

**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)
2013**

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>.**

December 2015

Agency for Healthcare Research and Quality
Healthcare Cost and Utilization Project (HCUP)

Phone: 866-290-HCUP (4287)

E-mail: hcup@ahrq.gov

Web site: <http://www.hcup-us.ahrq.gov>

NEDS Data and Documentation Distributed by:
HCUP Central Distributor

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

Fax: (866) 792-5313

E-mail: HCUPDistributor@ahrq.gov

TABLE OF CONTENTS

SUMMARY OF DATA USE LIMITATIONS	1
HCUP CONTACT INFORMATION	2
WHAT IS THE NATIONWIDE EMERGENCY DEPARTMENT SAMPLE (NEDS)?	3
UNDERSTANDING THE NEDS.....	3
ABSTRACT	4
INTRODUCTION TO THE NATIONWIDE EMERGENCY DEPARTMENT SAMPLE (NEDS)	5
Overview of NEDS Data	5
Identification of HCUP Records with Emergency Department Services.....	6
State-Specific Restrictions	7
File Structure of the NEDS	8
NEDS Data Elements.....	8
Getting Started.....	9
Copying and Decompressing the Comma-Delimited Files.....	10
Downloading and Running the Load Programs	10
NEDS Documentation	10
HCUP Online Tutorials.....	11
SAMPLING DESIGN OF THE NEDS.....	12
Universe of Hospital-Based Emergency Departments.....	12
Sampling Frame of the NEDS.....	12
Stratification Variables	12
U.S. Census Region.....	12
Trauma Centers	13
Urban-Rural Location of the ED	14
Teaching Status	14
Hospital Ownership.....	14
Sample Weights.....	14
Hospital Weights	15
Discharge Weights	15
Final NEDS Sample.....	15
HOW TO USE THE NEDS FOR DATA ANALYSIS	17
Limitations of the NEDS.....	17
Identifying Different Types of ED Events.....	18
Calculating National Estimates	18
Choosing Data Elements for Analysis	18
ICD-9-CM Diagnosis and External Cause of Injury Codes	19
ICD-9-CM and CPT Procedure Codes	19
Missing Values.....	20
Variance Calculations	20

Computer Software for Weighted and Variance Calculations	21
COMPARABLE ED DATA SOURCES	23
Appendix A: NEDS Introductory Information	A-1
Table A.1. HCUP Partners Participating in the 2013 NEDS	A-2
Figure A.1. HCUP States Included in the 2013 NEDS.....	A-3
Table A.2. Percentage of U.S Population and ED Visits Accounted for by the 30 HCUP States Participating in the NEDS, 2013.....	A-4
Table A.3. NEDS-Related Reports and Database Documentation Available on the HCUP-US Web Site	A-5
Table A.4. NEDS Stratifiers.....	A-6
Table A.5. NEDS Target Universe, Sampling Frame, and Final Sample Characteristics, 2013	A-7
Table A.6. NEDS Sampling Rates, 2013.....	A-8
Table A.7. Different Types of ED Events in the NEDS, 2013.....	A-12
Appendix B: State-Specific Restrictions	B-1
Table B.1. State-Specific Restrictions	B-2
Appendix C: NEDS Data Elements and Codes	C-1
Table C.1. Data Elements in the NEDS Core File	C-2
Table C.2. Data Elements in the NEDS Supplemental ED File	C-5
Table C.3. Data Elements in the NEDS Supplemental Inpatient File.....	C-6
Table C.4. Data Elements in the NEDS Hospital Weights File	C-8
Appendix D: Comparisons of the NEDS with Existing Sources of ED Data.....	D-1
Figure D.1. Emergency Department Visit Counts in the United States, 2013	D-2
Table D.1. Estimates of ED Visits by U.S. Geographic Region from Four ED Data Sources, 2013	D-3
Table D.2. Estimates of the ED Visits Resulting in Inpatient Admissions (Admission Rate) by U.S. Geographic Region, 2013	D-4
Table D.3. Estimates of the Number of Hospital-Based EDs by ED Visit Volume from Three ED Data Sources, 2013	D-5
Table D.4. Estimates of the Number of Injury-Related ED Visits from Two ED Data Sources, 2013	D-6

**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 Website or other 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](http://www.hcup-us.ahrq.gov)) 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.

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

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

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

Email: 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 2013.
- There are 30 HCUP Partner States that contributed to the 2013 NEDS: AR, AZ, CA, CT, FL, GA, HI, IA, IL, IN, KS, KY, MA, MD, MN, MO, NC, ND, NE, NJ, NV, NY, OH, RI, SC, SD, TN, UT, VT, and WI.
- The NEDS describes 135 million ED visits for 2013, 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, 2013*, summarizes the content of the NEDS and describes the development of the 2013 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). Please refer to detailed documentation before using the data.

