HEALTHCARE COST AND UTILIZATION PROJECT

Agency for Healthcare Research and Quality

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Causes of Injuries Treated in the Emergency Department, 2010

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Introduction

One person dies from an injury every 3 minutes in the United States.[1] More Americans aged 1–44 years die from injuries such as motor vehicle crashes, falls, or homicides than from any other cause, including cancer, HIV, or influenza.[2] Non-fatal injuries can have physical and financial consequences that impact the lives of individuals and their families. In addition, the treatment of injuries places an enormous burden on hospital emergency departments (EDs) and trauma care systems.[3]

This Statistical Brief presents data from the Healthcare Cost and Utilization Project (HCUP) Nationwide Emergency Department Sample (NEDS) on the most common causes of injuries that were treated in the ED in 2010. These visits began with treatment in the ED and either resulted in admission to the same hospital or did not result in admission (i.e., the patient was treated, stabilized and released from the ED; transferred to another hospital; or died in the ED). ED visits for injury are described based on the external cause of injury (e.g., falls, transport related, poisoning, burns, drowning, other blunt injuries). The distribution of injuries by severity, percentage of ED visits that result in admission to the same hospital, and total costs for admitted patients are also presented.

Findings

Injuries treated in the emergency department

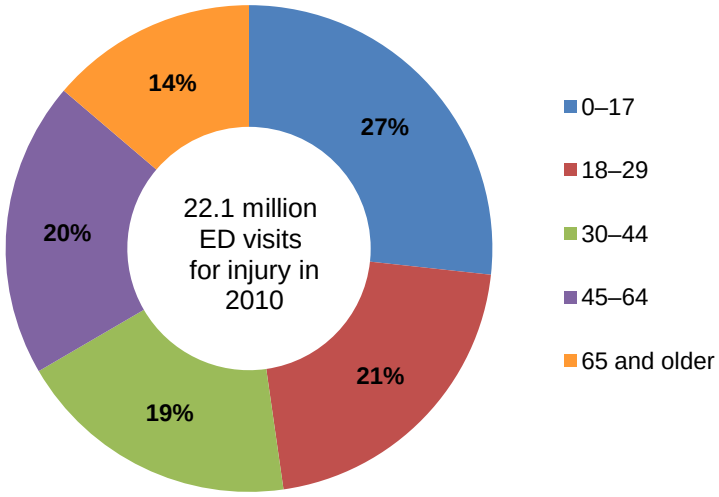
Of the 129 million ED visits in the United States in 2010, over 22 million (17 percent) were due to injuries. Patients younger than 30 years accounted for 48 percent of all injury-related ED visits, with pediatric patients (younger than 18 years) accounting for over one-quarter of all injury-related ED visits (figure 1).

Highlights

- In 2010, injuries accounted for 17 percent of all emergency department (ED) visits.
- Many injuries occurred among younger age groups; 48 percent of injury-related ED visits involved individuals younger than 30 years.
- The cause of injury varied according to age group. For example, over 70 percent of ED visits among persons aged 65 years and older were related to falls.
- Nearly four in 10 injury-related ED visits were expected to be covered by private insurance. Patients with Medicaid coverage and those with no insurance each constituted another 2 in 10 visits.
- Of injury-related ED visits, 90 percent were of mild severity.
- Across all injuries, seven percent of patients were admitted to the hospital after treatment in the ED.
- Injuries with the highest costs for patients treated in the ED and then admitted to the hospital were falls ($9.2 billion), motor vehicle accidents ($5.1 billion), and poisoning ($1.8 billion).

[1] Centers for Disease Control and Prevention. Injury: The Leading Cause of Death Among Persons 1–44. Injury Prevention and Control. Updated March 14, 2013. http://www.cdc.gov/injury/overview/leading_cod.html. Accessed May 6, 2013.
[2] Centers for Disease Control and Prevention. Saving Lives and Protecting People from Violence and Injuries. Injury Center. Updated November 27, 2012. http://www.cdc.gov/injury/overview/index.html. Accessed May 6, 2013.
[3] Centers for Disease Control and Prevention. Injury Response. Injury Center. Updated September 8, 2011. http://www.cdc.gov/injuryresponse. Accessed May 6, 2013.

