HEALTHCARE COST AND UTILIZATION PROJECT — HCUP
A FEDERAL-STATE-INDUSTRY PARTNERSHIP IN HEALTH DATA
Sponsored by the Agency for Healthcare Research and Quality

INTRODUCTION TO

THE HCUP NATIONWIDE READMISSIONS DATABASE (NRD)

2010–2017

Please read all documentation carefully.

BEGINNING WITH DATA YEAR 2016, THE NRD CONTAINS A FULL YEAR OF ICD-10-CM/PCS CODES

Beginning with data year 2016, the NRD includes a full calendar year of data with diagnosis and procedure codes reported using the ICD-10-CM/PCS coding system. The file structure is similar to the file structure of the NRD in data years prior to 2015.

2015 NRD CONTAINS ICD-9-CM AND ICD-10-CM/PCS CODES

On October 1, 2015, hospital administrative data began using ICD-10-CM/PCS, so the first nine months of 2015 contain ICD-9-CM codes and the last three months contain ICD-10-CM/PCS codes. Data elements and data structure for the 2015 have changed.

Data elements derived from AHRQ software tools are not available for ICD-10-CM/PCS data on the NRD.

These pages provide an introduction to the 2010–2017 NRD.

For full documentation and notification of changes, visit the HCUP User Support (HCUP-US) website at www.hcup-us.ahrq.gov.

Issued December 2019

Agency for Healthcare Research and Quality
Healthcare Cost and Utilization Project (HCUP)
Phone: 866-290-HCUP (4287)
Email: hcup@ahrq.gov
Website: www.hcup-us.ahrq.gov

NRD Data and Documentation Distributed by:

HCUP Central Distributor
Phone: (866) 556-4287 (toll-free)
Fax: (866) 792-5313
Email: HCUPDistributor@ahrq.gov

TABLE OF CONTENTS

HCUP NATIONWIDE READMISSIONS DATABASE (NRD)
SUMMARY OF DATA USE RESTRICTIONS

******* REMINDER *******

All users of the NRD must take the online HCUP Data Use Agreement (DUA) training course, and read and sign a Data Use Agreement.[a]

Authorized users of HCUP data agree to the following restrictions:[b]

- Will not use the data for any purpose other than research, analysis, and aggregate statistical reporting.
- Will not re-release any data to unauthorized users.
- Will not redistribute HCUP data by posting on any website or publishing in any other publicly accessible online repository. If a journal or publication requests access to data or analytic files, will cite restrictions on data sharing in the Data Use Agreement and direct them to AHRQ HCUP (www.hcup-us.ahrq.gov) for more information on accessing HCUP data.
- Will not identify or attempt to identify any individual, including by the use of vulnerability analysis or penetration testing. Methods that could be used to identify individuals directly or indirectly shall not be disclosed or published.
- Will not report any statistics where the number of observations (i.e., individual discharge records) in any given cell of tabulated data is less than or equal to 10 (≤10).
- Will not publish information that could identify individual establishments (e.g., hospitals) and will not contact establishments.
- Will not use the data concerning individual establishments for commercial or competitive purposes affecting establishments, or to determine rights, benefits, or privileges of establishments.
- Will not use the data for criminal and civil litigation, including expert witness testimony or for law enforcement activities.
- Will not use data elements from the proprietary severity adjustment software packages (e.g., 3M™ APR-DRGs) for any commercial purpose or to disassemble, decompile, or otherwise reverse engineer the proprietary software.
- Will acknowledge in reports that data from the "Healthcare Cost and Utilization Project (HCUP)" were used, including names of the specific databases used for analysis.[c]

Any violation of the limitations in the Data Use Agreement is punishable under Federal law by a fine, up to five years in prison, or both. Violations may also be subject to penalties under State statutes.

[a] The online Data Use Agreement training session and the Data Use Agreement are available on the HCUP-US website at www.hcup-us.ahrq.gov.

[b] This is a summary of key terms of the Data Use Agreement for Nationwide Databases; please refer to the DUA for full terms and conditions.

[c] Suggested citations for the HCUP databases are provided in the Requirements for Publishing with HCUP Data available at www.hcup-us.ahrq.gov/db/publishing.jsp.

HCUP CONTACT INFORMATION

All HCUP data users, including data purchasers and collaborators, must complete the online HCUP Data Use Agreement (DUA) Training Tool, and read and sign the HCUP Data Use Agreement. Proof of training completion and signed Data Use Agreements must be submitted to the HCUP Central Distributor as described below.

The on-line DUA training course is available at:
www.hcup-us.ahrq.gov/tech_assist/dua.jsp.

The HCUP Nationwide Data Use Agreement is available on the AHRQ-sponsored HCUP User Support (HCUP-US) website at: www.hcup-us.ahrq.gov

HCUP Central Distributor

Data purchasers will be required to provide their DUA training completion code and will execute their DUAs electronically as a part of the online ordering process. The DUAs and training certificates for collaborators and others with access to HCUP data should be submitted directly to the HCUP Central Distributor using the contact information below.

The HCUP Central Distributor can also help with questions concerning HCUP database purchases, your current order, training certificate codes, or invoices, if your questions are not covered in the Purchasing FAQs on the HCUP Central Distributor Web site.

Purchasing FAQs:
www.hcup-us.ahrq.gov/tech_assist/centdist.jsp

Phone: 866-556-HCUP (4287) (toll free)
Email: HCUPDistributor@AHRQ.gov
Fax: 866-792-5313 (toll free in the United States)

Mailing address:
HCUP Central Distributor
Social & Scientific Systems, Inc.
8757 Georgia Ave, 12th Floor
Silver Spring, MD 20910

HCUP User Support:

Information about the content of the HCUP databases is available on the HCUP User Support (HCUP-US) website (www.hcup-us.ahrq.gov). If you have questions about using the HCUP databases, software tools, supplemental files, and other HCUP products, please review the HCUP Frequently Asked Questions or contact HCUP User Support:

HCUP FAQs:
www.hcup-us.ahrq.gov/tech_assist/faq.jsp

Phone: 866-290-HCUP (4287) (toll free)
Email: hcup@ahrq.gov

WHAT IS THE NATIONWIDE READMISSIONS DATABASE (NRD)?

- The Nationwide Readmissions Database (NRD) is a database of all-payer hospital inpatient stays that can be used to generate national estimates of readmissions. Outcomes of interest include national readmission rates, reasons for returning to the hospital for care, and the hospital costs for discharges with and without readmissions.

- The NRD addresses a large gap in healthcare data—the lack of nationally representative information on hospital readmissions for all patients, regardless of the expected payer for the hospital stay. The NRD is designed to be flexible to various types of analyses of readmissions. Criteria to determine the relationship between multiple hospital admissions for an individual patient in a calendar year are left to the analyst using the NRD.

- The NRD is drawn from HCUP State Inpatient Databases (SID) containing verified patient linkage numbers that can be used to track a person across hospitals within a State, while adhering to strict privacy guidelines. Unweighted, the NRD contains data from approximately 18 million discharges each year. Weighted, it estimates roughly 36 million discharges in the United States.

- There are 28 HCUP Partner States that contributed to the 2017 NRD: Alaska, Arkansas, California, Delaware, Florida, Georgia, Indiana, Iowa, Louisiana, Maryland, Massachusetts, Mississippi, Missouri, Nebraska, New Mexico, Nevada, New York, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Utah, Virginia, Vermont, Washington, Wisconsin, and Wyoming. These States are geographically dispersed and account for 60.0 percent of the total U.S. resident population and 58.2 percent of all U.S. hospitalizations.

- The NRD is a publicly available database that can be purchased through the HCUP Central Distributor. The NRD is available for data years 2010–2017.

- Users must complete the HCUP Data Use Agreement Training Course prior to receiving the data.

WHAT'S NEW IN THE 2017 NRD?
• Beginning with the 2017 NRD, separate external cause code data elements are discontinued (formerly HCUP I10_ECAUSEn data elements). External cause codes are now at the end of the ICD-10-CM diagnosis array. The length of the diagnosis array has increased from 35 to 40 codes. Also, the length of the ICD-10-PCS procedure array has increased from 15 to 25 codes.

UNDERSTANDING THE NRD

- This document, *Introduction to the NRD, 2010 – 2017,* summarizes the content of the 2010–2017 NRD and describes the development of the NRD sample and weights.
- In addition, the HCUP-US website has a section on ICD-10-CM/PCS Resources that summarizes key issues for researchers using HCUP and other administrative databases that include ICD-10-CM/PCS coding. The web page provides general guidance and forewarning to users analyzing outcomes that may be affected by the transition to the ICD-10-CM/PCS coding system and lists other related web resources.
- Important considerations for data analysis are highlighted and references to further resources are provided.
- In-depth documentation for the NRD is available on the HCUP User Support (HCUP-US) website (www.hcup-us.ahrq.gov/db/nation/nrd/nrddbdocumentation.jsp). Please refer to detailed documentation before using the data.

HCUP NATIONWIDE READMISSIONS DATABASE (NRD)

ABSTRACT

The Nationwide Readmissions Database (NRD) is part of the Healthcare Cost and Utilization Project (HCUP) that is sponsored by the Agency for Healthcare Research and Quality (AHRQ). The NRD addresses a large gap in healthcare data – the lack of nationally representative information on hospital readmissions for all patients, regardless of the expected payer for the hospital stay. The NRD was created to enable analyses of national readmission rates and to support public health professionals, administrators, policymakers, and clinicians in their decision making.

The NRD is drawn from HCUP State Inpatient Databases (SID) that contain reliable, verified patient linkage numbers that can be used to track a person across hospitals within a State, while adhering to strict privacy guidelines. The 2017 NRD is constructed from 28 SID. These States are geographically dispersed and account for 60.0 percent of the total U.S. resident population and 58.2 percent of all U.S. hospitalizations. See Appendix A, Table 1 for a list of data organizations participating in the NRD.

The NRD includes community hospitals, excluding rehabilitation or long-term acute care hospitals. All discharges from the SID are included except the following:

- Discharges from patients with an age of 0 from 14 of the 28 SID in 2017 because patient linkage numbers are inconsistently reported for this age
- Discharges with missing patient linkage numbers
- Discharges with questionable patient linkage numbers, defined as 20 or more discharges in a year, hospitalized after discharged dead, and overlapping inpatient stays
- Discharges from hospitals with more than 50 percent of their total discharges excluded for any of the above causes, because patients treated at these hospitals may not be reliably tracked over time.

After exclusions, the 2017 NRD contains about 85 percent of SID discharges from the participating States. Unweighted, the NRD contains approximately 18 million discharges in 2017. Weighted, it estimates roughly 36 million discharges in the United States.

The NRD is designed to be flexible to various types of analyses of national readmissions for all payers. The criteria to determine the relationship between multiple hospital admissions for an individual patient are left to the analyst using the NRD. Outcomes of interest include national readmission rates, reasons for returning to the hospital for care, and the hospital costs for discharges with and without readmissions. *The NRD is not designed to support regional, State-, or hospital-specific readmission analyses.*

Access to the NRD is open to users who sign a Nationwide Databases Data Use Agreement (DUA). Uses are limited to research and aggregate statistical reporting. For more information on the NRD, visit the AHRQ-sponsored HCUP-US website at www.hcup-us.ahrq.gov.

INTRODUCTION TO THE NATIONWIDE READMISSIONS DATABASE (NRD)

Overview of NRD Data

The Healthcare Cost and Utilization Project (HCUP) Nationwide Readmissions Database (NRD) was created to enable analyses of national readmission rates and to support public health professionals, administrators, policymakers, and clinicians in their decision making. Reducing hospital readmissions is a key strategy for improving the quality of healthcare while containing cost. The NRD is designed to be flexible to various types of readmission analyses. The database includes discharges for patients with and without repeat hospital visits in a year and those who have died in the hospital. Repeat visits may or may not be related. The criteria to determine the relationship between hospital admissions are left to the analyst using the NRD.

States Included in the NRD

Some HCUP Partner organizations provided synthetic patient linkage numbers in their SID that can be used to track patients within and across hospitals in a particular State. Unique combinations of the patient linkage number and the patient's date of birth and sex constituted a verified patient linkage number.

States selected for the NRD have verified patient linkage numbers on at least 90 percent of adult discharges. From these States, the NRD included discharges from patients aged 1 year and older. Discharges aged 0 were only retained from States that had verified patient linkage numbers on more than 90 percent of discharges aged 0. Appendix A, Table 1 identifies the statewide data organizations that contribute to the NRD. Appendix A, Figure 1 displays the geographic distribution of the 28 HCUP Partner organizations participating in the 2017 NRD. Based on U.S. Census Bureau data, the 2017 NRD accounts for 60.0 percent of the U.S. population and 58.2 percent of U.S. hospitalizations reported in the American Hospital Association (AHA) Annual Survey Database.

Hospitals Included in the NRD

The SID contains inpatient discharges from all hospitals provided by the HCUP Partners (e.g., community, specialty, and Federal hospitals). The American Hospital Association (AHA) defines *community* hospitals as "all nonfederal short-term general and special hospitals, including special children's hospitals, whose facilities and services are available to the public."[1] Specialty hospitals included in the AHA definition of community hospitals are obstetrics-gynecology, ear-nose-throat, short-term rehabilitation, orthopedic, pediatric institutions, and long-term acute care (LTAC) facilities. Also included are public hospitals and academic medical centers.

The NRD is limited to data from community hospitals that are not rehabilitation or LTAC facilities. Noncommunity hospitals were excluded because of inconsistent capture of data across HCUP States. We excluded rehabilitation or LTAC hospitals because they treat a unique patient population that has longer stays and higher costs. Information on the percentage of SID discharges excluded by type of exclusion is provided in Appendix A, Table 2. Details on the number of hospitals in the NRD are provided in Appendix A, Table 3.

[1] American Hospital Association Glossary (https://www.ahadataviewer.com/glossary/)

Discharges Included in the NRD

All SID discharges from selected States and hospitals were included, with a few exceptions. Records with missing or unverified patient linkage numbers were excluded from the NRD. We excluded all discharges aged 0 from SID that had verified patient linkage numbers on less than 90 percent of discharges for this age group.

Another concern was verified patient linkage numbers that did not appear to track an individual within the year for the following reasons:

(1) Extraordinary utilization in the year, defined as 20 or more admissions in a calendar year
(2) Multiple discharges for the same identifier that showed the patient discharged dead from one admission and then admitted at a later date in the year
(3) Overlapping hospitalizations for the same patient linkage number at the same or different hospitals.

Discharges for patient linkage numbers considered questionable because of these three criteria were excluded from the NRD.

Discharge-specific exclusions such as the removal of unverified, missing, or questionable patient linkage numbers impacted individual hospitals if they had more than 50 percent of their annual discharges excluded. These hospitals were not good candidates for a readmission analysis because too many of their discharges could not be tracked over time and were therefore excluded from the NRD. Information on the percentage of SID discharges excluded by type of exclusion is provided in Appendix A, Table 2.

There were no exclusions for certain types of patients or clinical conditions. Therefore, we included conditions such as childbirth that generally do not result in a readmission. We retained discharges that resulted in an in-hospital death because these were possible readmission records. We also included discharges for residents and nonresidents of the State in which they were treated. Although most patients seek treatment at hospitals in their State of residence, there are occasions when patients are treated at hospitals in another State. Hospitals that specialize in certain types of care may attract patients from across the United States. In addition, hospitals near State borders frequently treat patients that reside in neighboring States. The data element RESIDENT identifies a discharge as a resident of the State in which he or she received hospital care. Details on the number of discharges in the NRD are provided in Appendix A, Table 3.

Discharges Involving Transfers

Hospital administrative databases like the NRD and SID are “discharge-level” files, meaning that each record represents one discharge abstract from an inpatient stay. If a patient visits the hospital multiple times in a given year, the SID includes separate records for each inpatient stay. In addition, if a patient is transferred between hospitals within the State, the SID contain two discharge records, one record from the first hospitalization and a second record from the latter hospitalization.[2] Readmission analyses do not usually allow the hospitalization at the receiving hospital to be counted as a readmission. To eliminate this possibility, we collapsed the pairs of records representing a transfer into a single “combined” record in the NRD and removed the original separate discharge records from the NRD. We defined *transfer* records as

[2] If the patient is transferred to an out-of-state hospital, the subsequent discharge would not be included in the NRD because the HCUP patient linkage numbers only can follow a patient within a State.

having all of the following characteristics:

- Discharge date of the first inpatient stay equaled the admission date of a subsequent inpatient stay[3]
- The first record had a discharge disposition of transfer to an acute care hospital
- The second record was from a different hospital and had an admission source indicating a transfer.

