HEALTHCARE COST AND UTILIZATION PROJECT

Agency for Healthcare Research and Quality

STATISTICAL BRIEF #235

January 2018

Trends in Hospital Inpatient Stays by Age and Payer, 2000–2015

Ruirui Sun, Ph.D., Zeynal Karaca, Ph.D., and Herbert S. Wong, Ph.D.

Introduction

The utilization of hospital care is related to and affected by changes in population characteristics, as well as market forces. In terms of population characteristics, growth in general and growth of the older adult population in particular may contribute to hospital visits.[1] The U.S. population has grown in the past decades, and the population of older adults has grown disproportionately.[2] Projections show that one in five Americans will be 65 years or older by 2030.[3]

In terms of market forces, factors such as efforts to reduce unnecessary hospitalization[4] and adjustments in reimbursement incentives may decrease utilization of inpatient care.[5] Market forces also may vary across age groups and eventually shift hospital utilization in terms of payer mix for those who seek care. Examples of such factors include employment status[6] and changes in health care policy that target age groups differently.

This Healthcare Cost and Utilization Project (HCUP) Statistical Brief presents data on hospital inpatient stays from 2000 through 2015 by age group and primary payer. First, trends in the population rate of inpatient stays by age group are presented. Second, trends in expected primary payer among inpatient stays by age group are examined. The National Inpatient Sample (NIS) from 2000 to 2015 was used to generate national estimates of inpatient stays. The total number of inpatient stays related to maternal and neonatal diagnoses accounted for 22–25 percent of all inpatient stays, and

[1] Bernstein AB, Hing E, Moss AJ, Allen KF, Siller AB, Tiggle RB. Health Care in America: Trends in Utilization. 2003. National Center for Health Statistics. www.cdc.gov/nchs/data/misc/healthcare.pdf. Accessed December 19, 2017.
[2] Howden LM, Meyer JA. Age and Sex Composition: 2010. 2010 Census Briefs, May 2011. U.S. Census Bureau. www.census.gov/content/dam/Census/library/publications/2011/dec/c2010br-03.pdf. Accessed December 19, 2017.
[3] Colby SL, Ortman JM. Projections of the Size and Composition of the U.S. population: 2014 to 2060. Current Population Reports. March 2015. U.S. Census Bureau. www.census.gov/content/dam/Census/library/publications/2015/demo/p25-1143.pdf. Accessed December 19, 2017.
[4] Leslie DL, Rosenheck R. Shifting to outpatient care? mental health care use and cost under private insurance. American Journal of Psychiatry. 1999;156(8):1250–7.
[5] Bernstein et al., 2003. Op. cit.
[6] Maeda JL, Henke RM, Marder WD, Karaca Z, Friedman BS, Wong HS. Association between the unemployment rate and inpatient cost per discharge by payer in the United States, 2005–2010. BMC Health Services Research. 2014;14:378.

Highlights

- Between 2000 and 2015, the population rate of nonneonatal, nonmaternal inpatient stays dropped for all age groups; the largest percentage decrease (25 percent) was among patients aged 65 years and over.
- Between 2000 and 2015, for all age groups under 65 years old the share of uninsured stays reached its 16-year low in 2015.
- From 2007 to 2015, Medicaid was the top primary payer for patients under age 18 years with nonneonatal, nonmaternal inpatient stays; its share exceeded 50 percent starting in 2012.
- From 2000 to 2015, the share of Medicaid among nonneonatal, nonmaternal inpatient stays for those aged 18–44 years and 45–64 years increased by 74 percent and 68 percent, respectively.
- Among patients aged 18–44 years, the share of nonneonatal, nonmaternal inpatient stays covered by Medicare increased by 21 percent from 2000 to 2015.
- Among patients aged 45–64 years, the share of nonneonatal, nonmaternal stays covered by Medicare increased by 43 percent from 2000 to 2015.
- Among patients aged 65 years and over, Medicare and private insurance together accounted for about 97 percent of inpatient stays each year.

