HEALTHCARE COST AND UTILIZATION PROJECT

Agency for Healthcare Research and Quality

STATISTICAL BRIEF #119

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Emergency Department Visits for Injuries Caused by Air and Paintball Guns, 2008

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Introduction

Air and paintball guns use compressed air to fire a projectile. Propulsion is provided through one of three ways: a spring that is cocked, carbon dioxide from a gas cartridge, or a pump-action mechanism. The velocities of the projectiles fired from these types of guns can overlap those attained by small-caliber bullets fired from conventional firearm pistols, and the types of injuries caused by the two types of guns can be similar.[1]

Air guns fire a metal object—either a ball bearing (BB) or a pellet. Paintball guns shoot a gelatin projectile containing non-toxic paint.[2] There is variation in the ease with which these types of guns can be attained. Some states have laws regulating their use and availability.[3] In other locations, they can be bought in toy stores.[2]

Air and paintball guns are popular. More than 3.2 million air guns are purchased in the United States annually,[1] and over 10 million Americans participate in paintball activities each year.[4] However, serious injury or death can result from the use of these guns.[2]

This Statistical Brief presents data from the Healthcare Cost and Utilization Project (HCUP) on emergency department (ED) visits for injuries caused by air and paintball guns in 2008. Characteristics of ED visits for injuries caused by each of these types of guns are compared. Age, patient location, primary expected payer, and most common all-listed diagnoses are examined. All differences between estimates noted in the text are statistically significant at the 0.05 level or better.

Highlights

- On average, every day there are 56 ED visits related to air and paintball gun injuries.
- The number of ED visits for injuries caused by air and paintball guns declined 20 percent between 2006 and 2008.
- Males were 5 times more likely than females to be seen in the ED for air and paintball gun injuries.
- About 60 percent of ED visits for air and paintball gun injuries were for children and adolescents 17 and younger. More than 1 in 4 ED visits for air and paintball gun injuries were for children ages 10 to 14 years and 1 in 9 visits were for children 9 or younger.
- One in four ED visits for injuries caused by air and paintball guns were billed as uninsured.
- ED visits for air and paintball gun injuries were higher in rural areas (92 per 1 million population) than in urban areas (61 per 1 million population).
- The most common injuries associated with air and paintball guns included open wounds of extremities (37.3 percent); superficial injuries (36.0 percent) and open wounds of head, neck and trunk (23.4 percent). Eye disorders accounted for 4 percent of injuries for air and paintball guns.

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[1] Nguyen, M., Annest, J., Mercy, J., Ryan, G., and Fingerhut, L. Trends in BB/pellet gun injuries in children and teenagers in the United States, 1985 – 99. Injury Prevention. 2002: 8: 185 – 191.

[2] Laraque, D. and the Committee on Injury, Violence, and Poison Prevention. Injury Risk of Nonpowder Guns. Pediatrics. 2004: 114(5): 1357 – 1361.

[3] Legal Community Against Violence. Non-powder Guns. 2008: http://www.lcav.org/content/non-powder_guns.pdf. Accessed July 31, 2011.

[4] Alliman, K., Smiddy, W., Banta, J., Qureshi, Y., Miller, D., and Schiffman, J. 2009. Ocular Trauma and Visual Outcome Secondary to Paintball Projectiles. American Journal of Opthalmology. 2009: 147(2): 239 – 242.

Findings

In 2008, there were over 20,300 emergency department (ED) visits for injuries caused by air and paintball guns (table 1). The majority of these visits were related to injuries caused by air guns (97.0 percent)—the remaining 3.0 percent were related to paintball guns.

