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Hospitalizations for Injury: United States, 1996

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Abstract

Objectives—This report presents national estimates of the 1996 hospitalizations for injury in the United States. Numbers and rates of discharges are shown within sex, age, and racial groups by type of injury. Average lengths of stay and days of care data by injury type are also included.

Methods—Estimates are based on medical abstract data collected in the National Hospital Discharge Survey. Diagnoses are coded according to the *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD–9–CM). Injuries are defined as ICD–9–CM codes 800–999. External causes of injury are defined as codes E800–E999 (E-codes).

Results—In 1996, there were 2.6 million hospitalizations for injury. Fractures resulted in over a million hospitalizations; medical injuries, including adverse effects and complications, were responsible for 666,000 hospitalizations. The medical records for 64 percent of the patients hospitalized for injuries had an external cause-of-injury code (E-code). Elderly people had the largest number and rate of injuries.

Conclusions—Data on injuries requiring hospitalization and characteristics of patients differentially affected can be used to design and target more effective injury prevention programs. Preventing injuries would decrease the considerable pain, disability, and economic impact associated with these conditions.

Keywords: inpatients • injury • poisoning • external cause of injury codes (E-codes)

Introduction

Injuries cost the United States over $200 billion in 1995 due to lost productivity and medical care (1). This was double the estimate for 1985 (2). Care for and consequences of injuries account for approximately 12 percent of U.S. health care costs (3).

In addition to the monetary costs of injury, there were serious human costs in 1996. Close to 150,000 persons died from injuries, which were the leading cause of death for people younger than 45 years of age (4). Injury also resulted in the hospitalization of approximately 2.6 million patients (table 1) who remained in the hospital for a total of 13.8 million days. Injuries were one of the leading reasons for hospital admission for those under 45 years of age (5).

Injuries serious enough to result in hospitalization are particularly costly in terms of human suffering, health care resource consumption, and time lost from work. Because a universal system for reporting nonfatal injuries does not exist, hospital discharge data are valuable sources of information on these injuries.

The primary purpose of this report is to present National Hospital Discharge Survey (NHDS) data on the characteristics (i.e., sex, age, and race) of patients hospitalized for particular types of injuries and the duration of their hospital stays. The data on trauma and poisoning are useful to epidemiologists and public health

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officials who design and implement injury surveillance, control, and prevention programs. The data on medical injuries are useful to hospitals, other providers, and those in charge of quality review and improvement programs. Knowing the types of injuries requiring hospitalization and the groups who have disproportionately higher rates of various injuries will enable health care professionals to more efficiently and effectively target their efforts to prevent injuries.

Data are also presented on the extent to which external causes of injury (E-codes) were reported in the 1996 NHDS. Accurate and reliable information about the cause of injuries (e.g., motor vehicles, falls, gun shots, medical misadventures, or recreational activities) combined with diagnosis data (e.g. fractures, burns, internal injuries) is critical for helping public health and medical care providers design more suitable interventions to prevent future injuries. NHDS data cannot currently be used to analyze the incidence of injuries in relation to their causes because information on cause of injury is incomplete, but it is improving. Between 1991 and 1996, the percent of first-listed injury discharges in NHDS that had at least one external cause recorded increased from 44 (6) to 64 percent. This report updates the information on the number of states mandating E-code collection.

Methods

Data source

NHDS has collected data since 1965 from a national probability sample of hospital inpatient records for the National Center for Health Statistics. Hospitals with at least six beds, an average length of stay of fewer than 30 days, and classified as general hospitals or children's general hospitals were included in the survey. Federal, military, and Department of Veterans Affairs hospitals were excluded. For 1996, 480 hospitals participated in the survey, which was a response rate of 94.7 percent. Data were collected for approximately 282,000 discharges from these hospitals.

Information gathered in NHDS included age, sex, expected source of payment, days of care, and discharge status for each patient. For 78 percent of the patients, race was also recorded. NHDS also included data on the hospitals' ownership and their Census regions. Medical information about patients was also gathered. This included up to seven diagnoses and up to four surgical and nonsurgical operations and procedures. Medical data were coded according to the *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD–9–CM) (7).

