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Emergency Department Visits in Rural and Non-Rural Community Hospitals, 2008

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Introduction

Emergency departments (EDs) are an important consideration in today's health policy dialogue. Previous studies note that annual ED visits have increased over time,¹ while reimbursement for emergency care by insurers has steadily decreased.² These challenges are magnified in rural areas, which typically have fewer health care resources, including medical staff, facilities, adequate financing, and modern technologies. More information is needed on the patient and hospital attributes of rural ED visits to further improve the emergency and overall care of rural patients.

This Statistical Brief presents data on the use of EDs in rural areas from the Healthcare Cost and Utilization Project (HCUP) Nationwide Emergency Department Sample (NEDS). The information focuses on patient and hospital characteristics of rural and non-rural emergency department visits in the United States in 2008. Variations in the most frequently listed conditions for adults and children are also discussed. All differences between estimates noted in the text are statistically significant at the 0.05 level or better.

Findings

Overall

In 2008, EDs in rural areas received over 8 million visits, translating to about 6.4 percent of all ED visits in the U.S., while about 117 million visits took place in non-rural EDs (table 1). EDs in rural areas admitted patients to the inpatient setting at nearly half the rate of non-rural EDs—8.3 percent versus 16.0 percent of ED visits.

Highlights

- In 2008, 6.4 percent of all ED visits occurred in rural areas. Approximately 8.3 percent of rural ED visits resulted in hospital admission, while 16.0 percent of non-rural ED visits resulted in admission.
- Only 2.4 percent of EDs in rural areas held a trauma level designation while 35.5 percent of non-rural EDs were designated Levels I, II, or III trauma centers.
- Approximately 51 percent of EDs in rural areas are located within facilities designated as critical access hospitals (CAHs).
- Only 1.8 percent of EDs in rural areas were located in teaching hospitals while 40.4 percent of non-rural EDs were in teaching hospitals.
- Patients who visited EDs in rural areas more often resided in ZIP Codes with the lowest median household income—56.2 percent of rural ED patients lived in the lowest income areas compared with 30.1 percent of non-rural ED patients.
- The most frequently treated conditions among adults (ages 18 and older) in EDs in rural areas were sprains and strains, contusions, abdominal pain, headache, and back problems. These were similar to those treated in non-rural EDs with the exception of headaches, which ranked lower, and chest pain, which ranked higher.
- Upper respiratory infections, contusions, ear infections, sprains and strains, and open wounds were the leading conditions among children visiting EDs in rural areas. Similar rankings existed among non-rural EDs for the top three pediatric conditions, while open wounds ranked 4th and fever ranked 5th in this population.

¹ HCUPnet. Healthcare Cost and Utilization Project (HCUP). 2006–2009. Agency for Healthcare Research and Quality, Rockville, MD. <http://hcupnet.ahrq.gov/> (accessed June 14, 2011).

² American College of Emergency Physicians. Costs of Emergency Care. <http://www.acep.org/content.aspx?id=25902> (accessed June 14, 2011).

Hospital characteristics of rural and non-rural emergency departments, 2008

EDs in rural areas differed from non-rural EDs in type of ownership. EDs in rural areas were primarily private, not-for-profit (56.2 percent) followed by public (32.2 percent) and private, for-profit (11.6 percent) hospitals. Higher percentages of non-rural EDs were in private, not-for-profit hospitals (72.0 percent) with fewer being in public hospitals (15.1 percent) and slightly more being in private, for-profit (13.0 percent) organizations.

Only 1.8 percent of EDs in rural areas were located within teaching hospitals, defined as having an AMA-approved residency program, being a member of the Council of Teaching Hospitals (COTH), or having a ratio of full-time equivalent interns and residents to beds of 0.25 or higher (data not shown), while 40.4 percent of non-rural EDs were in teaching hospitals.

Only 2.4 percent of EDs in rural areas held a Level III trauma classification while 35.5 percent of non-rural hospitals were classified as Levels I, II, and III trauma centers. Nearly 98 percent of rural hospitals had no trauma designation.

