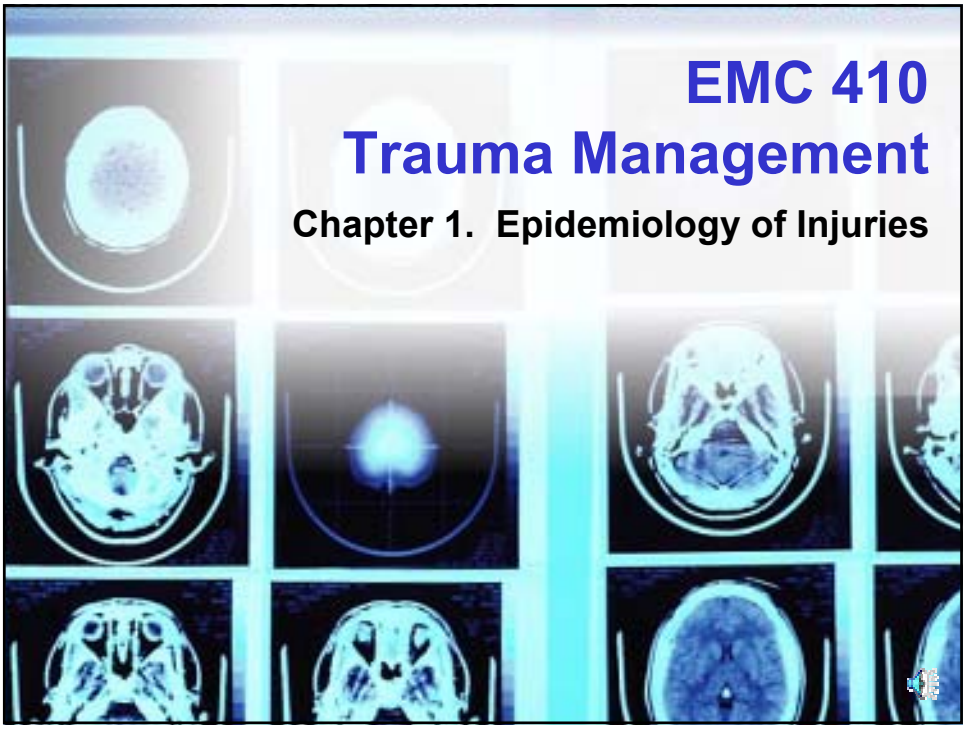


# EMC 410
# Trauma Management

## Chapter 1. Epidemiology of Injuries

## Unit Objectives

- **Upon completion of this chapter, you should be able to:**
  - Recognize the magnitude of traumatic injury as a public health problem.
  - Compare and contrast incidence and prevalence.
  - Describe the mathematical concept of rate, and define mortality and morbidity rates.
  - Explain the importance of surveillance of injuries, surveillance methods, and E-codes and N-codes.
  - Discuss the financial and human cost of trauma.

# Unit Objectives continued

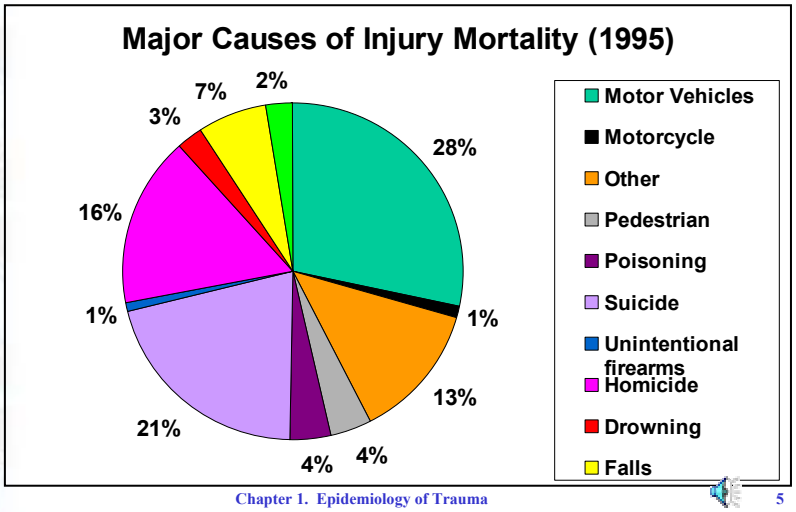
- Calculate life years lost and years of potential (or productive) life lost.
- Describe the major causes of injury mortality and morbidity in the United States.
- List the basic facts of motor vehicle crashes, including motorcycles, bicycles, pedestrians, as well as the impact of alcohol on motor vehicle injuries and deaths.
- Describe the epidemiology of drowning and water-related activities, fires, burns, fireworks, falls, poisonings, occupational injuries, firearm deaths, homicide, and suicide.