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

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 2013 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.¹ 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 30 million ED visits at 947 hospitals that approximate a 20-percent stratified sample of U.S. hospital-based EDs. Weights are provided to calculate national estimates pertaining to 135 million ED visits in 2013.

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 HCUP States participated in the 2013 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-based 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>.

¹ 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.² 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-based 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-Based Emergency Departments, and Records in the NEDS by Year

Data Year	HCUP States in the NEDS	Number of Hospital-Based EDs	Number of ED Visits, Unweighted	Number of ED Visits, Weighted for National Estimates
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 (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 (Added ND; NH data were not available)	951	29,421,411	131,048,605

² 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-Based 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 (Added NV; 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 (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 (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 (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 30 participating HCUP Partner States in 2013. Based on U.S. Census Bureau data, the HCUP NEDS States account for 67.7 percent of the U.S. population in 2013. The 30 States account for 66.0 percent of the ED visits reported in the 2013 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 (i.e., treat-and-release visits and transfers to another hospital).
- 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.

Four of the 30 Partners (CA, MA, NC, and OH) 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 in these States was evaluated on a State-by-State basis.

- CA, MA, and NC: 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.
- OH: The HCUP Partner provided a large outpatient database that combined records for ED services with records for other outpatient visits, such as ambulatory surgery, outpatient clinic, or laboratory. Each record contained a State-defined indicator of the type of outpatient service. Ohio outpatient records with an outpatient type of service value of E (ED), F (Fast Track ED), and U (Urgent Care) were considered to be ED records, even though information was not available to determine if 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.

State-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 State-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. In 2013, the NEDS Core File has about 30 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 2013, the NEDS Supplemental ED File has 25.3 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 procedures 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 2013, the NEDS Supplemental Inpatient File has 4.2 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 2013, the NEDS Hospital Weights File has 947 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 NEDS is an extremely large database that requires sophisticated statistical software for analysis. The following computer properties are needed in order to load and analyze the NEDS data:

- A DVD drive
- A hard drive with 60 to 100 gigabytes (GB) of available space
- A third-party zip utility such as ZIP Reader, 7-Zip, or WinZip®
- SAS®, SPSS®, Stata® or similar analysis software.

The total size of the comma-delimited files of the NEDS is about 14 GB. The NEDS files loaded into SAS are about 11 GB. In SAS, the largest use of space typically occurs during a sort, which requires work space about three times the size of the file. Thus, the NEDS files would require about 33 GB of available workspace to perform a sort. 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 under 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 variables. 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.

Copying and Decompressing the Comma-Delimited Files

The NEDS is delivered to users as comma-delimited files compressed with SecureZIP® from PKWARE. To copy and decompress the NEDS files from the DVD, the following steps are outlined:

- 1) Create a directory for the NEDS on the hard drive.
- 2) Unzip each compressed file from the DVD, saving it into a new directory using a third-party zip utility such as ZIP Reader, WinZip, or 7-Zip. Beginning with the 2010 NEDS, you will be prompted to enter the encryption password (sent separately by e-mail) to decrypt each file. Please note that attempts to unzip files using Windows will produce an error message similar to the following: "Compressed (Zipped) Folders Error. The password you typed is not correct. Try typing it again." The solution is to use a third-party zip utility such as ZIP Reader, 7-Zip, or WinZip rather than the built-in Windows Explorer function to open the archive. ZIP Reader may be downloaded for free at <http://comm.pkware.com/download-zipreader-business.html>. 7-Zip can be downloaded for free at <http://www.7-zip.org/>. Evaluation versions of WinZip may be downloaded from the WinZip Web site at www.winzip.com.

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 "Load Programs" section on this page.
- 3) Click on "SAS Load Programs", "SPSS Load Programs", or "Stata Load Programs" to go to the corresponding Load Programs page.
- 4) Select and download the load programs. They are specific to the data year. For example, the load program for the 2013 NEDS Core file is linked to "Core File" under "2013 NEDS". Save the load programs into the same directory as the NEDS files on the computer.
- 5) Edit and run the load programs as appropriate for the environment, to load and save the analysis files. For example, add directory paths for the input and output files as needed.

NEDS Documentation

Comprehensive documentation for the NEDS files is available on the HCUP-US Web site (<http://www.hcup-us.ahrq.gov>). 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.

To locate the NEDS documentation on HCUP-US, the user is instructed to:

- 1) Choose “Databases” from the home page (<http://www.hcup-us.ahrq.gov>).
- 2) Select the section labeled “Nationwide Emergency Department Sample (NEDS).”

[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 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 a 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 the three 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.

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.

SAMPLING DESIGN OF THE NEDS

The NEDS is built using a 20 percent stratified sample of hospital-based 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-based EDs selected.