An estimated 50.7 percent of EDs in rural areas were certified critical access hospitals (CAHs), receiving cost-based reimbursement for services rendered.

Table 1. Hospital characteristics of rural and non-rural emergency departments, 2008		
	Rural	Non-rural
Overall		
Number of ED visits*	8,054,187	116,891,077
Percentage of all ED visits	6.4	93.6
Percentage treat-and-release ED visits	91.7	84.0
Percentage ED visits resulting in admission	8.3	16.0
Hospital characteristics (percentage)		
Ownership/control*		
Public	32.2	15.1
Private, not-for-profit	56.2	72.0
Private, for-profit	11.6	13.0
Teaching status*		
Non-teaching	98.2	59.6
Teaching	1.8	40.4
Trauma level*		
Levels I, II, or III	2.4	35.5
No trauma designation	97.6	64.5
Occupancy*		
Low (<33%)	46.2	7.1
Moderate (33%–67%)	31.9	31.0
High (>67%)	21.9	61.8
*p-value< 0.05 (χ^2 testing comparing rural to non-rural). Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Emergency Department Sample, 2008		

Characteristics of patients visiting to rural and non-rural emergency departments, 2008

As show in table 2, EDs in rural areas had higher rates of visits per 100,000 population than their non-rural counterparts in the Northeast (50,115 versus 44,464 per 100,000), South (45,420 versus 43,790 per

Table 2. Characteristics of patients visiting rural and non-rural emergency departments, 2008		
	Rural	Non-rural
ED visits per 100,000 population	41,217	41,083
Population estimates per 100,000 by region of the US		
Northeast	50,115	44,464
Midwest	34,293	45,043
South	45,420	43,790
West	38,470	31,009
Patient characteristics (percentage)		
All age groups*		
0–17	22.4	21.1
18–44	38.0	40.4
45–64	21.0	21.5
65 and over	18.6	17.0
Pediatric age groups*		
0–4	41.0	45.6
5–9	20.8	19.7
10–14	20.4	18.3
15–17	17.9	16.4
Gender		
Male	45.5	45.0
Female	54.5	55.0
Race*†		
White	82.8	64.2
Black	12.7	20.9
Hispanic	3.6	12.7
Asian/Pacific Islander	0.9	2.2
Median income of patient's ZIP Code*		
First quartile (lowest income)	56.2	30.1
Second quartile	31.7	29.8
Third quartile	9.5	22.1
Fourth quartile (highest income)	2.6	18.1
Payer*		
Private insurance	31.3	37.0
Medicare	24.7	21.3
Medicaid	27.7	23.1
Uninsured/self-pay/no charge	16.4	18.5
† Race/ethnicity: rural missing=21.5%, non-rural missing=19.7%		
*p-value< 0.05 (χ^2 testing comparing rural to non-rural);		
Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Emergency Department Sample, 2008		

100,000), and West (38,470 versus 31,009 per 100,000), but lower rates in the Midwest when compared to non-rural counterparts (34,293 per 100,000 versus 45,043 per 100,000).

Most visits to EDs in rural areas were by whites (82.8 percent), followed by blacks (12.7 percent), Hispanics (3.6 percent), and Asian/Pacific Islanders (0.9 percent). Non-rural EDs treated smaller percentages of whites (64.2 percent), but larger proportions of blacks (20.9 percent), Hispanics (12.7 percent), and Asian/Pacific Islanders (2.2 percent).

Most rural ED visits involved patients residing in ZIP Codes in lower median income quartiles (56.2 percent in the lowest quartile and 31.7 percent in the second). In contrast, fewer patients visiting non-rural EDs resided in lower income ZIP Codes.

