HEALTHCARE COST AND UTILIZATION PROJECT

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Common Injuries That Result in Hospitalization, 2004

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Introduction

In 2004, nearly 5 percent of all hospital stays—about 1.9 million hospitalizations—were for treatment of an injury.[1] These stays totaled $19.5 billion dollars in hospital costs, accounting for 6.6 percent of the total cost of hospital care in the United States.[2] In order to reduce the substantial burden of injury on patients, their families, and the hospital care system, it is important to understand the types and causes of common injuries.

This Statistical Brief presents data from the Healthcare Cost and Utilization Project (HCUP) on the most common injuries resulting in hospitalization in 2004. Hospital stays for injury are described by condition, and cause of injury. All differences between estimates noted in the text are statistically significant at the 0.05 level or better.

Findings

Common injuries that result in hospitalization

Table 1 highlights specific injuries that resulted in hospitalization. Fractures were the most frequent reason for injury hospitalization in 2004, accounting for over one in two injury stays (52.4 percent). Hip fractures and leg fractures were the most common fractures, comprising 16.0 percent and 15.0 percent of all injury stays, respectively. Other fractures included spine, rib, and pelvis fractures (9.9 percent), arm fractures (8.6 percent), and skull and face fractures (2.9 percent).

Other common injury hospitalizations resulted from intracranial (brain) injuries (9.8 percent of injury stays), poisoning by medications other than psychiatric medications (7.8 percent), and crushing or internal injuries (6.3 percent).

Highlights

- Fractures were the most frequent reason for injury hospitalization in 2004, accounting for over one in two injury stays (52.4 percent). Specifically, hip fractures and leg fractures were the most common fractures, comprising 16.0 percent and 15.0 percent, respectively, of all injury stays.
- Intracranial (brain) injuries had the highest in-hospital death rate (10.2 percent) of all injury hospitalizations. Spinal cord injury was the most expensive injury ($36,900) and required the longest hospital stay (13.5 days).
- Leg fractures were the most common injury across all age groups, except for patients 65 years and older who were hospitalized most frequently for hip fractures (38.1 percent of injury stays among the elderly).
- The second most common injury for patients 18–44 and 45–64 was poisoning by medications other than psychiatric medications (12.7 percent and 9.8 percent, respectively). This condition was also among the top five injuries for patients younger than 18 years.
- By far, the most frequent cause of injury was falls. Over 38 percent of injury stays were the result of falls. Falls resulted in nearly 474,400 injury hospitalizations (67.9 percent) among patients age 65 and older.
- Nearly 15 percent of injury-related stays resulted from motor vehicle traffic accidents and 11.8 percent resulted from poisonings.

[1]The definition of injury used in this statistical brief is consistent with the State and Territorial Injury Prevention Directors Association's (STIPDA) *Consensus Recommendations for Using Hospital Discharge Data for Injury Surveillance.* http://stipda.org/associations/5805/files/hdd.pdf (Accessed October 31, 2006)

[2]Owens PL, Russo CA, Stocks C. *Frequency and Costs of Hospital Admissions for Injury, 2004.* HCUP Statistical Brief #18. November 2006, Agency for Healthcare Research and Quality, Rockville, MD. http://www.hcup-us.ahrq.gov/reports/statbriefs/sb18.pdf

Intracranial (brain) injuries had the highest in-hospital death rate (10.2 percent) of all injury hospitalizations. The in-hospital death rates for spinal cord injuries (5.7 percent), burns (4.1 percent), crushing or internal injuries (4.0 percent), and hip fracture (2.9 percent) were also relatively high compared with an overall in-hospital death rate of 2.1 percent. In addition, these injuries (intracranial injuries, spinal cord injuries, burns, internal injuries, and hip fracture) were more expensive and required longer lengths of stay than all other injuries. Spinal cord injury was the most expensive injury ($36,900) and required the longest hospital stay (13.5 days).

Common injuries, by age
Table 2 provides the 10 most common injuries by age. Hip fractures were the most common injury among patients 65 and older (38.1 percent of injury stays among the elderly) while leg fractures were the most common injury across all other age groups.

The second most common injury for patients 18–44 and 45–64 was poisoning by medications other than psychiatric medications (12.7 percent and 9.8 percent, respectively). This condition was among the top five injuries for patients younger than 18 years.

Intracranial injury was also in the top five for all age groups, accounting for 13.8 percent of injuries among patients younger than 18, 10.5 percent of injuries among 18–44 year olds, 9.1 percent of injuries among 45–64 year olds, and 8.5 percent of injuries among patients 65 and older.

