An Introduction to the Commonwealth Institute of Kentucky's HCUP-NRD Data

Md Yasin Ali Parh[1], MS; Seyed Karimi[1], PhD

[1]*University of Louisville, School of Public Health and Information Sciences*

1. Background

The Agency for Healthcare Research and Quality's (AHRQ) Healthcare Cost and Utilization Project (HCUP) data is the biggest longitudinal hospital care data collection in the United States (U.S.). HCUP is essentially a family of healthcare databases that started in 1988. The databases are:

- National Inpatient Sample (NIS),

- Kids' Inpatient Database (KID),

- Nationwide Ambulatory Surgery Sample (NASS),

- Nationwide Emergency Department Sample (NEDS),

- Nationwide Readmissions Database (NRD),

- State Inpatient Databases (SID),

- State Ambulatory Surgery and Services Databases (SASD), and

- State Emergency Department Databases (SEDD)

See https://www.hcup-us.ahrq.gov for more information. These databases are built based on information from state data organizations, hospital associations, private data organizations, and the federal government. Together with HCUP software tools and products, they can be used for research on a variety of contemporary healthcare topics and trends. Below is a brief overview of the National Readmission Database (NRD) data.

The NRD has been a part of the HCUP since 2010. It includes all-payer hospital inpatient stays and can be used to produce national readmission estimates, investigate causes of hospital revisiting for treatment, and the hospital costs for discharges with and without readmissions. Similar to the NIS data, the NRD is sampled from the State Inpatient Databases (SID). Currently, 31 states are contributing to constructing the NRD. These states account for about 61% of all hospital admissions in the U.S. and approximately 62% of all residents of the country. The recent NRD contains approximately 17 million (unweighted) discharge data. The weighted estimates include around 32 million discharges (See: NRD Overview (ahrq.gov)).

COMMONWEALTH INSTITUTE OF KENTUCKY

2. Database Information, Documentation, and Purchasing Information:

Regardless of the expected payer for the hospital stay, the NRD database is designed to facilitate various sorts of studies of national readmissions for all patients. Details about this public use databases and documentation are available at this https://hcup-us.ahrq.gov/db/nation/nrd/nrdarchive.jsp.

All purchasers and users of NRD data must complete the web-based HCUP Data Use Agreement (DUA) training course and sign an HCUP DUA before receipt of the data. HCUP data use agreement, training, and responsibility of HCUP data purchaser are available at https://hcup-us.ahrq.gov/tech_assist/dua.jsp.

3. NRD Data Elements and Summary Statistics

The NRD data element describes how the data element is coded in the HCUP databases and what are the uniform values. The descriptions are cumulative across all years of NRD data from 2010 to the current data year. Detailed data element information is available at https://hcup-us.ahrq.gov/db/nation/nrd/nrddde.jsp, and each year record layouts for the NRD file are available at this https://hcup-us.ahrq.gov/db/nation/nrd/nrdfilespecs.jsp. For each year's NRD data, a summary statistic is available at this https://hcup-us.ahrq.gov/db/nation/nrd/nrdsummstats.jsp. Summary statistics include means on all numeric variables, frequency distribution, and univariates on continuous variables.

The recent (2020) NRD data recorded 16,692,694 readmissions with a weighted sum of 32,336,475 records, and 505,635 patients died during hospitalization. The average age of the patients was 54.05 years (standard deviation, SD=24.36), and the majority (55.75%) of the hospital stayed patients were female. Also, the average length of hospital stay was 5.19 days (SD=7.98). Most of the patients were from large central metros (26.93%), 25.77% large fringe metros, 22.72% medium metros, 9.70% small metros, 8.08% micropolitan and the rest noncore areas.

4. Commonwealth Institute of Kentucky's (CIK) NRD Data

4.1. Years of Data

The CIK and the UofL Department of Pediatrics Child and Adolescent Health Research Design and Support Unit (CAHRDS) have jointly purchased the NRD datasets from 2010 to 2014 & 2019.

The data are in the SAS and csv formats, and include
- NRD core file
- NRD hospital file
- NRD diagnosis and procedure groups file and

COMMONWEALTH INSTITUTE OF KENTUCKY

- NRD severity measures file

The following describes the contents/variables of these four data files. The exact name of each variable in the data is also provided and hyperlinked to the HUCP webpage for documentation and summary statistics information.

4.2. Components of the 2019 NRD Core File

- **Patient demographic and location information**
  - Age in years at admission (AGE)
  - Indicator of sex (FEMALE)
  - Patient location: NCHS urban-rural code (PL_NCHS)
  - Median household income for patient's ZIP code (ZIPINC_QRTL)
  - *No race or ethnicity is reported.*

- **Admission information**
  - If admission day was on a weekend (AWEEKEND)

- **Diagnosis and procedure information**
  - ICD-10-CM birth indicator (I10_BIRTH)
  - ICD-10-CM delivery indicator (I10_DELIVERY)
  - ICD-10-CM diagnoses, principal and secondary (I10_DX1 – I10_DX40)
  - Injury ICD-10-CM diagnosis reported on record (I10_INJURY)
  - Multiple ICD-10-CM injuries reported on record (I10_MULTINJURY)
  - Number of ICD-10-CM diagnoses on this discharge (I10_NDX)
  - Number of procedures coded (I10_NPR)
  - ICD-10-PCS procedures, principal and secondary (I10_PR1–I10_PR25)
  - ICD-10-CM/PCS hospital service line indicator (I10_SERVICELINE)
  - Number of days from admission to procedure (PRDAY1-PRDAY25)
  - ICD-10-PCS major operating room procedure (PCLASS_ORPROC)

