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Hospital Readmissions and Multiple Emergency Department Visits, in Selected States, 2006–2007

*Claudia Steiner, M.D., M.P.H., Marguerite Barrett, M.S., and
Katherine Hunter, B.A.*

Introduction

Reducing hospital readmission rates is a key strategy for increasing the quality of health care, while reducing the cost of care. Patients may be readmitted to the hospital due to the severity and complexity of their underlying condition. However, research indicates that a large number of repeat hospital visits may be avoidable.^{1,2} Hospital emergency departments (ED) often serve as a gateway to a hospital admission, as well as a default source of care for some populations without adequate access to primary care. High rates of repeat patient visits to the hospital—whether to the ED or as an inpatient (IP) hospital admission—may indicate deficiencies in the health care delivery system.

Devising effective strategies to reduce the rate of multiple acute care hospital visits by the same person requires a thorough understanding of the factors that contribute to repeat visits. However, studying multiple acute care visits—IP readmissions, repeat ED visits, or patients that cross both the IP and ED setting—is difficult for a myriad of reasons including a lack of reliable patient identifiers that enable tracking of patients in hospital administrative data, as well as privacy concerns.

AHRQ created a set of supplemental files, called the “HCUP Revisit Files,” to facilitate research focusing on repeat hospital visits. These files are available to analysts and allow tracking a patient across time and hospital setting while adhering to strict privacy regulations.³ The files enable the linking of hospital visits that belong to a unique person and the calculation of the elapsed time between visits on selected HCUP State Inpatient Database (SID) and State Emergency Department Database (SEDD) files.

¹ Kruzikas DT, Jiang HJ, Remus D, Barrett ML, Coffey RM, Andrews R. *Preventable Hospitalizations: A Window Into Primary and Preventive Care, 2000*. Agency for Healthcare Research and Quality. 2004. Available at: <http://www.ahrq.gov/data/hcup/factbk5/factbk5.pdf>. Accessed on May 21, 2010.

² Encinosa, W., D. Bernard, and A. Dor. *Does Prescription Drug Adherence Reduce Hospitalizations and Costs?* NBER Working Paper No. w15691, January, 2010. <http://www.nber.org/papers/w15691>.

³ Overview of the HCUP Supplemental Files for Revisit Analyses available at <http://www.hcup-us.ahrq.gov/toolssoftware/revisit/revisit.jsp>.

Highlights

- Two out of every five patients who sought acute hospital care (either an inpatient stay or an emergency department visit) from 2006–2007 in the selected states made multiple visits to the hospital during the two-year period.
- More than a quarter of patients with an inpatient (IP) hospital stay in 2006–2007 in the selected states had multiple inpatient hospitalizations during the two-year period.
- Factoring in ED visits increased the rate of multiple visits by more than a third, from an average of 1.5 IP readmissions to 2.1 hospital visits per patient.
- Medicare patients had the highest IP readmission rates (1.9 visits per Medicare patient) while Medicaid patients had the highest ED revisit rates (2.5 visits per Medicaid patient).
- Looking across both IP and ED settings, patients living in the poorest communities had 26.5 percent higher hospital revisit rates compared to patients from the wealthiest areas: 2.2 versus 1.8 visits per patient, respectively.
- Accounting for ED visits increased the percentage of patients seeking repeat hospital care for asthma (31.3 percent increase), uncomplicated diabetes (22.8 percent increase) and high blood pressure (20.9 percent increase).

This Statistical Brief examines the characteristics of multiple visits to the hospital by the same patient for any cause from January 2006 to December 2007 in 12 selected states. Visits captured include IP hospital stays, multiple ED visits, and patients who seek care in both the IP and ED hospital settings. This Brief serves two purposes. First, it is an illustration of the types of longitudinal analyses that are now feasible with the HCUP databases using the HCUP Revisit Files. Second, it serves as a benchmark for the frequency of multiple patient visits in the acute care hospital setting.

