

**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 EMERGENCY DEPARTMENT SAMPLE (NEDS)  
2014**

**These pages provide introductory-level information about the NEDS.**

**For full documentation and notification of changes,  
visit the HCUP User Support (HCUP-US) Web site at  
<http://www.hcup-us.ahrq.gov>.**

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**HCUP NATIONWIDE EMERGENCY DEPARTMENT SAMPLE (NEDS)  
SUMMARY OF DATA USE LIMITATIONS**

**\*\*\*\*\* REMINDER \*\*\*\*\***

**All users of the NEDS must take the on-line HCUP Data Use Agreement (DUA) training course, and read and sign a Data Use Agreement. †**

Authorized users of HCUP data agree to the following restrictions: ‡

- Will not use the data for any purpose other than research or aggregate statistical reporting.
- Will not re-release any data to unauthorized users.
- Will not redistribute HCUP data by posting on any Web site or publically-accessible online repository.
- 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 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 involving those establishments, and will not use the data to determine rights, benefits, or privileges of individual establishments.
- 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.
- Will acknowledge that risk of individual identification of persons is increased when observations (i.e., individual discharge records) in any given cell of tabulated data is less than or equal to 10.

Any violation of the limitations in the Data Use Agreement is punishable under Federal law by a fine of up to \$10,000 and up to 5 years in prison. Violations may also be subject to penalties under State statutes.

† The on-line Data Use Agreement training session and the Data Use Agreement are available on the HCUP User Support (HCUP-US) Web site at <http://www.hcup-us.ahrq.gov>.  
‡ Specific provisions are detailed in the Data Use Agreement for Nationwide Databases.

## 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:  
[http://www.hcup-us.ahrq.gov/tech\\_assist/dua.jsp](http://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) Web site at: <http://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:

<https://www.distributor.hcup-us.ahrq.gov/Purchasing-Frequently-Asked-Questions.aspx>

Phone: 866-556-HCUP (4287) (toll free)

Email: [HCUPDistributor@AHRQ.gov](mailto: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) Web site (<http://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:

[http://www.hcup-us.ahrq.gov/tech\\_assist/faq.jsp](http://www.hcup-us.ahrq.gov/tech_assist/faq.jsp)

Phone: 866-290-HCUP (4287) (toll free)

Email: [hcp@ahrq.gov](mailto:hcp@ahrq.gov)

## WHAT IS THE NATIONWIDE EMERGENCY DEPARTMENT SAMPLE (NEDS)?

- The Nationwide Emergency Department Sample (NEDS) tracks information about emergency department (ED) visits across the country. Information includes geographic characteristics, hospital characteristics, patient characteristics, and the nature of visits (e.g., common reasons for ED visits, acute and chronic conditions, and injuries).
- The NEDS was constructed using the HCUP State Emergency Department Databases (SEDD) and the State Inpatient Databases (SID). The SEDD capture discharge information on ED visits that do not result in an admission (i.e., treat-and-release visits and transfers to another hospital). The SID contain information on patients initially seen in the emergency room and then admitted to the same hospital.
- The NEDS is a publicly available database that can be purchased through the HCUP Central Distributor. Annual data files are available from 2006 to 2014.
- There are 34 HCUP Partner organizations that contributed to the 2014 NEDS: AR, AZ, CA, CT, DC, FL, GA, HI, IA, IL, IN, KS, KY, MA, MD, ME, MN, MO, MT, NC, ND, NE, NJ, NV, NY, OH, RI, SC, SD, TN, UT, VT, WI, and WY.
- The NEDS describes 138 million ED visits for 2014, an exceptional resource for conducting research on high-profile emergent health delivery issues. One of the most distinctive features of the NEDS is its large sample size, which allows for analysis across hospital types and the study of relatively uncommon disorders and procedures.
- Users must complete the [HCUP Data Use Agreement Training Course](#) prior to receiving the data.

## UNDERSTANDING THE NEDS

- This document, *Introduction to the NEDS, 2014*, summarizes the content of the NEDS and describes the development of the 2014 NEDS sample and weights.
- Important considerations for data analysis are highlighted and references to further resources are provided.
- In-depth documentation for the NEDS is available on the HCUP User Support (HCUP-US) Web site ([www.hcup-us.ahrq.gov](http://www.hcup-us.ahrq.gov)). Please refer to detailed documentation before using the data.

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**HCUP Nationwide Emergency Department Sample (NEDS)**

**ABSTRACT**

The Nationwide Emergency Department Sample (NEDS) is part of the Healthcare Cost and Utilization Project (HCUP) that is sponsored by the Agency for Healthcare Research and Quality (AHRQ). The 2014 NEDS is a publicly available database that can be purchased through the HCUP Central Distributor.

The NEDS was created to enable analyses of emergency department (ED) utilization patterns and to support public health professionals, administrators, policymakers, and clinicians in their decision-making regarding this critical source of care. The ED serves a dual role in the U.S. healthcare system infrastructure, as a point of entry for approximately 50 percent of inpatient hospital admissions and as a setting for treat-and-release outpatient visits.<sup>1</sup> The NEDS has many research applications, because it contains information about geographic, hospital, and patient characteristics as well as descriptions of the nature of the visits (i.e., common reasons for ED visits, including injuries).

The NEDS is the largest all-payer ED database that is publicly available in the United States, containing information from 31 million ED visits at 945 hospitals that approximate a 20-percent stratified sample of U.S. hospital-owned EDs. Weights are provided to calculate national estimates pertaining to 138 million ED visits in 2014.

The NEDS is drawn from statewide data organizations that provide HCUP with data from ED visits that may or may not have resulted in hospital admission. Thirty-four HCUP Partner organizations participated in the 2014 NEDS. See [Appendix A, Table A.1](#) for a list of HCUP Partner organizations participating in the NEDS.

By stratifying on important hospital characteristics, the NEDS represents a microcosm of U.S. hospital-owned EDs. Stratification is based on the following five characteristics:

- Geographic region (Northeast, Midwest, South, and West)
- Trauma center designation (trauma level I, II, III, and nontrauma)
- Urban-rural location of the hospital (large metropolitan, small metropolitan, micropolitan, and non-urban residual)
- Teaching hospitals
- Hospital ownership or control (public, for-profit, and not-for-profit).

Access to the NEDS is open to users who sign Data Use Agreements. Uses are limited to research and aggregate statistical reporting. For more information on the NEDS, visit the AHRQ-sponsored HCUP User Support (HCUP-US) Web site at <http://www.hcup-us.ahrq.gov>.

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<sup>1</sup> Merrill, C. T. and Owens, P. L. (2007). Hospital Admissions That Began in the Emergency Department for Children and Adolescents, 2004. HCUP Statistical Brief #32. June 2007. Agency for Healthcare Research and Quality, Rockville, MD. Retrieved June 9, 2008 from <http://www.hcup-us.ahrq.gov/reports/statbriefs/sb32.pdf>

## INTRODUCTION TO THE NATIONWIDE EMERGENCY DEPARTMENT SAMPLE (NEDS)

### Overview of NEDS Data

The Healthcare Cost and Utilization Project (HCUP) Nationwide Emergency Department Sample (NEDS) was created to enable analyses of emergency department (ED) utilization patterns and to support public health professionals, administrators, policymakers, and clinicians in their decision-making regarding this critical source of care. The ED serves a dual role in the U.S. healthcare system infrastructure, as a point of entry for approximately 50 percent of inpatient hospital admissions and as a setting for treat-and-release outpatient visits.<sup>2</sup> The NEDS has many research applications, because it contains information about geographic, hospital, and patient characteristics as well as the nature of visits (e.g., common reasons for ED visits, acute and chronic conditions, and injuries).

The number of States, hospital-owned EDs, and ED visits included in the NEDS varies by year (Table 1). The specific HCUP Partner organizations that contribute to the NEDS are identified in [Appendix A, Table A.1](#).

**Table 1.** Number of States, Hospital-Owned Emergency Departments, and Records in the NEDS by Year

| Data Year | HCUP States in the NEDS  | Number of Hospital-Owned EDs | Number of ED Visits, Unweighted | Number of ED Visits, Weighted for National Estimates |
|-----------|--|------------------------------|---------------------------------|--|
| 2014      | AR, AZ, CA, CT, DC, FL, GA, HI, IA, IN, KS, KY, IL, MA, MD, ME, MN, MO, MT, NC, ND, NE, NJ, NV, NY, OH, RI, SC, SD, TN, UT, VT, WI, and WY<br>(Added DC, MT, and WY) | 945                          | 31,026,417                      | 137,807,901  |
| 2013      | AR, AZ, CA, CT, FL, GA, HI, IA, IN, KS, KY, IL, MA, MD, MN, MO, NC, ND, NE, NJ, NV, NY, OH, RI, SC, SD, TN, UT, VT, and WI<br>(Added AR; ME data were not available) | 947                          | 29,581,718                      | 134,869,015  |
| 2012      | AZ, CA, CT, FL, GA, HI, IA, IN, KS, KY, IL, MA, MD, ME, MN, MO, NC, ND, NE, NJ, NV, NY, OH, RI, SC, SD, TN, UT, VT, and WI   | 950                          | 31,091,029                      | 134,399,179  |
| 2011      | AZ, CA, CT, FL, GA, HI, IA, IN, KS, KY, IL, MA, MD, ME, MN, MO, NC, ND, NE, NJ, NV, NY, OH, RI, SC, SD, TN, UT, VT, and WI<br>(Added ND; NH data were not available) | 951                          | 29,421,411                      | 131,048,605  |

<sup>2</sup> Merrill, C. T. and Owens, P. L. (2007). Hospital Admissions That Began in the Emergency Department for Children and Adolescents, 2004. HCUP Statistical Brief #32. June 2007. Agency for Healthcare Research and Quality, Rockville, MD. Retrieved June 9, 2008 from <http://www.hcup-us.ahrq.gov/reports/statbriefs/sb32.pdf>



| Data Year | HCUP States in the NEDS  | Number of Hospital-Owned EDs | Number of ED Visits, Unweighted | Number of ED Visits, Weighted for National Estimates |
|-----------|--|------------------------------|---------------------------------|--|
| 2010      | AZ, CA, CT, FL, GA, HI, IA, IN, KS, KY, IL, MA, MD, MN, MO, NC, NE, NJ, NV, NY, OH, RI, SC, SD, TN, UT, VT, and WI<br>(Added NV;<br>ME and NH data were not available) | 961                          | 28,584,301                      | 128,970,364  |
| 2009      | AZ, CA, CT, FL, GA, HI, IA, IN, KS, KY, IL, MA, MD, ME, MN, MO, NC, NE, NH, NJ, NY, OH, RI, SC, SD, TN, UT, VT, and WI<br>(Added IL)                                   | 964                          | 28,861,047                      | 128,885,040  |
| 2008      | AZ, CA, CT, FL, GA, HI, IA, IN, KS, KY, MA, MD, ME, MN, MO, NC, NE, NH, NJ, NY, OH, RI, SC, SD, TN, UT, VT, and WI<br>(Added KY)                                       | 980                          | 28,447,148                      | 124,945,264  |
| 2007      | AZ, CA, CT, FL, GA, HI, IA, IN, KS, MA, MD, ME, MN, MO, NC, NE, NH, NJ, NY, OH, RI, SC, SD, TN, UT, VT, and WI<br>(Added NC, NY, RI)                                   | 966                          | 26,627,923                      | 122,331,739  |
| 2006      | AZ, CA, CT, FL, GA, HI, IA, IN, KS, MA, MD, ME, MN, MO, NE, NH, NJ, OH, SC, SD, TN, UT, VT, and WI   | 955                          | 25,702,597                      | 120,033,570  |

[Appendix A, Figure A.1](#) represents the geographic distribution of the 34 HCUP Partner organizations participating in the 2014 NEDS. Based on U.S. Census Bureau data, the HCUP NEDS States with the District of Columbia account for 68.7 percent of the U.S. population in 2014. The 34 Partner organizations account for 67.6 percent of the ED visits reported in the 2014 American Hospital Association (AHA) Annual Survey Database. Details on the percentage of population and ED visits by region are provided in [Appendix A, Table A.2](#).

### ***Identification of HCUP Records with Emergency Department Services***

Records for ED events are contained in two existing HCUP databases:

- State Emergency Department Databases (SEDD) capture discharge information on all ED visits that do not result in an admission to that hospital (e.g., treat-and-release visits, transfers to another hospital, deaths).
- State Inpatient Databases (SID) contain information on patients initially seen in the emergency room and then admitted to the same hospital.

Both of these HCUP databases contain a core set of clinical and non-clinical information elements that are defined in a uniform scheme for all patients, regardless of payer. This scheme makes it possible to combine records across databases.

Selection of ED records from the SEDD and SID for use in the NEDS was based on evidence of ED services reported on the record. Differing methods are used by HCUP Partner organizations for identifying ED records. The HCUP criteria for identifying an ED record (i.e., a discharge record for a patient with an ED event) look for at least one of the following conditions to be true:

- Revenue center code of 450-459 reported on discharge record, indicating ED services.
- ED charge greater than zero dollars, when revenue center codes were not available.
- Physicians' Current Procedural Terminology (CPT) code of 99281-99285 reported on discharge record, indicating ED physician services.
- ED identified by admission source (National Uniform Billing Committee (NUBC) preferred coding prior to October 1, 2007), point of origin (NUBC preferred coding from October 1, 2007 to June 30, 2010), or condition code of P7 (NUBC preferred coding for public reporting as of July 1, 2010). These criteria are used primarily for ED admissions.

