

## STATISTICAL BRIEF #84

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### Emergency Department Visits Associated with Motor Vehicle Accidents, 2006

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#### Introduction

Motor vehicle accidents (MVAs) are a significant cause of morbidity and mortality in the United States. According to the Centers for Disease Control and Prevention, nearly 44,000 people died as a result of motor vehicle traffic accidents in 2006.<sup>1</sup> Among children above the age of one, motor vehicle injuries are the leading cause of death, and for people of all ages, MVAs are the leading cause of death from unintentional injury.<sup>1,2</sup> Many more people are injured but survive. In 2007, about 3.2 million people sustained nonfatal injuries that resulted from traffic accidents, making MVAs the fourth most common cause of nonfatal injuries in 2007.<sup>3</sup> In addition to the physical and emotional burden on the injured and their families, MVAs result in significant health care costs for society because they often lead to visits to hospital emergency departments, inpatient hospital admissions, and for some, permanent disability.

This Statistical Brief presents data from the Healthcare Cost and Utilization Project (HCUP) on characteristics of emergency department (ED) visits resulting from MVAs in 2006. Patient characteristics such as age, sex, and residence are compared between MVA-related visits and non-MVA-related visits, in addition to comparisons of patient discharge location, hospital characteristics and payer for the two groups. The ten most common injury types are highlighted and differences in the prevalence of these injuries between MVA-related ED visits that result in inpatient admissions to the same hospital and

#### Highlights

- In 2006, more than 8 in 10 (84.7 percent) MVA-related ED visits were for patients that were treated and released.
- Nearly four of every ten (37.2 percent) MVA-related ED visits occurred in a trauma center; this compares to three of every ten (29.7 percent) non-MVA-related ED visits that were treated in a trauma center.
- MVA-related ED visits resulted in admission to the hospital for care about half as often as non-MVA-related ED visits (8.0 percent vs. 15.6 percent).
- More than half (58.0 percent) of MVA-related ED visits were made by people aged 18 to 44, while only 40.6 percent of non-MVA-related ED visits were made by people in that same age range.
- Greater than half of MVA-related visits (55.1 percent) were covered by private payers compared to only 34.0 percent of non-MVA-related visits.
- The most common injuries observed in MVA-related visits were sprains (44.4 percent), followed by contusions with intact skin surface (34.8 percent) and superficial injuries (11.8 percent). More serious injuries such as internal injury of the thorax, abdomen, and pelvis were considerably less common (2.6 percent).

<sup>1</sup>Centers for Disease Control and Prevention's Web-based Injury Statistics Query and Reporting System (WISQARS), 2006. Office of Statistics and Programming, National Center for Injury Preventions and Control, Centers for Disease Control and Prevention.

<sup>2</sup>CDC *Injury Fact Book*. November 2006. Atlanta: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention.

<sup>3</sup>Centers for Disease Control and Prevention's Web-based Injury Statistics Query and Reporting System (WISQARS), 2007. Office of Statistics and Programming, National Center for Injury Preventions and Control, Centers for Disease Control and Prevention.

visits that were treated and released are shown. The ten most common procedures performed for MVA-related ED visits are also tabulated. Comparisons of the prevalence of these procedures between admitted and treat-and-release patients are provided.

## Findings

In 2006, nearly 3.5 million people in the U.S. were treated in the ED for conditions resulting from MVAs (table 1). Among MVA-related ED visits, 84.7 percent were treated and released, 8.0 percent were admitted to the same hospital for care, 1.2 percent were transferred to another acute care hospital, 0.2 percent died in the ED, and 5.8 percent went to other destinations, such as skilled nursing facilities or an unknown destination. Compared to all other ED visits, MVA-related visits were more likely to be treated and released and less likely to be admitted for care. Among all other ED visits, 76.8 percent were treated and released and 15.6 percent were admitted for care.

### *MVA visits by patient and hospital characteristics*

Of MVA-related visits, 2.3 percent were under 5 years old, 13.1 percent were 5 to 17 years, 58.0 percent were 18 to 44 years, 20.0 percent were 45 to 64 years, and 6.6 percent were 65 years and older (table 1). While 58.0 percent of MVA-related visits were made by those aged 18 to 44 years, only 40.6 percent of non-MVA-related visits fell into that category. Overall, males represented 47.9 percent of MVA-related visits, but only 45.6 percent of all other visits. About half of MVA-related visits were made by people residing in large metro areas, one-third in small metro areas and the remaining in non-metro areas. Non-MVA-related visits had a slightly lower percentage of patients from large metro areas and a slightly higher percentage of people from non-metro areas.

