Chapter 14

Injuries with a Focus on Unintentional Injuries & Deaths
Learning Objectives

By the end of this chapter the reader will be able to:

• Define the term *intentionality of injury*
• Describe environmental factors associated with injuries
• State time trends in mortality from injuries in the U.S.
• List types of injuries associated with age group, e.g., children, adults, and the elderly
• Describe a theoretical framework that is used for injury prevention
Worldwide Injuries

- All types of injuries account for an estimated 5 million deaths annually.*
- Cause more than 3.5 million deaths, 6 percent of all deaths, and two-thirds of all injury deaths during a typical year.
- Unintentional injuries are:
  - Often preventable
  - Linked with environmental influences

Unintentional Injuries in the United States

- Fifth leading cause of mortality in the population as a whole
- Leading cause of death for the population aged 1 to 44 years
Standardized Classification of Injuries

• Helps in making international and domestic comparisons
• Provides helpful information for policy makers
• Improves accuracy and reliability of information
Standardized Classification of Injuries (continued)

• One of the methods for classifying injuries uses the *International Classification of Diseases* (ICD) Injury Matrices

• The ICD organizes injury data into helpful groupings in order to make international and national comparisons.
ICD: Two Main Dimensions

- External cause (e.g., car crash)
- Nature of the injury or diagnosis (e.g., fracture)
Injury

• The term injury refers to “the physical damage [to the person] that results when a human body is suddenly or briefly subjected to intolerable levels of energy.”
Injuries by Type of Energy

- Mechanical force
- Radiant energy from light or shock waves
- Extremes of temperature
- Electrical energy
- Chemical energy
Mechanism of Injury

• The cause (mechanism) of injury denotes “the way in which the person sustained the injury; how the person was injured; or the process by which the injury occurred…. The underlying cause is what starts the chain of events that leads to an injury.”
Examples of Causes of Injury

- Cut/pierce/stab
- Inhalation/ingestion/suffocation
- Natural/environmental
- Poisoning
- Struck by/against or crushed
- Transportation-related causes
- Pedal cyclist
Definition: Intent of Injury

- Refers to “Whether an injury was caused by an act carried out on purpose by oneself or by another person(s), with the goal of injuring or killing.”
Classifying Intent of Injuries: Three Terms

- Unintentional injuries
- Intentional injuries
- Undetermined injuries
Unintentional Injury

• An “injury or poisoning that is not inflicted by deliberate means”
Intentional Injury

- Includes those that result from self-harm (e.g., suicide), legal intervention (e.g., action of the police), interpersonal actions (e.g., assault), and acts of war
Unintentional Injury versus Accident

• The use of the term unintentional injury is preferred to accident; the latter implies a random event that cannot be prevented.
• The National Center for Health Statistics has added the term “unintentional injuries” in parentheses next to the category of accidents, the fifth leading cause of death in the U.S.
Injury Epidemiology

- A branch of epidemiology that studies the distribution and determinants of injuries in the population
- Used for prevention and control of injuries
- Used for policy development
<table>
<thead>
<tr>
<th>Data Source</th>
<th>Sponsor</th>
<th>Population Coverage</th>
<th>Information Available</th>
</tr>
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<tbody>
<tr>
<td>Behavioral Risk Factor Surveillance System</td>
<td>The CDC</td>
<td>All of United States (persons aged 18 years old and older)</td>
<td>Risk behaviors for leading causes of injury and death; injury-related data, e.g., occurrence of falls, use of seat belts.</td>
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<tr>
<td>National Hospital Discharge Survey</td>
<td>The CDC—National Center for Health Statistics</td>
<td>US national sample of about 500 hospitals</td>
<td>Injuries among persons who survive and are discharged from inpatient hospital care.</td>
</tr>
<tr>
<td>National Vital Statistics System</td>
<td>The CDC—National Center for Health Statistics</td>
<td>All of United States</td>
<td>Deaths causes by injuries and violence.</td>
</tr>
<tr>
<td>Web-based Injury Statistics Query and Reporting System (WISQARS)</td>
<td>The CDC</td>
<td>All of United States</td>
<td>Injury morbidity and mortality data. Fatal and nonfatal unintentional and violent injuries. Permits online user queries via interactive database.</td>
</tr>
</tbody>
</table>

Source: Data from National Center for Injury Prevention and Control. *CDC Injury Fact Book.* Atlanta, GA: Centers for Disease Control and Prevention; 2006:16.
Significance of Injuries

• Direct harm to people
• Injuries burden the health care system and rehabilitation facilities
• Impact a person’s family members
• Can lead to permanent disability
• May create stress and severe emotional responses
• Severe economic cost
Injuries Internationally

- Persons between the ages of 5 and 44 years are at special risk of injuries of all types.
- About half of injury-related mortality occurs in the group aged 15 to 44 years.
- Mortality from injuries among men is double that among women.
- Injuries account for approximately one-third of deaths among children aged 1 to 14 years in Europe, although death rates differ greatly between Eastern and Western European countries.
Figure 14-1 Number of injury deaths in the United States, 2006; all injury deaths (n = 179,065) and unintentional injury deaths (n = 121,599)

- All forms of injuries accounted for 179,065 deaths.

