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INTRODUCTION

The mission of the Agency for Healthcare Research and Quality (AHRQ) is to produce evidence to make health care safer, higher quality, more accessible, equitable, and affordable, and to work with the U.S. Department of Health and Human Services (HHS) and other partners to make sure that the evidence is understood and used.

AHRQ promotes health care quality improvement by conducting and supporting health services research that develops and presents scientific evidence regarding all aspects of health care. Health services research addresses issues of organization, delivery, financing, utilization, patient and provider behavior, quality, outcomes, effectiveness, and cost. AHRQ develops the knowledge, tools, and data needed to improve the health care system and help Americans, health care professionals, and policymakers make informed health decisions.

The AHRQ-sponsored Healthcare Cost and Utilization Project (HCUP, pronounced “H-Cup”) is a vital resource, helping the Agency achieve its research agenda and thereby furthering its goal of improving the delivery of health care in the United States.

AHRQ releases the HCUP Annual Activities Report each spring to describe HCUP accomplishments in the previous year and to detail current plans for the upcoming year. This report is intended to inform HCUP Partners about project activities and ways in which HCUP data currently are used.

Overview of the HCUP Project

HCUP is a family of databases and related software tools and products developed through a Federal-State-Industry partnership and sponsored by AHRQ. HCUP databases are derived from administrative data and contain encounter-level, clinical and nonclinical information including all-listed diagnoses and procedures, discharge status, patient demographics, and charges for all patients, regardless of payer (e.g., Medicare, Medicaid, private insurance, uninsured). HCUP data collection began 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.

The HCUP databases are based on the data collection efforts of organizations in participating States that maintain statewide data systems and are Partners with AHRQ.

HCUP databases include the following:

- **National (Nationwide) Inpatient Sample (NIS)** is the largest publicly available, all-payer inpatient health care database in the United States, yielding national estimates of inpatient stays. Beginning with the 2012 data year, the National Inpatient Sample (NIS) was redesigned to improve national estimates. It contains a sample of inpatient discharges representing approximately 20 percent of the total discharges from U.S.
community hospitals. The NIS contains information on all patients, regardless of payer, including individuals covered by Medicare, Medicaid, private insurance, and uninsured.

- **Kids’ Inpatient Database (KID)** is the only all-payer database for children in the United States. The KID contains a nationwide sample of pediatric inpatient discharges for patients younger than 21 years of age and is generally produced every three years. The next KID will be available for 2016, after the transition from ICD-9-CM codes, and will be comprised of ICD-10-CM/PCS data only.

- **Nationwide Emergency Department Sample (NEDS)** is the largest all-payer emergency department (ED) database in the United States. The NEDS includes discharge data on ED visits from a nationwide sample of 945 hospitals. It captures information for both treat-and-release visits and visits resulting in a hospital admission.

- **Nationwide Readmissions Database (NRD)** is designed to create national readmission rates. The NRD includes a sample of approximately 15 million discharges each year for discharges with and without readmissions. It addresses the need for nationally representative information on hospital readmissions.

- **State Inpatient Databases (SID)** contain the universe of inpatient discharges from participating States. The data are translated into a uniform format to facilitate multi-State comparisons and analyses. Together, the SID encompass about 97 percent of all U.S. community hospital discharges.

- **State Ambulatory Surgery and Services Databases (SASD)** include encounter-level data for ambulatory surgery and other outpatient services from hospital-owned facilities. In addition, some States provide ambulatory surgery and outpatient services from nonhospital-owned facilities.

- **State Emergency Department Databases (SEDD)** contain data from hospital-affiliated EDs for visits that do not result in hospitalizations. The SEDD files include all patients, regardless of payer, providing a unique view of ED care in a State or in a defined market over time.

Supplemental files for use with HCUP databases include the following:

- **Cost-to-Charge Ratio Files (CCR Files)** are hospital-level files that facilitate the conversion of inpatient total charges to total costs.

- **Hospital Market Structure Files (HMS Files)** are hospital-level files that contain various measures of hospital market competition. These measures are aggregate and are meant to provide a broad characterization of the intensity of competition that hospitals may be facing under various definitions of market area.

- **Kids’ Inpatient Database Trend Weights (KID-Trend Weights) File** is a discharge-level file that provides KID data users with trend weights that are consistently defined from 1997 through later years.

- **1993-2011 NIS Trend Weights Files** provide revised weights that adjust for changes in the 2012 NIS design, so that the 1993-2011 weights are calculated in the same way as 2012 and later estimates. For trends analysis using NIS data 2011 and earlier, the revised weights should be used to make national estimates comparable to the new design beginning with 2012 data.

- **1993-2002 NIS Supplemental Discharge-Level Files** facilitate analysis of trends using earlier years of NIS data. The files provide additional data elements for the 1993–2002
NIS that were added to the design in later years. The files include the trend weights from the NIS Trend Weights Files for convenience.

- **Supplemental Variables for Revisit Analyses** are discharge-level variables designed to facilitate analyses that track patients within a State as well as across time and hospital settings (inpatient, ED, and ambulatory surgery) while adhering to strict privacy guidelines. For data years 2003-2008, the revisit variables were stored in separate supplemental files. Beginning with 2009 data, the revisit variables are included in the SID, SASD, and SEDD databases and are no longer released separately.

### Highlights of 2016

In 2016, HCUP focused on expanding the type and number of data projects and resources available to researchers and policymakers. Project achievements during 2016 included the following:

#### Databases and Software Tools

- HCUP produced and released the 2014 NIS, NEDS, and NRD.
- HCUP began creating the 2015 SID, SASD, and SEDD using revised programs that accept ICD-10-CM/PCS data.
- HCUP continued to release the State databases via the Central Distributor. The Central Distributor added three new States and released 56 State databases in 2016.
- HCUP made further progress in producing timely information, using quarterly data for 2015–2016 from 21 HCUP Partners to generate projections and to identify utilization and outcome changes.
- HCUP introduced a new capacity to download nationwide databases delivered via secure digital download from the HCUP Central Distributor.
- AHRQ began a redesign of HCUPnet—HCUP’s free, online query system. The new site has a modernized look and feel, a simplified process for querying data, fewer clicks to reach information, and more flexibility in changing the content and display of data.
- HCUP continued to prepare the enhancements for Community Statistics on HCUPnet that are planned for release in 2017. New features include statistics for U.S.–Mexico border regions, time-aggregated statistics across 3 years of data to reduce the incidence of insufficient sample size, and updated 2013 statistics for participating States.
- HCUP released the 2014 CCR Files with Partner approval that contain hospital-specific, cost-to-charge ratios based on all-payer inpatient cost for nearly every hospital in the corresponding NIS, SID, and NRD.
- AHRQ made several new enhancements to HCUP Fast Stats – a tool on the HCUP-US Web site that provides easy access to the latest easy HCUP-based statistics for health information topics. AHRQ added new States, more recent data, and released two new topics. The **State Trends in Hospital Use by Payer** was expanded to include trends in emergency department (ED) visits. A new topic on **Opioid-Related Hospital Use** provides trends in opioid-related inpatient stays and ED visits at the national and State levels.
Reports and Analyses

- HCUP continued to produce the Statistical Briefs series on the HCUP User Support (HCUP-US) Web site, releasing 20 new Statistical Briefs. The Statistical Briefs covered topics such as hospital readmissions for patients with malnutrition, variation in the rate of cesarean sections, trends in mastectomies in hospital inpatient and ambulatory settings, and most expensive conditions by payer. AHRQ released its first two Statistical Briefs containing State-specific data, including a brief on opioid-related inpatient stays and emergency department visits.

- AHRQ released an HCUP Projections Report on acute myocardial infarction and acute stroke, and an HCUP Infographic: Malnutrition in Hospitalized Patients, which presents a visual representation of key points from HCUP Statistical Brief #210, Characteristics of Hospital Stays Involving Malnutrition, 2013.

- AHRQ released the 2015 National Healthcare Quality and Disparities Report (QDR), which included national and State-level estimates from the 2013 HCUP data. The QDR reports are available on QRDRnet (www.nhqrnet.ahrq.gov).

- AHRQ provided estimates of selected AHRQ Quality Indicator (QI) measures using 2014 HCUP data for the development of the next annual QDR, which is planned for release in early 2017.

- HCUP released nine new or updated Methods Series reports. The reports covered topics such as State Variation in Procedure Coding in the HCUP SEDD, Impact of ICD-10-CM/PCS on Research Using Administrative Databases, Challenges to Studying Patients Transferred Between Hospitals, Identifying Observation Services in HCUP State Databases, and Methods for Applying the AHRQ QIs to HCUP Data for the 2015 QDR.

Presentations and Outreach

- The User Support team showcased HCUP resources via presentations, Webinars, and exhibit booths at 15 venues.

- HCUP presented four HCUP data users’ workshops for health services researchers where attendees received hands-on training using the HCUP databases and related tools.

- HCUP hosted a two-part Webinar series on HCUP databases, products, and tools.

- AHRQ presented the HCUP Outstanding Article of the Year Award at the 2016 AcademyHealth Annual Research Meeting.

- HCUP updated four trainings from the HCUP Online Tutorial Series: HCUP Privacy and DUA Course, the HCUP Overview Course, Calculating Standard Errors, and Load and Check HCUP Data.

- HCUP released four quarterly newsletters to provide a summary of quarterly activities.

- HCUP highlighted select research studies that show interesting and important uses of data on the HCUP-US Research Spotlights page.

- HCUP provided monthly updates for HCUP-US Events and Product Release Calendars.

Partnership Activities and Resources

- AHRQ held quarterly Webinars with HCUP Partners to inform and involve Partners in the design and direction of the project. Meeting minutes, slides, and additional resources for
HCUP Partners Meetings are available on the Partner section of the HCUP-US Web site.

- HCUP initiated a new discussion topic on Challenges Partners Face as Data Stewards to identify priority areas and held further discussion in the December Partners Meeting. Partners identified three main challenges as data stewards: outpatient data issues (data quality, bundled outpatient data types), data processing issues (incomplete and missing data values), and challenges with linking to other data sources (Vital Records, All-Payer Claims Data, Medicaid data).
- HCUP developed the 2014 Border Crossing Report, which provides information on the flow of patients into and out of HCUP States and is available on the HCUP-US Partners page.
- HCUP continued to provide Partners with technical support, software tools, and reports designed to enhance the collection and use of inpatient and outpatient data.

Objectives for 2017

The current status of States participating in HCUP data collection and a description of the types of data they provide are displayed in the map below. In 2017, HCUP will continue to maintain the databases, tools, and reports as part of our commitment to ensure that HCUP remains a unique and valuable resource for health services research. We remain committed to supporting communication among HCUP Partners as well as between Partners and AHRQ. During the coming year, the project goals are to accomplish the following:

- Produce and release the 2015 NIS, NEDS, and NRD.
- Complete the 2015 SID, SASD, and SEDD and begin production of 2016 State Databases as participating Partner organizations complete and release their annual data files.
- Continue to produce HCUP Statistical Briefs—a series of online reports available on the HCUP-US Web site that are designed to summarize HCUP data for policy and nontechnical audiences.
- Continue to release HCUP Projections using historical inpatient data to create national estimates on health priorities for more recent time periods.
- Expand the collection of quarterly data from additional States to produce timely information.
- Generate estimates using HCUP data for the National Healthcare Quality and Disparities Report (QDR).
- Conduct research and analyses using HCUP data to explore the impact of changes in health policy, to analyze trends, and to evaluate structural and clinical factors on health care outcomes.
- Enhance the Community-Level Statistics query path on HCUPnet.
- Develop enhancements to HCUP Fast Stats and update existing topics quarterly or annually as newer data become available.
- Update HCUP Methods Series Reports that assist users with using the HCUP database and software tools.
 Begin three new research HCUP studies: the variations between State medication-assisted treatment policies and access to naloxone and readmissions/revisits for opioid-related diagnoses among the Medicaid population; the relationship between hospital, community, and patient factors and changes in revisit rates; and features of hospital accountable care organizations associated with care quality and program sustainability.
In 2016, AHRQ completed the fourth year of its current 5-year HCUP contract. In 2017, AHRQ will prepare for the next five-year plan, which will carry HCUP forward from 2018-2022. The scope of the HCUP contract builds on and maintains a strong foundation of valuable data, useful analytic tools, and important partnerships with State data organizations, hospital associations, and private data organizations.

HCUP’s objectives are to accomplish the following:

- Create and enhance a powerful source of national, State, and all-payer health care data.
- Produce a broad set of software tools and products to facilitate the use of HCUP and other administrative data.
- Enrich a collaborative partnership with statewide data organizations aimed at increasing the quality and use of health care data.
- Conduct and translate research to inform decisionmaking and improve health care delivery.

The current plan focuses on the following strategies to increase the impact of HCUP:
Maintain a strong core while enhancing data tools and measures.

Improve the value of HCUP by producing and disseminating information derived from the data.

Explore additional data and linkages that would enable HCUP to examine a wider set of health care encounters.

Place greater emphasis on and capacity for research analyses that use the breadth and depth of HCUP data to explore the impact of changes in health policy on health care. HCUP data allow researchers to document and analyze explanations for trends in health care and to propose and test hypotheses about the relative importance and impact of a variety of structural and clinical factors on health care outcomes, among other topics.

Emphasize the importance of data partnerships.

Expand outpatient data.