There are some records that meet only the first criterion. For this type of record, we defined them as *same-day* stays, that is, the discharge date for one inpatient stay was the same as the admission date of a second stay for the same patient, but there was no indication of a transfer by the discharge disposition or admission source. Same-day stays may or may not have involved different hospitals. Same-day stays may indicate that a patient was discharged too soon and then needed to be returned to the hospital on the same day. However, it was also possible that these were transfer records with an incorrect or missing discharge disposition and admission source. Therefore, we also collapsed the pairs of records representing same-day stays into a single "combined" record. A more detailed description of the methodology used to identify and combine transfer and same-day stays is provided in Appendix B.

Summary of Hospitals and Discharges Included in the NRD

The NRD includes community hospitals and excludes the following types of hospitals:

- Noncommunity hospitals because of inconsistent capture of data across HCUP States
- Community hospitals that are either rehabilitation or LTAC hospitals because these hospitals treat a unique patient population that has longer stays and higher costs.

All discharges from included hospitals were retained in the NRD with the following exceptions:

- Discharges from patients with an age of 0 from SID with verified patient linkage numbers on less than 90 percent of discharges for this age group
- Discharges with missing or unverified patient linkage numbers
- Discharges with questionable patient linkage numbers, defined as 20 or more discharges in a year, hospitalized after discharged dead, and overlapping inpatient stays
- Discharges from hospitals with more than 50 percent of their total discharges excluded for any of the above two causes. This does not include the exclusion for patients with an age of 0 with verified patient linkage numbers on less than 90 percent of discharges for this age group.

Information on the percentage of SID discharges excluded by type of exclusion is provided in Appendix A, Table 2. There were no exclusions for certain types of patients or clinical conditions. Discharges that resulted in an in-hospital death were included because these were possible readmission records. Discharges for residents and nonresidents of the State in which they were treated were also included. In addition, pairs of discharge records representing transfers or same-day stays (i.e., one discharge record from the sending hospital and one

[3] Although the text refers to using the discharge and admission date, in reality, we used the NRD data element NRD_DaysToEvent and LOS to identify the sequential order of inpatient records and whether they stopped and started on the same day.

discharge record from the receiving hospital) were collapsed into a single record so that the hospitalization at the receiving hospital could not be counted as a readmission. Details on the number of States, hospitals, and discharges in the NRD are provided in Appendix A, Table 3.

State-Specific Restrictions

Some sources that contributed data to the NRD imposed restrictions on the release of certain data elements or discharges that could be included in the database. In addition, because of confidentiality laws, some data sources were prohibited from providing HCUP with discharge records that indicated specific medical conditions, such as HIV/AIDS or behavioral health. Detailed information on these State-specific restrictions is available in Appendix C.

ICD-10-CM/PCS Started October 1, 2015 at the Beginning of Fiscal Year 2016

On October 1, 2015, the United States transitioned from using ICD-9-CM to ICD-10-CM/PCS code sets for reporting medical diagnoses and inpatient procedures.[4] ICD-10-CM/PCS consists of two parts:

- ICD-10-CM: diagnosis coding on inpatient and outpatient data
- ICD-10-PCS: procedure coding on inpatient data.

The HCUP-US website has a section on ICD-10-CM/PCS Resources that summarizes key issues for researchers using HCUP and other administrative databases that include ICD-10-CM/PCS coding. The web page provides general guidance and forewarning to users analyzing outcomes that may be affected by the transition to the ICD-10-CM/PCS coding system and lists other related Web resources.

File Structure of the NRD

Generally, the NRD includes three discharge-level files and one hospital-level file:

- **Discharge-level Files**
  - **Core File:** Contains data elements critical to readmission analyses
    - This file is available in all years of the NRD.
  - **Severity File:** Contains additional data elements to aid in identifying the severity of the condition for a specific discharge (e.g., comorbidity flags, 3M All-Patient Refined Diagnosis-Related Group [APR-DRG] value, risk of mortality, and severity)
  - **Diagnosis and Procedure Groups File:** Contains additional information on the diagnoses (e.g., chronic condition indicators) and procedures (e.g. procedure class)
    - This file is available in all years except the NRD beginning with data year 2016.
- **Hospital-level File:** Contains information on hospital characteristics.
  - This file is available in all years of the NRD.

The NRD unique record identifier (HCUP data element KEY_NRD) can be used to add data elements from the Severity and Diagnosis/Procedure Groups, if available, files to the records on

[4] ICD-9-CM: International Classification of Diseases, Ninth Revision, Clinical Modification;
ICD-10-CM/PCS: International Classification of Diseases, Tenth Revision, Clinical Modification/Procedure Coding System

the Core file. The NRD hospital identifier (HCUP data element HOSP_NRD) can be used to add data elements from the hospital-level file to the Core file.

File Structure of the NRD Beginning Data Year 2016

Beginning with data year 2016, the NRD is an annual, calendar year file that includes data with diagnosis and procedure codes reported using the ICD-10-CM/PCS coding system. The file structure of the NRD is similar to the file structure of the NRD in data years prior to 2015.

Data elements derived from AHRQ software tools are not available. For users interested in applying the AHRQ software tools to the ICD-10-CM/PCS-coded data in, the AHRQ software tools are available for download on the HCUP Tools & Software section of the HCUP-US website. The *Tools Loading* tutorial is available to users interested in applying the AHRQ software tools at www.hcup-us.ahrq.gov/tech_assist/tutorials.jsp.

Beginning with data year 2016, the NRD includes two discharge-level files and one-hospital level file:

- **Discharge-level Files**
  - **Core File:**
    - Beginning with data year 2017, separate reporting of external cause codes is discontinued (formerly HCUP data element I10_ECAUSEn). Instead, external cause codes have been added to the end of the ICD-10-C diagnosis array (I10_DXn). The size of the diagnosis array was increased from 25 to 40 codes. Also, the size of the ICD-10-PCS array (I10_PRn) was increased from 15 to 25 codes.
  - **Severity File:** The Elixhauser Comorbidity Software indicators are not included.
  - **Diagnosis and Procedure Groups File:** The NRD does not include this file, which historically contains variables derived from the AHRQ software tools.
- **Hospital-level File:** Contains information on hospital characteristics.

File Structure of the 2015 NRD

The NRD data files are annual, calendar-year files based on discharge date for all years except 2015. The introduction of ICD-10-CM/PCS on October 1, 2015 means that the 2015 NRD includes a combination of codes:

- Nine months of the data with ICD-9-CM codes (January 1, 2015 to September 30, 2015)
- Three months of data with ICD-10-CM/PCS codes (October 1, 2015 to December 31, 2015).

To alert users to this change in the ICD coding scheme, the file structure of the 2015 NRD differs from the annual files for other data years. In the 2015 NRD, the first three quarters of data (with ICD-9-CM codes) are stored separately from the fourth quarter of data (with ICD-10-CM/PCS codes). In addition, the names of diagnosis- and procedure-related data elements under ICD-10-CM/PCS have been changed to identify the coding scheme.

Data elements based on the AHRQ software tools that are derived from ICD-10-CM/PCS codes are not included in the fourth quarter data, but the AHRQ software tools are available for download on the HCUP Tools & Software section of the HCUP-US website. The *Tools Loading* tutorial is available to users interested in applying the AHRQ software tools at www.hcup-us.ahrq.gov/tech_assist/tutorials.jsp.

The 2015 NRD includes three discharge-level files and one hospital-level file:

- **Discharge-level Files**
    - **Core File:** In the 2015 NRD, data elements based on diagnoses and procedures have been moved out of the Core File and into the Diagnosis and Procedure Groups Files.
    - **Severity File**: There are two Disease Severity Measures Files for the 2015 NRD:
        - Nine months of the 2015 data with data elements based on ICD-9-CM codes (discharges from January 1, 2015 – September 30, 2015) are in the Disease Severity Measures File labeled Q1–Q3.
        - Three months of 2015 data with data elements based on ICD-10-CM/PCS codes (discharges from October 1, 2015 – December 31, 2015) are in the Severity File labeled Q4. The Elixhauser Comorbidity Software indicators are not available in the Q4 file because the ICD-10-CM/PCS version of the software is still under development.
    - **Diagnosis and Procedure Groups File:** There are two Diagnosis and Procedure Groups Files for the 2015 NRD:
        - Nine months of the 2015 data with ICD-9-CM codes (discharges from January 1, 2015 – September 30, 2015) are in the Diagnosis and Procedure Groups File labeled Q1–Q3. The Q1–Q3 file includes diagnosis and procedure codes in addition to data elements based on ICD-9-CM codes such as Diagnosis-Related Groups (DRGs), Clinical Classification Software (CCS) categories for diagnoses and procedures, and other data elements derived from AHRQ software tools.
        - Three months of 2015 data with ICD-10-CM/PCS codes (discharges from October 1, 2015 – December 31, 2015) are in the Diagnosis and Procedure Groups File labeled Q4. The Q4 file includes the ICD-10-CM/PCS diagnosis and procedure codes in data elements with the prefix "I10_". Data elements derived from AHRQ software tools are not available in the Q4 file because the ICD-10-CM/PCS versions are still under development.[5]
- **Hospital-level File:** Contains information on hospital characteristics.

[5] Beta versions of the HCUP Tools & Software for ICD-10-CM/PCS are available on the HCUP User Support website.

NRD Data Elements

The coding of data elements in the NRD is consistent with other HCUP databases. The following three objectives guided the definition of data elements in all HCUP databases:

- Ensure usability without extensive editing by analysts.
- Retain the largest amount of information available from the original sources, while still maintaining consistency among sources.
- Structure the information for efficient storage, manipulation, and analysis.

More information on the coding of HCUP data elements is available on the HCUP User Support (HCUP-US) website (www.hcup-us.ahrq.gov/db/coding.jsp).

The NRD contains more than 100 clinical and non-clinical data elements provided in a hospital discharge abstract, such as:

- Discharge month, quarter, and year[6]
- ICD-9-CM diagnoses with external cause of injury codes (or ICD-10-CM for discharges beginning October 1, 2015)
- ICD-9-CM procedures (or ICD-10-/PCS for discharges beginning October 1, 2015)
- Diagnosis and procedure classifications such as the Clinical Classifications Software (CCS) category, Chronic Condition Indicator (CCI), and procedure class (not available for discharges beginning October 1, 2015)
- Patient demographics (e.g., sex, age, income quartile based on the median household income of the patient's ZIP Code, and urban/rural location of the patient's residence)
- Expected source of primary payment (e.g., Medicare, Medicaid, private insurance, self-pay, and other insurance types)
- Total hospital charges and hospital cost[7]
- Discharge weights for generating national estimates.
- Data elements essential to readmission analyses:
    - Verified patient linkage number (HCUP data element NRD_VisitLink) that can be used to identify discharges belonging to the same patient
    - Timing between admissions for a patient (HCUP data element NRD_DaysToEvent)
    - Length of inpatient stay in days (HCUP data element LOS)
    - Identification of transfers, same-day stays, and combined transfer records (HCUP data elements SAMEDAYEVENT and REHABTRANSFER)
    - Identification of the patient as a resident of the State in which he or she received hospital care (HCUP data element RESIDENT).

[6] Admission and discharge dates were not available because of patient confidentiality restrictions.

[7] Total hospital cost must be added to the NRD using the HCUP supplemental Cost-to-Charge Ratio files.

Appendix D identifies the data elements in each 2017 NRD file:

- Table 1 for the NRD Core File
- Table 2 for the NRD Severity Files
- Table 3 for the NRD Diagnosis and Procedure Groups Files
- Table 4 for the Hospital File.

The tables in Appendix D provide summary documentation for the data. Please refer to the NRD documentation located on the HCUP-US website (www.hcup-us.ahrq.gov) for comprehensive information about data elements and the files.

For prior years, refer to the NRD Description of Data Elements page on the HCUP-US website or to previous versions of the NRD Introduction.

Getting Started

The HCUP Nationwide Readmissions Database (NRD) is distributed as comma-separated value (CSV) files delivered via secure digital download from the Online HCUP Central Distributor. The files are compressed and encrypted with SecureZIP® from PKWARE.

The NRD product is downloaded in a single zipped file for each year which contains several data-related files and accompanying documentation. The data-related files include the following compressed files:

1) Core File (NRD_yyyy_Core.zip, where yyyy indicates the data year)
2) Severity Measures File (NRDS_yyyy_Severity.zip, where yyyy indicates the data year).
3) Diagnosis and Procedure Groups File (NRD_yyyy_DX_PR_GRPS.zip, where yyyy indicates the data year)
4) Hospital File (NRD_yyyy_Hospital.zip, where yyyy indicates the data year)

To load and analyze the NRD data on a computer, users will need the following:

- The password provided by the HCUP Central Distributor
- A hard drive with at least 50 gigabytes of space available
- A third-party zip utility such as ZIP Reader, SecureZIP®, WinZip®, or Stuffit Expander®
- SAS®, SPSS®, Stata® or similar analysis software.

The total size of the comma-delimited version of the 2017 NRD is 6.2 GB. The 2017 NRD files loaded into SAS are about 12 GB. In SAS, the largest use of space typically occurs during PROC SORT, which requires work space about three times the size of the file. Thus, the NRD files would require at least 36 GB of available workspace to perform a sort procedure. Most SAS data steps will require twice the storage of the file, so that both the input and output files can coexist. The NRD files loaded into SPSS are under 16 GB. Because Stata loads the entire file into memory, it may not be possible to load every data element in the NRD Core file into Stata. Stata users will need to maximize memory and use the "_skip" option to select a subset of data elements. More details are provided in the Stata load programs.

With a file of this size and without careful planning, space could easily become a problem in a multi-step program. It is not unusual to have several versions of a file marking different steps while preparing it for analysis, and there may be more versions for the actual analyses. Therefore, the amount of space required could escalate rapidly.

Decompressing the NRD Files

To extract the data files from the compressed download file, follow these steps:

1) Create a directory for the NRD on your hard drive.

2) Unzip the compressed NRD product file into the new directory using a third-party zip utility. This will place compressed, encrypted data-related files in the new directory. You will be prompted to enter the encryption password (sent separately by email) to decrypt the file.

   Please note that attempts to unzip encrypted files using the built-in zip utility in Windows® (Windows Explorer) or Macintosh® (Archive Utility) will produce an error message warning of incorrect password and/or file or folder errors. The solution is to use a third-party zip utility.

   Third-party zip utilities are available from the following reputable vendors on their official Web sites.

   - ZIP Reader (Windows) (free download offered by the PKWARE corporation)
   - SecureZIP® for Mac or Windows (free evaluation and licensed/fee software offered by the PKWARE corporation)
   - WinZip (Windows) (evaluation and fee versions offered by the WinZip corporation)
   - Stuffit Expander® (Mac) (free evaluation and licensed/fee software offered by Smith Micro corporation)

3) Unzip each of the compressed, encrypted data-related files using the same password and third-party zip utility method. This will place the data-related ASCII files in this same directory by default.

Downloading and Running the Load Programs

Programs to load the data into SAS, SPSS, or Stata, are available on the HCUP User Support website (HCUP-US). To download and run the load programs, follow these steps:

1) Go to the NRD Database Documentation page on HCUP-US at www.hcup-us.ahrq.gov/db/nation/nrd/nrddbdocumentation.jsp.
2) Go to the “File Specifications and Load Programs” section on this page.
3) Click on “Nationwide SAS Load Programs”, “Nationwide SPSS Load Programs”, or “Nationwide Stata Load Programs” to go to the corresponding Load Programs page.
4) Select the data year and the database (“NRD”) from the drop-down lists on this page. Or you may select “NRD Load All Years” to obtain a zipped file with all load programs for multiple years at once.
5) Select and save the load programs you need. **The load programs are specific to the data year and data-related file**. For example, the load program for the 2017 NRD Core

file is found under the link “SAS NRD 2017 Core File” in the list generated by selecting “2017” and “NRD.” Save the load programs into the same directory as the NRD CSV files on your computer.

6) Edit and run the load programs as appropriate for your computing environment to create the analysis files. For example, modify the directory paths to point to the location of your input and output files.

