

STATISTICAL BRIEF #112

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Emergency Department Visits Related to Eye Injuries, 2008

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Introduction

Each year more than 2.5 million eye injuries occur and 50,000 people permanently lose part or all of their vision.¹ Nearly half (44.1 percent) of the injuries occur at home,¹ although nearly 800,000 work-related eye injuries occur each year^{2,3} and 14.7 percent of eye injuries among children ages 5 to 14 are due to sports injuries.¹ Yet, more than 90 percent of all eye injuries are preventable with the use of protective eyewear.^{1,2,3}

This Statistical Brief compiles information from the Healthcare Cost and Utilization Project (HCUP) on emergency department (ED) visits related to eye injuries in 2008. Characteristics of ED visits for eye injuries are compared to all other types of injury-related visits. Age, patient location, most common specific injuries and causes of injury are examined by types of ED visits. All differences between estimates noted in the text are statistically significant at the 0.05 level or better.

Findings

Overall population

In 2008, there were 636,619 ED visits related to eye injuries (table 1). This represents a rate of 209 ED visits per 100,000 population. On average, every day there were 1,744 ED visits related to eye injuries. About 3.1 percent of patients seen in the ED for eye injuries were admitted to the hospital—compared to 8.1 percent of ED visits for all other types of injuries.

The majority of treat and release ED visits related to eye injuries had a primary eye injury diagnosis (82.5 percent). In contrast, the majority of eye injury-related ED visits resulting in admission had a secondary eye injury diagnosis (72.4 percent)—meaning that the principal reason for admission was something other than an eye injury (table 1).

¹ American Academy of Ophthalmology and American Society of Ocular Trauma, United States Eye Injury Registry summary report, 1998–2002. Available at: <http://www.aao.org/newsroom/guide/upload/Eye-Injuries-BkgnderLongVersFinal-I.pdf>

² National Institute for Occupational Safety and Health (NIOSH). Healthy People 2010. Vision. Fact Sheet: Eye Safety at Work is Everyone's Business. www.cdc.gov/Features/dsworkPlaceEye/

³ Harrison, A., Telander, D.G. Eye injuries in the youth athlete: a case-based approach. *Sports Medicine*. 2002;31(1):33–40.

Highlights

- In 2008, there were about 636,619 ED visits related to eye injuries, a rate of 209 visits per 100,000 population.
- About 3.1 percent of patients seen in the ED for eye injuries were admitted to the hospital—compared to 8.1 percent of ED visits for all other types of injuries.
- ED visits related to eye injuries were 1.7 times higher for males (262 visits per 100,000 population) than females (158 visits per 100,000 population). In comparison, ED visits for other types of injuries were only 1.2 times higher for males than females (10,400 versus 9,007 per 100,000 population, respectively).
- Almost three-quarters of ED visits related to eye injuries were for patients 44 years and younger (73.6 percent).
- There were more than 5 times as many ED visits related to eye injuries for patients from rural areas (646 per 100,000 population) than urban areas (120 per 100,000).
- Common causes of eye-injury related ED visits included being struck by an object, falling, fires/burns, motor vehicle traffic and environment causes. Among cases admitted to the hospital from the ED, falls were the most common cause followed by motor vehicle traffic accident and being struck by an object.

Table 1: Characteristics of emergency department visits related to eye injuries (all-listed), 2008

	ED visits related to eye injuries*	Treat and release ED visits related to eye injuries*	ED visits resulting in admission related to eye injuries*	ED visits for all other injuries
Number of visits	636,619	616,766	19,853	29,482,454
ED visits per day	1,744	1,690	54	80,774
Rate per 100,000 population	209	203	7	9,696
Males, rate per 100,000 population	262	254	8	10,400
Females, rate per 100,000 population	158	153	5	9,007
Utilization characteristics				
Percentage treated and released	96.9%			
Percentage admitted to the hospital	3.1%			8.1%
Percentage of visits primarily/principally for eye injuries	80.8%	82.5%	27.6%	n/a
Percentage of visits with a secondary diagnosis of eye injuries only	19.2%	17.5%	72.4%	n/a
Patient characteristics				
Mean age, years	31.5	30.8	51.2	35.4
Percentage by age group:				
0 to 17 years	28.3%	28.8%	12.7%	25.8%
18 to 44 years	45.3%	45.9%	29.1%	41.5%
45 to 64 years	18.7%	18.7%	20.7%	19.2%
65 years and older	7.6%	6.7%	37.6%	13.5%
Percentage of male patients	61.7%	61.8%	59.1%	52.9%
Patient residence, rate per 100,000 population ¹				
Urban areas (large central, large fringe, and small and medium metropolitan), rate per 100,000 population	120	116	5	5,317
Rural areas (micropolitan and noncore), rate per 100,000 population	646	630	16	31,229

¹Missing patient's residence on 250,418 (<1%) injury records and income information on 751,631 (2.5%) injury records.

