chapter 11

# Miscellaneous Anti-infectives

## Key Terms

*anaerobic*
*blood dyscrasias*
*hypoglycemia*
*hypotension*

## Chapter Objectives

*On completion of this chapter, the student will:*

- Discuss the uses, general drug actions, adverse reactions, contraindications, precautions, and interactions of the drugs presented in this chapter.
- Discuss preadministration and ongoing assessments necessary with the administration of the drugs presented in this chapter.
- Identify nursing assessments that are performed when a drug is potentially nephrotoxic or ototoxic.
- List some nursing diagnoses particular to a patient taking the anti-infective drugs presented in this chapter.
- Discuss ways to promote optimal response to therapy and important points to keep in mind when educating patients about the use of the anti-infectives presented in this chapter.

The anti-infectives discussed in this chapter (see Summary Drug Table: Miscellaneous Anti-infectives) are singular drugs, that is, they are not related to each other and do not belong to any one of the drug groups discussed in Chapters 6 through 10. Some of these drugs are used only for the treatment of one type of infection, whereas others may be limited to the treatment of serious infections not treatable by other anti-infectives.

## CHLORAMPHENICOL

### ACTIONS AND USES

Chloramphenicol (Chloromycetin) interferes with or inhibits protein synthesis, a process necessary for the growth and multiplication of microorganisms. This is a potentially dangerous drug (see below), and therefore its use is limited to serious infections when less potentially dangerous drugs are ineffective or contraindicated.

### ADVERSE REACTIONS

Serious and sometimes fatal **blood dyscrasias** (pathologic condition of blood; disorder of cellular elements of blood) are the chief adverse reaction seen with the administration of chloramphenicol. In addition to blood dyscrasias, superinfection, hypersensitivity reactions, nausea, vomiting, and headache may be seen. It is recommended that patients receiving oral chloramphenicol be hospitalized so that patient observation and frequent blood studies can be performed during treatment with this drug.

### CONTRAINDICATIONS, PRECAUTIONS, AND INTERACTIONS

Chloramphenicol is contraindicated in patients with known hypersensitivity to the drug. This drug is used cautiously in patients with severe liver or kidney disease, in geriatric patients, in individuals with glucose-6-phosphate dehydrogenase (G6PD) deficiency (see Chap. 1), and during pregnancy (Category C) or lactation. Newborns are at increased risk for experiencing adverse reactions due to their inability to metabolize and excrete chloramphenicol.

## SUMMARY DRUG TABLE MISCELLANEOUS ANTI-INFECTIVES

| GENERIC NAME | TRADE NAME* | USES | ADVERSE REACTIONS | DOSAGE RANGES |
|---|---|---|---|---|
| chloramphenicol *klor-am-fen'-i-kole* | Chloromycetin, *generic* | Serious, susceptible infections in which other less potentially dangerous drugs are ineffective or contraindicated | Serious to fatal blood dyscrasias, superinfections, hypersensitivity, nausea, vomiting, headache | 50 mg/kg/d PO, IV in divided doses |
| linezolid *lah-nez'-oh-lid* | Zyvox | Infections due to vancomycin-resistant *Enterococcus* sp *faecium;* pneumonia due to *Staphylococcus aureus* and penicillin-susceptible *Streptococcus pneumoniae;* skin and skin structure infections | Nausea, diarrhea, headache, insomnia, pseudomembranous colitis | 600 mg PO or IV q12h |
| meropenem *meh-row-pen'-em* | Merrem IV | Intra-abdominal and soft tissue infections caused by multiresistant gram-negative organisms | Headache, diarrhea, abdominal pain, nausea, pain and inflammation at injection site, pseudomembraneous colitis | 1 g IV q8h |
| metronidazole *me-troe-nid'-uh-zole* | Flagyl, Protostat, *generic* | Infections caused by susceptible anaerobic microorganisms, amebiasis, trichomonas | Nausea, diarrhea, anorexia, seizures, numbness, hypersensitivity reactions, disulfiram-like reactions with alcohol ingestion | 7.5–15 mg/kg IV q6h; 7.5 mg/kg PO q6h |
| pentamidine isethionate *pen-tam'-ih-deen ice-uh-thigh'-uh-nate* | NebuPent, Pentam 300 | *Pneumocystis carinii* pneumonia (PCP) (IM, IV); prevention of PCP (inhalation) | Nausea, anxiety, anorexia, headache, metallic taste in mouth, chills, severe hypotension, leukopenia, hypoglycemia, thrombocytopenia | 4 mg/kg IM, IV once a day; 300 mg once every 4 wk by nebulizer |
| spectinomycin *spek-tin-oe-mye'-cin* | Trobicin | Gonorrhea | Soreness at injection site, urticaria, dizziness, rash, chills, fever, hypersensitivity reactions | 2 g IM as single dose; up to 4 g IM |
| vancomycin *van-koe-mye'-cin* | Vancocin, Vancoled, *generic* | Serious susceptible gram-positive infections not responding to treatment with other antibiotics | Nephrotoxicity, ototoxicity, nausea, chills, fever, urticaria, sudden fall in blood pressure, redness on face, neck, arms, and back | 500 mg to 2 g/d PO in divided doses; 500 mg IV q6h or 1 g IV q8–12h |

