HCUP Methods Series

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INTRODUCTION

This study evaluates the reporting of external cause of injury codes (E codes) on injury-related discharges in the Healthcare Cost and Utilization Project (HCUP) databases. The HCUP databases are developed through a Federal-State-Industry partnership sponsored by the Agency for Healthcare Research and Quality (AHRQ). Injuries are identified by Healthy People 2020 as one of the 10 high-priority public health issues in the United States. Injuries are the leading cause of death for Americans ages 1 to 44, and a leading cause of disability for all ages, regardless of sex, race/ethnicity, or socioeconomic status.[1] Data on injuries are essential to evaluate the effectiveness of existing policies and programs, as well as to determine the need for new prevention programs. Hospital discharge data from inpatient and outpatient settings, such as emergency rooms, can be used to identify significant injuries that are priority targets for prevention. E codes are an essential component of injury surveillance efforts because they describe the cause of injury.

Injury-related discharges were identified in the HCUP databases using International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) codes. The percentage of injuries with injury-related E codes was determined for each of the following HCUP databases:

- The State Inpatient Databases (SID) contain inpatient discharge data from a census of hospitals in the State. States participating in HCUP are listed in Appendix 1.

- The National (Nationwide) Inpatient Sample (NIS) is a nationally stratified, weighted sample of inpatient discharges.

- The HCUP State Emergency Department Databases (SEDD) contain data from hospital-affiliated emergency departments (EDs) for visits that do not result in hospitalizations (i.e., patients are treated, stabilized, and released).

- The HCUP Nationwide Emergency Department Sample (NEDS) is a nationally stratified, weighted sample of hospital-based EDs with information on ED visits that do not result in an admission and ED visits that result in an admission to the same hospital.

This report provides information on the HCUP databases between 2001 and 2012. Beginning with 2012 data, the NIS was redesigned to improve national estimates. There were two main changes to the sample design. One, the NIS became a sample of discharge records from HCUP-participating hospitals, rather than a sample of hospitals from which all discharges were retained. Two, the universe of hospitals for the NIS was limited to community hospitals excluding rehabilitation and long-term acute care hospitals (LTAC) in the U.S. using the definitions of hospitals and total discharges supplied by the statewide data organizations that contribute to HCUP. This second change to the NIS design reduces the total number of discharges in the U.S. by 3–4 percent.[2] To align the national estimates of inpatient discharges for injury from 2001–2011 with estimates for 2012 using the redesigned NIS, the prior year estimates were recalculated for this Method Series report using the NIS trend weights.[3] It

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[1] Injury and Violence Prevention Overview, Healthy People 2020, http://www.healthypeople.gov/2020/topics-objectives/topic/injury-and-violence-prevention (Accessed 2/16/2015)

[2] More information on the redesign of the NIS is available on the HCUP User Support Web site (https://www.hcup-us.ahrq.gov/db/nation/nis/reports/NISRedesignFinalReport040914.pdf).

[3] More information on NIS trend weights is available at https://www.hcup-us.ahrq.gov/db/nation/nis/trendwghts.jsp.

should be noted that the other HCUP databases used for this report (i.e., SID, SEDD, and NEDS) include information from LTAC hospitals if they are also a community nonrehabilitation hospital.

The information for the 2001 HCUP databases is from the HCUP Method Series #2004-06 *Healthcare Cost and Utilization Project (HCUP) E Code Evaluation*. This earlier report evaluated E code completeness for both injuries and medical misadventures. It also compared to E coding in similar administrative databases in 2001, such as the National Hospital Discharge Survey (NHDS) and the National Hospital Ambulatory Medical Care Survey (NHAMCS). The variation in E coding in 2001 across the HCUP States was examined in relation to State-specific policies, procedures, and edit checks.

METHODS

We defined injury records using only the first-listed diagnosis (DX1). On inpatient data, the first-listed diagnosis code reflects the condition established to be chiefly responsible for a patients' admission to the hospital and thus is considered the principal diagnosis code. However, on ED treat-and-release data, the first-listed diagnosis is the reason for visit.

Records with injuries are identified by ICD-9-CM diagnoses and E codes using the scheme recommended by the Safe States Alliance [formerly State and Territorial Injury Prevention Directors Association (STIPDA)]. The following tables define the range of injury diagnoses and E codes.