Unintentional Injury Deaths in the U.S., 2006

• Number of deaths: 121,599
• Three leading causes:
  – Transport-related
  – Poisonings
  – Falls
Figure 14-3 Percentage distribution of visits to emergency departments for unintentional injuries, United States, 2006.

# Ten Leading Causes of Injury Death by Age Group, U.S., 2006

<table>
<thead>
<tr>
<th>Rank</th>
<th>Age Groups</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Unintentional Suffocation</td>
<td>843</td>
</tr>
<tr>
<td>2</td>
<td>Unintentional MV Traffic</td>
<td>471</td>
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<tr>
<td>3</td>
<td>Unintentional Drowning</td>
<td>145</td>
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<tr>
<td>4</td>
<td>Unintentional Fall</td>
<td>1,532</td>
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<tr>
<td>5</td>
<td>Homicide Firearm</td>
<td>3,586</td>
</tr>
<tr>
<td>6</td>
<td>Unintentional Poisoning</td>
<td>4,317</td>
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<tr>
<td>7</td>
<td>Unintentional MV Traffic</td>
<td>4,317</td>
</tr>
<tr>
<td>8</td>
<td>Unintentional Suffocation</td>
<td>3,579</td>
</tr>
<tr>
<td>9</td>
<td>Unintentional Natural/Environment</td>
<td>3,579</td>
</tr>
<tr>
<td>10</td>
<td>Unintentional Poisoning</td>
<td>3,579</td>
</tr>
</tbody>
</table>

*Three causes are: Adverse effects, undetermined unspecified and unintentional falls

Two causes are: Unintentional firearm and unintentional poisoning

Source: National Vital Statistics System, National Center for Health Statistics, CDC.

Produced by: Office of Statistics and Programming, National Center for Injury Prevention and Control, CDC.

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Economic Impacts of Unintentional Injuries

• Include direct medical costs for treatment and indirect costs such as those due to:
  – Lost productivity at work and home
  – Charges for rehabilitative therapies
    (for physical and mental health)
  – Coverage of caregiver expenses
  – Personal injury lawsuits and other forms of litigation
  – Other nonmedical expenses such as purchase of wheelchair ramps.
Motor Vehicle Injuries

• In the U.S., motor vehicle crashes were the leading cause of unintentional deaths in 2006.
• Since the early 2000s, the number of such fatalities has not declined over time.
• Motor-vehicle fatalities and injuries vary according to the demographic characteristics of the victims, geographic region, and risk factors associated with crashes.
• The data suggest that young male drivers are most likely to be involved in fatal crashes.
Figure 14-6 Motor vehicle traffic fatality rates by age group, 1998–2008.

Traffic deaths per 100,000 population

Figure 14-7 Driver involvement rates in fatal crashes by age and sex, 2008.

All-Terrain Vehicles (ATV)

- In the 1990s, West Virginia had death rates from ATV crashes that were about eight times higher than the national average.
- The state enacted several laws to reduce ATV fatalities.
- Nevertheless, between 1999 and 2006, fatal ATV crashes increased by about 14% per year.
- Factors related to ATV fatalities were lower socioeconomic status, being single or divorced, and having lower levels of education.
Older Adult Drivers Aged 65 Years and Older

- Rate of traffic fatalities shows a declining trend in this group
- 2007: 31 million licensed drivers (almost one-fifth increase in number over the previous decade)
- 2007: 15% of all licensed drivers
- 2008: 183,000 older persons injured
Prevention of Motor Vehicle Crashes among Older Drivers

1. Maintaining regular exercise regimen
2. Reviewing personal use of medications that may impair driving
3. Annual vision checks
4. Creating a safe environment within the car’s interior by eliminating distractions, e.g., turning down the radio and not using a cell phone
5. Completing a driver’s training course for senior drivers.
Older Adult Drivers: Who Is Most at Risk?

• Motor vehicle crash deaths per capita among males and females begin to increase markedly starting at ages 70-74.

• Per mile traveled, fatal crash rates increase starting at age 75 and increase notably after age 80. This is largely due to increased susceptibility to injury.
Older Adult Drivers: Who Is Most at Risk? (continued)

• Age-related declines in vision and cognitive functioning (ability to reason and remember), as well as physical changes, may affect some older adults' driving abilities.

• Across all age groups, males had substantially higher death rates than females.
Motor Vehicle Traffic Fatalities and Crashes among Teen Drivers

• Approximately 3,500 teenagers (ages 15 to 19) died from crashes in 2008.

• As many as 100 times more teenagers were treated in hospital emergency rooms for crashes.