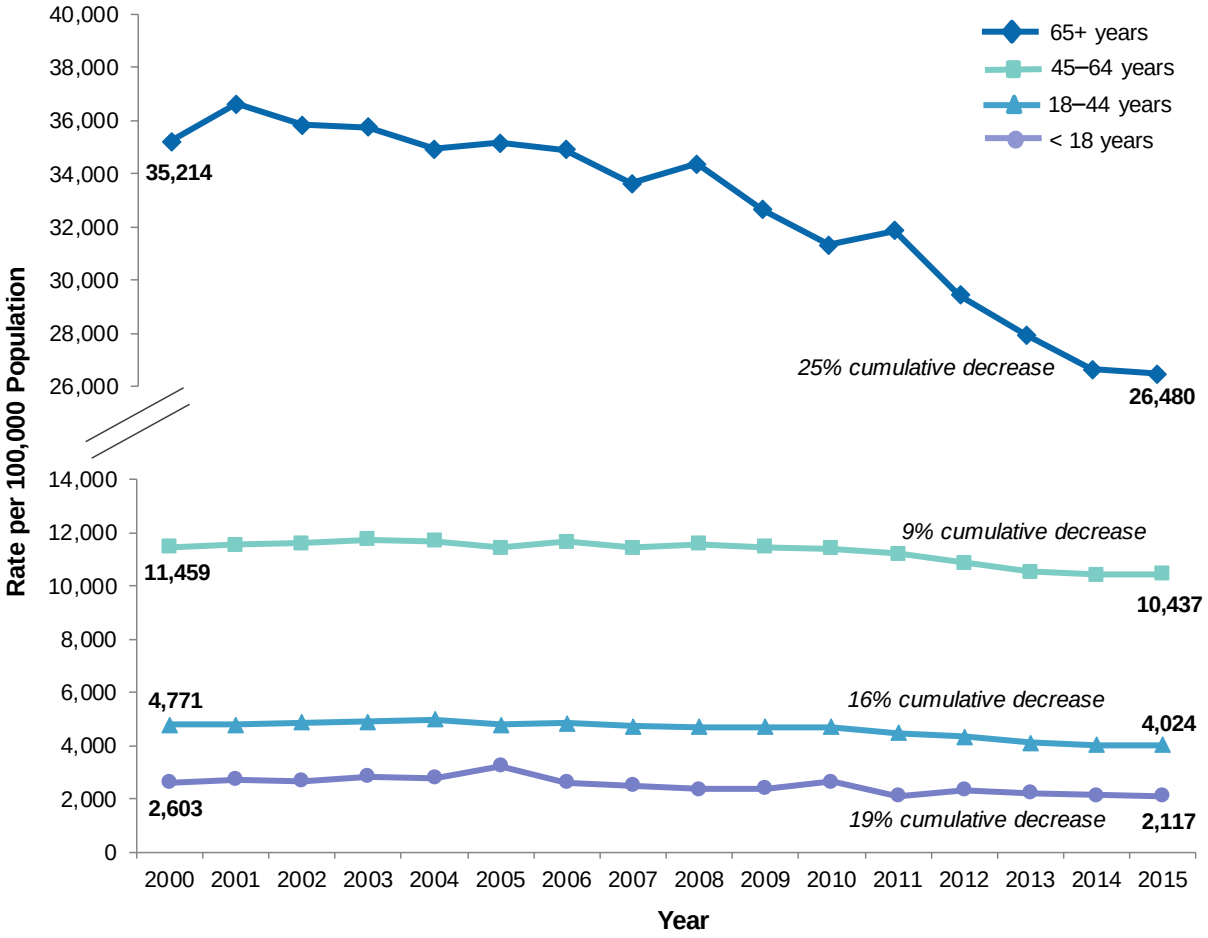
for 34–46 percent of those stays, Medicaid was the primary expected payer. Because of the relative size of this subpopulation and the high concentration in the distribution of expected payer, maternal and neonatal stays were excluded from the analysis.

Findings

National rate of inpatient stays by patient age, 2000–2015

Figure 1 presents the rate of nonneonatal, nonmaternal inpatient stays per 100,000 population from 2000 to 2015. Results are shown by four age groups.

Figure 1. Rate of nonneonatal, nonmaternal inpatient stays, per 100,000 population by age group, 2000–2015



Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets. Healthcare Cost and Utilization Project (HCUP), National (Nationwide) Inpatient Sample (NIS), 2000–2015

- **Older age groups have higher rates of nonneonatal and nonmaternal inpatient rates.**

  During the 16-year time period, patients aged 65 years and over had the highest rate of inpatient stays (above 26,400 per 100,000 population every year), followed by those aged 45–64 years (ranging from about 10,400 to 11,700 per 100,000 population). Patients aged 18 years and under were the most infrequent visitors for nonneonatal and nonmaternal inpatient stays, with a rate below 3,300 per 100,000 population every year.

