

Overview of Injury in Texas and the Role of the EMS/Trauma Registry

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Report Prepared by:

Linda Jones, MSPH, Kelly Johnson, BS,
John Hellsten, PhD, Blaise Mathabela, MS

Texas Department of State Health Services
Environmental Epidemiology and Injury Surveillance Group



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- The Emergency Medical Service Providers and Hospitals in the state of Texas
- Texas Department of Transportation

Thank you!



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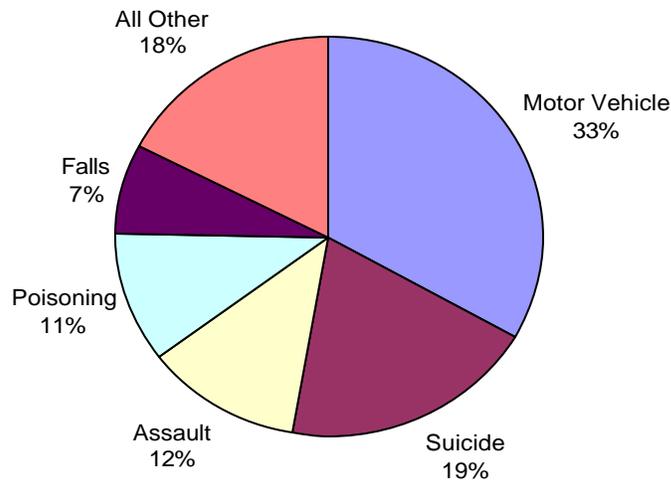
Injury Overview

In Texas injuries are the leading cause of death for residents under age 45 and the third leading cause of death and disability among Texans of all ages. The treatment of injuries costs the state millions of dollars and more years of potential life lost than any other health problem. Every day in Texas an average of 32 people die from injuries with motor vehicle crashes, suicide, and homicide topping the list of causes (Figure 1).

The majority of deaths (30.4 percent) in 2002 involving Texas residents ages 1 through 44 were due to injuries (4). Unintentional injuries comprise approximately two thirds of these deaths, and intentional injuries comprise the other third.

Figure 1

Injury-Related Deaths in Texas Residents, 2002



In 2001, unintentional injuries were the fourth leading cause of death in Texas, and the fifth leading cause in the United States (Box). In 2001, suicide was the tenth leading cause of death in Texas, which, if combined with unintentional injuries, shows definitively that injury is a serious public health problem in our state.

Ten Leading Causes of Death (all ages) in Texas and the United States –2001	
Texas	United States
1. Heart disease	1. Heart disease
2. Cancer	2. Cancer
3. Stroke	3. Stroke
4. <u>Unintentional Injuries</u>	4. Chronic low respiratory disease
5. Chronic low respiratory disease	5. <u>Unintentional Injuries</u>
6. Diabetes	6. Diabetes
7. Pneumonia and Influenza	7. Pneumonia and Influenza
8. Alzheimer’s disease	8. Alzheimer’s disease
9. Nephritis	9. Nephritis
10. <u>Suicide</u>	10. Septicemia

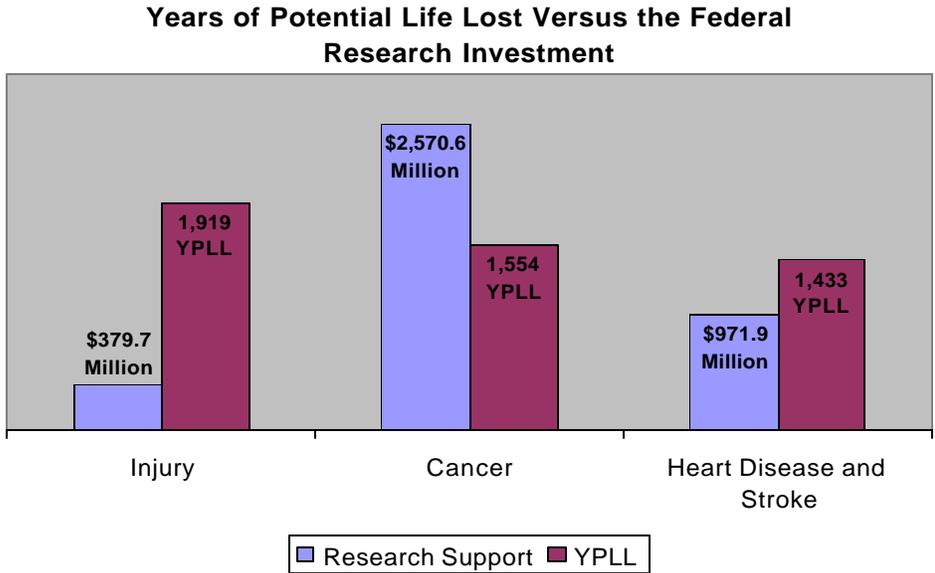
National Center for Health Statistics (NCHS) Vital Statistics System

Statistics on death rates are just one way of examining the impact of injuries on a population. Another way of looking at the impact is to measure the years of potential life lost, frequently referred to as YPLL. More specifically, YPLL is an estimation of the number of years a person or persons would have lived if conditions such as heart attacks, cancer, or motor vehicle crashes never happened. Since injuries occur with greater frequency among those under age 75, more years of potential life are lost to society through injuries than through any other cause.