# Injury is a Public Health Problem

- Leading cause of death for ages 1-34
- Second leading cause of death for ages 35-44
- 150,000 die each year
- Major causes:
  - MVC
  - Suicide
  - Homicide
  - Fires, drowning, falls and poisoning

# Injury is a Public Health Problem






# Injury is a Public Health Problem continued

- Homicide is the #1 cause of death in young African-Americans
- Had trends in homicide continued, homicide would have surpassed MVC as #1 cause of death in all groups by 2003
- 40% of all non-fatal ED visits are trauma-related
- Injury more common among males than females

# What is Epidemiology?


- John Snow, cholera, and the Broad Street well
- Components
  - Measurement of frequency
  - Distribution
  - Causes



# Epidemiology of Injury

- Assumptions
  - Injury does not occur at random
  - Causal and preventive factors that can be identified
- Measures of frequency

$$P = \frac{number\ of\ injuries}{total\ population}$$

$$I = \frac{number\ of\ new\ cases}{total\ population\ at\ risk\ for\ a\ specified\ time\ period}$$

# Mortality and Morbidity

$$\text{Morbidity rate} = \frac{\text{new cases of nonfatal injury}}{\text{total population at risk}}$$

$$\text{Mortality rate} = \frac{\text{new cases of fatal injury}}{\text{total population at risk}}$$

- May be expressed as crude rates or category-specific rates
- The “Tip of the Iceberg”




# Injury Surveillance

- Systematic collection of information on occurrence, outcome, and cost of injury
- National Highway and Traffic Safety Administration (NHTSA)
- National Transportation Safety Board (NTSB)
- National Electronic Injury Surveillance System (NEISS)

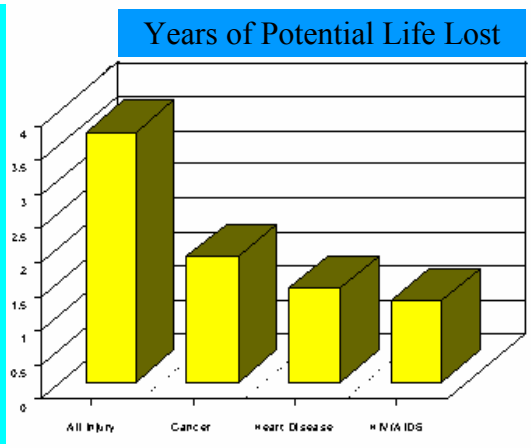
# Injury Surveillance continued

- International Classification of Disease (ICD)
  - E-codes
    - External cause of injury
    - Place of occurrence
  - N-codes
    - Specific injury
  - Used by trauma registries
  - Role of EMS in data collection



# The Cost of Injury

- 2/3 paid by private insurance
- 1/3 paid by federal, state, and local governments
- MVC injuries most costly
- YPLL and LYL
- In U.S. trauma is #1 cause of YPLL
- $224 billion (1994)



# Injury Mortality and Morbidity in the U.S.

- **MVC Injuries**
  - Highest rates among young (15 - 24)
  - Predominately male
  - Leading cause of head and spinal injury
  - Role of alcohol
  - Speed limits
  - Occupant protection
  - Roadway improvements



# Injury Mortality and Morbidity in the U.S. continued

- **Motorcycle Injuries**
  - 1,700 motorcycle deaths in 1994
  - Over half of fatalities are from head injuries
  - Unequivocally, helmet laws work

# Injury Mortality and Morbidity in the U.S. continued

- Pedestrian Injuries
  - 6,000 pedestrian deaths in 1995
  - Pedestrian deaths declining overall
  - Highest rates in the over 80 age group