Injury patients were defined as those with a principal or first-listed diagnosis within ICD–9–CM codes 800–994, referred to as true injuries (trauma and poisoning), or codes 995–999, referred to as medical injuries (adverse effects and miscellaneous complications of surgical and medical care) (7,8). Information on the cause of the injury should have been recorded in the medical record (using E-codes) along with the injury diagnosis. E-codes were identified using ICD–9–CM codes E800–E999.

Estimation

Sampled data from NHDS were inflated to produce national estimates using a multistage estimation procedure. A description of the estimation procedure, as well as other aspects of the survey's design, can be found in the National Hospital Discharge Survey Annual Summary for 1993 (9).

The standard error of a statistic is primarily a measure of the sampling variability that occurs by chance because only a sample rather than the entire universe is surveyed. Estimates of sampling variability for this report were calculated with SUDAAN (10).

Statistical significance

A determination of statistical significance in this report was based on the two-sided *t*-test with a critical value of 1.96 (0.05 level of significance). When an estimate is referred to as higher or lower than another estimate, this means that the difference is statistically significant.

Results

Almost 2.6 million injuries required hospitalization in 1996. This was an overall rate of 96.6 per 10,000 population. Over 1 million of these injuries were fractures—a rate of 38.3 per 10,000 population. Miscellaneous complications of medical and surgical care were the reason for 643,000 hospitalizations—a rate of 24.4 per 10,000 population. Although other types of injuries were considerably less frequent, there were more than 100,000 hospitalizations for the following categories: poisoning and toxic effects, intracranial injuries, lacerations and open wounds, and sprains and strains (table 1).

The following sections of this report will compare the rates for different types of injury within sex, race, and age groups. This is followed by a presentation of the same injury categories by average lengths of stay and days of care. The next section will discuss E-code data availability for various subgroups and types of injuries. The paper concludes with an interpretation of the major findings and a discussion of policy implications.

Type of injury by sex

The overall rate of injury for males and females did not differ significantly (table 1), but there were significant differences by sex in some specific categories of injuries. Females had a higher rate of fractures than males. Females also had a higher rate of poisoning and toxic effects, which includes overdoses and ''wrong substance given or taken in error'' (7).

The rates for intracranial injuries, lacerations and open wounds, dislocations, burns, internal injuries, and other injuries (as defined in tables 1–4) were higher for males than for females.

Type of injury by race

The overall rate of injury was similar for white and black people (table 1), but there were some statistically significant differences

Table 1. Number and rate of patients discharged from short-stay hospitals by first-listed injury diagnoses, sex, and race: United States, 1996

[Discharges from non-Federal hospitals. Excludes newborn infants. Diagnostic groupings and code number inclusions are based on the *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD–9–CM)]

First-listed diagnosis and ICD–9–CM code		Sex			Race[1]			
		Both sexes	Male	Female	White	Black	All other	Not stated
		Number of discharges in thousands						
All injury and poisoning	800–999	2,550	1,277	1,273	1,664	293	109	484
Fractures	800–829	1,012	421	591	703	73	37	199
Dislocation	830–839	23	14	9	14	*4	*	*5
Sprains and strains	840–848	104	58	46	68	*7	*	27
Intracranial injuries (excluding those with skull fracture)	850–854	141	91	50	85	18	8	29
Internal injury of chest, abdomen, and pelvis	860–869	82	59	23	47	15	6	14
Lacerations, open wounds, injuries to blood vessels	870–904	131	101	30	77	28	9	17
Late effects of injuries and poisoning[2]	905–909	*	*	*	*	*	*	*
Superficial injuries and contusions	910–924	61	31	30	36	9	*3	12
Burns	940–949	38	28	10	21	9	*	*6
Other injury	925–939,950–959	55	32	23	34	6	*	13
Poisoning and toxic effects	960–989	208	91	117	132	28	11	38
Other effects of environmental causes	990–994	17	11	*6	9	*	*	*
Certain adverse effects not elsewhere classified	995	23	11	12	13	*	*	*6
Miscellaneous complications of surgical and medical care	996–999	643	323	320	418	89	26	110
		Discharge rate per 10,000 population						
All injury and poisoning	800–999	96.6	99.2	94.1	76.1	88.1	91.2	. . .
Fractures	800–829	38.3	32.7	43.7	32.2	21.8	30.8	. . .
Dislocation	830–839	0.9	1.1	0.6	0.6	*1.2	*	. . .
Sprains and strains	840–848	3.9	4.5	3.4	3.1	*2.1	*	. . .
Intracranial injuries (excluding those with skull fracture)	850–854	5.3	7.0	3.7	3.9	5.5	6.6	. . .
Internal injury of chest, abdomen, and pelvis	860–869	3.1	4.6	1.7	2.2	4.4	5.1	. . .
Lacerations, open wounds, injuries to blood vessels	870–904	5.0	7.8	2.3	3.5	8.5	7.4	. . .
Late effects of injury and poisoning[2]	905–909	*	*	*	*	*	*	. . .
Superficial injuries and contusions	910–924	2.3	2.4	2.2	1.7	2.7	*2.7	. . .
Burns	940–949	1.4	2.1	0.7	1.0	2.7	*	. . .
Other injury	925–939,950–959	2.1	2.5	1.7	1.5	1.9	*	. . .
Poisoning and toxic effects	960–989	7.9	7.1	8.7	6.1	8.3	8.8	. . .
Other effects of environmental causes	990–994	0.6	0.8	*0.5	0.4	*	*	. . .
Certain adverse effects not elsewhere classified	995	0.9	0.9	0.9	0.6	*	*	. . .
Miscellaneous complications of surgical and medical care	996–999	24.4	25.1	23.6	19.1	26.8	21.8	. . .

