ANNUAL ACTIVITIES REPORT

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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 with 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 are currently used.

HEALTHCARE COST AND UTILIZATION PROJECT

In 2018, AHRQ began the first year of a five year plan which will carry HCUP forward from 2018–2022. The scope of the HCUP 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 (referred to collectively as “HCUP Partners”).

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.
- Emphasize the importance of data partnerships.
- Expand outpatient data.

AHRQ continued to hold HCUP Partners Meetings via Webinar on a quarterly schedule during 2018. 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 an introduction to the new Nationwide Ambulatory Surgery Sample (NASS) database, and an analysis of the opioid crisis in Missouri. In 2019, 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.

Overview of the HCUP Project

HCUP develops and maintains health care databases, related software tools, support services, and products created 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, and the uninsured), beginning in 1988. These databases enable research on a broad range of health policy issues, including cost and quality of health services, medical practice patterns, access to health care programs, and outcomes of treatments at the national, State, and local market levels.

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

The HCUP databases were revised to include ICD-10-CM/PCS codes beginning with October 2015. To alert users to the change, the file structure for the fourth quarter 2015 and subsequent years differs from the annual files for earlier years. The nationwide and State databases for 2015 include a combination of nine months with ICD-9-CM codes (January 1 – September 30) and three months with ICD-10-CM/PCS codes (October 1 – December 31).

HCUP Partner Participation by Data Type

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.
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 equal to approximately 20 percent of the total discharges from U.S. community hospitals, representing more than 97 percent of the U.S. population. The NIS contains information on all patients, regardless of payer, including individuals covered by Medicare, Medicaid, private insurance, and the 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 most recent KID is available for 2016.

- **The Nationwide Ambulatory Surgery Sample (NASS)** will be released annually starting in 2019, beginning with the 2016 data year. The NASS will be the largest all-payer ambulatory surgery database that has been constructed in the U.S., with an approximate 50 percent sample of major ambulatory surgery visits performed in hospital-owned facilities.

- **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 approximately 950 hospitals each year. 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 14 to 17 million discharges each year for discharges with and without readmissions, taken from HCUP Partners with verified patient linkage numbers. It addresses the need for nationally representative information on hospital readmissions for all ages.

- **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 emergency departments for visits that do not result in hospitalizations. The SEDD files include all patients, regardless of payer, providing a unique view of emergency department 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 for the 1997 KID that are calculated in the same way as the weights for the 2000 and later years of the KID.

- **1993-2011 NIS Trend Weights Files** provide revised weights for the 1993-2011 NIS that adjust for changes in the 2012 NIS design. The trend weights were calculated in the same way as weights for the 2012 and later NIS. 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** provide data elements that were not contained on the original 1993-2002 NIS files, which were added to the design in later years. These supplemental data elements are consistently defined across data years to facilitate analysis using earlier years of NIS data. The NIS trend weights are included 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, emergency department, and ambulatory surgery) while adhering to strict privacy guidelines. For data years 2003-2008, the revisit variables were provided
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 2018**

In 2018, HCUP focused on expanding the type and number of data projects and resources available to researchers and policymakers. Project achievements during 2018 included the following:

**Databases and Software Tools**

- HCUP produced and released the 2016 NIS, KID, NEDS, and NRD.
- HCUP produced and released the 2016 SID, SASD, and SEDD using revised programs that accept ICD-10-CM/PCS data.
- HCUP began creating the 2017 SID, SASD, and SEDD.
- HCUP continued to release the State and nationwide databases via the Central Distributor. In 2018, 3,834 State databases and 3,843 nationwide databases were distributed through the HCUP Central Distributor.
- HCUP made further progress in producing timely information, using quarterly data for 2017–2018 from 24 HCUP Partners to examine trends in inpatient stays, emergency department visits by payer, opioid-related hospital and emergency department use and to perform “quick response” analyses and support analytic research tasks.
- HCUP released the 2016 Partner-approved Cost-to-Charge Ratio (CCR) Files that contain hospital-specific, cost-to-charge ratios based on all-payer inpatient cost for nearly every hospital in the corresponding NIS, KID, NRD, and SID.
- HCUP released 2015 updates for Community Statistics on HCUPnet and continued to develop enhancements. New features include statistics for alcohol and other drug use, statistics for U.S.–Mexico border regions, and time-aggregated statistics across three years of data (to reduce the incidence of insufficient sample size).
- AHRQ added an interactive United States map to the opioid path on HCUP Fast Stats – an online tool that provides easy access to the latest HCUP-based statistics for select State and national health information topics. AHRQ also added more recent data through 2018 where available. Topics currently available in HCUP Fast Stats include the State Trends in Hospital Use by Payer (one for inpatient and one for outpatient); National Hospital Utilization and Costs; and Opioid-Related Hospital Use (national and State).

**Reports and Analyses**

- HCUP continued to produce the Statistical Briefs series on the HCUP User Support (HCUP-US) Web site, releasing 13 new Statistical Briefs. The Statistical Briefs covered topics such as geographic variation in substance-related inpatient stays, trends and disparities in delivery involving severe maternal morbidity, opioid-related inpatient stays and emergency department visits among patients 65 and older, and patient safety and adverse events.
- AHRQ released the 2017 National Healthcare Quality and Disparities Report (QDR), which included national and State-level estimates from the 2015 HCUP data. Because of the transition from ICD-9-CM to ICD-10-CM/PCS on October 1, 2015, only the first nine
months of the 2015 HCUP data were used for the 2015 QI estimates. The QDR reports are available on QRDRnet (www.nhqnet.ahrq.gov).

- AHRQ provided estimates of selected AHRQ Quality Indicator (QI) measures using 2016 HCUP data that were created in preparation for the next annual QDR. Unlike in previous years, the 2018 QDR and State Snapshots will not include State-specific QI estimates based on 2016 HCUP data, as the updated risk adjustment method for the AHRQ QI software is under development at AHRQ. State-specific QIs may be reported in future QDRs.

- HCUP released four new or updated Methods Series reports. The reports covered topics such as Population Denominator Data Sources and Data for Use with HCUP Databases, examining CHIP and Medicaid Expected Payer Coding, and examining Methods Applying AHRQ Quality Indicators.

Presentations and Outreach

- The User Support team showcased HCUP resources via presentations, Webinars, exhibit booths, and developed 22 presentations for 9 events.

- HCUP presented two HCUP data users’ workshops for health services researchers where attendees received in-person, face-to-face training using the HCUP databases and related tools.

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

- AHRQ recognized two health care services researchers (for excellent use of HCUP Data in a clinical and policy field) with the HCUP Outstanding Article of the Year Award at the 2018 AcademyHealth Annual Research Meeting.

- AHRQ sent an amendment to the HCUP Partners that provide State Ambulatory Surgery and Services Databases (SASD), requesting their participation in a new HCUP restricted-access public release database, the Nationwide Ambulatory Surgery Sample (NASS). An overview of the NASS was provided at the May Partners Meeting webinar.

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

Partnership Activities and Resources

- HCUP developed the 2016 Border Crossing Report, which provides information on the flow of patients into and out of HCUP States. AHRQ provided two new affiliate reports focused on cross-border hospitalizations for alcohol- and substance-related stays. The reports are 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.

- HCUP began recruiting outpatient quarterly data from Partners for emergency preparedness modeling of hospital utilization and identifying potential medical needs prior to a hurricane event.