Similarly, nearly 84 percent of MVA-related visits were made to metropolitan hospitals; of these metropolitan MVA-related visits, a little more than half were to teaching hospitals (table 2). Non-MVA related visits had only 80.9 percent of visits to metropolitan hospitals, and slightly less than half of those visits were to teaching hospitals. A little more than 37 percent of MVA-related visits were to EDs that are designated as trauma centers (Level I, II, or III), compared to only about 30 percent of non-MVA related visits. The majority of MVA-related visits (55.1 percent) were made by people with private insurance, followed by 24.6 percent by the uninsured and 9.8 percent by those on Medicaid. This is markedly different from non-MVA-related visits, where 34.0 percent of visits were made by people with private insurance, followed by 21.9 percent with Medicaid, 20.7 percent with Medicare, and 17.5 percent with no insurance.

### *Common injury types for MVA-related ED visits*

There were differences in the types of MVA-related injuries that led to hospital admission compared to patients who were treated and released. The top 10 injuries among all MVA-related visits included sprains, contusions with intact skin surface, superficial injuries, open wounds, certain traumatic complications and unspecified injuries, intracranial injury, neck and trunk fracture, upper limb fracture, lower limb fracture, and internal injury of the thorax, abdomen, and pelvis (table 3). The prevalence of these common injuries among MVA-related visits varied greatly, from 44.4 percent for sprains to 2.6 percent for internal injury of the thorax, abdomen, and pelvis.

Among MVA-related patients who were treated and released, injuries such as sprains, contusion with intact skin surface, superficial injuries, certain traumatic complications and unspecified injuries, and open wounds were more common (figure 1). MVA-related patients who were admitted to the hospital for care were more likely to have neck and trunk fractures, open wounds, upper limb fracture, lower limb fracture, and internal injury of the thorax, abdomen, and pelvis. These injuries were found in a much higher percentage of admitted patients than in treat-and-release-patients. Neck and trunk fracture had the largest percentage point difference (36.1 percent) between the two groups, present in 37.6 percent of admitted patients but only 1.5 percent of treat-and-release patients.

### *Common procedures performed for MVA-related ED visits*

Among all MVA-related visits, common procedures included the suture of skin and subcutaneous tissue; traction, splints and other wound care; computerized axial tomography (CT) head scans; treatment of a fracture or dislocation of a lower extremity other than the hip or femur; respiratory intubation and mechanical ventilation; and routine chest X-rays (table 4).

Comparing MVA-related visits that resulted in admission to the hospital with treat-and-release visits, treat-and-release visits most commonly had procedures related to diagnosis of injuries and care of cuts and wounds (figure 2). Patients who were admitted to the hospital needed not only wound care, such as the suture of skin and subcutaneous tissue, but also required treatments for lower extremity fractures and dislocations and respiratory intubation and mechanical ventilation.

### **Data Source**

The estimates in this Statistical Brief are based upon data from the HCUP 2005 and 2006 National Emergency Department Samples (NEDS). Comparisons of common procedures performed between visits that resulted in hospital admissions and visits to all other destinations were made using the NEDS Inpatient and ED supplemental files. All other tabulations were based on data from the NEDS core file. Information in the NEDS hospital weight file was used to account for sample design when calculating national estimates and standard errors. Supplemental sources included data from the 2006 American Hospital Association Annual Survey Database and Claritas Population Estimates.

### **Definitions**

#### *Injuries, 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. Injuries may be the primary (first-listed) or secondary diagnosis and are defined by ICD-9-CM diagnosis codes in the following range: 810.00 to 819.99. They are categorized using the CCS categorization scheme.

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.<sup>4</sup> This "clinical grouper" makes it easier to quickly understand patterns of diagnoses and procedures.

#### *Procedures and Clinical Classifications Software (CCS)*

Procedures include both principal and secondary procedures.

CCS categorizes procedure codes into clinically meaningful categories.<sup>4</sup> This "clinical grouper" makes it easier to quickly understand patterns of procedure use.

#### *Case definition*

The ICD-9-CM codes defining MVA-related visits include external causes of injury codes ("E codes") in the following range: E810.00 to E819.99.

#### *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

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

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.

