Chapter 13
Occupational Health
Occupational Medicine

• Medical specialty focusing on detection and prevention of diseases that arise from the work environment
Occupational Disease

• Defined as those health outcomes that are “…caused or influenced by exposure to general conditions or specific hazards encountered in the work environment.”
Origin of Occupational Health

- Recognition of occupational risks from mining occurred during Greek and Roman times.
Noteworthy Figures in History

- Rhazes (ca. 850-923) used occupational classifications in medical case descriptions.
- Paracelsus (1493-1541) wrote a book on occupational diseases.
- Bernardino Ramazzini (refer to next slide)
Bernardino Ramazzini (1633-1714)

- Considered the “father of occupational medicine”
- His book *De Morbis Artificum Diatriba* (*Diseases of Workers*) detailing the manifestations of occupational diseases was published in 1700.
Some Occupational Diseases Found in Historical Literature

- Miners’ asthma
- Potters’ rot
- Mad hatter’s disease
- Phossy jaw
- Mule spinners’ cancer
Historically Significant Occupational Accidents

- Triangle Shirtwaist Company fire
- Gauley Bridge disaster
Triangle Shirtwaist Company Fire

- Occurred on March 25, 1911 in New York City
- 146 women died in 15 minutes
- Doors were locked and fire escapes were missing.
Gauley Bridge Disaster

- Covered a time span that began about 1931
- Caused exposure of unprotected workers to high levels of silica dust
- Resulted in about 1,500 cases of silicosis and 1,000 deaths
The Occupational Environment and Health

- During 2001, approximately 5.2 million nonfatal, work-related illnesses and injuries were reported in private industry.
- During 2002, there were 5,542 work-related injury deaths.
The Costs of Occupational Injuries, Illnesses and Fatalities

• Direct costs of injuries in 2002 were estimated at $45.8 billion for private sector.

• Indirect costs in 2002 were estimated to be up to $229 billion for private industry.
Leading Causes of Disabling Conditions

- Sprains and strains
- Bruises and contusions
- Cuts, lacerations, and punctures
Agents of Occupational Disease

- Noise
- Dusts
- Toxic heavy metals and their fumes
- Carbon monoxide
- Chemicals
- Ionizing radiation
- Microbial agents
- Lifting heavy weights
- Repetitive motion
- Workplace accidents
- Work-related stress
Noise

• The term *ototoxic* refers to agents that can produce hearing loss.

• Ototoxic agents include very loud sounds and several classes of drugs and chemicals used in the work environment.
Toxic Heavy Metals and Their Fumes

- Toxic heavy metals (arsenic, lead, mercury, cadmium, chromium and nickel) are potential hazards to human health.

- Processing and milling of heavy metals put workers at risk of breathing fumes and dusts that contain toxic levels of these metals.
Carbon Monoxide

• An odorless, hazardous, toxic gas
• Found in many work settings
• Causes the formation of carboxyhemoglobin, which reduces the oxygen-carrying capacity of blood
Microbial Agents

- Are a source of health risks for workers in many occupational categories.
- For example, health care workers, workers exposed to sewage, and agricultural workers may be exposed to bacteria, viruses, and disease-carrying insects.
Work-Related Stress

- Chronic stress has been implicated in a range of somatic conditions (e.g., coronary heart disease) and mental disorders including depression.
- Workplace violence has been noted as a serious outcome of job-related stress.
Occupationally Associated Diseases and Conditions

- Allergic and irritant dermatitis
- Respiratory diseases
- Chronic obstructive pulmonary disease and asthma
- Fertility and pregnancy abnormalities
- Hearing loss caused by noise
- Musculoskeletal disorders
- Traumatic injuries and fatalities
- Conditions associated with job stress
Allergic and Irritant Dermatitis

• The skin is one of the most common sites of contact with chemicals in the workplace.

• Manufacturing, construction, food production, and activities such as metal plating and engine service put workers at highest risk for skin problems.
Respiratory Diseases

- Many of the work-related respiratory diseases are chronic conditions that have long latency periods.
- Asbestosis, coal workers’ pneumoconiosis, silicosis, byssinosis, mesothelioma, and lung cancer are examples of work-related respiratory diseases.
Chronic Obstructive Pulmonary Disease (COPD) and Asthma

- About 30% of cases of COPD and asthma can be linked to occupational exposures.
- COPD is related to workplace exposure to dusts.
- Asthma has become the most frequently diagnosed occupational respiratory disease in the U.S.
Fertility and Pregnancy Abnormalities

- Examples are birth defects, prematurity, low birth weight, spontaneous abortions, and developmental disabilities.
- A total of 4 million chemicals in use commercially use have not been tested for their reproductive effects.
- Most of the 1,000 chemicals used in the work environment that have been demonstrated to cause adverse reproductive effects among animals have not been tested with humans.
Hearing Loss Caused by Noise