Findings

About 40 percent of patients who sought acute hospital care from 2006–2007 in the 12 selected states made multiple visits to the hospital, for an IP stay or ED visit, during the two-year period. Most readmission studies only report information on patients who have multiple hospital IP stays; they exclude patients who sought care in the ED. Including patients who accessed hospital care in either or both acute care settings (IP and/or ED) over the two-year period increased the rate of multiple visits by more than a third, from an average of 1.5 to 2.1 acute care hospital visits per patient (figure 1). Hospital setting, as well as other demographic, insurance, and clinical characteristics, was associated with how often patients visited the hospital.

Inpatient readmission rates in 12 states, 2006–2007

Among the 12 selected states there were a combined 27.8 million IP stays from 2006–2007, representing information on 15.1 million patients (table 1). More than a quarter of these patients, 27.2 percent, had multiple IP stays in the two years, with an average of 1.5 stays per patient.

Several factors were associated with all-cause readmission rates including the patient's age, insurance type, and medical condition. Readmission rates increased with age—from 1.3 admissions for adult patients under 45 to 1.8 admissions for patients 65 years and older. Likewise, Medicare patients (an elderly patient population) had the highest readmission rates, with an average of 1.9 stays per Medicare patient. Privately insured patients had the lowest readmission rates (1.3 stays per patient). In contrast, readmission rates did not vary greatly based on community-level income: patients living in the poorest communities had similar readmission rates compared to those living in the wealthiest communities (about 1.5 stays per patient).

Table 1 displays readmission rates for four common chronic conditions: asthma, uncomplicated diabetes, high blood pressure, and hardening of the arteries (coronary atherosclerosis). Almost 21 percent of asthma patients had multiple inpatient stays over the study period, which is lower than the overall readmission rate of 27.2 percent. In contrast, patients for the other chronic conditions had higher readmission rates, ranging from 28.2 to 35.1 percent of patients being readmitted at least once in the two-year period.

ED revisit rates in 12 states, 2006–2007

Among the 12 selected states there were a combined 65.5 million ED visits from 2006–2007, representing information on 30.4 million patients (table 2). More than a third of these patients, 35.6 percent, had multiple treat-and-release ED visits in the two years, with an average of 1.9 visits per patient.

In contrast to IP readmission rates, ED revisit rates were highest among younger patients, those covered by Medicaid, and those living in the poorest communities. Patients ages 18–44 years averaged 2.0 visits per patient compared to older age groups that averaged about 1.7 visits per patient. Comparable to IP readmissions, the lowest ED revisit rates were among privately insured patients (1.6 stays per patients). However, unlike IP readmissions, Medicaid patients had higher ED revisit rates compared to Medicare patients (2.5 versus 1.9 stays, respectively), which is likely due to the younger average age of Medicaid patients.

While community-level income was not strongly associated with IP readmissions, it was an important association in ED revisits: patients living in the poorest communities had 25 percent higher average ED revisit rates compared to patients residing in the wealthiest areas (2.0 versus 1.6 ED visits per patient, respectively).

Multiple visits to the ED were less common than multiple inpatient stays for patients with hardening of the arteries (21.5 percent for ED visits and 35.1 for IP stays) and high blood pressure (23.4 percent for ED and 28.2 percent for IP stays). Revisit rates were similar across the ED and IP settings for the other two chronic conditions (23.6 percent for ED and 20.8 percent for IP for asthma patients, and 27.9 percent for ED and 30.3 percent for IP for patients with uncomplicated diabetes).

Multiple patient visits across the IP and ED hospital settings in 12 states, 2006–2007

Among the 12 selected states there were a combined 93.3 million hospital visits (IP stays or ED visits) from 2006–2007, representing information on 39.1 million patients (table 3). After including ED visits, about 4 in 10 patients made multiple trips to the hospital over the two years, with an average of 2.1 visits per patient.

Looking across all hospital visits (IP and ED) in the selected states, several factors were associated with multiple patient visits compared to studying IP hospital readmissions alone. Older patient age continued to be a factor in revisit rates: 2.2 compared to 1.8 hospital visits per patient in the 65 years and older versus 1–17 year old group, respectively. Including ED visits, Medicaid and Medicare patients had comparably high revisit rates (about 2.5 visits per patient). Privately insured patients continued to have the lowest rate of multiple visits with an average of 1.7 visits per patient.