#### *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 Children's Health Insurance Program (CHIP) may be included here. Because most state data do not identify CHIP patients specifically, it is not possible to present this information separately.
- Private insurance includes Blue Cross, commercial carriers, and private HMOs and PPOs.
- Other includes Worker's Compensation, TRICARE/CHAMPUS, CHAMPVA, Title V, and other government programs.
- Uninsured includes an insurance status of "self-pay" and "no charge."

When more than one payer is listed for a hospital discharge, the first-listed payer is used.

#### *Patient residence*

The patient residence element is determined by the patient's county of residence. All U.S. counties are classified as one of six categories by a scheme developed by the National Center for Health Statistics for use in studying the association between urbanization and health. These categories are as follows: large central metropolitan, large fringe metropolitan, medium metropolitan, small metropolitan, micropolitan, and not metropolitan or micropolitan. For the purpose of this Statistical Brief, the large central and large fringe metropolitan counties were grouped into the "large metropolitan" category; the medium and small metropolitan counties were grouped into the "small metropolitan" category; and the micropolitan and not metropolitan or micropolitan counties were grouped into the "non-metropolitan" category.

#### *Hospital location and teaching status*

The hospital location is determined to be urban or rural based upon a simplified adaptation of the 2003 Urban Influence Codes, for which large and small metropolitan counties are classified as "metropolitan" and all other categories are classified as "non-metropolitan." Teaching status was obtained from the American Hospital Association (AHA) Annual Survey of Hospitals. Non-metropolitan hospitals were not split according to teaching status because rural teaching hospitals were rare.

#### *Trauma center*

The presence and level of a trauma center is determined by information collected in the 2006 AHA Association Annual Survey. Level I indicates a regional resource trauma center; level II indicates a community trauma center; and level III indicates a rural trauma hospital. For this analysis, hospitals indicating trauma levels of IV or greater were categorized as "Not a trauma center."

#### *Discharge status*

Discharge status indicates the disposition of the patient at discharge from the ED, and includes the following five categories: routine (to home), transfer to short-term hospital, admitted as an inpatient to this hospital, died in the ED, or other. Other includes the following: other transfers, including skilled nursing facility, intermediate care, and another type of facility such as a nursing

home; home health care; against medical advice (AMA); and discharged alive, destination unknown.

## 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  
**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 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  
**Vermont** Association of Hospitals and Health Systems  
**Virginia** Health Information  
**Washington** State Department of Health  
**West Virginia** Health Care Authority  
**Wisconsin** Department of Health Services  
**Wyoming** Hospital Association

## About the NEDS

The HCUP Nationwide Emergency Department Database (NEDS) is a unique and powerful database that yields national estimates of emergency department (ED) visits. The NEDS was constructed using records from both the HCUP State Emergency Department Databases (SEDD) and the State Inpatient Databases (SID). The SEDD capture information on ED visits that do not result in an admission (i.e., treat-and-release visits and transfers to another hospital); the SID contain information on patients initially seen in the emergency room and then admitted to the same hospital. The NEDS was created to enable analyses of ED utilization patterns and support public health professionals, administrators, policymakers, and clinicians in their decision-making regarding this critical source of care.

## 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](http://www.hcup-us.ahrq.gov).

For additional HCUP statistics, visit HCUPnet, our interactive query system, at [www.hcup.ahrq.gov](http://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 2007*, located at <http://www.hcup-us.ahrq.gov/reports.jsp>.

For a detailed description of HCUP and more information on the design of the NEDS, 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 (NEDS), 2006*. Online. June 2009. U.S. Agency for Healthcare Research and Quality. [http://www.hcup-us.ahrq.gov/db/nation/neds/NEDS\\_2006\\_Introductionv4.pdf](http://www.hcup-us.ahrq.gov/db/nation/neds/NEDS_2006_Introductionv4.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](mailto:hcup@ahrq.gov) or send a letter to the address below:

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**Table 1: Distribution of MVA-Related and Non-MVA-Related ED Visits by Patient Characteristics, 2006**