Objectives for 2019

In 2019, 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 2017 NIS, NEDS, and NRD.
- Produce and release the new Nationwide Ambulatory Surgery Sample (NASS) beginning with the 2016 data year (and subsequent annual releases).
- Work with Partners to review and seek their permission to release new Emergency Department Cost-to-Charge Ratio Files (ED CCR), designed similarly to the inpatient CCRs.
- Continue to update and refine the beta versions of the HCUP Tools for ICD-10-CM/PCS. A fully refined version of the CCS for ICD-10-CM is expected to be released in 2019. Beginning with October 2015 data, the data elements derived from the HCUP tools are not available in the HCUP databases; users may download and apply the beta versions of the tools from the HCUP-US Web site. Additional information is provided for users on the ICD-10-CM/PCS Resources Page on HCUP-US.
- 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.
- 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.
- Conduct quick turn-around analyses using HCUP data in collaboration with federal agencies and other entities to address timely health issues, forecast medical needs in a disaster, and monitor ongoing trends.
- Explore new types of data related to social determinants of health to expand and enhance the core HCUP data.
- Further enhance the Community-Level Statistics on HCUPnet by and adding 2016 data and recruiting new Partners to participate.
- Develop enhancements to HCUP Fast Stats, including development of path using existing structure: select state, one other selection variable (e.g., hurricane or diagnosis) and one radio button (IP/ED). This also includes Coordination and communication to obtain Partner consent.
- Update and add new HCUP Methods Series Reports that assist users with using the HCUP databases and software tools.
- Continue a longitudinal study of Factors Related to County-Level Hot Spots for Opioid-Related Hospitalizations and begin two new studies on Severe Maternal Morbidity and on Robotic Surgeries.
- Communicate changes in databases, tools, and query sites to Partners and provide briefings on research studies.
- AHRQ initiated work on the Assessing and Predicting Medical Needs in a Disaster project – a collaboration with the Assistant Secretary for Planning and Evaluation (ASPE) and the Assistant Secretary for Preparedness and Response (ASPR), supported
by the Patient-Centered Outcomes Research Trust Fund (PCORTF). The goal of the project is to build a data resource and online query path containing county-level HCUP data on hospital utilization following natural disasters. This resource, focused initially on hurricanes, will provide a window into community medical needs and inform decisions around the deployment of resources during and following a natural disaster.

**SUMMARY OF HCUP RESEARCH ACTIVITIES FOR 2018**

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 the Department of Health and Human Services 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 mediums. 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 2018, 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 2018 or began earlier but changed significantly in 2018 are listed below. The HCUP databases used in these studies are shown in parentheses.
Studies Using State Databases

- County-Level Determinants of High Opioid-Related Hospitalization Rates (SID, SEDD)
- Effects of Medicaid Expansion Under the Affordable Care Act on Utilization of Inpatient and Emergency Department Care at Safety-Net and Non-Safety-Net Hospitals (SID, SEDD)
- Emergency Department Utilization After a Hurricane Varies by Age, Condition, and Proximity to the Hurricane (SID, SEDD)
- Impact of Vertical Integration on Hospital Utilization (SID, SEDD)
- Neonatal Abstinence Syndrome (SID)
- Readmission Following Inpatient Treatment for Opioid-Related Conditions (SID, SEDD)
- State Variations in Opioid Treatment Policies: Effects on Opioid-Related Hospital Readmissions (SID, SEDD)

Studies Using Nationwide Databases

- Population-Based Trends in Pediatric Cardiac Surgery and Interventional Cardiology Procedures in the United States (KID)

Studies Using Both Nationwide and State Databases

- Intriguing Trends in Perforated Appendicitis Rates in U.S. 1–17-Year-Olds (SID, NIS, KID)

Ongoing Studies

- National Healthcare Quality and Disparities Report (QDR)

Descriptions of these studies are provided below.

Studies Using State Databases

**County-Level Determinants of High Opioid-Related Hospitalization Rates**

**Introduction:** Adverse opioid-related health outcomes, including hospitalization and death, are a significant concern in the United States. Substantial geographic variation in these outcomes exists. Little is known about the role of community-level differences—including social, health, and policy factors—in differentiating areas affected by the opioid crisis. **Objectives:** The objective of this study was to identify community-level factors associated with counties with high versus low opioid-related hospitalization rates. **Methods:** This study used 2016 Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID) for the District of Columbia and 45 States: Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Florida, Hawaii, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming. We examined hospital discharges for patients aged 15 years and older in community acute care hospitals. We used a lasso regression to guide covariate selection followed by a logistic regression to determine factors that were significantly associated with areas with the highest opioid-related hospitalization rates. We examined a variety of county-level factors, including population characteristics (American
Community Survey), hospital characteristics (American Hospital Association Annual Survey), opioid prescribing rates (Centers for Disease Control and Prevention [CDC] U.S. Prescribing Rate Maps), pharmacy density (Census County Business Patterns), Medicaid managed care enrollment (Decision Resources Group Managed Market Surveyor), physician and health care facility resources and health professional shortage area designations (Health Resources and Services Administration [HRSA] Area Health Resources Files), reported crimes (Inter-university Consortium for Political and Social Research Uniform Crime Reporting Program), urban/rural classification (National Center for Health Statistics Urban-Rural Classification Scheme for Counties), affiliation with a religious congregation (Association of Statisticians of American Religious Bodies U.S. Religion Census), buprenorphine treatment provider availability (Substance Abuse and Mental Health Services Administration [SAMHSA] Buprenorphine Treatment Locator tool), and the prevalence of select comorbidities among inpatient hospital stays (HCUP SID). We also examined several State-level policy variables, including law enforcement seizures of fentanyl (amfAR Opioid & Health Indicators Database), out-of-pocket share of buprenorphine prescription payments (IQVIA Institute for Human Data Science Report: Use of Opioid Recovery Medications), pain management prescribing restrictions (National Alliance for Model State Drug Laws Pain Management and Prescribing Practices), prescription drug monitoring program policies (Prescription Drug Abuse Policy System), and naloxone availability policies (Prescription Drug Abuse Policy System).

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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 Non-Safety-Net Hospitals

Introduction: Determining the extent to which insurance coverage expansion under the Affordable Care Act has shifted the mix of Medicaid, uninsured, and privately insured patients at safety-net hospitals (SNHs) can provide insight into how changes to the Affordable Care Act or future health care reforms might affect these hospitals. The purpose of this study was to examine whether inpatient and emergency department (ED) utilization by Medicaid, uninsured, and privately insured patients shifted between SNHs and non-SNHs in major metropolitan markets. Methods: This study included hospitals in large metropolitan areas of 22 States with Healthcare Cost and Utilization Project (HCUP) 2011–2016 State Inpatient Databases (SID). State Emergency Department Databases (SEDD) were available from 14 States. Difference-in-differences (DID) models compared pre- and postexpansion changes at SNHs and non-SNHs in Medicaid expansion versus nonexpansion States. Outcomes included volume of nonmaternal Medicaid, uninsured, and privately insured inpatient stays and treat-and-release ED visits for patients aged 19–64 years. Results: Medicaid expansion was associated with a greater relative increase in Medicaid stays at non-SNHs compared with SNHs. By 2016 (as compared with the pre-Affordable Care Act period), Medicaid expansion was associated with a smaller percentage increase in Medicaid stays at SNHs (25.5 percent) versus non-SNHs (54.0 percent) (triple DID −18.5 percent; p=0.009). At the same time, Medicaid expansion was associated with increased concentration of uninsured ED visits at SNHs. By 2016 (as compared with the pre-Affordable Care Act period), Medicaid expansion was associated with a smaller percentage decrease in uninsured ED visits at SNHs (−17.2 percent) versus non-SNHs (−40.7 percent) (triple DID 39.7 percent; p=0.032). Private stays were above trend for SNHs and non-SNHs in expansion and nonexpansion States, likely because of implementation of health insurance exchanges and individual mandates across States in the country. Finally, Medicaid expansion was associated with a disproportionate increase in total Medicaid, uninsured, and privately insured ED visits at SNHs. By 2016 (as compared with the pre-Affordable Care Act period),
Medicaid expansion was associated with an increase in total utilization at SNHs (4.5 percent) versus a decrease at non-SNHs (–8.1 percent) (triple DID 13.6 percent; p=0.014). A manuscript from this study currently is being prepared for submission to Medical Care Research and Review.