NRD Documentation

Comprehensive documentation for the NRD files is available on the HCUP-US website (www.hcup-us.ahrq.gov/db/nation/nrd/nrddbdocumentation.jsp). Users of the NRD can access complete file documentation, including variable notes, file layouts, load programs, and summary statistics. Refer to these resources to understand the structure and content of the NRD and to aid in using the database.

Appendix A, Table 4 details the comprehensive NRD documentation available on HCUP-US.

HCUP Online Tutorials

For additional assistance, AHRQ has created the HCUP Online Tutorial Series, a series of free, interactive courses that provide training on technical methods for conducting research with HCUP data. Topics include an HCUP Overview Course and these tutorials that are helpful to NRD data users:

- The Nationwide Readmissions Database Tutorial provides a description of the NRD database design and a detailed example on how to use the NRD to estimate national readmission rates with standard errors.

- The Load and Check HCUP Data tutorial provides instructions on how to unzip (decompress) HCUP data, save it on a computer, and load the data into a standard statistical software package. This tutorial also describes how to verify that the data have been loaded correctly.

- The HCUP Tools Loading Tutorial provides instructions on how to unzip (decompress) the AHRQ software tools for ICD-10-CM/PCS, save it on the computer, and load the tool into a standard statistical software package for application to HCUP or other administrative databases. Users will also learn how to verify that the tool has loaded correctly. Information about the transition to ICD-10-CM/PCS is also included in this tutorial. While the instructions are specific to the beta version of the Clinical Classifications Software (CCS) for ICD-10-CM/PCS, the steps are broadly applicable to other AHRQ tools.

Other tutorials about the design or use of other HCUP databases also are available. The Online Tutorial Series is located on the HCUP-US website at www.hcup-us.ahrq.gov/tech_assist/tutorials.jsp.

HCUP Methods Series Reports on Readmission Methodology

HCUP has created three Methods Series reports that provide additional information on readmissions:

- *Overview of Key Readmission Measures and Methods* (Report #2012-04). This report describes 12 key measures of hospital readmissions from different agencies or companies. The 12 measures were selected for inclusion because they are: (1) endorsed by the National Quality Forum (NQF), (2) currently used by AHRQ in various initiatives, or (3) otherwise well-known and used by researchers.

- *Methodological Issues when Studying Readmissions and Revisits using Hospital Administrative Data* (Report #2011-01). This report discusses the decisions that need to be addressed as an analyst designs a study of patients with sequential acute care hospital visits based on hospital administrative data. Topics include considerations in preparing the administrative database for the analysis, defining repeat hospital visits, and reporting results.

- *Calculating Nationwide Readmission Database (NRD) Variances* (Report #2017-01). This report provides guidance on calculating variances for estimates of readmission outcomes using the NRD.

ICD-9-CM and ICD-10-CM/PCS Diagnosis and Procedure Codes

The NRD includes ICD-9-CM diagnosis and procedure codes on inpatient discharges prior to October 1, 2015. Starting on October 1, 2015, diagnosis and procedure codes are reported using ICD-10-CM/PCS. HCUP has developed recommendations for reporting statistics (e.g., counts, rates, averages) that are based on HCUP data with a mixture of ICD-9-CM and ICD-10-CM/PCS codes. These recommendations apply to calendar year 2015 data (which includes both ICD-9-CM and ICD-10-CM/PCS codes), as well as reporting trends that span the October 1, 2015 transition date (before and after the introduction of ICD10-CM/PCS).

ICD-9-CM and ICD-10-CM diagnosis and ICD-10-PCS procedure codes provide valuable insights into the reasons for hospitalization and what procedures patients receive, but these codes need to be carefully used and interpreted. ICD-9-CM and ICD-10-CM/PCS codes change every October as new codes are introduced and some codes are retired. It is critical to check all ICD-9-CM and/or ICD-10-CM/PCS codes used for your analysis to ensure the codes are in effect during the time period studied.

SAMPLING DESIGN OF THE NRD

The NRD was built to facilitate analyses of both all-cause and condition-specific readmissions. National estimates can be produced by applying weighting and stratification methods.

Target Universe

The target universe was limited to inpatient discharges treated at community hospitals in the United States that were not rehabilitation or LTAC facilities. Information on the target universe was available from the American Hospital Association (AHA) Annual Survey of Hospitals. The AHA Survey includes information on the number of inpatient admissions plus births and hospital characteristics such as ownership, number of beds, and location.

Sampling Frame

The sampling frame for the NRD was limited to discharges for patients treated at community hospitals in the NRD States that were not rehabilitation or LTAC facilities. All of the discharges in the sampling frame were included, making the NRD a sample of convenience. Sampling discharges or hospitals was not recommended because the sample needed to balance the database's ability to estimate readmissions for common conditions such as chronic illnesses with the ability to estimate readmissions for rare diseases such as sickle cell anemia. Developing the database using a 100 percent sample allows researchers to study both all-cause and condition-specific readmissions.

Discharge Weights

This section explains the need for post-stratification for weighting the sampling frame to the target universe and the weighting strategy. The term *post-stratification* is used because the stratification was performed after the data exclusions. Discharge weights for national estimates were developed using the target universe as the standard. Although we calculated discharge-level weights for the NRD, we did not calculate hospital-level weights. The NRD is not designed to support hospital-specific analyses. The NRD is a 100 percent sample of discharges, not hospitals; hospital weights are not applicable.

Post-Stratification for Weighting

Post-stratification for the purpose of weighting allowed us to compensate for any over- or under-represented types of hospitals and discharges in the sampling frame (the NRD) with respect to the distribution in the target universe (AHA data). The NRD was post-stratified by hospital and patient characteristics. We knew from the National Inpatient Sample (NIS) design that the following hospital characteristics explained significant differences in inpatient outcomes: census region, urban/rural location, hospital teaching status, size of the hospital defined by the number of beds, and hospital control.[8]

We had excluded discharges with unverified and missing patient linkage numbers because these patients cannot be tracked across time. In an examination of the distribution of patient age and sex between discharges with verified and unverified/missing patient linkage numbers in

[8] *Changes in the NIS Sampling and Weighting Strategy for 1998.* ONLINE January 18, 2002. Available at www.hcup-us.ahrq.gov/db/nation/nis/reports/Changes_in_NIS_Design_1998.pdf. Accessed September 15, 2011.

data year 2011, we determined that the majority of the unverified discharges (52.7 percent) were females aged 18–44 years old. In addition, we compared 30-day all-cause readmission rates in 2011 by age–sex categories across States and saw variation between SID with a high percentage of verified patient linkage numbers and States with a lower percentage of verified patient linkage numbers. These analyses demonstrated that there were differences between discharges with and without patient linkage numbers by sex and age. Therefore, the NRD was also post-stratified by sex and five age groups (0, 1–17, 18–44, 45–64, and 65 and older).

Weighting

We based the discharge counts by stratum for the target universe totals on all SID discharges from all HCUP Partners, unless there were missing hospitals. If there were hospitals missing from the stratum according to the AHA, then the target universe total included SID discharges for all available hospitals plus the AHA admission counts for the missing hospitals. This approach was consistent with the NIS and took advantage of the fact that the SID included over 95 percent of discharges from community hospitals that are not rehabilitation or LTAC hospitals in the United States. Discharge counts for the sampling frame were based on the NRD discharges (after the exclusion of States, hospitals, and discharges). To determine discharge-level weights, we summarized the number of discharges for the target universe and the sampling frame by stratum defined by hospital characteristics (census region, urban/rural location, hospital teaching status, size of the hospital defined by the number of beds, and hospital control) and patient characteristics (sex and five age groups [0, 1–17, 18–44, 45–64, and 65 and older]). Within each stratum, *s*, each NRD inpatient admission received a weight:

$$DISCWT_{i,j} = Ns(universe)_{i,j} \div Ns(sample)_{i,j}$$

where $Ns(universe)_{i,j}$ represents the number of inpatient discharges at community hospitals that were not a rehabilitation or LTAC hospital in the universe within stratum *s* for sex *i* and age group *j*; $Ns(sample)_{i,j}$ is the number of inpatient discharges in the sampling frame for sex *i* and age group j. Age group *j* included ages 0, 1–17, 18–44, 45–64, 65 and older. Therefore, each discharge's weight ($DISCWT_{i,j}$) is equal to the number of inpatient discharges it represents in stratum *s* for sex *i* and age group *j* during that year.

To improve reliability of the age distribution of the SID discharges, we collapsed some strata in the target universe prior to the weight calculations such that we included at least two SID hospitals and at least 100 discharges from the SID in each stratum. In addition, we collapsed some strata to include at least two hospitals in each stratum in the sample frame. We first collapsed strata across control/ownership, combining either the two private designations or all three types of control (public, private not-for-profit, and private for-profit). If the stratum combined across control still lacked a sufficient number of hospitals or discharges, then the location category was collapsed. Small and large metropolitan areas are combined or micropolitan and rural areas are combined. Lastly, if the stratum still lacked a sufficient number of hospitals or discharges, then the bed-size category was collapsed with large and medium hospitals combined. There was no collapsing of strata across region or teaching status. In addition, we adjusted weights if a hospital was missing data for one or more quarters in the year. The range of weights by age and sex are provided in Appendix A, Table 5.

Final NRD Sample

In summary, the NRD is an annual file constructed using one calendar year of discharge data. Included discharges were treated at community hospitals (excluding rehabilitation or LTAC

hospitals) for which the majority of their discharges had patient linkage numbers that were verified and not questionable. Discharge weights were calculated using post-stratification on hospital characteristics (census region, urban-rural location, teaching status, bed size, and hospital control) and patient characteristics (sex and five age groups [0, 1–17, 18–44, 45–64, and 65 and older]). The target universe of inpatient discharges in the United States was estimated for each stratum using SID total discharges augmented by AHA discharge counts when hospitals were not reported in the SID. Details on the number of States, hospitals, and discharges in the NRD are provided in Appendix A, Table 3. The range of discharge weights by age and sex are provided in Appendix A, Table 5. The NRD is designed to be flexible to various types of analyses of national readmissions. *The NRD is not designed to support regional, State- or hospital-specific readmission analyses.*

Limitations of the NRD

The NRD contains about 18 million inpatient discharge records and over 100 clinical and non-clinical data elements. A multitude of research studies can be conducted with the data, but there are some limitations.

- *Limitations on Studying Pediatric Readmissions*: The NRD excludes discharges for patients who were younger than 1 year from two-thirds of the SID in 2010–2012 NRD, about 60 percent of the SID in the 2013 NRD, and about half of the SID in the 2014-2017 NRD. The weights for pediatric discharges were often higher than adult discharges. The range of discharge weights by age and sex are provided for each data year in Appendix A, Table 5.

- *Limitations from Using One Year of Discharge Data*: The NRD is an annual file containing inpatient records for patients discharged in a calendar year. The files included patients admitted in the prior year and discharged in the current year, while excluding patients admitted to a hospital in the current year but discharged in the next year. Therefore, 30- or 60-day readmissions for patients admitted in the latter part of the year may not be captured if the subsequent admission crossed into the next year. In addition, one year of discharge data is probably an insufficient length of time for examining readmissions that are more than 90 days apart.

- *Limitations about Using More than One Year of the NRD*: The 2010–2017 NRD cannot be combined across data years to create a multi-year database. The patient linkage numbers (NRD_VisitLink) do not track the same person across years. The hospital identifiers in HOSP_NRD do not track the same hospital across years. Each year of the NRD must be considered as a separate sample.

- *Limitations from Using State-Specific Identifiers*: Patients who were hospitalized in one State and readmitted or transferred to a hospital in another State cannot be tracked in the NRD, because each of the SID uses different coding for their patient linkage numbers. The NRD includes nonresident patients because we want to retain discharges at border hospitals that provided care for patients in their community, even though that community happened to cross State borders. To understand the impact on readmission rates caused by using State-specific patient linkage numbers, we performed a sensitivity analysis using the 2011 Medicare Standard Analytic File (SAF) that allowed admissions for patients covered by Medicare fee-for-service (FFS) plans to be tracked across all States.

The analysis demonstrated that condition-specific readmission rates were higher if a patient could be tracked across all States, but the percentage increase was less than 5 percent for most of the CCS categories. This analysis was limited to the Medicare FFS population because of the data source. The Medicare (FFS and managed care) population accounted for about 40 percent of all inpatient discharges in 2011,[9] and previous research indicates that the Medicare population has higher readmission rates than populations covered by for other payers.[10] Conditions often associated with younger adults, such as pregnancy, were included in the Medicare estimates because about 20 percent of Medicare discharges are younger than 65 years.[11] Medicare patients younger than 65 include people who are disabled or who have been diagnosed with end-stage renal disease or amyotrophic lateral sclerosis (ALS).

Given the volume and severity of illness for Medicare patients, the estimates for the increase in the condition-specific readmission rates using the Medicare data provide a reasonable upper boundary on the impact. The details of this analysis are provided in Appendix E.

[9] HCUPnet query on the expected primary payer for the 2011 Nationwide Inpatient Sample. Accessed December 9, 2014.
[10] Wier LM, Barrett ML, Steiner C, Jiang HJ. All-Cause Readmissions by Payer and Age, 2008. HCUP Statistical Brief No. 115. June 2011. Rockville, MD: Agency for Healthcare Research and Quality. www.hcup-us.ahrq.gov/reports/statbriefs/sb115.pdf.
[11] HCUPnet query on the expected primary payer and age for the 2011 Nationwide Inpatient Sample. Accessed December 9, 2014.

HOW TO USE THE NRD FOR READMISSION ANALYSES

This section provides a brief synopsis of special considerations for using the NRD. For more details, refer to the comprehensive documentation on the HCUP-US website (www.hcup-us.ahrq.gov/db/nation/nrd/nrddbdocumentation.jsp).

All persons using the NRD (whether or not they are the original recipient of the data) must complete the online Data Use Agreement Training Tool available on the HCUP-US Web site (www.hcup-us.ahrq.gov/tech_assist/dua.jsp) and then read and sign a Data Use Agreement. A copy of the signed Data Use Agreements must be sent to the HCUP Central Distributor. See page two of this document for the mailing address.

NRD Data Elements Critical to Tracking a Patient and Determining the Time Between Admissions

For any readmission analysis of inpatient stays, three HCUP data elements are critical to tracking a patient and determining the time between admissions: NRD_VisitLink, NRD_DaysToEvent, and LOS (length of stay).

Patient Linkage Number (NRD_VisitLink)

NRD_VisitLink is the data element that links for all inpatient stays associated with a unique patient. All discharges in the NRD include a value for NRD_VisitLink. The value was assigned based on a unique combination of the synthetic patient linkage number provided by the HCUP Partner, date of birth, and sex. No verified patient linkage number was assigned if any one of the three pieces of information was missing. Because of discharge-level exclusions, NRD_VisitLink is always coded on records in the NRD.

Although the term *patient linkage number* is used to describe the information in the NRD data element NRD_VisitLink, the values are not recognizable as specific patient information. NRD_VisitLink does not include the values of the encrypted person's social security number, date of birth, or sex.

Time Between Admissions (NRD_DaysToEvent and LOS)

NRD_DaysToEvent is the number of days from a randomly chosen "start date" to the admission date for each patient's discharge. The actual admission and discharge dates could not be included on the NRD because they were considered highly sensitive information according to Health Insurance Portability and Accountability Act (HIPAA) guidelines. The coding scheme for NRD_DaysToEvent was designed to adhere to these strict privacy guidelines and protect patient confidentiality.

Each verified patient linkage number (NRD_VisitLink) was assigned a unique randomly chosen start date that was used to calculate NRD_DaysToEvent for all visits associated with that NRD_VisitLink value. The data element NRD_DaysToEvent was the difference between the visit's admission date and the start date associated with the NRD_VisitLink. NRD_DaysToEvent was reported as missing if the admission date was unavailable.

For readmission analyses, determining the number of days between the end of one admission and the start of the next admission is critical. We did not include any single data element specific to this timing difference in the NRD because the calculation is dependent on which two

discharges are of interest for the readmission study. For example, a study of readmissions for diabetes might only consider the number of days between two diabetes discharges, whereas a study of post-surgery infections might consider any discharge in 30 days.