* Figure does not meet standard of reliability or precision.
. . . Category not applicable.
[1]Numbers and rates for race categories are based on the 78 percent of discharges with a specified race.
[2]This category should not be first-listed. Rather it supplements information on a principal diagnosis.

between the two groups' rates for various types of injuries. White people had a higher fracture rate than black people. Blacks had higher rates of lacerations and open wounds, burns, internal injuries, and miscellaneous complications of surgical and medical care.

Type of injury by age

The rate of hospitalization per 10,000 population for injuries ranged from 38.6 for children under 15 years of age, to 288.7 for the elderly (65 years and over). The rate for elderly persons was significantly higher than the rate for each of the other age groups studied (table 2).

The fracture rate was lowest for the under-15 years age group and highest for the elderly age group. Fractures of the bones of the arm or leg were responsible for the majority of fracture hospitalizations for those under age 65 years. For those under 15 years of age, 72 percent of the fractures fell into these two categories: for the 15–44 year olds, 59 percent, and for the 45–64 year olds, 61 percent. For persons 65 years and over, 60 percent of the fractures were hip fractures.

In addition to their high fracture rate, the elderly had higher rates of intracranial injuries, superficial injuries and contusions, and other injuries than each of the other age groups studied.

The 15–24 year olds had higher rates of intracranial injuries than each of the other age groups under age 65 years, and this group, along with the 25–34 year olds, had higher rates of lacerations and open wounds than all of the other age groups. The 15–24, 25–34, and 35–44 year old age groups had higher poisoning rates than all of the other age groups and lower rates of sprains and strains than the older groups.

Beginning with the 25–34 age group, the rate of miscellaneous complications of surgical and medical care increased significantly for each successively higher age group. More than half of the patients in the under 15 years, 45–64 years, and 65 years and over age groups, and 44 percent of those

Table 2. Number and rate of patients discharged from short-stay hospitals by first-listed injury diagnoses and age: United States, 1996

[Discharges from non-Federal hospitals. Excludes newborn infants. Diagnostic groupings and code number inclusions are based on the *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD–9–CM)]

