

STATISTICAL BRIEF #80

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Emergency Department Visits for Injurious Falls among the Elderly, 2006

Pamela L. Owens, Ph.D., C. Allison Russo, M.P.H., William Spector, Ph.D., and Ryan Mutter, Ph.D.

Introduction

Each year, approximately one-third of elderly adults experience a fall.¹ Falls are the most common cause of fatal injuries among elderly adults age 65 years and older, as well as the most common cause of nonfatal injuries in this population.² The direct medical cost for fall-related injuries among the elderly is about \$20 billion annually and is expected to increase substantially over the next decade as the population ages.³ Often, common fall-related injuries, such as fractures, open wounds, or head traumas, are serious enough to result in emergency department (ED) treatment. These injuries can impair mobility and may require admission to a long-term care (LTC) facility for a year or more.⁴ Because many falls are preventable and their impact on the U.S. health care system is significant, it is important to better understand the types of fall-related injuries experienced by elderly adults, particularly those injuries requiring treatment in an ED.

This Statistical Brief presents data from the Healthcare Cost and Utilization Project (HCUP) Nationwide Emergency Department Sample (NEDS) on ED visits among elderly adults that noted both an injury diagnosis and a fall in 2006. Specifically, patient and utilization characteristics of ED visits for injurious falls are discussed and compared with all other types of ED visits among the elderly. Rates of injurious falls are presented by gender and age. The Brief also provides information about the types of injuries most often associated with fall-related ED visits, with a special focus on fractures. In addition to prevalence estimates, data on the likelihood of hospital admission and discharge to LTC are presented by

Highlights

- Elderly adults had over 2.1 million ED visits for injurious falls in 2006, accounting for 1 in 10 ED visits among patients aged 65 years and older.
- The cost of hospital care following an ED visit for an injurious fall among the elderly totaled \$6.8 billion in 2006.
- In 2006, nearly 1 in 7 women and 1 in 10 men aged 85 years and older had an ED visit for an injurious fall.
- The most common reasons for injurious fall-related ED visits among the elderly were fractures (41.0 percent), followed by superficial/contusion injuries (22.6 percent) and open wounds (21.4 percent).
- Hip fractures accounted for about 1 in 8 injurious fall-related ED visits among the elderly.
- Among the elderly, patients seen in the ED for injurious falls and subsequently admitted to the hospital were more likely to be discharged to LTC than ED patients admitted to the hospital with other conditions (65.7 percent versus 28.4 percent).
- Fall-related ED visits associated with fractures and internal organ injuries resulted in hospitalization (51.3 percent and 62.7 percent, respectively) and discharge to LTC (40.9 percent and 33.2 percent, respectively) more frequently than fall-related ED visits associated with other injuries.

¹ Hausdorff JM, Rios DA, Edelberg HK. Gait variability and fall risk in community-living older adults: a 1-year prospective study. *Arch Phys Med Rehabil* 2001;82:1050–6.

² Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. Web-based Injury Statistics Query and Reporting System (WISQARS). www.cdc.gov/ncipc/wisqars.

³ Stevens JA, Corso PS, Finkelstein EA, Miller TR. The costs of fatal and nonfatal falls among older adults. *Injury Prevention* 2006;12:290–5.

⁴ Stevens JA. Falls among older adults—risk factors and prevention strategies. In: *Falls free: promoting a national falls prevention action plan*. Washington, DC: The National Council on the Aging; 2005.

type of injury. Unless otherwise noted, estimates are based on all-listed diagnoses. All differences between estimates provided in the text are statistically significant at the 0.05 level or better.

Findings

General findings

In 2006, patients 65 years and older had over 2.1 million visits to the ED for injurious falls, which was 10.5 percent of all ED visits among the elderly (table 1).⁵ The majority of these cases (70.4 percent) were “treat-and-release” (i.e., the patient was released from the ED rather than being admitted to that hospital for further care); the remaining 29.6 percent of visits resulted in hospital admission.

Patient and utilization characteristics of ED visits for injurious falls among the elderly

Elderly patients seen in the ED for injurious falls were more likely to be female (70.2 percent versus 57.8 percent) and older (mean age of 80.1 years versus 77.4 years) compared with elderly ED patients with all other conditions (table 1). In fact, patients aged 75 to 84 years old accounted for the largest proportion of injurious fall-related ED visits among the elderly (40.3 percent), followed by patients 85 years and older (32.4 percent) and patients 65 to 74 years (27.3 percent).