Although community-level income was not associated with IP readmissions significantly, once ED visits were included, patients living in the poorest communities had a 22.2 percent higher average visit rate compared to patients from the wealthiest areas: 2.2 versus 1.8 visits per patient, respectively.

Including ED visits increased the percentage of patients seeking repeat acute hospital care for the selected chronic conditions, with the greatest difference among patients treated for asthma (31.3 percent increase from 27.3 percent for IP visits to 31.3 percent for IP and ED visits). The other conditions showed a 12 to 23 percent increase in the percentage of patients seeking repeat hospital care: uncomplicated diabetes (22.8 percent increase), hypertension (20.9 percent increase), and hardening of the arteries (11.7 percent increase). This indicates that patients hospitalized for these chronic conditions frequently made trips to the ED in addition to their hospital stay.

Data Source

The estimates in this Statistical Brief are based upon data from the HCUP 2006–2007 State Inpatient Databases (SID) and the State Emergency Department Databases (SEDD) for 12 states. States were selected based on availability of synthetic patient-level identifiers that enabled tracking of patients across time and both hospital settings (IP and ED): Arizona, California, Florida, Hawaii, Massachusetts, Missouri, Nebraska, New Hampshire, New York, South Carolina, Tennessee, and Utah.

Verification of person identifiers

In the HCUP Revisit Files, the synthetic person identifiers were verified against date of birth and gender. The percentage of verified person identifiers varied across states and patient characteristics. Across the 12 SID, the percentage of verified person identifiers ranged from 77% to 100% with an average of 90%. Information is very limited for patients age 0 years with an average across the states of 58% verified. Verified person identifiers are more available for patients ages 1–17 (average of 74% verified), but are most reliably reported for adults (above 94% verified). The percentage of verified person identifiers also varies by payer. Medicare patients have the highest percentage (98%) while no charge patients have the lowest (78%). The percentage of verified person identifiers is relatively consistent across community income quartiles of the patient (about 90%) and across selected clinical categories (above 95%).

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.

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.

The following CCS diagnoses were noted in this report:

- 49: Diabetes without complications
- 98: High blood pressure (hypertension)
- 101: Hardening of arteries (atherosclerosis)
- 128: Asthma

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 is determined using ZIP Code demographic data obtained from Claritas. The income quartile is missing for homeless and foreign patients.

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.
- Uninsured includes an insurance status of "self-pay."
- No charge includes patients not billed for care, including provision of charity care.
- Other includes Worker's Compensation, TRICARE/CHAMPUS, CHAMPVA, Title V, and other government programs.

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.

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

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
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 SID

The HCUP State Inpatient Databases (SID) are hospital inpatient databases from data organizations participating in HCUP. The SID contain the universe of the inpatient discharge abstracts in the participating HCUP states, translated into a uniform format to facilitate multistate comparisons and analyses. Together, the SID encompass almost 90 percent of all U.S. community hospital discharges in 2007. The SID can be used to investigate questions unique to one state; to compare data from two or more states; to conduct market area variation analyses; and to identify state-specific trends in inpatient care utilization, access, charges, and outcomes.

About the SEDD

The State Emergency Department Databases (SEDD) are hospital databases, from data organizations in participating states, which capture discharge information on all emergency department visits that do not result in an admission. Information on patients initially seen in the emergency room and then admitted to the hospital is included in the State Inpatient Databases (SID). The SEDD contain a core set of clinical and non-clinical information on all patients, regardless of payer. SEDD data can be combined with SID discharges that originate in the ED to enumerate all ED visits in a given state or market area. The SEDD can be used to investigate questions unique to one state; to compare data from two or more states; to conduct market area variation analyses; and to identify state-specific trends in ED care utilization, access, charges, and outcomes.

For More Information

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

Additional information is also available on the HCUP data used in this Statistical Brief: SID (<http://www.hcup-us.ahrq.gov/sidoverview.jsp>), SEDD (<http://www.hcup-us.ahrq.gov/seddoverview.jsp>) and the HCUP Revisit Files (<http://www.hcup-us.ahrq.gov/toolssoftware/revisit/revisit.jsp>).