Figure 1. Injury-related emergency department visits by age group



Source: Agency for Healthcare Research and Quality (AHRQ) Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), Nationwide Emergency Department Sample (NEDS), 2010

Table 1 presents the distribution of ED visits by cause of injury overall and by age group. The most common cause was falls (35.7 percent), followed by being struck by an object (18.3 percent) and motor vehicle injuries (12.5 percent). Although falls were the most common type of injury that resulted in an ED visit for all age groups, falls were much more common among those aged 65 years and older (71.2 percent) compared to the younger age groups (ages 0–17, 37.3 percent; ages 18–44, 21.9 percent; ages 45–64, 36.7 percent). Children (ages 0–17) had the largest proportion of injuries related to being struck by an object (26.5 percent) compared to the older age groups (ages 18–44, 19.7 percent; ages 45–64, 12.7 percent; ages 65 and older, 6.2 percent).

Table 1. Injury-related emergency department visits by cause (ranked by frequency) and distribution by age group

Cause of Injury[a]	Total number of injury-related ED visits	Percentage of injury-related ED visits by age group				
		All ages	Ages 0–17	Ages 18–44	Ages 45–64	Ages 65 and older
All injuries	22,069,400					
Falls	7,883,700	35.7	37.3	21.9	36.7	71.2
Struck by object	4,033,900	18.3	26.5	19.7	12.7	6.2
Motor vehicle	2,765,900	12.5	6.0	18.0	14.5	6.4
Overexertion	2,263,600	10.3	7.8	13.6	11.0	4.2
Cut	2,216,400	10.0	7.9	12.9	10.7	5.2
Nature/environment	1,102,500	5.0	6.2	4.6	5.3	3.2
Poison	727,500	3.3	2.6	3.8	4.2	1.9
Other transport	686,200	3.1	4.6	3.0	2.8	1.1
Fire	390,800	1.8	1.8	2.1	1.8	0.7
Machinery	125,400	0.6	0.1	0.7	1.0	0.5
Firearm	71,500	0.3	0.1	0.6	0.2	0.1
Suffocation	28,300	0.1	0.2	0.1	0.1	0.2
Drowning	12,900	0.1	0.1	0.0	0.0	0.0

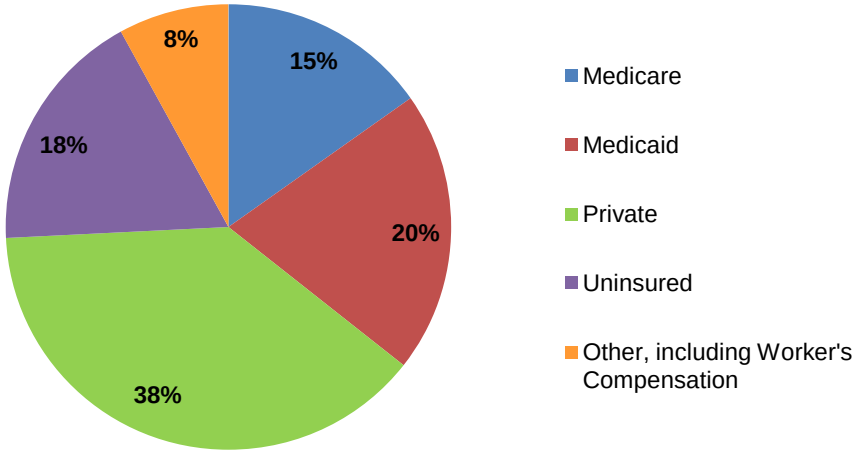
[a] Causes of injuries are ranked by the total number of injury-related ED visits. Because some ED visits involve more than one type of injury (i.e., cause of injury), the sum of ED visits across causes of injury is larger than the total of all injuries.

Source: Agency for Healthcare Research and Quality (AHRQ) Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), Nationwide Emergency Department Sample (NEDS), 2010

Primary payer and severity of injuries treated in the emergency department

Figure 2 presents the distribution of injury-related ED visits by expected primary payer. Injury-related ED visits were covered most frequently by private insurance (38 percent) or Medicaid (20 percent). Uninsured patients represented 18 percent of all injury-related ED visits.