First-listed diagnosis and ICD–9–CM code	All ages	Under 15 years	15–24 years	25–34 years	35–44 years	45–64 years	65 years and over
				Number of discharges in thousands			
All injury and poisoning 800–999	2,550	223	270	265	330	485	977
Fractures 800–829	1,012	71	86	81	97	154	523
Dislocation 830–839	23	*	*6	*4	*	*4	*4
Sprains and strains 840–848	104	*	*10	14	15	33	30
Intracranial injuries (excluding those with skull fracture) 850–854	141	20	26	15	16	18	46
Internal injury of chest, abdomen, and pelvis 860–869	82	9	17	14	17	14	11
Lacerations, open wounds, injuries to blood vessels 870–904	131	16	30	29	19	22	15
Late effects of injuries and poisoning[1] 905–909	*	*	*	*	*	*	*
Superficial injuries and contusions 910–924	61	*7	*7	*6	*7	8	26
Burns 940–949	38	11	*3	*6	*5	9	*4
Other injury 925–939,950–959	55	13	*6	7	7	7	15
Poisoning and toxic effects 960–989	208	24	47	40	46	30	22
Other effects of environmental causes 990–994	17	*	*	*	*	*	*
Certain adverse effects not elsewhere classified 995	23	*	*	*	*	7	7
Miscellaneous complications of surgical and medical care 996–999	643	41	30	45	87	174	266
				Discharge rate per 10,000 population			
All injury and poisoning 800–999	96.6	38.6	75.6	66.4	76.5	90.3	288.7
Fractures 800–829	38.3	12.4	24.0	20.3	22.4	28.7	154.5
Dislocation 830–839	0.9	*	*1.5	*1.0	*	*0.7	*1.1
Sprains and strains 840–848	3.9	*	*2.8	3.5	3.5	6.1	8.8
Intracranial injuries (excluding those with skull fracture) 850–854	5.3	3.5	7.2	3.7	3.7	3.4	13.6
Internal injury of chest, abdomen, and pelvis 860–869	3.1	1.6	4.7	3.6	3.9	2.7	3.2
Lacerations, open wounds, injuries to blood vessels 870–904	5.0	2.8	8.3	7.2	4.4	4.2	4.5
Late effects of injuries and poisoning[1] 905–909	*	*	*	*	*	*	*
Superficial injuries and contusions 910–924	2.3	*1.3	*1.9	*1.6	*1.5	1.4	7.7
Burns 940–949	1.4	1.9	*0.8	*1.6	*1.2	1.7	*1.1
Other injury 925–939,950–959	2.1	2.2	*1.6	1.7	1.7	1.3	4.6
Poisoning and toxic effects 960–989	7.9	4.2	13.0	10.1	10.7	5.5	6.5
Other effects of environmental causes 990–994	0.6	0.6	0.8	0.3	0.9	0.2	1.3
Certain adverse effects not elsewhere classified 995	0.9	0.6	0.4	0.3	0.5	1.4	2.2
Miscellaneous complications of surgical and medical care 996–999	24.4	7.2	8.3	11.4	20.1	32.4	78.4

* Figure does not meet standard of reliability or precision.
[1]This category should not be first-listed because it supplements information on a principal diagnosis.

aged 15–44 years with a diagnosis in this category had complications of an internal prosthetic device, implant, or graft. Seventeen percent of the miscellaneous complications category who were 15–44 years of age, 16 percent of those aged 45–64, and 14 percent of the elderly patients had postoperative infections.

Figure 1 presents data on the rate of injury hospitalizations per 10,000 population for six age groups by sex. Not only does this indicate the high elderly rate for both sexes relative to the younger age groups, but it also shows the very high rate of hospitalizations for elderly females. Figure 2 illustrates the proportion of injuries in each of four age groups that fall into the fractures and miscellaneous complications of medical and surgical care categories. Fractures and miscellaneous complications of medical and surgical care rates for elderly patients far exceeded those of the other age groups.

Days of care

The data on days of care in table 3 are included to provide information about the share of hospital resources being used for different categories of patients with injuries. In addition, data on the average length of stay can be used as an indicator of the seriousness of the condition. The average length of stay for the different diagnostic categories ranged from 2.7 days for patients with sprains and strains to 7.8 days for burns (table 3). In addition to the burns category, average lengths of stay of 5 or more days occurred for patients with fractures, intracranial injuries, internal injuries, and miscellaneous complications of surgical and medical care.

E-codes

External causes of injury are defined by ICD–9–CM codes E800–E999.

Table 4 shows the percent of patients with injuries who had at least one E-code on their record by sex, age, race, diagnoses for specific injuries, and number of diagnoses. This percent is also shown for hospital region, ownership, and size.

In 1996, 1.6 million patients, or 64 percent of patients hospitalized due to an injury, had at least one recorded E-code. This percent was similar for males and females. The percent of E-code completion ranged from 54 percent of the 65–74 year olds to