Elderly patients seen in the ED for injurious falls were less likely to be admitted to the hospital (29.6 percent versus 43.1 percent) compared with elderly ED patients with all other conditions, but more likely to be discharged to LTC (24.1 percent versus 14.7 percent). The difference in the likelihood of being discharged to LTC was especially pronounced among patients who came to the ED and were subsequently admitted to the hospital (65.7 percent versus 28.4 percent).

Elderly patients with injurious falls had similar lengths of hospital stays (5.5 days versus 5.4 days) when compared to elderly ED patients admitted to the hospital with all other conditions, but they experienced higher average cost of hospital care (\$10,800 versus \$9,900). The aggregate cost of hospital care following an ED visit for an injurious fall was \$6.8 billion—8.1 percent of the aggregate cost of all hospital stays following an ED visit among the elderly.

Rates of ED visits for injurious falls, by age and gender

The overall rate of ED visits for injurious falls among the elderly was 57.4 visits per 1,000 persons 65 years and older (data not shown). As shown in figure 1, elderly women had an ED visit for an injurious fall at a rate consistently higher than the rate for elderly men. Among 65 to 74 year olds, there were 37.7 ED visits for injurious falls per 1,000 women and 22.9 ED visits per 1,000 men. The rate more than doubled for the next age cohort (77.2 ED visits for injurious falls per 1,000 women 75 to 84 years and 49.6 ED visits per 1,000 men 75 to 84 years). That rate nearly doubled again for the last age cohort (143.2 ED visits for injurious falls per 1,000 women 85 years and older and 105.6 ED visits per 1,000 men 85 years and older). In 2006, nearly 1 in 7 women and 1 in 10 men aged 85 years and older had an ED visit for an injurious fall.

Most common injuries associated with ED visits for injurious falls among the elderly, by gender

Figure 2 presents the most common injuries resulting from falls among the elderly treated in the ED. The most common injuries related to falls were fractures, which accounted for 41.0 percent of injurious fall-related ED visits (876,200 ED visits), followed by superficial/contusion injuries (483,000 ED visits; 22.6 percent) and open wounds (457,500 ED visits; 21.4 percent). Other common fall-related injuries that were seen in the ED included sprains and strains (214,200 ED visits; 10.0 percent), internal organ injuries (97,900 ED visits; 4.6 percent), and dislocations (32,500 ED visits; 1.5 percent).

Women, who accounted for 70.2 percent of all injurious fall-related ED visits among the elderly, comprised an even higher percentage of ED visits for fall-related fractures (75.2 percent). Men, who

⁵ In 2006, approximately 80,000 hospital stays noting injurious falls were classified as routine, direct admissions (i.e., they did not originate from the ED). These cases were not included in this analysis because it is unclear whether these cases were planned admissions for the treatment of a fall already seen in the ED, a readmission for a complication resulting from an earlier fall seen in the ED, a fall that occurred in the hospital, or an untreated fall admitted by a physician.

accounted for 29.8 percent of all injurious fall-related ED visits among the elderly, accounted for a significantly higher percentage of ED visits for fall-related internal organ injuries (43.4 percent), a category made up mainly of traumatic brain injuries.

Focus on fall-related fractures among the elderly, by gender

For both women and men, the most common fall-related injury seen in the ED among the elderly was fracture (41.0 percent of injurious fall-related ED visits). Figure 3 provides a breakdown of the type of fractures that occur by the location of the fracture and gender. Upper extremity (arm) fractures (315,900 ED visits) and hip fractures (260,400 ED visits) were the most commonly occurring fall-related fractures seen in the ED, accounting for 14.8 percent and 12.2 percent, respectively, of injurious fall-related ED visits among the elderly. Skull fractures were the least common type of fall-related fractures among the elderly seen in the ED (24,600 ED visits).

As with all types of fractures, elderly women were more likely to have ED visits for upper extremity and hip fractures than elderly men (79.4 percent women versus 20.6 percent men for upper extremity fractures; 74.6 percent women versus 25.4 percent men for hip fractures). While women are two to three times more likely than men to have a fall-related ED visit for most types of fractures, women are only 1.5 times more likely have a fall-related ED visit for a skull fracture compared with men.