*Based on all-listed diagnoses.

Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Emergency Department Sample, 2008. Denominator data for rates were based on Annual Estimates of Resident Population for the United States, Regions, States and Puerto Rico: April 1, 2000 to July 1, 2009 (NST_EST2009-01, NC-EST2009-02). U.S. Census Bureau, Population Division.

Patient and utilization characteristics for ED visits related to eye injuries

As shown in table 1, males were 1.7 times more likely than females to be seen in the ED for eye injuries (262 versus 158 visits per 100,000 population, respectively), but males were only 1.2 times more likely than females to be seen in the ED for all other types of injuries (10,400 versus 9,007 per 100,000 population, respectively).

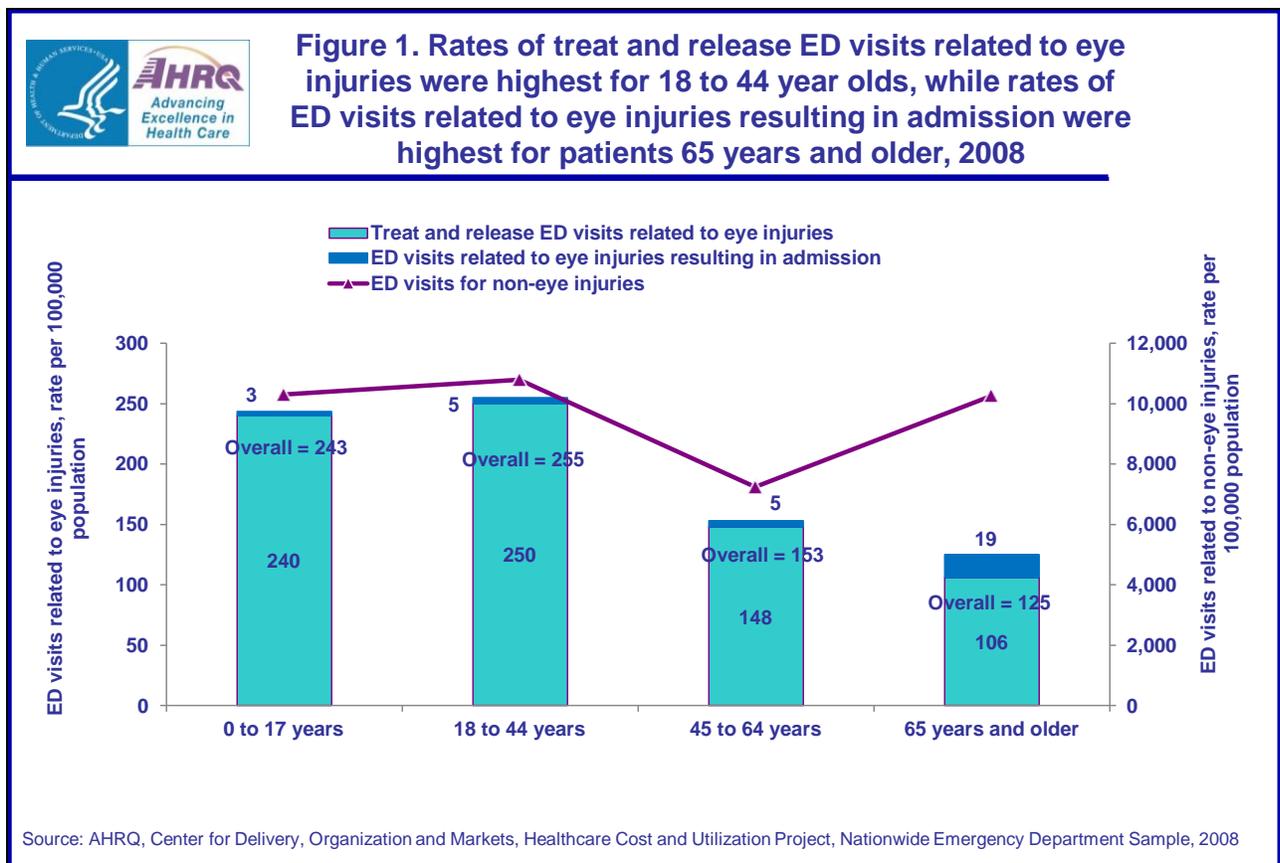
ED visits related to eye injuries by age

The average age of patients seen in the ED for eye injuries was 31.5 years, compared with 35.4 years for ED visits for all other types of injuries. The average age of patients with eye injuries treated and released from the ED was 20 years younger than the average age of patients with eye injuries seen in the ED and admitted to the hospital (30.8 versus 51.2 years, respectively).