- **The rate of nonneonatal and nonmaternal inpatient stays reached the lowest levels in 2014 or 2015 for all age groups.**

  Among patients aged 65 years and over, the rate of inpatient stays was 35,214 per 100,000 population in 2000. The rate stayed at or above 35,000 until 2005 when it started to drop. By 2015, the rate had decreased to its lowest level during this period—26,480 per 100,000 population—a 25 percent reduction compared with 2000.

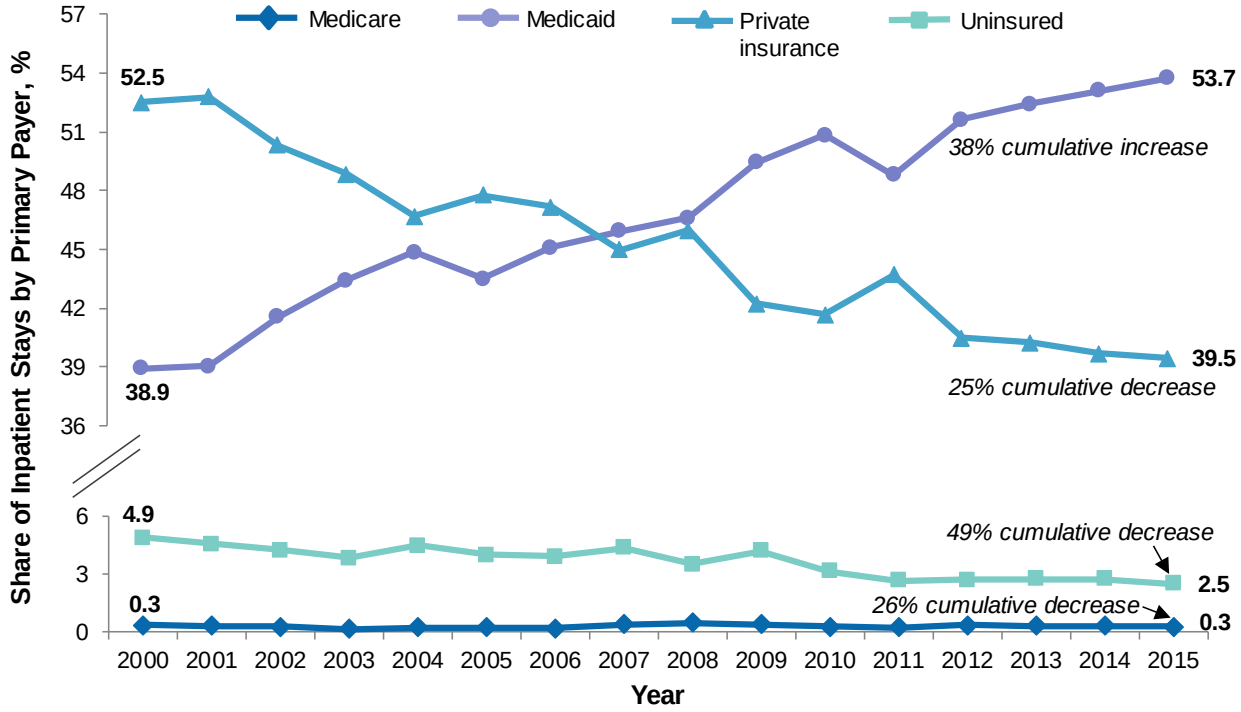
  Among patients aged 45–64 years, the rate of nonneonatal, nonmaternal inpatient stays was 11,459 per 100,000 population in 2000 and remained above 11,400 through 2010 after which it began to drop. By 2015, the rate has decreased to 10,437 per 100,000 population, a 9 percent decrease since 2000.

  Among patients aged 18–44 years, the rate was 4,771 per 100,000 population in 2000 and stayed at or above 4,700 per 100,000 through 2010. The rate began to drop below this level in 2011, and by 2015 the rate had decreased to 4,024, a 16 percent reduction since 2000.

  Among patients aged 18 years and under, the rate stayed above 2,600 from 2000 to 2006, with the highest rate reached in 2005 (3,236 per 100,000 population). In 2015, the rate reached its lowest level in 16 years at 2,117 per 100,000 population, a decrease of 19 percent since 2000.

Trends in primary payer among nonneonatal, nonmaternal inpatient stays by patient age, 2000–2015
Figures 2 to 5 present national trends in expected primary payer for nonneonatal, nonmaternal inpatient care for each age group from 2000 to 2015.

Figure 2. National trends in primary payer among nonneonatal, nonmaternal inpatient stays for patients under age 18 years, 2000–2015



Note: Shares of "Missing" and "Other" payers are not presented.