*The term *generic* indicates the drug is available in generic form.

The effects of oral hypoglycemic drugs, oral anticoagulants, and phenytoin may be increased when administered with chloramphenicol. Phenobarbital or rifampin may decrease chloramphenicol blood levels.

# LINEZOLID

## ACTIONS AND USES

Linezolid (Zyvox) is the first of a new classification, an oxazolidinone, that acts by binding to a site on a specific ribosomal RNA and preventing the formation of a component necessary for the bacteria to replicate. It is both bacteriostatic (ie, to enterococci and staphylococci) and bacteriocidal (ie, against streptococci). The drug is used in the treatment of vancomycin-resistant enterococcus (VRE), nosocomial (hospital acquired) and community acquired pneumonia, pneumonia, and in the treatment of skin and skin structure infections, including those caused by methicillin-resistant *Staphylococcus aureus* (MRSA).

## ADVERSE REACTIONS

The most common adverse reactions include nausea, vomiting, diarrhea, headache, and insomnia. The drug may also cause fatigue, depression, nervousness, and

photosensitivity. Pseudomembranous colitis and thrombocytopenia are the more serious adverse reactions caused by linezolid.

### CONTRAINDICATIONS, PRECAUTIONS, AND INTERACTIONS

The drug is contraindicated in the presence of an allergy to the drug, pregnancy (Category C), lactation, and phenylketonuria (oral form only). Linezolid is used cautiously in patients with bone marrow depression, hepatic dysfunction, renal impairment, hypertension, and hyperthyroidism.

When linezolid is used with antiplatelet drugs such as aspirin or the NSAIDs (see Chap. 18) there is an increased risk of bleeding and thrombocytopenia. When administered with the MAOIs (see Chap. 31) the effects of the MAOIs are decreased. There is a risk of severe hypertension if linezolid is combined with large amounts of food containing tyramine (eg, aged cheese, caffeinated beverages, yogurt, chocolate, red wine, beer, pepperoni).

## MEROPENEM

### ACTION AND USES

Meropenem (Merrem IV) inhibits synthesis of the bacterial cell wall and causes the death of susceptible cells. This drug is used for intra-abdominal infections caused by *Pseudomonas aeruginosa, Escherichia coli, Klebsiella pneumoniae,* and other susceptible organisms. Meropenem also is effective against bacterial meningitis caused by *Neisseria meningitidis, Streptococcus pneumoniae, and Hemophilus influenzae.*

### ADVERSE REACTIONS

The most common adverse reactions with meropenem include headache, nausea, vomiting, diarrhea, anorexia, abdominal pain, generalized pain, flatulence, rash, and superinfections. This drug also can cause an abscess or phlebitis at the injection site. An abscess is suspected if the injection site appears red or is tender and warm to the touch. Tissue sloughing at the injection site also may occur.

### CONTRAINDICATIONS, PRECAUTIONS, AND INTERACTIONS

Meropenem is contraindicated in patients who are allergic to cephalosporins and penicillins and in patients with renal failure. This drug is not recommended in children younger than 3 months or for women during pregnancy (Category B) or lactation. Meropenem is used cautiously in patients with central nervous system (CNS) disorders, seizure disorders, and in patients with renal or hepatic failure. When administered with probenecid, the excretion of meropenem is inhibited.