The HCUP Partners Meetings were held via Webinar on a quarterly schedule in 2016. Partners were invited to provide input regarding their priorities, to suggest possible changes for the project, and to discuss current data activities in their organizations. AHRQ shared challenges and accomplishments of the project as well as upcoming plans and initiatives. Many interesting topics were reported, such as HCUP hospital crosswalk enhancement, news and updates to HCUP Fast Stats, using State-specific data to increase understanding of the Nation’s substance use crisis, and an update on the AHRQ Quality Indicators (QIs). In 2017, AHRQ will continue the HCUP Partners Meetings by Webinar. Notes from the HCUP Partners Meetings are available on the password-protected Partners section of the HCUP-US Web site: www.hcup-us.ahrq.gov/login.jsp. AHRQ places great value on Partner input and will continue to seek Partner guidance on the use and development of HCUP data.

**SUMMARY OF HCUP ACTIVITIES FOR 2016**

AHRQ conducts exploratory studies using HCUP data to examine current health research topics and to identify areas for further data refinement. The studies described in this section were in response to carefully selected topics that are consistent with the AHRQ research agenda. AHRQ develops this agenda in consultation with many agencies within HHS and with prominent health care organizations and institutions. AHRQ’s research agenda reflects current priorities and emerging policy issues.

AHRQ also consults with industry experts, public officials, and other researchers to select topics for study. Finally, AHRQ solicits advice from data organizations participating in HCUP concerning product development and research.

In addition to exploratory studies conducted by the HCUP team, HCUP produces software tools and supplemental files to further enhance the administrative databases and to improve their value and ease of use. HCUP also produces methods reports including statistics, findings, and special technical analyses aimed at communicating and disseminating information about HCUP data. Additional information about HCUP software tools, supplemental files, and data reports is provided in the HCUP Project Overview Binder.

Finally, AHRQ researchers use HCUP data to conduct their own research and to engage in collaborations intended for publication in peer-reviewed journals or disseminated through other media. AHRQ conducts specific studies using HCUP data in collaboration with other Federal agencies, including the Centers for Disease Control and Prevention (CDC), the Food and Drug.
Administration (FDA), and the Substance Abuse and Mental Health Services Administration (SAMHSA). In these instances, an AHRQ HCUP team member works with a colleague at another agency, bringing together expertise in knowledge areas and respective data resources. All collaborations using HCUP data are conducted under the supervision of the AHRQ HCUP researcher.

In 2016, AHRQ investigated numerous HCUP-related topics with the dual goals of developing data for research use and exploring health outcomes to inform policy decisions. Studies that began in 2016 or began earlier but changed significantly in 2016 are listed below. The databases used in these studies are shown in parentheses.

**Studies Using State Databases**

- Accountable Care Organizations and Inpatient Mortality Rates (SID)
- The Affordable Care Act: Geographic Variation in Uninsurance and Changes in Hospital Inpatient Utilization (SID)
- Association Between the Opening of Retail Clinics and Low-Acuity Emergency Department Visits (SEDD)
- Changes in Hospital Service Demand, Cost, and Acuity Following the Affordable Care Act (SID, SEDD)
- Early Impact of the Affordable Care Act Medicaid Expansion on Safety-Net Hospital Inpatient Payer Mix and Market Shares (SID)
- Effects of Medicaid Expansion Under the Affordable Care Act on Utilization of Inpatient and Emergency Department Care at Safety-Net and Nonsafety-Net Hospitals (SID, SEDD)
- Hospital Utilization Among Young Adults Following the Affordable Care Act Dependent Care Coverage Expansion: Immediate and Persistent Impacts (SID, SEDD)
- Impact of Health System Affiliation on Hospital Resource Use Intensity and Quality of Care (SID)
- Impact of Race/Ethnicity and Socioeconomic Status on Risk-Adjusted Hospital Readmission Rates Following Hip and Knee Arthroplasty (SID)
- Impact of Race/Ethnicity and Socioeconomic Status on Risk-Adjusted Readmission Rates: Implications for the Hospital Readmissions Reduction Program (SID)
- Inpatient Hospital Cost and Safety Indicators for Older Adults Covered by Medicare Advantage Versus Fee-for-Service Plans (SID)
- Insurance Expansion and Hospital Emergency Department Access (SID, SEDD)
- The Marginal Hospital Costs of Adverse Drug Events Associated With Exposures to Anticoagulants and Diabetes Agents During Hospitalization (SID)
- Medicare Advantage Penetration and Hospital Costs Before and After the Affordable Care Act (SID)
- Medicare Advantage Versus Traditional Medicare: Effect on Hospital Admission Rates (SID)
- Medicare Fee-for-Service Spillovers on Readmissions after Implementation of the Hospital Readmission Reduction Program (SID)
- Readmission and Opportunities to Treat Opioid-Related Conditions at Initial Hospitalization (SID, SEDD)
- Returns to Emergency Department, Observation, or Inpatient Care Within 30 Days After Hospitalization, 2009–2010 Versus 2013–2014 (SID, SASD, SEDD)
- Shifts in Medicaid and Uninsured Payer Mix at Safety-Net and Nonsafety-Net Hospitals During the Great Recession (SID)
Validating Cost Estimates That Are Based on Cost-to-Charge Ratios Using Healthcare Cost and Utilization Project Data (SID, SEDD)

Studies Using Nationwide Databases

- Annual Report on Health Care for Children and Adolescents in the United States: Focus on Inpatient Readmissions (NRD)
- Have Widening Private-Medicare Payment Differences Led to Differences in Inpatient Hospital Treatment? (NIS)
- Variable Frequencies, Outcomes, and Costs Argue for Separate Tracking of Ischemic Strokes, Subarachnoid Hemorrhages, and Other Hemorrhagic Strokes (NIS)

Studies Using Both Nationwide and State Databases

- Emergency Department Visits for Severe Pediatric Injuries: Effect of Hospital Trauma Level on Rate of Admissions (SID, SEDD, NIS, NEDS)
- Injury Epidemiologic Collaborations (SID, SEDD, NIS)
- National Healthcare Quality and Disparities Reports (QDR) Special Analyses (SID, SEDD, NIS, NEDS)
- Using the Healthcare Cost Utilization Project to Inform State Health Policy: Opportunities and Challenges (SEDD, NEDS)

Ongoing Studies

- National Healthcare Quality and Disparities Report (QDR)

Descriptions of these studies are provided below.

Studies Using State Databases

Accountable Care Organizations and Inpatient Mortality Rates

Introduction: Accountable care organizations (ACOs) have proliferated rapidly since 2011. Although primary care is the core of the ACO model, hospitals are key partners in many ACOs, as reducing inpatient costs and readmissions is crucial for achieving success. Inpatient quality indicator (IQI) mortality rates are not measures on which ACOs are explicitly graded, but an important aspect of the ACO concept is to improve care delivery at the organizational level. There is interest from policymakers in understanding whether hospital participation in ACOs may benefit not only ACO-aligned populations but also unaligned populations on measures beyond those factored into shared savings determinations.

Methods: Data were from the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) 2008–2014 State Inpatient Databases (SID) from 34 States. We obtained hospital responses to questions about ACO participation from the American Hospital Association (AHA) Annual Survey and also from the AHA Survey of Care Systems and Payment. We will study mortality rates following admissions for the IQI-associated conditions: abdominal aortic aneurysm repair, coronary artery bypass grafting, acute myocardial infarction, and pneumonia. Linear regression modeling outcome rates, with hospital fixed effects and ACO participation indicators, will be used to derive average partial effects of ACO participation. Results are forthcoming.

Rachel Henke, Ph.D., Zeynal Karaca, Ph.D., Eli Cutler, Ph.D., and Michael Head, M.S.
**The Affordable Care Act: Geographic Variation in Uninsurance and Changes in Hospital Inpatient Utilization**

**Introduction:** The goal of this study was to analyze the relationship between uninsurance rates in hospital markets prior to implementation of the Affordable Care Act private and Medicaid coverage expansion provisions and uninsured discharge volumes following these reforms. This information can help policymakers understand how the size of “at-risk” populations translates into changes in utilization following reform. **Methods:** Data were from Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) 2011–2014 State Inpatient Databases (SID) from 20 States (Arizona, California, Colorado, Florida, Hawaii, Indiana, Iowa, Kansas, Kentucky, Michigan, Missouri, Montana, New Jersey, New York, Oregon, South Dakota, Tennessee, Vermont, Virginia, and Wisconsin); State population estimates from the Census Bureau; unemployment rate estimates from the Bureau of Labor Statistics; Hospital market definitions (Hospital Service Area) from Dartmouth Atlas of Health Care; and ZIP Code Tabulation Area (ZCTA) population estimates by insurance status and federal poverty level (FPL) from the U.S. Census Bureau’s American Community Survey. This was a retrospective cohort study, with hospitals as the sampling unit. Hospital fixed effects regression models were used to control for hospital heterogeneity. Geographic variation in hospital market uninsurance rates was used to estimate the effect of the Affordable Care Act Medicaid expansion and Health Insurance Marketplace subsidies on changes in uninsured hospital discharge volumes. We statistically controlled for other time-varying hospital market characteristics. **Results:** There were significant associations between rates of uninsurance in hospital markets and reductions in use of hospital inpatient services by the uninsured—a finding that holds for both expansion and nonexpansion States. Overall, between 2011 and 2013, the percentage of uninsured discharges increased from 11.3 percent to 12.1 percent and then fell to 8.3 percent. Between 2013 and 2014 in nonexpansion States, the percentage of uninsured discharges declined from 13.8 percent to 12.9 percent. In expansion States without pre-Affordable Care Act childless adult coverage, uninsured discharge percentages declined from 13.0 percent to 5.5 percent, whereas States with such coverage had declines from 7.1 percent to 4.8 percent. **Conclusion:** Hospitals in markets with higher average uninsurance rates before the Affordable Care Act coverage expansions experienced larger decreases in uninsured discharges following their implementations. We also found evidence, albeit somewhat tenuous, that declines in uninsured discharge volumes were greatest in expansion states without pre-expansion Medicaid childless adult coverage and weakest in non-expansion states.

**Eli Cutler, Ph.D., Michael Dworsky, Ph.D., Christine Eibner, Ph.D., Sharat Iyer, M.D., Zeynal Karaca, Ph.D., Brian J. Moore, Ph.D., Gary Pickens, Ph.D., and Herbert S. Wong, Ph.D.**

**Association Between the Opening of Retail Clinics and Low-Acuity Emergency Department Visits**

**Introduction:** Retail clinics have been promoted as a means of decreasing emergency department (ED) visits for low-acuity conditions, but researchers have never empirically addressed whether the clinics accomplish this goal. The purpose of this study was to evaluate whether the opening of retail clinics in ED catchment areas is associated with decreased ED utilization for 11 low-acuity conditions that can be treated at a retail clinic. **Methods:** Data were from the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) 2006–2012 State Emergency Department Databases (SEDD) for patients with low-acuity conditions who were treated and released from an ED. The SEDD were combined with data from Merchant Medicine, LLC, a research and consulting firm specializing in the field of walk-in medicine. These data included the dates of opening and closing and geocoded addresses of all retail clinics in the United States. Other data sources included the American
Hospital Association (AHA) Annual Survey Database™ for hospital characteristics and the Area Health Resources Files (AHRF) for county-level characteristics. The study included 2,043 EDs in the 23 States that contributed ED data from 2006–2012. Poisson regression models examined the association between retail clinic penetration and the rate of ED visits for low-acuity conditions. We measured retail clinic penetration as the percentage of the ED catchment area (ZIP Codes that accounted for three-quarters of all ED visits for low-acuity conditions) that overlapped with the geographic area within a 10-minute drive from a retail clinic. The main outcome was the rate of treat-and-release ED visits per 1,000 ED visits for 11 low-acuity conditions.

Results: Among all patients, retail clinic penetration was not associated with a reduced rate of low-acuity ED visits (rate ratio, 0.999; 95% confidence interval [CI], 0.997–1.000). Among patients with private insurance, there was a slight decrease in low-acuity ED visits (rate ratio, 0.997; 95% CI, 0.994–0.999). For the average ED in a given quarter, this translates to a 0.3 percent reduction (95% CI, 1–6) in low-acuity ED visits among individuals with privately insurance if retail clinic penetration rate increased by 10 percentage points per quarter. A manuscript from this study was published in the Annals of Emergency Medicine in November 2016.

Grant R. Martsolf, Ph.D., M.P.H., R.N., Katie Fingar, Ph.D., M.P.H., Rosanna M. Coffey, Ph.D., Ryan Kandrack, B.S., Tom Charland, B.A., Christine Eibner, Ph.D., Anne Elixhauser, Ph.D., Claudia A. Steiner, M.D., M.P.H., and Ateev Mehrotra, M.D., M.P.H.