Discharge disposition of elderly ED patients with an injurious fall, by common injuries

Compared with other common injuries associated with injurious falls among the elderly, a disproportionate percentage of ED visits involving the treatment of fractures and internal organ injuries resulted in hospital admission and/or discharge to LTC (figure 4). More than half (51.3 percent) of injurious fall-related ED visits associated with fractures among the elderly resulted in admission to the hospital, while almost two-thirds (62.7 percent) of injurious fall-related ED visits associated with internal organ injuries among the elderly required hospital admission. The proportion of all other injurious fall-related ED visits among the elderly that resulted in hospital admission ranged from 9.1 percent to 18.1 percent.

Moreover, fall-related ED visits associated with fractures and internal organ injuries were more likely than any other injurious fall-related ED visit to require LTC after treatment in the ED and/or hospital. The percentage of ED visits discharged to LTC (either directly from the ED or following hospitalization) was significantly higher for fractures (40.9 percent) and internal organ injuries (33.2 percent). The proportion of all other injurious fall-related ED visits among the elderly that resulted in discharge to LTC ranged from 8.4 percent to 13.5 percent.

Among those ED visits resulting in hospital admission, stays for fall-related fractures and internal organ injuries among the elderly also accounted for the highest mean hospital costs and longest lengths of stay in the hospital (figure 5). Among the elderly, hospitalizations for fractures due to falls averaged \$11,700 in hospital costs and 5.6 days in duration. Hospital stays for internal organ injuries due to falls averaged \$13,100 in hospital costs and 6.0 days in duration. The average hospital costs for all other fall-related injuries among the elderly were less than \$7,500 and averaged about four days in duration.

Data Source

The estimates in this Statistical Brief are based upon data from the HCUP Nationwide Emergency Department Sample (NEDS) for 2006. Supplemental sources included data on population estimates from Table 1: Annual Estimates of the Resident Population by Sex and Five-Year Age Groups for the United States: April 1, 2000 to July 1, 2008 (NC-EST2008-01); Population Division, U.S. Census Bureau, Release date: May 14, 2009 (<http://www.census.gov/popest/national/asrh/NC-EST2008/NC-EST2008-01.xls>).

Definitions

Diagnoses and ICD-9-CM

In the HCUP inpatient databases, the first listed diagnosis is the principal diagnosis. The principal diagnosis is that condition established after study to be chiefly responsible for the patient's admission to

the hospital. Subsequent diagnoses are secondary diagnoses. Secondary diagnoses are concomitant conditions that coexist at the time of admission or that develop during the stay and that affect the treatment received and/or the length of stay (LOS). In the HCUP outpatient databases, the first listed diagnosis may not be the principal diagnosis; it may just be the first listed diagnosis on the record. The purpose of this Statistical Brief was to look at the ED resource utilization for injurious falls among the elderly; therefore, estimates are based on all-listed diagnoses.

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.

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.⁶ Records with an all-listed 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-related visits.

Case Definition

For this report, the following codes were used to identify injurious falls:

Injurious falls: all-listed Clinical Classifications Software (CCS) external cause of injury (falls) diagnosis code of 2603 and all-listed ICD-9-CM injury 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.

Treat-and-release ED visits

Treat-and-release ED visits were those ED visits in which patients are treated and released from that ED (i.e., they are not admitted to that specific hospital).

ED visits resulting in hospital admission

ED visits resulting in a hospital stay included those patients initially seen in the ED and then admitted to the same hospital.

Nature of injury

The Barell Matrix is used to characterize the patterns of injury-related ICD-9-CM diagnosis codes into broad categories of injury including the nature of injury (e.g., fracture, dislocation, sprains and strains, internal organs, open wounds, contusion/superficial) and the body region or location of injury (e.g., upper extremity, lower extremity, torso, spinal cord, traumatic brain injury, vertebral column).⁷ The matrix contains 12 nature of injury categories and 9 location of injury categories, but only the most common types of injury are reported in this Brief. With the exception of contusion/superficial injury, an ED visit is categorized as a specific nature of injury type if present in any diagnosis field, regardless of coexisting injuries on the record. An ED visit is categorized as a superficial/contusion injury only when no other coexisting injuries are reported.

