influenza with pneumonia
– 487.1 Influenza with other respiratory manifestations
– 487.8 Influenza with other manifestations

Emergency admission source

Emergency admission indicates the patient was admitted to the hospital through the emergency department.

[3]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 the NIS

The HCUP Nationwide Inpatient Sample (NIS) is a nationwide database of hospital inpatient stays. The NIS is nationally representative of all community hospitals (i.e., short-term, non-Federal, non-rehabilitation hospitals). The NIS is a sample of hospitals and includes all patients from each hospital, regardless of payer. It is drawn from a sampling frame that contains hospitals comprising about 90 percent of all discharges in the United States. The vast size of the NIS allows the study of topics at both the national and regional levels for specific subgroups of patients. In addition, NIS data are standardized across years to facilitate ease of use.

About HCUP

HCUP is a family of powerful health care databases, software tools, and products for advancing research. Sponsored by the Agency for Healthcare Research and Quality (AHRQ), HCUP includes the largest all-payer encounter-level collection of longitudinal health care data (inpatient, ambulatory surgery, and emergency department) in the United States, beginning in 1988. HCUP is a Federal-State-Industry Partnership that brings together the data collection efforts of many organizations—such as State data organizations, hospital associations, private data organizations, and the Federal government—to create a national information resource.

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

HCUP would not be possible without the contributions of the following data collection Partners from across the United States:
Arizona Department of Health Services
Arkansas Department of Health & Human Services
California Office of Statewide Health Planning & Development
Colorado Health & Hospital Association
Connecticut Integrated Health Information (Chime, Inc.)
Florida Agency for Health Care Administration
Georgia GHA: An Association of Hospitals & Health Systems
Hawaii Health Information Corporation
Illinois Health Care Cost Containment Council and Department of Public Health
Indiana Hospital&Health Association
Iowa Hospital Association
Kansas Hospital Association
Kentucky Cabinet for Health and Family Services
Maryland Health Services Cost Review Commission
Massachusetts Division of Health Care Finance and Policy
Michigan Health & Hospital Association
Minnesota Hospital Association
Missouri Hospital Industry Data Institute
Nebraska Hospital Association
Nevada Division of Health Care Financing and Policy, Department of Human Resources
New Hampshire Department of Health & Human Services
New Jersey Department of Health & Senior Services
New York State Department of Health
North Carolina Department of Health and Human Services
Ohio Hospital Association
Oregon Office for Oregon Health Policy and Research and Oregon Association of Hospitals and Health Systems
Rhode Island Department of Health
South Carolina State Budget & Control Board
South Dakota Association of Healthcare Organizations
Tennessee Hospital Association
Texas Department of State Health Services
Utah Department of Health
Vermont Association of Hospitals and Health Systems
Virginia Health Information
Washington State Department of Health

West Virginia Health Care Authority
Wisconsin Department of Health & Family Services

For additional HCUP statistics, visit HCUPnet, our interactive query system at www.hcup.ahrq.gov.

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

Houchens, R., Elixhauser, A. *Using the HCUP Nationwide Inpatient Sample to Estimate Trends.* (Updated for 1988–2004). HCUP Methods Series Report #2006-05 Online. August 18, 2006. U.S. Agency for Healthcare Research and Quality. http://www.hcup-us.ahrq.gov/reports/2006_05_NISTrendsReport_1988-2004.pdf

Suggested Citation

Milenkovic, M., Russo, C. A., and Elixhauser, A. *Hospital Stays for Influenza, 2004.* HCUP Statistical Brief #16. November 2006. Agency for Healthcare Research and Quality, Rockville, MD. http://www.hcup-us.ahrq.gov/reports/statbriefs/sb16.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
Center for Delivery, Organization, and Markets
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Rockville, MD 20850

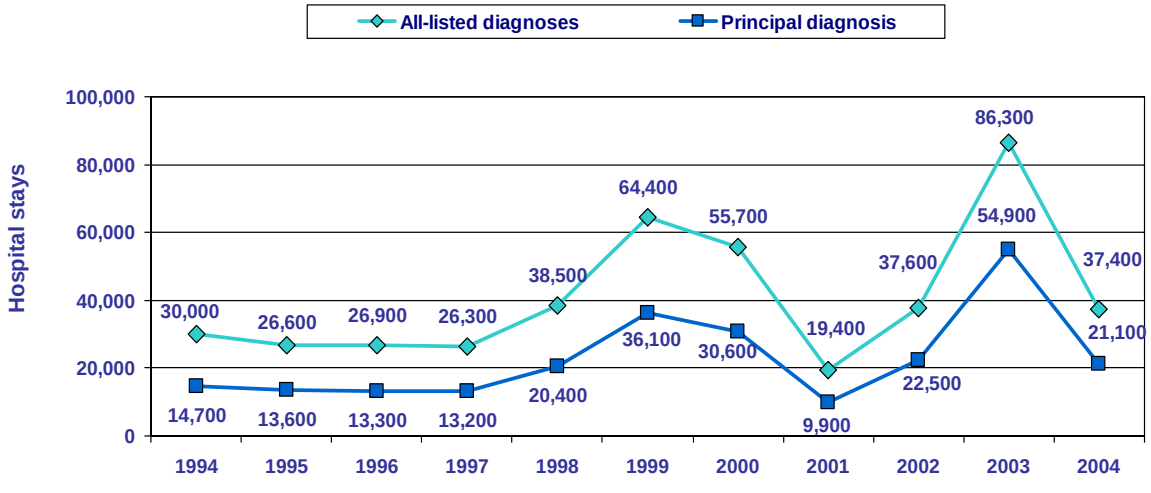
Table 1. Hospitalizations for influenza compared to hospitalizations for all conditions, 2004

	Hospital stays for influenza*	All hospital stays
Total number of discharges	21,100	38,661,800
Mean length of stay, days	5.3	4.6
Mean cost of hospitalization	$6,900	$7,700
Mean hospital cost per day	$1,300	$1,700
Aggregate costs for U.S.	$146 million	$ 295 billion
Percentage admitted through the emergency department	66.7%	43.1%
Percentage died in hospital	2.5%	2.1%

*Based on principal diagnosis.