## METRONIDAZOLE

### ACTIONS AND USES

The mode of action of metronidazole (Flagyl) is not well understood, but it is thought to disrupt DNA and protein synthesis in susceptible organisms. This drug may be used in the treatment of serious infections, such as intra-abdominal, bone, soft tissue, lower respiratory, gynecologic, and CNS infections caused by susceptible **anaerobic** (able to live without oxygen) microorganisms.

### ADVERSE REACTIONS

The most common adverse reactions seen with this drug are related to the gastrointestinal tract and may include nausea, anorexia, and occasionally vomiting and diarrhea. The most serious adverse reactions are associated with the CNS and include seizures and numbness of the extremities. Hypersensitivity reactions also may be seen. Thrombophlebitis may occur with intravenous (IV) use of the drug.

### CONTRAINDICATIONS, PRECAUTIONS, AND INTERACTIONS

This drug is contraindicated in patients with known hypersensitivity to the drug and during the first trimester of pregnancy (Category B). This drug is used cautiously in patients with blood dyscrasias, seizure disorders, and hepatic dysfunction. Safety in children (other than orally for amebiasis) has not been established.

The metabolism of metronidazole may decrease when administered with cimetidine. When administered with phenobarbital, the effectiveness of metronidazole may decrease. When metronidazole is administered with warfarin, the effectiveness of the warfarin is increased.

## PENTAMIDINE ISETHIONATE

### ACTIONS AND USES

Pentamidine isethionate (Pentam 300, the parenteral form; NebuPent, the aerosol form) is used in the treatment (parenteral form) or prevention (aerosol form) of

*Pneumocystis carinii* pneumonia, a pneumonia seen in those with acquired immunodeficiency syndrome. The mode of action of this drug is not fully understood.

### ADVERSE REACTIONS

More than half of the patients receiving this drug by the parenteral route experience some adverse reaction. Severe and sometimes life-threatening reactions include leukopenia (low white blood cell count), **hypoglycemia** (low blood sugar), thrombocytopenia (low platelet count), and **hypotension** (low blood pressure). Moderate or less severe reactions include changes in some laboratory tests, such as the serum creatinine and liver function tests. Other adverse reactions include anxiety, headache, hypotension, chills, nausea, and anorexia. Aerosol administration may result in fatigue, a metallic taste in the mouth, shortness of breath, and anorexia.

### CONTRAINDICATIONS, PRECAUTIONS, AND INTERACTIONS

This drug is contraindicated in individuals who have had previous hypersensitivity reactions to pentamidine isethionate. Pentamidine isethionate is used cautiously in patients with hypertension, hypotension, hyperglycemia, renal impairment, diabetes mellitus, liver impairment, bone marrow depression, pregnancy (Category C), or lactation.

An additive nephrotoxicity develops when pentamidine isethionate is administered with other nephrotoxic drugs (eg, aminoglycosides, vancomycin, or amphotericin B). An additive bone marrow depression occurs when the drug is administered with antineoplastic drugs or when the patient has received radiation therapy recently.

## SPECTINOMYCIN

### ACTIONS AND USES

Spectinomycin (Trobicin) is chemically related to but different from the aminoglycosides (see Chap. 10). This drug exerts its action by interfering with bacterial protein synthesis. Spectinomycin is used for the treatment of gonorrhea.

### ADVERSE REACTIONS

Soreness at the injection site, urticaria, dizziness, rash, chills, fever, and hypersensitivity reactions may be seen with the administration of this drug.

### CONTRAINDICATIONS, PRECAUTIONS, AND INTERACTIONS

This drug is contraindicated in known cases of hypersensitivity to spectinomycin. In addition, the drug should not be given to infants. If another sexually transmitted disease is present with gonorrhea, additional anti-infectives may be needed to eradicate the infectious processes. Safe use during pregnancy (Category B) or lactation or in children has not been established.

No known significant drug or food interactions for spectinomycin are known.

