Chapter 24
Microbial Diseases of the Respiratory System

The Upper Respiratory System
- Nose
- Pharynx (throat)
- Middle ear
- Eustachian tubes

The Lower Respiratory System
- Larynx
- Trachea
- Bronchial tubes
- Alveoli
- Pleura

Normal Microbiota of Respiratory System
- Suppress pathogens by competitive inhibition in upper respiratory system
- Lower respiratory system is sterile

Upper Respiratory System Diseases
- Pharyngitis
- Laryngitis
- Tonsillitis
- Sinusitis
- Epiglottitis: *H. influenzae* type b

Streptococcal Pharyngitis
- Also called strep throat
- *Streptococcus pyogenes*
- Resistant to phagocytosis
- Streptokinases lyse clots
- Streptolysins are cytotoxic
- Diagnosis by enzyme immunoassay (EIA) tests

Scarlet Fever
- *Streptococcus pyogenes*
- Pharyngitis
- Erythrogenic toxin produced by lysogenized *S. pyogenes*

Diphtheria
- *Corynebacterium diphtheriae*: Gram-positive rod
- Diphtheria toxin produced by lysogenized *C. diphtheriae*
- Diphtheria membrane: Fibrin, tissue, bacterial cells
- Prevented by DTaP vaccine
- Diphtheria toxoid
- Cutaneous diphtheria
- Infected skin wound leads to slow-healing ulcer

The Common Cold
- Rhinoviruses (50%)
- Coronaviruses (15–20%)

Picornaviridae
- Single-stranded RNA, + strand, nonenveloped
- Enterovirus
  - Poliovirus and coxsackievirus
- Rhinovirus
- Hepatitis A virus

Coronaviridae
- Single-stranded RNA, + strand, enveloped
- Upper respiratory infections
- Coronavirus
- SARS

Lower Respiratory System Diseases
- Bacteria, viruses, and fungi cause
- Bronchitis
- Bronchiolitis
- Pneumonia
Pertussis (Whooping Cough)
- *Bordetella pertussis*
- Gram-negative coccobacillus
- Capsule
- Tracheal cytotoxin of cell wall damaged ciliated cells
- Pertussis toxin
- Prevented by DTaP vaccine (acellular Pertussis cell fragments)
- Stage 1: Catarrhal stage, like common cold
- Stage 2: Paroxysmal stage—violent coughing sieges
- Stage 3: Convalescence stage

Tuberculosis
- *Mycobacterium tuberculosis*
- Acid-fast rod; transmitted from human to human
- *M. bovis*: <1% U.S. cases; not transmitted from human to human
- *M. avium-intracellulare* complex infects people with late-stage HIV infection
- Treatment: Prolonged treatment with multiple antibiotics
- Vaccines: BCG, live, avirulent *M. bovis*; not widely used in United States
- Tuberculin skin test screening
- Positive reaction means current or previous infection
- Followed by X-ray or CT exam, acid-fast staining of sputum, culturing of bacteria

Legionellosis
- *Legionella pneumophila*
- Gram-negative rod
- Found in water
- Transmitted by inhaling aerosols; not transmitted from human to human
- Symptoms: Potentially fatal pneumonia that tends to affect older men who drink or smoke heavily
- Diagnosis: Culture on selective media, DNA probe
- Treatment: Erythromycin