Changes in Hospital Service Demand, Cost, and Acuity Following the Affordable Care Act

Introduction: The objectives of this retrospective study were (1) to estimate effects of the Affordable Care Act insurance coverage expansions (States offering health insurance exchanges and States offering health insurance exchanges and Medicaid expansions) on hospital inpatient and emergency department (ED) utilization rates, cost, and acuity; and (2) to assess the effects of the size of the newly covered population on outcomes. Methods: Data were from the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) 2011–2014 State Inpatient Databases (SID). Data from the American Community Survey Public Use Microdata Samples (PUMS) for 2011–2014 were linked by State. We extracted Medicaid program information by State from the Kaiser Family Foundation Web site. We obtained quarterly State-level unemployment rates from the Bureau of Labor Statistics Local Area Unemployment Statistics. We also included State-level median income data from the Nielsen Company. We used fixed-effects regression to estimate the impact of Affordable Care Act insurance coverage expansions. Outcomes included discharge and ED encounter rates, cost, and illness severity. Models were estimated (1) using indicator variables for Affordable Care Act coverage expansion time periods (indicator model) and (2) exploiting State-level variation in the percentage of the population eligible for insurance coverage take-up (coverage expansion ratio [CER] model). Results. There were large, statistically significant percentage decreases in uninsured discharge rates in expansion States. With the exception of the youngest female age group (aged 19–34 years), discharge rates decreased by 40 percent or more per capita. Medicaid discharge rates increased by more than 15 percent for males aged 19–54 years and decreased by roughly the same amount for females aged 19–34 years. Discharge rates for Medicaid enrollees in non-expansion States increased for the oldest age group (aged 55–64 years). Affordable Care Act effect estimates for individuals with private insurance and all payers, when significant, were much smaller than for other groups. ED visit rates for uninsured individuals decreased by more than 10 percent for females aged 19–54 years and males aged 35–54 years. Total ED visit rates increased among male and female Medicaid enrollees aged 55–64 years in expansion States. We found positive and significant Affordable Care Act effects for ED costs for all insurance coverage categories and for most demographic groups in nonexpansion States, whereas we found significant
negative cost effects for males aged 35–54 years covered by Medicaid in expansion States. Significant inpatient cost effects all were negative, with one exception (females aged 19–34 years covered by Medicaid in expansion States). Affordable Care Act effects on the case-mix index generally were much smaller than effects on utilization rates or costs, with only two exceeding five percent in magnitude, both for inpatient discharges among females aged 19–34 years in expansion States: Medicaid (5.8 percent) and uninsured (~14.3 percent). CER model coefficients confirmed translation of previously uninsured/uncovered population sizes into utilization through the Affordable Care Act. Predictions from the CER model agreed closely with observed outcomes and those from the indicator model. **Conclusions:** Following implementation of the Affordable Care Act, States adopting Medicaid expansion had lower inpatient and ED per capita utilization, cost, and illness severity among those with no insurance, whereas ED visit rates increased for Medicaid enrollees. The magnitude of change in outcomes was associated with the size of the population that was newly eligible for insurance coverage. These changes may be due to insurance take-up selective on health status or behavior change related to insurance coverage acquisition. Changes in per capita utilization and cost have implications for private and government payer budgeting and planning.

**Gary Pickens, Ph.D., Zeynal Karaca, Ph.D., Eli Cutler, Ph.D., Michael Dworsky, Ph.D., Brian J. Moore, Ph.D., Teresa B. Gibson, Ph.D., and Herbert S. Wong, Ph.D.**

**Early Impact of the Affordable Care Act Medicaid Expansion on Safety-Net Hospital Inpatient Payer Mix and Market Shares**

**Introduction:** The Affordable Care Act instituted broad changes that may influence the demand for services provided at safety-net hospitals (SNHs). It included an extensive coverage expansion encouraging previously uninsured individuals to enroll in expanded State Medicaid programs or private plans offered via new insurance exchange marketplaces. Changes in patient demand for SNH services and competition for newly insured patients could affect SNH financing and their ability to care for poor and underserved populations. The purpose of this study was to examine the early impact of the Affordable Care Act’s Medicaid expansion on inpatient volume and market share SNHs. **Methods:** We used Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) 2013–2014 State Inpatient Databases (SID) to identify SNHs and local non-SNH competitors in nine Medicaid expansion States. These States were selected because at the time of the study they had at least one quarter of data available from 2014. To describe hospital markets, we merged the SID with data on hospital characteristics from the American Hospital Association (AHA) Annual Survey and ZIP Code-level data from Nielsen Claritas. Using fixed effects models, we compared changes in inpatient discharge volume and market shares for adults aged 19–64 years in SNHs and non-SNHs. This study included 556 hospitals with 25 or more beds located in nonrural areas: 189 SNHs and 367 of their local (within 15 miles) non-SNH competitors. **Results:** In Medicaid expansion States, there was a slower growth in Medicaid volume among SNHs relative to non-SNHs, as well as a shrinking gap in uninsured volume between these types of hospitals. The market shares of Medicaid and uninsured discharges decreased at SNHs and increased at non-SNHs. A manuscript from this study was revised and resubmitted to *Health Services Research* in December 2016.

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**Effects of Medicaid Expansion Under the Affordable Care Act on Utilization of Inpatient and Emergency Department Care at Safety-Net and Nonsafety-Net Hospitals**

**Introduction:** Demand for safety-net hospital (SNH) services may increase in States that expanded Medicaid under the Affordable Care Act. However, SNHs may lose patients to local competitors if newly insured patients seek care at non-SNHs. The purpose of this study was to examine whether inpatient and emergency department (ED) utilization by Medicaid and uninsured patients shifted between SNHs and non-SNHs in major metropolitan markets.

**Methods:** This study included hospitals in large metropolitan areas of 22 States with Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) 2011–2014 State Inpatient Databases (SID). State Emergency Department Databases (SEDD) were available from 14 States. Difference-in-differences models compared pre- and post-expansion changes at SNHs and non-SNHs in Medicaid expansion versus nonexpansion States. Outcomes included volume and market share of nonmaternal Medicaid and uninsured inpatient stays and treat-and-release ED visits for patients aged 19–64 years.

**Results:** In expansion States, Medicaid inpatient stays and ED visits increased following expansion, whereas uninsured inpatient stays decreased. On average, expansion State SNHs lost combined Medicaid and uninsured inpatient stays and treat-and-release ED visits for patients aged 19–64 years. Differences in differences models compared pre- and post-expansion changes at SNHs and non-SNHs in Medicaid expansion versus nonexpansion States. No shifts occurred in nonexpansion States. Medicaid plus uninsured ED visits also shifted from SNHs to non-SNHs, but this was not statistically different from trends in nonexpansion States. A manuscript from this study is being prepared for submission to *Medical Care*.

Katie Fingar, Ph.D., M.P.H., Eli Cutler, Ph.D., Gary Pickens, Ph.D., H. Joanna Jiang, Ph.D., José J. Escarce, M.D., Ph.D., and Ioana Popescu, M.D., M.P.H.

**Hospital Utilization Among Young Adults Following the Affordable Care Act Dependent Care Coverage Expansion: Immediate and Persistent Impacts**

**Introduction:** This study builds on work conducted in 2015 to evaluate the large-scale impact of the Affordable Care Act provision implemented midway through 2010 that compelled private insurers to allow young adults to stay on their parents’ insurance plan through age 25. With more data years available, we are better positioned to assess the longer-term impacts of this dependent coverage expansion (DCE) on hospital utilization.

**Methods:** Data will be from the AHRQ Healthcare Cost and Utilization Project (HCUP) 2008–2014 State Inpatient Databases (SID) and State Emergency Department Databases (SEDD). We will use 37 States from the SID (Arizona, Arkansas, California, Colorado, Connecticut, Florida, Georgia, Hawaii, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Michigan, Minnesota, Montana, North Carolina, Nebraska, Nevada, New Jersey, New York, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, Washington, West Virginia, Wisconsin, and Wyoming) and 22 States from the SEDD (Arizona, California, Connecticut, Florida, Georgia, Hawaii, Indiana, Iowa, Kansas, Kentucky, Minnesota, Montana, North Carolina, Nebraska, New Jersey, New York, Ohio, Rhode Island, South Carolina, South Dakota, Tennessee, and Wisconsin). HCUP data will be linked with American Community Survey (ACS) population data at the State level to derive utilization rates. Outcomes will include utilization rates for nonmaternal encounters, maternal encounters, behavioral health encounters, encounters for ambulatory-care-sensitive conditions, and total encounters. As a supplement to tabular output, we will produce detailed time series plots. Results are forthcoming.

Teresa B. Gibson, Ph.D., Zeynal Karaca, Ph.D., Gary Pickens, Ph.D., Eli Cutler, Ph.D., Brian J. Moore, Ph.D., and Michael Dworsky, Ph.D.
Impact of Health System Affiliation on Hospital Resource Use Intensity and Quality of Care

Introduction: The objective of this study was to assess the impact of hospital affiliation, centralization, and managed care plan ownership on inpatient cost and quality. Methods: Data were from the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) 2010–2012 State Inpatient Databases (SID) and from the American Hospital Association (AHA) Annual Survey Database. Inpatient discharges represented 3,957 community hospitals in 44 States. We conducted a retrospective, longitudinal regression analysis using hierarchical modeling of discharges clustered within hospitals. Detailed discharge data including costs, length of stay, and patient characteristics from the SID were merged with hospital survey data from the AHA. Results: Hospitals affiliated with health systems had a higher cost per discharge and better quality of care compared with independent hospitals. Centralized systems in particular had the highest cost for discharge and longest stays. Independent hospitals with managed care plans had a higher cost per discharge and better quality of care compared with other independent hospitals. Conclusions: The increasing prevalence of health systems and hospital managed care ownership may lead to higher quality but are unlikely to reduce hospital discharge costs. Encouraging participation in shared savings and losses or bundled payment approaches may be more powerful options.

Rachel Henke, Ph.D., Herbert S. Wong, Ph.D., Brian J. Moore, Ph.D., Eli Cutler, Ph.D., Zeynal Karaca, Ph.D., Bill Marder, Ph.D., and Hangshieng Liu, Ph.D.

Impact of Race/Ethnicity and Socioeconomic Status on Risk-Adjusted Hospital Readmission Rates Following Hip and Knee Arthroplasty

Introduction: Readmission rates following total hip arthroplasty (THA) and total knee arthroplasty (TKA) increasingly are used to measure hospital performance. Readmission rates that are not adjusted for race/ethnicity and socioeconomic status—patient risk factors beyond a hospital’s control—may not accurately reflect a hospital’s performance. In this study, we examined the extent to which risk-adjusting for race/ethnicity and socioeconomic status affected hospital performance in terms of readmission rates following THA and TKA. Methods: We calculated two sets of risk-adjusted readmission rates by (1) using the Centers for Medicare & Medicaid Services standard risk-adjustment algorithm that incorporates patient, age, sex, comorbidities, and hospital effects and (2) adding race/ethnicity and socioeconomic status to the model. Using data from the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP), 2011 State Inpatient Databases (SID), we compared the relative performances of 1,194 hospitals across the two methods. We focused on 16 HCUP Partner States that have reliable synthetic patient linkage numbers that can be used to track a person across hospitals within a State and that report the patient’s race/ethnicity. We obtained information on hospital characteristics from the American Hospital Association (AHA) Annual Survey Database. Results: Addition of race/ethnicity and socioeconomic status to the risk-adjustment algorithm resulted in (1) little or no change in the risk-adjusted readmission rates at nearly all hospitals; (2) no change in the designation of the readmission rate as better, worse, or not different from the population mean at >99 percent of the hospitals; and (3) no change in the excess readmission ratio at >97 percent of the hospitals. A manuscript from this study was published in The Journal of Bone and Joint Surgery in August 2016.

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Impact of Race/Ethnicity and Socioeconomic Status on Risk-Adjusted Readmission Rates: Implications for the Hospital Readmissions Reduction Program

Introduction: Under the Centers for Medicare & Medicaid Services (CMS) Hospital Readmissions Reduction Program (HRRP), hospitals with excess readmissions for select conditions and procedures are penalized. However, readmission rates are not risk adjusted for socioeconomic status (SES) or race/ethnicity. The purpose of the study was to examine how adding SES and race/ethnicity to the CMS risk-adjustment algorithm would affect hospitals’ excess readmission ratios and potential penalties under the HRRP. Methods: For each HRRP measure, we compared excess readmission ratios with and without SES and race/ethnicity included in the CMS standard risk-adjustment algorithm and estimated the resulting effects on overall penalties across a number of hospital characteristics. For the five HRRP measures (heart failure, acute myocardial infarction, chronic obstructive pulmonary disease, pneumonia, and total hip or knee arthroplasty), we used data from the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) 2011–2012 State Inpatient Databases (SID) to calculate the excess readmission ratio with and without SES and race/ethnicity included in the model. We used data from 15 States that had unique synthetic patient linkage numbers that track patients across hospitals, encompassing 43 percent of the US population. We linked HCUP SID data to 2011 American Hospital Association Annual Survey of Hospitals data to capture hospital characteristics and to American Community Survey (ACS) data to measure the socioeconomic status (SES) of the ZIP Code Tabulation Area (ZCTA) in which patients reside. Results: With these (excess readmission) ratios, we estimated the impact on HRRP penalties and found that risk adjusting for SES and race/ethnicity would affect Medicare payments for 83.8 percent of hospitals. The effect on the size of HRRP penalties ranged from −14.4 percent to 25.6 percent, but the impact on overall Medicare base payments was small—ranging from −0.09 percent to 0.06 percent. Including SES and race/ethnicity in the calculation had a disproportionately favorable effect on safety-net and rural hospitals. Any financial effects on hospitals and on the Medicare program of adding SES and race/ethnicity to the HRRP risk-adjustment calculation likely would be small. A manuscript from this study was published in Inquiry in October 2016.