Despite the enormity of the injury problem and its effects on YPLL, the federal investment for injury research has not kept pace (Figure 2). This is true at the state level as well.

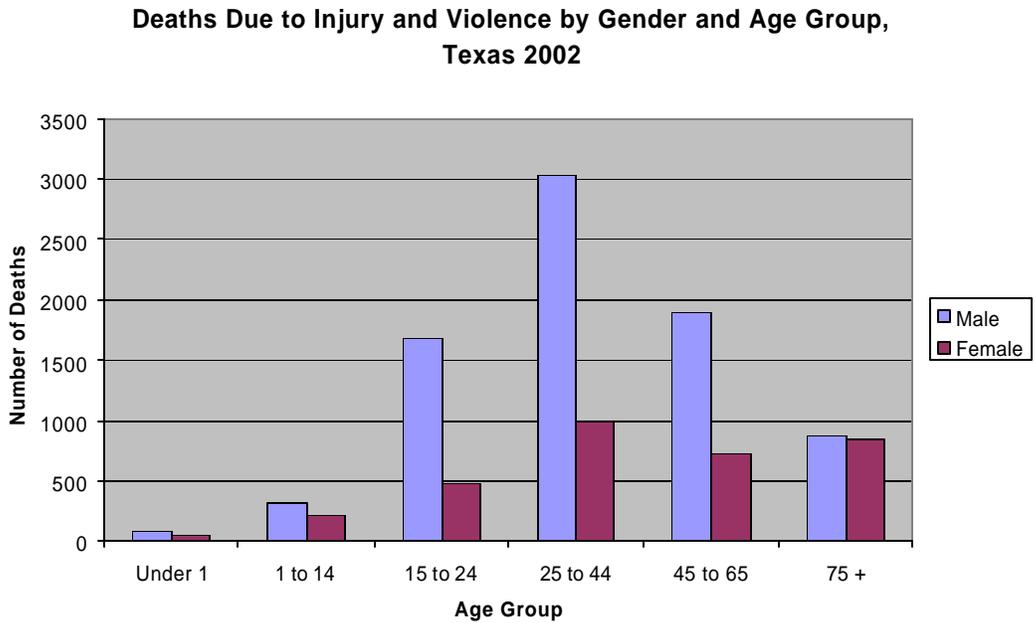


Figure 2



The distinction between unintentional and intentional injuries is important when studying the causes of injury and potential strategies to prevent them. The term “unintentional” refers to injuries that were unplanned or that used to be referred to as “accidents.” The term “intentional” is used to refer to injuries resulting from purposeful human action, whether directed at oneself or others (1, p. 28). In Texas, injuries and violence are the leading causes of death for people under age 45 and occur more often in males than females (Figure 3).

Figure 3



Injury Prevention

The Institute of Medicine report, Reducing the Burden of Injury, recognized that “...there is a yawning gap between what we already know about preventing and ameliorating injuries and what is being done in our communities, work places, and clinics.” According to the National Academy of Sciences, injury is the most under-recognized public health problem facing the nation today (5). While public health has a strong role to play in injury prevention, this is an issue that has roots in many areas – public safety, emergency medical care, mental health, substance abuse, police, and fire.

It is the responsibility of state government to protect the public’s health and, as such, to work to develop strategies to prevent injuries (6). Within state health departments, however, injury prevention struggles for recognition as a critical component of public health practice (7). Most public health authorities agree that a model public health system should include injury prevention programs at the state and local level (8).

Injuries, like infectious diseases, do not happen accidentally. Many injuries are preventable and by identifying the causes of injuries often it is possible to develop strategies to prevent them. The groundwork for prevention begins with injury surveillance. Collecting and analyzing data on injuries enables us to identify risk factors for the most common causes of injury so we can focus our resources for prevention activities where they may do the most good. Disseminating prevention activities to communities is essential and analyzing data on injuries may allow us to determine the effectiveness of these prevention activities.

In October of 1997 the State and Territorial Injury Prevention Directors’ Association appointed a Safe States Working Group to assemble, integrate and reflect upon the ideas contributed by the membership regarding the role of states and territories in achieving reductions in injury morbidity and mortality. Following are the core components of a model state injury prevention program and a list of the steps included in the public health approach to injury prevention that were identified by this group of experts. Note that data collection and analysis comprise the first step in this process.



**Core components of a Model
State Injury Prevention
Program**

1. Data collection and analysis and dissemination
2. Program design, implementation and evaluation
3. Coordination and collaboration
4. Technical support and training
5. Public policy and advocacy

**Public Health Approach to Injury
Prevention**

1. Determine the burden and develop a plan of action
2. conduct outreach and education to inform and motivate the public
3. provide technical support and training
4. work with communities for policy and environmental changes
5. evaluate and improve programs (9)



Purpose

The overall mission of the Injury Surveillance Group is to collect and analyze EMS and trauma care data to improve access to care and ultimately reduce morbidity and mortality. Surveillance and epidemiologic methods are used to define the magnitude of injuries in the state, identify populations at risk, monitor injury trends, investigate public concerns, and assist in science-based prevention activities.

It is mandated by law that all EMS providers (800+ entities) in the state and all hospitals (400+) designated to provide trauma care must report cases of injury to the EMS/Trauma Registry. Obtaining these data is a huge undertaking but without them it would be impossible to identify and assess where interventions could reduce the devastating effects and costs of injuries.