Suggested Citation

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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:

Irene Fraser, Ph.D., Director
Center for Delivery, Organization, and Markets
Agency for Healthcare Research and Quality
540 Gaither Road
Rockville, MD 20850

Table 1. Hospital inpatient stays in 12 selected states, 2006–2007

	Total number of IP stays	Total number of patients	Average percentage of patients with multiple IP stays in two years	Average number of IP stays per patient
Overall	27,843,400	15,098,800	27.2%	1.5
Age Group (years)				
0	3,582,800	*	*	*
1–17	1,366,900	745,300	18.8%	1.4
18–44	7,461,800	4,954,700	18.1%	1.3
45–64	6,344,700	3,591,000	30.5%	1.6
65+	9,086,200	4,748,500	40.7%	1.8
Community-level Income				
Quartile 1 (poorest communities)	8,168,800	4,244,800	28.8%	1.6
Quartile 2	6,512,900	3,564,800	28.1%	1.6
Quartile 3	6,277,700	3,418,200	26.5%	1.5
Quartile 4 (wealthiest communities)	6,335,300	3,568,300	24.5%	1.5
Expected Primary Payer				
Medicare	9,680,700	4,869,600	41.8%	1.9
Medicaid	5,702,400	2,615,400	23.0%	1.5
Private insurance	9,570,600	5,926,300	18.9%	1.3
Uninsured	1,657,600	972,300	21.8%	1.4
No charge	187,200	98,700	25.0%	1.5
Other	1,027,500	606,600	22.4%	1.4
Selected Conditions				
Asthma	1,699,600	1,126,600	20.8%	1.4
Diabetes without complications	3,615,100	2,179,400	30.3%	1.6
High blood pressure (hypertension)	8,229,000	5,241,300	28.2%	1.5
Hardening of the arteries (coronary atherosclerosis)	4,698,100	2,627,100	35.1%	1.7
Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, State Inpatient Databases, 12 States, 2006–2007: Arizona, California, Florida, Hawaii, Massachusetts, Missouri, Nebraska, New Hampshire, New York, South Carolina, Tennessee, and Utah.				
* Information for patients age 0 is excluded because patient identifiers are sparsely reported.				

Table 2. Emergency department visits in 12 selected states, 2006–2007

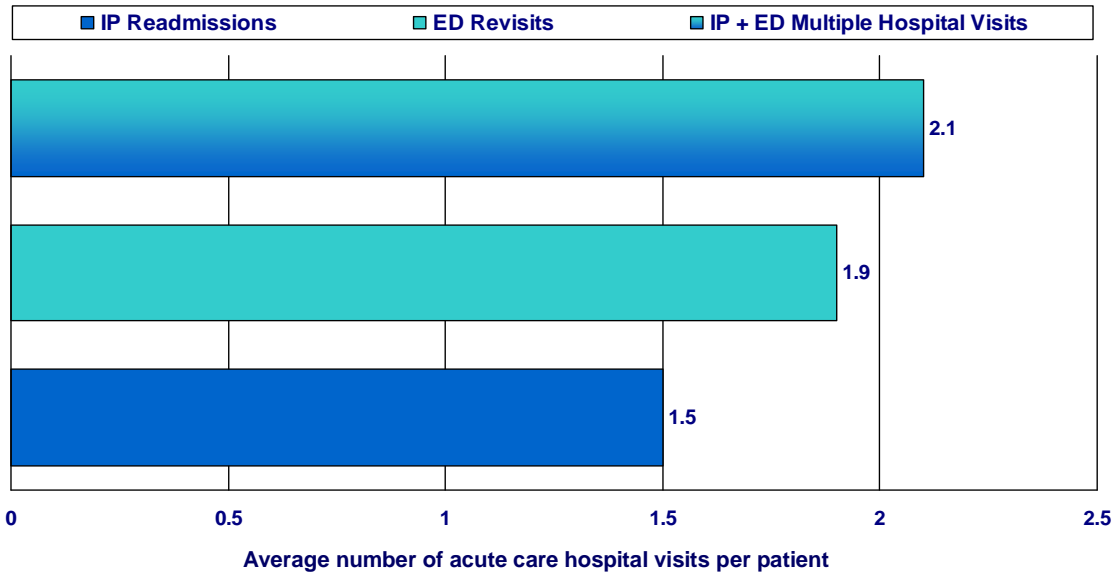
	Total number of ED visits	Total number of patients	Average percentage of patients with multiple ED visits in two years	Average number of ED visits per patient
Overall	65,452,700	30,414,200	35.6%	1.9
Age Group (years)				
0	2,769,200	*	*	*
1–17	14,162,500	5,704,100	35.4%	1.7
18–44	28,248,900	12,949,400	37.3%	2.0
45–64	12,775,900	6,692,900	31.8%	1.8
65+	7,494,200	4,314,500	34.4%	1.7
Community-level Income				
Quartile 1 (poorest communities)	21,709,500	9,404,800	39.7%	2.0
Quartile 2	16,109,200	7,391,000	37.5%	2.0
Quartile 3	14,051,600	6,699,000	33.8%	1.8
Quartile 4 (wealthiest communities)	12,372,100	6,368,200	28.2%	1.6
Expected Primary Payer				
Medicare	9,110,800	4,587,700	38.4%	1.9
Medicaid	15,371,100	5,263,300	50.4%	2.5
Private insurance	25,006,300	13,478,000	28.8%	1.6
Uninsured	11,458,800	4,902,200	38.0%	2.0
No charge	775,800	286,400	41.9%	2.2
Other	3,597,800	1,826,200	31.9%	1.7
Selected Conditions				
Asthma	2,610,300	1,526,100	23.6%	1.5
Diabetes without complications	2,852,400	1,706,200	27.9%	1.6
High blood pressure (hypertension)	6,012,500	3,978,500	23.4%	1.4
Hardening of the arteries (coronary atherosclerosis)	1,260,400	891,800	21.5%	1.4
Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, State Emergency Department Databases, 12 States, 2006–2007: Arizona, California, Florida, Hawaii, Massachusetts, Missouri, Nebraska, New Hampshire, New York, South Carolina, Tennessee, and Utah.				
* Information for patients age 0 is excluded because patient identifiers are sparsely reported.				