Table 1. Characteristics of ED visits for air and paintball gun injuries, 2008

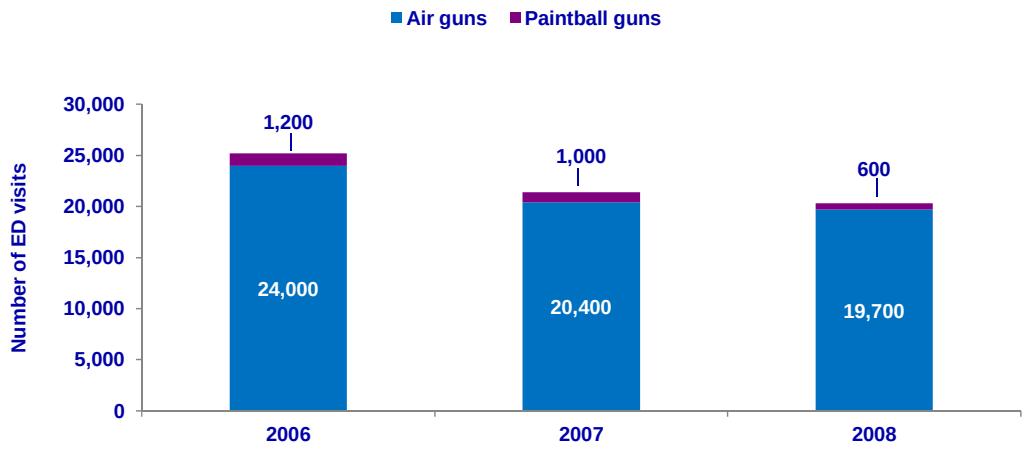
	ED visits for air and paintball gun injuries	ED visits for air gun injuries	ED visits for paintball gun injuries
Number of visits	20,338	19,724	614
ED visits per day	56	54	2
Rate per 1,000,000 population	67	65	2
Males, rate per 1,000,000 population	115	111	3
Females, rate per 1,000,000 population	21	20	1
Utilization characteristics			
Percentage treated and released	96.5%	96.7%	88.0%
Percentage admitted to the hospital	3.5%	3.3%	12.0%
Patient characteristics			
Mean age, years	19.3	19.1	25.7
Age group, rate per 1,000,000 population:			
Under 9 years	57	56	1
10 to 14 years	289	283	5
15 to 17 years	274	268	7
18 to 24 years	142	137	5
25 to 29 years	55	54	2
30 to 39 years	35	33	2
40 years and older	13	12	1
Patient residence, rate per 1,000,000 population[1]			
Urban areas (large central, large fringe, and small and medium metropolitan)	61	59	2
Rural areas (micropolitan and noncore)	92	94	2
Patient ZIP income quartile, rate per 1,000,000 population[2]			
Quartile 1 (0–25th percentile)	93	90	3
Quartile 2 (26th to 50th percentile)	78	76	2
Quartile 3 (51st to 75th percentile)	57	55	2
Quartile 4 (76th to 100th percentile)	34	33	1
Hospital region, rate per 1,000,000 population			
Northeast	55	52	2
Midwest	68	66	2
South	78	76	2
West	58	56	2

[1] Missing patient's residence on 99 (< 1%) records
[2] Missing patient's income quartile on 386 (< 2% of records)
Source: AHRQ, Center for Delivery, Organization, and Markets, 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

On average, every day there are 56 ED visits related to air and paintball gun injuries. Overall, about 3.5 percent of these ED visits result in hospitalization, although the admission rate was substantially higher for the subset of ED visits for injuries resulting from paintball guns (12.0 percent).

Overall, the number of ED visits for injuries caused by air and paintball guns declined 20 percent between 2006 and 2008 (figure 1) from 25,200 in 2006 to 20,300 in 2008. Paintball injuries declined more than air gun injuries (48 percent versus 18 percent).

Figure 1. Number of ED visits for injuries caused by air and paintball guns declined between 2006 to 2008



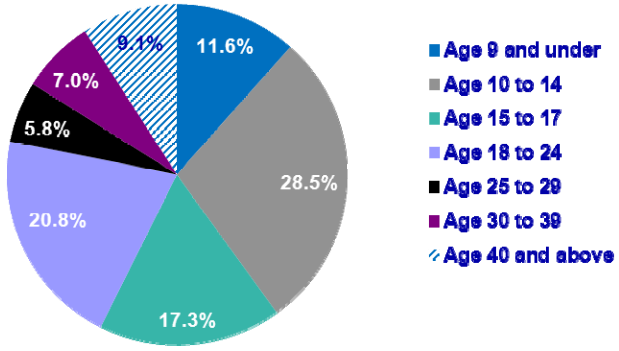
Source: AHRQ, Center for Delivery, Organization and Markets, Healthcare Cost and Utilization Project, Nationwide Emergency Department Sample, 2006-2008

Gender and age characteristics

As shown in table 1, males were 5 times more likely than females to be seen in the ED for air and paintball gun injuries (115 versus 21 per 1 million population, respectively). Overall, the average age of patients seen in the ED for all air and paintball gun injuries was 19.3 years, although the average age was slightly older for ED visits related to paintball guns (25.7 years).