Three of the 34 Partner organizations (CA, DC, and MA) do not provide ED charge information (either in revenue codes or a separate charge field) on records. This limited the ability to clearly identify ED visits in the SEDD using the HCUP criteria. Therefore, the identification of ED records for these data sources was evaluated individually.

- CA and MA: In each case, the HCUP Partner provided a source file that contained only ED treat-and-release records. Because the data source provided a dedicated ED file, all of the SEDD records were considered to be ED records, even though information was not available to determine if HCUP criteria were met.
- DC: The HCUP Partner provided a large outpatient database that combined records for ED services with records for other outpatient visits, such as ambulatory surgery. Each record contained a Partner-defined indicator of the type of outpatient service. Outpatient records with an outpatient type of service value of 1 (ED) and 2 (Fast Track ED) were considered to be ED records, even though information was not available on the record to determine if the HCUP criteria were met.

In data years 2010-2012 some OH hospitals consistently did not identify ED admissions in the SID. For these data years, OH hospitals were excluded from the NEDS sampling frame if the percentage of ED admissions between the prior data year and the current data year decreased by more than 20%. About 45 OH hospitals a year were excluded from the sampling frame in 2010-2012. By data year 2013, no OH hospitals needed to be excluded from the sampling frame because ED admissions were clearly identified.

### ***Partner-Specific Restrictions***

Some HCUP Partner organizations that contributed data to the NEDS imposed restrictions on the release of certain data elements or on the number and types of hospitals 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 Partner-specific restrictions is available in [Appendix B](#).

## ***File Structure of the NEDS***

Because of the size of the NEDS and the difference in information collected on records for patients admitted into the hospital directly from the ED (SID records) and for ED patients that are not admitted (SEDD records), the NEDS is divided into four different files:

**Core File:** This file contains 100 percent of the ED events – whether resulting in admission or not – from the sample of hospitals in participating States and the District of Columbia. In 2014, the NEDS Core File has about 31 million ED records. Refer to [Appendix C, Table C.1](#) for a list of data elements in the NEDS Core File.

**Supplemental ED File:** This file contains information on CPT-4 and ICD-9-CM procedures that were performed in the ED for patients who are not admitted directly to the hospital. This information came from the SEDD. In 2014, the NEDS Supplemental ED File has 26.6 million ED records. The unique NEDS record identifier (KEY\_ED) provides the linkage between the NEDS Core File and the Supplemental ED File. Refer to [Appendix C, Table C.2](#) for a list of data elements in the NEDS Supplemental ED File. For patients seen in the ED and admitted to the same hospital (SID records), information about the stay is contained in the Supplemental Inpatient File.

**Supplemental Inpatient File:** This file contains data elements that are not specific to the ED, such as total charges for the inpatient stay, length of inpatient stay, and ICD-9-CM procedures from the SID record. Procedures reported on the SID records may have been performed in the ED, but currently there is no way to verify this information. In 2014, the NEDS Supplemental Inpatient File has 4.4 million records. The unique NEDS record identifier (KEY\_ED) provides the linkage between the NEDS Core File and the Supplemental Inpatient File. Refer to [Appendix C, Table C.3](#) for a list of data elements in the NEDS Supplemental Inpatient File.

**Hospital Weights File:** This hospital-level file contains one observation for each hospital included in the NEDS and contains weights and variance estimation data elements. In 2014, the NEDS Hospital Weights File has 945 hospital-specific records. The HCUP ED hospital identifier (HOSP\_ED) provides the linkage between the NEDS Core File and the Hospital Weights File. A list of data elements in the Hospital Weights File is provided in [Appendix C, Table C.4](#).

## ***NEDS Data Elements***

The coding of data elements in the NEDS 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 HCUP User Support (HCUP-US) Web site (<http://www.hcup-us.ahrq.gov/db/coding.jsp>).

After analyzing the availability of information from the HCUP Partner organizations, a set of common fields to be available in the NEDS was created. The NEDS contains more than 100 clinical and non-clinical variables provided in a hospital discharge abstract, such as:

- ICD-9-CM diagnoses and external cause of injury codes

- Identification of injury-related ED visits, including mechanism and intent of injury and severity
- ICD-9-CM and CPT procedure codes
- Patient demographics (e.g., gender, age, urban-rural designation of residence, national quartile of the median household annual income for the patient's ZIP Code)
- Expected payment source (e.g., Medicare, Medicaid, private insurance, self-pay)
- Hospital characteristics (e.g., indicator of trauma center level, including pediatric trauma centers, urban-rural designation of county, ownership, teaching status, region of the U.S.)
- ED charges and total hospital charges for patients admitted as an inpatient through the ED.

[Appendix C](#) identifies the data elements in each NEDS file:

- [Table C.1](#) for the NEDS Core File (record = ED event)
- [Table C.2](#) for the NEDS Supplemental ED File (record = ED event that did not result in direct inpatient admission to the same hospital)
- [Table C.3](#) for the NEDS Supplemental Inpatient File (record = ED event that resulted in a direct inpatient admission to the same hospital)
- [Table C.4](#) for the Hospital Weights File (record = hospital).

Not all data elements in the NEDS are uniformly coded or available across all States. The tables in [Appendix C](#) provide summary documentation for the data. Please refer to the NEDS documentation on the HCUP-US Web site (<https://www.hcup-us.ahrq.gov/db/nation/neds/nedsdde.jsp>) for comprehensive information about the data elements.

## Getting Started

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

- 1) Core File (NEDS\_2014\_Core.zip)
- 2) Hospital Weights File (NEDS\_2014\_Hospital.zip)
- 3) Supplemental ED File (NEDS\_2014\_ED.zip)
- 4) Supplemental Inpatient File (NEDS\_2014\_IP.zip).

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

- The password provided by the HCUP Central Distributor
- A hard drive with 60 to 100 gigabytes (GB) 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 CSV version of the NEDS is 19 GB. The NEDS files loaded into SAS are about 15 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 NEDS files would require at least 45 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 NEDS files loaded into SPSS are about 30 GB. Because Stata loads the entire file into memory, it may not be possible to load every data element in the NEDS 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 NEDS Files***

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

- 1) Create a directory for the NEDS on your hard drive.
- 2) Unzip the compressed NEDS product file into the new directory using a third-party zip utility. This will place four 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 CSV 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

Web site (HCUP-US). These steps are used to download and run the load programs:

- 1) Go to the NEDS Database Documentation page on HCUP-US at <http://www.hcup-us.ahrq.gov/db/nation/neds/nedsdbdocumentation.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 (“NEDS”) from the drop down lists on this page. Or you may select “NEDS 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 2014 NEDS Core file is found under the link “SAS NEDS 2014 Core File” in the list generated by selecting “2014” and “NEDS.” Save the load programs into the same directory as the NEDS 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.

### ***NEDS Documentation***

Comprehensive documentation for the NEDS files is available on the HCUP-US Web site (<http://www.hcup-us.ahrq.gov/db/nation/neds/nedsdbdocumentation.jsp>). Users of the NEDS can access complete file documentation, including variable notes, file layouts, summary statistics, and related technical reports. Similarly, data users can download SAS, SPSS, and Stata load programs. These important resources help the user understand the structure and content of the NEDS and aid in using the database.

[Appendix A, Table A.3](#) details the comprehensive NEDS 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 information on using HCUP data and tools and training on technical methods for conducting research with HCUP data. Topics include an [HCUP Overview Course](#) and these tutorials:

- The [Load and Check HCUP Data](#) tutorial provides instructions on how to unzip (decompress) HCUP data, save it on your computer, and load the data into a standard statistical software package. This tutorial also describes how to verify that the data have loaded correctly.
- The [HCUP Sampling Design](#) tutorial is designed to help users learn how to account for sample design in their work with HCUP nationwide databases.
- The [Producing National HCUP Estimates](#) tutorial is designed to help users understand how three of the nationwide databases – the NIS, NEDS, and KID – can be used to produce national and regional estimates.
- The [Calculating Standard Errors](#) tutorial shows how to accurately determine the precision of the estimates produced from the HCUP nationwide databases. Users will learn two methods for calculating standard errors for estimates produced from the HCUP nationwide databases.

- The [Multi-year Analysis](#) tutorial presents solutions that may be necessary when conducting analyses that span multiple years of HCUP data.

New tutorials are added periodically. The Online Tutorial Series is located on the HCUP-US Web site at [http://hcup-us.ahrq.gov/tech\\_assist/tutorials.jsp](http://hcup-us.ahrq.gov/tech_assist/tutorials.jsp).

## **SAMPLING DESIGN OF THE NEDS**

The NEDS is built using a 20 percent stratified sample of hospital-owned EDs in the United States. The main objective of a stratified sample is to ensure that it is representative of the target universe. By stratifying on important hospital characteristics, the NEDS represents a “microcosm” of EDs in the U.S. For example, by including *trauma center designation* in the sampling strategy, the NEDS has the same percentage of trauma hospitals as the entire U.S. The NEDS contains all of the ED visits for the sample of hospital-owned EDs selected.

### **Universe of Hospital-Owned Emergency Departments**

A feasibility study performed in 2008 assessed several possible data sources for the universe of hospital-owned EDs in the United States: the American Hospital Association (AHA) Annual Survey Database (Health Forum, LLC © 2007); Verispan, LLC databases (now called IMS Health, Inc.); and the Centers for Medicare and Medicaid (CMS) Hospital Cost Reports. The AHA Annual Survey Database has the best data to apply for a couple of reasons. First, the AHA data provide the necessary hospital characteristics, such as ownership type and teaching status, and also report total ED visits for hospitals. Second, the crosswalk linkage from the HCUP databases to the AHA data is already established. The universe of hospital-owned EDs is therefore defined as the AHA community, nonrehabilitation hospitals that reported total ED visits. The AHA defines community hospitals as “all non-Federal, short-term, general, and other specialty hospitals”.<sup>3</sup> Included among community hospitals are pediatric institutions, public hospitals, and academic medical centers.

### **Sampling Frame of the NEDS**

The sampling frame of the NEDS is limited to a subset of the universe: hospital-owned EDs in the States and District of Columbia for which HCUP ED data (SID and SEDD) are available. The list of hospital-owned EDs in the frame consists of all AHA community, nonrehabilitation hospitals that report total ED visits in each of the frame States and District of Columbia *that could be matched to the ED data provided to HCUP*. If an ED in the AHA survey could not be matched to the ED data provided by the HCUP data source, it was eliminated from the sampling frame (but not from the target universe).

### **Stratification Variables**

The following hospital characteristics were used for sample stratification: U.S. Census region, trauma center designation, urban-rural location of the hospital, ownership, and teaching status. ED bed size was not used because no data source for this information could be identified. A number of data sources report the bed size of the hospital, but no source distinguishes between inpatient and ED beds.

The NEDS stratification variables are described below and detailed in [Appendix A, Table A.4](#).

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<sup>3</sup> More of the AHA “community hospital designation” is available at <http://www.ahadataviewer.com/glossary>.

## **U.S. Census Region**

The four Census regions – Northeast, Midwest, South, and West – were used to stratify EDs by geographic location because practice patterns may vary substantially by region. [Appendix A, Figure A.1](#) shows the NEDS States by region.

## **Trauma Centers**

A trauma center is a hospital that is equipped to provide comprehensive emergency medical services 24 hours a day, 365 days per year to patients with traumatic injuries. In 1976, the American College of Surgeons Committee on Trauma (ACS/COT) defined five levels of trauma centers:<sup>4</sup>

- Level I centers have comprehensive resources, are able to care for the most severely injured, and provide leadership in education and research.
- Level II centers have comprehensive resources and are able to care for the most severely injured, but do not provide leadership in education and research.
- Level III centers provide prompt assessment and resuscitation, emergency surgery and, if needed, transfer to a level I or II center.
- Level IV/V centers provide trauma support in remote areas in which no higher level of care is available. These centers resuscitate and stabilize patients and arrange transfer to an appropriate trauma facility.

The ACS/COT has a program that verifies hospitals as trauma level I, II, or III.<sup>5</sup> It is important to note that although all level I, II, and III trauma centers offer a high level of trauma care, there may be differences in the specific services and resources offered by hospitals of different levels. Trauma levels IV and V are designated at the State level (and not by ACS/COT) with varying criteria applied across States.

The level of the trauma centers in the NEDS was identified using the Trauma Information Exchange Program (TIEP) database, a national inventory of trauma centers in the U.S. collected by the American Trauma Society.<sup>6</sup> The TIEP database identifies all U.S. trauma centers that are level I, II, and III that treat both adults and children. TIEP includes some information on trauma centers within children's hospitals, but this is not their focus. To ensure that all of trauma centers are identified for the NEDS, the ACS/COT list of trauma centers and all State-specific Web sites on emergency services are reviewed to identify any additional trauma centers within children's hospitals and their associated trauma levels.