Because NRD_DaysToEvent was based on the admission date, the calculation of days needs to be the difference of NRD_DaysToEvent between two selected discharges for a unique verified patient linkage number (NRD_VisitLink), adjusted for the length of stay. Consider the following example:

- A patient with congestive heart failure has a 3-day hospital admission on 1/10/2013 and another admission on 1/25/2013.
- The NRD_DaysToEvent value is 1109 for the 1/10/2013 admission, and the NRD_DaysToEvent value is 1124 for the 1/25/2013 admission.
- The number of days between the *start of each admission* is 15 days (1124 – 1109 = 15) because NRD_DaysToEvent is based on the admission date.
- The number of days *between the admissions* (from discharge date of the first admission to the start of the second admission) is 12 days (1124 – 1109 - 3 = 12) because the patient had a 3-day LOS.

If NRD_DaysToEvent or LOS was missing, then it was not possible to determine the number of days to a subsequent admission. We considered removing the discharges with missing NRD_DaysToEvent and LOS from the NRD, but these data elements were very rarely missing. LOS was only critical if it was missing on the first admission in a series. If the admission was the second in the series, then LOS was not pertinent.

The lowest value of NRD_DaysToEvent is the earliest inpatient stay in the year for a patient. It is important to remember that if patient A has a value of 605 for NRD_DaysToEvent and patient B has a value of 300 for NRD_DaysToEvent, patient B's hospital stay did not necessarily take place prior to patient A's stay. In fact, patient B's NRD_DaysToEvent value has no relation to patient A's NRD_DaysToEvent value. Because of the use of a random start date in the calculation of NRD_DaysToEvent, the value of NRD_DaysToEvent cannot be compared across patients.

Additional information about the HCUP revisit variables is available on the HCUP User Support Web site (www.hcup-us.ahrq.gov/toolssoftware/revisit/revisit.jsp).

Defining Readmissions

The NRD was designed to support many different types of readmission analyses. Analysts can use the information contained in the NRD to define the index event and readmission specific to their topic of interest. Common terminology is first defined:

- *Index event* – the starting point for analyzing repeat hospital visits
- *Readmission* – a subsequent inpatient admission within a specified time period; readmission may be for a specific cause or any cause.

We next discuss the following analytic considerations for defining index events and readmissions:

- Defining the index event
- Specifying the criteria for a readmission

- Selecting the appropriate time period to qualify the readmission
- Reporting readmission rates.

Defining the Index Event

The index event is typically defined by a combination of clinical and demographic criteria. Inclusion and exclusion criteria should be used to define an index event indicator that identifies NRD discharges as an index event specific to the analysis of interest. The NRD does not include a data element for index events because they are specific to each analysis. However, the NRD does include the information necessary to define different types of index events.

Criteria can include, but are not limited to, age of the patient and specific diagnoses and/or procedures. The NRD contains various data elements that can be used for inclusion criteria:

- ICD-9-CM diagnosis and procedure codes (or ICD-10-CM/PCS for discharges beginning October 1, 2015)
- CCS categories (not available for discharges beginning October 1, 2015)
- Diagnosis-related group (DRG) and major diagnostic category (MDC)
- 3M All-Patient Refined DRG.

Possible exclusion criteria include the following:

- Index events in which the patient died in the hospital, because there is no risk of readmission.
- Patients with complicating comorbidities such as cancer or an immunocompromised state, because these conditions would greatly increase the risk of readmission.
- Transfers and same-day stays that were combined, because they represent a more complex type of care (NRD data element SAMEDAYEVENT not equal to 0).
- Discharge month for when the index event occurred, because there are limitations when using a calendar-year file defined by discharge date.

The annual NRD files include inpatient stays that were discharged in that data year. For example, the 2016 NRD includes admissions that began in 2015 and were discharged in 2016. In contrast, admissions that began later in 2016 and extended into 2017 are not included in the 2016 NRD. About one percent of discharges in the NRD started in the previous year; therefore, we expected that we were missing about one percent of admissions that started in the data year and were subsequently discharged in the following year. This will be true for each year of the NRD.

Deciding which discharge months should be included when qualifying an index event depends on (1) the time that will be allowed for a readmission, and (2) the data year. For example, if studying 30-day readmissions with the 2010 - 2014 and 2016 and future years of the NRD, the index event might be limited to those occurring in the discharge months of January through November. That allows the month of December for 30 days of follow-up.[12] In contrast, defining index events using the 2015 NRD needs to take into consideration the transition to ICD-10-CM/PCS on October 1, 2015. For example, if inclusion criteria for index events are based on

[12] Although it would be advantageous to be able to select a more specific date for a cut-off, patient confidentially concerns limited the available information on the admission and discharge dates to discharge month (data element DMONTH) and discharge year (data element YEAR).

ICD-9-CM diagnosis or procedure codes, these codes will only be available for the first nine months of the year. As such, it may be advisable to limit diagnosis- or procedure-specific readmissions analyses to these nine months. Selection of the time period will depend on whether the study is focused on diagnosis- and/or procedure-specific index events and readmissions. Consider three examples:

- Example 1. Index events are not defined by diagnoses and/or procedure codes followed by all-cause 30-day readmissions
    - Index events not defined by ICD-9-CM codes but other criteria (e.g., expected payer, age): Limit the index event to the discharge months of January through November. This allows December to identify all-cause 30-day readmissions.
    - All-cause readmissions: Use discharge months of January through December. Twelve months can be included because all-cause readmissions are not dependent on diagnosis/procedure coding.
- Example 2. Index events defined by diagnoses and/or procedure codes followed by all-cause 30-day readmissions
    - Index events defined by ICD-9-CM codes (e.g., diabetes, hip replacement): Limit the index event to the discharge months of January through September with ICD-9-CM data.
    - All-cause readmissions: Use discharge months of January through October. October data with ICD-10-CM/PCS data can be included because all-cause readmissions are not dependent on diagnosis/procedure coding.
- Example 3. Both index events and 30-day readmissions are defined by diagnoses and/or procedure codes
    - Index events defined by ICD-9-CM codes (e.g., diabetes, hip replacement): Limit the index event to the discharge months of January through August with ICD-9-CM data.
    - Readmissions based on ICD-9-CM codes (e.g., post-surgical infection): Use discharge months of January through September (with ICD-9-CM codes). October through December should be excluded from consideration unless the ICD-10-CM/PCS codes can be identified that are equivalent to the ICD-9-CM codes used to define readmissions in January through September.

Specifying the Criteria for a Readmission

Readmission analyses tend to consider one of the following: any subsequent admission regardless of cause, any subsequent admission that does not involve trauma, or any subsequent admission only if the event is "related" to the index event. In addition, a study may consider all readmissions within a time period or just the first readmission. The selection of criteria can dramatically change results. More information on how the results can change is available in an HCUP Method Series report on *Methodological Issues when Studying Readmissions and Revisits Using Hospital Administrative Data*.[13]

[13] Barrett M, Steiner C, Andrews R, Kassed C, Nagamine M. Methodological Issues when Studying Readmissions and Revisits Using Hospital Administrative Data. HCUP Methods Series Report No. 2011-01. Online March 9, 2011. Rockville, MD: U.S. Agency for Healthcare Research and Quality. www.hcup-us.ahrq.gov/reports/methods/2011_01.pdf.

The NRD includes several different diagnosis and procedure-related data elements that can be used to examine why a patient returned for hospital care. **The NRD does not identify any discharge as a readmission;** instead, we include the information necessary to select the appropriate readmission discharges in the NRD. Inclusion and exclusion criteria should be used to define a readmission indicator that identifies NRD discharges as readmissions specific to the analysis of interest.

Selecting the Time Period for Revisits

When determining an appropriate time period for the readmission, considerations include selecting a time that encompasses the same risk of exposure to all patients, seasonality of the disease, and possible external factors. Shorter time frames (7 or 14 days) are often used to make events attributable to hospital acute care; longer time frames may reflect differences in ambulatory care and/or coordination of care.

Reporting Rates of Readmission

Although the definition of *readmission rate*—number of readmissions divided by number of cases followed— seems simple, our research into readmission rates showed no standard definition. In some cases, the unit of observation was a patient; in others, the unit of observation was an index event, and individual patients were counted more than once. Some studies focused on the first readmission following an index event, whereas others counted all readmissions. The definitions of the readmission rate were specific to the purpose of the analyses.

Severity or risk adjustment may also be beneficial when comparing readmission rates across geographical regions, hospital types, or different patient populations. A simple risk adjustment would include the age and sex of the patient. A more complex adjustment might also include comorbidites, severity classified by the 3M All-Patient Refined DRG severity score, patient income quartile, or any other factor that could considerably increase or decrease the risk of subsequent hospital care. The NRD includes data elements to support these types of analyses in the Core, Severity, and Diagnosis and Procedure Groups files, if available.

Calculating Nationally Weighted Estimates

An analyst using the NRD must use the discharge-level weight (DISCWT) to produce national estimates. Weighted statistics estimate discharges treated at community hospitals (excluding rehabilitation and LTAC facilities) in the United States. Users should not equate the discharge-level weights to weights that can be used to estimate population counts.

Variance Calculations

It may be important for researchers to calculate a measure of precision for national estimates based on the NRD. Variance estimates must take into account both the sampling design and the form of the statistic. It is important to understand that the NRD is a sample of convenience from the SID and not a sample of hospitals or discharges. Standard error calculations should take into account the stratified sample (data element NRD_STRATUM) and hospitals defining the clusters (data element HOSP_NRD). One resource for understanding the issues surrounding variance calculations for the NRD is the HCUP Method Series Report on

Calculating Nationwide Readmissions Database (NRD) Variances.[14]

To accurately calculate variances from the NRD, appropriate statistical software and techniques must be used. A multitude of statistics can be estimated from the NRD data. Several computer programs that calculate statistics and their variances from sample survey data are listed in the next section. Some of these programs use general methods of variance calculations (e.g., the jackknife and balanced half-sample replications) that take into account the sampling design. However, it may be desirable to calculate variances using formulas specifically developed for certain statistics.

Computer Software for Weighted and Variance Calculations

The NRD discharge weights are needed to calculate national estimates of readmission counts and rates. In most cases, computer programs are readily available to perform these calculations. Several statistical programming packages allow weighted analyses.[15] For example, nearly all SAS procedures incorporate weights. In addition, several statistical analysis programs have been developed to specifically calculate statistics and their standard errors from survey data. Version 8 or later of SAS contains procedures (PROC SURVEYMEANS and PROC SURVEYREG) for calculating statistics based on specific sampling designs. Stata and SUDAAN are two other common statistical software packages that perform calculations for numerous statistics arising from the stratified, single-stage cluster sampling design.

[14] Yoon F, Sheng M, Jiang HJ, Steiner CA, Barrett ML. Calculating Nationwide Readmissions Database (NRD) Variances. HCUP Methods Series Report # 2017-01. Online January 24, 2017. U.S. Agency for Healthcare Research and Quality. www.hcup-us.ahrq.gov/reports/methods/methods.jsp.
[15] Carlson BL, Johnson AE, Cohen SB. An evaluation of the use of personal computers for variance estimation with complex survey data. *J Off Statistics*. 1993;9(4):795-814.

NRD READMISSION RATES REPORTED ON THE HCUPNET WEBSITE

Readmission rates generated from the NRD are available on HCUPnet, a free online query system based on data from the HCUP (http://hcupnet.ahrq.gov/). We define in this section how the readmission rates are calculated for HCUPnet to provide an example of how the NRD data elements might be used to define an index event, 7- and 30-day readmission, and readmission rates. Other types of readmission analyses are possible with the NRD; this is just one of many possible applications.

For the readmission rates on HCUPnet, we defined an *index event* as follows:

- Patient was discharged between January and November (1 <= DMONTH <= 11) for data years other than 2015.
    - For data year 2015, condition-specific readmission rates are based on index events from January to August with ICD-9-CM data.
- Patient was discharged alive (DIED = 0).
- Length of stay was non-missing (LOS >= 0).
- Discharge was for patient aged 1 year or older (AGE > 0).
- Patient may be a nonresident of the State (any value of RESIDENT).
- A patient is allowed to have multiple index events, regardless of how far apart.

For example, if a patient was discharged alive with a nonmissing length of stay on January 10, January 20, January 26, and March 30, all four discharges would qualify as index admissions.

For the readmission rates on HCUPnet, we defined *readmissions* as follows:

- The *first* discharge for a patient was within 7 or 30 days of an index event.
- Discharge occurred between January and December (1 <= DMONTH <= 12) for data years other than 2015.
    - For data year 2015, condition-specific readmission rates are based on readmissions from January to September with ICD-9-CM data.
- Discharge may be to the same or a different hospital (HOSP_NRD) and may result in a death.

On HCUPnet, we defined the readmission rates as the percentage of index admissions that had at least one readmission within 7 or 30 days.

- *Numerator* = total number of index events that had at least one subsequent hospital admission within 7 or 30 days.
- *Denominator* = total number of index events between January and November.
- *Rate* = numerator / denominator * 100.

Rates were not risk adjusted.

Consider an example of the 30-day, all-cause readmission rate for any diagnosis for a patient discharged alive on January 10, January 20, January 26, and March 30. Each admission is considered an index.

- January 10 is the first index admission.

- January 20 qualifies as a 30-day readmission for the January 10th index. It is also an index admission.
- January 26 qualifies as a 30-day readmission for the January 20th index. It is also an index admission.
- March 30 is an index admission, but it does not qualify as a readmission because it does not fall within 30 days of another index.

The 30-day readmission rate is 50 percent, because there are two 30-day readmissions for the four index admissions.

HCUPnet can be used to query 7- and 30-day readmission rates by various criteria. Queries can include the following criteria:

- Any diagnosis (no specific selection criteria on diagnosis or procedure)
- Principal diagnosis using CCS (using the HCUP data element DXCCS1)
- All-listed external cause of injury CCS (using the HCUP data elements E_CCSn)
- All-listed major operating room procedures using CCS (using the HCUP data elements PRCCSn with the corresponding PCLASSn = 3 or 4)
- MDC (using the HCUP data element MDC)
- DRG (using the HCUP data element DRGnoPOA that does not consider the present on admission indicator for assignment).

HCUPnet reports readmission counts, rates, and costs stratified by characteristics of the index stay. Stratification characteristics include:

- Age group is based on the HCUP data element AGE.
- Sex is based on the HCUP data element FEMALE.
- Payer is assigned using the primary and secondary expected payer (HCUP data elements PAY1 and PAY2). If the primary or secondary expected payer indicates Medicare, then the payer category is assigned to Medicare. This categorization includes patients who are dually-eligible for Medicare and Medicaid under Medicare. If not Medicare and the primary or secondary expected payer indicates Medicaid, then the payer category is Medicaid. If not Medicare or Medicaid and the primary or secondary expected payer indicates private insurance, then the payer category is Private. If not Medicare, Medicaid, or Private and the primary expected payer indicates self-pay or no charge, then the payer category is Self-pay/No charge. Stays for other types of payers are not reported on HCUPnet because this is a mixed payer group with small numbers. The expected secondary payer data element PAY2 is not available on the NRD.
- Income level is based on the HCUP data element ZIPINC_QRTL for the national quartile of the median household income for the patient's ZIP Code.
- Location is based on the HCUP data element PL_UR_CAT4 for the location of the patient's residence according to the Urban Influence Code (UIC) designation. Urban includes large and small metropolitan areas with all other areas categorized as rural. The data element PL_UR_CAT4 is not available on the NRD. The data element on the NRD for patient location is PL_NCHS, a six-category urban-rural classification scheme for U.S. counties developed by the National Center for Health Statistics (NCHS).