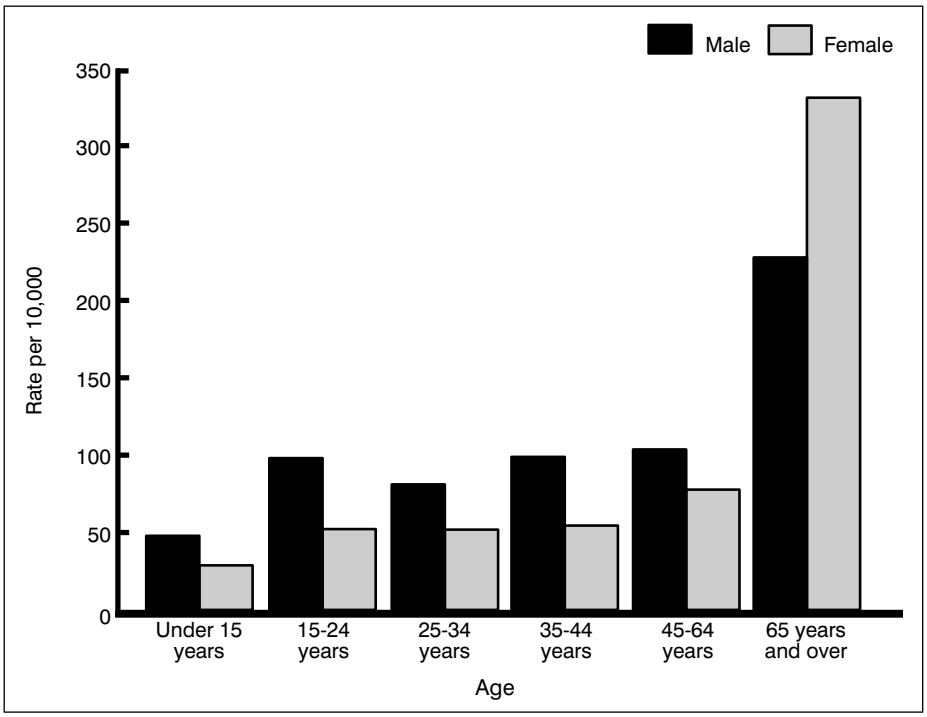

Figure 1. Rate of injury hospitalizations by age and sex: United States, 1996

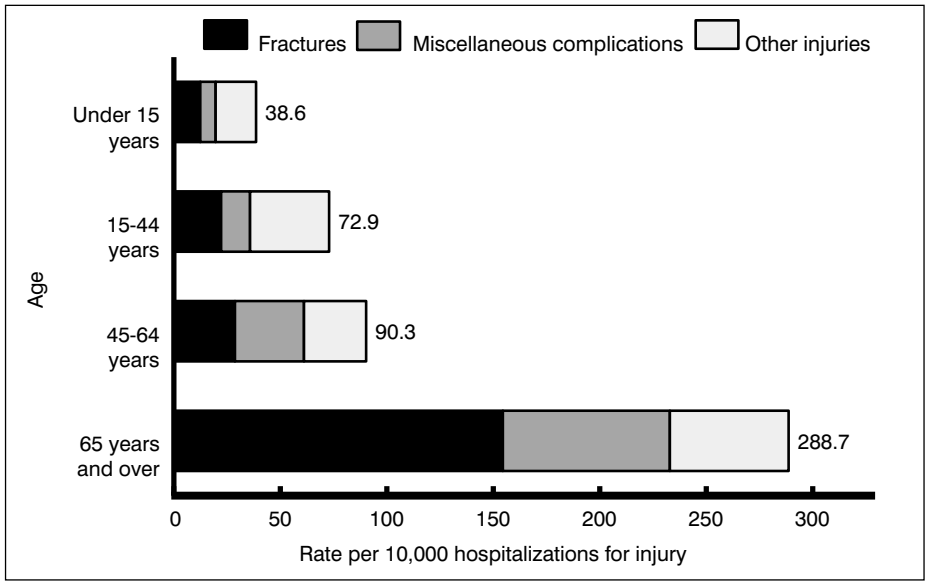

Figure 2. Rate of injury hospitalizations by age and selected diagnoses: United States, 1996

about three quarters of the 15–24 year olds. Sixty-nine percent of the black patients had at least one E-code in their patient records compared with 63 percent of the white patients. In the Northeast, over three-fourths of the records had E-codes and in the West, over two-thirds had these codes. In the South and Midwest, E-codes were recorded for at least half of the patients hospitalized for injury or poisoning.

There was considerable variation among the various types of injuries in completion of E-codes. Only 47 percent of the sprains and strains had an E-code compared with about 90 percent of those with poisoning and toxic effects. Other categories with at least two-thirds E-code completion were intracranial injuries, lacerations and open wounds, superficial injuries, burns, and other effects of environmental causes.