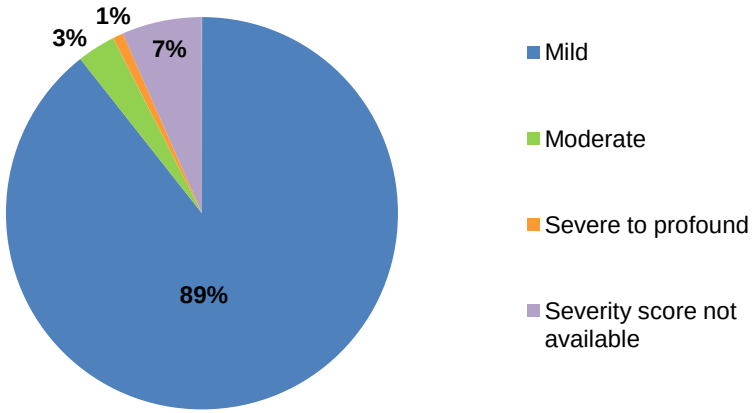
Figure 2. Injury-related emergency department visits by expected primary payer



Source: Agency for Healthcare Research and Quality (AHRQ) Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), Nationwide Emergency Department Sample (NEDS), 2010

Figure 3 presents the distribution of injury-related ED visits by severity. Eighty-nine percent of the injuries were classified as mild. Almost all mild injuries (96 percent) were treated and released from the ED (data not shown). Severe to profound injuries accounted for only one percent of the injuries.

Figure 3. Injury-related emergency department visits by severity of injury



Source: Agency for Healthcare Research and Quality (AHRQ) Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), Nationwide Emergency Department Sample (NEDS), 2010

Cost of injuries when patient is admitted to the hospital for treatment
Table 2 reports that 6.5 percent of injury-related ED visits resulted in an admission to the hospital. Injuries that most frequently led to admissions were related to firearms (admission rate of 37.9 percent) and poisoning (admission rate of 35.7 percent). One in five injuries due to suffocation (admission rate of 22.8 percent) or drowning (admission rate of 20.3 percent) was admitted. The admission rate for all other types of injuries was less than 10 percent.

ED and inpatient costs across all causes of injury in 2010 were $19.4 billion for admitted patients. The cause of injury with the highest associated cost was falls ($9.2 billion), followed by motor vehicle transport injuries ($5.1 billion) and poison-related injuries ($1.8 billion).

Table 2. Proportion of injury-related emergency department visits admitted to the same hospital and the total hospital cost for those admissions

Cause of Injury[a]	Total number of injury-related ED visits	Number of injury-related ED visits that resulted in admission to the same hospital	Percentage admitted to the same hospital	Total ED and inpatient cost of ED injury admissions (in millions)
All Injuries	22,069,400	1,442,900	6.5	$19,410
Falls	7,883,700	720,600	9.1	$9,210
Motor vehicle	2,765,900	218,200	7.9	$5,050
Poison	727,500	260,100	35.7	$1,760
Other transport	686,200	59,000	8.6	$880
Struck by object	4,033,900	64,300	1.6	$720
Firearm	71,500	27,100	37.9	$650
Cut	2,216,400	40,900	1.8	$440
Fire	390,800	16,600	4.3	$340
Nature/environment	1,102,500	23,100	2.1	$240
Overexertion	2,263,600	16,500	0.7	$150
Machinery	125,400	9,700	7.7	$140
Suffocation	28,300	6,400	22.8	$110
Drowning	12,900	2,600	20.3	$40

[a] Causes of injury are ranked by the total cost of ED injury admissions. Because some ED visits involve more than one type of injury (i.e., cause of injury), the sum of ED visits and costs across causes of injury is larger than the total of all injuries.

Source: Agency for Healthcare Research and Quality (AHRQ) Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), Nationwide Emergency Department Sample (NEDS), 2010

Data Source

The estimates in this Statistical Brief are based upon data from the Healthcare Cost and Utilization Project (HCUP) 2010 Nationwide Emergency Department Sample (NEDS).

Definitions

Injury
Emergency department (ED) visits with injuries are identified by International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis codes. ICD-9-CM assigns numeric codes to diagnoses. There are approximately 14,000 ICD-9-CM diagnosis codes.