Table 1 shows that 73.6 percent of ED visits related to eye injuries were for patients younger than 45 years (28.3 percent were for patients younger than 18 years and 45.3 percent were for patients 18 to 44 years old). Only 7.6 percent of patients with ED visits for eye injuries were 65 years and older—disproportionally fewer visits than ED visits for other types of injuries for this age group (13.5 percent).

Figure 1 shows that the highest rates of ED visits related to eye injuries were for 18 to 44 year olds (255 visits per 100,000 population), followed by children 0 to 17 years old (243 per 100,000 population). Those 65 years and older had the lowest rate of ED visits related to eye injuries (125 visits per 100,000 population)—over 2 times lower than the rate of 18 to 44 year olds. The highest rates of eye injury-related ED visits resulting in hospital admission were for adults 65 years and older (19 per 100,000 population), while the lowest rates of such visits were for children 0 to 17 years (3 per 100,000 population).

Age-specific rates of eye injury ED visits mirrored the age-specific rates of ED visits for other types of injuries, except among adults 65 years and older—eye injuries were less common in the older age group.



ED visits related to eye injuries by region and patient location

Figure 2 shows that the rate of ED visits related to eye injuries was highest in the Northeast (256 per 100,000 population) followed by the Midwest (242 per 100,000 population) and lowest in the West (156 per 100,000 population). Eye-injury related ED visits resulting in admission were comparable across all regions of the country (6.2 to 6.8 per 100,000 population). Regional variation for eye injury ED visits mirrored the regional rates of ED visits for other types of injury for all regions.