System Development

The original data collection system consisted of DOS-based data reporting software (CDC and TEXEMS), a modem file server, and a FoxPro database. Starting in 2000 the Texas Department of Health, now the Department of State Health Services, entered into an agreement with the Texas Department of Transportation to use federal highway funds to improve the system used to collect EMS and hospital data. Over the course of the next several years, a state-of-the-art web-based reporting system was designed, tested, and implemented. Training sessions on using the new system were conducted statewide.

The online EMS/Trauma Registry System, which was launched in September of 2002, replaces the old system with a robust data collection and analysis system that utilizes the Internet, and modem LAN capabilities, for data collection and submission. Reports and data analyses are generated by Crystal Reports and provided to users through a web-based interface. The foundation of the system is a tiered Oracle database warehouse that enables retrieval of near-real time data for preliminary data analysis and closed/cleansed data for comprehensive data analysis.

Features

EMS/Trauma Registry System features include:

- Easy-to-use data entry on the web;
- Fast, secure data file submission through the Internet;
- Automated data receipt and validation reports;
- Frequently updated submission status information;
- Features for record viewing, data editing, and duplicate deletion;
- Detailed user-defined reports; and

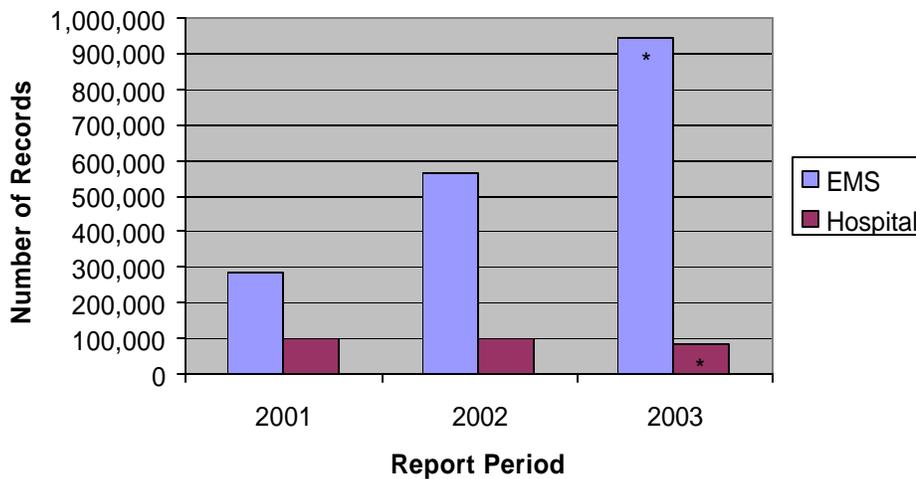


- Friendly, knowledgeable staff

Outcome

In 2001, prior to the implementation of the new system, the Registry processed approximately 275,000 injury-related records. Since deploying the new system the Registry processes over 1.25 million records each year. Almost 80% (78.8%) of acute care hospitals in Texas and 70% of EMS providers are sending data to the Registry.

EMS And Hospital Reporting, Texas 2001-2003



* Duplicate records for 2003 have been deleted.
2001 and 2002 duplicates are currently being evaluated.

How Data Are Being Used

Registry data are being used for a variety of purposes including:

- Assisting communities in conducting needs assessments for Safe Kids injury prevention campaigns,
- Analyzing ambulance diversion patterns in specific regions of the state,
- Providing supportive data for car booster seat legislation,
- Responding to legislative inquiries concerning EMS response times in remote areas of the state,
- Responding to requests for data on injuries due to fireworks, guns, submersions, falls, etc.

In summary, the collection of these data makes it possible to analyze injury data to determine the incidence, causes, and circumstances of fatal and non-fatal injuries. The



results of these analyses, in turn, help inform outreach and education efforts, and provide the information necessary to make informed policy changes.



Data Included In This Report

The data used in the following sections of this report represent hospital admissions due to major trauma during calendar year 2003. These records were submitted by licensed hospitals in the state of Texas. Records where a valid date of admission could not be determined were removed from the analyses. The 2003 hospital file consists of 71,425 hospital admissions from 293 reporting facilities. Finally, only Texas residents were included in these analyses.

Data Completeness

Of the 412 licensed acute care facilities in Texas, 293 (71.1%) reported data for calendar year 2003. This number does not include those facilities that submitted no reportable data notifications for all 12 calendar months.

Overall Data Quality

During the file preparation for this paper, duplicate records by facility were manually deleted by Registry staff. It should be noted that if a patient was admitted to a given hospital and then transferred to another hospital during the course of their treatment, both admissions would be counted in this file.

Age: Age could not be determined for 84 (0.12%) records. These records did not include a valid date of birth (age is a calculated field).

Cause of Injury: Cause of injury was listed as unknown for 6 (0.01%) records. These records were included in the total number of admissions as their corresponding diagnoses indicated a major trauma admission. For analysis purposes, these were included in the “Other and Unspecified” cause of injury category.

Sex: Sex could not be determined from the data for 51 (0.07%) records. These records were included in the total number of admissions, but were excluded from analysis by sex.