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Emergency Department Utilization After a Hurricane Varies by Age, Condition, and Proximity to the Hurricane

Introduction: Hospital emergency departments (EDs) are important emergency service providers during hurricanes, when other treatment options may not be available. Understanding how ED demand changes during hurricane events will help State and local organizations plan for emergency response. Methods: In 2018, the Healthcare Cost and Utilization Project (HCUP) team examined the impact on ED utilization for nine States affected by seven U.S. hurricanes between 2005–2016 using data from the HCUP State Emergency Department Databases (SEDD) and State Inpatient Databases (SID). The SID were limited to inpatient stays that originated in the ED. States were selected on the basis of availability of HCUP data and the designation by the Federal Emergency Management Agency (FEMA) that at least one county in the State was declared a disaster area. Data from the National Oceanic and Atmospheric Association (NOAA) were used to characterize the historical hurricanes studied and to track the hurricane trajectories using geographic information system (GIS) software. This resulted in the classification of FEMA-designated counties as being in the hurricane path, near the hurricane path, or remote from the hurricane path, as well as the assignment of State-specific “start dates” for each hurricane. Weekly ED encounter volumes derived from the SID and SEDD were based on the patient’s county of residence. Population-weighted rates of weekly ED encounters were calculated for the following: the 4 weeks preceding the hurricane, the week of the hurricane, and the 3 weeks following the hurricane. The four prior weekly rates were averaged to define a baseline rate. ED rates were stratified by age group (0–17, 18–64, and 65+ years) and principal diagnosis, which was defined broadly at the International Classification of Diseases chapter level. Results: Changes in weekly utilization after the hurricane depended critically on age and proximity of the patient residence to the hurricane path, with further critical interactions observed with age and principal diagnosis.

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Impact of Vertical Integration on Hospital Utilization

Introduction: The continuing waves of mergers, acquisitions, and vertical integration between hospitals, physicians, and other providers, as well as integration among insurers, create concerns about the effects of changes in market competition on the consumer, payers, and health and health care utilization and outcomes. High levels of market concentration could limit competition, increase prices, and limit access to providers, with a potential effect on quality of care, costs, and outcomes. Objective: The objective of this study was to understand how vertical integration between hospital systems and physician practices affects hospital service utilization and outcomes. The Centers for Medicare & Medicaid Services (CMS) has implemented reforms such as accountable care organizations and bundled payment models that have led to vertical integration. Because the government can take actions that influence vertical integration, it is important to understand the ramifications of leaning on these policy levers. Methods: We conducted an observational study of hospital discharge data to evaluate the impact of vertical integration events on readmissions in 16 States and employed targeted
maximum likelihood estimation (TMLE) to compare hospitals that did undergo integration events, becoming fulling integrated, with those that did not. We linked data from the following sources with Healthcare Cost and Utilization Project (HCUP) data to measure area and hospital characteristics. The American Hospital Association’s Annual Survey and the new Survey of Care Systems and Payments were used to provide information on the level of integration, determine vertical integration events, and control for differences in hospital characteristics. The Health Resources and Services Administration (HRSA) Area Health Resources Files provided demographic characteristics at the county and State level and were linked to discharges. The Health Care Services Acquisition Report, created and maintained by Irving Levin Associates, provided additional information on integration events between hospitals and physician groups. All-payer inpatient cost-to-charge ratios provided by AHRQ in addition to implicit price deflators for Gross Domestic Product obtained from the U.S. Bureau of Economic Analysis were applied by hospital to control for differences in local costs of health care. **Analysis:** To compare the changes in hospitals that changed from nonintegrated to integrated status with hospitals that remained nonintegrated, we employed TMLE. This method leverages machine learning techniques to model the outcome and treatment assignment mechanism while maintaining desirable statistical properties.

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

### Neonatal Abstinence Syndrome

**Introduction:** Neonatal abstinence syndrome (NAS) is characterized by withdrawal symptoms caused by abrupt cessation of illicit or prescription substances at birth. NAS is most commonly caused by maternal use of opioids, either illicitly or as part of pain management or substance use disorder treatment. NAS has increased seven-fold from 2000 to 2014 in parallel with increases in drug and opioid overdose deaths. No studies have used national data to compare factors distinguishing counties with high NAS rates from those with low rates. **Objective:** The objectives of this study were to describe characteristics of counties with high NAS rates compared with characteristics of counties with low NAS rates and analyze county-level factors associated with NAS rates in multivariate analyses. **Methods:** We used data from the 2016 Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID) to identify births with a diagnosis of NAS out of all birth hospitalizations. Rates of NAS per 1,000 birth hospitalizations were summarized at the county level and merged with 35 county- and State-level variables related to social context, access to health care, insurance coverage, and socio-demographics from various publicly available data sources. **Results:** Counties with high NAS rates (>80th percentile) were concentrated in Appalachia, throughout Maine and Vermont, around the Great Lakes, and in certain areas of Colorado, Montana, New Mexico, and Utah. Nationally, compared with counties with low NAS rates (<20th percentile), counties with high NAS rates had fewer primary care physicians (46.5 vs. 56.8 per 100,000 population), obstetrician-gynecologists (28.1 vs. 46.4), chiropractors/physical therapists (62.3 vs. 73.6), and mental health professionals (59.7 percent vs. 45.4 percent were whole shortage areas). The average opioid prescribing rate per 100 residents per year was higher in counties with high, compared with low, NAS rates (95.7 vs. 73.3). However, these factors were not associated with NAS rates in multivariate analyses. In the multivariate analyses, we found that more buprenorphine-waivered physicians, State policies requiring physicians to check prescription drug monitoring programs, and opioid-related funding were associated with higher NAS rates, as were higher rates of unemployment, poverty, and American Indian/Alaska Native residents (p<0.05). In analyses stratified by region, the population rate of buprenorphine-waivered physicians was the only factor associated with higher NAS rates across all models. This manuscript currently is being prepared for submission to *JAMA Pediatrics.*
Readmission Following Inpatient Treatment for Opioid-Related Conditions

Introduction: Previous research suggests that relatively few hospitalized patients with opioid-related conditions receive substance use treatment during their inpatient stay. Without treatment, these individuals may be more likely to have subsequent hospitalizations for continued opioid use disorder and resulting physical health problems. **Objective:** To evaluate the relationship between inpatient drug detoxification and/or rehabilitation treatment and subsequent opioid-related readmission. **Methods:** We used hospital inpatient discharge and emergency department (ED) visit data from community hospitals in California, Florida, Hawaii, Massachusetts, New York, South Carolina, and Tennessee from the Healthcare Cost and Utilization Project (HCUP). We used encrypted patient linkage numbers to link hospitalization records from the 2010–2013 State Inpatient Databases (SID) and ED visit records from the State Emergency Department Databases (SEDD) so that there was only one episode of care per person during the study period. To identify hospitals that had an alcohol or substance use detoxification unit, a psychiatric unit, or both, we used hospital-level data from the 2010–2013 American Hospital Association Annual Survey Databases. A multivariate analysis was conducted to examine the relationship between opioid-related readmission and the receipt of inpatient drug detoxification and/or rehabilitation during the index visit. **Results:** Our sample consisted of 329,037 patients from seven States with an opioid-related index hospitalization occurring between March 2010 and September 2013. 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. 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=0.60; 95 percent confidence interval=0.54–0.67) compared with patients with no inpatient drug detoxification or rehabilitation treatment. **Conclusions:** Our findings indicate that receipt of drug rehabilitation services in acute care hospitals is associated with a lower 90-day readmission rate. 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.

Janice Blanchard, M.D., Ph.D., Audrey J. Weiss, Ph.D., Marguerite L. Barrett, M.S., Carol Stocks, Ph.D., R.N., Pamela L. Owens, Ph.D., Rosanna M. Coffey, Ph.D., and Kevin C. Heslin, Ph.D.