Universe of Hospital-Based Emergency Departments

A feasibility study performed in 2008 assessed several possible data sources for the universe of hospital-based 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-based EDs is therefore defined as the AHA community, non-rehabilitation hospitals that reported total ED visits. The AHA defines community hospitals as “all non-Federal, short-term, general, and other specialty hospitals”.³ 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-based EDs in the States for which HCUP ED data (SID and SEDD) are available. The list of hospital-based EDs in the frame consists of all AHA community, non-rehabilitation hospitals that report total ED visits in each of the frame States *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](#).

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.

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

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:⁴

- 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.⁵ 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.⁶ 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
- Trauma level III could be grouped with nontrauma hospitals beginning in the 2011 NEDS.

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

⁵ 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.

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

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-based EDs was determined based on the county in which the hospital was located. The categorization is a simplified adaptation of the 2003 version of the Urban Influence Codes (UIC).⁷ The 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), or small metropolitan and micropolitan⁸ was necessary.

Teaching Status

A hospital-based 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 (COTH), 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 (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-based EDs and ED visits. Hospital-level weights were developed to extrapolate NEDS sample EDs to the universe of

⁷ United States Department of Agriculture Economic Research Service, 2007

⁸ The collapsing of small metropolitan and micropolitan areas was required in the South in 2011–2013.

hospital-based 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-based 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-based 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-based 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, non-rehabilitation 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, non-rehabilitation hospital-based EDs in the United States that were included in the 2013 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-based ED events from community, non-rehabilitation hospitals in the 30 HCUP Partner States 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-based 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).⁹ 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-based 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-based 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.

⁹ 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) 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 2013, about 15 percent of all ED visits (weighted) are missing information about ED charges. For ED visits that result in admission, 24 percent of records are missing ED charges. For ED visits that do not result in admissions, 13 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 1.6 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 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 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 2013 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-based 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/ftp/ftpicd9/ftpicd9.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.¹⁰

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 15 diagnoses 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 3 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/ftp/ftpicd9/ftpicd9.htm>, which shows ICD-9-CM code changes over time. CPT procedure codes, which are copyrighted by the American Medical 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.

¹⁰ This HCUP Methods Series report is available at https://www.hcup-us.ahrq.gov/reports/methods/2011_03.pdf.

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 3 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-based 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](#) 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.

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-based 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.¹¹ 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 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:

¹¹ 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.

<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 hospital-based EDs	American Hospital Association (AHA) Annual Survey Database	Database containing characteristics and descriptions of U.S. hospitals reported by hospitals via survey. Owned by Health Forum.
	National Emergency Department Inventory (NEDI) – USA	Inventory of U.S. ED locations and annual ED visit volume that integrates information from the AHA Annual Survey Database, the Hospital Market Profiling Solution [®] , Internet searches, and direct communication with hospital staff. Created by the Emergency Medicine Network (EMNet).
ED visit information from a sample of hospital-based 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).

Type of ED Data	ED Data Source	Description
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 2013 for the U.S. was available from three data sources (AHA, NEDS, and NHIS).¹² [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-based EDs by ED visit volume are available from three data sources (NEDS, AHA, and NEDI) and are displayed in [Appendix D, Table D.3](#).

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](#).

¹² At the time this document was created, the 2013 NHAMCS public use file was not available for developing comparative estimates.

Appendix A: NEDS Introductory Information

Table A.1. HCUP Partners Participating in the 2013 NEDS

State	HCUP Data Source
Arizona	Arizona Department of Health Services
Arkansas	Arkansas Department of Health
California	California Office of Statewide Health Planning and Development
Connecticut	Connecticut Hospital Association
Florida	Florida Agency for Health Care Administration
Georgia	Georgia Hospital Association
Hawaii	Hawaii Health Information Corporation
Illinois	Illinois Department of Public Health
Indiana	Indiana Hospital Association
Iowa	Iowa Hospital Association
Kansas	Kansas Hospital Association
Kentucky	Kentucky Cabinet for Health and Family Services
Maryland	Maryland Health Services Cost Review Commission
Massachusetts	Massachusetts Center for Health Information and Analysis
Minnesota	Minnesota Hospital Association (provides data for Minnesota and North Dakota)
Missouri	Missouri Hospital Industry Data Institute
Nebraska	Nebraska Hospital Association
Nevada	Nevada Department of Health and Human Services
New Jersey	New Jersey Department of Health
New York	New York State Department of Health
North Carolina	North Carolina Department of Health and Human Services
North Dakota	North Dakota (data provided by the Minnesota Hospital Association)
Ohio	Ohio Hospital Association
Rhode Island	Rhode Island Department of Health
South Carolina	South Carolina Revenue and Fiscal Affairs Office
South Dakota	South Dakota Association of Healthcare Organizations
Tennessee	Tennessee Hospital Association
Utah	Utah Department of Health and Utah Department of Health, Bureau of Emergency Medical Services
Vermont	Vermont Association of Hospitals and Health Systems
Wisconsin	Wisconsin Department of Health Services