Race: Race could not be determined from the data for 405 (0.57%) records. These records were included in the total number of admissions, but were excluded from analysis by race.



MOTOR VEHICLE COLLISIONS

ICD-9 (Injury): 810-829.9

ICD-10 (Mortality): V01-V89.9

Summary:

Motor vehicle collisions were the number one cause of injury-related hospitalizations in Texans (n=26,750) during calendar year 2003. Fortunately, only a portion of motor vehicle collisions result in injuries severe enough to require hospitalization. Unfortunately, those that require hospitalization can result in significant hospital stays, financial costs, and disability. Provisional mortality data for 2003 include 3,877 deaths due to injury sustained during motor vehicle collisions.

Facts:

- Motor vehicle collisions claim approximately 11 Texas lives each day.
- Motor vehicle injuries are the leading cause of injury in all age groups except the very young (less than one year) and the elderly (65+) where there are more injuries due to falls.
- 59% of motor vehicle-related injuries occur to people between 15 and 44 years of age.

According to the National Highway Traffic Safety Administration, an alcohol-related motor vehicle crash kills someone every 30 minutes and non-fatally injures someone every two minutes.

Risk factors for motor vehicle collision related injuries include:

- Driving while under the influence of drugs or alcohol;
- Riding unrestrained or improperly restrained;
- Age of the driver (younger more inexperienced drivers and older drivers with slower response times); and
- Distractions while driving (playing with the radio, talking on the phone, yelling at children/other passengers, etc).

In 2003, only 47% of motor vehicle occupants in Texas were listed as wearing a restraint at the time of the injury.

Potential Studies:

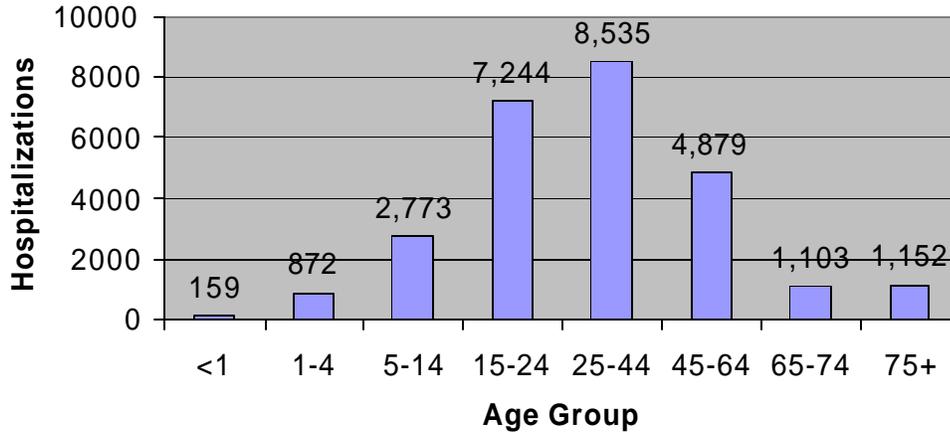
Future studies for motor vehicle-related injuries have the potential to bring about change in the form of improved legislation. Some situations that demand further investigation include:

- A comparison of outcomes for children riding in booster seats versus safety belts by age group and size;

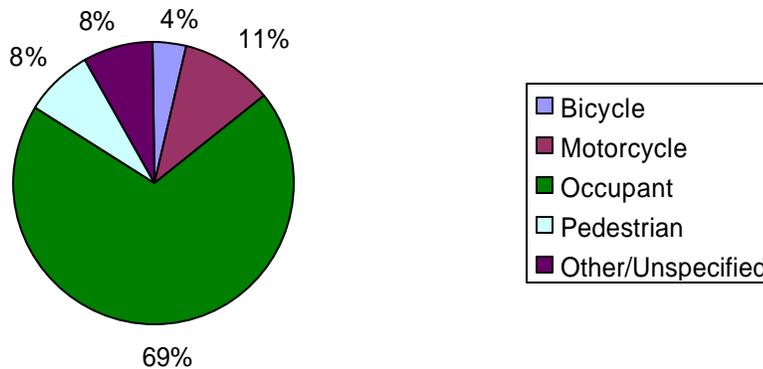


- An evaluation of the effects of restrictions on younger drivers; and
- An examination of locations with excessive numbers of crashes and associated risk factors.

**Motor Vehicle Collision-Related Hospitalizations,
Texas 2003**



**Motor Vehicle Collision-Related Injuries by Injured
Person, Texas 2003**



Resources:

National Highway Traffic Safety Administration (NHTSA), Dept. of Transportation (US). Traffic safety facts 2002: Alcohol. Washington (DC): NHTSA; 2003 [cited 2003 Oct 6]. Available from: URL: <http://www-nrd.nhtsa.dot.gov/pdf/nrd-30/NCSA/TSF2002/2002alcfacts.pdf>.



ICD-9 (Injury): 880 and 888.9
 ICD-10 (Mortality): W00-W19

Summary:

In 2003, there were 23,534 reported non-fatal injuries due to falls in Texas. Falls are the second leading cause of non-fatal injuries in Texas. The burden of falls is further exacerbated by the fact that most people survive, though they seek treatment and are hospitalized, placing a tremendous burden on the healthcare system. As the elderly population increases so will the number of injuries due to falls. Thus, we can expect the burden of injuries due to falls to increase in the coming decades.