State Variations in Opioid Treatment Policies: Effects on Opioid-Related Hospital Readmissions

Introduction: State policy approaches designed to provide opioid treatment options have received significant attention in addressing the opioid epidemic in the United States. In particular, expanded availability of naloxone to reverse overdose, Good Samaritan laws intended to protect individuals who attempt to provide or obtain emergency services for someone experiencing an opioid overdose, and expanded coverage of medication-assisted treatment (MAT) for individuals with opioid abuse or dependence may help curtail hospital readmissions from opioids. **Objectives:** The objective of this study was to evaluate the relationship between the presence of State opioid treatment policies—naloxone standing orders, Good Samaritan laws, and Medicaid MAT coverage—and opioid-related hospital readmissions. **Methods:** We examined the relationship between State opioid treatment policies and 90-day
opioid-related readmissions after a stay involving an opioid diagnosis. We used inpatient discharge data from non-Federal community hospitals in Arkansas, California, Florida, Georgia, Iowa, Maryland, Massachusetts, Nebraska, Nevada, New York, Tennessee, Vermont, and Wisconsin from the Healthcare Cost and Utilization Project (HCUP). We used encrypted patient linkage numbers to link records from the 2013, 2014, and 2015 (quarters 1 through 3) HCUP State Inpatient Databases (SID) during the study period. We used several State-level data sources to obtain information about the status of Medicaid MAT policies (American Society of Addiction Medicine State [ASAM] reports, a 2016 article by Grogan and colleagues and personal communication with the article authors, Georgia and Florida Medicaid Preferred Drug Lists, contacts at State Medicaid agencies, and Kaiser Family Foundation State Health Facts) and implementation dates for naloxone standing orders and Good Samaritan Laws (Policy Surveillance Program: A Law Atlas Project). At the State level, we also examined the role of State Medicaid coverage of ASAM-recommended substance use disorder treatment levels (Grogan and colleagues, 2016); availability of providers newly certified to administer buprenorphine/naloxone, substance abuse treatment facilities, and opioid treatment programs (Substance Abuse and Mental Health Services Administration [SAMHSA] Number of Drug Addiction Treatment Act [DATA]-Waived Practitioners Newly Certified per Year tracker, SAMHSA National Survey of Substance Abuse Treatment Services); and opioid overdose death rate (Kaiser Family Foundation State Health Facts). At the hospital level, we accounted for the presence of detoxification and psychiatry units (American Hospital Association Hospital Statistics). Results: Our sample included 383,334 opioid-related index hospitalizations. Patients treated in States with naloxone standing-order policies at the time of the index stay had higher adjusted odds of an opioid-related readmission than did those treated in States without such policies; however, this relationship was not present in States with Good Samaritan laws. Medicaid methadone coverage was associated with higher odds of readmission among all insurance groups except Medicaid. Medicaid MAT coverage generosity was associated with higher odds of readmission among the Medicaid group but lower odds of readmission among the Medicare and privately insured groups. More comprehensive Medicaid coverage of substance use disorder treatment and a greater number of opioid treatment programs were associated with lower odds of readmission. Conclusion: Differences in index hospitalization rates suggest that States with opioid treatment policies had a higher level of need for opioid-related intervention, which also may account for higher rates of readmission. More research is needed to understand how these policies can be most effective in influencing acute care use. Janice Blanchard, M.D., Ph.D., Audrey J. Weiss, Ph.D., Marguerite L. Barrett, M.S., Kimberly W. McDermott, Ph.D., and Kevin C. Heslin, Ph.D.

Studies Using Nationwide Databases

Population-Based Trends in Pediatric Cardiac Surgery and Interventional Cardiology Procedures in the United States

Introduction: The growing numbers of pediatric patients with heart disease and adult survivors of congenital heart disease highlight the need to track trends in volumes and outcomes of pediatric cardiac interventions. Methods: This was a retrospective cross-sectional/cohort study. Data for 1997–2012 came from querying HCUPnet, the online searchable version of the Kids’ Inpatient Database (KID) of the Healthcare Cost and Utilization Project (HCUP). We generated nationwide estimates of procedure discharge volumes for children aged 0–17 years with International Classification of Diseases, Ninth Revision, Clinical Modification principal procedure codes for surgical or interventional cardiology procedures of the heart or great vessels. Rates were calculated using Bridged-Race Population Estimates obtained from the Centers for Disease Control and Prevention (CDC) Wonder Web site. Annual cost and charge estimates were converted to Calendar Year 2014 dollars using Producer Price Index figures.
obtained from the Bureau of Labor Statistics Web site. **Results:** Inpatient cardiac procedure volumes declined from 30,721 cases (43/100,000 children aged 0–17 years) in 1997 to 27,397 (37/100,000) in 2012. Unadjusted mortality fell from 4.6 to 2.3 percent. Mean length of stay (MLOS) rose from 12.8 to 22.4 days. Aggregate hospital charges (in 2014 US$) rose from $3.5 to $8.6 billion. Corresponding costs rose from $1.4 to $2.5 billion. In 1997, cases with private insurance (57 percent) generated 53 percent of costs, and cases with Medicaid (33 percent) generated 38 percent of costs. In 2012, cases with private insurance (45 percent) generated 40 percent of costs, and cases with Medicaid (47 percent) generated 51 percent of costs. Uninsured patients fell from 3.1 percent of cases in 1997 to 1.9 percent in 2012. Mirroring data from prior years, 14,873 cases (377/100,000) in infants younger than 1 year were identified in the 2012 KID. Mortality, MLOS, and mean cost/case were 3.4 percent, 34.3 days, and $128,266, respectively. For individuals aged 1–17 years, mortality was 0.8 percent in 12,521 cases (18/100,000). MLOS was 8.2 days, and mean costs/case were $51,155. **Conclusions:** Procedure volumes and population-based rates for 1997–2012 fell by ~10 percent; unadjusted mortality fell by 50 percent. As markers of resource use, MLOS and inflation-adjusted costs and charges roughly doubled. Medicaid’s involvement increased. Relatively few treated patients were uninsured. Compared with individuals aged 1–17 years, infants had notably higher procedure rates, mortality, and resource use. Our findings merit further study using encounter-level data.

Darryl Gray, M.D., Sc.D., Kamal Pourmoghadam, M.D., Alan Hsu, M.D., Vivian Dicks, Ph.D., Jasmin Patel, M.P.H., Tri Le, M.P.H., Tameika McLean, M.S., Chinagozi Ugwu, M.P.H., Jeffrey Jacobs, M.D., Claudia A. Steiner, M.D., M.P.H., and Marshall Jacobs, M.D.