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Inpatient Hospital Cost and Safety Indicators for Elderly Medicare Advantage Versus Fee-for-Service Patients

Introduction: The purpose of this study is to compare differences in hospital resource cost of care, allowing for diagnostic mix, severity, complications, patient age, and other characteristics. Methods: Recognizing that choice of a Medicare Advantage plan likely is not random in the population of Medicare beneficiaries, we employ two-stage econometric models with instrumental variables for the insurance status. The hospital inpatient data for this study are drawn from the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) 2013 State Inpatient Databases. Data are from 25 States: Arizona, California, Connecticut, Florida, Georgia, Hawaii, Iowa, Kansas, Kentucky, Maryland, Michigan, Minnesota, Montana, Nevada, New Jersey, New York, North Dakota, Ohio, Oregon, Pennsylvania, South Dakota, Tennessee, Texas, Vermont, West Virginia. Zeynal Karaca, Ph.D., Bernard Friedman, Ph.D., Jeffrey Stensland, Ph.D., and Herbert S. Wong, Ph.D.
**Insurance Expansion and Hospital Emergency Department Access**

*Introduction:* This project investigates how the Affordable Care Act has affected hospitalizations among the newly insured. It will analyze whether the expansion of insurance changed the hospitals the newly insured patients visited using the average distance patients traveled to visit the hospital.  

*Methods:* The hospital inpatient and State emergency data for this study will be drawn from the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) 2010–2014 State Inpatient Databases (SID) and State Emergency Department Databases (SEDD). Data will come from 28 States: Arizona, California, Connecticut, Florida, Georgia, Hawaii, Illinois, Indiana, Iowa, Kansas, Kentucky, Maryland, Massachusetts, Minnesota, Missouri, Nebraska, Nevada, New Jersey, New York, North Dakota, Ohio, Rhode Island, South Carolina, South Dakota, Tennessee, Utah, Vermont, and Wisconsin.  

Craig Garthwaite, Ph.D., Tal Gross, Ph.D., Matthew Notowidigdo, Ph.D., and Zeynal Karaca, Ph.D.

**The Marginal Hospital Costs of Adverse Drug Events Associated With Exposures to Anticoagulants and Diabetes Agents During Hospitalization**

*Introduction:* Anticoagulants and diabetes agents and are two of the most challenging drug classes for medical management in the hospital, resulting in many adverse drug events (ADE). The objective of this study was to estimate the average marginal cost (MC) and the total annual hospital costs of ADEs associated with anticoagulants and diabetes agents for four hospitalized patient groups: those undergoing major surgeries and those with heart failure (HF), pneumonia, and acute myocardial infarction (AMI).  

*Methods:* Data were from the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) 2010–2013 State Inpatient Databases (SID) and the Medicare Patient Safety Monitoring System (MPSMS). ADE information was obtained using retrospective structured record review from trained MPSM data abstractors. Costs were derived using HCUP hospital-specific cost-to-charge ratios. Marginal cost estimates were made using extended estimating equations controlling for patient characteristics, comorbidities, hospital procedures, and hospital characteristics.  

*Results:* MC for an ADE was larger for patients exposed to anticoagulants than those exposed to diabetes agents. MCs varied by patient group. Anticoagulant ADE MCs ranged from $7,644 for AMI to $12,849 for pneumonia. MCs for ADEs related to diabetes agents ranged from $2,747 for HF to $9,054 for major surgery. The 2013 total hospital cost estimates for ADEs associated with anticoagulants and diabetes agents were more than $2.5 billion for each drug class.  

*Conclusions:* Findings show that incidence and MC of ADEs differ by drug class. Anticoagulant ADEs add more costs per stay, but diabetes agent ADEs are more common.  

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**Medicare Advantage Penetration and Hospital Costs Before and After the Affordable Care Act**

*Introduction:* The Medicare Advantage (MA) program has expanded dramatically since 2000, now covering approximately 30 percent of all Medicare beneficiaries. For this study, we examined the relationship between MA enrollment rates and overall utilization (e.g., hospital admission and readmission rates, types of hospitalizations, and associated costs) before and after implementation of the major provisions in the Affordable Care Act that impacted the Medicare Advantage program. We compared data from MA beneficiaries, traditional Medicare (TM) beneficiaries, and overall Medicare (OM) beneficiaries aged 65 years and older, and from non-Medicare (NM) beneficiaries aged 45–64 years.  

*Methods:* We used Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) State Inpatient...
Databases (SID) data spanning 2005–2014 from 14 States that differentiate between TM and MA: California, Connecticut, Florida, Georgia, Iowa, Massachusetts, Michigan, New Jersey, Nevada, New York, Ohio, Rhode Island, Tennessee, and Wisconsin. We calculated MA enrollment rates for 2004–2013 from the Centers for Medicare & Medicaid Services (CMS) Denominator File combined with publicly available enrollment by plan type data. Other data sources included Nielsen/Claritas population data, Census Bureau Small Area Health Insurance Estimates (SAHIE), Bureau of Labor Statistics (BLS) unemployment data, and Bureau of Economic Analysis (BEA) Gross Domestic Product (GDP) deflator data. We estimated longitudinal models using lagged MA enrollment (per capita or percent) as the key predictor of overall Medicare utilization, allowing its effect to differ before and after 2011, when the major Affordable Care Act provisions affecting the MA program went into effect. We used county-level fixed effects to control for time-invariant area characteristics. The primary outcome measure was cost per capita within each study population, which can be decomposed into the following components: discharges per capita, diagnosis-related group (DRG) intensity weight per discharge, and cost per DRG intensity weight. These constituent measures also were modeled. All models controlled for time-varying county-level characteristics, including demographic composition, uninsurance rate, and the unemployment rate.

Results: We found no substantive relationships between MA penetration and hospital utilization among Medicare and non-Medicare patients, and no consistent changes in the relationship between MA penetration and use before and after implementation of the major Affordable Care Act provisions affecting MA. Conclusion: MA enrollment growth did not lead to spillover reductions in hospital admissions or costs for Medicare and non-Medicare patients. Future research should examine whether previously observed reductions in expenditures resulted from savings in outpatient settings.

Herbert S. Wong, Ph.D., Zeynal Karaca, Ph.D., Teresa B. Gibson, Ph.D., Rachel Henke, Ph.D., Eli Cutler, Ph.D., Michael Head, M.S., and Chapin White, Ph.D.

Medicare Advantage Versus Traditional Medicare: Effect on Hospital Admission Rates

Introduction: The Medicare Advantage (MA) program has expanded dramatically since 2000, now covering approximately 30 percent of all Medicare beneficiaries. Given the growth in the program, it is important to understand how the care provided by MA compares with traditional Medicare (TM). One important reflection of care provided is prevention of hospital admissions. If MA is better than TM at curtailing admissions, which may indicate that it has more tools at its disposal to offer a continuum of care, then the government may want to further expand the MA program. If MA has similar or higher admission rates than TM, which may indicate stinting on care, then the government may want to enact policies that require MA plans to improve the quality of care provided. The purpose of this study was to compare hospital use for individuals covered by MA and TM. Methods: Data were from the American Hospital Association (AHA) Annual Survey of Hospitals and the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) 2013 State Inpatient Databases (SID). The following 28 States distinguished MA from TM in payer coding: Arizona, California, Connecticut, Florida, Georgia, Hawaii, Iowa, Kansas, Kentucky, Massachusetts, Maryland, Michigan, Minnesota, Montana, North Dakota, New Jersey, Nevada, New York, Ohio, Oregon, Pennsylvania, Rhode Island, South Dakota, Tennessee, Texas, Vermont, Wisconsin, and West Virginia. We measured resource use using cost per discharge, length of stay per discharge, and readmissions. Other data sources included the AHRQ HCUP 2013 Cost-to-Charge Ratio (CCR) Files, the Centers for Medicare & Medicaid Services (CMS) Denominator File, the CMS County to Core Based Statistical Area (CBSA) Crosswalk, the Health Resources and Services Administration (HRSA) Area Health Resources Files (AHRF), and the CMS Medicare Provider Analysis and Review (MedPAR) Hospital File. We employed coarsened exact matching to yield
a subsample of similar TM and MA enrollees. We conducted regressions on both the complete sample and the matched subsample, controlling for hospital fixed effects and time-varying characteristics at the patient, hospital, and market levels. **Results:** We found that the relationship between Medicare type (TM or MA) varied by service line category. MA was associated with a higher cost per discharge than TM for injury stays and surgical stays, a lower cost per discharge for mental health stays, and no difference for medical stays. Mirroring the cost results, we found that MA was associated with longer length of stay for injury stays and surgical stays and shorter length of stay for mental health stays, with medical stay results more sensitive to specification. Medicare type was not strongly associated with readmissions for most of the readmission conditions studied (acute myocardial infarction, pneumonia, heart failure, stroke, hip/knee replacement); the only statistically significant association was with readmissions following chronic obstructive pulmonary disease admissions, which were lower for MA than for TM. **Conclusion:** Although previous literature had found that MA was associated with lower cost per discharge and shorter length of stay compared with TM, we found that these differences vanished for the most part once we controlled for patient-, hospital-, and area-level characteristics. Our results suggest that, after controlling for observable characteristics, there is little remaining endogenous selection into MA on the basis of unobserved health status, at least as reflected in hospitalization-based outcome measures. The most prominent exception to our general finding of little difference was for mental health stays, for which stays covered by MA were notably shorter and less costly than those covered by TM.

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**Medicare Fee-for-Service Spillovers on Readmissions after Implementation of the Hospital Readmission Reduction Program**

**Introduction:** To improve quality and reduce payments for avoidable care, the Centers for Medicare & Medicaid Services (CMS) established the Hospital Readmission Reduction Program (HRRP) as a provision of the Affordable Care Act. Hospitals with more Medicare Fee-for-Service (FFS) patients may be more motivated to reduce readmissions given their greater exposure to HRRP financial risk. Thus, for hospitals in areas with higher FFS penetration, we would expect to see a larger reduction in readmissions for Medicare Advantage (MA) patients as a spillover effect of the HRRP. Further, the HRRP payment adjustment is applied only if the hospital has 25 or more FFS cases in each targeted type of admission—so increasing MA enrollment will lead more hospitals to fall below this threshold and become exempt from the penalty. Previous research has not examined this kind of spillover to MA patients from the HRRP. **Methods:** Data were from the AHRQ Healthcare Cost and Utilization Project (HCUP) 2008–2014 State Inpatient Databases (SID) from five States (California, Florida, Massachusetts, New York, and Tennessee) that distinguished MA from FFS in payer coding and provided patient identifiers to track readmissions. Medicare Advantage enrollment rates were calculated from the Centers for Medicare & Medicaid Services (CMS) Denominator File in conjunction with publicly available CMS MA enrollment files to identify MA enrollees in nonmanaged care plans. We modeled the probability of readmission using logistic regressions controlling for county fixed effects, time trends before and after the Affordable Care Act, and patient- and hospital-level characteristics. The key predictors were lagged FFS enrollment rate before and after implementation of the Affordable Care Act Medicare Advantage payment reform provisions. **Results:** For FFS beneficiaries, a 10 percentage point decrease in county FFS enrollment was associated with statistically significant increases in likelihood of readmission following initial admissions for heart failure, chronic obstructive pulmonary disease (COPD), and pneumonia, with estimated effect magnitudes of 1.0–1.6 percentage points. Acute
myocardial infarction (AMI) was the only condition that was not statistically significantly affected by decreasing county-level FFS enrollment, although the estimated effect was positive. For MA beneficiaries, a 10-percentage point decrease in county FFS enrollment was associated with an increase in likelihood of readmission following initial admissions for all four studies conditions (heart failure, COPD, pneumonia, and AMI), although only AMI and pneumonia results were statistically significant. Estimated effect magnitudes were on the order of 0.8–2.2, and in general were slightly weaker after Medicare Advantage payment reform relative to beforehand.

**Conclusion:** Our research suggests that increases in FFS enrollment could have a beneficial effect on readmissions for the entire Medicare program. This finding suggests that policymakers should carefully weigh the costs and benefits of continued growth in MA before making changes. However, MA plans may adopt a readmission penalty that mimics HRRP, thereby potentially reducing the spillover effect over time.

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**Readmission and Opportunities to Treat Opioid-Related Conditions at Initial Hospitalization**

**Introduction:** Previous research suggests that few hospitalized patients with opioid-related conditions receive treatment during the course of their inpatient stay. Without treatment, these individuals may be more likely to have subsequent hospitalizations for continued opioid abuse and resulting physical health problems. The purpose of the study was to evaluate the relationship between inpatient drug detoxification and/or rehabilitation treatment and subsequent opioid-related readmission. **Methods:** Data were from the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) 2010–2013 State Inpatient Databases (SID) hospital inpatient discharge data combined with emergency department (ED) data from the State Emergency Department Databases (SEDD) for seven States: California, Florida, Hawaii, Massachusetts, New York, South Carolina, and Tennessee. The sample included a total of 329,037 patients with an index hospitalization with any listed opioid-related diagnosis occurring between March, 2010 and September, 2013. Using encrypted patient linkage numbers, we linked hospitalization records from the SID and ED visit records from the SEDD such that there was only one episode of care per person during the study period. To identify hospitals that had an alcohol or substance abuse detoxification unit, a psychiatric unit, or both, we used the 2010–2013 American Hospital Association (AHA) Annual Survey Databases. **Results:** A relatively small percentage (19.4 percent) of patients with identified opioid-related conditions received treatment for drug use during their hospital inpatient stay: 16.0 percent received drug detoxification services, 1.6 percent received drug rehabilitation services, and 1.8 percent received combined drug detoxification and rehabilitation services. This low proportion of patients receiving in-hospital treatment for drug use persisted whether the opioid-related condition was a principal or secondary diagnosis. Controlling for sociodemographic, clinical, and hospital factors, patients who received drug rehabilitation, but not drug detoxification, during an opioid-related index hospitalization had lower odds of an opioid-related readmission within 90 days of discharge (odds ratio=0.65; 95% confidence interval=0.58–0.72) compared with patients with no inpatient drug detoxification and/or rehabilitation treatment. Our findings indicate that receipt of drug rehabilitation services in acute care hospitals is associated with a lower 90-day readmission rate, but further research is needed to understand whether this result is due to the treatment per se or to the sociodemographic or clinical characteristics of patients who receive rehabilitation.