ICD-9-CM Codes Used to Identify Injury Records

ICD-9-CM Diagnosis Codes	Description
800-909.2, 909.4, 909.9	Fractures; dislocations; sprains and strains; intracranial injury; internal injury of thorax, abdomen, and pelvis; open wound of the head, neck, trunk, upper limb, and lower limb; injury to blood vessels; late effects of injury, poisoning, toxic effects, and other external causes, excluding those of complications of surgical and medical care and drugs, medicinal or biological substances.
910-994.9	Superficial injury; contusion; crushing injury; effects of foreign body entering through orifice; burns; injury to nerves and spinal cord; traumatic complications and unspecified injuries; poisoning and toxic effects of substances; other and unspecified effects of external causes.
995.5-995.59	Child maltreatment syndrome.
995.80-995.85	Adult maltreatment, unspecified; adult physical abuse; adult emotional/ psychological abuse; adult sexual abuse; adult neglect (nutritional); other adult abuse and neglect.

E Codes Used to Identify Injury-Related Events

First character = "E" and *NOT ONE* of the following:

- E849.0-E849.9 (place of occurrence)
- E967.0-E967.9 (child and battering/maltreatment; perpetrator codes)
- E869.4 (accidental poisoning by second-hand tobacco smoke)
- E870-E879 (misadventures during surgical and medical care & surgical and medical procedures as the cause of abnormal reaction or later complication, without mention of misadventure at time of procedure)
- E930-E949 (drugs, medicinal, and biological substances causes adverse effects in therapeutic use).

Prior to data year 2003, E codes that were reported separately from the secondary diagnoses were placed at the end of the HCUP diagnosis array during the creation of the HCUP databases. Beginning in data year 2003, E codes were retained in a separate array from the diagnoses.

The percentage of injury discharges with an injury E code is defined as:

$$\frac{\text{\# of records with an injury diagnosis that have an injury-related E code}}{\text{\# of records with an injury diagnosis}} \times 100$$

Using the NIS and NEDS, we further determined the percentage of injury records that reported only nonspecific injury E codes. Nonspecific injury E codes were grouped into the following three mutually exclusive categories.

Nonspecific Injury E Codes

Fracture, cause unspecified	E887
Unspecified (combined)	
Unintentional	E9289, E9299
Suicide	E9589
Homicide	E9689
Undetermined	E9889
Legal, terrorism	E976, E9979
Other specified, NEC (combined)	
Unintentional	E9288, E9298
Suicide	E9588, E959
Homicide	E9688, E969, E9991
Undetermined	E9888, E989
Legal, terrorism	E977, E995, E9978, E998, E9990

RESULTS

In 2012, there were 1.8 million inpatient discharges for injury in the U.S. This accounts for 5.1 percent of the 35.2 million inpatient discharges in the year. In 2012, there were 27.0 million ED visits for injury in the U.S. This accounts for 20.1 percent of the 134.4 million ED visits in the year.

Table 1 lists the percentage of inpatient injury discharges with an injury E code reported for the total U.S. and for States participating in HCUP.

Table 1. Percentage of Inpatient Injury Discharges with an Injury E Code

Geographic Area	Data Year						
	2012	**2011**	**2010**	**2009**	**2008**	**2006**	**2001**
Total U.S.	91.9	92.3	91.0	92.3	91.7	86.2	85.7
AK	91.6	90.6	95.5	NA	NA	NA	NA
AR	98.0	98.4	98.5	98.3	98.0	96.6	NA
AZ	99.3	99.2	99.1	98.8	84.9	81.8	78.9
CA	92.3	92.3	92.8	92.9	93.0	93.4	94.3
CO	96.6	95.7	96.2	98.9	98.9	98.5	99.1
CT	99.4	99.5	99.4	99.5	99.4	99.4	99.4
FL	97.8	97.8	97.7	97.9	98.0	94.3	80.1
GA	94.5	94.9	95.5	93.6	95.4	94.2	94.0
HI	95.7	87.2	88.1	90.8	91.7	91.7	53.6
IA	90.3	88.7	87.2	87.6	86.7	80.5	80.7
IL	92.1	92.5	86.8	85.2	84.0	53.0	56.0
IN	71.2	70.5	66.7	70.7	67.6	68.7	NA
KS	93.4	93.7	93.2	93.0	92.7	86.9	60.0
KY	80.6	81.4	83.7	85.9	84.4	77.8	74.3
LA	82.2	79.7	79.1	82.5	85.0	NA	NA
MA	97.5	98.1	98.3	98.3	98.3	98.5	98.6
MD	96.4	96.3	96.0	96.0	96.1	95.7	95.2
ME	96.5	96.7	96.5	94.9	93.4	92.8	86.9
MI	77.1	82.8	83.3	82.6	82.3	82.2	85.3
MN	93.7	93.3	92.5	89.1	89.0	84.1	85.1
MO	97.2	97.4	97.9	97.8	98.1	98.6	98.3
MS	NA	51.1	58.1	NA	NA	NA	NA
MT	88.4	88.3	88.6	88.4	NA	NA	NA
NC	96.1	97.1	95.5	95.4	94.8	94.3	95.5
ND	73.9	76.1	NA	NA	NA	NA	NA
NE	94.0	94.2	93.8	94.7	95.0	94.8	95.7
NH	NA	NA	NA	98.3	98.7	98.9	
NJ	95.9	95.6	95.7	95.3	96.2	96.8	98.9
NM	95.9	95.2	94.0	89.0	NA	NA	NA