**Studies Using Both Nationwide and State Databases**

**Intriguing Trends in Perforated Appendicitis Rates in U.S. 1–17-Year-Olds**

**Introduction:** Appendiceal perforation is generally avoidable with timely recognition and appropriate treatment of acute appendicitis. We tracked perforated appendicitis rates in U.S. children as a potential indicator of health care access and quality. **Methods:** Data for this sequential, cross-sectional, study came from the State Inpatient Databases (SID) of the Agency for Healthcare Research and Quality Healthcare Cost and Utilization Project (HCUP). The SID capture administrative data on non-Federal hospital discharges from States whose residents now make up more than 95 percent of the U.S. population. Perforated appendicitis rates came from HCUP’s intramural Disparities Analytic File (DAF), a weighted sample of SID discharges from States (and hospitals within them) meeting specific criteria for coding of race and ethnicity. Using established criteria, we included discharges of 1–17-year-olds (excluding obstetric cases and in-bound transfers) with International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) principal or secondary discharge diagnosis codes of 540.0 (acute appendicitis with peritonitis), 540.1 (abscess of appendix), 540.9 (acute appendicitis not otherwise specified [NOS]), and 541 (appendicitis NOS). Cases coded as 540.0–540.1 were classified as perforations. DAF data included cases discharged 1/1/2001–9/30/2015 (when use of ICD-9-CM coding ended). Using the same ICD-9-CM codes, we estimated nationwide volumes of perforated and nonperforated appendicitis discharges (1/1/2000–12/31/2014) through online queries (https://hcupnet.ahrq.gov) of data from the HCUP National Inpatient Sample (NIS) and Kids’ Inpatient Database (KID). The annual NIS captures 20 percent weighted samples of all SID discharges. The triennial KID captures 80 percent weighted samples of SID pediatric care discharges. **Results:** DAF overall perforated appendicitis rates rose from 317.5 perforations/1,000 pediatric appendicitis cases in 2001 to 457.7/1,000 in 2015, with consistent age-group-specific rate gradients. Rates did not differ by sex (data not shown=DNS). Differences across other sociodemographic groups narrowed while all rates
increased. For example, the large 2001 difference between rates for Black patients (357.0/1,000) and White patients (294.4/1,000) (p<0.01) fell to 476.7/1,000 versus 457.7/1,000 in 2015 (p=0.33). Rates were generally highest among Medicaid and uninsured/self-pay/no charge patients. In 2001–2009/2010, rates were generally highest among patients and hospitals from/in large central metro areas, with less consistent patterns seen thereafter. NIS data mirrored KID data, estimating annual volumes of pediatric perforation cases at ~25,000 discharges/year. Most notably, numbers of nonperforated appendicitis cases declined after 2009–2010. This decline generated increased rates of perforation (expressed as proportions of all appendicitis cases) that mirrored DAF findings. **Conclusions:** Perforation rate age gradients presumably reflect age-specific differences in clinical presentation. Intra-year variation across sociodemographic subgroups may reflect differential access to prompt and appropriate care. However, perforation rate trends must be interpreted in light of observed decreasing volumes of nonperforated appendicitis cases. Rising perforation rates as described above may essentially reflect increasingly accurate exclusion of nonappendicitis cases from perforation rate denominators. Population-based tracking of perforations per 100,000 1–17-year-olds (32.1/100,000 in 2000 vs. 34.4/100,000 in 2014 per NIS; DNS) avoids the consequences of variation in diagnosing nonperforations. However, stratifying denominators (e.g., by insurance status) for this approach may be challenging. In any case, further investigations using encounter-level administrative and clinical data are needed to better interpret the trends we observed and to identify potential quality improvement targets.

Darryl T. Gray, M.D., Sc.D., and Trina Mizrahi, M.P.H.

**Ongoing Studies**

**National Healthcare Quality and Disparities Report (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 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. More detailed information is available through chartbooks on specific topics, such as access to care, patient safety, and healthy living, which are updated each year when funding is available.

The QDR and chartbooks are organized around the concept of access to care, quality of care, disparities in care, and six priority areas, including patient safety, person-centered care, care coordination, effective treatment, healthy living, and care affordability. With a focus on priority populations, the QDR summarizes quality of and disparities in care for populations at elevated risk for receiving poor health care. This aspect of the QDR 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 2018 QDR (to be released in 2019) will include national estimates of the AHRQ Quality Indicators™ (QIs) version 7.0.1 for data year 2016. Rates prior to 2016 are not reported because of the transition to the International Classification of Diseases, Tenth Revision, Clinical Modification/Procedure Coding System. Because risk adjustment was unavailable in the AHRQ
QI version 7.0.1 software during the report development, the QDR will include observed (unadjusted) national QI rates, and will not include State-specific QI rates.

For generating national QI estimates for the 2018 QDR, a nationally weighted analysis file was created by combining the HCUP State Inpatient Databases (SID) for data year 2016 that met the following inclusion criteria: (1) less than 10 percent of discharges failed edit checks on indicators of diagnoses being present on admission (POA), (2) the SID included information on day of principal and secondary procedure days, and (3) the SID included good reporting of race/ethnicity data. After hospitals and discharges that failed POA and race/ethnicity edits were excluded, the remaining discharges were weighted to the universe of community hospitals in the United States, excluding rehabilitation and long-term acute care facilities. For data year 2016, the nationally weighted analysis file includes data from 34 SID and more than 30.2 million discharges.

AHRQ disseminates the QDR and related products 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 reports, chartbooks, and QDR data, including State-specific information (i.e., the State Snapshots and a query tool for accessing the underlying data).

Marguerite L. Barrett, M.S., Kevin C. Heslin, Ph.D., and Karen Chaves, M.H.S.

NEW STUDIES PLANNED FOR 2019

Studies Using State Databases
- Association between Neonatal Abstinence Syndrome (NAS), Infant Characteristics, and Birth Defects (SID)
- Evaluation of the impact of new adult PCV13 recommendation on community-acquired pneumonia hospitalizations in the United States (SID)
- Factors Influencing the County-Level Burden of Opioid-Related Hospitalizations (SID)
- Hospital Delivery and Postpartum Visits Associated with Severe Maternal Morbidity (SID, SEDD)
- Hospital Readmissions and Preventable Hospitalizations for Nonelderly Adults Following National Insurance Expansions (SID)
- State-Level Trends and Variation in Neonatal Abstinence Syndrome and Maternal Opiate Use – 2010 to 2017 (SID)
- Surveillance for NAS and Maternal Opiate Use: Impact of International Classification of Diseases Coding Transition (SID)
- Transitioning from ICD-9-CM to ICD-10-CM/PCS in Estimating Injuries (SID, SEDD)
- Travel Time to Hospitals (SID)

Studies Using State Databases
Descriptions for these studies are provided below. The databases used in these studies are shown in parentheses above.

Association Between Neonatal Abstinence Syndrome, Infant Characteristics, and Birth Defects
This project examines the relationship between neonatal abstinence syndrome and associated birth defects and complications, including neonatal seizures, orofacial clefts, gastroschisis,
feeding difficulties, respiratory symptoms, and low birth weight. The 2016 State Inpatient Databases (SID) will be used.

Pamela L. Owens, Ph.D.

_Evaluation of the Impact of New Adult PCV13 Recommendation on Community-Acquired Pneumonia Hospitalizations in the United States_

Following the introduction of the 7 valent-pneumococcal conjugate vaccine (PCV7) into the routine childhood immunization schedule in 2000, declines in pneumonia hospitalization rates were seen among children under the age of 2 years as well as among older age groups because of indirect vaccine effects. In 2010, PCV7 was replaced by PCV13, which includes 6 additional serotypes. An initial study from the first 2 years post-PCV13 introduction suggested that there was a further decline in pneumonia hospitalizations among children <2 years of age. However, despite this decline in pneumonia hospitalization rates, _Streptococcus pneumoniae_ (pneumococcus) remains an important cause of community-acquired pneumonia in adults. Based on a U.S. multicenter pneumonia etiology study conducted a decade after PCV7 introduction and several years after PCV13 introduction in children, pneumococcus was the leading cause of community-acquired bacterial pneumonia among adults. The goal of this study is to evaluate the effect of the 2014 PCV13 recommendation for adults on community-acquired pneumonia hospitalizations, pneumococcal pneumonia, and invasive pneumococcal disease among adults >65 years of age and to assess cost-effectiveness of the 2014 PCV13 recommendation for adults. The outcomes of interest for this project will be all-cause community-acquired pneumonia hospitalizations, pneumococcal pneumonia hospitalizations without invasive disease, and invasive pneumococcal disease.

Fernanda Lessa, M.D., Cynthia Whitney, M.D., Michael Spiller, Ph.D., Carol Stocks, Ph.D., and Zeynal Karaca, Ph.D.