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Returns to Emergency Department, Observation, or Inpatient Care Within 30 Days After Hospitalization, 2009–2010 Versus 2013–2014

Introduction: In 2012, the Centers for Medicare & Medicaid Services (CMS) initiated the Medicare Hospital Readmissions Reduction Program (HRRP), which penalizes hospitals for having high rates of potentially avoidable readmissions. In recent years, there has been a reduction in readmission rates, particularly within the Medicare program. Many people have credited this reduction to the success of the Medicare HRRP. However, there has been an increase in the use of observation stays and treat-and-release ED visits, which could be driving at least part of the reduction in readmission rates. Thus recent reductions may be driven by changes in patterns of care rather than by improved quality of care. If a patient who was previously hospitalized for an HRRP-defined condition returns within 30-days and is discharged home after being treated in observation services (OS) or the ED, this visit does not count as a readmission. As a result, hospitals and physicians may be under more pressure to treat patients on an outpatient basis. The goal of this study was to assess whether the Medicare HRRP has been associated with a reduction in readmission rates through increased utilization of treat-and-release OS and ED visits. Methods: We used Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) data from four States (Georgia, Nebraska, South Carolina, Tennessee) to compare matched index hospitalizations for acute myocardial infarction (AMI), heart failure (HF), and pneumonia in 2009–2010 and 2013–2014. We examined trends in 30-day rates of return inpatient, observation, and ED visits for adults aged 18–64 years with private insurance, Medicaid, or no insurance and for older adults with Medicare. We also examined the leading diagnoses associated with returns to the hospital. Results: Observation and ED visits represented 28 percent to 53 percent of returns to the hospital. Return rates remained stable among adults with private insurance (15.1 percent vs. 15.3 percent; \( P=0.45 \)) and declined modestly among older adults with Medicare (25.3 percent vs. 25.0 percent; \( P=0.04 \)). Increases in observation and ED visits offset declines in inpatient readmissions. Return rates rose among patients with Medicaid (31.0 percent vs. 32.1 percent; \( P=0.04 \)) and the uninsured (18.8 percent vs. 20.1 percent; \( P=0.004 \)) because observation and ED visits increased. A manuscript from this study is being prepared for submission to the New England Journal of Medicine.

Teryl Nuckols, M.D., M.S., Katie Fingar, Ph.D., M.P.H., Marguerite L. Barrett, M.S., Grant R. Martsof, Ph.D., M.P.H., R.N., Carol Stocks, Ph.D., R.N., Pamela L. Owens, Ph.D., and Claudia A. Steiner, M.D., M.P.H.

Shifts in Medicaid and Uninsured Payer Mix at Safety-Net and Nonsafety-Net Hospitals During the Great Recession

Introduction: There has been ongoing concern regarding the viability of safety-net hospitals (SNHs), which care for vulnerable populations. Methods: We examined payer mix at SNHs and non-SNHs during a period covering the Great Recession using Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) 2006–2012 Statewide Inpatient Databases (SID) from 38 States. Privately insured stays decreased at both SNHs and non-SNHs. Results: Non-SNHs increasingly served Medicaid and uninsured patients, whereas Medicaid stays at SNHs decreased and uninsured stays remained stable. A manuscript from this study was accepted for publication in the Journal of Healthcare Management in November 2016.

Katie Fingar, Ph.D., M.P.H., Rosanna M. Coffey, Ph.D., Andrew Mulcahy, Ph.D., M.P.P., Roxanne M. Andrews, Ph.D., and Carol Stocks, Ph.D., R.N.
Validating Cost Estimates That Are Based on Cost-to-Charge Ratios Using Healthcare Cost and Utilization Project Data

Introduction: The purpose of this study was to explore the consistency, accuracy, validity, and reliability of the current Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) Cost-to-Charge Ratio Files (CCR Files). Methods: Data were from HCUP 2013 State Inpatient Databases (SID) for 44 States; State Emergency Department Databases (SEDD) from 2013 for 11 States (Hawaii, Iowa, Kentucky, Minnesota, Nebraska, New Jersey, North Dakota, South Dakota, Tennessee, Wisconsin, and Vermont); Centers for Medicare & Medicaid Services (CMS) Hospital Cost Report Information System (HCRIS) forms 2552-10 and 2552-96 from 2004–2013; and CMS National Physician Fee Schedule Relative Value File for Calendar Year 2013. This analysis included a detailed evaluation of the current process for creating the HCUP CCR Files, including an overview of hospital charge and cost data generation and CCR processing steps. We tested the consistency of HCRIS reports over time, with special emphasis on the major change in CMS forms in 2010. We explored the number of HCUP hospitals requiring imputation of a CCR and the specific reasons imputation was required. We explored cost estimation alternatives and how they are used in practice. We also tested the reliability of CCR Files by comparing the cost estimates created by HCUP CCR Files with estimates derived from relative value units (RVUs). We investigated the extent to which these costing methods agreed with each other using a large sample of line-item records from hospitals that contributed to the HCUP SEDD in 2013. Results: A regression of hospital-specific CCRs on the interaction of hospital State and hospital type (the stratification on which CCR imputations are based) yielded an R-squared of 0.62. Limiting data to Current Procedural Terminology (CPT®) codes for services commonly provided in both facility and nonfacility settings, we derived CCR-based cost estimates under three different hospital department clustering schemes of varying granularity, and we used Spearman rank correlations to assess the strength of agreement between within-hospital cost estimate rankings of CPT codes derived from each CCR clustering scheme against RVU-derived cost estimates. The majority of line items valid for this comparison fell under diagnostic radiology CPT codes. Longitudinal consistency of the Medicare cost report data was assessed using the difference in fits (DFFITS) regression diagnostic criterion. This approach identified between two percent and four percent of hospital-year charges and costs as outliers. Conclusion: Revising the CCR Files to include additional cost centers should be considered seriously because of aggregation bias that can occur when the coarser hospital-wide CCR is used. Imputations for missing or suspect CCR values were associated with relatively large standard errors and should be used cautiously. Within-hospital rankings of CPT-level procedure grouping costs obtained using CCRs and RVUs were moderate-to-highly correlated with one another for the most part, suggesting general agreement on the limited range of CPT codes for which this kind of comparison could be made. However, the cost estimates themselves obtained from the two approaches differed substantially, with CCR-based cost estimates generally exceeding RVU-based cost estimates. Longitudinal analysis of the Medicare cost reports, from which the CCRs are derived, generally revealed consistency over time. We concluded that an outlier detection method using longitudinal analysis may be useful for detecting anomalies and creating imputations, but this would need further evaluation.

Gary Pickens, Ph.D., Eli Cutler, Ph.D., Thomas J. Flottemesch, Ph.D., Brian J. Moore, Ph.D., and Natalia Coenen, M.P.H.
Studies Using Nationwide Databases

Annual Report on Health Care for Children and Youth in the United States: Focus on Inpatient Readmissions

Introduction: The aim of this study is to describe selected trends in inpatient readmissions among children and youth aged 1 to 18 years from 2009 to 2014. Methods: This is a repeated retrospective cohort study for the years 2009–2014 (inclusive). Analyses were conducted using administrative data from the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) National Readmissions Databases (NRD). We estimated frequencies and rates of pediatric inpatient readmissions by select patient and hospital characteristics. We also estimated the impact of readmissions on resource use. The study will be designed to examine frequencies and rates over a five year period; the 10 most frequent diagnoses and procedures and any changes in rankings; patient characteristics associated with readmissions; and resource use associated with readmissions.

Kevin Heslin, Ph.D., Pamela L. Owens, Ph.D., Lisa Simpson, M.B., B.Ch., M.P.H., F.A.A.P., and Marie McCormick, M.D., Sc.D.

Have Widening Private-Medicare Payment Differences Led to Differences in Inpatient Hospital Treatment?

Previous research has documented a widening difference between hospital payment rates from private insurance compared to those paid by Medicare. We used discharge data from the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) National (Nationwide) Inpatient Databases for years 2011-2012 to test whether these payment rate differences were associated with differences in hospital care. We examined hospital care for discharges just from 2001-2012 before and after age 65, when the primary payer mix shifts significantly from private insurance to Medicare coverage. Despite the widening private-Medicare payment differential, we found little change in age-65 discontinuities for the measures we examined: hospitalization rates, case mix, referral-sensitive surgeries, the amount of care provided (length of stay, charges, and number of procedures), and the quality and patient safety of that care.

Thomas M. Selden, Ph.D., Zeynal Karaca, Ph.D., and Sandra L. Decker, Ph.D.

Variable Frequencies, Outcomes, and Costs Argue for Separate Tracking of Ischemic Strokes, Subarachnoid Hemorrhages, and Other Hemorrhagic Strokes

Introduction: Although causes and treatment vary for ischemic strokes (ISs), subarachnoid hemorrhages (SAHs), and other hemorrhagic strokes (OHSs), their results are sometimes combined in reported statistics and quality of care measures. The purpose of this study was to determine whether these three types of stroke differ in frequency and outcomes. Methods: International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) principal discharge diagnosis codes of 430 (SAH), 431–432 (OHS), and 433–434 (IS) were used to obtain US nationwide estimates of stroke frequency and outcomes for 2006–2012. Data came from HCUPnet, the on-line query system of the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP). HCUP’s sampling frame captured approximately 90 percent of discharges from non-Federal acute care hospitals in 2006 and more than 95 percent of discharges in 2012. Data came from HCUP’s Nationwide Inpatient Sample (NIS), a stratified sample that essentially captures 20 percent of HCUP discharges. Rates were calculated using bridged-race population estimates from the Centers for Disease Control and Prevention’s WONDER Web site. Annual cost estimates were converted to CY 2012 dollars using Producer Price Index figures from the Bureau of Labor Statistics. Results: In 2006 and 2012, there were 2,005 discharges (2.7/100,000) for individuals aged 0–17 years.
diagnosed with IS, SAH, and OHS. Percentages of each condition in 2006 compared with 2012 differed for IS (33.9 vs 34.2), SAH (19.5 vs 17.0), and OHS (46.6 vs 48.9). In 2006, there were 653,429 stroke discharges (290.1/100,000) for individuals aged 18 years and older. Among ISs (82.0 percent of cases), 49.3 percent were routine discharges, 46.3 percent were discharged to other care settings, and 4.4 percent died as inpatients. Mean length of stay (MLOS) was 4.8 days. Mean hospital costs (not charges) were $10,059 per case. Among SAHs (4.1 percent of cases), 35.2 percent were routine discharges and inpatient mortality was 23.1 percent. MLOS was 12.3 days. Mean costs were $41,941. Among OHSs (13.9 percent of cases), 24.3 percent were routine discharges and 24.3 percent died as inpatients. MLOS was 7.8 days. Mean costs were $17,456. In 2012, there were 680,980 adult stroke discharges (283.5/100,000). Among ISs (82.5 percent of cases), 45.7 percent were routine discharges and 3.7 percent died as inpatients. MLOS was 4.5 days. Mean costs were $11,651. Among SAHs (3.6 percent of cases), 37.2 percent were routine discharges and mortality was 19.6 percent. MLOS was 11.7 days. Mean costs were $50,372. Among OHSs (13.9 percent of cases), 23.3 percent were routine discharges and mortality was 21.7 percent. MLOS was 7.4 days. Mean costs were $19,871. Conclusions: Pediatric and adult stroke discharge rates were stable from 2006 to 2012, but these events were proportionally much more common in adults. Stroke type distributions varied. Compared with 2006, in 2012 adult inpatient mortality fell and MLOS varied. Overall aggregate adult inflation-adjusted acute care hospital costs rose from $8 to $10 billion/year. Lower frequency rates, worse outcomes, and higher resource use for individuals with SAHs and OHSs relative to ISs argue for separate tracking of results for different stroke types.

Darryl Gray, M.D., Sc.D., Chinagozi Ugwu, M.P.H., and Anne McLeod, M.S.N.

Studies Using Both Nationwide and State Databases

Emergency Department Visits for Severe Pediatric Injuries: Effect of Hospital Trauma Level on Rate of Admissions

Introduction: The purpose of this study was to address two broad research questions related to pediatric injuries: (1) What are the demographic, clinical, and insurance characteristics of emergency department (ED) visits for severe pediatric injuries in the United States? (2) How does a hospital’s trauma level affect its overall rate of admissions through the ED, transfer patterns, mortality rate, and/or follow-up care? Methods: We used the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) 2005–2014 Nationwide Emergency Department Sample (NEDS), National (Nationwide) Inpatient Sample (NIS), State Inpatient Databases (SID), and State Emergency Department Databases (SEDD). The events of interest included pediatric ED visits and inpatient stays for severe injury, such as traumatic brain injuries, spinal injuries, and fractures for children aged 15 years and younger (excluding newborns). This work was funded via an interagency agreement with the Health Services Research and Administration (HRSA) Bureau’s Emergency Medical Services for Children (EMSC) Program. Results are forthcoming.