Figure A.1. HCUP States Included in the 2013 NEDS

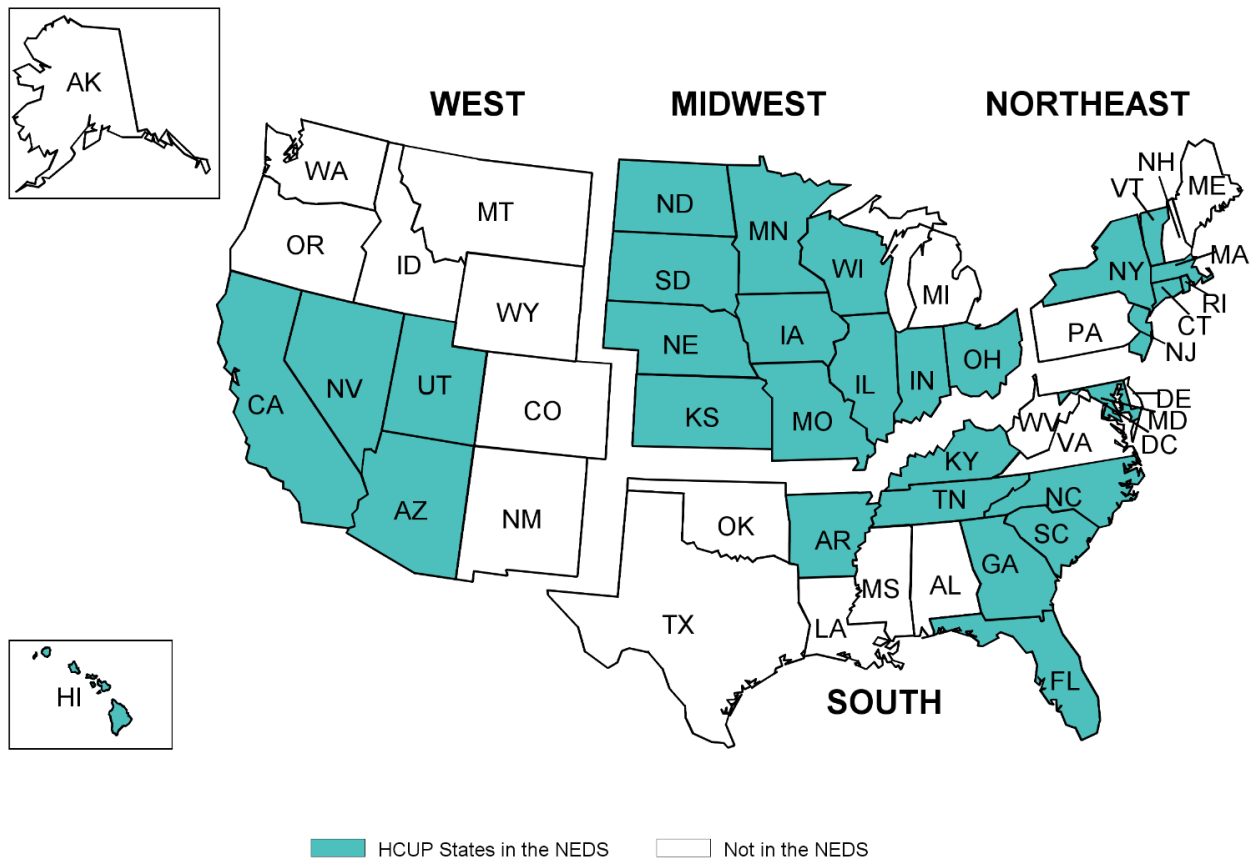


Table A.2. Percentage of U.S Population and ED Visits Accounted for by the 30 HCUP States Participating in the NEDS, 2013

Region	U.S. Population, 2013	Percentage of U.S. Population in NEDS States (%)	ED Visits in the U.S., 2013	Percentage of U.S. ED Visits in NEDS States (%)
Northeast	55,943,073	72.4	25,758,251	69.5
Midwest	67,547,890	85.4	30,767,113	84.2
South	118,383,453	54.0	53,817,056	53.3
West	74,254,423	70.1	24,526,595	67.5
Nation	316,128,839	67.7	134,869,015	66.0

Source: Population count from the U.S. Census Bureau, Annual Estimates of the Population for the United States, 2013, Table NST-EST2013-01. ED visits in the U.S. from the American Hospital Association Annual Survey of Hospitals, 2013.