_Factors Influencing the County-Level Burden of Opioid-Related Hospitalizations_

**Introduction:** Opioid-related outcomes vary across States and within States across urban and rural areas and counties. Limited research exists that examines the relationship between community-level factors and opioid-related outcomes. **Objective:** To explore community characteristics that may influence relative changes in opioid-related hospitalization rates. **Methods:** We will use hospital inpatient discharge data from community hospitals for two time periods (e.g., 2012–2013 vs. 2016–2017) for approximately 40 States from the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID). Community-level factors will be selected from a range of data sources and may include, for example, State-level opioid-related policy factors, county-level population demographic characteristics, and county-level economic and employment characteristics (such as poverty level and percentage of manual labor industry employment). A longitudinal analysis will be conducted to examine the role of community-level characteristics in distinguishing those counties that experience relative improvement in their opioid-related hospitalization rates versus those counties that do not experience improvement.

Kevin C. Heslin, Ph.D., Pamela L. Owens, Ph.D., and Audrey J. Weiss, Ph.D.

_Hospital Delivery and Postpartum Visits Associated With Severe Maternal Morbidity_

Severe maternal morbidity (SMM)—inclusive of such conditions at delivery as stroke, sepsis, and pulmonary embolism—is an important indicator of the quality of women’s health care. Considered a “near miss” for maternal mortality, in many cases, SMM otherwise would have led to death without prompt identification and treatment. Although recent research suggests women who experience SMM during delivery are at an increased risk of readmission, further research is needed to describe the total burden of SMM at delivery and postpartum in both inpatient and
emergency department (ED) settings. Additional information on factors associated with revisits among women with SMM at delivery may aid efforts to reduce postpartum readmissions. Our primary objective is to examine hospital delivery and postpartum revisits associated with SMM. Revisits will include both inpatient readmissions and ED revisits. Specifically, this study will (1) quantify and compare rates of 7-day, 30-day, and 42-day postpartum revisits overall, and those involving in-hospital mortality, following deliveries with and without SMM and (2) examine factors associated with postpartum revisits following SMM deliveries. **External data sources:** We will combine Healthcare Cost and Utilization Project (HCUP) data with other county-level data sources (e.g., the Area Health Resources Files) to describe characteristics of the patient’s location of residence.

**Pamela L. Owens, Ph.D., Lawrence Reid, Ph.D., MPH, and Katie Fingar, Ph.D., MPH**

### Hospital Readmissions and Preventable Hospitalizations for Nonelderly Adults Following National Insurance Expansions

**Introduction:** The Affordable Care Act sought to increase insurance coverage through the introduction of Marketplace coverage and, in some States, expanded eligibility for Medicaid. Improved insurance coverage may serve to reduce hospital readmission rates by providing access to health care outside of the hospital. Although this anticipated effect was not found following 2006 insurance expansions in Massachusetts, this possibility has not been investigated following the Affordable Care Act’s national insurance expansions in 2014. **Objective:** This study proposes to help fill that gap by analyzing data on a universe of hospital discharges for two States that expanded Medicaid (New York and Washington) and three States that as of 2019 did not (Florida, Nebraska, and Utah). **Methods:** The analyses will rely on data from the Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID) for 2011 through the third quarter of 2015. We will test for discontinuous changes in readmission rates in 2014 for expansion relative to nonexpansion States. In estimating probabilities of readmission, we will include controls for national trends in readmissions, patient characteristics (age, sex, case mix), and area-level characteristics, including the unemployment rate and the number of physicians per capita by county and year (using data from the Area Health Resources Files). State and hospital fixed effects will alternatively be included in all analyses. We also will consider any discontinuous change in the probability of readmission for patients from ZIP Codes with high rates of uninsurance prior to 2014 compared with others. Rates of insurance coverage in 2009–2013 will be merged into the SID data by patient ZIP Code of residence using data from the American Community Survey from 2009–2013. The effect of the Affordable Care Act on Prevention Quality Indicators also will be examined.

**Sandra L. Decker, Ph.D.**

### State-Level Trends and Variation in Neonatal Abstinence Syndrome and Maternal Opiate Use – 2010 to 2017

This project examines State trends and variation in neonatal abstinence syndrome (NAS) birth hospitalizations and maternal opioid use disorder. The objectives of this project are (1) to examine recent State-level trends in NAS and maternal opiate use (2010–2015) and (2) to examine current variation in NAS and maternal opiate use by State and sociodemographic characteristics (race/ethnicity, expected primary payer, community-level income, rural/urban residence) to characterize burden and inform preventive efforts. The 2010–2017 State Inpatient Databases (SID) will be used.

**Pamela L. Owens, Ph.D., Carol Stocks, Ph.D., R.N., Ashley Hirai, Ph.D., and Jean Ko, Ph.D.**
**Surveillance for NAS and Maternal Opiate Use: Impact of International Classification of Diseases Coding Transition**

This project examines the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) to International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) coding transition for neonatal abstinence syndrome (NAS) birth hospitalizations and maternal opioid use disorder. The objectives of this project are (1) to establish ICD-10 coding for NAS and maternal opiate use in birth and delivery hospitalizations and (2) to examine comparability with ICD-9 coding and the impact on trend analyses. The 2014–2017 State Inpatient Databases (SID) will be used.

**Pamela L. Owens, Ph.D., Carol Stocks, Ph.D., R.N.**

**Transitioning from ICD-9-CM to ICD-10-CM/PCS in Estimating Injuries**

This project examines how estimates of injuries and external causes of injury were impacted by the transition from ICD-9-CM to ICD-10-CM/PCS. The project uses data from HCUP 2014 and 2016 State Inpatient Databases and State Emergency Department Databases.

**Renee Johnson, Ph.D., Holly Hedegaard, Ph.D., and Pamela L. Owens, Ph.D.**

**Travel Time to Hospitals**

This study will compute travel time and distance from patient ZIP Code to hospital ZIP Code for every hospital in the patient’s referral region (HRR). Travel time will be used later in various policy projects. **Data:** Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID), 2014–2016. **External data:** Census tract data.

**William Encinosa, Ph.D.**

**Studies Using Nationwide Databases**

- Utilization of Robotic Technology in Frequently Performed Outpatient Surgeries: An Overview From the Nationwide Ambulatory Surgery Sample

**Studies Using Nationwide Databases**

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

**Utilization of Robotic Technology in Frequently Performed Outpatient Surgeries: An Overview From the Nationwide Ambulatory Surgery Sample**

Since the 1980s, the frequency of inpatient surgeries has decreased, while the volume of outpatient procedures steadily increased at a faster pace. Robot-assisted surgery was introduced in the early 1990s; however, data for the study of this phenomenon, particularly in outpatient settings, has been limited, and the existing national estimates show gaps in key pieces of information. A cross-sectional design using the 2016 Nationwide Ambulatory Surgery Sample (NASS) will be used to examine discharge-level variation in adoption of robotic technology. Outcomes of interest will be the frequency and types of outpatient surgical procedures for adults, and possibly children, with and without the use of robotic technology.

**Carol Stocks, Ph.D., RN, and Katie Fingar, Ph.D., MPH**
**USING HCUP DATA IN CONJUNCTION WITH OTHER DATA SOURCES**

To enhance the value of the Healthcare Cost and Utilization Project (HCUP) data as a research tool, AHRQ supplements the HCUP databases with information about hospital and community characteristics obtained from Partner-approved and other 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.

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.

**Association of Statisticians of American Religious Bodies U.S. Religion Census (ASARB)**

The U.S. Religion Census reports the number of congregations in every U.S. county equivalent for each of 236 faith groups. Each participating religious body supplies the number of churches, full members, adherents, and attendees for each county. U.S. Religion Census collects data on the number of congregations, members, adherents, and attendees. Not all groups collect or report all items. We examined a variety of county-level factors, including affiliation with a religious congregation.

