Study Outline Chapter 14

Introduction (p. 394)

- Disease-causing microorganisms are called pathogens.
- Pathogenic microorganisms have special properties that allow them to invade the human body or produce toxins.
- When a microorganism overcomes the body's defenses, a state of disease results.

Pathology, Infection, and Disease (pp. 394- 395)

- Pathology is the scientific study of disease.
- Pathology is concerned with the etiology (cause), pathogenesis (development), and effects of disease.
- Infection is the invasion and growth of pathogens in the body.
- A host is an organism that shelters and supports the growth of pathogens.
- Disease is an abnormal state in which part or all of the body is not properly adjusted or is incapable of performing normal functions.

Normal Microbiota (pp. 395- 398)

- Animals, including humans, are usually germ-free in utero.
- Microorganisms begin colonization in and on the surface of the body soon after birth.
- Microorganisms that establish permanent colonies inside or on the body without producing disease make up the normal microbiota.
- Transient microbiota are microbes that are present for various periods and then disappear.

Relationships Between the Normal Microbiota and the Host (pp. 395- 396)

- The normal microbiota can prevent pathogens from causing an infection; this phenomenon is known as microbial antagonism.
- Normal microbiota and the host exist in symbiosis (living together).
- The three types of symbiosis are commensalism (one organism benefits and the other is unaffected), mutualism (both organisms benefit), and parasitism (one organism benefits and one is harmed).

Opportunistic Microorganisms (pp. 396- 397)

- Opportunistic pathogens do not cause disease under normal conditions but cause disease under special conditions.

Cooperation Among Microorganisms (pp. 397- 398)

- In some situations, one microorganism makes it possible for another to cause a disease or produce more severe symptoms.

The Etiology of Infectious Diseases (pp. 398- 399)

Koch' s Postulates (p. 398)

- Koch' s postulates are criteria for establishing that specific microbes cause specific diseases.

- Koch' s postulates have the following requirements: (a) the same pathogen must be present in every case of the disease; (b) the pathogen must be isolated in pure culture; (c) the pathogen isolated from pure culture must cause the same disease in a healthy, susceptible laboratory animal; and (d) the pathogen must be reisolated from the inoculated laboratory animal.

Exceptions to Koch' s Postulates (pp. 398- 399)

- Koch' s postulates are modified to establish etiologies of diseases caused by viruses and some bacteria, which cannot be grown on artificial media.
- Some diseases, such as tetanus, have unequivocal signs and symptoms.
- Some diseases, such as pneumonia and nephritis, may be caused by a variety of microbes.
- Some pathogens, such as *S. pyogenes*, cause several different diseases.
- Certain pathogens, such as HIV, cause disease in humans only.

Classifying Infectious Diseases (pp. 400- 404)

- A patient may exhibit symptoms (subjective changes in body functions) and signs (measurable changes), which a physician uses to make a diagnosis (identification of the disease).
- A specific group of symptoms or signs that always accompanies a specific disease is called a syndrome.
- Communicable diseases are transmitted directly or indirectly from one host to another.
- A contagious disease is one that is easily spread from one person to another.
- Noncommunicable diseases are caused by microorganisms that normally grow outside the human body and are not transmitted from one host to another.

The Occurrence of a Disease (pp. 400- 401)

- Disease occurrence is reported by incidence (number of people contracting the disease) and prevalence (number of cases at a particular time).
- Diseases are classified by frequency of occurrence: sporadic, endemic, epidemic, and pandemic.

The Severity or Duration of a Disease (p. 401)

- The scope of a disease can be defined as acute, chronic, subacute, or latent.
- Herd immunity is the presence of immunity to a disease in most of the population.

Emerging Infectious Diseases (pp. 401- 404)

- New diseases and diseases with increasing incidences are called emerging infectious diseases (EIDs).
- EIDs can result from the use of antibiotics and pesticides, climatic changes, travel, the lack of vaccinations, and case reporting.
- The CDC, NIH, and WHO are responsible for surveillance and responses to emerging infectious diseases.