The fifth most common injury among 18–44 year olds in the hospital was poisoning by psychiatric drugs, accounting for 45,700 hospital stays. For 45–64 year olds and patients 65 and older, arm fracture was the fifth most common injury.

Causes of injury resulting in hospitalization
Table 3 illustrates causes of injuries that resulted in hospitalization in 2004. By far, the most frequent cause of injury was falls. Over 38 percent of injury stays were the result of falls, while 14.9 percent of injury stays resulted from motor vehicle traffic accidents and 11.8 percent resulted from poisonings.

Four percent of all injuries were caused by being struck by or against an object. About 2.7 percent of all injuries were caused by being cut or pierced. About 2.6 percent of injury stays were caused by transportation other than motor vehicles, such as animals, off-road vehicles, trains, aircraft, and boats. Other causes of injury (such as firearms, burns, adverse effects of medical drugs or care, environment, and overexertion including lifting, pulling, pushing or strenuous movements during recreational activities) were implicated in less than 2 percent of all injury hospitalizations each.

Causes of injury resulting in hospitalization, by age
Figure 1 shows that the major causes of injury stays varied by age. For all age groups except patients age 18–44, falls were the most common cause of injury stays. Falls resulted in nearly 474,400 injury hospitalizations among patients age 65 and older, or 67.9 percent of all injury-related hospitalizations in this age group.

Motor vehicle traffic accidents were the most common cause of injury stays among patients age 18–44 and contributed to nearly 144,800 injury admissions, or 24.4 percent of all injury stays in this age group. Motor vehicle traffic accidents were the second most common cause of injury stays among all other age groups.

Poisonings were commonly noted during injury stays among patients age 18–44 (accounting for 20.1 percent of all injury stays in this age group). Poisoning was also a top cause of injury for patients under 18 years (accounting for 12.3 percent of injury stays) and patients age 45–64 (15.0 percent of injury stays).

Data Source

The estimates in this Statistical Brief are based on data from the HCUP 2004 Nationwide Inpatient Sample (NIS).

Definitions

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 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.

Principal diagnosis, 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.

ICD-9-CM is the International Classification of Diseases, Ninth Revision, Clinical Modification, which assigns numeric codes to diagnoses. There are about 12,000 ICD-9-CM diagnosis codes.

For this Statistical Brief, injuries were defined in a manner consistent with the State and Territorial Injury Prevention Directors Association's (STIPDA) *Consensus Recommendations for Using Hospital Discharge Data for Injury Surveillance.*[3] Records with a principal ICD-9-CM diagnosis code in the range of 800–909.2, 909.4, 909.9, 910–994.9, 995.5–995.59, and 995.80–995.85 were identified as injury hospitalizations. Although not used in this brief, there are other common definitions of injury developed by various sources, such as the American College of Surgeons' National Trauma Data Bank (http://www.facs.org/trauma/ntdb.html) and the National Center for Health Statistics' Web report from the National Hospital Discharge Survey (http://www.cdc.gov/nchs/data/ad/ad371.pdf).

CCS categorizes ICD-9-CM diagnoses into 260 clinically meaningful categories. This "clinical grouper" makes it easier to quickly understand patterns of diagnoses and procedures.

For this Statistical Brief, the CCS was used to categorize specific injury diagnoses.

Cause of injury
The cause of injury is determined by the External Cause of Injury Codes (commonly referred to as E-codes), which supplement the ICD-9-CM diagnosis codes. These codes designate the cause of injury. Multiple E-codes may be present on a single hospital record.

Costs and charges
Total hospital charges were converted to costs using cost-to-charge ratios based on hospital accounting reports from the Centers for Medicare and Medicaid Services (CMS).[4] Costs will tend to reflect the actual costs of production, while charges represent what the hospital billed for the case. For each hospital, a hospital-wide cost-to-charge ratio is used because detailed charges are not available across all HCUP States. Hospital charges reflect the amount the hospital charged for the entire hospital stay and does not include professional (physician) fees. For the purposes of this Statistical Brief, costs are reported to the nearest hundreds.

About the NIS

The HCUP Nationwide Inpatient Sample (NIS) is a nationwide database of hospital inpatient stays. The NIS is nationally representative of all community hospitals (i.e., short-term, non-Federal, non-rehabilitation hospitals). The NIS is a sample of hospitals and includes all patients from each hospital, regardless of

[3]Injury Surveillance Workgroup. *Consensus Recommendations for Using Hospital Discharge Data for Injury Surveillance.* Online. 2003. State and Territorial Injury Prevention Directors Association. http://stipda.org/associations/5805/files/hdd.pdf (Accessed October 31, 2006)

[4]HCUP Cost-to-Charge Ratio Files (CCR). Healthcare Cost and Utilization Project (HCUP). 2001–2003. U.S. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/db/state/costtocharge.jsp

payer. It is drawn from a sampling frame that contains hospitals comprising 88 percent of all discharges in the United States. The vast size of the NIS allows the study of topics at both the national and regional levels for specific subgroups of patients. In addition, NIS data are standardized across years to facilitate ease of use.