Geographic Area	Data Year						
	2012	2011	2010	2009	2008	2006	2001
NV	87.0	86.2	73.8	93.9	92.8	77.9	NA
NY	99.2	99.2	99.2	99.0	98.9	98.9	98.8
OH	61.0	62.5	62.8	65.0	65.0	67.9	NA
OK	92.3	92.6	76.2	91.3	93.1	61.3	NA
OR	93.6	93.2	91.9	89.1	89.0	86.7	87.9
PA	98.9	98.9	97.4	97.3	97.3	NA	96.1
RI	94.8	95.8	97.0	97.3	97.2	98.2	92.8
SC	98.4	98.7	98.6	97.6	96.9	86.7	97.1
SD	74.2	73.7	72.2	69.3	67.2	65.2	NA
TN	96.0	96.8	96.8	96.4	96.2	91.8	94.1
TX	86.8	87.2	87.0	86.3	85.3	81.7	70.2
UT	92.3	91.0	90.4	90.4	90.7	91.5	90.7
VA	94.9	94.5	93.9	95.8	85.9	79.0	77.5
VT	98.6	98.2	96.4	96.9	99.3	98.9	98.2
WA	95.4	95.4	94.5	95.9	93.5	93.7	97.3
WI	99.7	99.7	99.6	99.5	99.4	99.3	98.5
WV	80.6	78.6	71.1	70.2	68.0	53.6	52.6
WY	80.5	76.2	76.5	77.9	79.4	NA	NA

Abbreviations: NA, data are not available.
Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP) databases. Estimates for the total U.S. are from the National (Nationwide) Inpatient Sample (NIS). National estimates for 2001–2011 used the NIS trend weights for estimates consistent with the 2012 redesigned NIS. State estimates are from the State Inpatient Databases (SID), and not all States participate in HCUP.

Table 2 lists the number of injuries treated in the U.S. during an inpatient stay and enumerates the percentage of these injuries with nonspecific injury E codes.

Table 2. Number of Inpatient Injury Discharges in the United States Reported with Nonspecific E Codes

Data Year	Total number of inpatient injury discharges in the U.S.	Percentage of injury records with an injury E code					Percentage of injury records without an injury E code
		Total	Fracture, cause unspecified	Unspecified (combined)	Other specified, NEC (combined)	All Other	
2012	1,788,941	91.9	0.7	2.0	1.0	88.2	8.1
2011	1,778,696	92.3	0.7	2.2	1.0	88.3	7.7
2010	1,967,491	91.0	0.7	2.2	0.9	87.2	9.0
2009	1,791,366	92.3	0.7	2.2	1.0	88.4	7.7
2006	1,809,996	86.2	0.7	2.2	0.8	82.5	13.8

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), National (Nationwide) Inpatient Sample (NIS). National estimates for 2001–2011 used the NIS trend weights for estimates consistent with the 2012 redesigned NIS.

Table 3 lists the percentage of ED visits for injury with an injury E code reported for the total U.S. and for States participating in HCUP.