The stratum for trauma center in the NEDS was limited to trauma levels I, II, and III. Level IV and V centers were not included because the criteria for designation varied across States. For hospital confidentiality purposes, a collapsed stratification was necessary if the strata size in the universe or frame was less than two hospitals. The grouping of trauma centers into collapsed categories varied by data year:

- Trauma centers levels I and II could be grouped together in all years of the NEDS
- Trauma levels I through level III could be grouped together in the 2006-2010 NEDS

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<sup>4</sup> MacKenzie EJ, Hoyt DB, Sacra JC, et al. National inventory of hospital trauma centers. *JAMA*. 2003;289:1515-1522.

<sup>5</sup> American College of Surgeons Committee on Trauma, Verification, Review, and Consultation Program for Hospitals. Additional details are available at <https://www.facs.org/quality-programs/trauma/vrc>. Accessed November 2015.

<sup>6</sup> American Trauma Society. Trauma Information Exchange Program. Available at: <http://www.amtrauma.org/?page=TIEP>. Accessed October 2014.



- Trauma level III could be grouped with nontrauma hospitals beginning in the 2011 NEDS.

The change between the 2010 and 2011 NEDS was prompted by differences between injury-related services provided by trauma level I and II centers versus injury-related services provided by trauma level III centers. Services at trauma level III centers were more similar to nontrauma hospitals.

### ***Urban-Rural Location of the ED***

The urban-rural location of hospital-owned EDs was determined based on the county in which the hospital was located. The categorization is based on Urban Influence Codes (UIC).<sup>7</sup> In the 2014 NEDS, the categorization is a simplified adaptation of the 2013 version of the UIC. Prior to 2014, the categorization is a simplified adaptation of the 2003 version of the UIC. The twelve detailed UIC categories are combined into four broader categories:

- Large metropolitan area – areas with at least one million residents
- Small metropolitan area – areas with less than one million residents
- Micropolitan area – non-metropolitan area with at least 10,000 people or more
- Non-urban residual.

If the strata size in the universe or frame was less than two hospitals, a collapsed stratification of metropolitan (large and small), non-metropolitan (micropolitan and non-urban residual), small metropolitan and micropolitan,<sup>8</sup> or all areas<sup>9</sup> was necessary.

### ***Teaching Status***

A hospital-owned ED is considered to be a teaching facility if the associated hospital has an American Medical Association (AMA) approved residency program, is a member of the Council of Teaching Hospitals (COH), or has a ratio of full-time equivalent interns and residents to beds of 0.25 or higher according to the AHA Annual Survey Database. Because there are very few teaching hospitals in micropolitan and rural areas, teaching status was only used to stratify EDs in metropolitan areas.

### ***Hospital Ownership***

Hospital ownership or control was categorized according to information reported in the AHA Annual Survey Database. Ownership categories include:

- Public – government, non-Federal
- Voluntary – private, not-for-profit
- Proprietary – private, investor-owned/for-profit.

When there were enough hospitals of each type, EDs were stratified into public, voluntary, and proprietary categories. If necessary, because of small strata size in the universe, a collapsed stratification of public versus private was used; the voluntary, non-profit and proprietary/for-profit hospitals were combined to form a single “private” category. Stratification based on ownership or control was not advisable in some regions because of the dominance of one type of hospital

<sup>7</sup> United States Department of Agriculture Economic Research Service (<https://www.ers.usda.gov/data-products/urban-influence-codes.aspx>)

<sup>8</sup> The collapsing of small metropolitan and micropolitan areas was required in the South in 2011–2014.

<sup>9</sup> The collapsing of all areas was required in the South in 2014.

(e.g., Northeast).

### **Sample Weights**

To obtain nationwide estimates, weights were developed using the AHA universe as the standard. These were developed separately for analyses of hospital-owned EDs and ED visits. Hospital-level weights were developed to extrapolate NEDS sample EDs to the universe of hospital-owned EDs. Similarly, discharge-level discharge weights were developed to extrapolate NEDS sample ED visits to the universe of ED visits.

### **Hospital Weights**

Hospital weights to the universe were calculated after sampling and by strata. Hospital-owned EDs were stratified on the same variables that were used for sampling: geographic region, trauma center designation, urban-rural location, teaching status, and ownership or control. The strata that were collapsed for sampling were also collapsed for sample weight calculations. Within each stratum,  $s$ , each ED in the NEDS sample received a weight:

$$\text{HOSPWT} = W_s(\text{universe}) = N_s(\text{universe}) \div N_s(\text{sample})$$

where  $W_s(\text{universe})$  was the ED universe weight, and  $N_s(\text{universe})$  and  $N_s(\text{sample})$  were the number of hospital-owned EDs within stratum  $s$  in the universe and sample, respectively. Thus, each hospital's universe weight (HOSPWT) is equal to the number of universe hospitals it represents during that year. Because 20 percent of the hospitals in each stratum were sampled when possible, the ED weights were usually near five.

### **Discharge Weights**

Discharge weights to the universe were calculated after sampling and by strata. Hospital-owned EDs were stratified in a manner similar to that for universe hospital-weight calculations. Within stratum,  $s$ , for hospital,  $i$ , the universe weight for each visit in the NEDS sample, was calculated as:

$$\text{DISCWT} = DW_{is}(\text{universe}) = [DN_s(\text{universe}) \div ADN_s(\text{sample})] * (4 \div Q_i)$$

where  $DW_{is}(\text{universe})$  was the discharge weight;  $DN_s(\text{universe})$  represented the number of ED visits from community, nonrehabilitation hospitals in the universe within stratum  $s$ ;  $ADN_s(\text{sample})$  was the number of adjusted ED visits from sample hospitals, selected for the NEDS; and  $Q_i$  represented the number of quarters of ED visits contributed by hospital  $i$  to the NEDS (usually  $Q_i = 4$ ). Thus, each discharge's weight (DISCWT) is equal to the number of universe ED visits it represents in stratum  $s$  during that year.

### **Final NEDS Sample**

The target universe for the NEDS was: (1) community, nonrehabilitation hospital-owned EDs in the United States that were included in the 2014 AHA Annual Survey Database, and (2) reported total ED visits. Excluded were a handful of non-rural hospitals that reported less than ten ED visits in a year.

The NEDS sampling frame included hospital-owned ED events from community, nonrehabilitation hospitals in the 34 HCUP Partner organizations that provided discharge abstracts on patients admitted to the hospital through the ED and on patients treated and released or transferred to another hospital from the ED. The HCUP hospitals were required to

be represented in the AHA data and have no more than 90 percent of their ED visits resulting in admission. [Appendix A, Table A.5](#) lists the final target universe and sampling frame for the NEDS.

The NEDS is a stratified probability sample of hospital-owned EDs in the frame. Sampling probabilities were calculated to select 20 percent of the universe contained in each stratum, which was defined by region, trauma designation, urban-rural location, teaching status, and hospital ownership or control. A sample size of 20 percent was based on previous experience with similar research databases. A larger sample would be cumbersome for data users, given that a 20 percent sample contains about 30 million records. A 20 percent sample also enables the user to split the NEDS into two 10 percent subsamples for estimation and validation of models.

To further ensure accurate geographic representation, hospitals were implicitly stratified by State and three-digit ZIP Code (i.e., the first three digits of the hospital's five-digit ZIP Code).<sup>10</sup> This was accomplished through sorting by three-digit ZIP Code within each stratum prior to drawing a systematic random sample of hospitals. Within the three-digit ZIP Code, hospitals were sorted by a random number to ensure further geographic generalizability of hospitals within the frame States; otherwise, generally, three-digit ZIP Codes that are proximal in value are geographically near one another within a State. Furthermore, the U.S. Postal Service locates regional mail distribution centers at the three-digit level. Thus, the boundaries tend to be a compromise between geographic size and population size.

Using the universe of U.S. hospital-owned EDs, strata were defined by region, trauma designation, urban-rural location, teaching status, and hospital ownership or control. Strata with less than two hospitals in the universe and frame were collapsed with adjacent stratum based on urban-rural location, trauma designation, or ownership or control. After stratifying and sorting the frame hospitals, a random sample of up to 20 percent of the total number of hospital-owned EDs in the U.S. was selected within each stratum. A stratum with a shortfall was defined as having an insufficient number of EDs in the frame to meet the threshold of 20 percent of the universe for that stratum. In strata with shortfalls, the sampling rate from the universe was less than 20 percent and all possible EDs in the frame were selected for the NEDS. In contrast, the sampling rate is larger than 20 percent in some strata because protecting hospital confidentiality required a minimum of two sampled EDs in each stratum. [Appendix A, Table A.6](#) lists the sampling rates by stratum for the NEDS.

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<sup>10</sup> The State and ZIP Code of the hospital were used for sampling, but are not included in the NEDS data files.

## HOW TO USE THE NEDS FOR DATA ANALYSIS

This section provides a brief synopsis of special considerations for using the NEDS. For more details, refer to the comprehensive documentation on the HCUP-US Web site (<http://www.hcup-us.ahrq.gov/>).

All persons using the NEDS (whether or not they are the original recipient of the data) must complete the on-line Data Use Agreement Training Course available on the HCUP-US Web site ([https://www.hcup-us.ahrq.gov/tech\\_assist/dua.jsp](https://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 2 of this document for the mailing address.

### Limitations of the NEDS

The NEDS contains about 30 million ED 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.

- The NEDS is an extremely large database that requires sophisticated, statistical software for analysis and 60 to 100 GB of computer space.
- In 2014, about 16 percent of all ED visits (weighted) are missing information about ED charges. For ED visits that result in admission, 27 percent of records are missing ED charges. For ED visits that do not result in admissions, 14 percent of records are missing ED charges. The missing information is concentrated in the West. Estimates of the sum of charges should use the product of the number of cases times the average charge to account for records with missing information.
- The NEDS contains event-level records, not patient-level records. This means that individual patients who visit the ED multiple times in one year may be present in the NEDS multiple times. There is no uniform patient identifier available that would allow a patient-level analysis to identify individuals with more than one ED visit. In contrast, some HCUP State databases may be used for this type of analysis.
- If a patient is directly admitted from the ED to the same hospital, one discharge record is included in the NEDS. If a patient is transferred from an ED to another ED, there would be two discharge records—one from the “transfer out” hospital and one from the receiving hospital. Both of these records will be included in the NEDS only if both hospitals were selected for inclusion in the NEDS sample. It is possible that only one of these two records will be included in the NEDS, if only one of the hospitals was sampled. This type of transfer (from an ED to another ED or acute care hospital) only occurs in about 1.5 percent of the NEDS.
- For a patient who was directly admitted to the same hospital through the ED, clearly identifying whether a procedure was performed in the ED or as part of the inpatient stay is not currently possible. Information on procedures for ED admissions is stored in the NEDS Supplemental Inpatient File.
- The reporting of outpatient surgery records that originate care in the ED (e.g., fracture and dislocation procedures, appendectomies, etc.) can vary by State. These types of events are captured in the NEDS if they are included in the SEDD.

- For hospital confidentiality purposes, trauma hospitals were grouped together in the HCUP data element HOSP\_TRAUMA: trauma levels I and II (in all years of the NEDS), trauma levels I through III (in the 2006-2010 NEDS), and trauma level III and nontrauma (beginning in the 2011 NEDS). This protects hospital identification and limits the analyses that can be performed by individual levels of trauma centers, but does allow the general distinction of trauma versus nontrauma facilities.
- The NEDS is not linkable to other HCUP databases, does not intentionally contain the same hospitals as the HCUP NIS, and cannot be used for State-level analyses. In fact, States and the District of Columbia are not identified in the NEDS.

## Identifying Different Types of ED Events

The HCUP data element *ED event* distinguishes among the different types of ED events. [Appendix A, Table A.7](#) provides the number and percentage of records in the 2014 NEDS for each of the five ED event types.

## Calculating National Estimates

**To produce national estimates, weights MUST be used.**

- The hospital weight (HOSPWT) should be used for producing nationwide hospital-level statistics for analyses that use the hospital-owned ED as the unit of analysis.
- The discharge weight (DISCWT) should be used for producing nationwide visits-level statistics for analyses that use the ED visit as the unit of analysis.

Because the NEDS is a stratified sample, proper statistical techniques must be used to calculate standard errors and confidence intervals. For detailed instructions, refer to the HCUP Methods Series report #2003-02 [Calculating Nationwide Inpatient Sample Variances](#) on the HCUP-US Web site (<http://www.hcup-us.ahrq.gov/>). The HCUP Nationwide Inpatient Sample (NIS) prior to 2012 used stratified sample design similar to the NEDS, so techniques appropriate for the NIS prior to 2012 are also appropriate for the NEDS.

When creating national estimates, it is a good idea to check results against other data sources, if available. Summary benchmarks for national estimates from the NEDS are provided in [Appendix D](#). Also included in [Appendix D](#) are comparable estimates from other ED data sources. For example, the National Hospital Ambulatory Medical Care Survey (NHAMCS) has an ED component and published national health statistics annually.

To ensure that weights are used appropriately and estimates and variances are calculated accurately, researchers can also use HCUPnet, the free online query system (<http://www.hcupnet.ahrq.gov/>). HCUPnet is a Web-based query tool for identifying, tracking, analyzing, and comparing statistics on hospitals at the national, regional, and State levels. HCUPnet offers easy access to national statistics and trends as well as selected State statistics about hospital stays, ED visits and ambulatory surgeries. This tool provides step-by-step guidance, helping researchers to quickly obtain the statistics they need. HCUPnet generates statistics using the HCUP databases.