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.

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

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 & Human Services
California Office of Statewide Health Planning & Development
Colorado Health & Hospital Association
Connecticut Integrated Health Information (Chime, Inc.)
Florida Agency for Health Care Administration
Georgia GHA: An Association of Hospitals & Health Systems
Hawaii Health Information Corporation
Illinois Health Care Cost Containment Council and Department of Public Health
Indiana Hospital&Health Association
Iowa Hospital Association
Kansas Hospital Association
Kentucky Cabinet for Health and Family Services
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 Division of Health Care Financing and Policy, Department of Human Resources
New Hampshire Department of Health & Human Services
New Jersey Department of Health & Senior Services
New York State Department of Health
North Carolina Department of Health and Human Services
Ohio Hospital Association
Oregon Office for Oregon Health Policy and Research and Oregon Association of Hospitals and Health Systems
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 & Family Services

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

References

For a detailed description of HCUP and 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.

Design of the HCUP Nationwide Inpatient Sample, 2004. Online. August 8, 2006. U.S. Agency for Healthcare Research and Quality. http://www.hcup-us.ahrq.gov/db/nation/nis/reports/NIS_2004_Design_Report.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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Table 1. Common injuries resulting in hospitalization, 2004*

	Principal diagnosis	Total number of stays	Percentage of injury stays	Mean hospital cost	Mean length of stay (days)	In-hospital death rate
1	Hip fracture	304,300	16.0%	$12,000	6.3	2.9%
2	Leg fracture	284,900	15.0%	$10,700	4.7	0.6%
3	Spine, rib and pelvis fractures	187,500	9.9%	$10,200	5.5	1.4%
4	Intracranial (brain) injury	186,100	9.8%	$16,300	6.8	10.2%
5	Arm fracture	162,300	8.6%	$7,700	3.3	0.4%
6	Poisoning by medications other than psychiatric medications	148,000	7.8%	$5,000	2.8	1.3%
7	Crushing injury or internal injury	119,000	6.3%	$16,200	6.9	4.0%
8	Poisoning by psychiatric drugs	78,600	4.2%	$4,500	2.4	0.7%
9	Other injuries	69,100	3.6%	$6,600	3.5	2.7%
10	Superficial injury, bruise	58,100	3.1%	$4,300	3.0	0.5%
11	Open wounds of arms and legs	57,500	3.0%	$7,100	3.6	0.2%
12	Skull and face fractures	54,900	2.9%	$9,700	3.6	0.6%
13	Sprains and strains	53,200	2.8%	$4,600	2.3	*
14	Open wounds of head, neck, and trunk	43,000	2.3%	$6,300	2.7	0.7%
15	Burns	32,500	1.7%	$17,600	8.9	4.1%
16	Poisoning by substances other than medicine	24,900	1.3%	$5,700	2.8	1.2%
17	Joint disorders and dislocations due to trauma	17,200	0.9%	$8,200	3.5	0.8%
18	Spinal cord injury	15,600	0.8%	$36,900	13.5	5.7%
	All injuries	**1,896,587**	**100.0%**	**$10,300**	**4.8**	**2.4%**

*Based on principal diagnosis.

Note: Statistics based on estimates with a relative standard error (standard error/weighted estimate) greater than 0.30 or with standard error = 0 are not reliable. These statistics are suppressed and are designated with an asterisk (*).

Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2004.