Table 3. Hospital inpatient and emergency department visits in 12 selected states, 2006–2007

	Total number of hospital visits (IP or ED)	Total number of patients	Average percentage of patients with multiple hospital visits (IP or ED) in two years	Average number of hospital visits (IP or ED) per patient
Overall	93,296,100	39,070,000	40.0%	2.1
Age Group (years)				
0	6,352,100	*	*	*
1–17	15,529,400	6,037,200	37.1%	1.8
18–44	35,710,800	15,595,500	39.1%	2.1
45–64	19,120,600	8,717,200	38.2%	2.0
65+	16,580,400	7,166,100	48.6%	2.2
Community-level Income				
Quartile 1 (poorest communities)	29,878,400	11,551,500	43.8%	2.2
Quartile 2	22,622,100	9,360,300	42.0%	2.1
Quartile 3	20,329,300	8,707,000	38.5%	2.0
Quartile 4 (wealthiest communities)	18,707,400	8,660,600	33.4%	1.8
Expected Primary Payer				
Medicare	18,791,500	7,395,600	51.1%	2.5
Medicaid	21,073,600	6,564,500	50.7%	2.6
Private insurance	34,576,900	17,261,700	32.1%	1.7
Uninsured	13,116,400	5,277,500	40.2%	2.1
No charge	963,000	326,400	44.1%	2.4
Other	4,625,300	2,165,700	35.1%	1.8
Selected Conditions				
Asthma	4,310,000	2,416,500	27.3%	1.6
Diabetes without complications	6,467,500	3,331,300	37.2%	1.9
High blood pressure (hypertension)	14,241,400	8,024,300	34.1%	1.7
Hardening of the arteries (coronary atherosclerosis)	5,958,400	3,083,600	39.2%	1.9
Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, State Inpatient Databases and State Emergency Department Databases, 12 States, 2006–2007: Arizona, California, Florida, Hawaii, Massachusetts, Missouri, Nebraska, New Hampshire, New York, South Carolina, Tennessee, and Utah.				
* Information for patients age 0 is excluded because patient identifiers are sparsely reported.				



Figure 1. The rate of acute care repeat hospital visits increased by more than a third once ED visits were included, 2006–2007



Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, State Inpatient Databases and State Emergency Department Databases, 12 States, 2006–2007