Facts:

- In certain age groups, less than one year, and 65 and older, falls surpass motor vehicle accidents as the leading cause of non-fatal injuries.
- Most non-fatal falls occur in ages 75 and older, and 45 to 64.
- The breakdown of non-fatal falls by age group and gender is as follows:

According to CDC, non-Hispanic White men have the highest fall-related death rates, followed by non-Hispanic White women, African-American men, and African-American women.

2003* NONFATAL FALLS BY AGE GROUP AND GENDER

AGE GROUP	GENDER	FREQ.
< 1	Male	116
	Female	87
1 - 4	Male	827
	Female	608
5 - 14	Male	1,868
	Female	983
15 - 24	Male	1,137
	Female	330
25 - 44	Male	2,456
	Female	1,012
45 - 64	Male	2,512
	Female	2,242
65 - 74	Male	976
	Female	1,555
75+	Male	1,800
	Female	4,988

*Data reported by hospitals to the Texas EMS/Trauma Registry. There were nineteen cases reported with unknown age.



Risk factors for falls include:

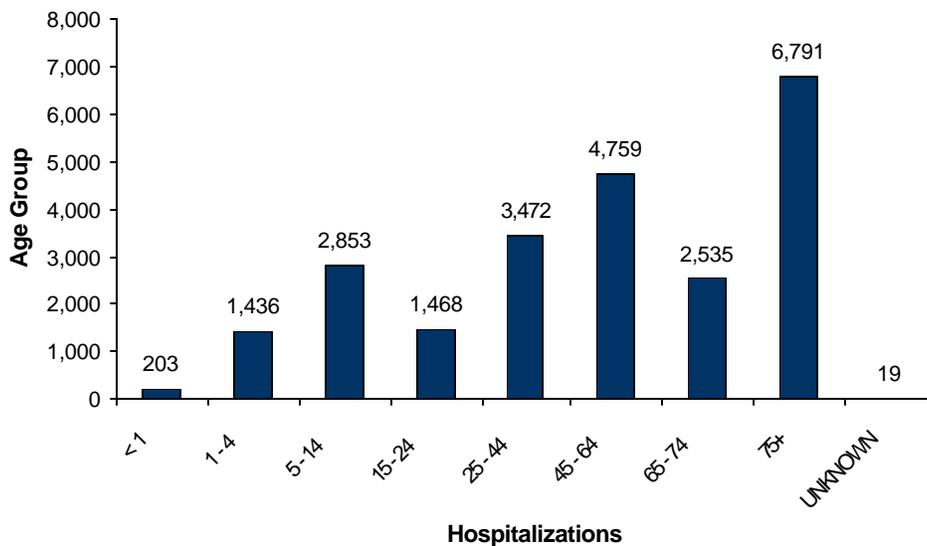
- Becoming older
- For most age groups, being male is a risk factor for falls. However, at older ages, specifically 65 years and older, being female becomes a risk factor.

Potential studies:

Future research studies in the area of falls should:

- Determine which strategies are effective in reducing fall-related injuries among the elderly, such as hip pads, improved vision, and improved lighting;
- Determine the role of osteoporosis in fall-related injuries, especially among women; and
- Evaluate strategies designed to reduce falls in health care settings, including long-term care facilities.

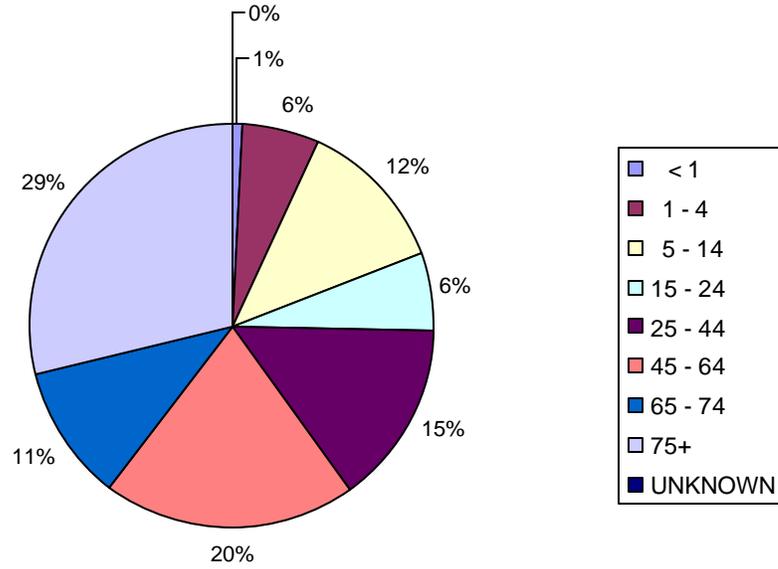
Fall-Related Hospitalizations by Age Group, Texas 2003*



*Data reported by hospitals to the Texas EMS/Trauma Registry.



Fall-Related Injuries by Age Group, Texas 2003*



*Data reported by hospitals to the Texas EMS/Trauma Registry.

Resources:

Falls Among Older Adults. Injury Fact Book 2001-2002. Centers for Disease Control and Prevention: National Center for Injury Prevention and Control, November 2001.

