

KATHRYN HILGENKAMP

ENVIRONMENTAL HEALTH

ECOLOGICAL PERSPECTIVES

Injury and Safety Issues

Chapter 16

The Significance of Accidents

- More than 400 Americans die each day due to injuries from accidents
- Most people experience a significant injury at least once in their lifetime
- Many are disabled or incur large medical costs

History of Injury Prevention

- Johann Peter Frank suggested that accident prevention activities should be part of a comprehensive health program in 1788
 - The goal was to teach or motivate citizens to act safely
 - The country was primarily rural
 - Unintentional injuries were attributed to human error
 - An emphasis on individual responsibility made sense

History of Injury Prevention (continued)

- In the early 1900s automobile makers and insurance companies began research on accidents
 - The focus was on high-risk individuals and high-risk behaviors
 - Prevention strategies focused on the individual
- Psychologists emphasized the importance of emotional antecedents to life events from 1915 to 1940
 - It was accepted that some individuals were “accident prone”

Accident Prone Individuals?

- Although research persisted on the accident prone personality for 50 years, no one type of person was more “prone” than others
- Psychological interventions did not appear to work for those who experienced more accidents
- It was determined accidents were caused by human error, product design, mental or physical impairment, environmental conditions, and other factors

J. J. Gibson (1904–1979)

- A psychologist instrumental in changing perceptions about accident causes
- Before his work accidents were considered random events for which no one but the victim was responsible
- He defined an accident as an “uncontrolled, unplanned release of energy transfer”

J. J. Gibson (1904–1979) (continued)

- J. J. Gibson identified five agents causing injuries:
 - Kinetic or mechanical energy
 - Chemical energy
 - Thermal energy
 - Electrical energy
 - Radioactive energy

Hugh DeHaven (1895–1980)

- A pilot in WW I who was able to walk away from a serious crash
- Began crash investigation research and crash testing
- His work resulted in better automobile design, seat belts, and air bags to reduce the severity of accidental injuries

Dr. John Stapp (1910–1999)

- An Air Force colonel investigating safety harnesses for pilots
- Conducted experiments on biomechanics of acceleration and deceleration at high speeds
- He was known to personally test safety harnesses subjected to extreme energy transfer forces

Dr. John E. Gordon (1890–1983)

- A colonel in the military in WWI
- Studied nonbattle injuries experienced during war, practices, and on leave
- Studied the distribution of causes of injury because he believed epidemiology was useful for studying accidents

Ross McFarland (1901–1976)

- A psychologist and trainer of aviation medicine specialists
- Documented that highway crashes among military personnel were more prevalent than plane crashes
- Applied ergonomics to show that gear shift design would reduce the number of accidents

Ergonomics

- After WW I the field of ergonomics was born
- “The body of knowledge about human abilities, human limitations, and other human characteristics relevant to design”
- Used to design tools, machines, systems, tasks, jobs, and environments for safe human use

Dr. William Haddon (1926–1985)

- An engineer and public health physician for New York, “the father of injury epidemiology and injury control”
- Believed the way to reduce incidence and severity of accidents was to study the **kinetic energy** involved
- Looked at the crash sequence for his research
- His work represented the first epidemiological study for injury research that included relative risk and interaction of contributory factors

The Haddon Matrix

- Three phases of an accident
 1. Pre-injury phase
 - When control of energy expenditure is lost
 2. Injury phase
 - Less than one second; when energy is transferred to people and causes damage
 3. Post-injury phase
 - When attempts are made to repair the damage and regain physiological homeostasis

Ralph Nader (1934–present)

- His 1959 article *The Safe Car You Can't Buy* declared that automobile makers were designing cars for style, cost, and performance while ignoring accidental injuries, disabilities, and deaths
- His 1965 book *Unsafe at Any Speed* focused on environmental aspects of the pre-crash and crash phases of auto accidents

Ralph Nader (1934–present) (continued)

- He targeted General Motors' faulty rear suspension system on the Corvair
- He drew attention to the fact that some automobile manufacturers were hiding information about product safety
- He founded the NGO Public Citizen, credited with the passage of several laws appropriate to environmental health

Public Health Initiatives

- The W. K. Kellogg Foundation awarded grants for public health demonstration projects in the 1950s and 1960s
- The Division of Special Health Services for the U.S. Public Health Service initiated injury control programs for
 - Radiological health
 - Tuberculosis
 - Air pollution
 - Chronic diseases

U.S. Governmental Agencies

- In 1956 the Division of Accident Prevention was added to address highway and nonhighway safety concerns
- In 1967 the National Highway Safety Bureau (NHSB) was formed with Dr. Haddon as director; it was later renamed the National Highway Traffic Safety Administration (NHTSA)

U. S. Governmental Agencies (continued)

- In the 1970s, the Consumer Product Safety Commission was created
- Emergency medical services were also expanded in the 1970s to reduce deaths due to accidents
- In the 1980s, substantial improvements in highway safety had been gained

U. S. Governmental Agencies (continued)

- In 1985 the Committee on Trauma Research published *Injury in America* reporting all injuries
- After that, Congress
 - Provided funding for injury control research to the Centers for Disease Control
 - Established the National Center for Injury Prevention and Control
- The American Public Health Association (APHA) reestablished its injury control section

Intentional Injuries

- Those that result when one person intends to harm himself/herself or another person
 - Homicide
 - Suicide
 - Rape
 - Domestic violence
 - Physical assault
 - Other abusive behaviors

Homicide

- Nearly half of all deaths from firearm injuries are victims of homicide
- The murder rate has fallen to its lowest level in three decades (6 per 100,000 population)
- It is the third leading cause of death for children ages 5 to 14 years of age
- More than 80% of infant homicides are the result of child abuse by parents

Suicide

- Usually self-inflicted
- Difficult to determine as not all suicidal deaths are identified
- Suicide rates are very high among young people in Japan, China, Europe, and the U.S.