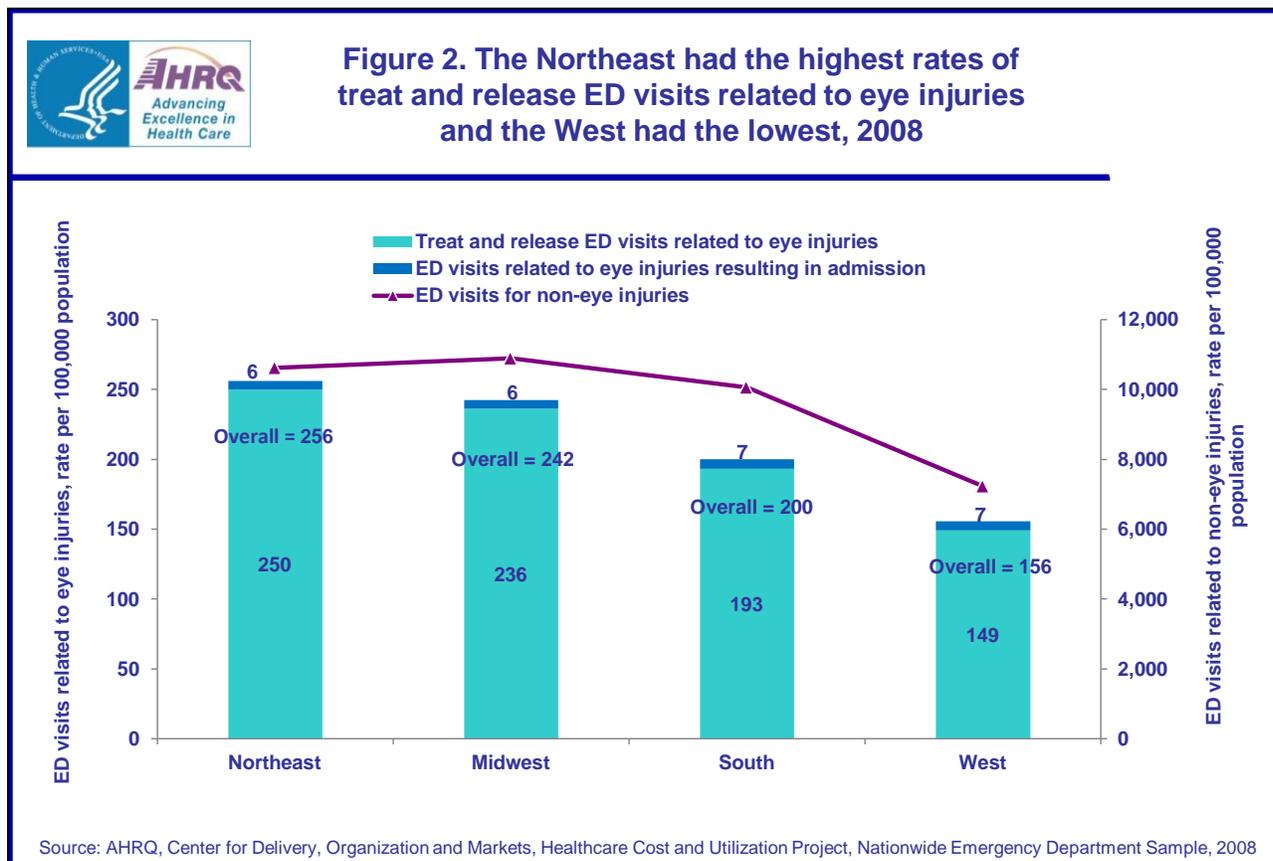


Table 1 shows ED visits related to eye injuries by patient residence. For patients who lived in rural areas, the rate of ED visits related to eye injuries was 646 per 100,000 population, 5.4 times higher than in urban areas (large central, large fringe, and medium and small metropolitan designations) where the rate was 120 per 100,000 population. This is consistent with other types of injury where ED visit rates for rural patients were nearly 6 times higher than for urban patients (31,229 versus 5,317 per 100,000 population).

Specific eye injury diagnosis, by visit

The most common specific eye injury seen in the ED was a superficial injury to the cornea, accounting for nearly half of all eye injuries (48.7 percent), followed by laceration of the eyelid (9.3 percent) and bruise of the eye (7.3 percent). This pattern was also reflected in treat and release ED visits related to eye injuries. In contrast, the most common specific eye injuries resulting in admission from the ED included wounds to the ocular glands (16.9 percent), bruises to the orbital tissues (15.2 percent) and bruises of the eyelids (11.2 percent).

Table 2: Top 10 eye injuries that result in an ED visit, by visit, 2008

All-listed diagnoses (ICD-9-CM code)	All ED visits			Treat and release ED visits			ED visits resulting in admission		
	Rank	Number	Percentage	Rank	Number	Percentage	Rank	Number	Percentage
Superficial injury of cornea (918.1)	1	310,011	48.7%	1	309,178	50.1%	10	833	4.2%
Laceration of skin of eyelid and around eye area (870.0)	2	58,959	9.3%	2	56,999	9.2%	4	1,961	9.9%
Unspecified bruise of eye (921.9)	3	46,539	7.3%	3	45,303	7.3%	8	1,235	6.2%
Bruise of orbital tissues (921.2)	4	42,576	6.7%	4	39,560	6.4%	2	3,016	15.2%
Other specified open wound of ocular adnexa (tear glands) (870.8)	5	41,926	6.6%	5	38,563	6.3%	1	3,363	16.9%
Bruise of eyelids and around eye areas (921.1)	6	25,061	3.9%	7	22,832	3.7%	3	2,229	11.2%
Superficial injury of eyelids and around eye area (918.0)	7	23,748	3.7%	6	23,286	3.8%			
Superficial injury of conjunctiva (918.2)	8	17,876	2.8%	8	17,833	2.9%			
Other superficial injuries to eye (918.9)	9	17,834	2.8%	9	17,702	2.9%			
Bruise of eyeball (921.3)	10	17,766	2.8%	10	16,488	2.7%	7	1,279	6.4%
Black eye, not other specified (921.0)							5	1,682	8.5%
Ocular laceration with exposure of tissue within the eyeball (871.1)							6	1,478	7.4%
Ocular laceration without exposure of tissue within the eyeball (871.0)							9	947	4.8%

Source: Agency for Healthcare Research and Quality, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Emergency Department Sample, 2008

Causes of ED visits for eye injuries, by visit

Across all ED visits related to eye injuries, the top five causes of eye injuries were being struck by an object such as being hit during a fight or being involved in sports injury (31.1 percent), falls into an object (10.0 percent), fire or burns such as from caustic or corrosive substances (4.3 percent), motor vehicle traffic accident (3.3 percent), and environmental injuries such as a bite from an insect or animal (3.2 percent). Some variation was seen in the distribution of the causes of injury for eye-injury related ED visits resulting in admission. Falls were the most common cause of injury for such visits (36.1 percent), followed by motor vehicle traffic accident (19.1 percent), and being struck by an object (12.0 percent).