VIOLENCE

ICD-9 (Injury - Assault): 960-969.9
 ICD-9 (Injury – Suicide): 950-959.9
 ICD-10 (Mortality – Assault): X85-Y09, Y87.1
 ICD-10 (Mortality – Suicide): X60-X84, Y87.0

Summary:

Violence is a leading cause of injury in Texas (assault being third and suicide being fourth). In 2003, there were 8,519 hospital admissions reported to the Trauma Registry regarding victims of violence. This includes self-inflicted injuries and assaults by others, including legal intervention. Males accounted for more than 80% of these admissions and 70% were minorities. Over 80% of these events occurred in people under 45 years of age.

HOSPITAL ADMISSIONS DUE TO VIOLENCE								
Sex			Race/Ethnicity			Age		
	#	Rate per 100,000		#	Rate per 100,000		#	Rate per 100,000
Male	7,171	66.0	White (non-Hispanic)	2,671	23.8	< 1 Year	113	32
						Female	1,346	12.3
			Hispanic	3,594	49.1	5-14	186	5.6
			Other	211	27.7	15-24	2,714	81.6
						25-44	4,009	61
						45-64	1,183	25
						65-74	103	8.7
TOTAL	8,519	39.0				75+	120	12.2

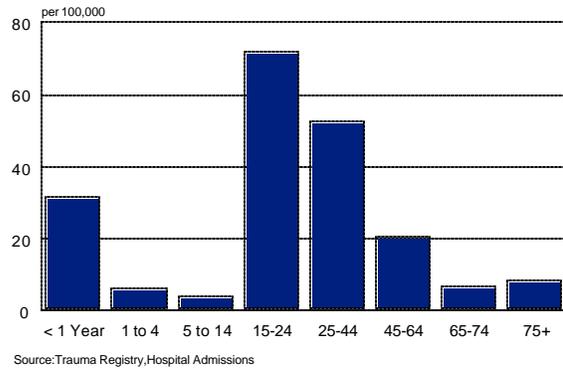
Facts:

Victims of violence tend to be members of particular demographic groups:

- The rate for males is more than 5 times that of females.
- The rate of violence among African-Americans is more than 3 times that for non-Hispanic Whites and 40% higher than that of Hispanics.
- Rates of violence among 15-24 year olds and 25-44 year olds were 2 to 14 times higher than for other age groups.

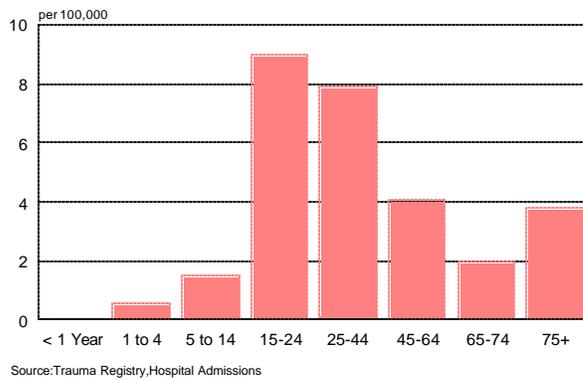
According to CDC, for every homicide that occurs each year, there are more than 100 nonfatal injuries resulting from interpersonal violence.

Assaults by Agegroup 2003



- Rates of violence are highest among victims 15-44 years of age.

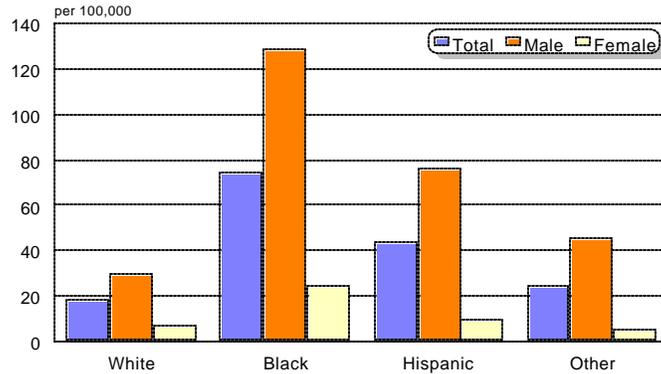
Suicide Attempts by Agegroup 2003



Assault

There were 7,305 hospital admissions for assault reported to the Trauma Registry in 2003; this represents nearly 85% of the admissions for intentional injuries.

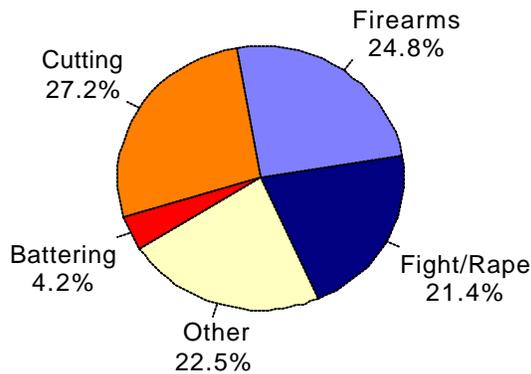
Assaults by Sex and Race/Ethnicity 2003



Source: Trauma Registry, Hospital Admissions

- Rates of assault among African American males are 4 times that of non-Hispanic White males and nearly 50% higher than Hispanic males.
- African Americans have the highest rates of assault among females; rates for Hispanic females are only slightly higher than for non-Hispanic White females.

Type of Assault 2003



Source: Trauma Registry, Hospital Admissions

- The incidences of assaults were evenly distributed among the different types of assault.