Table 2: Top 10 injuries resulting in hospitalization, by age, 2004*

Principal diagnosis	Age Group (in years)							
	0-17		18-44		45-64		65+	
	Rank (R), Number of injuries (N) (Percentage of age-specific injury stays)							
	R	N (%)	R	N (%)	R	N (%)	R	N (%)
Hip fracture					6	27,800 (7.2%)	1	266,000 (38.1%)
Leg fracture	1	31,700 (15.0%)	1	95,500 (16.1%)	1	80,300 (20.7%)	3	75,800 (10.9%)
Spine, rib and pelvis fractures			6	41,500 (7.0%)	3	36,500 (9.4%)	2	102,400 (14.7%)
Intracranial (brain) injury	3	29,200 (13.8%)	3	62,200 (10.5%)	4	35,200 (9.1%)	4	59,100 (8.5%)
Arm fracture	2	30,800 (14.6%)	7	39,300 (6.6%)	5	33,300 (8.6%)	5	57,500 (8.2%)
Poisoning by medications other than psychiatric medications	4	17,500 (8.3%)	2	75,500 (12.7%)	2	37,900 (9.8%)	10	16,900 (2.4%)
Crushing injury or internal injury	6	16,600 (7.9%)	4	59,200 (10.0%)	7	25,700 (6.6%)	9	17,200 (2.5%)
Poisoning by psychiatric drugs			5	45,700 (7.7%)	8	21,000 (5.4%)		
Other injuries	5	16,700 (7.9%)			10	13,300 (3.4%)	7	18,400 (2.6%)
Superficial injury, bruise							6	27,800 (4.0%)
Open wounds of arms and legs	10	7,300 (3.4%)	8	30,500 (5.1%)				
Skull and face fractures	7	12,000 (5.7%)	9	27,300 (4.6%)				
Sprains and strains					9	15,500 (4.0%)	8	17,900 (2.6%)
Open wounds of head, neck, and trunk	9	7,600 (3.6%)	10	21,700 (3.7%)				
Burns	8	8,700 (4.1%)						
Total top 10		**178,100 (80.5%)**		**597,500 (85.4%)**		**326,700 (84.4%)**		**659,100 (94.4%)**

*Based on principal diagnosis.

Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2004.

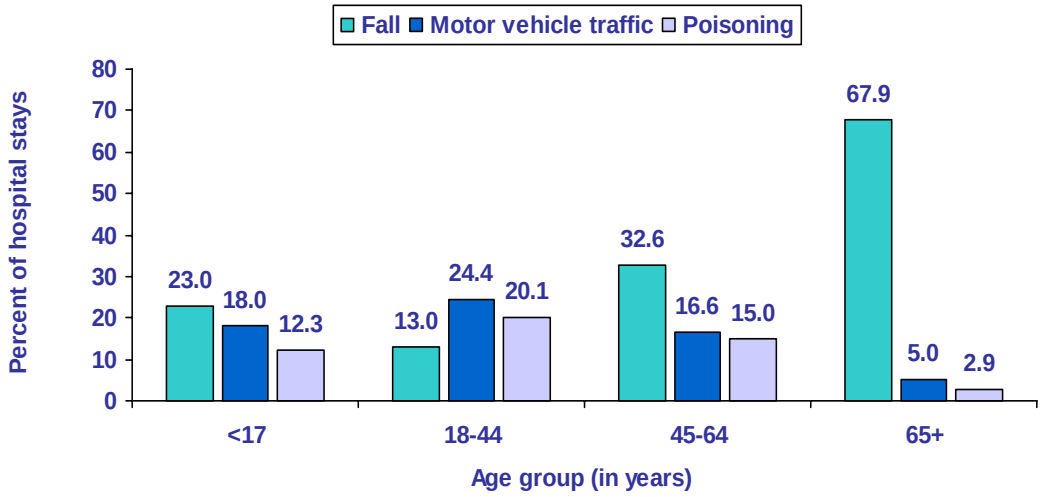
Table 3: Causes of injuries that result in hospitalization, 2004

Mechanism of injury	Total number of stays	Percentage of injury stays
Fall	729,100	38.4%
Motor vehicle traffic (MVT)	282,900	14.9%
Poisoning	224,100	11.8%
Struck by, against	75,500	4.0%
Cut/pierce	51,800	2.7%
Transportation (not MVT)	50,000	2.6%
Other specified causes of injury	38,100	2.0%
Firearm	32,100	1.7%
Adverse effects of medical drugs	29,300	1.5%
Natural/environment	27,000	1.4%
Overexertion	26,400	1.4%
Fire/burn	26,000	1.4%
Adverse effects of medical care	17,500	0.9%
Pedal cyclist (not MVT)	17,500	0.9%
Machinery	16,900	0.9%
Suffocation	6,400	0.3%
Pedestrian (not MVT)	3,500	0.2%
Drowning/submersion	3,100	0.2%

*Based on all-listed external cause of injury codes; Not all injury discharges have an associated external cause of injury code. “Unspecified” causes of injury codes are omitted from this list.

Source: AHRQ, Center for Delivery, Organization and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2004.

Figure 1. Top three causes of injuries that result in hospitalization, by age, 2004*



*Based on all-listed external cause of injury codes

Source: AHRQ, Center for Delivery, Organization and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2004.