Injuries are identified by the first-listed diagnosis using a scheme recommended by the Safe States Alliance.[4] The table below lists the diagnosis codes in the range 800–999 used to identify injuries:

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.
Excludes:	
909.3, 909.5	Late effect of complications of surgical and medical care and late effects of adverse effects of drug, medicinal, or biological substance.
995.0–995.4, 995.6–995.7, 995.86, 995.89	Other anaphylactic shock; angioneurotic edema; unspecified adverse effect of drug, medicinal and biological substance; allergy, unspecified; shock due to anesthesia; anaphylactic shock due to adverse food reaction; malignant hyperpyrexia or hypothermia due to anesthesia.
996–999	Complications of surgical and medical care, not elsewhere classified

Causes of injury

The cause of injury is determined by the external cause of injury codes (a subset of the ICD-9-CM diagnosis codes). The codes are consistent with the classification system used by the Centers for Disease Control (CDC) that is documented at http://www.cdc.gov/injury/wisqars/ecode_matrix.html. The NEDS includes 11 data elements that identify the cause of the injury: cutting, drowning, falling, fire, firearm, machinery, motor vehicle, natural/environmental, poisoning, suffocation, and being struck. This Statistical Brief allows a single ED visit to include multiple causes if there were multiple injuries. For example, if an individual was treated in the ED following a motor vehicle accident in which he/she was burned by an engine fire, the ED visit would be counted under motor vehicle injuries and fire injuries.

Injury severity

The injury severity score is assigned using a publicly available Stata program for Injury Classification (ICDPIC). The program uses ICD-9-CM diagnosis codes to assign a severity score ranging from 1 to 75, with 75 being the most severe. The Injury Severity Score (ISS) is based on an anatomical scoring system that provides an overall score for patients with multiple injuries. Each injury is assigned an Abbreviated Injury Scale (AIS) score, allocated to one of six body regions: head, face, chest, abdomen, extremities (including pelvis), and external. Only the highest AIS score in each body region is used. To produce the ISS score, the score of the three most severely injured body regions is squared and the results are added to produce the ISS score. The ISS correlates linearly with mortality, morbidity, hospital stay, and other measures of severity. Injuries are categorized by severity score as mild (less than 9), moderate (9–15), severe (16–25), and profound (greater than 25). More information on the ISS is available at http://www.trauma.org/index.php/main/article/383/.

Types of hospitals included in HCUP

HCUP is based on data from community hospitals, which are defined as short-term, non-Federal, general, and other hospitals, excluding hospital units of other institutions (e.g., prisons). HCUP data include

[4] Injury Surveillance Workgroup. Consensus Recommendations for Using Hospital Discharge Data for Injury Surveillance. Marietta (GA): State and Territorial Injury Prevention Directors Association; 2003. http://www.safestates.org/associations/5805/files/HospitalDischargeData.pdf. Please note that in 2010, the organizational name State and Territorial Injury Prevention Directors Association (STIPDA) was changed to Safe States Alliance.

obstetrics and gynecology, otolaryngology, orthopedic, cancer, pediatric, public, and academic medical hospitals. Excluded are long-term care, rehabilitation, psychiatric, and alcoholism and chemical dependency hospitals. Community hospitals included in the Nationwide Emergency Department Sample (NEDS) have hospital-based emergency departments with no more than 90 percent of their ED visits resulting in admission.

Unit of analysis
The unit of analysis is the emergency department (ED) encounter, not a person or patient. This means that a person who is seen in the ED multiple times in one year will be counted each time as a separate "encounter" in the ED.

Costs and charges
Total hospital charges were converted to costs using HCUP Cost-to-Charge Ratios based on hospital accounting reports from the Centers for Medicare & Medicaid Services (CMS).[5] *Costs* will reflect the actual expenses incurred in the production of hospital services, such as wages, supplies, and utility costs; *charges* represent the amount a hospital billed for the case. Total costs include costs for both ED and inpatient services and are only reported for ED visits that result in admission. For each hospital, a hospital-wide cost-to-charge ratio is used. Hospital charges reflect the amount the hospital billed for the entire hospital stay and do not include professional (physician) fees. For the purposes of this Statistical Brief, costs are reported in millions.

