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

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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 NEDS data.

The NEDS has been a part of HCUP since 2006. NEDS is generated from State Emergency Department Databases (SEDD) and the State Inpatient Databases (SID), which include geographic characteristics, hospital characteristics, patient characteristics, and the nature of visits. This largest publicly available database on emergency department (ED) use and provides national estimates of ED visits. Data from 41 statewide data organizations are currently included in the NEDS sampling frame, which covers approximately 85% of the U.S. population and roughly 84% of all ED visits. The recent NEDS records over 28 million ED visits annually, with a weighted total of around 123 million ED visits from roughly 1,000 hospitals (See: https://hcup-us.ahrq.gov/nedsoverview.jsp).

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2. Database information, documentation, and purchasing information:

The NEDS database describes the ED visits regardless of the inpatient stay and provides an estimate of the ED visits in U.S. Detailed documentation for the NEDS, including detailed specifications, restrictions, and resources necessary for researchers working and publishing with the NEDS is available at https://hcup-us.ahrq.gov/db/nation/neds/nedsarchive.jsp.

All purchasers and users of NEDS 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. NEDS Data Elements and Summary Statistics

Data element descriptions explain how the data element is coded in the HCUP databases and what are the uniform values. The descriptions are cumulative across all years of NEDS data from 2006 to the current data year. Detailed data element information is available at https://hcup-us.ahrq.gov/db/nation/neds/nedsdde.jsp, and each year record layouts for the NEDS file are available at this https://hcup-us.ahrq.gov/db/nation/neds/nedsfilespecs.jsp. The NEDS was designed to evaluate ED usage patterns and to help medical professionals, administrators, public health experts, and policymakers to make decisions on this crucial area of healthcare. For each year's NEDS data, a summary statistic is available at this https://hcup-us.ahrq.gov/db/nation/neds/nedssummstats.jsp. Summary statistics include means on all numeric variables, frequency distribution, and univariates on continuous variables.

The recent (2020) NEDS data recorded 28,036,349 inpatient stays with a weighted sum of 143,432,284 records, and 164,416 patients died during hospitalization. The average age of the patients was 43.36 years (standard deviation, 23.78), and the majority (54%) of the hospital stayed patients were female. Most of the patients were white (54.92%), 20.62% black, 15.93% Hispanic, 3.38% other races, 2.41% Asian/Pacific Islander, 0.59% Native American, and the rest of the patient's race were missing.

4. Commonwealth Institute of Kentucky's (CIK) NEDS 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 NEDS datasets from 2006 to 2019.

The data, which are in CSV format, include
- NEDS core file
- NEDS hospital file
- NEDS supplemental emergency department file
- NEDS supplemental inpatient file, and

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- NEDS diagnosis and procedure groups file

The following describes the contents/variables of these five 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 NEDS Core File**

- **Patient demographic and location information**
  - Age in years at admission (AGE)
  - Indicator of sex (FEMALE)
  - Race (RACE)
  - Patient Location: NCHS urban-rural code (PL_NCHS)
  - Median household income national quartile for the patient (ZIPINC_QRTL)

- **Admission information**
  - If admission day was a weekend (AWEEKEND)
  - Admission month (AMONTH)
  - Type of ED event (ED event)

- **Diagnosis information**
  - ICD-10-CM Diagnosis (I10_DXn) up to 35 diagnoses; n = 1, 2, …, 35
  - Number of ICD-10-CM diagnoses on this discharge (I10_NDX)
  - Injury ICD-10-CM diagnosis reported on record (I10_INJURY)
  - Multiple ICD-10-CM injuries reported on record (I10_MULTINJURY)
  - Mechanism of injury: cut or pierce (I10_INJURY_CUT)
  - Mechanism of injury: drowning or submersion (I10_INJURY_DROWN)
  - Mechanism of injury: fall (I10_INJURY_FALL)
  - Mechanism of injury: fire, flame, hot object, or hot substance (I10_INJURY_FIRE)
  - Mechanism of injury: firearm (I10_INJURY_FIREARM)
  - Mechanism of injury: machinery (I10_INJURY_MACHINERY)
  - Mechanism of injury: motor vehicle traffic, including the occupant of a car, motorcyclist, pedal cyclist, pedestrian, other, or unspecified (I10_INJURY_MVT)
  - Mechanism of injury: natural or environmental, including venomous and nonvenomous bites and stings (I10_INJURY_NATURE)
  - Mechanism of injury: overexertion (I10_INJURY_OVEREXERTION)
  - Mechanism of injury: poisoning, including drugs and nondrugs (I10_INJURY_POISON)
  - Mechanism of injury: struck by or against (I10_INJURY_STRUCK)
  - Mechanism of injury: suffocation (I10_INJURY_SUFFOCATION)
  - Intent of injury: assault (I10_INTENT_ASSAULT)
  - Intent of injury: intentional self-harm (I10_INTENT_SELF_HARM)
  - Intent of injury: unintentional (I10_INTENT_UNINTENTIONAL)