## VANCOMYCIN

### ACTIONS AND USES

Vancomycin (Vancocin) acts against susceptible gram-positive bacteria by inhibiting bacterial cell wall synthesis and increasing cell wall permeability. This drug is used in the treatment of serious gram-positive infections that do not respond to treatment with other anti-infectives. It also may be used in treating anti-infective–associated pseudomembranous colitis caused by *Clostridium difficile*.

### ADVERSE REACTIONS

Nephrotoxicity (damage to the kidneys) and ototoxicity (damage to the organs of hearing) may be seen with the administration of this drug. Additional adverse reactions include nausea, chills, fever, urticaria, sudden fall in blood pressure with parenteral administration, and skin rashes.

### CONTRAINDICATIONS, PRECAUTIONS, AND INTERACTIONS

This drug is contraindicated in patients with known hypersensitivity to vancomycin. Vancomycin is used cautiously in patients with renal or hearing impairment and during pregnancy (Category C) and lactation.

When administered with other ototoxic and nephrotoxic drugs, additive effects may be seen.

## NURSING PROCESS

### ● The Patient Receiving a Miscellaneous Anti-infective

#### ASSESSMENT

***Preadministration Assessment***

Before administering these drugs, the nurse takes and records the patient's vital signs and identifies and records

the symptoms of the infection. It is very important to take a thorough allergy history, especially a history of drug allergies. When culture and sensitivity tests are ordered, these procedures must be performed before the first dose of the drug is given. Other laboratory tests such as renal and hepatic function tests, complete blood count, and urinalysis also may be ordered before and during drug therapy for early detection of toxic reactions.

### *Ongoing Assessment*

The nurse should monitor the patient's vital signs every 4 hours or as ordered by the primary health care provider. It is important to notify the primary health care provider if there are changes in the vital signs, such as a significant drop in blood pressure, an increase in the pulse or respiratory rate, or a sudden increase in temperature.

The nurse observes the patient at frequent intervals, especially during the first 48 hours of therapy. It is important to report any adverse reaction to the primary health care provider before the next dose of the drug is due.

## NURSING DIAGNOSES

Drug-specific nursing diagnoses are highlighted in the Nursing Diagnoses Checklist. Other nursing diagnoses applicable to these drugs are discussed in Chapter 4.

## PLANNING

The expected outcomes for the patient depend on the reason for administration of the anti-infective but may include an optimal response to drug therapy, management of adverse drug reactions, a decrease in anxiety, and an understanding of and compliance with the prescribed drug regimen.

## IMPLEMENTATION

### *Promoting an Optimal Response to Therapy*

Monitoring each patient for response to drug therapy and for the appearance of adverse reactions is an integral part of promoting an optimal response to therapy. The nurse immediately reports serious adverse reactions, such as signs and symptoms of a hypersensitivity reaction or superinfection, respiratory difficulty, or a marked drop in blood pressure.

**Nursing Diagnoses Checklist**

- ✓ **Anxiety** related to infection, seriousness of illness, route of administration, other factors (specify)
- ✓ **Diarrhea** related to adverse drug reaction, superinfection
- ✓ **Pain** related to intramuscular injection
- ✓ **Risk for Disturbed Sensory Perception: Auditory** related to adverse drug effects (ototoxicity)
- ✓ **Risk for Impaired Urinary Elimination** related to adverse drug effects (nephrotoxicity)

INTRAMUSCULAR ADMINISTRATION. To promote an optimal response to therapy when giving these drugs intramuscularly (IM), the nurse inspects previous injection sites for signs of pain or tenderness, redness, and swelling. In addition, the nurse reports any persistent local reaction to the primary health care provider. It also is important to develop a plan for rotation of injection sites and to record the site used after each injection.

INTRAVENOUS ADMINISTRATION. When giving these drugs IV, the nurse inspects the needle site and area around the needle at frequent intervals for signs of extravasation of the IV fluid. More frequent assessments are performed if the patient is restless or uncooperative.

The rate of infusion is checked every 15 minutes and adjusted as needed. This is especially important when administering vancomycin because rapid infusion of the drug can result in severe hypotension and shock. The nurse inspects the vein used for the IV infusion every 4 to 8 hours for signs of tenderness, pain, and redness (which may indicate phlebitis or thrombophlebitis). If these symptoms are apparent, the nurse restarts the IV in another vein and brings the problem to the attention of the primary health care provider.