APPENDIX A: NRD INTRODUCTORY INFORMATION

Table A.1. HCUP Partners Participating in the 2017 NRD

State	HCUP Data Source
Alaska	Alaska Department of Health and Social Services
Arkansas	Arkansas Department of Health
California	California Office of Statewide Health Planning and Development
Delaware	Delaware Division of Public Health
Florida	Florida Agency for Health Care Administration
Georgia	Georgia Hospital Association
Indiana	Indiana Hospital Association
Iowa	Iowa Hospital Association
Louisiana	Louisiana Department of Health
Maryland	Maryland Health Services Cost Review Commission
Massachusetts	Massachusetts Center for Health Information and Analysis
Mississippi	Mississippi Department of Health
Missouri	Missouri Hospital Industry Data Institute
Nebraska	Nebraska Hospital Association
Nevada	Nevada Department of Health and Human Services
New Mexico	New Mexico Department of Health
New York	New York State Department of Health
Oregon	Oregon Association of Hospitals and Health Systems
Pennsylvania	Pennsylvania Health Care Cost Containment Council
South Carolina	South Carolina Revenue and Fiscal Affairs Office
South Dakota	South Dakota Association of Healthcare Organizations
Tennessee	Tennessee Hospital Association
Utah	Utah Department of Health
Vermont	Vermont Association of Hospitals and Health Systems
Virginia	Virginia Health Information
Washington	Washington State Department of Health
Wisconsin	Wisconsin Department of Health Services
Wyoming	Wyoming Hospital Association

Figure A.1. HCUP States Participating in the 2017 NRD

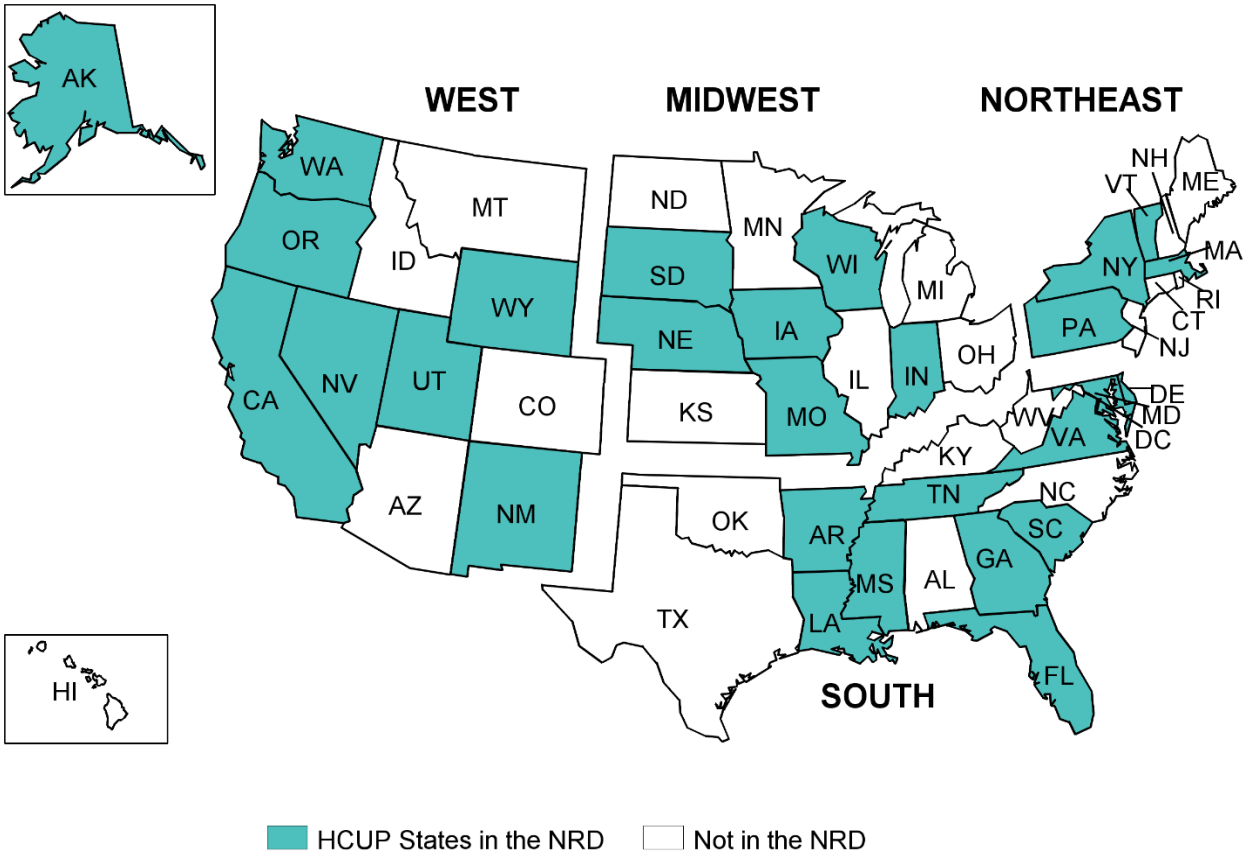

Table A.2. Percentage of SID Discharges in the NRD by Type of Discharge

Type of Discharge		Percentage of SID Discharges						
	2017	**2016**	**2015[a]**	**2014**	**2013**	**2012**	**2011**	**2010**
Included in the NRD	84.8	84.7	85.0	85.0	84.7	84.1	83.8	83.5
Excluded from the NRD	15.2	15.3	15.0	15.0	15.3	15.9	16.2	16.5
Hospital-level exclusions								
Noncommunity hospitals	2.9	2.9	2.9	2.7	2.5	2.5	2.6	2.4
Rehabilitation or LTAC hospitals	0.2	0.2	0.3	0.2	0.3	0.3	0.2	0.3
Discharge-level exclusions								
Discharges from all patients with an age of 0 (number of SID with excluded records)	6.9 (14 of 28 SID)	7.0 (13 of 27 SID)	7.0 (13 of 27 SID)	7.2 (10 of 22 SID)	7.6 (12 of 21 SID)	8.0 (12 of 18 SID)	8.0 (12 of 18 SID)	8.0 (12 of 18 SID)
Discharges with missing or unverified patient linkage numbers	4.4	4.4	4.1	4.1	4.1	4.3	4.4	4.5
Questionable patient linkage numbers: same patient linkage number on 20 or more discharges	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.7

Type of Discharge	2017	Percentage of SID Discharges						
		2016	2015[a]	2014	2013	2012	2011	2010
Questionable patient linkage numbers: patient is hospitalized after discharged dead	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Questionable patient linkage numbers: overlapping inpatient stays	0.4	0.4	0.4	0.4	0.5	0.3	0.4	0.4
Discharges from hospitals with more than 50 percent of their total discharges excluded for any of the above causes	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2

[a] In 2015, discharges were excluded if the diagnosis or procedures codes were not valid for the time period (e.g., ICD-10-CM/PCS codes reported in January-September 2015). This criterion excluded 0.02 percent of discharges.

Table A.3. Summary of NRD States, Hospitals, and Inpatient Stays

Year	States	Number of States for Discharges Aged 1 Year and Older	Number of States for Discharges Aged 0	Number of Hospitals	Number of Discharges in the NRD, Unweighted	Number of Discharges in the NRD, Weighted
2017	AK, AR, CA, DE, FL, GA, IA, IN, LA, MA, MD, MO, MS, NE, NM, NV, NY, OR, PA, SC, SD, TN, UT, VA, VT, WA, WI, WY	28	14	2,454	17,978,754	35,790,513
2016	AK, AR, CA, FL, GA, HI, IA, LA, MA, MD, MO, MS, NE, NM, NV, NY, OR, PA, SC, SD, TN, UT, VA, VT, WA, WI, WY	27	14	2,355	17,197,683	35,660,906
2015	AK, AR, CA, FL, GA, HI, IA, LA, MA, MD, MO, MS, NE, NM, NV, NY, OR, PA, SC, SD, TN, UT, VA, VT, WA, WI, WY	27	14	2,367	17,198,125	35,673,252
2014	AR, CA, FL, GA, HI, IA, LA, MA, MD, MO, NE, NM, NV, NY, SC, SD, TN, UT, VA, VT, WA, WI	22	12	2,048	14,894,613	35,306,427

2013	AR, CA, FL, GA, HI, IA, LA, MA, MO, NE, NM, NV, NY, SC, SD, TN, UT, VA, VT, WA, WI	21	9	2,006	14,325,172	35,580,348
2012	AK, AR, CA, FL, GA, HI, LA, MA, MO, NE, NM, NY, SC, TN, UT, VA, VT, WA	18	6	1,715	13,459,216	36,465,049
2011	AK, AR, CA, FL, GA, HI, LA, MA, MO, MS, NE, NM, NY, SC, TN, UT, VA, WA	18	6	1,804	13,915,176	36,909,160
2010	AK, AR, CA, FL, GA, HI, LA, MA, MO, MS, NE, NM, NY, SC, TN, UT, VA, WA	18	6	1,809	13,907,610	37,284,093

Table A.4. NRD-Related Reports and Database Documentation Available on HCUP-US

Description of the NRD Files

- NRD Overview
  - HCUP Partner in the NRD
- Introduction to the NRD, 2010-2017 (*this document*)
- NRD Related Reports

Restrictions on the Use

- HCUP Data Use Agreement Training
- Data Use Agreement for the HCUP Nationwide Databases
- Requirements for Publishing with HCUP data

File Specifications and Load Programs

- NRD File Specifications – details data file names, number of records, record length, and record layout
- Nationwide SAS Load Programs
- Nationwide SPSS Load Programs
- Nationwide Stata Load Programs

Data Elements in the NRD

- Availability of NRD Data Elements by Year – lists which data elements are available each year
- NRD Description of Data Elements – details uniform coding and State-specific idiosyncrasies
- Summary Statistics – lists means and frequencies on nearly all data elements

Additional Resources for Data Elements

- HCUP Quality Control Procedures – describes procedures used to assess data quality
- HCUP Coding Practices – describes how HCUP data elements are coded
- HCUP Hospital Identifiers – explains data elements that characterize individual hospitals

ICD-10-CM/PCS Data Included in the NRD Starting With 2015

- NRD Changes Beginning Data Year 2016
- 2015 NRD Revised File Structure and New Data Elements
- Additional ICD-10-CM/PCS Resources
- HCUP Tools Loading Tutorial

Known Data Issues

- Limitations on Using the NRD
- NRD, 2010-2012
- NRD, 2010-2013
- NRD, 2014

HCUP Tools: Labels and Formats

- Clinical Classifications Software (CCS)
- Format Programs – to create value labels
  - DRG Formats
  - HCUP Formats
  - HCUP Diagnoses and Procedure Groups Formats, including CCS Categories
  - ICD-9-CM Formats
  - ICD-10-CM/PCS Format
  - Severity Formats

Obtaining HCUP Data

- Purchase HCUP Data from the HCUP Central Distributor

Table A.5.1 Range of Discharge Weights by Patient Age and Sex, 2017

Patient Age and Sex	Discharge Weights, 2017		
	Minimum	Average Across Hospitals	Maximum
Males			
Age 0	1.06	4.90	18.18
Age 1–17	1.05	3.32	18.33
Age 18–44	1.07	2.07	14.42
Age 45–64	1.07	2.00	14.75
Age 65 and older	1.07	2.01	15.14
Females			
Age 0	1.04	4.95	19.04
Age 1–17	1.05	2.89	16.07
Age 18–44	1.06	2.02	12.44
Age 45–64	1.08	1.98	15.01
Age 65 and older	1.05	2.00	14.80

Table A.5.2 Range of Discharge Weights by Patient Age and Sex, 2016

Patient Age and Sex	Discharge Weights, 2016		
	Minimum	Average Across Hospitals	Maximum
Males			
Age 0	1.15	4.95	25.83
Age 1–17	1.07	2.98	24.00
Age 18–44	1.14	2.19	14.09
Age 45–64	1.11	2.12	10.53
Age 65 and older	1.08	2.13	12.99
Females			
Age 0	1.14	4.96	25.53
Age 1–17	1.10	2.84	18.03
Age 18–44	1.09	2.13	12.47
Age 45–64	1.08	2.12	11.80

Age 65 and older	1.07	2.13	13.61

Table A.5.3 Range of Discharge Weights by Patient Age and Sex, 2015

Patient Age and Sex	Discharge Weights, 2015		
	Minimum	Average Across Hospitals	Maximum
Males			
Age 0	1.06	5.39	34.10
Age 1–17	1.04	2.85	12.78
Age 18–44	1.12	2.13	8.91
Age 45–64	1.10	2.09	10.47
Age 65 and older	1.08	2.11	13.24
Females			
Age 0	1.06	5.33	35.22
Age 1–17	1.04	2.71	9.53
Age 18–44	1.07	2.07	12.59
Age 45–64	1.08	2.09	11.88
Age 65 and older	1.07	2.12	14.12

Table A.5.4 Range of Discharge Weights by Patient Age and Sex, 2014

Patient Age and Sex	Discharge Weights, 2014		
	Minimum	Average Across Hospitals	Maximum
Males			
Age 0	1.07	5.74	33.81
Age 1–17	1.03	3.46	14.75
Age 18–44	1.11	2.49	10.39
Age 45–64	1.13	2.47	10.59
Age 65 and older	1.07	2.48	10.56
Females			
Age 0	1.06	5.76	35.66
Age 1–17	1.03	3.18	11.50
Age 18–44	1.06	2.45	15.15

Age 45–64	1.10	2.44	12.38
Age 65 and older	1.06	2.48	11.46

Table A.5.5 Range of Discharge Weights by Patient Age and Sex, 2013

	Discharge Weights, 2013		
Patient Age and Sex	**Minimum**	**Average Across Hospitals**	**Maximum**
Males			
Age 0	1.07	6.40	31.90
Age 1–17	1.04	3.56	18.48
Age 18–44	1.13	2.56	11.33
Age 45–64	1.10	2.54	10.58
Age 65 and older	1.07	2.56	11.81
Females			
Age 0	1.07	6.49	35.30
Age 1–17	1.04	3.32	11.28
Age 18–44	1.06	2.48	7.53
Age 45–64	1.09	2.52	9.83
Age 65 and older	1.06	2.58	11.68

Table A.5.6 Range of Discharge Weights by Patient Age and Sex, 2012

	Discharge Weights, 2012		
Patient Age and Sex	**Minimum**	**Average Across Hospitals**	**Maximum**
Males			
Age 0	1.09	9.77	76.69
Age 1–17	1.03	4.27	25.68
Age 18–44	1.13	3.05	27.90
Age 45–64	1.09	3.12	43.50
Age 65 and older	1.07	3.13	31.76
Females			
Age 0	1.09	9.52	71.09
Age 1–17	1.04	3.88	23.56

Age 18–44	1.06	3.06	28.86
Age 45–64	1.08	3.00	30.71
Age 65 and older	1.05	3.10	27.81

Table A.5.7 Range of Discharge Weights by Patient Age and Sex, 2011

	Discharge Weights, 2011		
Patient Age and Sex	**Minimum**	**Average Across Hospitals**	**Maximum**
Males			
Age 0	1.10	10.70	83.94
Age 1–17	1.03	3.97	27.99
Age 18–44	1.12	2.91	21.52
Age 45–64	1.12	2.97	19.77
Age 65 and older	1.06	2.99	17.64
Females			
Age 0	1.10	10.64	73.09
Age 1–17	1.04	3.65	24.70
Age 18–44	1.06	2.92	18.34
Age 45–64	1.06	2.91	21.19
Age 65 and older	1.05	2.96	17.96

Table A.5.8 Range of Discharge Weights by Patient Age and Sex, 2010

	Discharge Weights, 2010		
Patient Age and Sex	**Minimum**	**Average Across Hospitals**	**Maximum**
Males			
Age 0	1.12	19.09	247.05
Age 1–17	1.04	3.93	27.60
Age 18–44	1.14	2.94	19.35
Age 45–64	1.17	2.98	25.46
Age 65 and older	1.08	3.01	24.93
Females			
Age 0	1.12	19.49	237.79

Age 1–17	1.04	3.61	24.20
Age 18–44	1.07	2.96	16.94
Age 45–64	1.12	2.90	20.21
Age 65 and older	1.06	2.97	22.87

APPENDIX B: HANDLING OF TRANSFERS AND SAME-DAY STAYS

Hospital administrative databases like the NRD and SID are "discharge-level" files, meaning that each record represents one discharge abstract from an inpatient stay. If a patient visits the hospital multiple times in a given year, the SID includes separate records for each inpatient stay. In addition, if a patient is transferred between hospitals within the State, the SID contain two discharge records, one record from the first hospitalization and a second record from the latter hospitalization.[16]

Defining Transfers and Same-Day Events

Readmission analyses do not usually allow the hospitalization at the receiving hospital to be counted as a readmission. To eliminate this possibility, we collapsed the pairs of records representing a transfer into a single "combined" record in the NRD and removed the original separate discharge records from the NRD. We defined *transfer* records as having all of the following characteristics:

- Discharge date of the first inpatient stay equaled the admission date of a subsequent inpatient stay.[17]
- The first record had a discharge disposition of transfer to an acute care hospital.
- The second record was from a different hospital and had an admission source indicating a transfer.

We defined a discharge as a *same-day* stay if the discharge date for one inpatient stay was the same as the admission date of a second stay for the same patient (same as transfers), but there was no indication of a transfer by the discharge disposition or admission source. Same-day stays may or may not have involved different hospitals. Same-day stays may indicate that a patient was discharged too soon and then needed to be returned to the hospital on the same day. However, it was also possible that these were transfer records with an incorrect or missing discharge disposition and admission source.