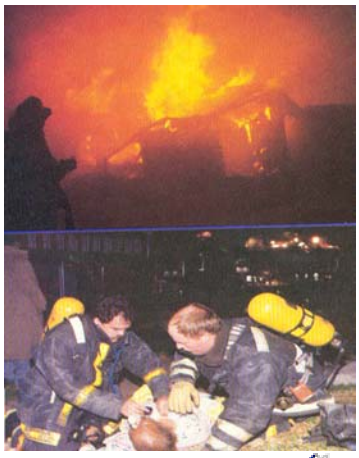


# Injury Mortality and Morbidity in the U.S. continued

- Drowning and Water-Related Injuries
  - 4,350 drownings in 1995
  - Steady decline in all age groups
  - Alaska has the highest drowning rate
  - Accounts for 90% of all recreational boating deaths
  - High number of tub and bucket drownings

# Injury Mortality and Morbidity in the U.S. continued

- **Fires and Burns**
  - 20,000 fire-related deaths between 1992 and 1997
  - House fires are #1 cause
  - 2/3 of house fire deaths are due to smoke inhalation
  - Children, elderly, and males at greater risk





# Injury Mortality and Morbidity in the U.S. continued

- Falls
  - 12,000 deaths in 1998 due to falls
  - most fall deaths occur in the elderly
  - falls in sports

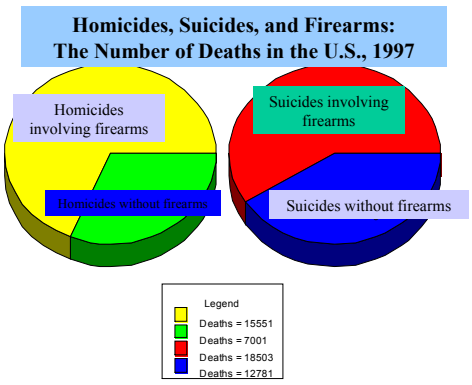
# Injury Mortality and Morbidity in the U.S. continued

- **Firearms**
  - Suicide, homicide, and unintentional injury
  - Firearms deaths will outpace MVC deaths by 2003
  - Nearly 32,000 firearm deaths in 1997
  - Overall fatality rate is 15 per 100,000
  - 170 per 100,000 for black males
  - Firearm injuries cost $20 billion per year, 80% of which is paid for with taxpayer dollars



# Injury Mortality and Morbidity in the U.S. continued

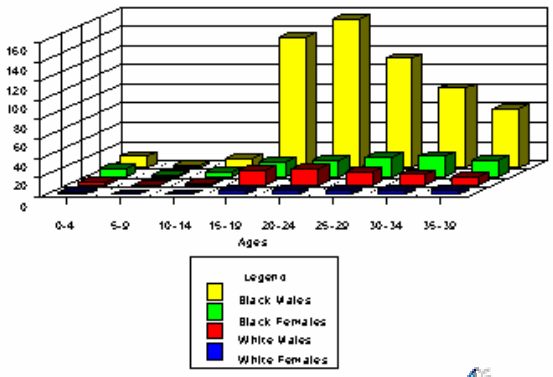
- **Firearms continued**
  - U.S. firearm deaths are highest in the world and 8 times higher than the next closest country
  - A gun in the home is 43 times more likely to kill a family member than an intruder
  - A home with a gun is 5 times more likely to be the scene of a suicide and 3 times more likely to experience homicide



# Injury Mortality and Morbidity in the U.S. continued

- **Firearms continued**
  - Roughly 1/2 million non-fatal firearm injuries per year
  - 1/4 of all gun owners store them loaded and in an unlocked area
  - Used in 70% of all homicides

**Homicide Death Rates by Race and Sex**
Per 100,000 population, 1995






# Highlights of Epidemiology of Trauma

- A public health crisis
  - Morbidity and mortality
  - Financial cost
- Leading cause of death of 1-34 age group
- Accounts for 40% of all non-fatal ED visits
- At risk population
  - Young
  - Male
  - Minority
  - Lower SES
  - Intoxicated