## Choosing Data Elements for Analysis

For all data elements to be used in the analysis, the user should first perform descriptive statistics and examine the range of values, including number of missing cases. Summary statistics are available on the HCUP-US Web site under Database Documentation for the NEDS (<https://www.hcup-us.ahrq.gov/db/nation/neds/nedssummstats.jsp>). When anomalies (such as large numbers of missing cases) are detected, descriptive statistics can be performed by region

for that variable to determine whether or not there are region-specific differences. Sometimes, performing descriptive statistics by hospital (HOSP\_ED) can be helpful in detecting hospital-specific data anomalies.

### **ICD-9-CM Diagnosis and External Cause of Injury Codes**

ICD-9-CM diagnosis codes provide valuable insights into the reasons for ED visits and hospitalizations, but these codes need to be carefully used. ICD-9-CM codes change every October as new codes are introduced and some codes are retired. See the Conversion Table at <http://www.cdc.gov/nchs/dataawh/ftpserve/ftp/cd9/ftp/cd9.htm>, which shows ICD-9-CM code changes over time. **It is essential to check all ICD-9-CM codes used for analysis to ensure that the codes are in effect during the time period(s) studied.**

The meaning of the first listed diagnosis (DX1) differs based on the type of ED visit. Please refer to the HCUP Methods Series Report on the Meaning of the First-Listed Diagnosis on Emergency Department and Ambulatory Surgery Records.<sup>11</sup>

Diagnoses reported on an inpatient admission from the ED may be from both the ED and inpatient hospital settings. It may be useful to compare diagnostic-specific ED visits that do not result in hospitalization to those resulting in hospitalization.

Up to four external cause-of-injury codes (E codes) are retained in separate data elements (ECODE1-ECODE4). The first listed E code (ECODE1) is not necessarily the underlying or principal cause of the injury.

The collection and reporting of E codes vary greatly across States. Some States have laws or mandates for the collection of E codes; others do not. In addition, some States do not require hospitals to report E codes in the range E870-E879 (“misadventures to patients during surgical and medical care”) which means that these occurrences will be underreported.

The NEDS contains fields for up to 30 diagnoses starting in data year 2014 (15 diagnoses prior to 2014) and four E codes per ED record, although the number of code fields populated varies by State due to reporting differences. Some States provide more than the maximum code fields retained on the NEDS. To reduce the file size of the NEDS, the number of codes retained was limited. Less than one percent of all ED records report more fields than the maximum allowed on the NEDS.

### **ICD-9-CM and CPT Procedure Codes**

The type of procedure codes (ICD-9-CM or CPT) that is included on NEDS records varies by State and is determined by the data provided to HCUP by the HCUP Partner. Some HCUP Partner organizations provide only one type of procedure code (ICD-9-CM or CPT) and others provide both types. In addition, the type of procedure code may also vary within a State between records for ED visits that result in an admission to the same hospital (from the SID) and ED visits that do not result in an admission (from the SEDD).

When doing longitudinal analyses, be mindful of coding changes over time. ICD-9-CM procedure codes change every October as new codes are introduced and some codes are retired. See the Conversion Table at <http://www.cdc.gov/nchs/dataawh/ftpserve/ftp/cd9/ftp/cd9.htm>, which shows ICD-9-CM code changes over time. CPT procedure codes, which are copyrighted by the American Medical

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<sup>11</sup> This HCUP Methods Series report is available at [https://www.hcup-us.ahrq.gov/reports/methods/2011\\_03.pdf](https://www.hcup-us.ahrq.gov/reports/methods/2011_03.pdf).

Association, can change each year in January. It is essential to check all procedure codes used for analysis to ensure that the codes are in effect during the time period(s) studied.

The NEDS contains fields for up to and nine ICD-9-CM procedures and 15 CPT procedures per ED record, although the number of code fields populated varies by State due to reporting differences. Some States provide more than the maximum code fields retained on the NEDS. To reduce the file size of the NEDS, the number of diagnosis and procedure codes retained was limited. Less than one percent of all ED records report more fields than the maximum allowed on the NEDS.

## Missing Values

Missing data values can compromise the quality of estimates. For example, if the outcome for ED visits with missing values is different from the outcome for ED visits with valid values, then sample estimates for that outcome will be biased and inaccurately represent the ED utilization patterns. There are several techniques available to help overcome this bias. One strategy is to use imputation to replace missing values with acceptable values. Another strategy is to use sample weight adjustments to compensate for missing values. Descriptions of such data preparation and adjustment are outside the scope of this report; however, it is recommended that researchers evaluate and adjust for missing data, if necessary.

Alternatively, if the cases with and without missing values are assumed to be similar with respect to their outcomes, no adjustment may be necessary for estimates of means and rates because the non-missing cases would be representative of the missing cases. However, some adjustment may still be necessary for the estimates of totals. Sums of data elements (such as aggregate ED charges) containing missing values would be incomplete because cases with missing values would be omitted from the calculations. Estimates of the sum of charges should use the product of the number of cases times the average charge to account for records with missing information.

## Variance Calculations

It may be important for researchers to calculate a measure of precision for some estimates based on the NEDS sample data. Variance estimates must take into account both the sampling design and the form of the statistic. The sampling design consisted of a stratified, single-stage cluster sample. A stratified random sample of hospital-owned EDs (clusters) was drawn and then all ED visits were included from each selected hospital. **To accurately calculate variances from the NEDS, appropriate statistical software and techniques must be used.** For detailed instructions, refer to the HCUP Methods Series report #2003-02 [Calculating Nationwide Inpatient Sample Variances](http://www.hcup-us.ahrq.gov) on the HCUP-US Web site ([http://www.hcup-us.ahrq.gov/](http://www.hcup-us.ahrq.gov)). The HCUP Nationwide Inpatient Sample (NIS) prior to 2012 used stratified sample design similar to the NEDS, so techniques appropriate for the NIS prior to 2012 are also appropriate for the NEDS.

If hospitals inside the sampling frame are similar to hospitals outside the frame, the sample hospitals can be treated as if they were randomly selected from the entire universe of hospitals within each stratum. Standard formulas for a stratified, single-stage cluster sample without replacement could be used to calculate statistics and their variances in most applications.

A multitude of statistics can be estimated from the NEDS 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.

These variance calculations are based on finite-sample theory, which is an appropriate method for obtaining cross-sectional, nationwide estimates of outcomes. According to finite-sample theory, the intent of the estimation process is to obtain estimates that are precise representations of the nationwide population at a specific point in time. In the context of the NEDS, any estimates that attempt to accurately describe characteristics and interrelationships among hospitals and ED visits during a specific year should be governed by finite-sample theory. Examples would be estimates of expenditure and utilization patterns.

Alternatively, in the study of hypothetical population outcomes not limited to a specific point in time, the concept of a "superpopulation" may be useful. Analysts may be less interested in specific characteristics of the finite population (and time period) from which the *sample* was drawn than they are in hypothetical characteristics of a conceptual superpopulation from which any particular finite *population* in a given year might have been drawn. According to this superpopulation model, the nationwide population in a given year is only a snapshot in time of the possible interrelationships among hospital, market, and discharge characteristics. In a given year, all possible interactions between such characteristics may not have been observed, but analysts may wish to predict or simulate interrelationships that may occur in the future.

Under the finite-population model, the variances of estimates approach zero as the sampling fraction approaches one. This is the case because the population is defined at that point in time and because the estimate is for a characteristic as it existed when sampled. This is in contrast to the superpopulation model, which adopts a stochastic viewpoint rather than a deterministic viewpoint. That is, the nationwide population in a particular year is viewed as a random sample of some underlying superpopulation over time. Different methods are used for calculating variances under the two sample theories. The choice of an appropriate method for calculating variances for nationwide estimates depends on the type of measure and the intent of the estimation process.

### **Computer Software for Weighted and Variance Calculations**

The hospital weights are useful for producing hospital-level statistics for analyses that use the *hospital-owned ED* as the unit of analysis. In contrast, the discharge weights are useful for producing visit-level statistics for analyses that use the *ED visit* as the unit of analysis.

In most cases, computer programs are readily available to perform these calculations. Several statistical programming packages allow weighted analyses.<sup>12</sup> 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. Examples of the use of SAS, SUDAAN, and Stata to calculate NIS variances are presented in the special report [Calculating Nationwide Inpatient Sample Variances](#) on the HCUP-US Web site (<http://www.hcup-us.ahrq.gov>). Although the examples using the NIS also apply to the NEDS, it should be noted that the NEDS is a much larger data set. Please consult the documentation for the different

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<sup>12</sup> 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.



software packages concerning the use of large databases. For an excellent review of programs to calculate statistics from survey data, visit the following Web site:  
<http://www.hcp.med.harvard.edu/statistics/survey-soft/>.

The NEDS includes a Hospital Weights File with variables required by these programs to calculate finite-population statistics. The file includes synthetic hospital identifiers (Primary Sampling Units or PSUs), stratification variables, and stratum-specific totals for the numbers of ED visits and hospitals so that finite-population corrections can be applied to variance estimates.

In addition to these subroutines, standard errors can be estimated by validation and cross-validation techniques. Given that a very large number of observations will be available for most NEDS analyses, it may be feasible to set aside a part of the data for validation purposes. Standard errors and confidence intervals then can be calculated from the validation data.

If the analytic file is too small to set aside a large validation sample, cross-validation techniques may be used. For example, ten-fold cross-validation would split the data into 10 subsets of equal size. The estimation would take place in 10 iterations. In each iteration, the outcome of interest is predicted for one-tenth of the observations by an estimate based on a model that is fit to the other nine-tenths of the observations. Unbiased estimates of error variance are then obtained by comparing the actual values to the predicted values obtained in this manner.

### COMPARABLE ED DATA SOURCES

To aid in understanding of NEDS, national estimates from the NEDS are compared to available sources of similar data (Table 2). Each of the following ED data sources has potential for use in research addressing ED utilization and policy.

**Table 2.** Sources of Emergency Department (ED) Data by Type

| Type of ED Data             | ED Data Source   | Description  |
|-----------------------------|--|--|
| National inventories of EDs | American Hospital Association (AHA) Annual Survey Database | Database containing characteristics and descriptions of hospitals in the U.S. reported by hospitals via survey. Owned by Health Forum.   |
|                             | National Emergency Department Inventory (NEDI) – USA       | Inventory of ED locations in the U.S. and annual ED visit volume that integrates information from the AHA Annual Survey Database, the Hospital Market Profiling Solution, <sup>®</sup> Internet searches, and direct communication with hospital staff. Created by the Emergency Medicine Network (EMNet). The NEDI is only available every other year and was not created for 2014. |

| Type of ED Data                                | ED Data Source  | Description   |
|--|---|---|
| ED visit information from a sample of EDs      | HCUP Nationwide Emergency Department Sample (NEDS)                              | Nationwide sample drawn from the HCUP SID and SEDD, stratified and weighted to be nationally representative of ED visits and facilities. Sponsored by the Agency for Healthcare Research and Quality (AHRQ) of the U.S. Department of Health and Human Services (DHHS). |
|  | National Hospital Ambulatory Medical Care Survey (NHAMCS)                       | National probability sample survey of utilization and provision of ambulatory services in hospital emergency and outpatient departments. Sponsored by the National Center for Health Statistics (NCHS) of the DHHS' Centers for Disease Control and Prevention (CDC).   |
|  | National Electronic Injury Surveillance System – All Injury Program (NEISS-AIP) | National probability sample providing counts of injuries seen in the ED. Sponsored by the National Center for Injury Prevention and Control (NCIPC) of the DHHS' CDC and the US Consumer Product Safety Commission (CPSC).  |
| ED visit information from a sample of patients | National Health Interview Survey (NHIS)   | A comprehensive survey of the civilian non-institutionalized population residing in the United States at the time of the interview. Sponsored by the National Center for Health Statistics (NCHS) of the DHHS CDC.  |

Information on total ED visits in 2014 for the U.S. was available from three data sources (AHA, NEDS, and NHIS).<sup>13</sup> [Appendix D, Figure D.1](#) displays the range of total ED visits; [Appendix D, Table D.1](#) lists the total ED visits in the U.S and the totals by census region. The total U.S. ED visit counts are relatively consistent across the data sources. The South consistently had the highest number of ED visits.

Information on the total number of ED visits by region and the percentage of all ED visits resulting in inpatient admissions are available from one data source (NEDS) and are displayed in [Appendix D, Table D.2](#).

Estimates of the number of hospital-owned EDs by ED visit volume are available from two data sources (NEDS and AHA) and are displayed in [Appendix D, Table D.3](#).

<sup>13</sup> At the time this document was created, the 2014 NHAMCS public use file was not available for developing comparative estimates.