- The second most-commonly self-reported occupational injury or illness
- As many as 10 million workers in U.S. suffer from noise-induced hearing loss.
- Prolonged exposure may result in psychological reactions that adversely impact the immune system and physical well-being.
Nature of Sound and Hearing

- Sound is produced by oscillating waves of various frequencies.
- The term *Hertz (Hz)* denotes the number of cycles per second associated with the oscillation of a given sound wave.
Sound Pressure Level (SPL) and Decibels (dBs)

- The sound pressure level (SPL) is a measure of the intensity of sound.
- The SPL is reported on a logarithmic scale that uses decibels (dBs).
- An increase of 10dB represents a 10-fold increase in sound intensity.
- dBs are advantageous for characterizing the large variability in the range of sounds that the human ear can perceive.
Two Employment Categories Affected Greatly by Noise

- Construction industry
- Health care industry
Permissible Noise Levels in the Workplace

• The NIOSH recommended exposure limit (REL) for noise exposure in the workplace during an 8-hour shift is 85 dBA.

• dBA refers to A-weighting, meaning that exposure is an 8-hour time-weighted average.
Infectious Diseases
(Examples of Workers at Risk)

- Health care workers
- Public utility workers
- Agricultural workers
- Social service workers and corrections personnel
- Clinical laboratory specialists
- Mortuary workers
- Adult film industry workers
Musculoskeletal Disorder (MSD)

- Refers to “…an injury or disorder of the muscles, nerves, tendons, joints, cartilage, or spinal disks.”
Common MSD in the Workplace*

- Sprains, strains, tears
- Back pain, hurt back
- Carpal tunnel syndrome
- Soreness, pain, hurt, except the back
- Hernia
- MSD system and connective tissue diseases and disorders, except tendonitis
- Tendonitis

*Refer to Figure 13-17 in the text.
Traumatic Injuries and Fatalities

- Acute trauma is one of the major sources of work-related death and disability.
- There was a 42% decrease in the average annual rate of occupational fatalities in the U.S. between 1980 and 1995.
- In 2002, a total of 5,524 fatal occupational injuries were reported in the U.S.
Industries Accounting for the Largest Frequencies of Death

- Construction
- Transportation and public utilities
- Agriculture, forestry, fishing, and hunting
Job Stress

• The term *job stress* is “. . . defined as the harmful physical and emotional responses that occur when the requirements of the job do not match the capabilities, resources, or needs of the worker.”
Conditions Associated with Job Stress

- Anxiety, stress, and neurotic disorders
- “Going postal”
- Critical incident stress

Note: Of six job categories, the classification of technical, sales, and administrative support had the highest percentage of cases of anxiety, stress, and neurotic disorders in 2001.
Preventing Occupational Disease

• Primary Prevention
  – Engineering controls
    • Quieter machinery, improved building ventilation
  – Optimal work practices and administrative controls
    • Use of safety education programs, reorganizing work schedules to reduce exposure to hazards
Personal Protective Equipment (PPE)

- Apparatuses “…designed to protect employees from serious workplace injuries or illnesses resulting from contact with chemical, radiological, physical, electrical, mechanical, or other workplace hazards.”
Primary Prevention Versus Use of PPE

- The three methods of primary prevention are preferred over other methods for protecting workers such as the use of PPE.
Examples of PPE

• Respirators
  – Various types are used to filter airborne particles, remove airborne chemicals and gases, or supply clean air.

• Devices to Protect Hearing
  – Ear muffs and ear plugs

• Protective Eyewear
  – Goggles, face shields, safety glasses, and full-face respirators
Public Health Surveillance

• Surveillance systems include the collection of information about occupational injuries and illnesses and maintenance of databases on exposures to occupational hazards.
U.S. Agencies That Conduct Surveillance

- National Institute for Occupational Safety and Health (NIOSH)
- National Center for Health Statistics (NCHS)
- Bureau of Labor Statistics (BLS)
- Occupational Safety and Health Administration (OSHA)
- Mine Safety and Health Administration (MSHA)
Surveillance Programs Operated by NIOSH

• National Surveillance System of Pneumoconiosis Mortality (NSSPM)
• National Traumatic Occupational Fatalities (NTOF) Surveillance System
• State-based Sentinel Event Notification System for Occupational Risks (SENSOR)
Exposure Limits

- Guidelines and regulations for limitation of workplace exposures to hazardous agents

- The threshold limit value (TLV) “Refers to airborne concentrations of substances and represents conditions under which it is believed that nearly all workers may be unaffected.”