chapter 33

General Characteristics of Antimicrobial Drugs

Objectives

AFTER STUDYING THIS CHAPTER, THE STUDENT WILL BE ABLE TO:

1. Identify populations who are at increased risk for development of infections.
2. Discuss common pathogens and methods of infection control.
3. Assess clients for local and systemic signs of infection.
4. Discuss common and potentially serious adverse effects of antimicrobial drugs.
5. Identify clients at increased risk for adverse drug reactions.
6. Discuss ways to increase benefits and decrease hazards of antimicrobial drug therapy.
7. Discuss ways to minimize emergence of drug-resistant microorganisms.
8. State appropriate nursing implications for a client receiving an antimicrobial drug.
9. Discuss important elements of using antimicrobial drugs in children, older adults, those with renal or hepatic impairment, and those with critical illness.

OVERVIEW

Antimicrobial drugs are used to prevent or treat infections caused by pathogenic (disease-producing) microorganisms. The human body and the environment contain many microorganisms, most of which live in a state of balance with the human host and do not cause disease. When the balance is upset and infection occurs, characteristics of the infecting microorganism(s) and the adequacy of host defense mechanisms are major factors in the severity of the infection and the person's ability to recover. Conditions that impair defense mechanisms increase the incidence and severity of infections and impede recovery. In addition, use of antimicrobial drugs may lead to serious infections caused by drug-resistant microorganisms. To help prevent infectious diseases and participate effectively in antimicrobial drug therapy, the nurse must be knowledgeable about microorganisms, host responses to microorganisms, and antimicrobial drugs.

MICROORGANISMS AND INFECTIONS

In an infection, microorganisms initially attach to host cell receptors (ie, proteins, carbohydrates, lipids). For example, some bacteria have hair-like structures that attach them to skin and mucous membranes. Most microorganisms preferentially attach themselves to particular body tissues. The microorganisms may then invade tissues, multiply, and produce infection. A major characteristic of microorganisms is their ability to survive in various environments. Bacteria, for example, may form mutant strains, alter their structures and functions, or become embedded in a layer of mucus. These adaptations may protect them from normal body defense mechanisms and antimicrobial drugs. Drug-resistant bacterial strains can be produced in the presence of antimicrobial drugs. Classifications, normal microbial flora, and common pathogenic microorganisms are described in the following sections.

Classifications

Bacteria are subclassified according to whether they are aerobic (require oxygen) or anaerobic (cannot live in the presence of oxygen), their reaction to Gram's stain (gram positive or gram negative), and their shape (eg, cocci, bacilli).

Viruses are intracellular parasites that survive only in living tissues. They are officially classified according to their structures, but are more commonly described according to origin and the disorders or symptoms they produce. Human pathogens include adenoviruses, herpesviruses, and retroviruses (see Chap. 39).

Fungi are plant-like organisms that live as parasites on living tissue or as saprophytes on decaying organic matter. Approximately 50 species are pathogenic in humans (see Chap. 40).