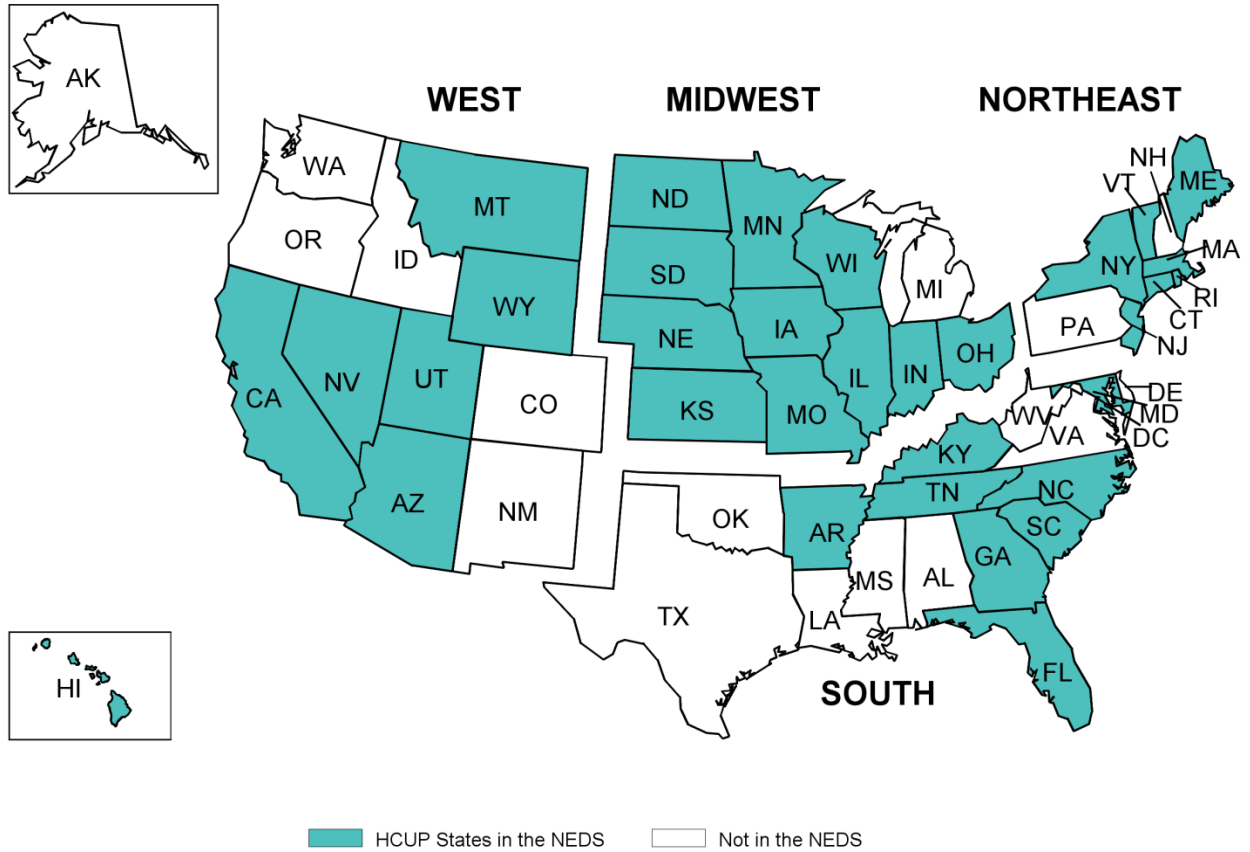
Estimates of the number of injury-related ED visits are available from two data sources (NEDS and NEISS-AIP) and are displayed in [Appendix D, Table D.4](#).

## **Appendix A: NEDS Introductory Information**

**Table A.1. HCUP Partner Organizations Participating in the 2014 NEDS**

| <b>HCUP Partner Organization</b>  |
|---|
| Arizona Department of Health Services   |
| Arkansas Department of Health   |
| California Office of Statewide Health Planning and Development                |
| Connecticut Hospital Association  |
| District of Columbia Hospital Association                                     |
| Florida Agency for Health Care Administration                                 |
| Georgia Hospital Association  |
| Hawaii Health Information Corporation   |
| Illinois Department of Public Health  |
| Indiana Hospital Association  |
| Iowa Hospital Association   |
| Kansas Hospital Association   |
| Kentucky Cabinet for Health and Family Services                               |
| Maine Health Data Organization  |
| Maryland Health Services Cost Review Commission                               |
| Massachusetts Center for Health Information and Analysis                      |
| Minnesota Hospital Association (provides data for Minnesota and North Dakota) |
| Missouri Hospital Industry Data Institute                                     |
| Montana MHA - An Association of Montana Health Care Providers                 |
| Nebraska Hospital Association   |
| Nevada Department of Health and Human Services                                |
| New Jersey Department of Health   |
| New York State Department of Health   |
| North Carolina Department of Health and Human Services                        |
| North Dakota (data provided by the Minnesota Hospital Association)            |
| Ohio Hospital Association   |
| Rhode Island Department of Health   |
| South Carolina Revenue and Fiscal Affairs Office                              |
| South Dakota Association of Healthcare Organizations                          |
| Tennessee Hospital Association  |
| Utah Department of Health   |
| Vermont Association of Hospitals and Health Systems                           |
| Wisconsin Department of Health Services                                       |
| Wyoming Hospital Association  |

Figure A.1. HCUP States and the District of Columbia Included in the 2014 NEDS



**Table A.2. Percentage of U.S Population and ED Visits Accounted for by the 34 HCUP Organizations Participating in the NEDS, 2014**

| <b>Region</b> | <b>U.S. Population, 2014</b> | <b>Percentage of U.S. Population in the NEDS (%)</b> | <b>ED Visits in the U.S., 2014</b> | <b>Percentage of U.S. ED Visits in the NEDS (%)</b> |
|---------------|------------------------------|--|------------------------------------|---|
| Northeast     | 56,152,333                   | 74.9   | 25,611,340                         | 72.7  |
| Midwest       | 67,745,108                   | 85.4   | 31,215,078                         | 84.6  |
| South         | 119,771,934                  | 54.5   | 55,266,599                         | 54.6  |
| West          | 75,187,681                   | 71.5   | 25,714,884                         | 69.8  |
| <b>Nation</b> | <b>318,857,056</b>           | <b>68.7</b>  | <b>137,807,901</b>                 | <b>67.6</b>   |

Source: Population count from the U.S. Census Bureau, Annual Estimates of the Population for the United States, 2014, Table NST-EST2014-01. ED visits in the U.S. from the American Hospital Association Annual Survey of Hospitals, 2014.

**Table A.3. NEDS-Related Reports and Database Documentation Available on the HCUP-US Web Site**

|   |  |
|---|--|
| <p><b>Description of NEDS Database</b></p> <ul style="list-style-type: none"> <li>• NEDS Overview <ul style="list-style-type: none"> <li>○ HCUP Partners in the NEDS</li> </ul> </li> <li>• Introduction to the NEDS, 2014 (<i>this document</i>) and prior years</li> <li>• NEDS Related Reports</li> </ul> <p><b>Restrictions on the Use</b></p> <ul style="list-style-type: none"> <li>• HCUP Data Use Agreement Training</li> <li>• Data Use Agreement for the HCUP Nationwide Databases</li> <li>• Requirements for Publishing with HCUP data</li> </ul> <p><b>File Specifications and Load Programs</b></p> <ul style="list-style-type: none"> <li>• NEDS File Specifications – details data file names, number of records, record length, and record layout</li> <li>• Nationwide SAS Load Programs</li> <li>• Nationwide SPSS Load Programs</li> <li>• Nationwide Stata Load Programs</li> </ul> <p><b>Data Elements</b></p> <ul style="list-style-type: none"> <li>• Availability of NEDS Data Elements by Year – lists which data elements are available each year</li> <li>• NEDS Description of Data Elements – details uniform coding and State-specific idiosyncrasies</li> <li>• Summary Statistics – lists means and frequencies on nearly all data elements</li> </ul> <p><b>Additional Resources for NEDS Data Elements</b></p> <ul style="list-style-type: none"> <li>• HCUP Quality Control Procedures – describes procedures used to assess data quality</li> <li>• HCUP Coding Practices – describes how HCUP data elements are coded</li> <li>• HCUP Hospital Identifiers – explains data elements that characterize individual hospitals</li> </ul> | <p><b>Known Data Issues</b></p> <ul style="list-style-type: none"> <li>• 2011</li> <li>• 2006 and 2007</li> </ul> <p><b>HCUP Tools: Labels and Formats</b></p> <ul style="list-style-type: none"> <li>• Clinical Classifications Software (CCS)</li> <li>• Format Programs – to create value labels <ul style="list-style-type: none"> <li>○ DRG Formats</li> <li>○ HCUP Formats</li> <li>○ HCUP Diagnoses and Procedure Groups Formats, including CCS Categories</li> <li>○ ICD-9-CM Formats</li> <li>○ ICD-10-CM Formats</li> </ul> </li> </ul> <p><b>Obtaining HCUP Data</b></p> <ul style="list-style-type: none"> <li>• Purchase HCUP Data from the HCUP Central Distributor</li> </ul> |
|---|--|



**Table A.4. NEDS Stratifiers**

| <b>Stratifier</b> | <b>Values</b>  |
|-------------------|--|
| Region            | 1: Northeast<br>2: Midwest<br>3: South<br>4: West  |
| Trauma            | 0: Not a trauma center<br>1: Trauma center level I<br>2: Trauma center level II<br>3: Trauma center level III<br><br>Collapsed categories used for strata with small sample sizes<br>4: Nontrauma or trauma center level III (beginning in the 2011 NEDS)<br>8: Trauma center level I or II (in all years of the NEDS)<br>9: Trauma center level I, II or III (only in the 2006-2010 NEDS)             |
| Urban-Rural       | 1: Large metropolitan<br>2: Small metropolitan<br>3: Micropolitan<br>4: Non-urban residual<br><br>Collapsed categories used for strata with small sample sizes<br>6: Any urban-rural location (used in the South in 2014)<br>7: Small metropolitan and micropolitan (used in the South in 2011-2014)<br>8: Metropolitan (large and small)<br>9: Non-metropolitan (micropolitan and non-urban location) |
| Teaching          | 0: Metropolitan non-teaching<br>1: Metropolitan teaching<br>2: Non-metropolitan teaching and non-teaching  |
| Control           | 0: All (used for combining public, voluntary, and private)<br>1: Public – government, non-Federal<br>2: Voluntary – private, non-profit<br>3: Proprietary – private, investor-owned/for-profit<br>4: Private (used for combining private voluntary and proprietary)  |

**Table A.5. NEDS Target Universe, Sampling Frame, and Final Sample Characteristics, 2014**

|                        | <b>Description</b>   | <b>Number of Hospital-owned EDs, 2014</b> | <b>Number of ED Events, 2014</b> |
|------------------------|--|---|----------------------------------|
| <b>Target Universe</b> | EDs in community, nonrehabilitation U.S. hospitals that reported total ED visits in the AHA Annual Survey Database                 | 4,594                                     | 137,807,901                      |
| <b>Sampling Frame</b>  | EDs in the 33 States and the District of Columbia that provide information on ED visits that result and do not result in admission | 2,751                                     | 86,973,811                       |
| <b>2014 NEDS</b>       | 20 percent sample of target universe drawn from the sampling frame   | 945                                       | 31,026,417                       |

Source: HCUP Nationwide Emergency Department Sample, 2014

**Table A.6. NEDS Sampling Rates, 2014**

NEDS stratum is defined by 5 digits:

1st digit – Region: (1) Northeast, (2) Midwest, (3) South, (4) West

2nd digit – Trauma: (0) Not a trauma center, (1) Trauma center level I, (2) Trauma center level II, (3) Trauma center level III, Collapsed categories used for strata with small sample sizes: (8) Trauma center level I or II, (4) Trauma center level III and Non-Trauma.