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

<p>Description of the NEDS Files</p> <ul style="list-style-type: none"> • Introduction to the NEDS, 2013 (<i>this document</i>) and prior years • HCUP Quality Control Procedures – describes procedures used to assess data quality • File Specifications – details data file names, number of records, record length, and record layout <p>Restrictions on the Use of the NEDS</p> <ul style="list-style-type: none"> • Data Use Agreement for the NEDS • Requirements for publishing with HCUP data <p>Load Programs</p> <ul style="list-style-type: none"> • SAS Load Programs • SPSS Load Programs • Stata Load Programs <p>Description of Data Elements in the NEDS</p> <ul style="list-style-type: none"> • Description of Data Elements – details uniform coding and State-specific idiosyncrasies • Availability of Data Elements by Year – lists which data elements are available each year <p>Additional Resources for NEDS Data Elements</p> <ul style="list-style-type: none"> • Summary Statistics – lists means and frequencies on nearly all data elements • HCUP Coding Practices – describes how HCUP data elements are coded • HCUP Hospital Identifiers – explains data elements that characterize individual hospitals 	<p>Known Data Issues</p> <ul style="list-style-type: none"> • 2011 • 2006 and 2007 <p>HCUP Tools: Labels and Formats</p> <ul style="list-style-type: none"> • Overview of Clinical Classifications Software (CCS) • Format library programs to create value labels <ul style="list-style-type: none"> ○ DRG formats ○ HCUP formats ○ HCUP diagnoses and procedure groups, including CCS categories ○ ICD-9-CM formats <p>NEDS-Related Reports</p> <ul style="list-style-type: none"> • NEDS Related Reports
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Table A.4. NEDS Stratifiers

Stratifier	Values
Region	1: Northeast 2: Midwest 3: South 4: West
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 4: Nontrauma or trauma center level III (beginning in the 2011 NEDS) 8: Trauma center level I or II (in all years of the NEDS) 9: Trauma center level I, II or III (only in the 2006-2010 NEDS)
Urban-Rural	1: Large metropolitan 2: Small metropolitan 3: Micropolitan 4: Non-urban residual Collapsed categories used for strata with small sample sizes 7: Small metropolitan and micropolitan (used in the South in 2011-2013) 8: Metropolitan (large and small) 9: Non-metropolitan (micropolitan and non-urban location)
Teaching	0: Metropolitan non-teaching 1: Metropolitan teaching 2: Non-metropolitan teaching and non-teaching
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)

Table A.5. NEDS Target Universe, Sampling Frame, and Final Sample Characteristics, 2013

	Description	Number of Hospital-Based EDs, 2013	Number of ED Events, 2013
Target Universe	EDs in community, non-rehabilitation U.S. hospitals that reported total ED visits in the AHA Annual Survey Database	4,624	134,869,015
Sampling Frame	EDs in the 30 HCUP States that provide information on ED visits that result and do not result in admission	2,668	82,168,081
2013 NEDS	20 percent sample of target universe drawn from the sampling frame	947	29,581,718

Source: HCUP Nationwide Emergency Department Sample, 2013

Table A.6. NEDS Sampling Rates, 2013

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: (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)

NEDS Stratum	Number of Hospital-Based EDs					Sampling Rate	
	AHA Universe	20% of Universe	Frame	Frame Shortfall	NEDS	NEDS to Universe	NEDS to Frame
Total	4,624	962	2,668	15	947	20.5%	35.5%
Northeast							
10100	117	24	73	0	24	20.5%	32.9%
10110	90	18	69	0	18	20.0%	26.1%
10200	86	18	47	0	18	20.9%	38.3%
10210	23	5	9	0	5	21.7%	55.6%
11110	44	9	34	0	9	20.5%	26.5%
11210	13	3	5	0	3	23.1%	60.0%
12110	15	3	9	0	3	20.0%	33.3%
12210	17	4	7	0	4	23.5%	57.1%
13800	8	2	4	0	2	25.0%	50.0%
13810	5	2	2	0	2	40.0%	100.0%
14320	83	17	35	0	17	20.5%	48.6%
14420	53	11	21	0	11	20.8%	52.4%
18320	5	2	2	0	2	40.0%	100.0%
18800	12	3	5	0	3	25.0%	60.0%

NEDS Stratum	Number of Hospital-Based EDs					Sampling Rate	
NEDS Stratum	AHA Universe	20% of Universe	Frame	Frame Shortfall	NEDS	NEDS to Universe	NEDS to Frame
Midwest							
20100	154	31	137	0	31	24.2%	22.6%
20110	53	11	40	0	11	29.7%	27.5%
20200	152	31	115	0	31	28.2%	27.0%
20210	28	6	22	0	6	30.4%	27.3%
20320	224	45	194	0	45	25.1%	23.2%
20421	190	38	173	0	38	23.2%	22.0%
20424	258	52	205	0	52	28.3%	25.4%
21110	39	8	34	0	8	26.7%	23.5%
21210	26	6	19	0	6	50.0%	31.6%
22110	23	5	13	0	5	35.7%	38.5%
22210	33	7	24	0	7	26.9%	29.2%
23100	20	4	18	0	4	26.3%	22.2%
23110	11	3	10	0	3	30.0%	30.0%
23200	27	6	25	0	6	24.1%	24.0%
23210	18	4	16	0	4	30.8%	25.0%
23321	7	2	4	0	2	66.7%	50.0%
23324	37	8	36	0	8	23.8%	22.2%
23420	12	3	10	0	3	25.0%	30.0%
28100	27	6	22	0	6	22.7%	27.3%
28200	24	5	19	0	5	31.3%	26.3%
28920	12	3	5	0	3	60.0%	60.0%