SPECIAL CONSIDERATIONS FOR SPECIFIC DRUGS. To promote an optimal response to therapy, the nurse should know the following special considerations for specific drugs.

*Chloramphenicol.* When the drug is given orally, the nurse gives it to the patient whose stomach is empty, 1 hour before or 2 hours after meals. If gastrointestinal distress occurs, it is acceptable to give the drug with food. Chloramphenicol is also given IV. The drug should be administered around the clock to maintain therapeutic blood levels of the drug.

**Nursing Alert**

*The blood dyscrasias may occur with the administration of chloramphenicol during either short- or long-term therapy. The nurse observes patients closely for signs and symptoms that may indicate a blood dyscrasia—fever, sore throat, sores in the mouth, easy bruising or bleeding (even several weeks after the drug regimen is completed) and extreme fatigue.*

*It is important to monitor closely serum blood levels of chloramphenicol, particularly in patients with impaired liver or kidney function or when administering chloramphenicol with other drugs metabolized by the liver. Blood concentration levels exceeding 25 mcg/mL increase the risk of the patient developing bone marrow depression.*

*Linezolid.* The drug is given orally or intravenously (IV). When the drug is taken orally, it is administered every 12 hours and may be taken with or without food. If nausea develops, the drug may be taken with food. Foods

high in tyramine (see Chap. 31) are avoided because of the risk of hypertension. When given IV, the drug is infused during a period of 30 to 120 minutes. The nurse protects the drug from light by leaving the overwrap in place until ready to administer. It is important to monitor the patient's platelet count regularly, particularly if the drug is used for longer than 2 weeks.

*Meropenem.* This drug is administered only by the IV route. The nurse gives meropenem every 8 hours over a period of 15 to 30 minutes if the drug is diluted or over a period of 3 to 5 minutes as a bolus injection (5–20 mL).

*Metronidazole.* When the nurse prepares the drug, the package insert should be consulted for reconstitution of the powder form because the directions for the order of preparation for IV administration must be followed. After reconstitution, the solution should be clear to pale yellow to pale green; do not use if the solution is cloudy or contains particulates. The drug should be used within 24 hours. When given orally, it is important to give the drug with meals to avoid gastrointestinal upset. The nurse informs the patient that an unpleasant metallic taste may be noted during therapy. When the drug is given on an outpatient basis, it is a good idea to advise the patient to avoid drinking alcoholic beverages during and for at least 1 day after treatment. When metronidazole is mixed with alcohol, the patient may experience flushing, nausea, vomiting, headache, and abdominal cramping.

The nurse informs patients being treated for gynecologic infections, such as trichomoniasis, that sexual contact with infected partners may lead to reinfection, so sexual partners must be treated concurrently.

*Pentamidine Isethionate.* When the drug is given IM or IV, the nurse prepares the drug according to the manufacturer's directions. When the drug is given by the IV route, it is important to infuse the drug over 1 hour. When the drug is given by aerosol, the nurse uses a special nebulizer (Respirgard II) and delivers the drug until the chamber is empty. It also is a good idea to explain or demonstrate the use of the nebulizer to the patient. The nurse monitors blood pressure frequently during administration because sudden, severe hypotension may occur after administration. Because hypotension can occur after a single dose, the nurse should always have the patient lying down when the drug is administered. The nurse assesses the patient for signs of hypoglycemia (weakness, diaphoresis, cool skin, shakiness) and hyperglycemia (flushed dry skin, fruity breath odor, increased thirst, and increased urination).

*Spectinomycin.* Spectinomycin may be given as a single dose, but multiple doses may be prescribed for complicated, widespread gonorrhea. The nurse warns the patient that the IM injection may be uncomfortable and that soreness at the injection site may be noted for a brief time. The nurse emphasizes the importance of following the primary health care provider's recommendations regarding a follow-up examination to determine if the infection has been eliminated. In addition, the nurse explains to the patient that all sexual contacts need to receive treatment.

*Vancomycin.* The nurse can administer vancomycin orally or by intermittent IV infusion. This drug is not administered IM. Unused portions of reconstituted oral suspensions and parenteral solutions are stable for 14 days when refrigerated after reconstitution.