Types of hospitals included in HCUP

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

Unit of analysis

The unit of analysis is the ED visit, not a person or patient. This means that a person who visits the ED multiple times in one year will be counted each time as a separate ED visit.

⁶ 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 August 24, 2009).

⁷ Barell V, Aharonson-Daniel L, Fingerhut LA, Mackenzie EJ, Ziv A, Boyko V, Abargel A, Avitzour M, Heruti R. An introduction to the Barell body region by nature of injury diagnosis matrix. *Inj Prev*. 2002 Jun;8(2):91-6.

Hospital costs

For ED visits resulting in hospital admission, total hospital charges were converted to hospital costs using HCUP Cost-to-Charge Ratios based on hospital accounting reports from the Centers for Medicare and Medicaid Services (CMS).⁸ Hospital 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 one-hundredth.

There are currently no similar Cost-to-Charge Ratios for ED visits that are treat-and-release. For this reason, total and mean costs were not calculated for all ED visits.

Discharge status

Discharge status indicates the disposition of the patient at discharge from the ED or the hospital, and includes the following six categories: routine (to home), admitted to the hospital from the ED, transfer to another short-term hospital, transfer to long-term care (including skilled nursing facility, intermediate care, and another type of facility such as a nursing home), home health care, against medical advice (AMA), or died in the hospital.

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 (asterisk indicates states that contribute emergency department data for treat-and-release patients):

Arizona Department of Health Services*
Arkansas Department of Health
California Office of Statewide Health Planning & 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 Health Association*
Iowa Hospital Association*
Kansas Hospital Association*
Kentucky Cabinet for Health and Family Services*
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*

⁸ HCUP Cost-to-Charge Ratio Files (CCR). Healthcare Cost and Utilization Project (HCUP). 2001–2006. U.S. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/db/state/costtocharge.jsp.

New Jersey Department of Health and Senior Services*
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
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 and Utah Office of Health Care Statistics*
Vermont Association of Hospitals and Health Systems*
Virginia Health Information
Washington State Department of Health
West Virginia Health Care Authority
Wisconsin Department of Health and Family Services*
Wyoming Hospital Association

About the NEDS

The HCUP Nationwide Emergency Department Sample (NEDS) is a nationwide database of hospital-based ED visits. The NEDS is nationally representative of all community hospital-based emergency departments (i.e., short-term, non-Federal, non-rehabilitation hospital-based emergency departments). The NEDS is a 20 percent stratified sample of hospital-based EDs and includes records on all patients, regardless of payer. The NEDS contains information on 26 million records (unweighted) on ED visits at over 950 hospitals. The vast size of the NEDS allows the study of topics at both the national and regional levels for specific subgroups of patients. The NEDS is scheduled to be produced annually, beginning with the 2006 data year.

About HCUPnet

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

For More Information

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

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

For information on other hospitalizations in the U.S., download *HCUP Facts and Figures: Statistics on Hospital-based Care in the United States in 2006*, located at <http://www.hcup-us.ahrq.gov/reports.jsp>.

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:

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, 2006. Online. June 19, 2009. U.S. Agency for Healthcare Research and Quality.
http://www.hcup-us.ahrq.gov/db/nation/neds/NEDS_2006_Introductionv4.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>

Barrett M, Coffey R, Levit K, Nagamine M, Hunter K. *Population Denominator Data for Use with the HCUP Databases (Updated)*. HCUP Methods Series Report #2008-07. Online November 25, 2008.
http://www.hcup-us.ahrq.gov/reports/2008_07.pdf

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<http://www.hcup-us.ahrq.gov/reports/statbriefs/sb80.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:

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. Characteristics of ED visits for injurious falls among elderly adults 65 years and older, 2006

	ED visits for injurious falls	ED visits for all other conditions
Total number of ED visits	2,139,500	18,212,500
Percentage of all ED visits	10.5%	89.5%
Percentage of ED visits that were treat-and-release	70.4%	56.9%
Percentage of ED visits resulting in hospital admission	29.6%	43.1%
<i>Patient Characteristics:</i>		
Percentage female	70.2%	57.8%
Mean age (years)	80.1	77.4
Age group (percentage):		
65-74 years	27.3%	39.8%
75-84 years	40.3%	39.4%
85+ years	32.4%	20.7%
<i>Utilization Characteristics:</i>		
Percentage of ED visits that result in discharge to long-term care*	24.1%	14.7%
Percentage of ED visits resulting in hospital admission that later result in discharge to long-term care***	65.7%	28.4%
Mean length of hospital stay (days)**	5.5	5.4
Mean cost of hospital stay**	\$10,800	\$9,900
Aggregate hospital cost**	\$6.8 billion	\$76.8 billion