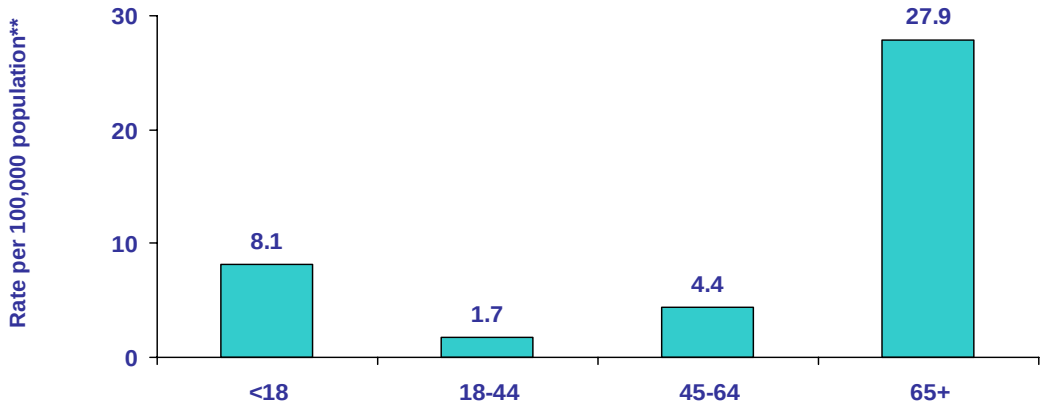
Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2004.

Figure 1. Trends in hospitalizations for influenza, all-listed diagnoses versus principal diagnosis, 1994–2004



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

Figure 2. The rate of hospitalization for influenza, by age, 2004*

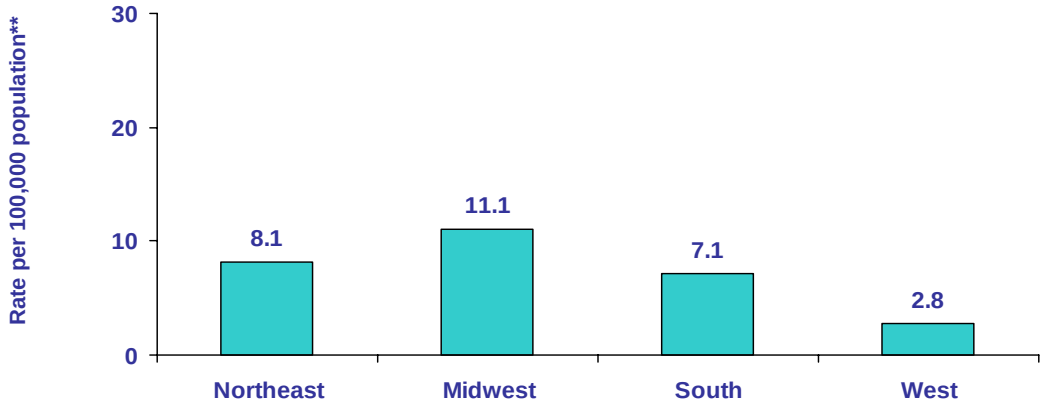


*Based on principal diagnosis.

**The denominator is the entire U.S. population for each age group. U.S. Census Bureau, Population Division, Census 2004.

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

Figure 3. The rate of hospitalization for influenza, by region, 2004*

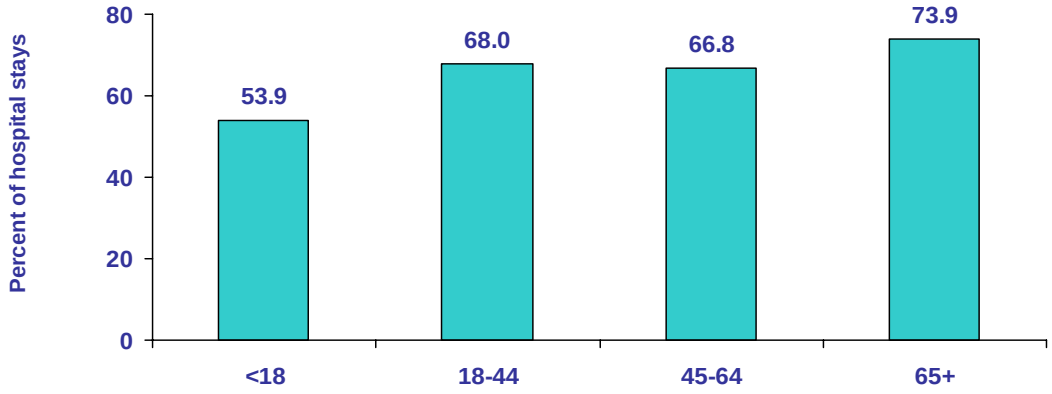


*Based on principal diagnosis.

**The denominator is the entire U.S. population for each region. U.S. Census Bureau, Population Division, Census 2004.

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

Figure 4. Distribution of hospitalizations for influenza originating in the emergency department, by age, 2004*



*Based on principal diagnosis.

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