NEDS Stratum	Number of Hospital-Based EDs					Sampling Rate	
NEDS Stratum	AHA Universe	20% of Universe	Frame	Frame Shortfall	NEDS	NEDS to Universe	NEDS to Frame
South							
30110	100	20	47	0	20	20.0%	42.6%
30202	121	25	69	0	25	20.7%	36.2%
30203	112	23	46	0	23	20.5%	50.0%
30210	40	8	18	0	8	20.0%	44.4%
30322	111	23	70	0	23	20.7%	32.9%
30323	71	15	39	0	15	21.1%	38.5%
30422	171	35	87	0	35	20.5%	40.2%
30423	89	18	33	0	18	20.2%	54.5%
31110	40	8	16	0	8	20.0%	50.0%
31210	34	7	20	0	7	20.6%	35.0%
32110	13	3	7	0	3	23.1%	42.9%
32700	19	4	6	0	4	21.1%	66.7%
32710	34	7	14	0	7	20.6%	50.0%
33202	19	4	10	0	4	21.1%	40.0%
33203	26	6	6	0	6	23.1%	100.0%
33322	23	5	4	1	4	17.4%	100.0%
33323	13	3	2	1	2	15.4%	100.0%
33424	14	3	3	0	3	21.4%	100.0%
33810	33	7	4	3	4	12.1%	100.0%
34101	34	7	11	0	7	20.6%	63.6%
34102	145	29	74	0	29	20.0%	39.2%
34103	173	35	56	0	35	20.2%	62.5%
34201	68	14	26	0	14	20.6%	53.8%
34321	88	18	27	0	18	20.5%	66.7%
34421	188	38	59	0	38	20.2%	64.4%
38100	11	3	2	1	2	18.2%	100.0%

NEDS Stratum	Number of Hospital-Based EDs					Sampling Rate	
NEDS Stratum	AHA Universe	20% of Universe	Frame	Frame Shortfall	NEDS	NEDS to Universe	NEDS to Frame
West							
40102	113	23	91	0	23	20.4%	25.3%
40103	62	13	54	0	13	21.0%	24.1%
40202	72	15	52	0	15	20.8%	28.8%
40203	33	7	13	0	7	21.2%	53.8%
40321	38	8	15	0	8	21.1%	53.3%
40324	69	14	32	0	14	20.3%	43.8%
40424	88	18	22	0	18	20.5%	81.8%
41110	29	6	20	0	6	20.7%	30.0%
41210	6	2	3	0	2	33.3%	66.7%
42110	16	4	12	0	4	25.0%	33.3%
42200	27	6	8	0	6	22.2%	75.0%
42210	12	3	3	0	3	25.0%	100.0%
43104	14	3	4	0	3	21.4%	75.0%
43202	22	5	6	0	5	22.7%	83.3%
43203	6	2	2	0	2	33.3%	100.0%
43920	36	8	2	6	2	5.6%	100.0%
44101	17	4	13	0	4	23.5%	30.8%
44110	56	12	38	0	12	21.4%	31.6%
44201	27	6	13	0	6	22.2%	46.2%
44210	29	6	18	0	6	20.7%	33.3%
44421	98	20	17	3	17	17.3%	100.0%
48100	18	4	11	0	4	22.2%	36.4%

Source: HCUP Nationwide Emergency Department Sample, 2013

Table A.7. Different Types of ED Events in the NEDS, 2013

ED Event	Number of ED Visits	Percent of ED Visits
ED visit in which the patient is treated and released	113,163,524	83.9
ED visit in which the patient is admitted to this same hospital	19,255,862	14.3
ED visit in which the patient is transferred to another short-term hospital	2,043,418	1.5
ED visit in which the patient died in the ED	199,286	0.2
ED visit in which patient is not admitted to the same hospital, destination unknown	206,185	0.2
ED visit in which the patient is discharged alive, destination unknown (but not admitted)	740	0.0

Source: HCUP Nationwide Emergency Department Sample, 2013

Appendix B: State-Specific Restrictions

The table below enumerates the types of restrictions applied to the 2013 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. State-Specific Restrictions