Pamela L. Owens, Ph.D. and Marguerite L. Barrett, M.S.

Injury Epidemiologic Collaborations

The Pacific Institute for Research and Evaluation (PIRE) is conducting ongoing work with AHRQ to create State fact sheets on the incidence of injury and related costs. These fact sheets summarize key findings of analyses using SPSS and/or SAS to combine, clean, and tabulate injury-related hospitalizations and emergency department visits for the Children’s Safety Network. Data are from the Healthcare Cost and Utilization Project (HCUP) National (Nationwide) Inpatient Sample (NIS), State Inpatient Databases (SID), and State Emergency...
Department Databases (SEDD). Data and findings from this effort are used to support the ad hoc technical assistance needs of State and Federal agencies, non-profit organizations, and professionals involved in injury prevention (e.g., academic scholars). PIRE also is conducting a study supported by the Health Resources and Services Administration (HRSA) to examine the effect of Poison Control Centers on outcomes for poisonings. The project will link Poisoning control center data with State hospital and emergency department discharge data from the SID and SEDD, respectively.

Ted Miller, Ph.D., Bruce A. Lawrence, Ph.D., M.A., and Claudia A. Steiner, M.D., M.P.H.

National Healthcare Quality and Disparities Reports (QDR) Special Analyses

In support of the National Healthcare Quality and Disparities Report (QDR), various Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization (HCUP) databases are being used for special analyses that are directed by AHRQ.

In 2016, we published two manuscripts:

- Moore BJ, Coffey RM, Heslin KC, Moy E. Admissions after discharge from an emergency department for chest symptom. *Diagnosis*. 2016;3(3):103-113. The analysis used 2012 and 2013 SID and SEDD data from eight States to examine patient characteristics associated with inpatient admissions for related symptoms after discharge from an ED for chest symptoms


Four manuscripts were submitted to peer-reviewed journals:

- *Managed care and inpatient mortality in adults: effect of primary payer*, which used 2009 State Inpatient Databases (SID) data for 11 States to examine the association between managed care and inpatient mortality for four common inpatient conditions.

- *Age-related disparities in access to trauma centers for patients with severe head injuries following the release of the updated field triage guidelines*, which used 2009 and 2012 SID and SEDD data from 31 States. The authors examined whether older adults with a traumatic head injury were less likely to receive initial treatment at a trauma center before and after introduction of the revised field triage guidelines.

- *Sepsis-related hospitalizations and deaths: ten-year trends by race and ethnicity*, which used 2004–2013 SID data to describe trends in sepsis-related hospitalizations and in-hospital mortality rates by race/ethnicity.

- *The association of patients’ primary language with readmission for high-volume hospital conditions*, which used 2009–2013 SID data from California to examine the association between patients’ primary language and readmission for high-volume hospital conditions while controlling for clinical factors, patient characteristics (e.g., sex, race, community income), and hospital characteristics (e.g., bed size, location).

Ernest Moy, M.D., M.P.H., Kevin Heslin, Ph.D., Karen Chaves, M.H.S., Rosanna M. Coffey, Ph.D., Marguerite L. Barrett, M.S., Katie Fingar, Ph.D., M.P.H., Susan O. Raetzman, M.S.P.H., Thomas J. Flottemesch, Ph.D., Jenna Jones, Ph.D., Brian J. Moore, Ph.D., and Anika L. Hines, Ph.D., M.P.H.
Using the Healthcare Cost Utilization Project to Inform State Health Policy: Opportunities and Challenges

Research and policy analysts seeking to understand the changing health care environment increasingly are turning to the State and national databases of the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP). These discharge-level databases contain diverse data to help answer important policy questions, particularly at the State level. In general, statewide databases include nearly the census of discharge-level encounters from community hospitals in States that participate in HCUP. Nationwide databases involve complex sampling of discharges from the statewide databases to address specific objectives that the respective nationwide databases are designed to address. The specific database choice is an important analytic consideration that often is misunderstood. Choosing a database less than ideal for the research question at hand and the analytic methods deployed may produce misleading inference. This study will provide an overview of the HCUP databases with particular attention on the objectives, strengths, and limitations of their different classes. It also will provide specific guidance on database selection in the context of State health policy research.

Michel Boudreaux, Ph.D., Sharon Long, Ph.D., and Zeynal Karaca, Ph.D.

Ongoing Studies

National Healthcare Quality and Disparities Reports (QDR)

Since 2003, the Agency for Healthcare Research and Quality (AHRQ) has produced congressionally mandated reports each year on health care quality and disparities for vulnerable populations in the United States. The National Healthcare Quality and Disparities Report (QDR) includes information from the AHRQ Healthcare Cost and Utilization Project (HCUP) and from numerous other organizations, including the Centers for Disease Control and Prevention (CDC), the National Center for Health Statistics (NCHS), and the Centers for Medicare & Medicaid Services (CMS).

The QDR provides a comprehensive overview of the quality of health care received by the general population and disparities in care experienced by different racial, ethnic, and socioeconomic groups. Information on individual measures will be available through chartbooks, which will be posted monthly.

The QDR measures and tracks trends in quality and disparities in seven key areas of health care: access to health care, patient safety, person-centered care, care coordination, effective treatment, healthy living, and care affordability. A focus on priority populations summarizes quality and disparities in care for populations at elevated risk for receiving poor health care. This section includes HCUP-based measures related to racial, ethnic, and socioeconomic factors for priority populations as well as changes over time and across the urban-rural continuum.

The 2016 QDR (to be released in early 2017) will include national estimates of the AHRQ Quality Indicators (AHRQ QI™), version 4.4, for data years 2000–2014 and State-level estimates for data years 2004 and 2011–2014. For the national estimates in 2013–2014, HCUP created a nationally weighted analysis file from the State Inpatient Databases (SID). The sampling design (sample of hospitals) was similar to the 2012 Nationwide Inpatient Sample (NIS) and was used to report national estimates by various patient characteristics (e.g., age, sex, race/ethnicity, community income, expected payer, urban-rural location of the patient’s residence) and hospital characteristics (e.g., region, ownership, teaching status, urban-rural location). National QI estimates for years prior to 2013 were derived using the NIS. Individual
SID were used for reporting State-level estimates of the AHRQ QIs overall and by race/ethnicity, expected payer, and community income. State-level rates are reported only for HCUP Partners that have volunteered previously to participate in the report and for new participants. AHRQ disseminates the QDR information through the AHRQ Web site at www.ahrq.gov/research/findings/nhqrdr/index.html. There also is an integrated Web site at www.nhqnet.ahrq.gov that provides a single access point to the QDR data, including State-specific information (i.e., the State Snapshots and a query tool for accessing the underlying data).

Rosanna M. Coffey, Ph.D., Marguerite L. Barrett, M.S., Ernest Moy, M.D., M.P.H., Kevin Heslin, Ph.D., and Karen Chaves, M.H.S.

NEW STUDIES PLANNED FOR 2017

Studies Using State Databases

- Impact of Accountable Care Organizations on In-Hospital Care (SID, SEDD)
- The Relationship Between Hospital, Community, and Patient Factors and Changes in Revisit Rates (SID, SASD, SEDD)
- State Variations in Medication-Assisted Treatment Policy and Naloxone Access and Hospital Readmissions or Revisits for Opioid-Related Diagnoses Among the Medicaid Population (SID, SEDD)

Descriptions for these studies are provided below. The databases used in these studies are shown in parentheses above.

Studies Using State Databases

**Impact of Accountable Care Organizations on In-Hospital Care**

**Introduction:** The purpose of this study is to examine the impact of accountable care organizations (ACOs) on the cost and quality of hospital care. **Methods:** We will use data from the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID), and will also consider using data from the State Emergency Department Databases (SEDD) and State Ambulatory Surgery Databases (SASD). As of August 2015, 9 States with SID data had launched Medicaid ACO programs in 2015: Colorado, Iowa, Illinois, Maine, Minnesota, New Jersey, Oregon, Utah, and Vermont. All of these States also contribute data to the SASD and 7 also contribute data to the SEDD (Colorado and Oregon excluded). We will review program descriptions to identify and confirm the States to include, or counties within States, and focus our analyses on the geographic areas in which a Medicaid ACO program has been widely implemented. We plan to include several pre-ACO implementation years and may include non-ACO states as comparators. HCUP data will be linked with the American Hospital Association (AHA) Annual Survey to obtain hospital characteristics, including whether the hospital has established a Medicaid ACO, and/or with the AHA Survey of Care Systems and Payment™ to obtain detailed hospital ACO characteristics. We will conduct an environmental scan to obtain information about Medicaid ACO program implementation. We will also consider linking HCUP data with the American Community Survey (ACS) Public Use Microdata Sample (PUMS) to obtain Medicaid or other public enrollment estimates. However, we may opt to use hospital-based observation units instead of population-based observation units. Costs will be estimated using cost-to-charge ratios (CCRs), and quality will be measured by select inpatient—and possibly emergency department—quality measures such as prevention quality indicators (PQIs). Analysis will be conducted at the county
level if feasible (i.e., if ACO enrollment data are obtainable at the county level), stratifying on
demographic characteristics and using regression techniques as appropriate. Otherwise we will
conduct analysis at the State level with appropriate demographic stratifications and will consider
difference-in-differences designs and synthetic control methods for inference. We will
complement our statistical analysis with descriptive or qualitative analysis of Medicaid ACO
implementation features.

Teresa B. Gibson, Ph.D., Rachel Henke, Ph.D., Chapin White, Ph.D., Eli Cutler, Ph.D.,
Michael Head, M.S., Herbert S. Wong, Ph.D., and Zeynal Karaca, Ph.D.

The Relationship Between Hospital, Community, and Patient Factors and Changes in
Revisit Rates

Introduction: Beginning in early 2010, there has been a reduction in readmission rates,
especially within the Medicare program. This reduction largely is offset by increases in the use of
observation stays and emergency department (ED) visits. The purpose of this project is to
examine variation in changes in revisit rates across hospitals, communities, and patient
characteristics and to identify key correlates of changes in the pattern of revisits. These findings
will help determine the equity and varied impact of recent reductions in readmission rates.

Methods: Data from the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost
and Utilization Project (HCUP) State Inpatient Databases (SID), State Emergency Department
Databases (SEDD), and State Ambulatory Surgery and Services Databases (SASD) from four
States (Georgia, Nebraska, South Carolina, and Tennessee) will be used to identify index
admissions and subsequent revisits from 2009–2010 and 2013–2014. Data will be from
patients covered by all payers and diagnosed with congestive heart failure, acute myocardial
infarction, and pneumonia. Data will be linked to the American Community Survey to calculate
community-level sociodemographic characteristics such as poverty rates; the American Hospital
Association Annual Survey Database to calculate hospital structural characteristics and
integration; the Area Health Resources Files to calculate county-level health system
characteristics, nursing homes per capita, primary care physicians per capita, specialists per
capita, and primary care providers per specialist; Hospital Compare to estimate hospital quality
indicators; and SK&A (QuintilesIMS) databases to identify provider integration and
competition. We will conduct a multiple cross-sectional model to estimate differences in
changes in revisit rates across various hospital, community, and patient characteristics, where
the dependent variables will be defined as any versus no revisit to inpatient, observation, or ED
care. The independent variables will include such factors as structural characteristics (e.g.,
hospital ownership), market integration (e.g., accountable care organization penetration), area
sociodemographic characteristics (e.g., income, rurality), and patient characteristics (e.g.,
payer). Each characteristic will be interacted with a pre-post binary variable representing the
time periods 2009–2010 and 2013–2014. The “effect” of interest will be estimated by comparing
changes in probability of revisits across varying values of the independent variables between

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M.S., Carol Stocks, Ph.D., R.N., Pamela L. Owens, Ph.D., H. Joanna Jiang, Ph.D., and
Teryl Nuckols, M.D., M.S.H.S.

State Variations in Medication-Assisted Treatment Policy and Naloxone Access
and Hospital Readmissions or Emergency Department Revisits for Opioid-Related
Diagnoses

Introduction: Deaths from unintentional overdose from opioids have increased over the past
decade. Theoretically, patients at high risk for opioid overdose who receive medication-assisted
treatment (MAT) as well as those who have access to naloxone should have fewer
hospitalizations and emergency department (ED) visits for adverse events related to opioids. The objective of this study is to evaluate the odds of a readmission or ED revisit within 90 days after discharge for an index hospitalization for an opioid-related diagnosis among patients based on State generosity of policies related to MAT for opioids and naloxone access. **Methods:** The principal data used for this study will be the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) 2013, 2014, and 2015 (Quarters 1 through 3) State Inpatient Databases (SID) and State Emergency Department Databases (SEDD) for multiple States (at this time, data from the following States is expected for use): California, Florida, Georgia, Hawaii, Iowa, Nebraska, Nevada, South Dakota, Tennessee, Vermont, and Wisconsin. Using encrypted patient linkage numbers, we will link hospitalization records from the SID and ED visit records from the SEDD such that there was only one episode of care per person during the study period. MAT and naloxone access by State will be identified from publicly available data, such as the American Society of Addiction Medicine’s 2013 Advancing Access to Medications, the Substance Abuse and Mental Health Service Administration’s 2014 report on Medicaid Coverage and Financing of Medications to Treat Alcohol and Opioid Use Disorders, the Network of Public Health Law, and The Drug Policy Alliance’s Interactive Map of State Public Health Laws. **Analyses:** The principal independent variable is the state policies related to MAT and naloxone; the primary dependent variable is opioid-related hospital readmissions and ED revisits. Analyses will focus on evaluating the association between the key outcome and independent variables, controlling for demographic characteristics that may affect the rates of readmissions or revisits including race/ethnicity, age, sex, and community-level median income based on ZIP Code of residence.