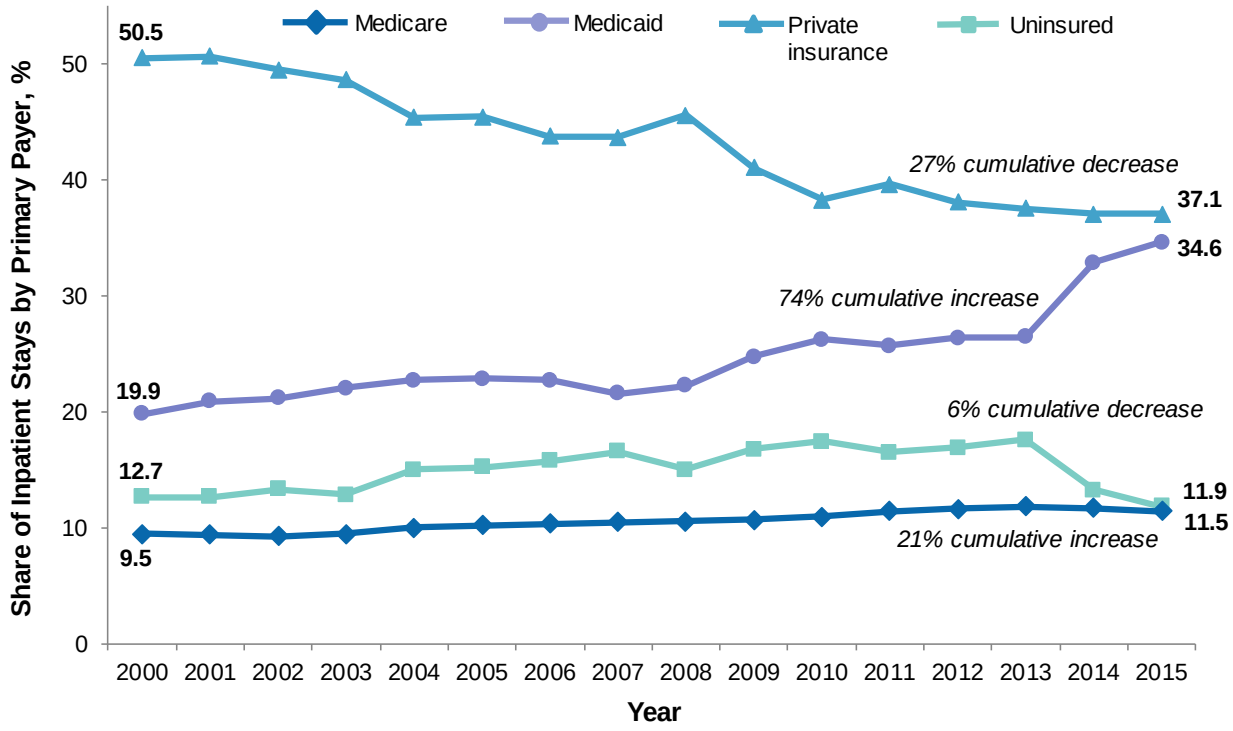
Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets. Healthcare Cost and Utilization Project (HCUP), National (Nationwide) Inpatient Sample (NIS), 2000–2015

- **Starting in 2007, Medicaid replaced private insurance as the most common primary payer for nonneonatal and nonmaternal inpatient stays among those under age 18 years**.

  In 2000, the most common payer for nonneonatal and nonmaternal inpatient stays among patients under age 18 years was private insurance (52.5 percent), followed by Medicaid (38.9 percent). By 2015, the share of Medicaid had reached 53.7 percent, which is an increase of 38 percent since 2000. By 2015, the share of private insurance had dropped to 39.5 percent, its lowest level in 16 years—a decrease of 25 percent since 2000.

  The share of uninsured patients within this age group fluctuated between 3.2 and 4.9 percent from 2000 to 2010 and dropped to 2.8 percent or below thereafter. The share of Medicare within this age group stayed below 0.5 percent in all years.