Private insurance served as the primary expected payer for 31.3 percent of visits to EDs in rural areas followed by Medicaid (27.7 percent), Medicare (24.7 percent), and the uninsured (16.4 percent). A greater percentage of visits to non-rural EDs were billed to private insurance (37.0 percent) and uninsured (18.5 percent) compared to EDs in rural areas, while smaller percentages were covered by Medicaid (23.1 percent) and Medicare (21.3 percent).

Most frequent first-listed conditions for rural and non-rural EDs for adults 18 years and older, 2008

Table 3 displays top ranking conditions among adults visiting rural and non-rural EDs. The leading conditions seen in EDs in rural areas were sprains and strains (5.5 percent), contusions (5.4 percent), abdominal pain (3.7 percent), headache (3.6 percent), and back problems (3.6 percent). Sprains (5.2 percent), contusions (4.2 percent), abdominal pain (4.3 percent), and back problems (3.3 percent) were also among the top five for non-rural EDs; however, headaches (2.7 percent) ranked much lower in non-rural EDs while non-specific chest pain (4.0 percent) was top-ranking.

Table 3. Most frequent first-listed conditions for rural and non-rural ED visits for adults 18 years and older, 2008						
First-listed condition (CCS code)	Rural			Non-rural		
	Rank	Number	Percentage of total	Rank	Number	Percentage of total
Sprains and strains	1	346,208	5.5	1	4,827,511	5.2
Superficial injury; contusion	2	339,460	5.4	3	3,888,722	4.2
Abdominal pain	3	233,064	3.7	2	3,977,790	4.3
Headache; including migraine	4	223,327	3.6	7	2,465,250	2.7
Spondylosis; intervertebral disc disorders; other back problems	5	223,248	3.6	5	3,077,636	3.3
Nonspecific chest pain	6	220,647	3.5	4	3,652,629	4.0
Other upper respiratory infections	7	211,602	3.4	9	2,382,729	2.6
Open wounds of extremities	8	211,587	3.4	8	2,418,742	2.6
Urinary tract infections	9	175,221	2.8	10	2,295,766	2.5
Chronic obstructive pulmonary disease and bronchiectasis	10	159,002	2.5	14	1,534,780	1.7

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

Most frequent first-listed pediatric (ages 0–17 years) conditions in rural emergency departments, 2008

Table 4 displays top ranking conditions among children (ages 0–17) visiting rural and non-rural EDs. Upper respiratory infections (12.9 percent), contusions (8.5 percent), ear infections (7.2 percent), sprains and strains (5.2 percent), and open wounds (4.4 percent) were the leading conditions among children visiting EDs in rural areas. Similar rankings existed among non-rural EDs for the top three conditions, while open wounds ranked 4th and fever ranked 5th in this population.

First-listed condition (CCS code)	Rural			Non-rural		
	Rank	Number	Percentage of total	Rank	Number	Percentage of total
Other upper respiratory infections	1	233,131	12.92464	1	2,623,562	10.65667
Superficial injury; contusion	2	153,383	8.503492	2	1,570,637	6.379785
Otitis media and related conditions	3	129,047	7.154297	3	1,434,799	5.828021
Sprains and strains	4	93,817	5.201173	6	984,297	3.998123
Open wounds of head; neck; and trunk	5	80,217	4.447193	4	1,172,239	4.761525
Open wounds of extremities	6	67,440	3.738847	11	668,561	2.715633
Fever of unknown origin	7	63,516	3.521321	5	1,079,701	4.385646
Viral infection	8	60,864	3.374259	8	780,210	3.169142
Other injuries and conditions due to external causes	9	54,521	3.022627	7	969,266	3.937071
Fracture of upper limb	10	50,469	2.797952	9	701,726	2.850346

Source: AHRQ, 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 NEDS. Supplemental sources included data from the U.S. Census Bureau, Population Division, Annual Estimates of the Population for the United States, Regions, and Divisions and U.S. Census Bureau, Current Population Reports, P60-226, Coverage by Type of Health Insurance. Many of the statistics may be generated from HCUPnet, a free, online query system that provides users with immediate access to the largest set of publicly available, all-payer national, regional, and State-level hospital care databases from HCUP.