We collapsed records that were part of transfers or same-day stays into a single combined record. These combined records account for about three percent of records in the NRD and are identified by the data element SAMEDAYEVENT. The value of SAMEDAYEVENT is defined as follows:

- Transfer involving two discharges from <u>different</u> hospitals (value 1): Discharge date of one admission equaled the admission date on another record for the same patient. There was a discharge disposition of transfer to an acute care hospital on the first record and an admission source of transfer (in) on the subsequent record; two different hospitals were involved.
- Same-day stay involving two discharges at <u>different</u> hospitals (value 2): The discharge date on the first inpatient stay equaled the admission date on a second inpatient stay for the same patient; two different hospitals were involved, but the coding of either the discharge disposition or admission source did not indicate a transfer.

[16] If the patient is transferred to an out-of-State hospital, the subsequent discharge would not be included in the NRD because the HCUP patient linkage numbers only can follow a patient within a State.
[17] Although the text refers to using the discharge and admission date, in reality, we used the NRD data element NRD_DaysToEvent and LOS to identify the sequential order of inpatient records and whether they stopped and started on the same day.

- Same-day stays involving two discharges at the same hospital (value 3): The discharge date on the first inpatient stay equaled the admission date on a second inpatient stay for the same patient; the hospital was the same on both records.
- Same-day stay involving three or more discharges, same or different hospitals (value 4): Multiple records indicating a combination of transfers and other same-day events seem odd, but they do rarely occur in administrative data.
- Not a transfer or other same-day stay (value 0). About 97 percent of the records in the NRD did not involve transfers or same-day stays.

Please note that if a patient had a discharge disposition of transfer and an admission source that also indicated a transfer, but the discharge date of the first stay did not equal the admission date of the second stay (e.g., the patient was admitted the next day because the transfer occurred at night), the two records are not considered a transfer in the NRD.

Creating a Combined Transfer Record

Combining information across transfer and same-day stay records required specific rules for how to handle different types of information on the pairs of records. We first ordered the pairs of records by earliest occurrence in the year. The different scenarios described below detail how we combined different types of information:

- *Use first*. For information that pertains to day of admission (e.g., admission month, admission source, NRD_DaysToEvent), the combined transfer record used the information from the first record in the pair.
- *Use last record*. For information that pertains to the end of the time in the hospital (e.g., discharge disposition, expected payer, the Diagnosis Related group [DRG]), the combined transfer record used the information from the latter record in the pair.
- *Summarize*. For information that needed to reflect both stays, the combined transfer record summarized the information. For example, length of stay and total charge were summed across the pair of records.
- *Diagnoses and related data elements*. Each record included arrays of ICD-9-CM or ICD-10-CM diagnoses and related data elements. On the assumption that the diagnoses on the latter record would reflect the final determination of diagnoses after complete treatment, we retained the diagnoses reported on the latter record at the beginning of the diagnosis array (including the principal diagnosis). We added the diagnoses from the first record to the end of the diagnosis array. Diagnosis codes in the NRD are limited to a maximum of 25 (prior to 2014), 30 (starting in 2014), and 40 (starting in 2017) with no more than the maximum number of diagnoses retained on a combined transfer record. The same scheme was used for all diagnosis-related data elements also contained in arrays.
    - ***Exception to this rule when the transfer records used the same diagnosis/procedure coding system (ICD-9-CM or ICD-10-CM/PCS):*** If the second part of the transfer had a principal diagnosis of rehabilitation, medical evaluation, or other types of aftercare, using the principal diagnosis from the second part of the stay on the combined record masked the real reason for the admission. If the latter record had any one of the following Clinical Classifications Software (CCS) categories as the principal diagnosis, the assignment of diagnoses and related data elements was modified to give

precedence to the information on the first inpatient stay with the information from the latter stay added to the end of the associated arrays:

- CCS 254: Rehabilitation care; fitting of prostheses; and adjustment of devices
- CCS 255: Administrative/social admission
- CCS 256: Medical examination/evaluation
- CCS 257: Other aftercare
- CCS 258: Other screening for suspected conditions (not mental disorders or infectious disease)
- CCS 259: Residual codes; unclassified.

These types of transfer records are flagged by the data element REHABTRANSFER (value 1).

- ***Exception to this rule when the transfer records included different diagnosis/procedure coding system:*** If the first record included ICD-9-CM codes and the latter record was discharged after October 1, 2015 with ICD-10-CM/PCS codes, then only the ICD-10-CM/PCS diagnosis and procedure codes were retained on the combined transfer record.

- *Procedures and related data elements*. Each record included arrays of ICD-9-CM or ICD-10-PCS procedure codes and related data elements. Although procedure codes were not necessarily reported in the order in which they were performed, we decided to retain the procedures reported on the first record at the beginning of the procedure array. The procedures from the latter record were added to the end of the procedure array. The NRD is limited to a maximum of 15 procedure codes (prior to 2017) and 25 procedure codes (starting in 2017), so no more than the maximum number of procedures were retained on a combined transfer record. The same scheme was used for all procedure-related data elements that were also contained in arrays. The day of procedure on the latter record was adjusted for the length of stay on the first record, so the days reflected the time from the beginning of the first stay.
- *Hospital identifiers and characteristics*. The hospital identifiers and characteristics from the latter stay were retained on the combined transfer record. This assumed that the latter hospital was primarily responsible for the care.
- *Patient characteristics*. The patient characteristics (e.g., age, sex, income quartile) from the first stay were retained on the combined transfer record.

APPENDIX C: STATE-SPECIFIC RESTRICTIONS

The table below enumerates the types of restrictions applied to the Nationwide Readmissions Database. Restrictions include the following types:

- Confidentiality of records
    - Restricted release of age in years
- Missing discharges for specific populations of patients.

Table C.1. State-Specific Restrictions

Confidentiality of Records
Restricted release of patient's age in years to ensure patient confidentiality: • Age (AGE) values greater than 90 are aggregated into a single category of 90 years or older in the NRD.
Missing Discharges for Specific Populations of Patients
The following data sources may be missing discharge records for specific populations of patients: At least one Partner prohibits the release of discharge records for patients with HIV diagnoses. At least one Partner prohibits the release of inpatient records that were discharged from Alternative Level of Care units of the hospital (e.g., skilled nursing or swing bed units). At least one Partner prohibits the release of abortion discharges. At least one Partner restricts the release of ICD-10-CM diagnosis codes for medical misadventures and adverse effects.

APPENDIX D: NRD DATA ELEMENTS AND CODES

Beginning with data year 2016, data elements derived from AHRQ software tools (e.g., Clinical Classification Software (CCS) and the Elixhauser Comorbidity Software) are not available in the NRD. For users interested in applying the AHRQ software tools to the ICD-10-CM/PCS-coded data , the AHRQ software tools are available for download on the HCUP Tools & Software section of the HCUP-US website. The *Tools Loading* tutorial is available to users interested in applying the AHRQ software tools at www.hcup-us.ahrq.gov/tech_assist/tutorials.jsp.

Table D.1. Data Elements in the 2017 NRD Core File

Category	Data Element Name	Description
Admission/ Discharge	AWEEKEND	Admission on weekend: 0) admission on Monday–Friday, (1) admission on Saturday–Sunday
	DIED	Indicates in-hospital death: 0) did not die during hospitalization, (1) died during hospitalization
	DISPUNIFORM	Disposition of patient, uniform coding: (1) routine, (2) transfer to short term hospital, (5) other transfers, including skilled nursing facility, intermediate care, and another type of facility, (6) home health care, (7) against medical advice, (20) died in hospital, (99) discharged alive, destination unknown
	DQTR	Coded: (1) Jan–Mar, (2) Apr–Jun, (3) Jul–Sep, (4) Oct–Dec
	ELECTIVE	Indicates elective admission: (1) elective, (0) nonelective admission
	HCUP_ED	Indicator that discharge record includes evidence of emergency department (ED) services: (0) record does not meet any HCUP ED criteria, (1) ED revenue code was on SID record, (2) ED charge reported on SID record, (3) ED CPT procedure code on SID record, (4) other indication of ED services
	YEAR	Discharge year
Clinical Information	DRG	DRG in use on discharge date
	DRG_NoPOA	DRG assignment made without the use of the present on admission flags for the diagnoses
	DRGVER	Grouper version in use on discharge date
	DXVER	Diagnosis version (indicating ICD-10-CM)
	I10_DX1–I10_DX40	ICD-10-CM diagnoses, principal and secondary
	I10_NDX	Number of ICD-10-CM diagnoses coded on the record
	I10_NPR	Number of procedures coded
	I10_PR1–I10_PR25	ICD-10-PCS procedures, principal and secondary
	MDC	MDC in use on discharge date
	MDC_NoPOA	MDC assignment made without the use of the present on admission flags for the diagnoses

Category	Data Element Name	Description
	PRDAY1-PRDAY25	The day on which the procedure is performed. A value of 0 indicates the day of admission.
	PRVER	Procedure version (indicating ICD-10-PCS)
NRD Identifiers	HOSP_NRD	NRD hospital identifier specific to the NRD and is not linkable to any other HCUP or external databases. HOSP_NRD can be used to add data elements from the Hospital file to records on the discharge-level files. The values of HOSP_NRD differ from year to year. An individual hospital cannot be tracked across data years.
	KEY_NRD	Unique record identifier for the discharge in the NRD and not linkable to any other HCUP or external databases. KEY_NRD can be used to add data elements from the Severity and Diagnosis/Procedure Groups files to the records on the Core file within the same data year. The values of KEY_NRD are different in each data year 2010–2012 and 2015–2017, but are nonunique between 2013 and 2014. Please note that KEY_NRD is a record identifier and not a patient linkage number. NRD_VISITLINK is the patient linkage number specific to the NRD.
Patient Demographics	AGE	Age in years coded 0-90 years; any age greater than 90 was set to 90. Missing age was imputed using other records with the same patient linkage number. In the 2017 NRD, about 150 discharges (0.00 percent) had the age imputed.
	FEMALE	Indicates sex: (0) male, (1) female. Missing sex was imputed using other records with the same patient linkage number. In the 2017 NRD, about 50 discharges (0.00 percent) had the sex imputed.
	PAY1	Expected primary payer, uniform: (1) Medicare, (2) Medicaid, (3) private insurance, (4) self-pay, (5) no charge, (6) other

Category	Data Element Name	Description
	PL_NCHS	Patient location: National Center for Health Statistics (NCHS) urban-rural classification scheme for U.S. counties: (1) "Central" counties of metro areas of >=1 million population, (2) "Fringe" counties of metro areas of >=1 million population, (3) Counties in metro areas of 250,000–999,999 population, (4) Counties in metro areas of 50,000–249,999 population, (5) Micropolitan counties, (6) Not metropolitan or micropolitan counties
	ZIPINC_QRTL	Median household income quartiles for patient's ZIP Code: (1) quartile 1 [lowest income], (2) quartile 2, (3) quartile 3, (4) quartile 4 [highest income]. • For 2017, the median income quartiles are defined as: (1) $1–$43,999; (2) $44,000–$55,999; (3) $56,000–$73,999; and (4) $74,000 or more.[1]
Readmission Specific	DMONTH	Discharge month coded from (1) January to (12) December
	NRD_DAYSTOEVENT	Count of days from randomly selected "start date" to admission date coded differently for each value of NRD_VisitLink
	NRD_VISITLINK	Patient linkage number specific to the NRD and not linkable to any other HCUP or external databases. The values of NRD_VISITLINK differ from year to year. An individual person cannot be tracked across data years.
	REHABTRANSFER	A combined record involving transfer to rehabilitation, evaluation, or other aftercare: (1) yes, (0) no
	RESIDENT	Identifies patient as a resident of the State in which he or she received hospital care: (1) resident, (0) nonresident

[1] For 2016, the median income quartiles are defined as: (1) $1–$42,999; (2) $43,000–$53,999; (3) $54,000–$70,999; and (4) $71,000 or more. For 2015, the median income quartiles are defined as: (1) $1–$41,999; (2) $42,000–$51,999; (3) $52,000–$67,999; and (4) $68,000 or more. For 2014, the median income quartiles are defined as: (1) $1–$39,999; (2) $40,000–$50,999; (3) $51,000–$65,999; and (4) $66,000 or more. For 2013, the median income quartiles are defined as: (1) $1–$37,999; (2) $38,000–$47,999; (3) $48,000–$63,999; and (4) $64,000 or more. For 2012, the median income quartiles are defined as: (1) $1–$38,999; (2) $39,000–$47,999; (3) $48,000–$62,999; and (4) $63,000 or more. For 2011, the median income quartiles are defined as: (1) $1–$38,999; (2) $39,000–$47,999; (3) $48,000–$63,999; and (4) $64,000 or more. For 2010, the median income quartiles are defined as: (1) $1–$40,999; (2) $41,000–$50,999; (3) $51,000–$66,999; and (4) $67,000 or more.

Category	Data Element Name	Description
	SAMEDAYEVENT	Identifies records that were combined from transfer or same-day stay pairs of records: (0) not a combined transfer or other same-day stay record, (1) combined transfer involving two discharges from different hospitals, (2) combined same-day stay involving two discharges at different hospitals, (3) combined same-day stay involving two discharges at the same hospital, (4) combined same-day stay involving three or more discharges at same or different hospitals
Resource Use	LOS	Length of stay, edited
	TOTCHG	Total charges, edited
Weighting	DISCWT	NRD discharge weight to be used for calculating national estimates
	NRD_STRATUM	NRD stratum for post-stratification based on geographic region, urban/rural location, teaching status, size of hospital based on number of beds, and control/ownership. For the confidentiality of hospitals and States, the NRD_STRATUM was randomly assigned. The values of NRD_STRATUM differ from year to year. An individual stratum cannot be tracked across data years.

Table D.2. Data Elements in the 2017 NRD Severity Measures File

Beginning with data year 2016, the Elixhauser Comorbidity Software indicators are not available in the NRD.A beta version of the Elixhauser Comorbidity Software for ICD-10-CM/PCS is available on the HCUP-US website (www.hcup-us.ahrq.gov/toolssoftware/comorbidityicd10/comorbidity_icd10.jsp).

For prior years, refer to the NRD Description of Data Elements page on the HCUP-US website or to previous versions of the NRD Introduction.

Category	Data Element Name	Description
3M APR-DRG	APRDRG	3M All Patient Refined DRG
	APRDRG_Risk_Mortality	3M All Patient Refined DRG: Risk of Mortality Subclass: (0) No class specified, (1) Minor likelihood of dying, (2) Moderate likelihood of dying, (3) Major likelihood of dying, (4) Extreme likelihood of dying
	APRDRG_Severity	3M All Patient Refined DRG: Severity of Illness Subclass: (0) No class specified, (1) Minor loss of function (includes cases with no comorbidity or complications), (2) Moderate loss of function, (3) Major loss of function, (4) Extreme loss of function
NRD Identifiers	HOSP_NRD	NRD hospital identifier specific to the NRD and is not linkable to any other HCUP or external databases. HOSP_NRD can be used to add data elements from the Hospital file to records on the discharge-level files. The values of HOSP_NRD differ from year to year. An individual hospital cannot be tracked across data years.
	KEY_NRD	Unique record identifier for the discharge in the NRD and not linkable to any other HCUP or external databases. KEY_NRD can be used to add data elements from the Severity and Diagnosis/Procedure Groups files to the records on the Core file within the same data year. The values of KEY_NRD are different in each data year 2010–2012 and 2015–2017 but are not unique between 2013 and 2014. Please note that KEY_NRD is a record identifier and not a patient linkage number. NRD_VISITLINK is the patient linkage number specific to the NRD.

Table D.3. Data Elements in the 2017 NRD Diagnosis and Procedure Groups Files

Beginning with data year 2016, the Diagnosis and Procedure Groups File is not available on the NRD.

For prior years, refer to the NRD Description of Data Elements page on the HCUP-US website or to previous versions of the NRD Introduction.