Figure 3. National trends in primary payer among nonneonatal, nonmaternal inpatient stays for patients aged 18–44 years, 2000–2015



Note: Shares of "Missing" and "Other" payers are not presented.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets. Healthcare Cost and Utilization Project (HCUP), National (Nationwide) Inpatient Sample (NIS), 2000–2015

- **Among nonneonatal, nonmaternal inpatient stays for 18-to-44-year-olds, private insurance was the most common primary payer, followed by Medicaid.**

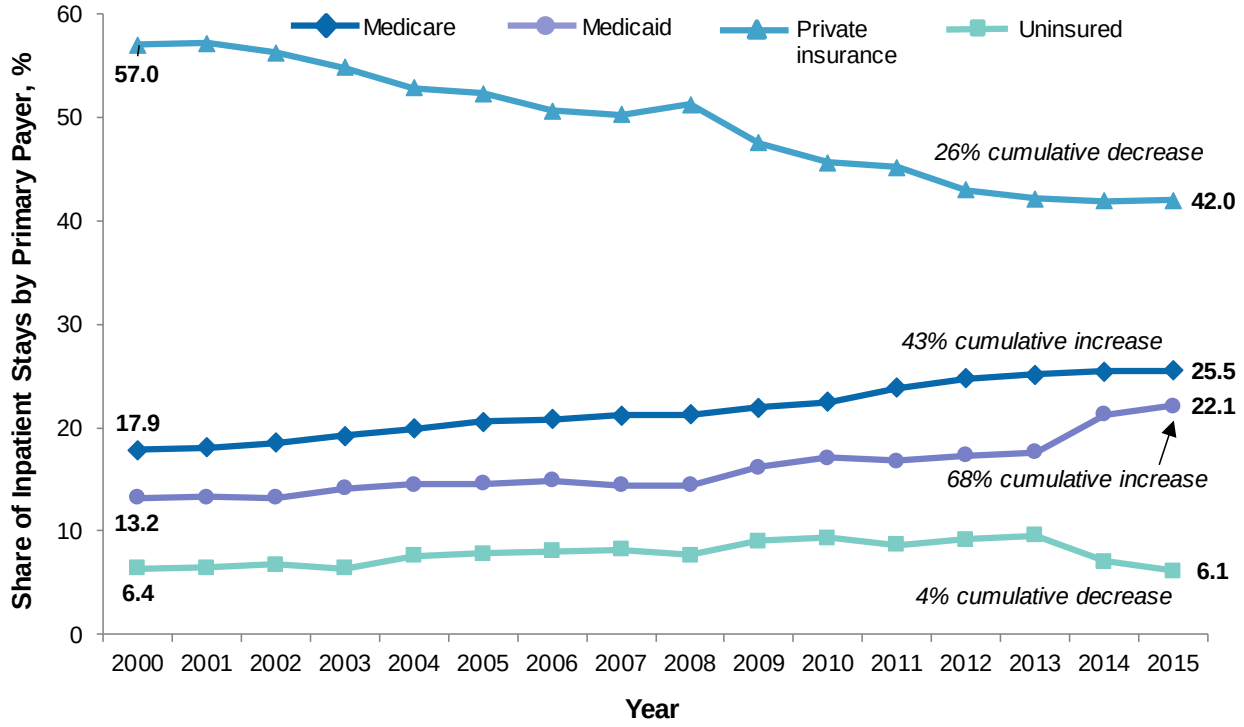
  The most common primary payer for nonneonatal and nonmaternal inpatient stays among patients aged 18–44 years was private insurance, which accounted for 50.5 percent of stays in 2000 and dropped to 37.5 percent in 2013. During the same period, the share of Medicaid increased from 19.9 percent to 26.5 percent, the share of uninsured increased from 12.7 percent to 17.6 percent, and the share of Medicare increased from 9.5 percent to 11.9 percent.

- **From 2013 to 2015, the share of Medicaid within this age group increased and the share of uninsured decreased.**

  The share of Medicaid in 2015 was 34.6 percent, which is an increase of 74 percent since 2000. The share of uninsured in 2015 dropped to 11.9 percent, its lowest level during these 16 years.

  The share of private insurance dropped to 37.1 percent in 2015 and remained as the most common payer within this age group. The share of Medicare in 2015 was 11.5, an increase of 21 percent since 2000.