### Nursing Alert

*The nurse should administer each IV dose of vancomycin over 60 minutes. Too rapid an infusion may result in a sudden and profound fall in blood pressure and shock. When giving the drug IV, the nurse closely monitors the infusion rate and the patient's blood pressure. The nurse reports any decrease in blood pressure or reports of throbbing neck or back pain. These symptoms could indicate a severe adverse reaction referred to as "red neck" or "red man" syndrome. Symptoms of this syndrome include a sudden and profound fall in blood pressure, fever, chills, paresthesias, and erythema (redness) of the neck and back.*

*The nurse reports patient complaints of difficulty hearing or tinnitus (ringing in the ears) to the primary health care provider before the next dose is due. In addition, the nurse monitors the fluid intake and output and brings any decrease in the urinary output to the attention of the primary health care provider.*

## Monitoring and Managing Adverse Reactions

MANAGING ANXIETY. Patients may exhibit varying degrees of anxiety related to their illness and infection and the necessary drug therapy. When these drugs are given by the parenteral route, patients may experience anxiety because of the discomfort or pain that accompanies an IM injection or IV administration. The nurse reassures the patient that every effort will be made to reduce pain and discomfort although complete pain relief may not always be possible.

MANAGING DIARRHEA. Diarrhea may be a sign of a superinfection or pseudomembranous colitis, both of which are adverse reactions that may be seen with the administration of any anti-infective. The nurse checks each stool and reports any changes in color or consistency. When vancomycin is given as part of the treatment for pseudomembranous colitis, it is important to record the color and consistency of each stool to determine the effectiveness of therapy.

MANAGING PAIN. Pain at the injection site may occur when these drugs are given IM. The nurse warns the patient that discomfort may be felt when it is injected and that additional discomfort may be experienced for a brief time afterward. The nurse places a warm moist compress over the injection site to help alleviate the discomfort.

## Home Care Checklist

### ADMINISTERING PENTAMIDINE AT HOME

The patient may be required to receive aerosol pentamidine at home. Before discharge, the nurse checks to make sure that arrangements have been made to deliver the specialized equipment and supplies, such as a Respirgard II nebulizer and diluent, to the home. The nurse also instructs the patient and caregiver on how to administer the drug:

- ☑ Prepare the solution immediately before its use.
- ☑ Dissolve the contents of one vial in 6 mL sterile water and protect the solution from light.
- ☑ Place the entire solution in the reservoir. Do not put any other drugs into the reservoir.
- ☑ Attach the tubing to the nebulizer and reservoir.
- ☑ Place the mouthpiece in your mouth and turn on the nebulizer.
- ☑ Breathe in and out deeply and slowly. The entire treatment should last 30 to 45 minutes.
- ☑ Tap the reservoir periodically to ensure that all of the drug is aerosolized.
- ☑ When the treatment is finished, turn off the nebulizer.
- ☑ Clean the equipment according to the manufacturer's instructions.
- ☑ Allow tubing, reservoir, and mouthpiece to air dry.
- ☑ Store the equipment in a clean plastic bag and put it away for the next dose.
- ☑ Use a calendar to mark the days you are to receive the drug and check off each time you've done the treatment.

**MONITORING FOR NEPHROTOXICITY AND OTOTOXICITY.** It is important for the nurse to monitor for nephrotoxicity. The nurse measures and records intake and output during the time the patient is receiving these drugs. Any changes in the intake and output ratio or in the appearance of the urine must be reported immediately because these may indicate nephrotoxicity.

The nurse also closely monitors for ototoxicity in all patients receiving an anti-infective. It is important to report any ringing in the ears, difficulty hearing, or dizziness to the primary health care provider. Changes in hearing may not be noticed initially by the patient, but when changes occur they usually progress from difficulty in hearing high-pitched sounds to problems hearing low-pitched sounds.

### *Educating the Patient and Family*

Anytime a drug is prescribed for a patient, the nurse is responsible to ensure that the patient has a thorough understanding of the drug, the treatment regimen, and the potential adverse reactions. Not all of the miscellaneous anti-infectives are prescribed for use within the clinical setting. Chloramphenicol, metronidazole, and vancomycin can be given orally and prescribed for outpatient use. However, patients requiring oral chloramphenicol are usually hospitalized so that blood studies can be done during treatment.