Table D.4. Data Elements in the 2017 NRD Hospital File

Category	Data Element Name	Description
Admission/ Discharge	YEAR	Discharge year
Hospital Information	H_CONTROL	Control/ownership of hospital: (1) government, nonfederal [public], (2) private, not-for-profit [voluntary], (3) private, investor-owned [proprietary]
	HOSP_BEDSIZE	Size of hospital based on the number of beds: (1) small, (2) medium, (3) large. The categories are defined using region of the U.S., the urban-rural designation of the hospital, in addition to the teaching status.
	HOSP_UR_TEACH	Teaching status of hospital: (0) metropolitan non-teaching, (1) metropolitan teaching, (2) non-metropolitan
	HOSP_URCAT4	Hospital urban-rural location: (1) large metropolitan areas with at least 1 million residents, (2) small metropolitan areas with less than 1 million residents, (3) micropolitan areas, (4) not metropolitan or micropolitan, (8) metropolitan, collapsed category of large and small metropolitan, (9) non-metropolitan, collapsed category of micropolitan and rural
	NRD_STRATUM	NRD stratum for post-stratification based on geographic region, urban/rural location, teaching status, bed size, and control. Region is not identified. The values of NRD_STRATUM differ from year to year. An individual stratum cannot be tracked across data years.
NRD Identifiers	HOSP_NRD	NRD hospital identifier specific to the NRD and is not linkable to any other HCUP or external databases. The values of HOSP_NRD differ from year to year. An individual hospital cannot be tracked across data years.
Weighting	N_DISC_U	Number of discharges in the target universe in the stratum
	N_HOSP_U	Number of hospitals in the target universe in the stratum
	S_DISC_U	Number of NRD discharges in the stratum
	S_HOSP_U	Number of NRD hospitals in the stratum
	TOTAL_DISC	Total number of discharges for this hospital in the NRD

APPENDIX E: EVALUATION OF THE DIFFERENCE IN READMISSION RATES CAUSED BY HCUP PATIENT LINKAGE NUMBERS BEING SPECIFIC TO A STATE

The HCUP revisit variables (NRD_VisitLink and NRD_DaysToEvent) that can be used to track patients across hospitalizations were created from patient linkage numbers provided by the HCUP Partners. These identifiers can only track patients across hospitals in a single State. Consider the following two illustrative examples:

1. If a person is hospitalized in February in New York and then hospitalized in April to the same hospital or to a different hospital in New York, the HCUP revisit variables for the New York SID will be able to track the patient across the two visits.
2. If a person is hospitalized in February in New York and then hospitalized in April to a hospital in Florida, the HCUP revisit variables for the New York SID will not track the patient between New York and Florida.

The HCUP revisit variables are specific to tracking patients hospitalized in a State, regardless of whether the patient is a resident of the State. This limitation in the HCUP revisit variables causes the readmission rates to be artificially low. Consider the following example:

- Patient A has two index events in California and was readmitted one time in California within 30 days.
- Patient B has three index events in California but was in Florida when readmitted within 30 days.

The true readmission rate across these two patients is 0.40 (0.40 = 2 readmissions / 5 index events). Using only California data, the readmission rate is 0.20 (0.20 = 1 readmission / 5 index events). Using California and Florida data combined, the readmission rate is 0.17 (0.17 = 1 readmission / 6 index events; there are 6 index events because the readmission for patient B in Florida gets counted as an index event because it cannot be tied to the hospitalization in California).

We used the 2011 Medicare Standard Analytic File (SAF) to examine the impact on readmission rates caused by having State-specific patient linkage numbers. The SAF includes patient linkage numbers that follow Medicare Fee-For-Service (FFS) patients across States; therefore, they do not have the same limitations as the HCUP data. We calculated condition-specific readmission rates in two ways. The index event for both readmission rates was allowed to include resident and nonresident discharges, similar to the NRD. The index events were grouped by the AHRQ Clinical Classifications Software (CCS) category for the principal diagnosis. For the first set of readmission rates, we required that a 30-day readmission for any cause occur in the same State as the index event, similar to the NRD. For the second set of readmission rates, we allowed the 30-day readmission for any cause to occur in any State. We limited the comparison of readmission rates to CCS categories with at least 100 index events. There were 247 CCS categories and the number of index events ranged from 101 to 468,709.

The analysis of readmission rates using the 2011 Medicare FFS data demonstrated that condition-specific readmission rates were higher if a patient could be tracked across all States, but that the percentage increase was less than 5 percent for most of the CCS categories. This analysis was limited in that it focused on the Medicare FFS population. The Medicare population accounted for 40 percent of all inpatient discharges in 2011,[1] and previous research indicates that this population has higher readmission rates than discharges for other payers.[2] Conditions often associated with younger adults, such as pregnancy, were included in the

[1] HCUPnet query on the expected primary payer for the 2011 Nationwide Inpatient Sample. Accessed December 9, 2014.
[2] Wier LM, Barrett ML, Steiner C, Jiang HJ. All-Cause Readmissions by Payer and Age, 2008. HCUP Statistical Brief #115. June 2011. Rockville, MD: Agency for Healthcare Research and Quality.

Medicare estimates because 20 percent of Medicare discharges are under the age of 65.[3] Medicare patients under the age of 65 include people who are disabled or who have been diagnosed with end-stage renal disease or amyotrophic lateral sclerosis (ALS). Given the volume and severity of illness for Medicare patients, the estimates for the increase in the condition-specific readmission rates using the Medicare data provided a reasonable upper bound on the impact. The following three tables provide more detail on specific changes in readmission rates.

Table E.1 lists the percentage increase between the two types of readmission rates for the 20 conditions with the largest number of index events. These 20 conditions represent 54 percent of the index events in the analysis. The increase in the readmission rates when we capture readmission in other States ranged from 1.9 percent for urinary tract infections to 3.7 percent for chest pain.

Table E.1. Twenty Conditions with the Largest Number of Index Events, Restricting Readmissions to Within State and Across All States

Clinical Classifications Software Principal Diagnosis Category for the Index Event	Number of Index Events	30-Day Readmission Rate per 100 Index Events		Percentage Increase in the Readmission Rates When Patients Were Followed Across States
		Readmissions Limited to the Same State as the Index Event	Readmissions Considered from Any State	
108: Congestive heart failure; nonhypertensive	468,709	25.05	25.70	2.6
122: Pneumonia (except that caused by tuberculosis or sexually transmitted disease)	443,388	18.25	18.69	2.4
2: Septicemia (except in labor)	405,898	21.42	21.87	2.1
203: Osteoarthritis	363,295	5.57	5.70	2.2
127: Chronic obstructive pulmonary disease and bronchiectasis	356,562	21.99	22.40	1.9
106: Cardiac dysrhythmias	345,225	16.73	17.27	3.3
159: Urinary tract infections	277,674	18.31	18.66	1.9
237: Complication of device;		21.23	21.83	2.8

[3] HCUPnet query on the expected primary payer and age for the 2011 Nationwide Inpatient Sample. Accessed December 9, 2014.

Clinical Classifications Software Principal Diagnosis Category for the Index Event	Number of Index Events	30-Day Readmission Rate per 100 Index Events		Percentage Increase in the Readmission Rates When Patients Were Followed Across States
		Readmissions Limited to the Same State as the Index Event	Readmissions Considered from Any State	
implant or graft	274,669			
109: Acute cerebrovascular disease	232,510	14.73	15.23	3.4
157: Acute and unspecified renal failure	228,134	22.04	22.60	2.5
101: Coronary atherosclerosis and other heart disease	220,481	15.44	15.99	3.5
100: Acute myocardial infarction	205,949	19.66	20.41	3.8
55: Fluid and electrolyte disorders	192,425	20.33	20.81	2.4
205: Spondylosis; intervertebral disc disorders; other back problems	178,614	10.62	10.93	2.9
197: Skin and subcutaneous tissue infections	178,097	16.09	16.45	2.2
226: Fracture of neck of femur (hip)	172,566	13.89	14.19	2.2
50: Diabetes mellitus with complications	159,421	23.81	24.31	2.1
238: Complications of surgical procedures or medical care	155,584	20.50	21.08	2.9
153: Gastrointestinal hemorrhage	155,410	18.75	19.27	2.8
102: Nonspecific chest pain	148,512	13.50	14.00	3.7

Table E.2 lists the 10 conditions with the largest percentage differences between the two types of readmission rates. We expect the readmission rates using discharges across all States to be higher than the readmissions restricted to the same State as the index event. Only three CCS categories had an increase of more than 10 percent in the two readmission rates, and these CCS categories had a very small number of index events. The other seven CCS categories had a percentage increase between 6.6 percent and 7.9 percent and also had relatively small numbers of index events.

Table E.2. Ten Conditions with the Largest Difference in Readmission Rates, Restricting Readmissions to Within State and Across All States

Clinical Classifications Software Principal Diagnosis Category for the Index Event	Number of Index Events	30-Day Readmission Rate per 100 Index Events		Percentage Increase in the Readmission Rates When Patients Were Followed Across States
		Readmissions Limited to the Same State as the Index Event	Readmissions Considered from Any State	
188: Fetopelvic disproportion; obstruction	153	4.58	5.23	14.3
20: Cancer; other respiratory and intrathoracic	952	17.65	19.85	12.5
655: Mental disorders usually diagnosed in infancy, childhood, or adolescence	115	15.65	17.39	11.1
227: Spinal cord injury	2,420	17.69	19.09	7.9
185: Prolonged pregnancy	665	2.11	2.26	7.2
77: Encephalitis (except that caused by tuberculosis or sexually transmitted disease)	1,945	17.22	18.46	7.2
240: Burns	4,110	16.40	17.54	7.0
213: Cardiac and circulatory congenital anomalies	2,502	13.75	14.71	7.0
670: Miscellaneous disorders	3,592	13.34	14.23	6.7
96: Heart valve disorders	47,909	21.73	23.16	6.6

Table E.3 has the complete listing of readmissions rates for the 247 CCS categories. The majority of CCS categories (221 of the 247, 89.5 percent) had a percentage increase between the two types of readmission rates of less than 5 percent.

Table E.3. Readmission Rates Restricting Readmissions to Within State and Across All States, Medicare Standard Analytic File, 2011

Clinical Classifications Software Principal Diagnosis Category for the Index Event	Number of Index Events	30-Day Readmission Rate per 100 Index Events		Percentage Increase in the Readmission Rates When Patients Were Followed Across States
		Readmissions Limited to the Same State as the Index Event	Readmissions Considered from Any State	
1: Tuberculosis	955	21.99	22.72	3.3
2: Septicemia (except in labor)	405,898	21.42	21.87	2.1
3: Bacterial infection; unspecified site	1,625	18.22	18.71	2.7
4: Mycoses	10,755	27.56	28.10	2.0
5: HIV infection	7,495	26.99	27.66	2.5
6: Hepatitis	10,121	35.23	36.29	3.0
7: Viral infection	14,033	16.01	16.46	2.8
8: Other infections; including parasitic	4,117	13.46	14.09	4.7
9: Sexually transmitted infections (not HIV or hepatitis)	699	14.16	14.45	2.0
10: Immunizations and screening for infectious disease	149	14.09	14.09	0.0
11: Cancer of head and neck	8,915	20.43	21.40	4.8
12: Cancer of esophagus	3,956	26.69	27.68	3.7
13: Cancer of stomach	7,171	23.79	24.68	3.8
14: Cancer of colon	37,987	17.16	17.53	2.2
15: Cancer of rectum and anus	12,496	21.26	21.68	2.0
16: Cancer of liver and	5,935	24.08	25.14	4.4

Clinical Classifications Software Principal Diagnosis Category for the Index Event	Number of Index Events	30-Day Readmission Rate per 100 Index Events		Percentage Increase in the Readmission Rates When Patients Were Followed Across States
		Readmissions Limited to the Same State as the Index Event	Readmissions Considered from Any State	
intrahepatic bile duct				
17: Cancer of pancreas	12,641	24.41	25.74	5.5
18: Cancer of other GI organs; peritoneum	7,043	24.00	25.27	5.3
19: Cancer of bronchus; lung	51,885	20.46	21.12	3.2
20: Cancer; other respiratory and intrathoracic	952	17.65	19.85	12.5
21: Cancer of bone and connective tissue	3,007	20.02	20.82	4.0
22: Melanomas of skin	989	13.25	13.65	3.0
23: Other non-epithelial cancer of skin	2,483	15.99	16.31	2.0
24: Cancer of breast	18,788	9.27	9.41	1.5
25: Cancer of uterus	10,304	11.81	12.35	4.5
26: Cancer of cervix	1,616	20.92	21.78	4.1
27: Cancer of ovary	6,450	21.83	22.71	4.0
28: Cancer of other female genital organs	2,155	15.82	16.15	2.0
29: Cancer of prostate	24,323	6.93	7.13	3.0
31: Cancer of other male genital organs	308	22.73	23.38	2.9
32: Cancer of bladder	14,780	22.18	23.03	3.8
33: Cancer of kidney and renal pelvis	14,717	13.23	13.84	4.6
34: Cancer of other urinary organs	1,716	16.14	16.96	5.1
35: Cancer of brain and nervous system	7,670	20.38	21.51	5.6
36: Cancer of thyroid	3,775	9.35	9.48	1.4
37: Hodgkin`s disease	584	32.36	33.39	3.2

Clinical Classifications Software Principal Diagnosis Category for the Index Event	Number of Index Events	30-Day Readmission Rate per 100 Index Events		Percentage Increase in the Readmission Rates When Patients Were Followed Across States
		Readmissions Limited to the Same State as the Index Event	Readmissions Considered from Any State	
38: Non-Hodgkin`s lymphoma	12,102	34.35	35.44	3.2
39: Leukemias	8,871	33.62	34.86	3.7
40: Multiple myeloma	5,748	28.97	29.91	3.2
41: Cancer; other and unspecified primary	1,514	16.84	17.90	6.3
42: Secondary malignancies	65,482	23.08	23.97	3.8
43: Malignant neoplasm without specification of site	2,667	24.03	24.82	3.3
44: Neoplasms of unspecified nature or uncertain behavior	14,836	25.74	26.54	3.1
45: Maintenance chemotherapy; radiotherapy	25,281	61.29	61.98	1.1
46: Benign neoplasm of uterus	4,909	7.29	7.37	1.1
47: Other and unspecified benign neoplasm	34,259	12.74	13.18	3.4
48: Thyroid disorders	9,288	10.81	11.00	1.8
49: Diabetes mellitus without complication	3,189	16.09	16.31	1.4
50: Diabetes mellitus with complications	159,421	23.81	24.31	2.1
51: Other endocrine disorders	23,041	20.09	20.52	2.1
52: Nutritional deficiencies	4,402	24.49	24.97	1.9
53: Disorders of lipid metabolism	147	14.29	14.29	0.0
54: Gout and other crystal arthropathies	9,186	17.46	17.92	2.6
55: Fluid and electrolyte disorders	192,425	20.33	20.81	2.4

Clinical Classifications Software Principal Diagnosis Category for the Index Event	Number of Index Events	30-Day Readmission Rate per 100 Index Events		Percentage Increase in the Readmission Rates When Patients Were Followed Across States
		Readmissions Limited to the Same State as the Index Event	Readmissions Considered from Any State	
56: Cystic fibrosis	1,507	20.31	20.77	2.3
57: Immunity disorders	306	28.76	30.07	4.5
58: Other nutritional; endocrine; and metabolic disorders	33,388	16.81	17.25	2.6
59: Deficiency and other anemia	92,656	23.19	23.74	2.4
60: Acute posthemorrhagic anemia	16,095	21.09	21.66	2.7
61: Sickle cell anemia	15,360	34.26	35.22	2.8
62: Coagulation and hemorrhagic disorders	9,731	27.73	28.53	2.9
63: Diseases of white blood cells	17,437	26.37	27.06	2.6
64: Other hematologic conditions	1,256	22.05	22.93	4.0
76: Meningitis (except that caused by tuberculosis or sexually transmitted disease)	3,339	16.17	17.07	5.6
77: Encephalitis (except that caused by tuberculosis or sexually transmitted disease)	1,945	17.22	18.46	7.2
78: Other CNS infection and poliomyelitis	2,052	22.86	23.64	3.4
79: Parkinson`s disease	6,647	13.25	13.44	1.4
80: Multiple sclerosis	6,730	13.80	14.28	3.4
81: Other hereditary and degenerative nervous system conditions	17,788	16.29	16.83	3.3
82: Paralysis	1,732	17.21	17.55	2.0
83: Epilepsy; convulsions	70,843	15.62	16.10	3.1