Figure 2 shows that the majority of ED visits for air and paintball gun injuries was for children age 17 years and younger (57.4 percent)—more than 1 in 4 ED visits for air and paintball gun injuries were for children ages 10 to 14 years (28.5 percent). Over 1 in 9 ED visits for air and paintball gun injuries were for children younger than 10 years of age (11.6 percent).

Figure 2. The majority of ED visits for injuries caused by air and paintball guns were for children 17 years and younger, 2008



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

Age-specific rates of ED visits for air and paintball gun injuries were highest for 10 to 14 and 15 to 17 year olds (289 and 274 per 1 million population, respectively). ED visits for air and paintball gun injuries were less common among the youngest age group (9 years and younger) and older age groups (25 and older), with fewer than 60 visits per 1 million population.

Region and patient location characteristics

Table 1 shows that the rate of ED visits for injuries caused by air and paintball guns was higher in rural than in urban areas (92 versus 61 per 1 million population). The location-specific ED visit rates for air gun injuries were consistent with the overall rates, but the ED visit rate for paintball injuries was similar for rural and urban areas (2 per 1 million population).

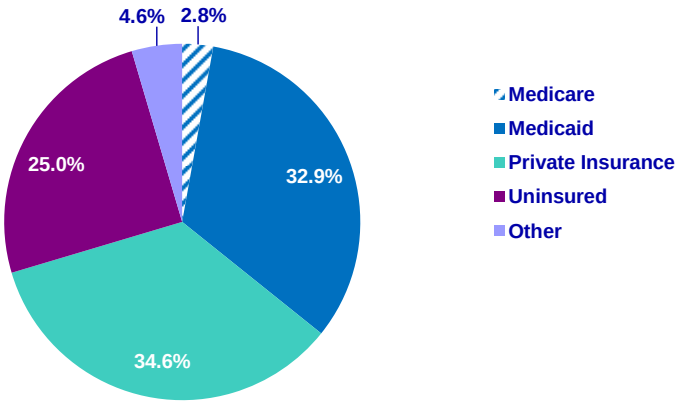
ED visit rates varied by community income level for injuries caused by air and paintball guns and specifically for air guns. ED visit rates were highest for individuals from the lowest income communities (93 per 1 million population) and lowest for individuals from the highest income communities (34 per 1 million population).

The overall ED visit rate for air and paintball gun injuries and for air guns injuries specifically was highest in the South and lowest in the Northeast (78 and 55 per 1 million population, respectively). There was no substantial difference in ED visit rates for injuries caused by paintball guns across the regions (2 per 1 million population).

Expected primary payer

Figure 3 shows that over one-third of ED visits for injuries caused by air and paintball guns were billed to private insurance (34.6 percent) and an additional one-third was billed to Medicaid (32.9 percent). One in four ED visits for injuries caused by air and paintball guns were billed as uninsured (25.0 percent).

Figure 3. One in four ED visits for injuries caused by air and paintball guns were billed as uninsured, 2008[1]



[1]Missing primary expected payer on < 1% of records

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

Specific diagnoses for ED visits for injuries caused by air and paintball guns

Table 2 shows that the most common all-listed diagnoses for ED visits related to air and paintball guns was open wounds to extremities (37.3 percent), followed by superficial injuries (36.0 percent), and open wounds to the head, neck and truck (23.4 percent).

Common diagnoses were consistent across the types of guns, with several exceptions. Air guns were more often implicated in open wounds of head, neck and trunk (seen in 23.8 percent of air gun injuries compared to 10.1 percent of paintball injuries) and open wounds of extremities (seen in 38.1 percent of air gun and 12.4 percent of paintball injuries). In contrast, eye injuries were less common among air gun injuries (3.7 percent) than paintball gun injuries (15.0 percent).