- **Diagnosis-related group (DRG)**
  - Diagnosis related group in use on discharge date (DRG)
  - DRG in use on discharge date, calculated without present on admission (DRG_NoPOA)
  - DRG or MS-DRG grouper version used on discharge date (DRGVER)

- **Major diagnostic categories (MDCs)**
  - Major diagnostic category (MDC) in use on discharge date (MDC)
  - MDC assignment made without the use of the POA flags for the diagnoses (MDC_NoPOA)

- **Resource use information**
  - Length of stay (LOS)
  - Total charges (TOTCHG)

- **Readmission specific information**
  - Days from start date to admission (NRD_DAYSTOEVENT)

Uof**L** COMMONWEALTH INSTITUTE OF KENTUCKY

- Patient linkage variable in the NRD (NRD_VISITLINK)
- A combined record involving transfer to rehabilitation, evaluation, or other aftercare (REHABTRANSFER)
- Identifies patient as a resident of the State in which he or she received hospital care (RESIDENT)
- Identifies transfer and same day stay collapsed records (SAMEDAYEVENT)

- **Discharge information**
  - Discharge month (DMONTH)
  - Discharge quarter (DQTR)
  - Elective versus non-elective admission (ELECTIVE)
  - HCUP indicator of emergency department record (HCUP_ED)
  - Discharge year (YEAR)

- **Payer information**
  - Primary expected payer (PAY1)

- **NRD linkage data element**
  - HCUP NRD hospital identification number (HOSP_NRD)
    * This *identification number does not link to other HCUP databases or to external databases*

  - HCUP NRD record identifier (KEY_NRD)
    * *This identifier does not link to other HCUP databases or to external databases which also unique record identifier and cannot be used to track a person over time*

- **Weighting**
  - Weight to discharges in the universe (DISCWT)
  - NRD stratum used for weighting (NRD_STRATUM)

4.3. Components of the 2018 NRD Hospital File

- **NRD linkage data element**
  - HCUP NRD hospital identification number (HOSP_NRD)

- **Discharge information**
  - Discharge year (YEAR)

- **Hospital Information**
  - Control/ownership of hospital (H_CONTRL)
  - Bed size of hospital (HOSP_BEDSIZE)
  - Teaching status of hospital (HOSP_UR_TEACH)
  - Hospital urban-rural designation (HOSP_URCAT4)
  - NRD stratum used for weighting (NRD_STRATUM)

- **Weighting**
  - Total number of inpatient discharges in the universe of AHA community excluding, non-

rehabilitation hospitals (N_DISC_U)
- Total number of hospitals in the universe of AHA community excluding non-rehabilitation hospitals (N_HOSP_U)
- Total number of inpatient discharges in sampled hospitals (S_DISC_U)
- Total number of sampled hospitals (S_HOSP_U)
- Total number of discharges for this hospital in the NRD (TOTAL_DISC)

4.4. Components of the 2018 NRD Severity File

o **NRD linkage data element**
   - NRD unique record number (KEY_NRD)
   - NRD hospital number (HOSP_NRD)

o **All patient refined diagnosis related group (DRG)**
   - All patient refined DRG (APRDRG)
   - All patient refined DRG: risk of mortality subclass (APRDRG_Risk_Mortality)
   - All patient refined DRG: severity of illness subclass (APRDRG_Severity)

4.5. Components of the 2018 NRD Diagnosis and Procedure Groups File

o **NRD linkage data element**
   - NRD unique record number (KEY_NRD)
   - NRD hospital number (HOSP_NRD)

o **Elixhauser comorbidity software refined for ICD-10-CM**
   - Elixhauser comorbidity measure refined for ICD-10-CM diagnosis codes (CMR*aaa*[1])
   - Version of the Elixhauser comorbidity measure refined for ICD-10-CM diagnosis codes (CMR_VERSION)

   [1]*aaa* denotes the specific comorbidity measure.

o **Clinical classifications software refined (CCSR) category**
   - Clinical classifications software refined (CCSR): ICD-10-CM diagnosis classification within body system AAA (DXCCSR *aaannn*[2])
   - Default clinical classifications software refined (CCSR) for principal/first-listed ICD-10-CM diagnosis (DXCCSR_DEFAULT_DX1)
   - Version of the clinical classifications software refined (CCSR) for ICD-10-CM diagnosis codes (DXCCSR_VERSION)
   - Clinical classifications software refined (CCSR): ICD-10-PCS procedure classification within clinical domain aaa (PRCCSR_*aaannn*[3])
   - Version of the clinical classifications software refined (CCSR) for ICD-10-PCS procedure codes (PRCCSR_VERSION)

   [2]*aaa* denotes the body system, and *nnn* denotes the CCSR number within the body

system.

[3]PCLASSn was also available on the NRD through quarter 3 of the data year 2015 and was specific to the coding of ICD-9-CM procedures.

- o **Procedure classes refined for ICD-10-PCS**
  - Procedure classes refined for ICD-10-PCS procedure codes (PCLASS*n*)
  - Major operating room ICD-10-PCS procedure indicator (PCLASS_ORPROC)
  - Version of the procedure classes refined for ICD-10-PCS procedure codes(PCLASS_VERSION)

Note: The data linkage element NRD hospital number is available for all files. The NRD record number is also available for all files except the hospital file. Discharge year are common in both core and hospital files

5. Publications
The following link provides access to lists of publications on HCUP data.
https://hcup-us.ahrq.gov/reports/pubsearch/pubsearch.jsp