**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.
Bureau of Labor Statistics (BLS)

The Bureau of Labor Statistics (BLS) of the U.S. Department of Labor is the principal federal agency responsible for measuring labor market activity, working conditions, and price changes in the economy. The BLS is used in conjunction with HCUP data to determine unemployment rates for a given area and to convert annual cost and charge estimates from earlier years.

Centers for Disease Control and Prevention (CDC)

**CDC WONDER Web site.** 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. The WONDER 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.

**The CDC U.S. Prescribing Rate and Overdose Maps.** These maps were used to examine county-level retail opioid prescriptions dispensed per 100 persons. These maps and a variety of other variables from the CDC WONDER Multiple Cause of Death, Local Health Department (LHD) such as substance abuse treatment services, increased tobacco, alcohol or other drug prevention, and population-based primary prevention activities related to substance abuse or mental illness were used at the county level.

**CDC Diabetes County Data Indicators.** The County Data application allows views of data and trends of diagnosed diabetes, obesity, and leisure-time physical inactivity at the national, state, and county levels. Access includes: 1) state and county-level data in the United States, 2) data on how counties compare with each other, and 3) maps and motion charts to examine how changes in diabetes coincide with changes in obesity over time and by location.

**CDC Grant Funding Profiles.** This Web site provides interactive data and summaries of CDC cooperative agreement and grant funding to recipients in U.S. states and territories, and the District of Columbia, starting with fiscal year (FY) 2010. The data allows users to view, sort, and analyze funding data by funding opportunity announcement, funding source (CDC funding category and sub-category), geography, and recipient name and type.

Census Bureau

**Census Bureau’s American Community Survey (ACS) Tables.** The ACS is a nationwide survey designed to provide communities a look at how they are changing. It is a critical element in the Census Bureau's decennial census program. The ACS provides single-year and multi-year estimates on several important factors, such as age, sex, race, insurance status, and households. Information is available at several geographic levels, including national, regional, State, county, and census tract.

**Census County Business Patterns (CBP).** CBP is an annual series that provides subnational economic data by industry. Statistics are available on business establishments at the U.S. level and by State, County, Metropolitan area, ZIP Code, and Congressional District Levels. Data for Puerto Rico and the Island Areas are available at the State and county equivalent levels. Data for establishments are presented by geographic area, 6-digit North American Industry Classification System (NAICS) industry, legal form of organization (U.S. and state only), and employment size class. The data may be linked to HCUP data at the state, county, metropolitan area, or ZIP Code level.
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).

Housing and Urban Development (HUD) Comprehensive Housing Affordability Strategy (CHAS) Data

The Department of Housing and Urban Development (HUD) receives custom tabulations of American Community Survey (ACS) data from the U.S. Census Bureau, which is based on five-year averages. These data, known as the CHAS data set provide information on the extent of housing problems and housing needs, particularly for low income households. Information is available at the State, county, census tract, and smaller sub-division levels.

The HUD Annual Homeless Assessment Report to Congress (AHAR) provides Point-in-Time (PIT) estimates, offering a snapshot of homelessness—both sheltered and unsheltered— on a single night. The one-night counts are conducted in late January of each year. The PIT counts also provide an estimate of the number of people experiencing homelessness within particular populations, such as people with chronic patterns of homelessness, veterans experiencing homelessness, and people under the age of 25 who are experiencing homelessness on their own, not in company of their parent or guardian. In addition, the AHAR includes demographic characteristics for all people experiencing homelessness, people experiencing homelessness in households without children, people in families with children, and veterans experiencing homelessness. National estimates, state estimates, and estimates for “Continuums of Care” with the highest and lowest rates of homelessness are provided.

KIDS COUNT Child Well-Being Index

KIDS COUNT is a project of the Annie E. Casey Foundation and a source of data on children and families. Each year, the KIDS COUNT Data Book assesses child well-being in the United States. A variety of county-level factors, including pharmacy density were examined.

Centers for Medicare & Medicaid Services

Hospital Cost Reports. 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.

Hospital Compare. 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 in-hospital postsurgical complications identified in HCUP data.

County-level and Hospital-level Information. 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.

**Hospital Service Area File.** 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 used in HCUP studies.

**CMS Medicare Opioid Prescribing Map Tool.** This Interactive tool that shows geographic comparisons, at the state, county, and ZIP code levels, of de-identified Medicare Part D opioid prescription claims – prescriptions written and then submitted to be filled – within the United States. The mapping tool presents Medicare Part D opioid prescribing rates for 2015 as well as the change in opioid prescribing rates from 2013 to 2015.

**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.

**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.

**Council for Community and Economic Research Cost of Living Index**

The Cost of Living Index (COLI) is the most reliable source of city-to-city comparisons of key consumer costs available since 1968. The Council for Community and Economic Research (C2ER) collects and compares COLI data on more than 300 U.S. cities in order to publish COLI on a quarterly basis. Both data and methodology are reviewed by an Advisory Board composed of academic researchers and government.

**County-Health Rankings Health Status Determinants**

The annual County Health Rankings measure vital health factors, including high school graduation rates, obesity, smoking, unemployment, access to healthy foods, the quality of air
and water, income inequality, and teen births in nearly every county in America. The annual Rankings provide a snapshot of how health is influenced by where individuals live, learn, work and play.

**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 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); (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); (3) disaster declaration information from the Federal Emergency Management Agency (FEMA).

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.

**HCUP Supplemental Files**

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 national inpatient databases – the NIS and KID files. HMS Files are not available for the NRD.

**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 Care Services Acquisition Report**

The Health Care Services Acquisition Report, created and maintained by Irving Levin Associates, provides additional information on integration events between hospitals and physician groups. Levin analyzes key information such as price, revenue, target, acquirer, price per bed per unit, and income multiples when available.

**Health Resources and Services Administration Products**

The Area Health Resource File (AHRF) is 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.

**Inter-University Consortium for Political and Social Research (ICPSR) Uniform Crime Reporting (UCR) Program Data**

Each year, participating law enforcement agencies contribute crime reports to the Federal Bureau of Investigation (FBI) either directly or through their State reporting programs. ICPSR archives the UCR data as five separate components: (1) summary data, (2) county-level data, (3) incident-level data (National Incident-Based Reporting System [NIBRS]), (4) hate crime data, and (5) various, mostly nonrecurring, data collections. Summary data are reported in four types of files: (a) Offenses Known and Clearances by Arrest, (b) Property Stolen and Recovered, (c) Supplementary Homicide Reports (SHR), and (d) Police Employee (LEOKA) Data (Law Enforcement Officers Killed or Assaulted). The county-level data provide counts of arrests and offenses aggregated to the county level. County populations are also reported. These data may be linked to HCUP data at the State or county level.
IQVIA Institute for Human Data Science Report: Use of Opioid Recovery Medications

The IQVIA Institute for Human Data Science contributes to the advancement of human health globally through timely research, analysis and scientific expertise applied to granular non-identified patient-level data. Several State-level policy variables from the Institute were examined including out of pocket share of buprenorphine prescription payments.

Kaiser Family Foundation Web site

The Kaiser Family Foundation (Web site) contains Medicaid program information by State 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.

State Health Facts is a project of the Henry J. Kaiser Family Foundation and provides health data for all 50 states, the District of Columbia, and the United States. In some cases, data are available for counties, territories, and other geographies. State Health Facts is comprised of more than 800 health indicators and provides users with the ability to map, rank, trend, and download data. Data come from a variety of public and private sources, including Kaiser Family Foundation reports, public websites, government surveys and reports, and private organizations.

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 with 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. 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 emergency department (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.

National Association of County & City Health Officials (NACCHO) Local Health Department Profiles

The National Association of County and City Health Officials (NACCHO) regularly conducts two surveys to assess local health department (LHD) infrastructure and activities over time. The
National Profile of Local Health Departments (commonly referred to as “the Profile study”) represents the largest, most reliable source of data on LHDs and collects information on LHD infrastructure, workforce, finance, governance, activities, and services. The Forces of Change surveys assess the impact of a variety of trends affecting change in LHDs, including health reform, economic factors, and accreditation.