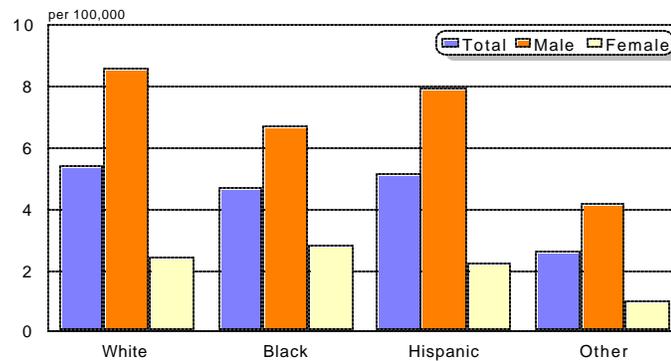
Suicide

There were 1,126 hospital admissions for suicide attempts reported to the Trauma Registry in 2003. This is likely an underestimate of the actual occurrence of suicide attempts in the state.

**If you or anyone you know is considering hurting him/her self, call 1 800 SUICIDE for immediate assistance.*

According to CDC, for every completed suicide it is estimated that there are 20 to 25 suicide attempts.

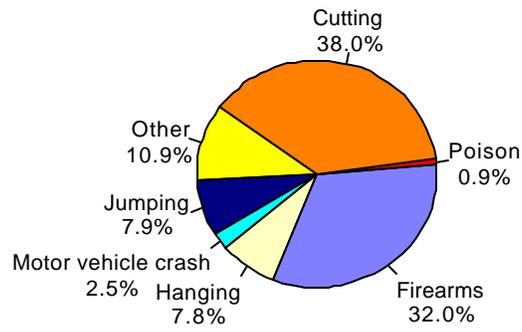
Suicide Attempts by Sex and Race/Ethnicity 2003



Source: Trauma Registry, Hospital Admissions

- Suicide attempt rates among non-Hispanic White males are 25% higher than for African-American males.
- The rates of suicide attempts among females are similar across race/ethnic groups.

Method of Suicide Attempt 2003



Source: Trauma Registry, Hospital Admissions

- Firearms and Cutting account for 7 of 10 suicide attempts.



EXPOSURE TO FIRE, FLAMES, AND SMOKE

ICD-9 (Injury): 890-899.9

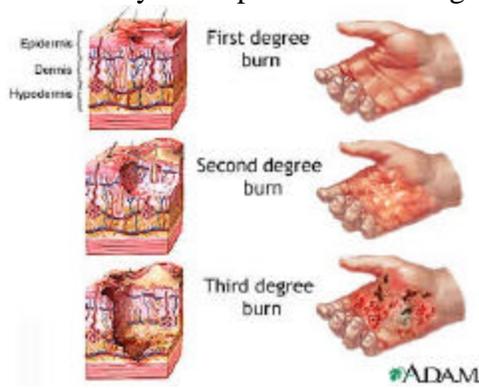
ICD-10 (Mortality): X00-X19

Summary:

Injuries due to exposure to smoke and fire were the fifth leading cause of injury-related hospitalizations reported in Texas residents (n=959) during calendar year 2003. It is important to note that the true burden is actually higher since people with burn injuries that are not severe enough to require hospitalization often are treated in the emergency department and released. These individuals are not included in these data. Provisional mortality data for 2003 include 224 deaths due to exposure to smoke and fire.

Facts:

- Each year in the United States, medical attention will be required of an estimated 1.1 million burn injuries (American Burn Association).
- Many burn-related deaths are due to burn-related infections.
- The severity of a burn injury is determined by the depth of skin damage:
 - First Degree/Superficial – damage limited to the epidermis
 - Second Degree/Partial Thickness – includes damage to the epidermis and dermis
 - Third Degree/Full Thickness – damage reaches to underlying tissues



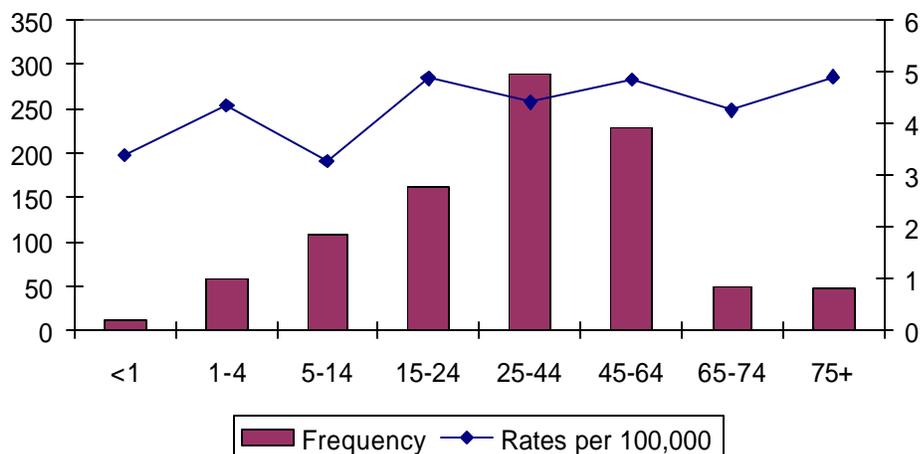
<http://www.nlm.nih.gov/medlineplus/ency/imagepages/1078.htm>