Janice Blanchard, M.D., Ph.D., Audrey J. Weiss, Ph.D., Kevin Heslin, Ph.D., Marguerite L. Barrett, M.S., and Kimberly McDermott, Ph.D.

**USING HCUP DATA IN CONJUNCTION WITH OTHER DATA SOURCES**

To enhance the value of Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) data as a research tool, AHRQ supplements the HCUP databases with Partner-approved information about hospital and community characteristics obtained from external sources. AHRQ conducts this data augmentation for three reasons: (1) to supplement information available to AHRQ intramural researchers and their contractors on specific, approved research projects; (2) to create derivative data elements for the externally released State and Nationwide Databases; and (3) to add supplementary data elements for the externally released State and Nationwide Databases. These types of linkages leverage other data sources, thus increasing the value of HCUP data for research.

AHRQ releases two hospital-level HCUP Supplemental Files based on external data that are designed to augment the data elements in the National Inpatient Sample (NIS), Kids’ Inpatient Database (KID), Nationwide Readmissions Database (NRD), and State Inpatient Databases (SID). The HCUP Cost-to-Charge Ratio Files (CCR Files) provide a conversion between the total charge information (representing the amount hospitals billed for services) and the cost for hospital services. CCR File measures, which are developed using Centers for Medicare & Medicaid Services (CMS) Hospital Cost Report data, are available at the hospital level.

The HCUP Hospital Market Structure Files (HMS Files) contain various measures of hospital market competition. These measures are available at the hospital level and are developed using data from the American Hospital Association (AHA) Annual Survey of Hospitals Database, Area Health Resource File (AHRF), linkage to urban/rural indicators, and ZIP-Code data based on longitude and latitude for calculations of distance and travel times. Data for a State’s hospitals are included in the CCR and HMS Files at the discretion of the participating data.
organization. Beginning with 2012 data, the HMS Files are no longer linkable to the NIS and KID files. HMS Files are not available for the NRD.

The following descriptions provide a sample of the protocols used to link HCUP data to other data files.

**American Community Survey**

The U.S. Census Bureau’s American Community Survey is linked to HCUP data by ZIP code information to obtain population estimates in a given ZIP code by insurance status and federal poverty level.

**American Hospital Association**

Annual linkage of the AHA Annual Survey of Hospitals Database to HCUP data is necessary for the creation of the HCUP databases. HCUP uses the AHA data for three principal purposes: (1) to obtain characteristics of the hospitals for intramural research; (2) to add hospital characteristics to restricted-access, public release data; and (3) to sample and weight hospital discharges for the NIS, NEDS, NRD, and KID.

1. HCUP develops a separate AHA file for intramural research that contains basic institutional characteristics such as size, ownership, teaching status, location, utilization, finance, and personnel. A “crosswalk” file is developed to link the State’s hospital identifier to the AHA identifier, which also links the HCUP and AHA data sets. This linkage of supplemental hospital characteristics to HCUP databases greatly enriches the discharge data for intramural research at AHRQ.

2. HCUP adds hospital information from the AHA Annual Survey Database to the NIS, NEDS, NRD, and KID. Hospital identifiers have never been included in the NEDS or NRD, but prior to 2012 data when permitted by the data organizations, the NIS and KID included the AHA hospital identifier, hospital name, and address. Beginning with 2012 data, hospital identifiers, name, and address are no longer included in the NIS or KID. AHA hospital identifiers are included on the Central Distributor State Databases when permitted by the data organizations. Use of the data for approved research purposes is permitted, such as linking to other institutional information from non-HCUP data sets for analysis and aggregate statistical reporting. However, users of any HCUP data are prohibited from identifying individual facilities directly or by inference in disseminated material. This restriction is listed in all HCUP Data Use Agreements (DUAs). In addition, users of the data must not contact establishments directly concerning data in the HCUP databases.

3. HCUP creates the NIS, KID, and NRD sampling frames from all community, nonrehabilitation hospitals in the SID. The NEDS sampling frame includes hospital-owned EDs for which both SEDD and SID data are available. Information on hospital characteristics was provided in the AHA Annual Survey Database. To obtain national estimates, HCUP develops discharge weights using information from the AHA Annual Survey of Hospitals Database. Beginning with 2012 data, the NIS contains a sample of approximately 20 percent of inpatient discharges from all community, nonrehabilitation hospitals participating in HCUP. The NEDS contains all emergency department (ED) visits from a stratified sample representing 20 percent of hospital-owned EDs in U.S. community, nonrehabilitation hospitals. The NRD contains a sample of discharges for patients treated at community nonrehabilitation hospitals in States where verified patient linkage numbers are available.
The AHA’s Hospital Information Technology Database is a supplement to the American Hospital Association (AHA) Annual Survey of Hospitals. The AHA Annual Survey IT Database, formerly called the Hospital Electronic Health Record (EHR) Adoption Database, contains current information on healthcare technology adoption and indicators in response to the HITECH Act in terms of clinical documentation, lab reports and test results, computerized provider order entry, and decision support and bar coding. The database also pinpoints where in the hospital these functions are implemented. These data can be linked to the HCUP databases by the AHA hospital identifier. The results help users understand the capabilities of the hospitals’ EHR systems, and they reveal the major and minor barriers to implementation. The databases include only those hospitals that respond to the supplemental information technology survey.

The American Hospital Association (AHA) Survey of Care Systems and Payment is a supplement to the American Hospital Association (AHA) Annual Survey of Hospitals Database. All U.S. community hospitals are invited to participate in the Survey. In addition, responses are gathered from non-hospital organizations, such as payers. This database allows hospitals and researchers to track and monitor the evolution of new systems of care, including Accountable Care Organizations (ACO), Patient-Centered Medical Homes, clinically integrated networks, and other systems innovations. These data can be linked to the HCUP databases by the AHA hospital identifier. Databases enhanced with this information facilitates research on a variety of policy-relevant issues such as: identifying which types of hospitals are engaged in new care models; ascertaining current and expected payment structures; understanding current care coordination models; and recognizing risk arrangements, governance, and physician arrangements.

**Bureau of Economic Analysis (BEA)**

Bureau of Economic Analysis (BEA) Gross Domestic Product (GDP) deflator data is used to adjust HCUP cost data for inflation. The GDP deflator is a measure of the level of prices of all new, domestically produced, final goods and services in an economy. GDP is the total value of all final goods and services produced within that economy during a specified period.

**CDC Wonder Web site – Bridged-Race Population Estimate**

Bridged-Race Population Estimates are produced by the U.S. Census Bureau in collaboration with the National Center for Health Statistics (NCHS) and released by NCHS. This data bridges 31 race categories accounted for in the 2000 Census down to the four race categories in the 1977 Census. These population estimates are used to calculate rates with HCUP NIS race variables.

**Centers for Medicare & Medicaid Services**

Using hospital identifiers, AHRQ links the cost information obtained from the Centers for Medicare & Medicaid Services (CMS) Hospital Cost Report data files, which are collected by CMS, to the intramural HCUP data to create the annual HCUP Cost-to-Charge Ratio Files (CCR Files). The HCUP CCR Files are hospital-level files that enable the conversion of charges into costs for nearly every hospital in the corresponding NIS, SID, NRD, or KID.

The CMS Hospital Compare tool provides information about the quality of care for over 4,000 Medicare-certified hospitals in the United States. Using the tool, AHRQ examines the role of various hospital factors, such as nurse-to-patient ratio and surgical quality, on racial and ethnic disparities in inpatient postsurgical complications identified in HCUP data.
For certain research projects, AHRQ links county-level and hospital-level information obtained from CMS to the HCUP data. County-level databases contain such information as the number of beneficiaries in the county, the number of beneficiaries by type of plan coverage, and the area wage index. These data are linked to the discharge files using the patient’s or hospital’s county. Hospital-level files maintained by CMS include the Medicare Cost Reports, area wage index, and case-mix index. These data are linked using the hospital identifier. The State’s hospital identifier is crosswalked to the identifier on the AHA Annual Survey of Hospitals Database, which contains the Medicare hospital identifier.

The CMS Medicare Hospital Service Area File (HSAF) is used for the community-level statistics initiative to estimate the impact of missing hospitals on HCUP community-level statistics. The HSAF identifies counties with incomplete data. It provides the universe of Medicare discharges in the United States and contains the patient’s residential ZIP Code, Medicare provider identification number (ID), and a sum of patient discharges, days, and charges for all Medicare patients. Capture rates computed from the HSAF and SID allowed HCUP to examine several thresholds for suppression of county information that is due to missing hospitals in the SID.

The CMS Denominator File, CMS County to core Based Statistical Area (CBSA) Crosswalk, CMS Medicare Provider Analysis and Review (MedPAR) Hospital File, and the CMS National Physician Fee Schedule Relative Value File data sources are also used in HCUP studies.

**Children’s Hospital Association (formerly National Association of Children’s Hospitals and Related Institutions)**

During the construction of the KID, the AHA hospital identifier is used to link this database to a list of children’s hospitals provided to AHRQ by the Children’s Hospital Association. The Children’s Hospital Association data are used to help identify children’s hospitals and to determine the teaching status of these facilities.

**Dartmouth Atlas of Care – Hospital Market Definitions (Hospital Service Area)**

AHRQ uses the Hospital Market Definitions (Hospital Service Area) from Dartmouth Atlas of Health Care to compare hospital markets. This information helps map geographic areas to hospital markets to determine which ZIP variables are most appropriate to use when using the HCUP data.

**Decision Resources Group (DRG) Managed Market Surveyor (formerly HealthLeaders–Interstudy Managed Market Surveyor County Database)**

The Managed Market Surveyor Database, contains State, county-level, and Metropolitan Statistical Area (MSA) enrollment in managed care plans, including health maintenance organization (HMO) and preferred provider organization (PPO) penetration. For specific projects, AHRQ links this database to HCUP data at the county level on the basis of the hospital's location.

**Environmental Files**

AHRQ links county-level temperature data to HCUP county-level hospitalization and emergency department data using two external data sets: (1) weather station data maintained by the National Oceanic and Atmospheric Administration (NOAA) and (2) modeled data covering the entire county from the North American Land Data Assimilation System (NLDAS), which is obtained from the National Aeronautics and Space Administration (NASA).
The Aerometric Information Retrieval System (AIRS) is the largest database documenting air pollutant concentrations across the country. This database is maintained by the United States Environmental Protection Agency (EPA). For some research projects, AHRQ links nationwide air pollutant data from the AIRS to HCUP nationwide hospitalization data using admission data and patient ZIP code.

**Healthcare Information and Management Systems Society (HIMSS) Analytics® Database**

The HIMSS Analytics® Database provides information on health IT adoption. HIMSS Analytics, a subsidiary of the Healthcare Information and Management Systems Society, annually surveys a sample of U.S. non-Federal hospitals affiliated with integrated health care delivery systems (IHDSs). The HIMSS data include information about the extent of electronic medical records functionality, which is reflected in a score from 0 to 7. This database was used with the HCUP SID and SEDD to track Health Information Exchanges and other information technology variables.

**Health Resources and Services Administration Products**

Researchers may enhance the analytic capabilities of HCUP by using the Area Health Resource File (AHRF), a publicly available database developed by the Health Resources and Services Administration (HRSA) Bureau of Health Professions. The AHRF contains county-level statistics on health care professions, hospitals and health care facilities, and population and environmental classifications. The AHRF county-level data can be linked to the HCUP databases to provide additional information such as demographic data on the hospital's county or patient’s county of residence. The AHRF is not part of the HCUP databases; researchers are required to obtain the AHRF separately.

The HRSA Data Warehouse (HDW) integrates data with various external sources, enabling researchers to collect relevant and meaningful information on health care programs and the associated populations they serve. For some research projects, AHRQ links primary care service area (PCSA) data from the HDW—which contains nationwide data on U.S. primary health care resources, populations, and utilizations—with patient PCSA-level data in the HCUP SID.

**Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) Survey**

HCAHPS patient survey responses at U.S. hospitals are aggregated for each hospital and reported publicly by the Centers for Medicare and Medicaid Services (CMS) on their Hospital Compare Web site starting March 2008. AHRQ links these data with hospital-level characteristics to control for patients’ perceptions of the quality of hospitals. In these studies, AHRQ typically “controls” for the percent of patients that replied in a certain way to a particular question or group of questions by entering hospital percentages as they vary across time and hospitals in a regression model.