**National Alliance for Model State Drug Laws (NAMSDL) Pain Management and Prescribing Practices**

NAMSDL provides an overview regarding State statutes, regulations, and guidelines related to the treatment of chronic pain and prescribing practices; information related to the regulation of pain clinics and facilities with a focus on the treatment of pain. Several State-level policy variables including pain management prescribing restrictions were examined.

**National Cancer Institute State Cancer Profiles**

The National Institutes of Health, National Cancer Institute provides a table of incidence statistics for use in assessing the burden and risk for a major cancer site for the U.S. overall and for states with cancer registries whose data have met the criteria required for inclusion in the U.S. Cancer Statistics External Web Site Policy. The 95% confidence intervals for the rates provide a measure of how certain or uncertain the point estimate is and can be used to generally assess how different one rate is from another.

**Penn State Northeast Regional Center for Rural Development Social Capital Index**

Composite index of social capital based on total associations (i.e. religious organizations, civic and social associations, business associations, political organizations, professional organizations, labor organizations, bowling centers, sports and fitness centers, country clubs, sports teams) per 1,000 population in 2014, 2012 voter turnout, 2010 census response rate, and number of non-profit organizations without an international approach in 2014.

**Prescription Drug Abuse Policy System (PDAPS)**

PDAPS is developed by Legal Science, LLC, in collaboration with legal experts at Temple University’s Center for Health Law, Policy and Practice. PDAPS has built on the work of staff and grantees at the Public Health Law Research Program of the Robert Wood Johnson Foundation, based at Temple Law School. Several State-level policy variables including prescription drug monitoring program policies and naloxone availability policies were examined.

**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.

**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.

**Substance Abuse and Mental Health Services Administration (SAMHSA)**

The SAMHSA Buprenorphine Treatment Locator tool allows examination of a variety of county-level factors related to buprenorphine treatment provider availability. The Behavioral Health Treatment Services Locator is an online source of information for persons seeking treatment facilities in the United States or U.S. Territories for substance abuse/addiction and/or mental health problems.

**Substance Use Files**

AHRQ used State-level data sources to obtain information about the status of Medicaid medication-assisted treatment (MAT) policies: (1) The American Society of Addiction Medicine article regarding access to addiction medications and implications for opioid addiction treatment; and (2) preferred drug lists from the Florida and Georgia Medicaid Comprehensive Preferred Drug Lists. Several State-level data sources from the LawAtlas Project were also used to obtain information about implementation dates for naloxone standing orders and Good Samaritan Laws.

**amfAR Opioid & Health Indicators Database.** The database contains the total number of drug seizures that were tested by forensic laboratories and reported to contain fentanyl to the Drug Enforcement Agency's (DEA) National Forensic Laboratory Information System (NFLIS) in a calendar year. The NFLIS collects drug chemistry analysis results, as well as other related information, from cases analyzed by state, local and federal forensic laboratories. These laboratories analyze substances secured in law enforcement operations across the country. Several State-level policy variables including law enforcement seizures of fentanyl were examined.

**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. Department of Agriculture, the Census Bureau, 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 Claritas files 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 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 Claritas 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.
**Substance Use-Related Data Sources**

- The CDC U.S. Prescribing Rate and Overdose Maps
- CMS Medicare Opioid Prescribing Map Tool
- IQVIA Institute for Human Data Science Report: Use of Opioid Recovery Medications
- Prescription Drug Abuse Policy System (PDAPS)
- Substance Abuse and Mental Health Services Administration (SAMHSA)
- The American Society of Addiction Medicine
- Florida and Georgia Medicaid Comprehensive Preferred Drug Lists
- LawAtlas Project
- amfAR Opioid & Health Indicators Database

**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 2018, what they are used for and the statistics provided.

<table>
<thead>
<tr>
<th>Agency</th>
<th>Use</th>
<th>Description of HCUP Statistics Provided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistant Secretary for Planning and Evaluation (ASPE)/DHHS</td>
<td>Health and Human Services (HHS) Opioid Dashboard</td>
<td>• National estimates of hospital visits related to opioid overdoses (poisoning) and to NAS</td>
</tr>
<tr>
<td>Assistant Secretary for Preparedness and Response (ASPR)/DHHS</td>
<td>Resource Planning for Hurricane Florence</td>
<td>• Expected change in hospital utilization in the Carolinas after Hurricane Florence</td>
</tr>
</tbody>
</table>
| Center for Medicare & Medicaid Innovation (CMMI) | Partnership for Patients (PfP) | • National benchmark for readmissions to U.S. community hospitals, so that clinicians and policy makers can accurately measure improvements in the rate of readmissions for patients as interventions are implemented under the PfP  
• National estimate for readmissions of all conditions combined, as well as the rate of readmissions for specific conditions  
• Several of the measures in support of the PfP healthcare associated condition initiative including the maternal safety indicator |
<table>
<thead>
<tr>
<th>Agency</th>
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<th>Description of HCUP Statistics Provided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centers for Disease Control and Prevention (CDC)</td>
<td>Million Hearts Initiative</td>
<td>- 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 and Prevention (CDC), /National Center for Health Statistics (/NCHS)</td>
<td>To inform CDC’s definition of injuries using ICD-10-CM codes.</td>
<td>- State-based estimates of hospitalizations for injuries, types of injuries and external cause of injuries.</td>
</tr>
</tbody>
</table>
| Centers for Disease Control and Prevention (CDC)/ National Center for Health Statistics (NCHS) | Health US | - Cost of hospital procedures for the "Health US" publication  
- Annual statistics on the all-payer costs for common operating room surgeries using estimates from the NIS |
| Centers for Disease Control and Prevention (CDC)/ National Center for Health Statistics (NCHS) | Healthy People 2030 | - Rate of hospitalization per 100,000 population for pressure ulcers, falls, selected Prevention Quality Indicators (PQIs), diabetes, and urinary tract infections for Healthy People 2030 monitoring  
- The statistics are based on HCUP NIS and are provided by age, gender, urban/rural residence. |
| Health Resources and Services Administration (HRSA) | Emergency Medical Services for Children (EMSC) program | - National estimates of trends in the number of severely injured children treated in acute care settings, where the treatments are occurring (e.g., Level I/II trauma centers, Level III trauma centers, non-trauma centers), and the associated outcomes |
| Health Resources and Services Administration (HRSA) & Centers for Disease Control and Prevention (CDC) | Create benchmarks for performance measures for Maternal & Child Health (MCH) Title V block grants to States | Estimates of national performance measures:  
- Rates of hospital admission for injuries for children  
- Rates of childbirth hospitalizations with an indication of severe maternal morbidity (e.g. heart or kidney failure, stroke, embolism, hemorrhage)  
- Rates of newborn infants diagnosed with neonatal abstinence syndrome |
<p>| Office of the Assistant Secretary of Health (OASH)/Department of Health and Human Services (DHHS) | Trends in Neonatal Abstinence Syndrome (NAS) births in the United States | - Quarterly updated estimates of neonatal abstinence syndrome (NAS) births using the SID and quarterly inpatient files |
| Office of the Assistant Secretary of Health, DHHS | Longitudinal evaluation of the DHHS Action Plan to prevent Healthcare-Associated Infections (HAIs) | - Estimates of Clostridium difficile infection in hospitals for the Phase four National Action Plan, to track its success in preventing Healthcare-Associated Infections (HAIs) |</p>
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TECHNICAL SUPPORT TO HCUP USERS

Users of HCUP data, software tools, and products include health services researchers, policymakers, consumers, providers, and other constituent groups.

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.

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 2019. We value and welcome your feedback and suggestions. Please contact Carol Stocks or Bill Freeman at AHRQ to share your comments or pose questions about the project.

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