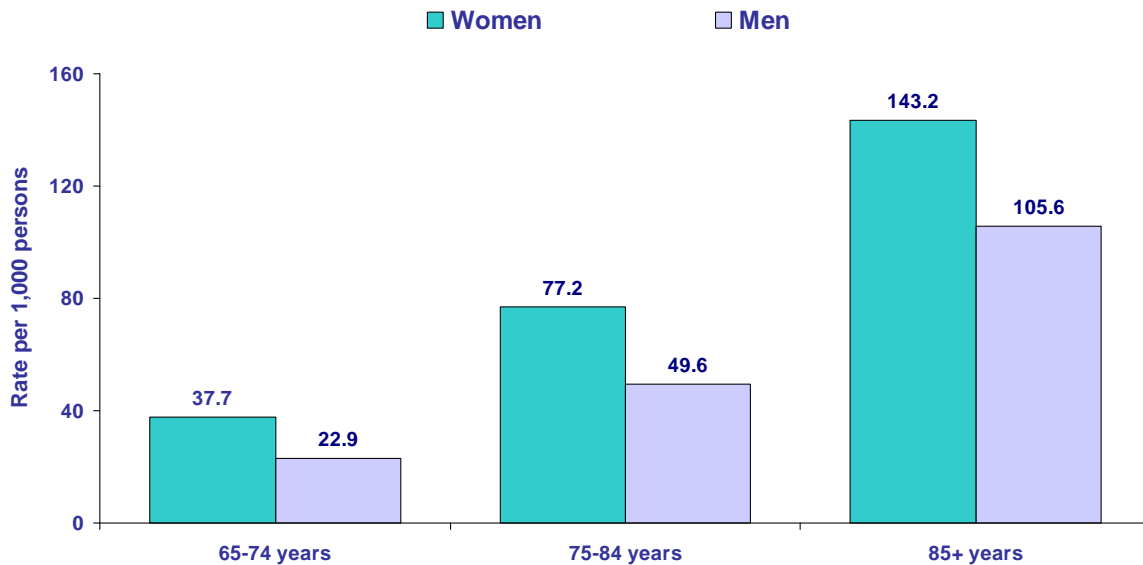
*Discharge disposition was missing for 410,600 ED visit records (14,800 ED visits resulting in hospital admission).

**Applies only to those ED visits resulting in hospital admission.

Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Emergency Department Sample (NEDS), 2006.



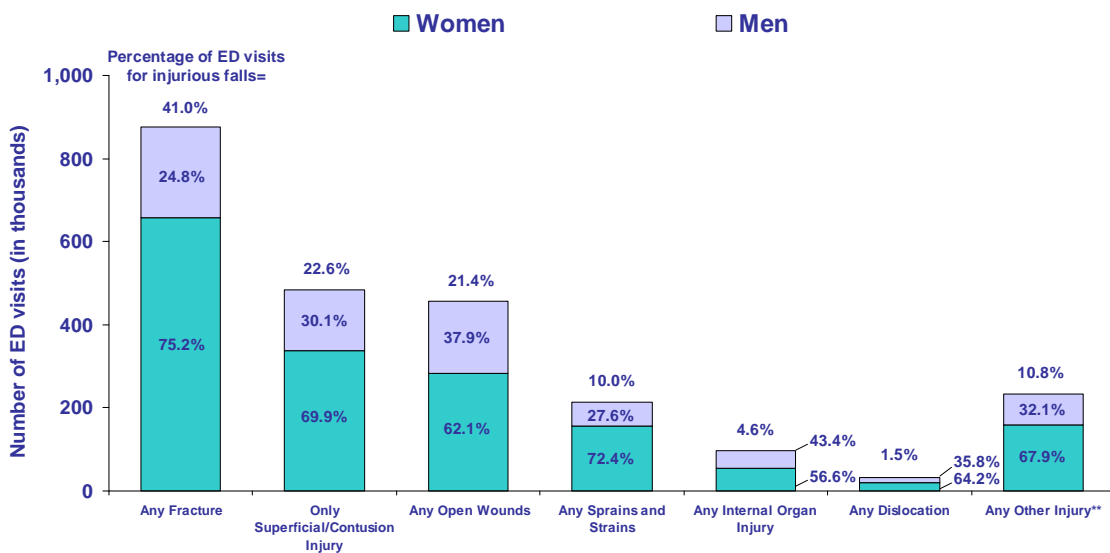
Figure 1. Rates of ED visits for injurious falls among elderly men and women, by age, 2006