3rd digit – Urban-rural location: (1) Large metropolitan, (2) Small metropolitan, (3) Micropolitan, (4) Non-urban residual, Collapsed categories used for strata with small sample sizes: (6) Any urban-rural location, (7) Small Metro and Micro, (8) Metropolitan (large and small), (9) Non-metropolitan (micropolitan and non-urban location)

4th digit – Teaching: (0) Metropolitan non-teaching, (1) Metropolitan teaching, (2) Non-metropolitan teaching and non-teaching, (3) Metro Non-Teaching and Non-Metro

5th digit – Control: (0) All (used for combining public, voluntary, and private), (1) Public – government, non-Federal, (2) Voluntary – private, non-profit, (3) Proprietary – private, investor-owned/for-profit, (4) Private (used for combining private voluntary and proprietary)

| <b>NEDS Stratum</b> | <b>Number of Hospital-owned EDs</b> |                        |              |                        |             | <b>Sampling Rate</b>    |                      |
|---------------------|-------------------------------------|------------------------|--------------|------------------------|-------------|-------------------------|----------------------|
| <b>NEDS Stratum</b> | <b>AHA Universe</b>                 | <b>20% of Universe</b> | <b>Frame</b> | <b>Frame Shortfall</b> | <b>NEDS</b> | <b>NEDS to Universe</b> | <b>NEDS to Frame</b> |
| Total               | 4,594                               | 957                    | 2,751        | 12                     | 945         | 20.6%                   | 34.4%                |
| <b>Northeast</b>    |                                     |                        |              |                        |             |                         |                      |
| 10100               | 86                                  | 18                     | 59           | 0                      | 18          | 20.9%                   | 30.5%                |
| 10110               | 120                                 | 24                     | 91           | 0                      | 24          | 20.0%                   | 26.4%                |
| 10200               | 76                                  | 16                     | 47           | 0                      | 16          | 21.1%                   | 34.0%                |
| 10210               | 35                                  | 7                      | 19           | 0                      | 7           | 20.0%                   | 36.8%                |
| 10420               | 53                                  | 11                     | 38           | 0                      | 11          | 20.8%                   | 28.9%                |
| 11110               | 47                                  | 10                     | 35           | 0                      | 10          | 21.3%                   | 28.6%                |
| 11210               | 14                                  | 3                      | 5            | 0                      | 3           | 21.4%                   | 60.0%                |
| 12100               | 4                                   | 2                      | 3            | 0                      | 2           | 50.0%                   | 66.7%                |
| 12110               | 17                                  | 4                      | 11           | 0                      | 4           | 23.5%                   | 36.4%                |
| 12210               | 19                                  | 4                      | 11           | 0                      | 4           | 21.1%                   | 36.4%                |
| 13800               | 6                                   | 2                      | 2            | 0                      | 2           | 33.3%                   | 100.0%               |
| 13810               | 8                                   | 2                      | 4            | 0                      | 2           | 25.0%                   | 50.0%                |
| 14320               | 72                                  | 15                     | 33           | 0                      | 15          | 20.8%                   | 45.5%                |
| 18320               | 4                                   | 2                      | 2            | 0                      | 2           | 50.0%                   | 100.0%               |

| <b>NEDS Stratum</b> | <b>Number of Hospital-owned EDs</b> |                        |              |                        |             | <b>Sampling Rate</b>    |                      |
|---------------------|-------------------------------------|------------------------|--------------|------------------------|-------------|-------------------------|----------------------|
| <b>NEDS Stratum</b> | <b>AHA Universe</b>                 | <b>20% of Universe</b> | <b>Frame</b> | <b>Frame Shortfall</b> | <b>NEDS</b> | <b>NEDS to Universe</b> | <b>NEDS to Frame</b> |
| <b>Midwest</b>      |                                     |                        |              |                        |             |                         |                      |
| 20100               | 122                                 | 25                     | 113          | 0                      | 25          | 24.2%                   | 22.1%                |
| 20110               | 80                                  | 16                     | 64           | 0                      | 16          | 29.7%                   | 25.0%                |
| 20200               | 154                                 | 31                     | 116          | 0                      | 31          | 28.2%                   | 26.7%                |
| 20210               | 35                                  | 7                      | 27           | 0                      | 7           | 30.4%                   | 25.9%                |
| 20321               | 53                                  | 11                     | 46           | 0                      | 11          | 25.1%                   | 23.9%                |
| 20324               | 164                                 | 33                     | 141          | 0                      | 33          | 23.2%                   | 23.4%                |
| 20421               | 187                                 | 38                     | 168          | 0                      | 38          | 28.3%                   | 22.6%                |
| 20424               | 254                                 | 51                     | 207          | 0                      | 51          | 26.7%                   | 24.6%                |
| 21110               | 41                                  | 9                      | 36           | 0                      | 9           | 50.0%                   | 25.0%                |
| 21210               | 26                                  | 6                      | 19           | 0                      | 6           | 35.7%                   | 31.6%                |
| 22110               | 29                                  | 6                      | 19           | 0                      | 6           | 26.9%                   | 31.6%                |
| 22210               | 38                                  | 8                      | 29           | 0                      | 8           | 26.3%                   | 27.6%                |
| 22324               | 10                                  | 2                      | 5            | 0                      | 2           | 30.0%                   | 40.0%                |
| 23100               | 12                                  | 3                      | 11           | 0                      | 3           | 24.1%                   | 27.3%                |
| 23110               | 21                                  | 5                      | 19           | 0                      | 5           | 124.1%                  | 26.3%                |
| 23200               | 25                                  | 5                      | 24           | 0                      | 5           | 224.1%                  | 20.8%                |
| 23210               | 22                                  | 5                      | 19           | 0                      | 5           | 324.1%                  | 26.3%                |
| 23321               | 6                                   | 2                      | 3            | 0                      | 2           | 424.1%                  | 66.7%                |
| 23324               | 37                                  | 8                      | 35           | 0                      | 8           | 524.1%                  | 22.9%                |
| 23420               | 12                                  | 3                      | 10           | 0                      | 3           | 624.1%                  | 30.0%                |
| 28100               | 22                                  | 5                      | 18           | 0                      | 5           | 66.7%                   | 27.8%                |
| 28200               | 20                                  | 4                      | 16           | 0                      | 4           | 23.8%                   | 25.0%                |

| <b>NEDS Stratum</b> | <b>Number of Hospital-owned EDs</b> |                        |              |                        |             | <b>Sampling Rate</b>    |                      |
|---------------------|-------------------------------------|------------------------|--------------|------------------------|-------------|-------------------------|----------------------|
| <b>NEDS Stratum</b> | <b>AHA Universe</b>                 | <b>20% of Universe</b> | <b>Frame</b> | <b>Frame Shortfall</b> | <b>NEDS</b> | <b>NEDS to Universe</b> | <b>NEDS to Frame</b> |
| <b>South</b>        |                                     |                        |              |                        |             |                         |                      |
| 30110               | 159                                 | 32                     | 77           | 0                      | 32          | 20.1%                   | 41.6%                |
| 30202               | 113                                 | 23                     | 64           | 0                      | 23          | 20.4%                   | 35.9%                |
| 30203               | 98                                  | 20                     | 45           | 0                      | 20          | 20.4%                   | 44.4%                |
| 30210               | 79                                  | 16                     | 35           | 0                      | 16          | 20.3%                   | 45.7%                |
| 30321               | 64                                  | 13                     | 27           | 0                      | 13          | 20.3%                   | 48.1%                |
| 30322               | 93                                  | 19                     | 53           | 0                      | 19          | 20.4%                   | 35.8%                |
| 30323               | 59                                  | 12                     | 26           | 0                      | 12          | 20.3%                   | 46.2%                |
| 30422               | 160                                 | 32                     | 80           | 0                      | 32          | 20.0%                   | 40.0%                |
| 30423               | 87                                  | 18                     | 32           | 0                      | 18          | 20.7%                   | 56.3%                |
| 31110               | 47                                  | 10                     | 24           | 0                      | 10          | 21.3%                   | 41.7%                |
| 31210               | 31                                  | 7                      | 16           | 0                      | 7           | 22.6%                   | 43.8%                |
| 32110               | 17                                  | 4                      | 9            | 0                      | 4           | 23.5%                   | 44.4%                |
| 32710               | 45                                  | 9                      | 20           | 0                      | 9           | 20.0%                   | 45.0%                |
| 33202               | 18                                  | 4                      | 10           | 0                      | 4           | 22.2%                   | 40.0%                |
| 33203               | 24                                  | 5                      | 2            | 3                      | 2           | 8.3%                    | 100.0%               |
| 33321               | 21                                  | 5                      | 2            | 3                      | 2           | 9.5%                    | 100.0%               |
| 33322               | 17                                  | 4                      | 4            | 0                      | 4           | 23.5%                   | 100.0%               |
| 33323               | 10                                  | 2                      | 2            | 0                      | 2           | 20.0%                   | 100.0%               |
| 33424               | 12                                  | 3                      | 3            | 0                      | 3           | 25.0%                   | 100.0%               |
| 33810               | 60                                  | 12                     | 10           | 2                      | 10          | 16.7%                   | 100.0%               |
| 34101               | 31                                  | 7                      | 12           | 0                      | 7           | 22.6%                   | 58.3%                |
| 34102               | 110                                 | 22                     | 61           | 0                      | 22          | 20.0%                   | 36.1%                |
| 34103               | 152                                 | 31                     | 50           | 0                      | 31          | 20.4%                   | 62.0%                |
| 34201               | 73                                  | 15                     | 27           | 0                      | 15          | 20.5%                   | 55.6%                |
| 34421               | 176                                 | 36                     | 53           | 0                      | 36          | 20.5%                   | 67.9%                |
| 38600               | 17                                  | 4                      | 2            | 2                      | 2           | 11.8%                   | 100.0%               |

| <b>NEDS Stratum</b> | <b>Number of Hospital-owned EDs</b> |                        |              |                        |             | <b>Sampling Rate</b>    |                      |
|---------------------|-------------------------------------|------------------------|--------------|------------------------|-------------|-------------------------|----------------------|
| <b>NEDS Stratum</b> | <b>AHA Universe</b>                 | <b>20% of Universe</b> | <b>Frame</b> | <b>Frame Shortfall</b> | <b>NEDS</b> | <b>NEDS to Universe</b> | <b>NEDS to Frame</b> |
| <b>West</b>         |                                     |                        |              |                        |             |                         |                      |
| 40101               | 16                                  | 4                      | 13           | 0                      | 4           | 25.0%                   | 30.8%                |
| 40102               | 84                                  | 17                     | 66           | 0                      | 17          | 20.2%                   | 25.8%                |
| 40103               | 56                                  | 12                     | 47           | 0                      | 12          | 21.4%                   | 25.5%                |
| 40110               | 97                                  | 20                     | 73           | 0                      | 20          | 20.6%                   | 27.4%                |
| 40202               | 59                                  | 12                     | 40           | 0                      | 12          | 20.3%                   | 30.0%                |
| 40203               | 25                                  | 5                      | 13           | 0                      | 5           | 20.0%                   | 38.5%                |
| 40210               | 49                                  | 10                     | 29           | 0                      | 10          | 20.4%                   | 34.5%                |
| 40321               | 37                                  | 8                      | 8            | 0                      | 8           | 21.6%                   | 100.0%               |
| 40324               | 64                                  | 13                     | 29           | 0                      | 13          | 20.3%                   | 44.8%                |
| 40424               | 78                                  | 16                     | 44           | 0                      | 16          | 20.5%                   | 36.4%                |
| 41110               | 32                                  | 7                      | 24           | 0                      | 7           | 21.9%                   | 29.2%                |
| 42110               | 23                                  | 5                      | 17           | 0                      | 5           | 21.7%                   | 29.4%                |
| 42204               | 17                                  | 4                      | 7            | 0                      | 4           | 23.5%                   | 57.1%                |
| 43104               | 11                                  | 3                      | 4            | 0                      | 3           | 27.3%                   | 75.0%                |
| 43202               | 18                                  | 4                      | 5            | 0                      | 4           | 22.2%                   | 80.0%                |
| 43203               | 5                                   | 2                      | 2            | 0                      | 2           | 40.0%                   | 100.0%               |
| 43321               | 10                                  | 2                      | 5            | 0                      | 2           | 20.0%                   | 40.0%                |
| 43810               | 22                                  | 5                      | 3            | 2                      | 3           | 13.6%                   | 100.0%               |
| 43924               | 23                                  | 5                      | 5            | 0                      | 5           | 21.7%                   | 100.0%               |
| 44201               | 31                                  | 7                      | 14           | 0                      | 7           | 22.6%                   | 50.0%                |
| 44421               | 95                                  | 19                     | 35           | 0                      | 19          | 20.0%                   | 54.3%                |
| 48102               | 9                                   | 2                      | 6            | 0                      | 2           | 22.2%                   | 33.3%                |
| 48103               | 4                                   | 2                      | 2            | 0                      | 2           | 50.0%                   | 100.0%               |
| 48210               | 25                                  | 5                      | 9            | 0                      | 5           | 20.0%                   | 55.6%                |

Source: HCUP Nationwide Emergency Department Sample, 2014

**Table A.7. Different Types of ED Events in the NEDS, 2014**

| <b>ED Event</b>   | <b>Number of ED Visits</b> | <b>Percent of ED Visits</b> |
|---|----------------------------|-----------------------------|
| ED visit in which the patient is treated and released                                     | 115,922,971                | 84.1                        |
| ED visit in which the patient is admitted to this same hospital                           | 19,435,011                 | 14.1                        |
| ED visit in which the patient is transferred to another short-term hospital               | 2,051,283                  | 1.5                         |
| ED visit in which the patient died in the ED  | 190,374                    | 0.1                         |
| ED visit in which patient is not admitted to the same hospital, destination unknown       | 205,658                    | 0.2                         |
| ED visit in which the patient is discharged alive, destination unknown (but not admitted) | 2,604                      | 0.0                         |

Source: HCUP Nationwide Emergency Department Sample, 2014

## **Appendix B: Partner-Specific Restrictions**



The table below enumerates the types of restrictions applied to the 2014 Nationwide Emergency Department Sample. Restrictions include the following types:

- Confidentiality of hospitals
- Confidentiality of records
- Limited reporting of external cause of injury codes
- Missing discharges for specific populations of patients.