	MVA-Related ED Visits			Non-MVA-Related ED Visits		
	Number of Visits	Percentage	Rate of Visits Per 1,000 Population	Number of Visits	Percentage	Rate of Visits Per 1,000 Population
<b>All</b>	3,497,406		11.7	116,536,344		391.1
Percentage of total ED visits	2.9%			97.1%		
<b>Age</b>						
<5	80,496	2.3%	4.0	10,941,444	9.4%	545.9
5–17	458,545	13.1%	8.6	13,646,973	11.7%	254.6
18–44	2,029,448	58.0%	18.0	47,303,043	40.6%	418.6
45–64	701,120	20.0%	9.5	24,516,310	21.0%	332.3
65–84	204,629	5.9%	6.3	15,678,296	13.5%	484.2
85+	22,991	0.7%	4.4	4,446,014	3.8%	860.3
<b>Gender</b>						
Female	1,823,372	52.1%	12.1	63,430,836	54.4%	419.3
Male	1,673,322	47.9%	11.4	53,092,908	45.6%	361.9
<b>Patient Residence</b>						
Large metro	1,757,829	50.7%	11.0	55,833,730	48.2%	350.4
Small metro	1,109,702	32.0%	12.5	36,866,526	31.9%	416.0
Non-metro	598,712	17.3%	12.0	23,038,517	19.9%	460.8
<b>Discharge Status*</b>						
Treat-and-release	2,963,759	84.7%	9.9	89,536,068	76.8%	300.5
Admitted for care	281,060	8.0%	0.9	18,193,199	15.6%	61.1
Transferred to another acute care hospital	40,363	1.2%	0.1	1,158,078	1.0%	3.9
Died in the ED	8,002	0.2%	0.0	175,634	0.2%	0.6
Other	204,223	5.8%	0.7	7,473,365	6.4%	25.1

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

**Notes:** Denominator data for rates were based on Claritas Population Estimates, 2007.

\*The total U.S. population was used as the denominator to calculate discharge status rates.

\*Percentages are the within-group distribution.



**Table 2: Distribution of MVA-Related and Non-MVA-Related ED Visits by Hospital Characteristics and Payer, 2006**

	MVA-Related ED Visits		Non-MVA-Related ED Visits	
	Number of Visits	Percentage	Number of Visits	Percentage
<b>Hospital Location and Teaching Status</b>				
Non-Metropolitan	564,535	16.1%	22,201,684	19.1%
Metropolitan	2,932,872	83.9%	94,334,659	80.9%
Teaching	1,498,122	42.8%	45,440,519	39.0%
Non-Teaching	1,434,750	41.0%	48,894,140	42.0%
<b>Trauma Center</b>				
Not a trauma center	2,195,795	62.8%	81,868,961	70.3%
Trauma Center	1,301,611	37.2%	34,667,383	29.7%
Level I	544,375	15.6%	13,059,114	11.2%
Level II	515,568	14.7%	13,436,823	11.5%
Level III	241,668	6.9%	8,171,446	7.0%
<b>Payer</b>				
Medicare	124,375	3.6%	24,144,092	20.7%
Medicaid	342,265	9.8%	25,569,579	21.9%
Private Insurance	1,925,805	55.1%	39,609,432	34.0%
Uninsured	861,517	24.6%	20,448,149	17.5%
Other	243,444	7.0%	6,765,092	5.8%

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

**Note:** Percentages are the within-group distribution.

**Table 3: Ten Most Common Injuries in MVA-Related ED Visits, 2006**

<b>Rank</b>	<b>All-listed Injuries</b>	<b>Number of Visits with each Injury</b>	<b>Percentage of All MVA-Related ED Visits</b>
1	Sprains	1,554,495	44.4%
2	Contusion with Intact Skin Surface	1,215,643	34.8%
3	Superficial Injuries	413,921	11.8%
4	Open Wounds	356,432	10.2%
5	Certain Traumatic Complications and Unspecified Injuries	324,514	9.3%
6	Intracranial Injury	171,516	4.9%
7	Neck and Trunk Fracture	169,492	4.8%
8	Upper Limb Fracture	165,013	4.7%
9	Lower Limb Fracture	137,034	3.9%
10	Internal Injury of Thorax, Abdomen, and Pelvis	90,079	2.6%