Table 2. Top 5 all-listed diagnoses associated with ED visits for air and paintball gun injuries, by type of gun, 2008

All-listed diagnoses (CCS code)**	ED visits for air and paintball gun injuries			ED visits for air/BB gun injuries			ED visits for paintball gun injuries		
	Rank	N	Percentage	Rank	N	Percentage	Rank	N	Percentage
Open wounds of extremities (236)	1	7,592	37.3%	1	7,516	38.1%	4	76	12.4%
Superficial injury, contusion (239)	2	7,315	36.0%	2	6,927	35.1%	1	388	63.2%
Open wounds of head, neck and trunk (235)	3	4,751	23.4%	3	4,689	23.8%	5	62	10.1%
Other injuries and conditions due to external causes (244)	4	1,219	6.0%	4	1,121	5.7%	2	98	16.0%
Immunizations and screening for infections (10)	5	988	4.9%	5	960	4.9%		27	4.5%
Other eye disorders (91)		820	4.0%		728	3.7%	3	92	15.0%

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

**Excludes history of tobacco use

Data Source

The estimates in this Statistical Brief are based upon data from the HCUP 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 entitled "Population Denominator Data for Use with the HCUP Databases (Updated with 2009 Population Data", HCUP Methods Series Report #2010-02. Online April 12, 2010. US Agency for Healthcare Research and Quality (www.hcup-us.ahrq.gov/reports/methods.jsp).

Definitions

Diagnoses, ICD-9-CM, and Clinical Classifications Software (CCS)
The first-listed or principal diagnosis is the diagnosis that appears first on the record. For ED visits that result in hospital admission, this is the principal diagnosis. The principal diagnosis is that condition established after study to be chiefly responsible for occasioning the admission of the patient to the hospital for care. The principal diagnosis is always the reason for admission. For treat-and-release ED visits, it may not be the principal diagnosis but may simply be the diagnosis that appears first on the record. Secondary diagnoses are concomitant conditions that coexist at the time of admission or that develop during the stay. All-listed diagnoses include the first-listed or principal diagnosis plus additional conditions that coexist at the time of the ED visit, or that develop during the stay following the ED visit, and which have an effect on the treatment or length of stay in the ED or hospital.

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.[5] This "clinical grouper" makes it easier to quickly understand patterns of diagnoses and procedures.

Case Definition
The ICD-9-CM external cause of injury codes (E-codes) defining air and paintball gun injuries include diagnosis codes:

E922.4: Accident caused by firearm and air gun missile—air gun (BB gun, pellet gun)
E922.5: Accident caused by firearm and air gun missile—paintball gun
E955.6: Suicide and self-inflicted injury by air gun
E955.7: Suicide and self-inflicted injury by paintball gun
E968.6: Assault by air gun
E985.6: Injury by air gun, undetermined whether accident or on purpose
E985.7: Injury by paintball gun, undetermined whether accident or on purpose

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. Excluded are long-term care, rehabilitation, psychiatric, and alcoholism and chemical dependency hospitals. Please note, a discharge of this nature will be included in the NIS if it occurred in a community hospital.

Unit of analysis
The unit of analysis for HCUP data is the hospital encounter (i.e., the ED visit or the ED visit in addition to the hospital stay), 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 "ED visit".

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
- *Small Metropolitan*: Counties in metro areas 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 Statistical 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).

Median community-level income
Median community-level income is the median household income of the patient's ZIP Code of residence. The cut-offs for the quartile designation are determined using ZIP Code demographic data obtained from Claritas. The income quartile is missing for homeless and foreign patients.

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[5] 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

For 2008, the income quartiles are as follows:

- Lowest income quartile: $1-$38,999
- Second income quartile: $39,000-$48,999
- Third income quartile: $49,000-$63,999
- Highest income quartile: $64,000+

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 more general groups:

- Medicare includes fee-for-service and managed care Medicare patients.
- Medicaid includes fee-for-service and managed care Medicaid patients. Patients covered by the State Children's Health Insurance Program (SCHIP) may be included here. Because most state data do not identify SCHIP patients specifically, it is not possible to present this information separately.
- Private insurance includes Blue Cross, commercial carriers, and private HMOs and PPOs.
- Other includes Workers' Compensation, TRICARE/CHAMPUS, CHAMPVA, Title V, and other government programs.
- Uninsured includes an insurance status of "self-pay" and "no charge."

When more than one payer is listed for a ED record, the first-listed payer is used.

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. The NEDS is produced annually beginning in 2006.

About HCUPnet

HCUPnet is an online query system that offers instant access to the largest set of all-payer health care databases 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 a detailed description of HCUP, more information on the design of the NEDS, 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

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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