The Extent of Host Involvement (p. 404)

- A local infection affects a small area of the body; a systemic infection is spread throughout the body via the circulatory system.

- A secondary infection can occur after the host is weakened from a primary infection.
- An inapparent, or subclinical, infection does not cause any signs of disease in the host.

The Spread of Infection (pp. 404- 409)

Reservoirs of Infection (pp. 404- 406)

- A continual source of infection is called a reservoir of infection.
- People who have a disease or are carriers of pathogenic microorganisms are human reservoirs of infection.
- Zoonoses are diseases that affect wild and domestic animals and can be transmitted to humans.
- Some pathogenic microorganisms grow in nonliving reservoirs, such as soil and water.

The Transmission of Disease (pp. 406- 408)

- Transmission by direct contact involves close physical contact between the source of the disease and a susceptible host.
- Transmission by fomites (inanimate objects) constitutes indirect contact.
- Transmission via saliva or mucus in coughing or sneezing is called droplet transmission.
- Transmission by a medium such as water, food, or air is called vehicle transmission.
- Airborne transmission refers to pathogens carried on water droplets or dust for a distance greater than 1 meter.
- Arthropod vectors carry pathogens from one host to another by both mechanical and biological transmission.

Portals of Exit (pp. 408- 409)

- Just as pathogens have preferred portals of entry, they also have definite portals of exit.
- Three common portals of exit are the respiratory tract via coughing or sneezing, the gastrointestinal tract via saliva or feces, and the urogenital tract via secretions from the vagina or penis.
- Arthropods and syringes provide a portal of exit for microbes in blood.

Nosocomial (Hospital-Acquired) Infections (pp. 409- 411)

- A nosocomial infection is any infection that is acquired during the course of stay in a hospital, nursing home, or other health care facility.
- About 5- 15% of all hospitalized patients acquire nosocomial infections.

Microorganisms in the Hospital (p. 409)

- Certain normal microbiota are often responsible for nosocomial infections when they are introduced into the body through such medical procedures as surgery and catheterization.
- Opportunistic, drug-resistant gram-negative bacteria are the most frequent causes of nosocomial infections.

The Compromised Host (p. 410)

- Patients with burns, surgical wounds, and suppressed immune systems are the most susceptible to nosocomial infections.

The Chain of Transmission (pp. 410- 411)

- osocomial infections are transmitted by direct contact between staff members and patient and between patients.
- Fomites such as catheters, syringes, and respiratory devices can transmit nosocomial infections.

The Control of Nosocomial Infections (p. 411)

- Aseptic techniques can prevent nosocomial infections.
- Hospital infection control staff members are responsible for overseeing the proper cleaning, storage, and handling of equipment and supplies.

Patterns of Disease (pp. 411- 412)

Predisposing Factors (pp. 411- 412)

- A predisposing factor is one that makes the body more susceptible to disease or alters the course of a disease.
- Examples include gender, climate, age, fatigue, and inadequate nutrition.

The Development of Disease (p. 412)

- The incubation period is the time interval between the initial infection and the first appearance of signs and symptoms.
- The prodromal period is characterized by the appearance of the first mild signs and symptoms.
- During the period of illness, the disease is at its height, and all disease signs and symptoms are apparent.
- During the period of decline, the signs and symptoms subside.
- During the period of convalescence, the body returns to its prediseased state, and health is restored.

Epidemiology (pp. 413-416)

- The science of epidemiology is the study of the transmission, incidence, and frequency of disease.
- Modern epidemiology began in 1848 when John Snow investigated a London cholera epidemic.
- Data about infected people are collected and analyzed in descriptive epidemiology.
- In analytical epidemiology, a group of infected people is compared with an uninfected group.
- Controlled experiments designed to test hypotheses are performed in experimental epidemiology.
- Case reporting provides data on incidence and prevailence to local, state, and national health officials.
- The Centers for Disease Control and Prevention (CDC) is the main source of epidemiologic information in the United States,
- The CDC publishes the *Morbidity and Mortality Weekly Report* to provide information on morbidity (incidence) and mortality (deaths).