Table 3: Top 5 common causes of eye injuries that result in an ED visit, by visit, 2008

General cause of injury/Specific cause of injury (E-code) ¹	All ED visits			Treat and release ED visits			ED visits resulting in admission		
	Rank	Number	Percentage	Rank	Number	Percentage	Rank	Number	Percentage
Struck by/against	1	198,013	31.1%	1	195,630	31.7%	3	2,383	12.0%
Other striking against by object accidentally with or without subsequent fall (E917.9)		120,413	18.9%		119,824	19.4%		589	3.0%
Unarmed fight or brawl (E960.0)		28,057	4.4%		27,274	4.4%		783	3.9%
Struck by/against an object accidentally in sports without subsequent fall (E917.0)		22,266	3.5%		22,099	3.6%		168	0.8%
Struck by/against other object accidentally without subsequent fall (E917.4)		7,179	1.1%		7,081	1.1%		98	0.5%
Striking by thrown object (E968.2)		5,356	0.8%		4,844	0.8%		512	2.6%
Struck accidentally by falling object (E916)		5,380	0.8%		5,267	0.9%		113	0.6%
Falls	2	63,873	10.0%	2	56,709	9.2%	1	7,164	36.1%
Fall from other slipping, tripping, or stumbling (E885.9)		18,554	2.9%		16,546	2.7%		2,008	10.1%
Unspecified fall (E888.9)		12,634	2.0%		10,135	1.6%		2,499	12.6%
Fall resulting in striking against an object (E888.1)		12,589	2.0%		12,042	2.0%		547	2.8%
Fire/burn	3	27,490	4.3%	3	27,216	4.4%	5	274	1.4%
Caustic and corrosive substances (E924.1)		16,229	2.5%		16,161	2.6%		68	0.3%
Motor vehicle traffic	4	20,863	3.3%	5	17,071	2.8%	2	3,793	19.1%
Other motor vehicle accident involving collision with parked vehicle (E812.0)		4,969	0.8%		4,293	0.7%		675	3.4%
Environment	5	20,681	3.2%	4	20,142	3.3%	4	539	2.7%
Bite of nonvenomous arthropod (E906.4)		7,596	1.2%		7,481	1.2%		115	0.6%
Other specified injury caused by animal (E906.8)		6,224	1.0%		6,158	1.0%		66	0.3%

¹Missing cause of injury for 61,952 ED records.

*Specific causes of eye injuries are reported separately if an estimate of at least 5,000 visits is obtained; E-code = external cause of injury code.

Source: Agency for Healthcare Research and Quality, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Emergency Department Sample, 2008

Data Source

The estimates in this Statistical Brief are based upon data from the HCUP 2008 Nationwide Inpatient Sample (NIS) and the 2008 Nationwide Emergency Department Sample (NEDS). Supplemental source included data on regional population estimates from "Table 1: Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2000 to July 1, 2009 (NST-EST2009-01)", Population Division, U.S. Census Bureau, Release date: December 2009 (<http://www.census.gov/popest/states/NST-ann-est.html>) and information in the methods report by Barrett, M., Hunter, K., Coffey, R., Levit, K. Population Denominator Data for Use with the HCUP Databases (Updated with 2009 Population Data). HCUP Methods Series Report # 2010-02. Online April 12, 2010. U.S. Agency for Healthcare Research and Quality. Available: <http://www.hcup-us.ahrq.gov/reports/methods.jsp>.

Definitions

Diagnoses, ICD-9-CM, and Clinical Classifications Software (CCS)

The principal diagnosis is that condition established after study to be chiefly responsible for the patient's admission to the hospital. Secondary diagnoses are concomitant conditions that coexist at the time of admission or that develop during the stay. All-listed diagnoses include the principal diagnosis plus these additional secondary conditions.

ICD-9-CM is the International Classification of Diseases, Ninth Revision, Clinical Modification, which assigns numeric codes to diagnoses. There are about 13,600 ICD-9-CM diagnosis codes.

CCS categorizes ICD-9-CM diagnoses into a manageable number of clinically meaningful categories.⁴ This "clinical grouper" makes it easier to quickly understand patterns of diagnoses and procedures.