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

**Note:** All-listed diagnoses were used to identify injuries and were grouped using a CCS categorization scheme.

**Table 4: Top 10 Procedures in All MVA-related ED visits, 2006**

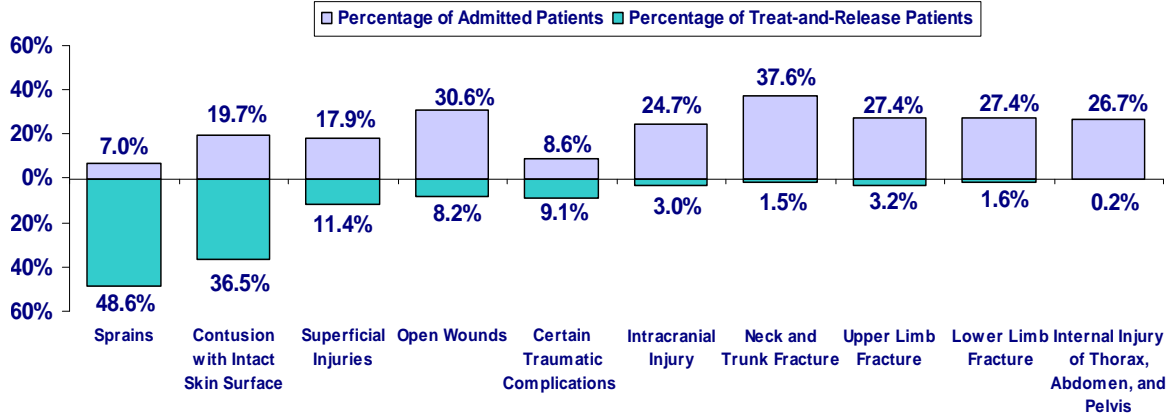
<b>Rank</b>	<b>All-listed Procedures</b>	<b>Number of Visits with each Procedure</b>	<b>Percentage of All MVA-Related ED Visits</b>
1	Other diagnostic procedures (interview, evaluation, consultation)	181,977	5.2%
2	Suture of skin and subcutaneous tissue	148,845	4.3%
3	Other diagnostic radiology and related techniques	131,092	3.7%
4	Traction; splints; other wound care	114,334	3.3%
5	Other therapeutic procedures	92,663	2.6%
6	Computerized axial tomography (CT) scan of head	51,781	1.5%
7	Treatment of fracture or dislocation of lower extremity (other than hip or femur)	45,436	1.3%
8	Prophylactic vaccinations and inoculations	45,342	1.3%
9	Respiratory intubation and mechanical ventilation	39,880	1.1%
10	Routine chest X-ray	38,925	1.1%

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

**Note:** All-listed procedures were used and grouped using a CCS categorization scheme.



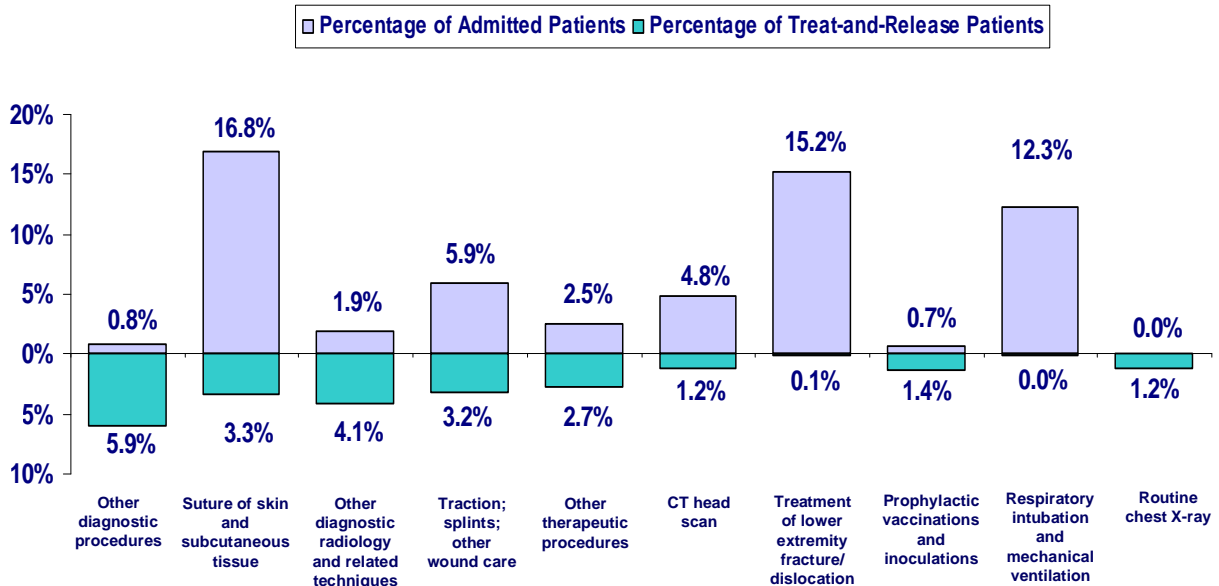
**Figure 1. Percentage of Treat-and-Release and Admitted MVA Patients Affected by 10 Most Common MVA-Related Injuries**



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



**Figure 2. Percentage of Treat-and-Release and Admitted MVA Patients Affected by 10 Most Common MVA-Related Procedures**



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