• Risk factors for crashes among teen drivers are:
  – Inexperience in driving a vehicle
  – Failure to use seat belts
  – Driving without adult supervision while other teens are passengers
  – Drinking and driving
Teen Drivers (continued)

• Reduction of motor vehicle fatalities can be accomplished through increased use of educational programs for teenage drivers and their parents.

• Graduated drivers licensing programs are highly effective in reducing crashes among drivers who are 16 years old.
Child Safety Seats

- Protect infants and young children during a car crash or sudden stop.
- Should not be placed in the front seat because of the risk of injury from air bags.
- When transporting infants who are younger than one year old and weight less than 20 pounds, the seats should face toward the rear of the vehicle.
Unintentional Injuries among Children, U.S.

- The top source of mortality and morbidity among children
- Injuries tend to be an under-recognized public health issue.
- Death rate for unintentional injuries was 15.0 per 100,000 (2000-2005).
**Figure 14-12** Unintentional injury death rates among children aged 0–19 years, by sex and age group, United States, 2000–2005.

Figure 14-14 Unintentional injury death rates among children aged 0–19 years, by cause, United States, 2000–2005.

Key Facts about Unintentional Injury Deaths among Children, United States—2000-2006

• On average, 12,175 children 0 to 19 years of age died each year in the U.S. from an unintentional injury.
• Males had higher injury death rates than females.
• Injuries due to transportation were the leading cause of death for children.
• The leading causes of injury death differed by age group.
Key Facts about Unintentional Injury (continued)

- Risk for injury death varied by race.
  - Highest: American Indian and Alaska Natives
  - Lowest: Asian or Pacific Islanders
  - Whites and African Americans had similar rates.
- Injury death rates varied by state depending upon the cause of death.
- For injury causes with an overall low burden, death rates greatly varied by age.
Sports- and Recreation-Related Traumatic Brain Injuries

• In the U.S., almost 40 million children and adolescents take part in organized sports; about 170 million adults engage in physical activity not connected with work.

• Participation in these activities incurs the risk of traumatic brain injury (TBIs), which can cause long-lasting adverse health effects such as behavioral changes and memory loss.
Figure 14-17 Estimated annual rate* of nonfatal sports- and recreation-related traumatic brain injuries treated in emergency departments, by age group and sex—National Electronic Injury Surveillance System-All Injury Program, United States, 2001–2005.


*Per 100,000 population.
†95% confidence interval.
Injuries among the Elderly

- Increased risk of numerous types of injuries.
- Persons over the age of 64 years have the highest risk of fatal injuries and injuries that lead to a hospital stay.
- Mortality and morbidity from falls, motorcycle crashes, machinery, poisoning, and drowning increased during the first decade of the 21st century.
### Types of Injury and Violence that Pose the Greatest Threat to Older Adults, U.S.

- Elder abuse and maltreatment
- Falls among older adults
- Injuries among older adult drivers
- Residential fire-related injuries
- Sexual abuse among older adults
- Suicide among older adults
- Traumatic brain injury (especially among persons 75 years of age and older)
Injuries and Fatalities from Falling

- Leading cause of fatal and nonfatal injuries for persons aged 65 years and older.
- 16,650 persons in this age group succumbed to falls during 2006.
- Greatest prevalence of falling occurred among American Indian/Alaska natives.
- Highest prevalence of injuries among those who fell occurred among Hispanic persons.
- The prevalence of falling was similar for men and women, although women had a greater percentage of fall-related injuries than men.
**Figure 14-18** Rate* of unintentional fall-related death among adults aged ≥ 65 years, by sex—United States, 1987–1996

*Per 100,000 population.

Figure 14-20 The public health approach to injury prevention.

Problem Health Approach: Problem Definition

- Refers to gathering data and analyzing datasets for patterns and trends
- Injury specialists define subgroups of the population that have the highest prevalence of specific types of injuries.
  - For example, the higher rate of motor vehicle fatalities among men in comparison with women
Problem Health Approach: Risk and Protective Factors-- Risk Factors

- Variables that increase the probability of the occurrence of an injury
- Personal behavior and environmental components contribute to the risk of unintentional injuries.
  - Examples of behavioral risk factors for motor vehicle fatalities:
    - Alcohol consumption
    - Failure to wear seat belts
    - Driving while distracted.
Problem Health Approach: Risk and Protective Factors-- Protective Factors

- Reduce the probability of an injury
- Examples for motor vehicle crashes:
  - Child safety seats
  - Air bags
  - Seat belt use among older drivers
  - Driving when the weather and other conditions are safest
  - Avoiding the use of alcohol when driving
Problem Health Approach: Prevention Strategies

• Methods to prevent the occurrence of future injuries

• Example related to falling:
  – Identify risk factors for falls among the elderly
  – Modify the environment to reduce the incidence of falling
Problem Health Approach: Widespread Adoption

• Disseminate successful prevention strategies widely
• Implement safety laws