Case definition

Using the Barell Matrix for the classification of injuries, the following all-listed ICD-9-CM codes were used to identify injuries in general and eye injuries specifically:

All injuries: 800–909.2, 909.4, 909.9, 910–994.9, 996.5–995.9, 995.80–995.85

Eye injuries: 870.0–871.9, 918.0–918.9, 921.0–921.9, 940.0–940.9, 941.02, 941.12, 941.22, 941.32, 941.42, 941.52, 950.0, 950.9

Types of hospitals included in HCUP

HCUP is based on data from community hospitals, defined as short-term, non-Federal, general and other hospitals, excluding hospital units of other institutions (e.g., prisons). HCUP data include OB-GYN, ENT, orthopedic, cancer, pediatric, public, and academic medical hospitals. They exclude long-term care, rehabilitation, psychiatric, and alcoholism and chemical dependency hospitals, but these types of discharges are included if they are from community hospitals.

Unit of analysis

The unit of analysis is the ED visit or hospital discharge (i.e., the hospital stay), not a person or patient. This means that a person who is admitted to the ED or hospital multiple times in one year will be counted each time as a separate "visit" or "discharge" from the hospital.

Urban-rural location

Urban-rural location is one of six categories as defined by the National Center for Health Statistics:

- Large Central Metropolitan: Central counties of metropolitan areas with a population of 1 million or greater
- Large Fringe Metropolitan: Fringe counties of counties of metropolitan areas with a population of 1 million or greater
- Medium Metropolitan: Counties in metro area of 250,000–999,999 population

⁴ HCUP CCS. Healthcare Cost and Utilization Project (HCUP). December 2009. U.S. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp.

- Small Metropolitan: Counties in metro area of 50,000-249,999 population
- Micropolitan: Micropolitan counties, i.e. a non-metropolitan county with an area of 10,000 or more population
- Non-core: Non-metropolitan and non-micropolitan counties

For the purposes of this Stat Brief, large central, large fringe, medium metropolitan and small metropolitan were collapsed to urban, and micropolitan and non-core were collapsed to rural. The cut-off for each location is determined using demographic data obtained from Claritas, Inc. (San Diego, CA).

Region

Region is one of the four regions defined by the U.S. Census Bureau:

- Northeast: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, and Pennsylvania
- Midwest: Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas
- South: Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma, and Texas
- West: Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Washington, Oregon, California, Alaska, and Hawaii

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:

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 Division of Health Care Finance and Policy
Michigan Health & Hospital Association
Minnesota Hospital Association
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 and Senior Services
New Mexico Health Policy Commission
New York State Department of Health
North Carolina Department of Health and Human Services
Ohio Hospital Association
Oklahoma State Department of Health
Oregon Association of Hospitals and Health Systems
Pennsylvania Health Care Cost Containment Council
Rhode Island Department of Health
South Carolina State 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 support public health professionals, administrators, policymakers, and clinicians in their decision-making regarding this critical source of care.

About HCUPnet

HCUPnet is an online query system that offers instant access to the largest set of all-payer health care databases that are publicly available. HCUPnet has an easy step-by-step query system, allowing for tables and graphs to be generated on national and regional statistics, as well as trends for community hospitals in the U.S. HCUPnet generates statistics using data from HCUP's Nationwide Inpatient Sample (NIS), the Kids' Inpatient Database (KID), the Nationwide Emergency Department Sample (NEDS), the State Inpatient Databases (SID) and the State Emergency Department Databases (SEDD).

For More Information

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

For additional HCUP statistics, visit HCUPnet, our interactive query system, at www.hcup.ahrq.gov.

For information on other hospitalizations in the U.S., download *HCUP Facts and Figures: Statistics on Hospital-Based Care in the United States in 2008*, located at <http://www.hcup-us.ahrq.gov/reports.jsp>.

For a detailed description of HCUP, more information on the design of the NIS, and methods to calculate estimates, please refer to the following publications:

Introduction to the HCUP Nationwide Emergency Department Sample, 2008. Online. October 2010. U.S. Agency for Healthcare Research and Quality.
<http://hcup-us.ahrq.gov/db/nation/neds/NEDS2008Introductionv3.pdf>

Introduction to the HCUP State Inpatient Databases. Online. June 2010. U.S. Agency for Healthcare Research and Quality. http://hcup-us.ahrq.gov/db/state/siddist/Introduction_to_SID.pdf

Introduction to the HCUP State Emergency Department Databases. Online. June 2010. U.S. Agency for Healthcare Research and Quality. http://hcup-us.ahrq.gov/db/state/sedddist/Introduction_to_SEDD.pdf

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>

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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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