Source: Agency for Healthcare Research and Quality, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Emergency Department Sample, 2006 and Population Estimates, Population Division, U.S. Census Bureau, 2006



Figure 2. Number of ED visits for injurious falls among elderly men and women, by nature of injury, 2006*



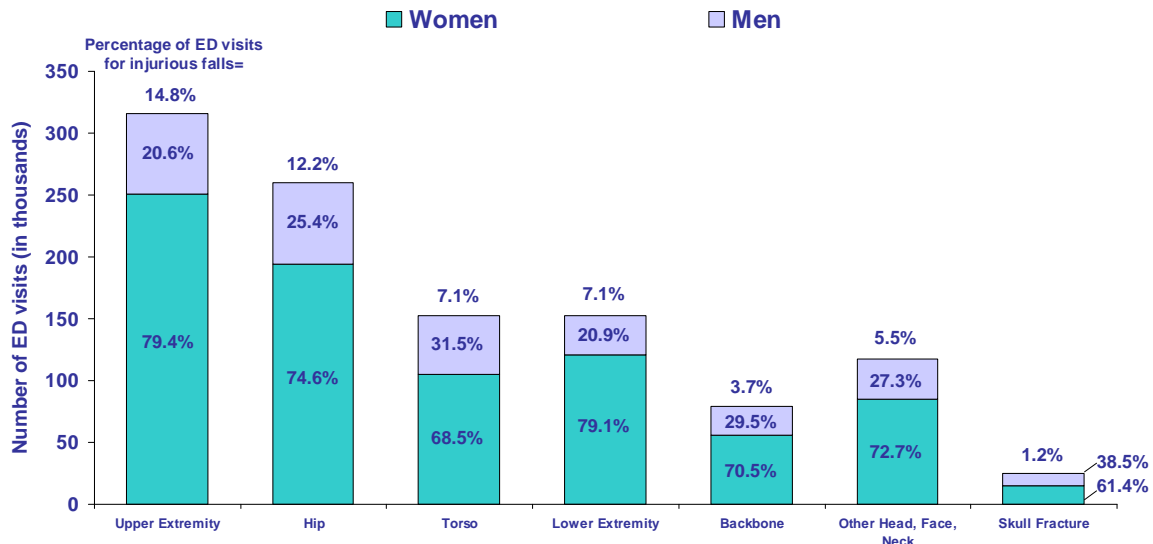
*An ED visit for injurious falls is categorized as a specific nature of injury if the injury is present in any diagnosis field.

**Includes unspecified injuries, system-wide and late effects, nerve injuries, burns, injuries to the blood vessels, crushing injuries, and amputations.

Source: Agency for Healthcare Research and Quality, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Emergency Department Sample, 2006



Figure 3. Number of ED visits for injurious falls among elderly men and women, by location of fracture, 2006*