Domestic Violence

- Physical violence and abusive behavior leading to intentional injury
- Unfortunately very common
- **Assault** is a verbal threat
- **Battery** is a physical threat

Rape

- It is intentional, not an accident
- It is a crime of violence, not passion
- Forced sexual intercourse
 - There is physical damage, psychological damage, and post-traumatic syndrome
- Statutory rape is sex with a minor under age 21
- It can lead to arrest and prosecution

Unintentional Injuries

- Implies circumstances that could not be avoided; errors in judgments; poor health; or lack of physical ability to avoid harm
- Could be due to human error, faulty product design, impairment, environmental conditions, and other factors
- The leading cause of death for individuals under age 45
- Fifth leading cause of death in the U.S.

Unintentional Injuries: MVAs

- Motor vehicle accidents (MVAs) are the most common cause of death 15–25 years of age
- Teenagers have the highest rate of MVA-related deaths
- Seniors over age 75 are the second highest
- MVAs are the most common cause of serious injury

DUI/DWI

- Driving Under the Influence (DUI) or Driving While Intoxicated (DWI) accounts for 45% of MVA fatalities
- The highest intoxication rates in fatal crashes were among 21–24 year olds
- Young drivers arrested for DUI/DWI are four times more likely to die in a future MVA

Zero Tolerance Laws

- Many states have this law
- It does not matter what the blood alcohol level (BAC) is of a minor
- The use of prescription painkillers and over-the-counter antihistamines are treated the same if the person is driving
- If an underage person is caught driving under the influence of drugs or alcohol (DUI or DUJA) their license can be revoked, they can spend time in jail, and a fine must be paid

Other Causes of MVAs

- Heavy traffic and traffic delays
- Construction
- Distractions (infants and children, cell phones, food, maps)
- Inconsiderate or impaired drivers
- Aggressive driving behaviors

Aggressive Drivers

- Exceed the speed limit
- Tailgate the car in front of them
- Change lanes frequently
- Verbally abuse or make rude gestures to another driver
- Disobey traffic signs

Road Rage

- Occurs when one driver physically assaults another driver or car

Reducing Risk of MVA Injuries

- Keep your vehicle in good condition
- Let road conditions and traffic dictate good driving behavior
- Observe the speed limit except when there is fog, rain, snow, or ice on the road
- Use the “two second rule” rather than tailgate
- Wear safety restraints and seat belts

Safety Restraints for Infants and Children

- Seatbelts hold occupants in place during a collision
 - Prevents ejection
 - Protects the person from objects in the car
- Infants and children should be in the back seat
- Infants (less than 1 year) should face the rear of the car
- Children (weighing 40 lbs. or more) can face forward

Home Safety

- Injuries occur from falls, poisonings, guns, fires, and power equipment
- Young children have the highest risk
- Cabinets with toxic materials, medicines, and guns should be locked
- Matches and lighters should be kept in a safe place
- Power equipment should have safety shields

Gun Control

- The 1968 Gun Control Act prohibits the sale of rifles by mail and the sale of guns to minors, felons, or addicts
- The 1993 Brady Handgun Control Act provides for a waiting period before someone can buy or transfer a handgun to another while a criminal check is made
- The 1994 Violent Crime Control and Law Enforcement Act banned the manufacture, sale, and possession of certain assault weapons

Which Are You?

- Proponents recognize the high incidence of deaths, disabilities, and injuries due to guns
- Opponents feel it is their right to carry a gun for protection

Product Safety

- The Consumer Product Safety Commission (CPSC) was created in 1972 because some products presented an unreasonable risk of injury
- The CPSC requires safety labels, recalls hazardous products, and bans them

School Safety

- Crosswalk safety for pedestrians is a concern
 - Many schools have voluntary crossing guards
- The sale of drugs on school property is a federal offense
- Bullying is a concern
- Bus safety is a concern
 - School buses are not required to have seat belts

Playgrounds

- Jane Addams provided a playground at Hull House in Chicago for immigrant children living in tenements
- Playground equipment is legally considered “an attractive nuisance”

Playground Hazards

- Wood equipment may be treated with arsenic
 - Children should wash their hands after playing and before eating
- Dangerous equipment includes:
 - Merry-go-rounds, teeter-totters, swings, slides, climbers (jungle gym, monkey bars)

Recreational Needs

- National parks were designated
- The parks and recreation movement expanded after WW II
- The President's Fitness Program encouraged physical activity for good health

Safety Rules For...

- Walking, jogging
- Biking
- Horseback riding
- Swimming
- Boating
- Hiking and mountain climbing
- All-terrain vehicles and snowmobiles
- Skiing and snowboarding
- Hunting and fishing

Mechanisms of Injury

- The circumstances found after a crash or accident that determines how injuries were received

Hazards

Mechanical

- Occur when the transfer of mechanical energy results in immediate or gradually acquired injury

Psychosocial

- Usually factor into mechanical hazards
- Includes DUI/DUIA, distractions, presence in crime areas, not using safety devices, not heeding safety advice
- Emotions such as anger, fear, feeling a lack of control or violence