Clinical Classifications Software Principal Diagnosis Category for the Index Event	Number of Index Events	30-Day Readmission Rate per 100 Index Events		Percentage Increase in the Readmission Rates When Patients Were Followed Across States
		Readmissions Limited to the Same State as the Index Event	Readmissions Considered from Any State	
84: Headache; including migraine	12,433	13.04	13.56	4.0
85: Coma; stupor; and brain damage	7,730	16.96	17.50	3.2
87: Retinal detachments; defects; vascular occlusion; and retinopathy	1,091	9.90	10.36	4.6
88: Glaucoma	274	13.14	13.50	2.8
89: Blindness and vision defects	1,943	12.30	13.02	5.9
90: Inflammation; infection of eye (except that caused by tuberculosis or sexually transmitted disease)	3,104	13.24	13.85	4.6
91: Other eye disorders	1,835	11.55	12.15	5.2
92: Otitis media and related conditions	1,410	11.49	12.13	5.6
93: Conditions associated with dizziness or vertigo	29,165	8.27	8.53	3.2
94: Other ear and sense organ disorders	1,672	13.22	13.64	3.2
95: Other nervous system disorders	88,536	18.37	18.94	3.1
96: Heart valve disorders	47,909	21.73	23.16	6.6
97: Peri-; endo-; and myocarditis; cardiomyopathy (except that caused by tuberculosis or sexually transmitted disease)	19,317	21.89	22.71	3.8
98: Essential hypertension	21,797	11.97	12.30	2.8
99: Hypertension with complications and secondary hypertension	101,943	24.08	24.58	2.1

Clinical Classifications Software Principal Diagnosis Category for the Index Event	Number of Index Events	30-Day Readmission Rate per 100 Index Events		Percentage Increase in the Readmission Rates When Patients Were Followed Across States
		Readmissions Limited to the Same State as the Index Event	Readmissions Considered from Any State	
100: Acute myocardial infarction	205,949	19.66	20.41	3.8
101: Coronary atherosclerosis and other heart disease	220,481	15.44	15.99	3.5
102: Nonspecific chest pain	148,512	13.50	14.00	3.7
103: Pulmonary heart disease	67,061	16.71	17.20	2.9
104: Other and ill-defined heart disease	3,266	13.38	14.15	5.7
105: Conduction disorders	29,215	11.42	11.86	3.9
106: Cardiac dysrhythmias	345,225	16.73	17.27	3.3
107: Cardiac arrest and ventricular fibrillation	3,236	18.88	19.96	5.7
108: Congestive heart failure; nonhypertensive	468,709	25.05	25.70	2.6
109: Acute cerebrovascular disease	232,510	14.73	15.23	3.4
110: Occlusion or stenosis of precerebral arteries	59,225	10.67	10.97	2.8
111: Other and ill-defined cerebrovascular disease	7,927	11.30	11.86	4.9
112: Transient cerebral ischemia	80,396	11.31	11.66	3.1
113: Late effects of cerebrovascular disease	8,073	15.88	16.31	2.7
114: Peripheral and visceral atherosclerosis	77,210	19.15	19.65	2.6
115: Aortic; peripheral; and visceral artery aneurysms	35,223	15.16	15.95	5.2
116: Aortic and peripheral arterial embolism or	11,656	22.50	23.07	2.6

Clinical Classifications Software Principal Diagnosis Category for the Index Event	Number of Index Events	30-Day Readmission Rate per 100 Index Events		Percentage Increase in the Readmission Rates When Patients Were Followed Across States
		Readmissions Limited to the Same State as the Index Event	Readmissions Considered from Any State	
thrombosis				
117: Other circulatory disease	61,972	17.52	17.98	2.6
118: Phlebitis; thrombophlebitis and thromboembolism	67,493	16.60	17.07	2.8
119: Varicose veins of lower extremity	1,061	16.21	16.68	2.9
120: Hemorrhoids	12,573	17.41	17.74	1.9
121: Other diseases of veins and lymphatics	9,833	20.34	21.06	3.5
122: Pneumonia (except that caused by tuberculosis or sexually transmitted disease)	443,388	18.25	18.69	2.4
123: Influenza	11,775	11.77	12.03	2.2
124: Acute and chronic tonsillitis	809	7.17	7.54	5.2
125: Acute bronchitis	26,446	13.00	13.32	2.4
126: Other upper respiratory infections	9,847	13.01	13.48	3.6
127: Chronic obstructive pulmonary disease and bronchiectasis	356,562	21.99	22.40	1.9
128: Asthma	85,354	18.61	18.99	2.0
129: Aspiration pneumonitis; food/vomitus	95,063	20.93	21.22	1.4
130: Pleurisy; pneumothorax; pulmonary collapse	37,794	25.02	25.81	3.1
131: Respiratory failure; insufficiency; arrest (adult)	136,502	24.58	25.19	2.5
132: Lung disease due to external agents	2,365	20.25	21.02	3.8

Clinical Classifications Software Principal Diagnosis Category for the Index Event	Number of Index Events	30-Day Readmission Rate per 100 Index Events		Percentage Increase in the Readmission Rates When Patients Were Followed Across States
		Readmissions Limited to the Same State as the Index Event	Readmissions Considered from Any State	
133: Other lower respiratory disease	44,901	18.94	19.54	3.1
134: Other upper respiratory disease	12,106	18.43	19.09	3.6
135: Intestinal infection	86,677	22.59	23.04	2.0
136: Disorders of teeth and jaw	3,436	12.34	12.75	3.3
137: Diseases of mouth; excluding dental	5,261	14.94	15.32	2.5
138: Esophageal disorders	41,912	16.29	16.70	2.5
139: Gastroduodenal ulcer (except hemorrhage)	12,983	17.04	17.62	3.4
140: Gastritis and duodenitis	34,213	19.14	19.57	2.2
141: Other disorders of stomach and duodenum	26,484	24.64	25.32	2.8
142: Appendicitis and other appendiceal conditions	18,638	9.55	9.84	3.0
143: Abdominal hernia	62,904	13.38	13.74	2.6
144: Regional enteritis and ulcerative colitis	16,244	23.15	24.02	3.7
145: Intestinal obstruction without hernia	131,147	17.46	17.93	2.7
146: Diverticulosis and diverticulitis	107,020	14.55	14.91	2.5
147: Anal and rectal conditions	13,837	16.30	16.68	2.3
148: Peritonitis and intestinal abscess	8,092	27.39	28.28	3.2
149: Biliary tract disease	107,986	14.87	15.38	3.4
151: Other liver diseases	36,907	32.88	34.08	3.7
152: Pancreatic disorders	66,802	19.80	20.58	4.0

Clinical Classifications Software Principal Diagnosis Category for the Index Event	Number of Index Events	30-Day Readmission Rate per 100 Index Events		Percentage Increase in the Readmission Rates When Patients Were Followed Across States
		Readmissions Limited to the Same State as the Index Event	Readmissions Considered from Any State	
(not diabetes)				
153: Gastrointestinal hemorrhage	155,410	18.75	19.27	2.8
154: Noninfectious gastroenteritis	41,796	16.12	16.57	2.8
155: Other gastrointestinal disorders	73,673	20.39	20.92	2.6
156: Nephritis; nephrosis; renal sclerosis	1,488	25.00	25.54	2.2
157: Acute and unspecified renal failure	228,134	22.04	22.60	2.5
158: Chronic kidney disease	8,075	26.13	26.81	2.6
159: Urinary tract infections	277,674	18.31	18.66	1.9
160: Calculus of urinary tract	32,158	13.21	13.53	2.4
161: Other diseases of kidney and ureters	12,302	19.05	19.64	3.1
162: Other diseases of bladder and urethra	8,649	18.28	18.82	3.0
163: Genitourinary symptoms and ill-defined conditions	15,706	20.16	20.69	2.6
164: Hyperplasia of prostate	23,248	11.51	11.75	2.1
165: Inflammatory conditions of male genital organs	6,873	13.90	14.22	2.3
166: Other male genital disorders	2,842	15.94	16.50	3.5
167: Nonmalignant breast conditions	2,997	13.38	13.65	2.0
168: Inflammatory diseases of female pelvic organs	3,024	15.18	15.68	3.3
169: Endometriosis	940	7.98	8.19	2.7
170: Prolapse of female	25,446	3.53	3.66	3.7

Clinical Classifications Software Principal Diagnosis Category for the Index Event	Number of Index Events	30-Day Readmission Rate per 100 Index Events		Percentage Increase in the Readmission Rates When Patients Were Followed Across States
		Readmissions Limited to the Same State as the Index Event	Readmissions Considered from Any State	
genital organs				
171: Menstrual disorders	3,085	9.17	9.37	2.1
172: Ovarian cyst	2,420	10.29	10.50	2.0
173: Menopausal disorders	2,132	12.48	12.81	2.6
175: Other female genital disorders	7,410	11.86	12.27	3.4
177: Spontaneous abortion	119	6.72	6.72	0.0
180: Ectopic pregnancy	159	8.18	8.18	0.0
181: Other complications of pregnancy	3,919	20.31	20.80	2.4
182: Hemorrhage during pregnancy; abruptio placenta; placenta previa	266	17.67	18.80	6.4
183: Hypertension complicating pregnancy; childbirth and the puerperium	1,544	16.78	16.90	0.8
184: Early or threatened labor	1,068	23.69	24.06	1.6
185: Prolonged pregnancy	665	2.11	2.26	7.2
186: Diabetes or abnormal glucose tolerance complicating pregnancy; childbirth; or the puerperium	822	19.34	19.83	2.5
187: Malposition; malpresentation	414	4.59	4.59	0.0
188: Fetopelvic disproportion; obstruction	153	4.58	5.23	14.3
189: Previous C-section	2,229	3.99	4.08	2.3
190: Fetal distress and abnormal forces of labor	584	4.62	4.62	0.0
191: Polyhydramnios and	821	8.53	8.77	2.9

Clinical Classifications Software Principal Diagnosis Category for the Index Event	Number of Index Events	30-Day Readmission Rate per 100 Index Events		Percentage Increase in the Readmission Rates When Patients Were Followed Across States
		Readmissions Limited to the Same State as the Index Event	Readmissions Considered from Any State	
other problems of amniotic cavity				
192: Umbilical cord complication	421	1.43	1.43	0.0
193: OB-related trauma to perineum and vulva	1,159	1.12	1.12	0.0
195: Other complications of birth; puerperium affecting management of mother	2,716	8.51	8.62	1.3
196: Normal pregnancy and/or delivery	450	1.56	1.56	0.0
197: Skin and subcutaneous tissue infections	178,097	16.09	16.45	2.2
198: Other inflammatory condition of skin	2,901	21.06	21.68	2.9
199: Chronic ulcer of skin	25,685	21.13	21.62	2.3
200: Other skin disorders	2,589	17.69	18.00	1.7
201: Infective arthritis and osteomyelitis (except that caused by tuberculosis or sexually transmitted disease)	24,731	19.24	19.77	2.8
202: Rheumatoid arthritis and related disease	5,487	12.96	13.30	2.7
203: Osteoarthritis	363,295	5.57	5.70	2.2
204: Other non-traumatic joint disorders	16,187	11.90	12.27	3.1
205: Spondylosis; intervertebral disc disorders; other back problems	178,614	10.62	10.93	2.9
206: Osteoporosis	146	21.23	21.92	3.2
207: Pathological fracture	31,718	19.03	19.46	2.3
208: Acquired foot	1,705	7.57	7.68	1.5

Clinical Classifications Software Principal Diagnosis Category for the Index Event	Number of Index Events	30-Day Readmission Rate per 100 Index Events		Percentage Increase in the Readmission Rates When Patients Were Followed Across States
		Readmissions Limited to the Same State as the Index Event	Readmissions Considered from Any State	
deformities				
209: Other acquired deformities	17,245	9.92	10.22	3.0
210: Systemic lupus erythematosus and connective tissue disorders	3,920	26.79	27.37	2.2
211: Other connective tissue disease	47,933	13.59	14.00	3.0
212: Other bone disease and musculoskeletal deformities	21,751	12.33	12.63	2.5
213: Cardiac and circulatory congenital anomalies	2,502	13.75	14.71	7.0
214: Digestive congenital anomalies	713	15.71	16.69	6.3
215: Genitourinary congenital anomalies	1,201	16.24	16.57	2.1
216: Nervous system congenital anomalies	397	17.88	18.39	2.8
217: Other congenital anomalies	4,654	8.10	8.36	3.2
225: Joint disorders and dislocations; trauma-related	6,439	11.14	11.34	1.8
226: Fracture of neck of femur (hip)	172,566	13.89	14.19	2.2
227: Spinal cord injury	2,420	17.69	19.09	7.9
228: Skull and face fractures	7,091	11.90	12.38	4.0
229: Fracture of upper limb	43,161	11.92	12.33	3.5
230: Fracture of lower limb	61,816	13.59	13.96	2.7
231: Other fractures	87,204	14.05	14.50	3.2
232: Sprains and strains	9,057	11.52	11.91	3.4
233: Intracranial injury	55,231	16.40	17.16	4.6

Clinical Classifications Software Principal Diagnosis Category for the Index Event	Number of Index Events	30-Day Readmission Rate per 100 Index Events		Percentage Increase in the Readmission Rates When Patients Were Followed Across States
		Readmissions Limited to the Same State as the Index Event	Readmissions Considered from Any State	
234: Crushing injury or internal injury	13,358	15.29	15.98	4.5
235: Open wounds of head; neck; and trunk	5,616	12.29	12.84	4.5
236: Open wounds of extremities	5,507	13.78	14.11	2.4
237: Complication of device; implant or graft	274,669	21.23	21.83	2.8
238: Complications of surgical procedures or medical care	155,584	20.50	21.08	2.9
239: Superficial injury; contusion	16,861	15.88	16.23	2.2
240: Burns	4,110	16.40	17.54	7.0
241: Poisoning by psychotropic agents	14,978	12.82	13.27	3.5
242: Poisoning by other medications and drugs	27,934	15.48	15.99	3.3
243: Poisoning by nonmedicinal substances	2,659	11.51	12.19	5.9
244: Other injuries and conditions due to external causes	19,846	15.79	16.34	3.5
245: Syncope	95,001	11.90	12.29	3.2
246: Fever of unknown origin	17,447	19.54	20.14	3.1
247: Lymphadenitis	1,297	18.50	19.20	3.8
248: Gangrene	17,575	33.79	34.34	1.6
249: Shock	554	23.11	24.19	4.7
250: Nausea and vomiting	16,042	22.97	23.48	2.2
251: Abdominal pain	36,919	20.14	20.89	3.7
252: Malaise and fatigue	14,952	16.77	17.19	2.5

Clinical Classifications Software Principal Diagnosis Category for the Index Event	Number of Index Events	30-Day Readmission Rate per 100 Index Events		Percentage Increase in the Readmission Rates When Patients Were Followed Across States
		Readmissions Limited to the Same State as the Index Event	Readmissions Considered from Any State	
253: Allergic reactions	5,477	15.45	15.94	3.2
254: Rehabilitation care; fitting of prostheses; and adjustment of devices	1,558	11.04	11.10	0.6
256: Medical examination/evaluation	101	22.77	23.76	4.3
257: Other aftercare	1,889	14.08	14.45	2.6
258: Other screening for suspected conditions (not mental disorders or infectious disease)	522	17.43	17.63	1.1
259: Residual codes; unclassified	43,683	18.57	19.14	3.0
650: Adjustment disorders	1,361	13.45	13.89	3.3
651: Anxiety disorders	4,677	15.72	16.02	1.9
652: Attention-deficit	245	19.59	20.00	2.1
653: Delirium	37,650	14.28	14.72	3.1
654: Developmental disorders	613	19.09	19.41	1.7
655: Disorders usually diagnosed in infancy	115	15.65	17.39	11.1
656: Impulse control disorders	417	17.03	17.51	2.8
657: Mood disorders	45,648	18.81	19.38	3.0
658: Personality disorders	431	25.52	26.45	3.6
659: Schizophrenia and other psychotic disorders	47,114	22.04	22.37	1.5
660: Alcohol-related disorders	30,228	20.72	21.24	2.5
661: Substance-related disorders	32,424	18.68	19.28	3.2

Clinical Classifications Software Principal Diagnosis Category for the Index Event	Number of Index Events	30-Day Readmission Rate per 100 Index Events		Percentage Increase in the Readmission Rates When Patients Were Followed Across States
		Readmissions Limited to the Same State as the Index Event	Readmissions Considered from Any State	
662: Suicide and intentional self-inflicted injury	240	16.67	17.50	5.0
663: Screening and history of mental health and substance abuse codes	11,302	28.35	29.03	2.4
670: Miscellaneous disorders	3,592	13.34	14.23	6.7