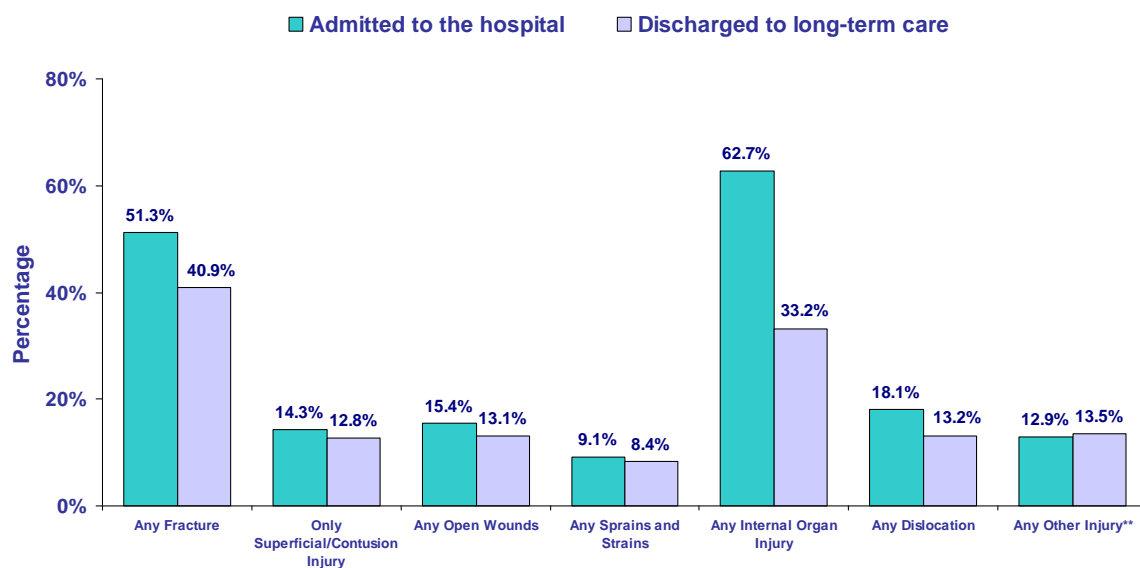


*An ED visit for injurious falls is categorized as a fracture if the injury is present in any diagnosis field.

Source: Agency for Healthcare Research and Quality, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Emergency Department Sample, 2006



Figure 4. Percentage of ED visits admitted to the hospital and discharged to long-term care among elderly patients treated for injurious falls, by nature of injury, 2006*



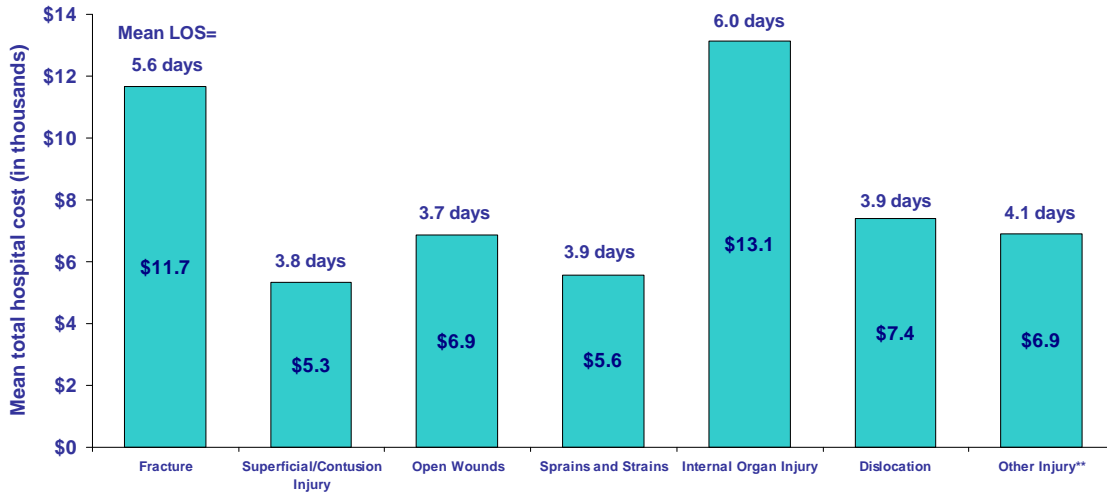
* An ED visit for injurious falls is categorized as a specific nature of injury if the injury is present in any diagnosis field.

**Includes unspecified injuries, system-wide and late effects, nerve injuries, burns, injuries to the blood vessels, crushing injuries, and amputations.

Source: Agency for Healthcare Research and Quality, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Emergency Department Sample, 2006



Figure 5. Mean total hospital cost and length of hospital stay for ED visits that result in admission among elderly patients treated for injurious falls, by nature of injury, 2006*



* An ED visit for injurious falls is categorized as a specific nature of injury if the injury is present in the principal diagnosis field.

**Includes unspecified injuries, system-wide and late effects, nerve injuries, burns, injuries to the blood vessels, crushing injuries, and amputations.

Source: Agency for Healthcare Research and Quality, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Emergency Department Sample, 2006