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

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- Disposition from ED (DISP_ED)
- Died in the ED, died in the hospital, or did not die (DIED_VISIT)

o **HCUP source file**
- Source of HCUP Record (SID or SEDD) (HCUPFILE)

o **Linkage data element**
- NEDS unique record number (KEY_ED)
- NEDS hospital number (HOSP_ED)
  * *KEY_ED does not link to other HCUP databases or to external databases*
  * *HOSP_ED does not link to other HCUP databases or to external databases*

o **Weights (to calculate national estimates)**
- NEDS discharge weight (DISCWT)

o **NEDS stratum**
- Stratum used to sample hospital (NEDS_STRATUM)

o **Resource use information**
- Total ED charges (TOTCHG_ED)

o **Payer information**
- Primary expected payer (PAY1)
- Expected secondary payer (PAY2)

4.3. **Components of the 2019 NEDS Hospital File**

o **Linkage data element**
- NEDS hospital number (HOSP_ED)

o **Hospital characteristics**
- Region of the hospital (HOSP_REGION)
- Control/ownership of hospital (H_CONTRL)
- NEDS hospital stratum (NEDS_STRATUM)
- Hospital urban-rural designation (HOSP_URCAT4)
- Hospital trauma level designation (HOSP_TRAUMA)
- Teaching status of hospital (HOSP_UR_TEACH)

o **Discharge counts**
- Total number of inpatient discharges in the universe AHA community, excluding non-rehabilitation hospitals, in the stratum (N_DISC_U)
- Total number of hospitals in the universe of AHA community excluding non-rehabilitation hospital (N_HOSP_U)
- Total number of ED visits from this hospital in the NEDS (TOTAL_EDvisits)

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- o **Hospital counts**
  - Total number of inpatient discharges in sampled hospitals (S_DISC_U)
  - Total number of sampled hospitals (S_HOSP_U)

- o **Weights (to calculate national estimates)**
  - NEDS discharge weight (DISCWT)
  - Hospital-level weight on the HCUP nationwide databases (HOSPWT)

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

4.4. Components of the 2019 NEDS Supplemental ED File

- o **Linkage data element**
  - NEDS unique record number (KEY_NEDS)
  - NEDS hospital number (HOSP_ED)

- o **CPT procedure information**
  - CPT-4/HCPCS procedures (CPTn) up to 35 procedure codes; n = 1, 2, …, 35
  - Clinical Classifications Software (CCS): services and procedures classification (CPTCCSn) up to 35 services and procedures classification; n = 1, 2, …, 35
  - Number of CPT/HCPCS procedures for this discharge (NCPT)

4.5. Components of the 2019 NEDS Supplemental Inpatient File

- o **Linkage data element**
  - NEDS unique record number (KEY_NEDS)
  - NEDS hospital number (HOSP_ED)

- o **Disposition of patient from the hospital**
  - Disposition from inpatient discharge record (DISP_IP)

- o **Diagnosis-related group (DRG)**
  - DRG in use on discharge date (DRG)
  - DRG in use on discharge date, calculated without POA (DRG_NoPOA)
  - DRG or MS-DRG grouper version used on discharge date (DRGVER)
  - MDC in effect on discharge date (MDC)
  - MDC in use on discharge date, calculated without POA (MDC_NoPOA)

- o **Resource use information**
  - Length of stay for inpatient stay (LOS_IP)
  - Total charge for ED and inpatient services (TOTCHG_IP)

- o **ICD-10-PCS procedure information**
  - ICD-10-PCS procedure code (I10_PR_IPn) up to 9 procedure codes; n = 1, 2, … ,9

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- Number of procedures on the ED admission record (I10_NPR_IP)

  o **Data elements derived from the HCUP Software Tools for ICD-10- PCS**
    - Procedure Classes Refined for ICD-10-PCS procedure codes (PCLASSn[1])
    - Version of the Procedure Classes Refined for ICD-10-PCS procedure codes (PCLASS_VERSION)
    - Clinical Classifications Software Refined (CCSR): ICD-10-PCS Procedure Classification within Clinical Domain aaa (PRCCSR_aaannn[2])
    - Version of the Clinical Classifications Software Refined (CCSR) for ICD-10-PCS procedure codes (PRCCSR_VERSION)

      [1] PCLASS_IPn was available on the NEDS through quarter 3 of the data year 2015 and was specific to the coding of ICD-9-CM procedures.

      [2] Where aaa denotes the clinical domain, and *nnn* denotes the CCSR number within the clinical domain.

4.6. Components of the 2019 NEDS Diagnosis and Procedure Groups File

  o **Linkage data element**
    - NEDS unique record number (KEY_NEDS)
    - NEDS hospital number (HOSP_ED)

  o **Clinical Classifications Software Refined (CCSR) for ICD-10- CM diagnoses**
    - Clinical Classifications Software Refined (CCSR): ICD-10-CM Diagnosis Classification within Body System AAA (DXCCSR_aaannn[3])
    - 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)

      [3] *aaa* denotes the body system, and *nnn* denotes the CCSR number within the body system. For example, the data element DXCCSR_CIR007 indicates CCSR category for Essential hypertension under the body system of Diseases of the Circulatory System.

  o **Elixhauser Comorbidity Software Refined for ICD-10-CM**
    - Elixhauser Comorbidity Measure Refined for ICD-10-CM diagnosis codes (CMR_aaa[4])
    - Version of the Elixhauser Comorbidity Measure Refined for ICD-10-CM diagnosis codes (CMR_VERSION)

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

Note: The data linkage element NEDS hospital number is available for all files. The NEDS record number is also available for all files except the hospital file.

5. Publications

The following link provides access to lists of publications on HCUP data.

https://hcup-us.ahrq.gov/reports/pubsearch/pubsearch.jsp