Discussion

The human and economic costs of injuries requiring hospitalization are considerable. The data presented in this report provide information about the types of injuries requiring hospitalization, the number of hospital days devoted to their care, and the groups who have disproportionately higher rates of certain injuries. E-code data from NHDS are incomplete and, therefore, could not be used in the interpretation of the data. However, information was incorporated about the cause of death for fatal injuries because it is recorded on death certificates. It is assumed that many of the causes that resulted in a higher number of fatal injuries within certain groups also resulted in higher nonfatal injuries requiring hospitalization for these same groups.

NHDS data show that elderly people had the highest hospitalization rate for injuries. Over half a million of the elderly patients' injuries were fractures (table 2). Baker and others (11) indicate that advanced age substantially increases the risk of hospitalization for minor fractures. This may partially explain the elderly population's higher hospitalization rate. But this age group also had numerous serious fractures, including almost 350,000 hip fractures (5). The rates of intracranial injuries, superficial injuries and contusions, and other injuries were also significantly higher for the elderly population. Two-thirds of the elderly population's deaths due to injury resulted from motor vehicle injuries, firearms, suffocation, and falls (12). It is likely that a number of the nonfatal injuries also were due to these same causes.

Fractures were also numerous for each of the other age groups, although the rates were low relative to the elderly population. Women had a higher rate of fractures than men did, and white people had a higher rate than black people did. The higher fracture rate for women is due to the very high rate for women over 65 years of age (207.5 per 10,000 population). This rate was more than double the rate of 78.2 for males in that age group. One reason for the higher female rate could be the higher number

Table 3. Number of days of care and average length of stay of patients discharged from short-stay hospitals by first-listed injury diagnoses: United States, 1996

[Discharges from non-Federal hospitals. Excludes newborn infants. Diagnostic groupings and code numbers are based on the *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD–9–CM)]

First-listed diagnosis and ICD–9–CM codes		Days of care	
		Number in thousands	Average length of stay in days
Fractures	800–829	5,952	5.9
Dislocation	830–839	64	2.8
Sprains and strains	840–848	279	2.7
Intracranial injuries (excluding those with skull fracture)	850–854	940	6.7
Internal injury of chest, abdomen, and pelvis	860–869	623	7.6
Lacerations, open wounds, injuries to blood vessels	870–904	461	3.5
Late effects of injury and poisoning[1]	905–909	*	*
Superficial injuries and contusions	910–924	184	3.0
Burns	940–949	293	7.8
Other injury	925–939,950–959	193	3.5
Poisoning and toxic effects	960–989	611	2.9
Other effects of environmental causes	990–994	74	4.4
Certain adverse effects not elsewhere classified	995	70	3.1
Miscellaneous complications of surgical and medical care	996–999	3,955	6.2

* Figure does not meet standard of reliability or precision.
[1]This category should not be first-listed because it supplements information on a principal diagnosis.

of women who suffer from osteoporosis, which contributes to reduced bone mass and increased bone fragility (13). Because previous research (14–16) has found that bone density is greater among black people than among white people, the prevalence of osteoporosis and the incidence of fractures would be expected to be lower in the black population than in the white population.

Males had significantly higher rates for intracranial injuries, lacerations and open wounds, dislocations, burns, internal injuries, and other injury. Runyan (17) cited some explanations for higher rates of injury among males: more driving by males, more participation in high risk sports (such as football), and a greater tendency by males to acquire weapons. The rate of motor vehicle injury deaths for males in 1996 was more than twice that for females, and the firearm death rate for males was also higher than the rate for females (4,12).

The 15–24 year olds and the 25–34 year olds had significantly higher rates of lacerations and open wounds. The latter group had a significantly higher rate of intracranial injuries than any of the age groups under 65. Other research has documented high young adult (particularly male) death rates caused by firearms and motor vehicle-related injuries (4,12). It is reasonable to assume that these causes result in numerous nonfatal injuries for this age group as well.

The higher rates of lacerations and open wounds, burns, and internal injuries for black people could partially be explained by a greater exposure to violence. In 1996, cause-of-death statistics show that the homicide and legal intervention rate among black people was 29.8 per 100,000 deaths compared with 4.7 per 100,000 deaths for white people (4).