When pentamidine is prescribed for aerosol use at home, the nurse reviews the use of the special nebulizer, as well as directions for cleaning and maintaining the nebulizer equipment (see Home Care Checklist: Administering Pentamidine at Home).

When metronidazole is prescribed, the nurse warns the patient to avoid the use of alcoholic beverages because a severe reaction may occur.

To decrease the chance of noncompliance, the nurse emphasizes the following points when any of these drugs are prescribed on an outpatient basis:

- Take the drug at the prescribed time intervals. These time intervals are important because a certain amount of the drug must be in the body at all times for the infection to be controlled.
- Take the drug with food or on an empty stomach as directed on the prescription container.

- Do not increase or omit the dose unless advised to do so by the primary health care provider.
- Complete the entire course of treatment. Do not stop the drug, except on the advice of a primary health care provider, before the course of treatment is completed even if symptoms have improved or have disappeared. Failure to complete the prescribed course of treatment may result in a return of the infection.
- Notify the primary health care provider if symptoms of the infection become worse or there is no improvement in the original symptoms after about 5 to 7 days.
- Contact the primary health care provider as soon as possible if a rash, fever, sore throat, diarrhea, chills, extreme fatigue, easy bruising, ringing in the ears, difficulty hearing, or other problems occur.
- Avoid drinking alcoholic beverages unless use has been approved by the primary health care provider.

## EVALUATION

- The therapeutic drug effect is achieved and the infection is controlled.
- Adverse reactions are identified, reported to the primary health care provider, and managed successfully.
- Pain or discomfort following IM or IV administration is relieved or eliminated.
- Anxiety is reduced.
- The patient and family demonstrate understanding of the drug regimen.

## ● *Critical Thinking Exercises*

1. *The charge nurse asks you to discuss the drug metronidazole (Flagyl) at a team conference. Determine what specific points regarding administration and patient and family teaching you would discuss at the conference.*
2. *Mr. Stone is receiving vancomycin. One adverse reaction that may be seen with the administration of this drug is ototoxicity. Rather than ask Mr. Stone directly whether he is having any problem with his hearing, discuss how you might determine if ototoxicity might be occurring.*
3. *Mr. Reeves has a severe infection and is receiving chloramphenicol IV. The nurse notes several bruises on Mr. Reeves arm after 2 days of therapy. What action (if any) should the nurse take. Give a rationale for your answer.*

## ● *Review Questions*

1. When educating a patient about the drug linezolid the nurse instructs the patient _____.
   - **A.** to take the drug without food to enhance absorption
   - **B.** to avoid foods high in tyramine such as chocolate, coffee, tea, and red wine
   - **C.** to avoid alcohol for at least 10 days after taking the drug
   - **D.** that frequent liver function tests will be necessary while taking the drug
2. When giving a drug that is potentially neurotoxic, the nurse reports which of the patient's complaints related to neurotoxicity?
   - **A.** light-headedness and abdominal pain
   - **B.** severe headache and feeling chilly
   - **C.** numbness of the extremities and dizziness
   - **D.** blurred vision and tinnitus
3. When giving spectinomycin to Mr. Jackson for gonorrhea, the nurse advises him to _____.
   - **A.** return for a follow-up examination
   - **B.** limit his fluid intake to 1200 mL per day while taking the drug
   - **C.** return the next day for a second injection
   - **D.** avoid drinking alcohol for the next 10 days
4. When monitoring the IV infusion of vancomycin, the nurse makes sure the drug infuses over a period of 60 minutes because rapid infusion can result in a _____.
   - **A.** fluid overload and respiratory distress
   - **B.** sudden and profound fall in blood pressure
   - **C.** fluid deficit and dehydration
   - **D.** sudden and severe rise in blood pressure

## ● *Medication Dosage Problems*

1. A patient is prescribed 500 mg of vancomycin PO every 6 hours. The drug is available in 500-mg tablets. The nurse administers _____.
2. Metronidazole 250 mg IV is ordered. The drug is available in a vial with 500 mg/2 mL. The nurse administers _____.
3. The primary health care provider prescribes linezolid 400 mg PO. The drug is available as an oral suspension in a strength of 100 mg/5 mL. The nurse administers _____.