Table 3. Percentage of ED Visits for Injury with an Injury E Code

Geographic Area	Data Year						
	2012	**2011**	**2010**	**2009**	**2008**	**2006**	**2001**
Total U.S.	94.3	94.0	94.1	93.2	93.0	92.2	NA
AZ	99.3	99.2	99.3	99.2	96.8	98.4	NA
CA	97.6	97.5	97.3	95.3	92.5	92.9	NA
CT	99.7	99.8	99.7	99.7	99.4	99.9	99.4
FL	98.0	97.8	97.9	97.8	97.0	93.2	NA
GA	96.0	96.2	96.0	93.6	96.2	97.2	NA
HI	NA	NA	95.5	91.8	91.2	97.5	NA
IA	92.1	91.7	91.3	90.6	89.2	90.3	NA
IL	91.8	91.4	86.8	85.5	NA	NA	NA
IN	73.6	71.2	68.2	69.7	71.0	74.5	NA
KS	94.0	94.3	93.2	90.6	86.8	85.9	NA
KY	86.0	84.8	83.1	82.8	79.3	NA	NA
MA	99.4	99.3	99.5	99.5	98.7	99.9	NA
MD	96.0	96.8	97.1	97.2	96.6	97.1	94.9
ME	97.2	96.3	NA	91.0	87.5	NA	80.1
MN	94.5	81.4	80.5	80.7	71.5	79.5	71.9
MO	99.3	99.4	99.5	99.5	99.2	99.7	98.2
NC	99.4	99.1	98.7	98.6	97.5	NA	NA
ND	74.1	84.9	NA	NA	NA	NA	NA
NE	97.9	98.1	98.1	98.0	98.5	99.4	97.7
NH	NA	NA	NA	94.3	92.4	95.0	NA
NJ	83.5	83.2	84.7	85.0	85.0	83.0	NA
NV	93.3	93.6	94.2	NA	NA	NA	NA
NY	99.7	99.7	99.7	99.6	99.6	100.0	NA
OH	69.4	70.7	70.2	71.5	69.3	68.6	NA
RI	97.5	97.8	97.9	98.4	98.0	NA	NA
SC	99.5	99.5	99.5	98.5	95.9	98.1	97.6
SD	90.6	90.9	90.6	91.9	89.4	87.9	NA
TN	95.5	96.5	96.7	96.8	95.3	96.9	97.3
UT	96.0	95.5	95.5	95.5	91.6	97.3	95.7
VT	97.7	98.4	92.7	95.0	98.2	98.9	NA
WI	99.8	99.8	99.7	99.4	99.4	100.0	NA

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP) databases. Estimates for the total U.S. are from the Nationwide Emergency Department Sample (NEDS). State estimates are from the State Emergency Department Databases (SEDD), and not all States participate in HCUP. The SEDD includes only those ED visits that do not result in admission to the same hospital.

Table 4 lists the number of injuries treated in the emergency room in the U.S. and enumerates the percentage of these injuries with nonspecific injury E codes.

Table 4. Number of ED Visits for Injury in the United States Reported with Nonspecific E Codes

Data Year	Total number of ED visits of injury in the U.S.	Percentage of injury records with an injury E code					Percentage of injury records without an injury E code
		Total	Fracture, cause unspecified	Unspecified (combined)	Other specified, NEC (combined)	All Other	
2012	27,010,165	94.3	0.2	6.1	2.9	85.1	5.7
2011	27,030,374	94.0	0.2	5.9	2.7	85.2	6.0
2010	27,230,927	94.1	0.2	6.0	2.4	85.5	5.9
2009	26,764,923	93.2	0.2	5.3	2.3	85.4	6.8

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), Nationwide Emergency Department Sample.

APPENDIX 1. HCUP PARTNERS

Alaska State Hospital and Nursing Home Association
Arizona Department of Health Services
Arkansas Department of Health
California Office of Statewide Health Planning and Development
Colorado Hospital Association
Connecticut Hospital Association
Florida Agency for Health Care Administration
Georgia Hospital Association
Hawaii Health Information Corporation
Illinois Department of Public Health
Indiana Hospital Association
Iowa Hospital Association
Kansas Hospital Association
Kentucky Cabinet for Health and Family Services
Louisiana Department of Health and Hospitals
Maine Health Data Organization
Maryland Health Services Cost Review Commission
Massachusetts Center for Health Information and Analysis
Michigan Health & Hospital Association
Minnesota Hospital Association (provides data for Minnesota and North Dakota)
Mississippi Department of Health
Missouri Hospital Industry Data Institute
Montana MHA - An Association of Montana Health Care Providers
Nebraska Hospital Association
Nevada Department of Health and Human Services
New Hampshire Department of Health & Human Services
New Jersey Department of Health
New Mexico Department of Health
New York State Department of Health
North Carolina Department of Health and Human Services
North Dakota (data provided by the Minnesota Hospital Association)
Ohio Hospital Association
Oklahoma State Department of Health
Oregon Association of Hospitals and Health Systems
Oregon Office of Health Analytics
Pennsylvania Health Care Cost Containment Council
Rhode Island Department of Health
South Carolina Revenue and Fiscal Affairs Office
South Dakota Association of Healthcare Organizations
Tennessee Hospital Association
Texas Department of State Health Services
Utah Department of Health
Vermont Association of Hospitals and Health Systems
Virginia Health Information
Washington State Department of Health
West Virginia Health Care Authority
Wisconsin Department of Health Services
Wyoming Hospital Association