Poisoning rates were higher for females and for the age groups 15–24 years, 25–34 years, and 35–44 years. This category does not include drug dependence or nondependent abuse of drugs. Forty-three percent of the poisonings among males and 58 percent of those for females were caused by analgesics, antipyretics, and antirheumatics. This includes aspirin and acetaminophen (ICD–9–CM code 965) and psychotropic drugs (ICD–9–CM 969), primarily antidepressants and tranquilizers. Some of these cases may have been suicide attempts, which are more common among females than among males (18), while others could have been mistakes. In the absence of complete E-code data, the extent to which either is the case is unknown. Comparison with cause-of-death statistics is not helpful in this case because deaths due to drug-induced causes include a much broader definition of drug use than the poisoning and toxic effects category (4).

Beginning with the 25–34 age group, the rate of miscellaneous complications of surgical and medical care increased significantly for each successive age group. This could be because as age increases, so do health problems and encounters with the medical care system. The complexity of medical care, and therefore the attendant risks, would also be expected to increase with advancing age. Black people also had a significantly higher rate of these complications than white people did.

Data from NHDS does not include information needed to determine how many medical injuries were due to medical errors. Some patients may have received appropriate medical care, but complications occurred because of the complexity of the procedures undertaken, the often fragile condition of the patient (particularly of the elderly), and the variability of patient response to invasive procedures. Others may have received inappropriate or inadequate care. Whether these injuries are medical errors, they are negative consequences that should be reviewed by health care providers, and the findings should be utilized to design quality improvement programs.

Table 4. Percent of patients by selected patient and hospital characteristics with first-listed injury diagnoses discharged from short-stay hospitals with one or more external cause-of-injury codes (E-codes): United States, 1996

[Discharges from non-Federal hospitals. Excludes newborn infants. Data are for discharges with first-listed diagnoses of 800–999 from the *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD–9–CM), with one or more external cause-of-injury codes]

Characteristic		Percent with E-code[1]
All injury and poisoning discharges		63.7
Sex		
Male		64.9
Female		62.5
Age		
Under 5 years		71.4
5–14 years		69.7
15–24 years		74.4
25–34 years		73.0
35–44 years		68.0
45–64 years		63.0
65–74 years		53.9
75 years and over		56.5
Race		
White		62.9
Black		69.4
All other		60.9
Not stated		63.9
Region		
Northeast		76.6
Midwest		58.3
South		56.1
West		69.3
First-listed diagnosis and ICD–9–CM codes		
Fractures	800–829	63.4
Dislocation	830–839	49.3
Sprains and strains	840–848	47.4
Intracranial injuries (excluding those with skull fracture)	850–854	67.2
Internal injury of chest, abdomen, and pelvis	860–869	60.7
Lacerations, open wounds, injuries to blood vessels	870–904	74.6
Late effects of injury and poisoning[2]	905–909	*
Superficial injuries and contusions	910–924	66.4
Burns	940–949	69.8
Other injury	925–939,950–959	64.6
Poisoning and toxic effects	960–989	89.5
Other effects of environmental causes	990–994	83.1
Certain adverse effects not elsewhere classified	995	61.4
Miscellaneous complications of surgical and medical care	996–999	56.0
Number of diagnoses		
7		60.1
6		71.3
5		69.8
4		71.3
3		75.2
2		60.7
Hospital ownership		
Church/nonprofit		62.4
Proprietary		59.6
Government		73.8
Hospital bed size		
6–99 beds		64.5
100–299 beds		62.1
300–499 beds		65.5
500 beds or more		64.2

* Figure does not meet standard of reliability or precision.
[1]E-code is external cause-of-injury and poisoning code.
[2]This category should not be first-listed because it supplements information on a principal diagnosis.

The absence of E-codes for more than a third of the hospitalizations limits the ability to use NHDS data to draw definitive conclusions about the cause and prevention of injuries. But programs to reduce the number of injuries have been designed based on likely causes of injuries as indicated in other data sources and publications, many of which are cited in this paper.

Prevention-of-injury programs targeted at the elderly population include providing assistance with medical management of illness (e.g., medication monitoring) (19) and making their homes safer by eliminating potential hazards (11). These programs may potentially reduce the number of falls that cause fractures as well as other serious injuries. Prevention and earlier diagnosis and treatment of osteoporosis is aimed at reducing fractures in future elderly populations.