Confidentiality of Hospitals
<p>Limitations on sampling to ensure hospital confidentiality:</p> <ul style="list-style-type: none"> • All States: <ul style="list-style-type: none"> ○ 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. ○ 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.
Confidentiality of Records
<p>Limitations on selected data elements to ensure patient confidentiality:</p> <ul style="list-style-type: none"> • Age (AGE) values greater than 90 are set to 90 for all NEDS records. • At least one Partner requires that admission month (AMONTH) is set to missing on all records.
Limited Reporting of External Cause of Injury Codes
<ul style="list-style-type: none"> • 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.
Missing Discharges for Specific Populations of Patients
<ul style="list-style-type: none"> • At least one Partner prohibits the release of discharge records for patients with HIV diagnoses. • At least one Partner prohibits the release of behavioral health including chemical dependency care or psychiatric care discharges. • At least one Partner prohibits the release of abortion discharges.

Appendix C: NEDS Data Elements and Codes

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

Type of Data Element	HCUP Data Element	Coding Notes
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 – DX15	ICD-9-CM diagnoses
	DXCCS1 – DXCCS15	Clinical Classifications Software (CCS) category for all diagnoses
	CHRON1 – CHRON15	Chronic condition indicator for all diagnoses: (0) non-chronic condition, (1) chronic condition
Discharge timing	NDX	Number of diagnoses coded on the original record. A maximum of 15 codes are retained on the NEDS.
	DQTR	Coded: (1) Jan - Mar, (2) Apr - Jun, (3) Jul - Sep, (4) Oct – Dec
Disposition of patient from the ED	YEAR	Calendar year of ED visits
	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)
ED event	DIED_VISIT	Died in ED: (0) did not die (1) died in the ED, (2) died in the hospital
	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)
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

Type of Data Element	HCUP Data Element	Coding Notes
	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
	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

Type of Data Element	HCUP Data Element	Coding Notes
	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 2013, the median income quartiles are defined as: 1) \$1 - \$37,999; (2) \$38,000 - \$47,999; (3) \$48,000 - \$63,999; and (4) \$64,000 or more.
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 (Prior to 2011, HOSP_REGION is on the Core file; beginning in 2011, it is only available on the Hospital File)
	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

Type of Data Element	HCUP Data Element	Coding Notes
CPT procedure information	CPT1 – CPT15	CPT/HCPCS procedures performed in the ED
	CPTCCS1- 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 – PR_ED9	ICD-9-CM procedures performed in ED
	PRCCS_ED1 – PRCCS_ED9	Clinical Classifications Software (CCS) category for all ICD-9-CM procedures
	PCLASS_ED1 – 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 (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 (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

Type of Data Element	HCUP Data Element	Coding Notes
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	Grouper 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 (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 (Prior to 2011, DISCWT is on the Supplemental IP file; beginning in 2011, it is only available on the Core and Hospital File)

Type of Data Element	HCUP Data Element	Coding Notes
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

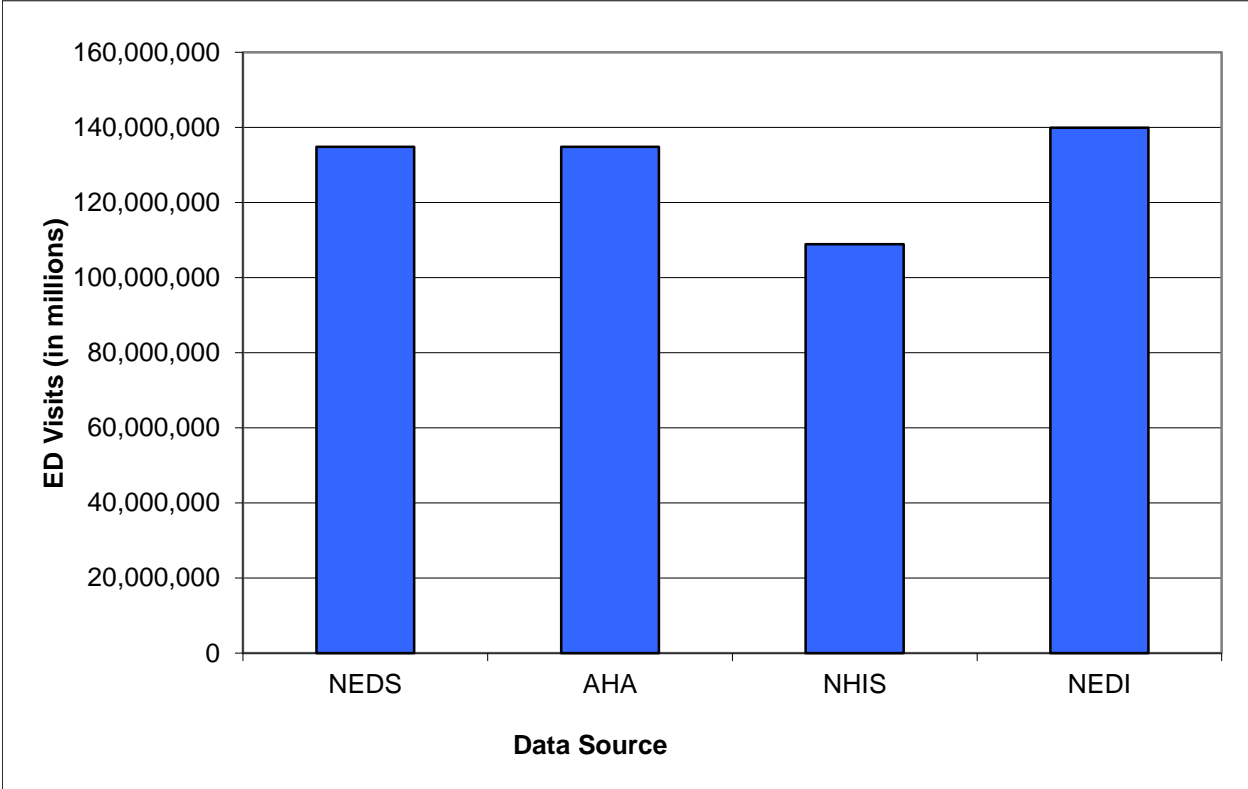
Table C.4. Data Elements in the NEDS Hospital Weights File