Payer
Payer is the expected primary payer for the hospital stay. To make coding uniform across all HCUP data sources, payer combines detailed categories into general groups:

- Medicare: includes patients covered by fee-for-service and managed care Medicare
- Medicaid: includes patients covered by fee-for-service and managed care Medicaid
- Private Insurance: includes Blue Cross, commercial carriers, and private health maintenance organizations (HMOs) and preferred provider organizations (PPOs)
- Other: includes Worker's Compensation, TRICARE/CHAMPUS, CHAMPVA, Title V, and other government programs
- Uninsured: includes an insurance status of "self-pay" and "no charge."

Encounters billed to the State Children's Health Insurance Program (SCHIP) may be classified as Medicaid, Private Insurance, or Other, depending on the structure of the State program. Because most State data do not identify SCHIP patients specifically, it is not possible to present this information separately.

When more than one payer is listed for a hospital discharge, the first-listed payer is used.

About HCUP

HCUP is a family of powerful health care databases, software tools, and products for advancing research. Sponsored by the Agency for Healthcare Research and Quality (AHRQ), HCUP includes the largest all-payer encounter-level collection of longitudinal health care data (inpatient, ambulatory surgery, and emergency department) in the United States, beginning in 1988. HCUP is a Federal-State-Industry Partnership that brings together the data collection efforts of many organizations—such as State data organizations, hospital associations, private data organizations, and the Federal government—to create a national information resource.

HCUP would not be possible without the contributions of the following data collection Partners from across the United States:

Alaska State Hospital and Nursing Home Association
Arizona Department of Health Services

[5] HCUP Cost-to-Charge Ratio Files (CCR). Healthcare Cost and Utilization Project (HCUP). 2001–2009. U.S. Agency for Healthcare Research and Quality, Rockville, MD. Updated September 2012. http://www.hcup-us.ahrq.gov/db/state/costtocharge.jsp. Accessed May 6, 2013.

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
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 Health Policy and Research
Pennsylvania Health Care Cost Containment Council
Rhode Island Department of Health
South Carolina Budget & Control Board
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

About the NEDS

The HCUP Nationwide Emergency Department Database (NEDS) is a unique and powerful database that yields national estimates of emergency department (ED) visits. The NEDS was constructed using records from both the HCUP State Emergency Department Databases (SEDD) and the State Inpatient Databases (SID). The SEDD capture 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 was created to enable analyses of ED utilization patterns and to support public health professionals, administrators, policymakers, and clinicians in their decisionmaking regarding this critical source of care. The NEDS is produced annually beginning in 2006.

For More Information

For more information about HCUP, visit http://www.hcup-us.ahrq.gov/.

For additional HCUP statistics, visit HCUPnet, our interactive query system, at http://hcupnet.ahrq.gov/.

For information on other hospitalizations in the United States, download HCUP Facts and Figures: Statistics on Hospital-Based Care in the United States in 2009, located at http://www.hcup-us.ahrq.gov/reports.jsp.

For a detailed description of HCUP, more information on the design of the Nationwide Emergency Department Sample (NEDS), and methods to calculate estimates, please refer to the following publications:

Introduction to the HCUP Nationwide Emergency Department Sample, 2010. Online. November 2012. U.S. Agency for Healthcare Research and Quality. http://hcup-us.ahrq.gov/db/nation/neds/NEDS2010Introductionv3.pdf. Accessed May 6, 2013.

Houchens R, Elixhauser A. Final Report on Calculating Nationwide Inpatient Sample (NIS) Variances, 2001. HCUP Methods Series Report #2003-2. Online. June 2005 (revised June 6, 2005). U.S. Agency for Healthcare Research and Quality. http://www.hcup-us.ahrq.gov/reports/CalculatingNISVariances200106092005.pdf. Accessed May 6, 2013.

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AHRQ welcomes questions and comments from readers of this publication who are interested in obtaining more information about access, cost, use, financing, and quality of health care in the United States. We also invite you to tell us how you are using this Statistical Brief and other HCUP data and tools, and to share suggestions on how HCUP products might be enhanced to further meet your needs. Please e-mail us at hcup@ahrq.gov or send a letter to the address below:

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