Prevention of injury efforts targeted at reducing motor vehicle injuries can especially benefit high-risk groups such as the elderly, adolescents, and young adults. Previous prevention efforts in this area are credited, in part, with a decline of nearly 30 percent from 1980 to 1997 in the motor vehicle traffic fatality rate (4,12). This decrease occurred despite the increase in the number of miles driven per person during this period.

Efforts to reduce injuries from firearms, to improve the safety of recreational activities, and to identify and treat those with substance abuse problems have also been developed to help reduce injuries particularly in high-risk, younger age groups.

A recent Institute of Medicine (IOM) report, ''To Err is Human: Building a Safer Health System,'' (20) suggests ways for health providers to prevent medical mistakes and to improve patient safety. Hospitals should find the data in this report on hospitalization for medical injuries useful in designing and implementing the suggested IOM improvements in their utilization and quality-of-care review systems.

Data on the utilization of inpatient hospital care are presented in this report. Publications covering injury care delivered in other settings, including the

estimated 34.9 million injury-related emergency department visits and visits to outpatient departments and doctors' offices, have been published (21–23). Data on nonfatal injury and poisoning episodes and injury conditions from the 1997 National Health Interview Survey, a household survey, was recently published (24).

Throughout this report, the number of patients are discussed. Because the data from NHDS are for discharges rather than for distinct individuals, it should be noted that patients may be counted more than once if they have more than one hospitalization in a year and if each of their hospital discharges are included in the sample. This report presents data on the utilization of hospital resources so it is appropriate to include data on each hospitalization regardless of whether the patient is a readmission. Those interested in the number of individual people requiring hospitalization for injuries in a given year should be cautioned that the estimates may be somewhat higher than the figures needed for their research.

Each of the patient demographic variables was examined separately by type of injury because crossing these data by more than one of these variables at a time frequently resulted in unreliable numbers. Future research with larger samples should permit more detailed crossing of these variables to better identify the characteristics of groups in need of certain intervention programs.

As stated earlier, the data on race of patient are incomplete. In 1996, race was not identified for 22 percent of the injury discharges. The NHDS data on race are incomplete largely because a number of hospitals providing automated data to NHDS did not include race data for any of their patients. Therefore, missing data on the race variable does not appear to be related to racial characteristics of the discharge itself. A study (25) of the limitations of the NHDS data on race found that race is more often missing for white people. NHDS data on race should be interpreted cautiously when the differences among racial groups are small and/or not substantiated by other research.

NHDS data for 1996 could not be used to produce reliable, unbiased national estimates of the causes of injuries requiring hospitalization. E-codes were not present for 36 percent of the records with a first-listed injury diagnosis. In addition, there is evidence in the literature that there is bias in the recording of E-codes. A study of E-codes in Maryland conducted by Marganitt and others (26) found a systematic underreporting of E-codes in the elderly population, the severely injured, and patients with long lengths of hospital stay. These groups were more likely to have multiple chronic conditions prior to the injury, more serious injuries, and/or more complications during the hospital stay. In these situations, the data fields available for recording diagnoses were likely to be filled, thereby leaving no room for the E-codes. E-codes are considered to be of lesser importance to hospitals because they do not influence reimbursement. Hence E-codes would be less likely to be coded than diagnosis codes.

There is evidence that NHDS data may become more useful for yielding reliable data on the causes of injury. The reporting of E-codes is improving because more states are mandating their use. In 1991, only 44 percent of the diagnoses for injuries included an E-code, and only 5 states mandated their use (6). By 1998, 68 percent of these diagnoses had E-codes, and 23 states mandated their collection in hospital data systems (1). As the number of states mandating the use of E-codes grows, the likelihood of recording them on NHDS abstract forms is expected to increase. Also, many of the forms used for gathering hospital discharge data are being expanded to include a larger number of diagnosis codes. This could help eliminate the bias against recording E-codes due to inadequate space.

Information on external causes is critical for planning, implementing, and evaluating injury-control programs (11). Incomplete recording of E-codes limits the usefulness of hospital discharge data sources (like NHDS) for injury surveillance, research, and prevention (1). A report based on household survey data gathered in the 1997 National Health Interview Survey contains information on the leading external causes of injury as well as the place of injury (24). These data, along with cause of death statistics and smaller studies of the causes of injuries, can provide some indication of interventions that could be designed to prevent or lessen injuries.

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