Type of Data Element	HCUP Data Element	Coding Notes
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-based EDs in the stratum
	S_HOSP_U	Number of sampled hospital-based 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, (7) collapsed category of small metropolitan and micropolitan beginning in the 2011 NEDS, (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

Type of Data Element	HCUP Data Element	Coding Notes
Hospital weight	HOSPWT	Weight to hospital-based EDs in AHA universe (i.e., total U.S.)

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

Figure D.1. Emergency Department Visit Counts in the United States, 2013



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

Table D.1. Estimates of ED Visits by U.S. Geographic Region from Four ED Data Sources, 2013

ED Visits	ED Data Sources							
	NEDS ¹		AHA		NEDI		NHIS ²	
	N (weighted)	% ³	N	% ³	N	% ³	N (weighted)	% ³
By Census Region								
Northeast	25,758,251	19%	25,758,251	19%	25,295,058	18%	18,570,471	17%
Midwest	30,767,113	23%	30,767,113	23%	30,903,541	22%	27,130,710	25%
South	53,817,056	40%	53,817,056	40%	58,624,567	42%	43,151,646	40%
West	24,526,595	18%	24,526,595	18%	25,099,395	18%	20,066,207	18%
Total U.S.	134,869,015	100%	134,869,015	100%	139,922,560	100%	108,919,033	100%

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

¹ 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.

² 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.

³ 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, 2013

ED Visits Resulting in Inpatient Admissions	ED Data Sources	
	NEDS	
	N (weighted)	% of all ED Visits
By Census Region		
Northeast	4,037,475	15.67
Midwest	4,020,606	13.07
South	7,721,391	14.35
West	3,476,390	14.17
Total U.S.	19,255,862	14.28

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

Table D.3. Estimates of the Number of Hospital-Based EDs by ED Visit Volume from Three ED Data Sources, 2013

Volume of ED Visits in 2013	Data Sources					
	NEDS		AHA		NEDI	
	N (weighted)	% ¹	N	% ¹	N	% ¹
Less than 10,000 visits	1,353	29.26	1,579	34.15	1,483	29.51
10,000 - 19,999 visits	833	18.01	808	17.47	978	19.46
20,000 - 29,999 visits	638	13.80	558	12.07	694	13.81
30,000 - 39,999 visits	481	10.40	465	10.06	591	11.76
40,000 - 49,999 visits	390	8.44	326	7.05	435	8.66
50,000 or more visits	929	20.10	888	19.20	844	16.80
All Hospital-based EDs	4,624	100.00	4,624	100.00	5,025	100.00

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

¹ 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, 2013

	ED Data Source	
	NEDS ¹	NEISS-AIP ²
Total number of ED visits for injuries (weighted)	29,631,148	30,888,063
Injury Intent		
Unintentional	27,147,300	28,649,449
Assault	1,221,999	1,643,801
Self-harm	453,573	494,169
Injury Mechanism		
Cutting/piercing	2,188,783	2,329,422
Drowning/submersion	12,900	5,539
Falling	9,166,311	8,790,337
Fire, flame or hot object	389,082	405,327
Firearm	68,141	84,258
Machinery	120,150	186,432
Motor vehicle traffic	3,147,200	3,887,356
Natural//environmental (incl. bites and stings)	1,438,613	1,616,438
Poisoning	936,603	1,316,874
Struck by or against	4,011,572	5,661,201
Suffocation	56,169	59,444

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.

¹ 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).

² 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 October 27, 2015.