Figure 4. National trends in primary payer among nonneonatal, nonmaternal inpatient stays for patients aged 45–64 years, 2000–2015



Note: Shares of "Missing" and "Other" payers are not presented.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets. Healthcare Cost and Utilization Project (HCUP), National (Nationwide) Inpatient Sample (NIS), 2000–2015

- **Among nonneonatal, nonmaternal inpatient stays for patients aged 45–64 years, private insurance was the most common primary payer, followed by Medicare.**

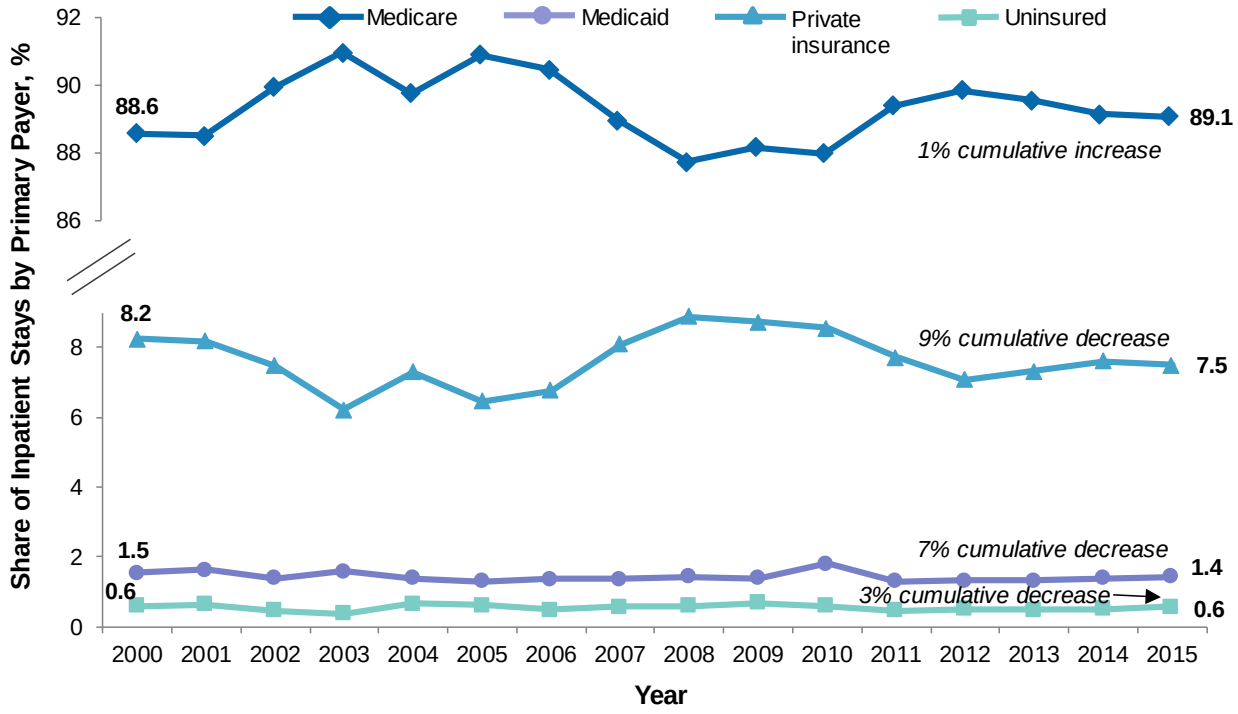
  The share of private insurance among inpatient stays for patients aged 45–64 years dropped from 57.0 percent in 2000 to 42.1 percent in 2013. During the same period, the share of Medicare increased from 17.9 percent to 25.1 percent, the share of Medicaid increased from 13.2 percent to 17.6 percent, and the share of uninsured increased from 6.4 percent to 9.6 percent, which remained the lowest among all payers for this age group.

- **From 2013 to 2015, the share of inpatient stays covered by Medicaid increased and the share that were uninsured decreased.**

  By 2015, the share of inpatient stays covered by Medicaid in this age group had increased to 22.1 percent, an increase of 68 percent since 2000. The share of stays that were uninsured had dropped to 6.1 percent, its lowest level during this period.

  The share of inpatient stays covered by private insurance in 2014 and 2015 was at about the same level as it had been in 2013. From 2000 to 2015, the share of stays covered by private insurance decreased by 26 percent, but private insurance remained the most common primary payer. The share of stays covered by Medicare reached 25.5 percent in 2015, an increase of 43 percent since 2000.

Figure 5. National trends in primary payer among nonneonatal, nonmaternal inpatient stays for patients aged 65 years and over, 2000–2015



Note: Shares of "Missing" and "Other" payers are not presented.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets. Healthcare Cost and Utilization Project (HCUP), National (Nationwide) Inpatient Sample (NIS), 2000–2015

- **Medicare and private insurance accounted for about 97 percent of nonneonatal and nonmaternal inpatient stays among patients aged 65 years and over.**

  Among patients aged 65 years and over, the share of inpatient stays covered by Medicare fluctuated between 88 and 91 percent during the 2000–2015 period; at the same time, the share of stays covered by private insurance fluctuated between 6 and 9 percent. These two payers together consistently covered about 97 percent of the inpatient stays within this age group during the 16-year period.