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.

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.³ This "clinical grouper" makes it easier to quickly understand patterns of diagnoses and procedures.

³ 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

Unit of analysis

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

Urban-rural location of the emergency department

The urban-rural location of hospital-based EDs was determined based on the county in which the hospital is located. The categorization is a simplified adaptation of the 2003 version of the Urban Influence Codes (UIC).⁴ The 12 categories of the UIC are combined into four broader categories:

Non-rural:

- **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

Rural:

- **Non-urban residual**

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.

Trauma center level

Trauma center level indicates the trauma level of the hospital based on information from the Trauma Information Exchange Program database (TIEP), a national inventory of trauma centers in the U.S. Information is collected by the American Trauma Society and the Johns Hopkins Center for Injury Research and Policy and funded by the Centers for Disease Control and Prevention. Designation of trauma center levels I, II, and III are based on criteria developed by the American College of Surgeons' Committee on Trauma (ACS/COT).

The level of trauma center designation from the American Hospital Association Annual Survey:

- **Level I:** have comprehensive resources and are able to care for the most severely injured; also provide leadership in education and research;
- **Level II:** have comprehensive resources and are able to care for the most severely injured
- **Level III:** provide prompt assessment and resuscitation, emergency surgery and, if needed, transfer to a level I or II center.
- **No trauma designation:** not a trauma center.

Critical access hospitals⁵

Critical access hospitals (CAHs) are community hospitals that receive cost-based reimbursement. This reimbursement is intended to improve financial performance and reduce hospital closures. A facility that meets the following criteria may be designated by CMS as a CAH:

- Is located in a state that has established with CMS a Medicare rural hospital flexibility program; *and*
- Has been designated by the state as a CAH; *and*
- Is currently participating in Medicare as a rural public, non-profit or for-profit hospital; or was a participating hospital that ceased operation during the 10-year period from November 29, 1989 to November 29, 1999; or is a health clinic or health center that was downsized from a hospital; *and*
- Is located in a rural area or is treated as rural; *and*
- Is located more than a 35-mile drive from any other hospital or CAH (in mountainous terrain or in areas with only secondary roads available, the mileage criterion is 15 miles); *and*

⁴ United States Department of Agriculture Economic Research Service, 2007

⁵ Centers for Medicare and Medicaid Services. Critical Access Hospitals.

https://www.cms.gov/CertificationandCompliance/04_CAHS.asp (accessed on June 14, 2011)

- Maintains no more than 25 inpatient beds; *and*
- Maintains an annual average length of stay of 96 hours per patient for acute inpatient care; *and*
- Complies with all CAH Conditions of Participation, including the requirement to make available 24-hour emergency care services 7 days per week.

Occupancy

Occupancy is an estimated percentage of staffed beds that are occupied. Occupancy rate is calculated as the average daily census (from the American Hospital Association) divided by the number of hospital beds:

- **Low:** less than 33 percent
- **Moderate:** 33 to 67 percent
- **High:** greater than 67 percent

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:** fee-for-service and managed care Medicare patients.
- **Medicaid:** 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:** Blue Cross, commercial carriers, and private HMOs and PPOs.
- **Other:** Workers' Compensation, TRICARE/CHAMPUS, CHAMPVA, Title V, and other government programs.
- **Uninsured:** an insurance status of "self-pay" and "no charge."

When more than one payer is listed for a hospital discharge, 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

Teaching status

The hospital's teaching status was obtained from the AHA Annual Survey of Hospitals. A hospital is considered to be a teaching hospital if it has an 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 .25 or higher.

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 Sample (NEDS) is a unique and powerful database that yields national estimates of emergency department 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.

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:

Steiner, C., Elixhauser, A., Schnaier, J. The Healthcare Cost and Utilization Project: An Overview. *Effective Clinical Practice* 5(3):143–51, 2002.

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>

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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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