**Table B.1. Partner-Specific Restrictions**

|   |
|---|
| <b>Confidentiality of Hospitals</b>   |
| <p>Limitations on sampling to ensure hospital confidentiality:</p> <ul style="list-style-type: none"> <li>• All Partners: <ul style="list-style-type: none"> <li>○ Prior to collapsing stratum: if there is a “unique” hospital in the State, it is excluded from sampling. “Unique” is defined as the only hospital in the State universe for a stratum. For example, if there is only one rural, non-teaching, trauma level III hospital in a State, then it is excluded from the sampling frame.</li> <li>○ After sampling: stratifier data elements are set to missing if the stratum had fewer than two hospitals in the universe of the State’s hospitals.</li> </ul> </li> </ul> |
| <b>Confidentiality of Records</b>   |
| <p>Limitations on selected data elements to ensure patient confidentiality:</p> <ul style="list-style-type: none"> <li>• Age (AGE) values greater than 90 are set to 90 for all NEDS records.</li> <li>• At least one Partner requires that admission month (AMONTH) is set to missing on all records.</li> </ul>   |
| <b>Limited Reporting of External Cause of Injury Codes</b>  |
| <ul style="list-style-type: none"> <li>• At least one Partner removes E codes in the range E870-E879 (medical misadventures) and E930-E949 (adverse effects) from the data files supplied to HCUP.</li> </ul>   |
| <b>Missing Discharges for Specific Populations of Patients</b>  |
| <ul style="list-style-type: none"> <li>• At least one Partner prohibits the release of discharge records for patients with HIV diagnoses.</li> <li>• At least one Partner prohibits the release of behavioral health including chemical dependency care or psychiatric care discharges.</li> <li>• At least one Partner prohibits the release of abortion discharges.</li> </ul>  |

## **Appendix C: NEDS Data Elements and Codes**

**Table C.1. Data Elements in the NEDS Core File**

| <b>Type of Data Element</b>        | <b>HCUP Data Element</b> | <b>Coding Notes</b>   |
|------------------------------------|--------------------------|---|
| Admission timing                   | AWEEKEND                 | Admission on weekend: (0) admission on Monday-Friday, (1) admission on Saturday-Sunday  |
|                                    | AMONTH                   | Admission month coded from (1) January to (12) December   |
| Age at admission                   | AGE                      | Age in years coded 0-90 years. Any ages greater than 90 were set to 90.   |
| Diagnosis information              | DX1 – DX30               | ICD-9-CM diagnoses<br>A maximum of 30 diagnoses are retained on the NEDS in 2014; up to 15 diagnoses are retained in prior years.   |
|                                    | DXCCS1 – DXCCS30         | Clinical Classifications Software (CCS) category for all diagnoses<br>A maximum of 30 diagnoses are retained on the NEDS in 2014; up to 15 diagnoses are retained in prior years.   |
|                                    | CHRON1 – CHRON30         | Chronic condition indicator for all diagnoses: (0) non-chronic condition, (1) chronic condition   |
|                                    | NDX                      | Number of diagnoses coded on the original record. A maximum of 30 diagnoses are retained on the NEDS in 2014; up to 15 diagnoses are retained in prior years.   |
| Discharge timing                   | DQTR                     | Coded: (1) Jan - Mar, (2) Apr - Jun, (3) Jul - Sep, (4) Oct – Dec   |
|                                    | YEAR                     | Calendar year of ED visits  |
| Disposition of patient from the ED | DISP_ED                  | Disposition from ED: (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, (9) admitted as an inpatient to this hospital, (20) died in ED, (21) Discharged/transferred to court/law enforcement , (98) not admitted, destination unknown, (99) discharged alive, destination unknown (but not admitted) |
|                                    | DIED_VISIT               | Died in ED: (0) did not die (1) died in the ED, (2) died in the hospital  |
| ED event                           | EDevent                  | Type of ED event: (1) ED visit in which the patient is treated and released, (2) ED visit in which the patient is admitted to this same hospital, (3) ED visit in which the patient is transferred to another short-term hospital, (9) ED visit in which the patient died in the ED, (98) ED visits in which patient was not admitted, destination unknown, (99) ED visit in which patient was discharged alive, destination unknown (but not admitted)         |

| Type of Data Element     | HCUP Data Element   | Coding Notes   |
|--------------------------|---|--|
| Injury-related variables | INJURY  | Injury diagnosis reported: (0) no injury diagnoses reported, (1) injury is reported in first-listed diagnosis, (2) injury is reported in a diagnosis other than the first-listed diagnosis |
|                          | MULTINJURY  | Multiple injuries reported: (0) one or no injury diagnosis reported, (1) more than one injury diagnosis reported, regardless of position   |
|                          | INJURY_SEVERITY   | Injury severity score assigned by ICDPIC Stata program. Range of 1 to 75 with 75 being the most severe. Value of 99 means severity of injury could not be determined.                      |
|                          | ECODE1 – ECODE4   | External cause of injury and poisoning codes (ICD-9-CM).   |
|                          | E_CCS1 – E_CCS4   | CCS category for the external cause of injury and poisoning codes  |
|                          | NECODE  | Number of external cause of injury codes on the original record. A maximum of 4 codes are retained on the NEDS.  |
|                          | INTENT_SELF_HARM  | E Codes and/or diagnoses indicate intended self harm: (0) not intended self harm, (1) intended self harm   |
|                          | INTENT_UNINTENTIONAL  | E Codes indicate injury was unintentional: (0) no unintentional injury, (1) unintentional injury   |
|                          | INTENT_ASSAULT  | E Codes indicate injury by assault: (0) no injury by assault, (1) injury by assault  |
|                          | INJURY_CUT  | E Codes indicate injury by cutting or piercing: (0) no injury by cutting or piercing, (1) injury by cutting or piercing  |
|                          | INJURY_DROWN  | E Codes indicate injury by drowning or submersion: (0) no injury by drowning or submersion, (1) injury by drowning or submersion   |
|                          | INJURY_FALL   | E Codes indicate injury by falling: (0) no injury by falling, (1) injury by falling  |
|                          | INJURY_FIRE   | E Codes indicate injury by fire, flame, or hot object: (0) no injury by fire, flame, or hot object, (1) injury by fire, flame, or hot object   |
|                          | INJURY_FIREARM  | E Codes indicate injury by firearm: (0) no injury by firearm, (1) injury by firearm  |
| INJURY_MACHINERY         | E Codes indicate injury by machinery: (0) no injury by machinery, (1) injury by machinery   |  |
| INJURY_MVT               | E Codes indicate injury involving motor vehicle traffic, including the occupant of a car, motorcyclist, pedal cyclist, pedestrian, or unspecified person: (0) no injury involving motor vehicle traffic, (1) injury involving motor vehicle traffic |  |

| Type of Data Element  | HCUP Data Element           | Coding Notes  |
|---|-----------------------------|---|
|   | INJURY_NATURE               | E Codes indicate injury involving natural or environmental causes, including bites and stings: (0) no injury involving natural or environmental causes, (1) injury involving natural or environmental causes                      |
|   | INJURY_POISON               | E Codes indicate injury by poisoning: (0) no injury by poisoning, (1) injury by poisoning   |
|   | INJURY_STRUCK               | E Codes indicate injury involving being struck by or against something: (0) no injury involving being struck by or against, (1) injury involving being struck by or against   |
|   | INJURY_SUFFOCATION          | E Codes indicate injury by suffocation: (0) no injury by suffocation, (1) injury by suffocation   |
| Gender of patient   | FEMALE                      | Indicates gender: (0) male, (1) female  |
| Urban-rural location of the patient's residence                     | PL_NCHS (beginning in 2013) | Urban–rural designation for patient's county of residence: (1) large central metropolitan, (2) large fringe metropolitan, (3) medium metropolitan, (4) small metropolitan, (5) micropolitan, (6) not metropolitan or micropolitan |
|   | PL_NCHS2006 (prior to 2013) |   |
| National quartile for median household income of patient's ZIP Code | ZIPINC_QRTL                 | Median household income quartiles for patient's ZIP Code. 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.                   |
| Payer information   | PAY1                        | Expected primary payer, uniform: (1) Medicare, (2) Medicaid, (3) private including HMO, (4) self-pay, (5) no charge, (6) other  |
|   | PAY2                        | Expected secondary payer, uniform: (1) Medicare, (2) Medicaid, (3) private including HMO, (4) self-pay, (5) no charge, (6) other  |
| Total ED charges  | TOTCHG_ED                   | Total charges for ED services, edited   |
| HCUP source file  | HCUPFILE                    | Source of HCUP record: (SEDD) from SEDD file, (SID) from SID file   |
| Discharge weight  | DISCWT                      | Discharge weight used to calculate national estimates. Weights ED visits to AHA universe.   |
| Hospital identifier, synthetic                                      | HOSP_ED                     | Unique HCUP NEDS hospital number – links to NEDS Hospital Weights file, but not to other HCUP databases   |
| Hospital characteristics  | HOSP_REGION                 | Region of hospital: (1) Northeast, (2) Midwest, (3) South, (4) West<br>(Prior to 2011, HOSP_REGION is on the Core file; beginning in 2011, it is only available on the Hospital File)   |

| <b>Type of Data Element</b>  | <b>HCUP Data Element</b> | <b>Coding Notes</b>  |
|------------------------------|--------------------------|--|
|                              | NEDS_STRATUM             | Stratum used to sample hospitals, based on geographic region, trauma, location/teaching status, and control. Stratum information is also contained in the Hospital Weights file. |
| Record identifier, synthetic | KEY_ED                   | Unique HCUP NEDS record number – links to NEDS Supplemental files, but not to other HCUP databases   |

**Table C.2. Data Elements in the NEDS Supplemental ED File**

| <b>Type of Data Element</b>    | <b>HCUP Data Element</b>   | <b>Coding Notes</b>   |
|--------------------------------|----------------------------|---|
| CPT procedure information      | CPT1 – CPT15               | CPT/HCPCS procedures performed in the ED  |
|                                | CPTCCS1-<br>CPTCCS15       | Clinical Classifications Software (CCS) category for all CPT/HCPCS procedures   |
|                                | NCPT                       | Number of procedures coded on the original record. A maximum of 15 CPT codes are retained on the NEDS.  |
| ICD-9-CM procedure information | PR_ED1 –<br>PR_ED9         | ICD-9-CM procedures performed in ED   |
|                                | PRCCS_ED1 –<br>PRCCS_ED9   | Clinical Classifications Software (CCS) category for all ICD-9-CM procedures  |
|                                | PCLASS_ED1 –<br>PCLASS_ED9 | Procedure class for all ICD-9-CM procedures: (1) Minor Diagnostic, (2) Minor Therapeutic, (3) Major Diagnostic, (4) Major Therapeutic   |
|                                | NPR_ED                     | Number of procedures coded on the original record. A maximum of 9 ICD-9-CM procedure codes are retained on the NEDS.  |
| HCUP source file               | HCUPFILE                   | Source of HCUP record: (SEDD) from SEDD file, (SID) from SID file<br>(Prior to 2011, HCUPFILE is on the Supplemental ED file; beginning in 2011, it is only available on the Core File)                                   |
| Discharge weight               | DISCWT                     | Discharge weight used to calculate national estimates. Weights ED visits to AHA universe<br>(Prior to 2011, DISCWT is on the Supplemental ED file; beginning in 2011, it is only available on the Core and Hospital File) |
| Hospital characteristics       | NEDS_STRATUM               | Stratum used to sample hospitals, based on geographic region, trauma, location/teaching status, and control. Stratum information is also contained in the Hospital Weights file.  |
| Hospital identifier, synthetic | HOSP_ED                    | Unique HCUP NEDS hospital number – links to NEDS Hospital Weights file, but not to other HCUP databases   |
| Record identifier, synthetic   | KEY_ED                     | Unique HCUP NEDS record number – links to NEDS Supplemental files, but not to other HCUP databases  |

**Table C.3. Data Elements in the NEDS Supplemental Inpatient File**

| <b>Type of Data Element</b>              | <b>HCUP Data Element</b> | <b>Coding Notes</b>  |
|--|--------------------------|--|
| Disposition of patient from the hospital | DISP_IP                  | Disposition from hospital admission: (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 |
| Diagnosis Related Group (DRG)            | 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                   | Groupver version in use on discharge date  |
|  | MDC                      | Major Diagnosis Category (MDC) in use on discharge date  |
|  | MDC_NoPOA                | MDC in use on discharge date, calculated without the use of the present on admission flags for the diagnoses   |
| Length of hospital inpatient stay        | LOS_IP                   | Length of stay, edited   |
| Total charges for inpatient stay         | TOTCHG_IP                | Total charges for ED and inpatient services, edited  |
| ICD-9-CM procedure information           | PR_IP1 – PR_IP9          | ICD-9-CM procedures coded on ED admissions. Procedure may have been performed in the ED or during the hospital stay.   |
|  | PRCCS_IP1 – PRCCS_IP9    | Clinical Classifications Software (CCS) category for all ICD-9-CM procedures   |
|  | PCLASS_IP1 – PCLASS_IP9  | Procedure class for all ICD-9-CM procedures: (1) Minor Diagnostic, (2) Minor Therapeutic, (3) Major Diagnostic, (4) Major Therapeutic  |
|  | NPR_IP                   | Number of procedures coded on the original record. A maximum of 9 ICD-9-CM procedure codes are retained on the NEDS.   |
| HCUP source file                         | HCUPFILE                 | Source of HCUP record: (SEDD) from SEDD file, (SID) from SID file<br>(Prior to 2011, HCUPFILE is on the Supplemental IP file; beginning in 2011, it is only available on the Core File)  |
| Discharge weight                         | DISCWT                   | Discharge weight used to calculate national estimates. Weights ED visits to AHA universe<br>(Prior to 2011, DISCWT is on the Supplemental IP file; beginning in 2011, it is only available on the Core and Hospital File)  |



| <b>Type of Data Element</b>    | <b>HCUP Data Element</b> | <b>Coding Notes</b>  |
|--------------------------------|--------------------------|--|
| Hospital characteristics       | NEDS_STRATUM             | Stratum used to sample hospitals, based on geographic region, trauma, location/teaching status, and control. Stratum information is also contained in the Hospital Weights file. |
| Hospital identifier, synthetic | HOSP_ED                  | Unique HCUP NEDS hospital number – links to NEDS Hospital Weights file, but not to other HCUP databases  |
| Record identifier, synthetic   | KEY_ED                   | Unique HCUP NEDS record number – links to NEDS Supplemental files, but not to other HCUP databases   |