  Within this age group, the share of stays covered by Medicaid remained under 2 percent, and the share of stays that were uninsured remained under 0.8 percent.

To summarize across age groups, from 2000 to 2015, for patients aged 64 years or younger, the share of inpatient stays with an expected primary payer of private insurance decreased and the share of stays with Medicaid increased. The share of uninsured stays reached its 16-year low in 2015. For patients aged 18–64 years, the share of stays with Medicare increased during the 16-year period.

About Statistical Briefs

HCUP Statistical Briefs provide basic descriptive statistics on a variety of topics using HCUP administrative health care data. Topics include hospital inpatient, ambulatory surgery, and emergency department use and costs, quality of care, access to care, medical conditions, procedures, and patient populations, among other topics. The reports are intended to generate hypotheses that can be further explored in other research; the reports are not designed to answer in-depth research questions using multivariate methods.

Data Source

The estimates in this Statistical Brief are based upon data from the Healthcare Cost and Utilization Project (HCUP) 2000–2015 National (Nationwide) Inpatient Sample (NIS). Supplemental sources included population denominator data for use with HCUP databases, derived from information available from the Bureau of the Census.[7]

Definitions

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 1 year will be counted each time as a separate discharge from the hospital.

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 general groups:

- Medicare: includes patients covered by fee-for-service and managed care Medicare
- Medicaid: includes patients covered by fee-for-service and managed care Medicaid
- Private Insurance: includes Blue Cross, commercial carriers, and private health maintenance organizations (HMOs) and preferred provider organizations (PPOs)
- Uninsured: includes an insurance status of *self-pay* and *no charge*
- Other: includes Workers' Compensation, TRICARE/CHAMPUS, CHAMPVA, Title V, and other government programs

Hospital stays billed to the State Children's Health Insurance Program (SCHIP) may be classified as Medicaid, Private Insurance, or Other, depending on the structure of the State program. Because most State data do not identify patients in SCHIP specifically, it is not possible to present this information separately.

Diagnosis-related groups (DRGs) and major diagnostic categories (MDCs)
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 assigned DRG.

Coding criteria for the types of hospitalization are based on MDCs. MDCs are broad groups of DRGs that relate to an organ or a body system (e.g., digestive system) and not to an etiology. For example, MDC 01 – Diseases and Disorders of the Nervous System and MDC 02 – Diseases and Disorders of the Eye. Each hospital stay has one DRG and one MDC assigned to it.
In this Statistical Brief, nonneonatal and nonmaternal hospitalizations are identified using the MDCs that are not equal to 14 (Pregnancy, Childbirth and the Puerperium) or 15 (Newborns and Other Neonates with Conditions Originating in the Perinatal Period).

[7] Barrett M, Coffey R, Levit K. Population Denominator Data for Use With the HCUP Databases (Updated With 2016 Population Data). HCUP Methods Series Report # 2017-04 ONLINE. October 17, 2017. U.S. Agency for Healthcare Research and Quality. www.hcup-us.ahrq.gov/reports/methods/methods.jsp. Accessed November 22, 2017.

Types of hospitals included in the HCUP National (Nationwide) Inpatient Sample
The National (Nationwide) Inpatient Sample (NIS) is based on data from community hospitals, which are defined as short-term, non-Federal, general, and other hospitals, excluding hospital units of other institutions (e.g., prisons). The NIS includes obstetrics and gynecology, otolaryngology, orthopedic, cancer, pediatric, public, and academic medical hospitals. Excluded are long-term care facilities such as rehabilitation, psychiatric, and alcoholism and chemical dependency hospitals. Beginning in 2012, long-term acute care hospitals are also excluded. However, if a patient received long-term care, rehabilitation, or treatment for a psychiatric or chemical dependency condition in a community hospital, the discharge record for that stay will be included in the NIS.

About HCUP

The Healthcare Cost and Utilization Project (HCUP, pronounced "H-Cup") is a family of health care databases and related software tools and products developed through a Federal-State-Industry partnership and sponsored by the Agency for Healthcare Research and Quality (AHRQ). HCUP databases bring together the data collection efforts of State data organizations, hospital associations, and private data organizations (HCUP Partners) and the Federal government to create a national information resource of encounter-level health care data. HCUP includes the largest collection of longitudinal hospital care data in the United States, with all-payer, encounter-level information beginning in 1988. These databases enable research on a broad range of health policy issues, including cost and quality of health services, medical practice patterns, access to health care programs, and outcomes of treatments at the national, State, and local market levels.