Risk factors for burn-related injuries include:

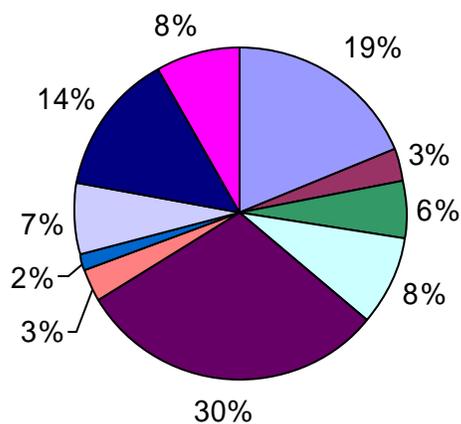
- Smoking;
- Fireplay behavior in children;
- Substandard housing or homes without telephones; and
- Improperly stored chemicals and other materials.

According to Smith, et al, alcohol use contributes to an estimated 40% of residential fire deaths

Burn-Related Hospitalizations by Age Group, Texas 2003



Burn-Related Hospitalizations by Exposure, Texas 2003



- Private Dwelling (Uncontrolled)
- Other Structure (Uncontrolled)
- Not a Building (Uncontrolled)
- Accidental Ingestion of Clothing
- Highly flammable material
- Private Dwelling (Controlled)
- Other Structure (Controlled)
- Not a Building (Controlled)
- Other Specified Fire
- Unspecified Fire

Resources:

Smith GS, Branas C, Miller TR. Fatal nontraffic injuries involving alcohol: a meta-analysis. *Annals of Emergency Medicine* 1999;33(6):659-68.



General Trauma and Injury :

Texas EMS/Trauma Registry

www.dshs.state.tx.us/injury

Center for Health Statistics

<http://www.dshs.state.tx.us/chs/default.htm>

Vital Statistics

<http://www.dshs.state.tx.us/bvs/default.htm>

Emergency Management

<http://www.dshs.state.tx.us/hcqs/ems/default.htm>

CDC National Center for Injury Prevention and Control

www.cdc.gov/ncipc

Customized data reports

www.cdc.gov/ncipc/wisqars

Consumer facts and tip sheets

www.cdc.gov/ncipc/safeusa

National Sexual Violence Resource Center

www.nsvrc.org

National Violence Against Women Prevention Research Center

www.violenceagainstwomen.org

National Youth Violence Prevention Resource Center

www.safeyouth.org

National Program for Playground Safety

www.uni.edu/playground

National Resource Center on Aging and Injury

www.olderadultinjury.org

National Library of Medicine – PubMed article search engine

<http://www.ncbi.nlm.nih.gov/entrez/query.fcgi>



Motor Vehicle Collisions :

Fatal Accident Reporting System (FARS)

<http://www-fars.nhtsa.dot.gov/>

Crash Outcome Data Evaluation System (CODES) Project

<http://www-nrd.nhtsa.dot.gov/departments/nrd-30/ncsa/codes.html>

National Safe Kids Campaign

<http://www.safekids.org/>

Medline

<http://www.nlm.nih.gov/medlineplus/motorvehiclesafety.html>

Violence:

Centers for Disease Control and Prevention, Division of Violence Prevention

www.cdc.gov/ncipc/dvp/dvp.htm

American Association of Suicidology

www.suicidology.org

Community Preventive Services

www.thecommunityguide.org/violence/default.htm

Burns :

American Burn Association

www.ameriburn.org

National Institute of General Medical Sciences at the National Institutes of Health

<http://www.nigms.nih.gov>

Burn Survivor Network

<http://www.burnsurvivor.com/>



1. Institute of Medicine, *Reducing the Burden of Injury: Advancing Prevention and Treatment*, National Academy Press, Washington, DC., 1999
2. Centers for Disease Control and Prevention. 1991. Update: Years of Potential Life Lost Before Age 65 – United States, 1988 and 1989. *Morbidity and Mortality Weekly Report*, 40:60-62.
3. Waller, JA. 1994. Reflections on a half century of injury control. *American Journal of Public Health* 84(4): 664-670.
4. (<http://www.tdh.state.tx.us/chs/vstat/latest/nmortal.htm>).
5. National Academy of Sciences, *Injury in America: A Continuing Public Health Problem*, Washington, DC, National Research Council, 1985, p. 1-17
6. Institute of Medicine, *The Future of Public Health*, National Academy Press, Washington, DC, 1988, pp. 48-49, 77
7. Consensus Recommendations for Injury Surveillance in State Health Departments, report by State and Territorial Injury Prevention Directors' Association, Marietta, GA, September, 1999, p.3
8. American Public Health Association, Association of State and Territorial Health Officials, National Association of County Health Officials, US Conference of Local Health Officials, Department of Health and Human Services, Public Health Service. *Model Standards: A Guide for Community Preventive Health Services*, American Public Health Association, Washington, DC., 1985
9. "Five Components of a Model State Injury Prevention Program and Three Phases of Program Development," State and Territorial Injury Prevention Directors' Association, October, 1997
10. *The Injury Chart Book: A Graphical Overview of the Global Burden of Injuries*, Department of Injuries and Violence Prevention, World Health Organization, Geneva, 2002, p. 10.