**Table C.4. Data Elements in the NEDS Hospital Weights File**

| <b>Type of Data Element</b>    | <b>HCUP Data Element</b> | <b>Coding Notes</b>   |
|--------------------------------|--------------------------|---|
| Discharge counts               | N_DISC_U                 | Number of AHA universe ED visits in the stratum   |
|                                | S_DISC_U                 | Number of sampled ED visits in the sampling stratum   |
|                                | TOTAL_EDvisits           | Total number of ED visits for this hospital in the NEDS   |
| Discharge weights              | DISCWT                   | Discharge weight used to calculate national estimates. Weights ED visits to AHA universe.   |
| Discharge Year                 | YEAR                     | Discharge year  |
| Hospital counts                | N_HOSP_U                 | Number of AHA universe hospital-owned EDs in the stratum  |
|                                | S_HOSP_U                 | Number of sampled hospital-owned EDs in the stratum   |
| Hospital identifier, synthetic | HOSP_ED                  | Unique HCUP NEDS hospital number – links to NEDS Hospital Weights file, but not to other HCUP databases   |
| Hospital characteristics       | 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, (6) collapsed category of any urban-rural location, (7) collapsed category of small metropolitan and micropolitan, (8) metropolitan, collapsed category of large and small metropolitan, (9) non-metropolitan, collapsed category of micropolitan and rural |
|                                | HOSP_CONTROL             | Control/ownership of hospital: (0) government or private, collapsed category, (1) government, nonfederal, public, (2) private, non-profit, voluntary, (3) private, invest-own, (4) private, collapsed category  |
|                                | HOSP_REGION              | Region of hospital: (1) Northeast, (2) Midwest, (3) South, (4) West   |
|                                | HOSP_TRAUMA              | Trauma center level: (0) nontrauma center, (1) trauma level I, (2) trauma level II (3) trauma level III, (4) nontrauma or trauma level III, collapsed category beginning in the 2011 NEDS, (8) trauma level I or II, collapsed category (9) trauma level I, II, or III, collapsed category in the 2006-2010 NEDS. Children's hospitals with trauma centers are classified with adult/pediatric trauma centers.  |
|                                | HOSP_UR_TEACH            | Teaching status of hospital: (0) metropolitan non-teaching, (1) metropolitan teaching, (2) non-metropolitan   |
|                                | NEDS_STRATUM             | Stratum used to sample EDs, includes geographic region, trauma, location/teaching status, and control   |

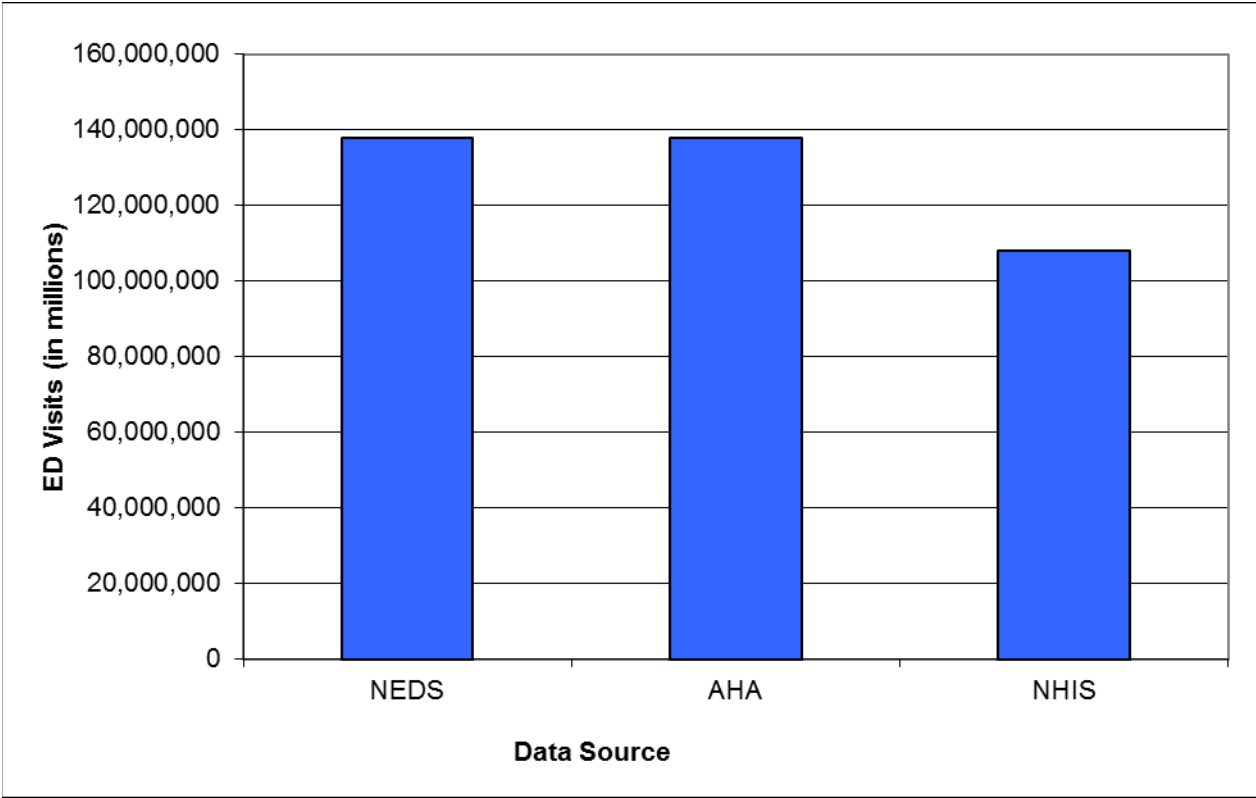
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| <b>Type of Data Element</b> | <b>HCUP Data Element</b> | <b>Coding Notes</b>   |
|-----------------------------|--------------------------|---|
| Hospital weight             | HOSPWT                   | Weight to hospital-owned EDs in AHA universe (i.e., total U.S.) |

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## **Appendix D: Comparisons of the NEDS with Existing Sources of ED Data**

**Figure D.1. Emergency Department Visit Counts in the United States, 2014**



Notes: ED = emergency department; NEDS = HCUP Nationwide Emergency Department Sample; AHA = American Hospital Association Annual Survey Database; NHIS = National Health Interview Survey.

**Table D.1. Estimates of ED Visits by U.S. Geographic Region from Four ED Data Sources, 2014**

| ED Visits               | ED Data Sources   |                |             |                |                   |                |
|-------------------------|-------------------|----------------|-------------|----------------|-------------------|----------------|
|                         | NEDS <sup>1</sup> |                | AHA         |                | NHIS <sup>2</sup> |                |
|                         | N<br>(weighted)   | % <sup>3</sup> | N           | % <sup>3</sup> | N                 | % <sup>3</sup> |
| <b>By Census Region</b> |                   |                |             |                |                   |                |
| Northeast               | 25,611,340        | 18.6           | 25,611,340  | 18.6           | 17,100,114        | 15.8           |
| Midwest                 | 31,215,078        | 22.7           | 31,215,078  | 22.7           | 29,175,038        | 27.0           |
| South                   | 55,266,599        | 40.1           | 55,266,599  | 40.1           | 41,719,892        | 38.7           |
| West                    | 25,714,884        | 18.7           | 25,714,884  | 18.7           | 19,947,414        | 18.5           |
| <b>Total U.S.</b>       | 137,807,901       | 100.0          | 137,807,901 | 100.0          | 107,942,458       | 100.0          |

Notes: ED = emergency department; NEDS = HCUP Nationwide Emergency Department Sample; AHA = American Hospital Association Annual Survey Database; NHIS = National Health Interview Survey.

<sup>1</sup> NEDS weighted counts by geographic region exactly match the AHA counts because the AHA data were used as control totals for the NEDS discharge weights.

<sup>2</sup> NHIS estimates were calculated using the midpoint of the ranges provided in the survey (0, 1, 2-3, 4-5, 6-7, 8-9, 10-12, and 13-15). For the upper range of visits in the survey (16 or more ED visits), 16 ED visits were used for the estimate.

<sup>3</sup> Column percent indicates the percentage of the total records in the ED data source that are in the Census region.

**Table D.2. Estimates of the ED Visits Resulting in Inpatient Admissions (Admission Rate) by U.S. Geographic Region, 2014**

| ED Visits Resulting in Inpatient Admissions | ED Data Sources |                    |
|---|-----------------|--------------------|
|   | NEDS            |                    |
|   | N (weighted)    | % of all ED Visits |
| <b>By Census Region</b>                     |                 |                    |
| Northeast                                   | 3,924,067       | 15.3               |
| Midwest                                     | 4,133,768       | 13.2               |
| South                                       | 7,842,662       | 14.2               |
| West  | 3,534,513       | 13.7               |
|   |                 |                    |
| <b>Total U.S.</b>                           | 19,435,011      | 14.1               |

Notes: ED = emergency department; NEDS = HCUP Nationwide Emergency Department Sample

**Table D.3. Estimates of the Number of Hospital-owned EDs by ED Visit Volume from Three ED Data Sources, 2014**

| Volume of ED Visits in 2014   | Data Sources    |                |              |                |
|-------------------------------|-----------------|----------------|--------------|----------------|
|                               | NEDS            |                | AHA          |                |
|                               | N<br>(weighted) | % <sup>1</sup> | N            | % <sup>1</sup> |
| Less than 10,000 visits       | 1,334           | 29.0           | 1,558        | 33.9           |
| 10,000 - 19,999 visits        | 785             | 17.1           | 791          | 17.2           |
| 20,000 - 29,999 visits        | 545             | 11.9           | 537          | 11.7           |
| 30,000 - 39,999 visits        | 523             | 11.4           | 454          | 9.9            |
| 40,000 - 49,999 visits        | 314             | 6.8            | 310          | 6.7            |
| 50,000 or more visits         | 1,094           | 23.8           | 944          | 20.5           |
| <b>All Hospital-owned EDs</b> | <b>4,595</b>    | <b>100.00</b>  | <b>4,595</b> | <b>100.00</b>  |

Notes: ED = emergency department; NEDS = Nationwide Emergency Department Sample from the Healthcare Cost and Utilization Project; AHA = American Hospital Association Annual Survey Database.

<sup>1</sup> Column percent indicates the percentage of the total records in the ED data source that are in each group of ED visits.



**Table D.4. Estimates of the Number of Injury-Related ED Visits from Two ED Data Sources, 2014**

|   | ED Data Source    |                        |
|---|-------------------|------------------------|
|   | NEDS <sup>1</sup> | NEISS-AIP <sup>2</sup> |
| Total number of ED visits for injuries (weighted) | 29,446,063        | 30,838,741             |
| Injury Intent                                     |                   |                        |
| Unintentional                                     | 27,500,014        | 28,728,927             |
| Assault   | 1,252,533         | 1,558,436              |
| Self-harm   | 458,039           | 494,169                |
| Injury Mechanism                                  |                   |                        |
| Cutting/piercing                                  | 2,095,090         | 2,237,158              |
| Drowning/submersion                               | 14,235            | 10,089                 |
| Falling   | 9,364,670         | 9,180,719              |
| Fire, flame or hot object                         | 410,749           | 402,743                |
| Firearm   | 85,026            | 81,034                 |
| Machinery   | 116,567           | 175,034                |
| Motor vehicle traffic                             | 3,361,161         | 3,839,933              |
| Natural//environmental (incl. bites and stings)   | 1,483,084         | 1,666,956              |
| Poisoning   | 959,270           | 1,474,055              |
| Struck by or against                              | 3,893,280         | 5,439,767              |
| Suffocation                                       | 56,754            | 71,571                 |

Notes: ED = emergency department; NEDS = Nationwide Emergency Department Sample from the Healthcare Cost and Utilization Project; NEISS-AIP = National Electronic Injury Surveillance System All-Injury Program.

<sup>1</sup> Injury diagnosis of 800-909.2, 909.4, 909.9, 910-994.9, 995.5-995.59, 995.80-995.85 (HCUP data element INJURY > 0).

<sup>2</sup> Data from WISQARS Query System (<http://webappa.cdc.gov/sasweb/ncipc/nfirates2001.html>). Includes non-fatal, all-cause injuries. Patients who died on arrival to the ED or during treatment in the ED are excluded. Queried December 2, 2016.