HCUP would not be possible without the contributions of the following data collection Partners from across the United States:

Alaska Department of Health and Social Services
Alaska State Hospital and Nursing Home Association
Arizona Department of Health Services
Arkansas Department of Health
California Office of Statewide Health Planning and Development
Colorado Hospital Association
Connecticut Hospital Association
District of Columbia 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
Maine Health Data Organization
Maryland Health Services Cost Review Commission
Massachusetts Center for Health Information and Analysis
Michigan Health & Hospital Association
Minnesota Hospital Association
Mississippi State Department of Health
Missouri Hospital Industry Data Institute
Montana Hospital Association
Nebraska Hospital Association
Nevada Department of Health and Human Services
New Hampshire Department of Health & Human Services
New Jersey Department of Health
New Mexico Department of Health
New York State Department of Health
North Carolina Department of Health and Human Services

North Dakota (data provided by the Minnesota Hospital Association)
Ohio Hospital Association
Oklahoma State Department of Health
Oregon Association of Hospitals and Health Systems
Oregon Office of Health Analytics
Pennsylvania Health Care Cost Containment Council
Rhode Island Department of Health
South Carolina Revenue and Fiscal Affairs Office
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 Department of Health and Human Resources, West Virginia Health Care Authority
Wisconsin Department of Health Services
Wyoming Hospital Association

About the NIS

The HCUP National (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, nonrehabilitation hospitals). The NIS includes all payers. It is drawn from a sampling frame that contains hospitals comprising more than 95 percent of all discharges in the United States. The vast size of the NIS allows the study of topics at the national and regional levels for specific subgroups of patients. In addition, NIS data are standardized across years to facilitate ease of use. Over time, the sampling frame for the NIS has changed; thus, the number of States contributing to the NIS varies from year to year. The NIS is intended for national estimates only; no State-level estimates can be produced.

The 2012 NIS was redesigned to optimize national estimates. The redesign incorporates two critical changes:

- Revisions to the sample design—starting with 2012, the NIS is now a *sample of discharge records from all HCUP-participating hospitals*, rather than a sample of hospitals from which all discharges were retained (as is the case for NIS years before 2012).

- Revisions to how hospitals are defined—the NIS now uses the *definition of hospitals and discharges supplied by the statewide data organizations* that contribute to HCUP, rather than the definitions used by the American Hospital Association (AHA) Annual Survey of Hospitals.

The new sampling strategy is expected to result in more precise estimates than those that resulted from the previous NIS design by reducing sampling error: for many estimates, confidence intervals under the new design are about half the length of confidence intervals under the previous design. The change in sample design for 2012 necessitates recomputation of prior years' NIS data to enable analyses of trends that use the same definitions of discharges and hospitals.

For More Information

For other information on hospitalizations in the United States, refer to the HCUP Statistical Briefs located at www.hcup-us.ahrq.gov/reports/statbriefs/sb_hospoverview.jsp.

For additional HCUP statistics, visit:

- HCUP Fast Stats at www.hcup-us.ahrq.gov/faststats/landing.jsp for easy access to the latest HCUP-based statistics for health information topics
- HCUPnet, HCUP's interactive query system, at www.hcupnet.ahrq.gov/

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

For a detailed description of HCUP and more information on the design of the National (Nationwide) Inpatient Sample (NIS), please refer to the following database documentation:

Agency for Healthcare Research and Quality. Overview of the National (Nationwide) Inpatient Sample (NIS). Healthcare Cost and Utilization Project (HCUP). Rockville, MD: Agency for Healthcare Research and Quality. Updated December 2016. www.hcup-us.ahrq.gov/nisoverview.jsp. Accessed January 31, 2017.

Suggested Citation

Sun R (AHRQ), Karaca Z (AHRQ), Wong HS (AHRQ). Trends in Hospital Inpatients Stays by Age and Payer, 2000–2015. HCUP Statistical Brief #235. January 2018. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/reports/statbriefs/sb235-Inpatient-Stays-Age-Payer-Trends.pdf.

* * *

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

Sharon B. Arnold, Ph.D., Acting Director
Center for Delivery, Organization, and Markets
Agency for Healthcare Research and Quality
5600 Fishers Lane
Rockville, MD 20857

This Statistical Brief was posted online on January 23, 2018.