**Kaiser Family Foundation Web site**

The Kaiser Family Foundation (Web site) is a non-profit organization that focuses on health policy issues at the national and State level. HCUP extracted Medicaid program information by State from the Kaiser Family Foundation Web site and was used in conjunction with HCUP and other data sources to estimate changes in hospital inpatient and emergency department (ED) utilization rates, cost, and acuity by payer.
**Medicare Patient Safety Monitoring System**

For certain research projects, AHRQ enhances the analytical capabilities of HCUP by linking to the Medicare Patient Safety Monitoring System (MPSMS). MPSMS is a national surveillance project aimed at identifying the rates of specific adverse events that occur in the hospital for Medicare patients. MPSMS includes a subset of hospitals participating in the Medicare Hospital Payment Monitoring Program. The project conducts a chart abstraction of randomly selected, all-payer adult discharges. MPSMS is a de-identified, record-level database that includes information abstracted about the patient’s stay in the hospital, including health care associated injury or harm. MPSMS hospital level information can be linked to the HCUP data to provide a more robust understanding of the frequency and epidemiology of health care associated injury or harm for the inpatient population. The MPSMS hospital identifier must first be linked to the CMS Provider of Services (POS) file, which then can be crosswalked to the identifier on the AHA Annual Survey Databases and then linked to HCUP. Individual records can be linked using a probabilistic approach; linking does not identify patients because both HCUP data and the MPSMS are de-identified databases.

**Merchant Medicine**

Merchant Medicine is a research and consulting firm specializing in the field of walk-in medicine, tracks the location of all retail clinics in the United States on an ongoing basis in an effort to inform businesses specializing in walk-in medicine. The data, available starting in 2005, can also be purchased for research purposes. These data include the dates of opening and closing and geocoded addresses of all retail clinics in the United States. These data can be linked to HCUP databases at the ZIP Code level by calculating the percentage of ED catchment areas (ZIP Codes that accounted for three-quarters of all ED visits for low-acuity conditions in the pre-study period) that overlapped with the geographic area within a 10-minute drive from a retail clinic.

**QuintilesIMS Outpatient Surgery Centers Profiling Solution**

For certain intramural research projects, AHRQ may link facility-level data from the Outpatient Surgery Centers Profiling Solution database (formerly called SDI Freestanding Outpatient Surgery Center (FOSC) database) to freestanding ambulatory surgery data in the HCUP SASD. The Outpatient Surgery Centers Profiling Solution), created by SDI (now QuintilesIMS), contains facility-level data on free-standing ambulatory care centers in the United States. Data include operational characteristics (e.g., number of operating rooms, number of physicians), surgical characteristics (e.g., types and number of surgeries performed), purchasing patterns, facility name and address, and personnel information.

**Small Area Health Insurance Estimates for Counties and States**

Census Bureau Small Area Health Insurance Estimates (SAHIE) produces and disseminates model-based estimates of health insurance coverage for counties and states. SAHIE data are included in the study of the relationship between Medicare Advantage enrollment rates and overall utilization (e.g., hospital admission and readmission rates, types of hospitalizations, and associated costs).

**SK&A Data Products**

QuintilesIMS’ SK&A Data Products provides the largest telephone-verified national dataset of 7 million profiles of health care providers and over 1 million profiles of health care organizations. The profiles include detail characteristics about individual providers and organizations, such as
affiliations with health systems and Accountable Care Organizations. This supplemental database allows for analyses to understand how organizational structures and market forces influence the delivery, costs, and quality of health care.

**State Board of Medical Examiners Physician Data**

In order to understand physician practice styles for specific research, AHRQ links the HCUP SID to State-specific Board of Medical Examiners physician data in order to create files for analysis. AHRQ contacted and received permission from select State Partners to conduct this study.

**Surescripts**

Surescripts®, an e-prescribing network, links to the HCUP data by geographical market, or Hospital Referral Region (HRR). Surescripts is an e-prescription network used by the majority of all community pharmacies in the U.S. routing prescriptions, excluding closed systems such as Kaiser Permanente. This includes chain, franchise, and independently owned pharmacies. Surescripts network data exclude controlled substances.

**Trauma Information Exchange Program**

For certain intramural research projects, AHRQ may link hospital-level data from the Trauma Information Exchange Program (TIEP) to the HCUP SEDD and SID. The TIEP data are maintained by the American Trauma Society and the Johns Hopkins Center for Injury Research and Policy, which receive funding from the CDC. The database maintains a national inventory of trauma centers in the United States and designates the trauma level (I, II, III, IV, or V). Trauma-level data are also used for the NEDS as one of the sample selection criteria and for post-stratification for weighting.

**Urban/Rural Indicators**

AHRQ also links files in the HCUP data that provide measures of the urban character or rural character of the patient’s residence or hospital’s location. This information includes the county-based Core-Based Statistical Area (CBSA), Urban Influence Code, and the Rural Urban Continuum Code. These codes are available through files maintained by the U.S. Census Bureau, the U.S. Department of Agriculture, and the Health Resources and Services Administration (HRSA). Linkages to these files are made using the patient’s county or hospital’s county. Another urban/rural measure has been developed through linkage to the ZIP Code-based Rural Urban Commuting Area (RUCA) codes available from the Washington, Wyoming, Alaska, Montana, Idaho (WWAMI) Rural Health Research Center. This linkage is made using the patient’s ZIP Code of residence or the hospital’s ZIP Code.

HCUP creates a version of the urban/rural codes through linkage to National Center for Health Statistics (NCHS) data available from the CDC. The NCHS provides county-level classifications of urban/rural location, which includes gradations of metropolitan, micropolitan, and noncore counties by population size. Population counts from the ZIP Code-level The Nielsen Company Claritas file are assigned to a county and then aggregated to the NCHS urban/rural designation. Both patient and hospital locations are reported by NCHS designation.

Any patient ZIP Code linkage would conform to Partner and Data Use Agreement (DUA) restrictions.
ZIP Code-Based and County-Based Census Data

For database development and specific research, AHRQ links data from the U.S. Census to the HCUP intramural data to obtain additional characteristics of the patient’s community, such as the demographics, the urban or rural character, and the longitude and latitude for calculations of distance and travel times. AHRQ frequently uses the population ZIP-Code-level counts from Demographic Update Files provided by The Nielsen Company, formerly Claritas (a vendor that compiles and adds values to the U.S. Bureau of Census data).

During construction of the HCUP State Databases, AHRQ uses the patient’s ZIP Code to link to the ZIP Code-based Nielsen data to create two derived data elements representing median income categories for the patient’s ZIP Code. One data element is based on the distribution of the U.S. population; the other data element is based on the distribution of the population in the State. For each variable, the four median income categories are designed to be broad enough to protect patient confidentiality. Ultimately, no category contains fewer than two ZIP Codes in a State. The data element with the national income quartiles is included on the restricted-access, public release NIS, KID, NEDS, and NRD. ZIP-Code-based and county-based census data cannot be linked to the restricted-access public release NIS, KID, NEDS, and NRD because neither the ZIP Code or county of the patient or hospital are included in the databases (as of 2012 data).

The U.S. Census Bureau’s ZIP Code Tabulation Area (ZCTA) is used with HCUP data for population counts of uninsured people for studies that require ZIP code information.

HCUP Statistics provided to Agencies

Federal and other agencies rely on AHRQ for statistics to fulfill some of their program data needs. These are usually recurring, annual requests. The table below lists the agencies to which AHRQ provided statistics in 2016, what they are used for and the statistics provided.

<table>
<thead>
<tr>
<th>Agency</th>
<th>Use</th>
<th>Description of HCUP Statistics</th>
</tr>
</thead>
</table>
| Center for Medicare & Medicaid Innovation, Department of Health and Human Services (DHSS) | Partnership for Patients (P4P) | • Readmissions to US community hospitals for all conditions combined as well as specific conditions, used as benchmarks, so that clinicians and policymakers can accurately measure improvements in the rate of readmissions for patients as interventions are implemented under the P4P.  
• Several measures in support of the P4P health care associated condition initiative including the maternal safety indicator:  
  • Two maternal PSI measures in support of the Partnership-for-Patients (PfP) initiative  
  • Four additional PSIs that go into a summary measure of Hospital-Acquired Conditions (HAC) of the PfP initiative. |
<p>| Office of the Assistant | Longitudinal evaluation of the DHHS Action Plan | Infection rates for six HAIs for inpatient hospitals at the State, regional, and national levels to complement the baseline generated as part of the DHHS Action Plan. |</p>
<table>
<thead>
<tr>
<th>Agency</th>
<th>Use</th>
<th>Description of HCUP Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secretary of Health, DHHS</td>
<td>to prevent Healthcare-Associated Infections (HAI)</td>
<td>National and State-level statistics of treated cardiovascular and cerebrovascular conditions to Million Hearts – a national initiative to prevent one million heart attacks and strokes over the next five years. Statistics are age and sex-adjusted hospitalization rates of five conditions: acute myocardial infarction (AMI), acute stroke, AMI or acute stroke, acute cerebrovascular disease (CVD), and broad screen for CVD.</td>
</tr>
<tr>
<td>Centers for Disease Control, DHHS</td>
<td>Million Hearts</td>
<td>Mean and total all-payer costs per hospitalization for common operating room surgeries using estimates from the HCUP National Inpatient Sample (NIS).</td>
</tr>
<tr>
<td>National Center for Health Statistics, DHHS</td>
<td>Health U.S.</td>
<td>Rate of hospitalization per 100,000 population for pressure ulcers in older adults for Healthy People 2020 monitoring. The statistics are based on the HCUP NIS and are provided by age, gender, urban/rural residence. Cochlear implants</td>
</tr>
<tr>
<td>National Center for Health Statistics, DHHS</td>
<td>Healthy People 2020</td>
<td>Rates of hospital admission for injuries for children</td>
</tr>
<tr>
<td>National Center for Health Statistics, DHHS</td>
<td>National Performance Measures and National Outcome Measures mandated by Title V legislation for State Block Grant Program</td>
<td>Rates of childbirth hospitalizations with an indication of severe maternal morbidity (e.g. heart or kidney failure, stroke, embolism, hemorrhage)</td>
</tr>
<tr>
<td>Health Resources and Services Administration, Maternal and Child Health, DHHS</td>
<td>Health Care Quality Indicators Project</td>
<td>Rates of newborn infants diagnosed with neonatal abstinence syndrome</td>
</tr>
<tr>
<td>Organization for Economic Co-operation and Development</td>
<td></td>
<td>Hospitalizations for asthma, diabetes, chronic obstructive pulmonary disease, and dementia-related conditions</td>
</tr>
</tbody>
</table>

**TECHNICAL SUPPORT TO HCUP USERS**

Users of HCUP data, software tools, and products include health services researchers, policymakers, consumers, providers, and other constituent groups. These users have varied backgrounds including public health, health policy, medicine, economics, and other social sciences. They represent a variety of sectors including academia, private industry, the media, and government.

HCUP technical support provides a bridge between the project and its users by facilitating and promoting the use of HCUP data, software tools, and products. This support is intended to increase awareness of the value of HCUP resources, educate individuals on appropriate uses of HCUP data, and showcase the myriad of potential research and policy analysis applications.

Technical support to HCUP users assists the public, government, and our HCUP Partners in the following ways:
1. Expands knowledge about HCUP via educational seminars, online tutorials, exhibit booths, presentations, and poster sessions.

2. Provides HCUP documentation on the HCUP-US Web site that includes answers to Frequently Asked Questions and detailed methods for using HCUP databases, software tools, linkable files, and HCUPnet.

3. Produces a series of descriptive and analytic HCUP reports.

4. Identifies peer-reviewed publications that use HCUP resources.

5. Maintains a catalog of available HCUP databases and products.

6. Provides online information about ordering procedures, requirements for obtaining and using HCUP databases, and methods of acquiring other HCUP products.

The HCUP-US Web site (www.hcup-us.ahrq.gov) is integral in providing technical support to HCUP users. Please refer to the HCUP Online Resources section of the HCUP Project Overview Binder for more detailed information about the Web site.

As part of technical support, the Technical Assistance team answers user questions about HCUP databases and the application of HCUP tools and products. Complex questions are answered by research personnel trained in epidemiology, health services research, statistics, economics, and medicine. Programming staff provide advice on technical issues related to HCUP data and HCUP-provided programs. The Technical Assistance team forwards specific user questions, such as media and interagency requests and high-profile inquiries, to AHRQ staff. The Technical Assistance staff may be reached through a dedicated toll-free telephone number and email address: 1-866-290-HCUP or hcup@ahrq.gov.

**TECHNICAL SUPPORT FOR HCUP PARTNERS**

HCUP is made possible through the voluntary participation of State data organizations, hospital associations, and private data organizations that have partnered with AHRQ.

In addition to the products and technical support that are available to all HCUP users, the Partners are afforded other benefits for their participation in the project. HCUP creates analytic tools, data products, and reports for Partners; provides subject-matter expertise on data issues to Partners; promotes communication and information exchange among Partners about inpatient and outpatient data collection and use; and returns complimentary copies of the HCUP databases to participating data organizations.

For more information on technical support for HCUP Partners, see the section on Benefits of Partnership provided with this Annual Activities Report.
We hope you and your affiliates find this report helpful. AHRQ values the extensive contributions of each HCUP Partner and will continue to seek Partner guidance on the use and development of HCUP data in 2017. We value and welcome your feedback and suggestions. Please contact Jenny Schnaier or Carol Stocks at AHRQ to share your comments or pose questions about the project.

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