chapter 16

Antiparasitic Drugs

Key Terms

amebiasis
anthelmintic
cinchonism
gametocytes
helminthiasis
helminths
merozoites
parasite
sporozoites

Chapter Objectives

On completion of this chapter, the student will:

- Discuss the uses, general drug action, adverse effects, contraindications, precautions, and interactions of the drugs used in the treatment of helminth infections, malaria, and amebiasis.
- Discuss important preadministration and ongoing assessment activities the nurse should perform on the patient taking an anthelmintic, antimalarial, or amebicide drug.
- List some nursing diagnoses particular to a patient taking an anthelmintic, antimalarial, or amebicide drug.
- Discuss ways to promote an optimal response to therapy, how to manage adverse reactions, and important points to keep in mind when educating patients about the use of the anthelmintics, antimalarials, and amebicides.

A **parasite** is an organism that lives in or on another organism (the host) without contributing to the survival or well-being of the host. **Helminthiasis** (invasion of the body by helminths [worms]), malaria (an infectious disease caused by a protozoan and transmitted to humans through a bite from an infected mosquito), and **amebiasis** (invasion of the body by the ameba *Entamoeba histolytica*) are worldwide health problems caused by parasites.

Pinworm is a helminth infection that is universally common; most other helminth infections are predominantly found in countries or areas of the world that lack proper sanitary facilities. Malaria is rare in the United States, but it is sometimes seen in individuals who have traveled to or lived in areas where this disease is a health problem. The first antimalarial drug, quinine, is derived from the bark of the cinchona tree. Amebiasis is seen throughout the world, but it is less common in developed countries where sanitary facilities prevent the spread of the causative organism.

ANTHELMINTIC DRUGS

Anthelmintic (against helminths) drugs are used to treat helminthiasis. Roundworms, pinworms, whipworms, hookworms, and tapeworms are examples of helminths. Table 16-1 lists the organisms that cause helminth infections. The anthelmintic drugs are listed in the Summary Drug Table: Anthelmintic Drugs.

ACTION, USES, AND ADVERSE REACTIONS

Although the actions of anthelmintic drugs vary, their prime purpose is to kill the parasite. Adverse reactions associated with the anthelmintic drugs, if they do occur, are usually mild when the drug is used in the recommended dosage.

Albendazole

Albendazole (Albenza) interferes with the synthesis of the parasite's microtubules, resulting in death of susceptible larva. This drug is used to treat larval forms of pork tapeworm and to treat liver, lung, and peritoneum disease caused by the dog tapeworm.

Mebendazole

Mebendazole (Vermox) blocks the uptake of glucose by the helminth, resulting in a depletion of the helminth's

TABLE 16-1 Common Names and Causative Organisms of Parasitic Infections

COMMON NAME	CAUSATIVE ORGANISM
Roundworm	*Ascaris lumbricoides*
Pinworm	*Enterobius vermicularis*
Whipworm	*Trichuris trichiura*
Threadworm	*Strongyloides stercoralis*
Hookworm	*Ancylostoma duodenale, Necator americanus*
Beef tapeworm	*Taenia saginata*
Pork tapeworm	*Taenia solium*
Fish tapeworm	*Diphyllobothrium latum*

own glycogen. Glycogen depletion results in a decreased formation of adenosine triphosphate, which is required by the helminth for reproduction and survival. This drug is used to treat whipworm, pinworm, roundworm, American hookworm, and the common hookworm. Treatment with mebendazole may cause transient abdominal pain and diarrhea.

Pyrantel

The activity of pyrantel (Antiminth) is probably due to its ability to paralyze the helminth. Paralysis causes the helminth to release its grip on the intestinal wall; it is then excreted in the feces. Pyrantel is used to treat roundworm and pinworm. Some patients receiving pyrantel may experience gastrointestinal side effects, such as nausea, vomiting, abdominal cramps, or diarrhea.

Thiabendazole

The exact mechanism of action of thiabendazole (Mintezol) is unknown. This drug appears to suppress egg or larval production and therefore may interrupt the life cycle of the helminth. Thiabendazole is used to treat threadworm. Thiabendazole may cause hypersensitivity reactions, drowsiness, and dizziness.

CONTRAINDICATIONS, PRECAUTIONS, AND INTERACTIONS

Albendazole

Albendazole is contraindicated in patients with known hypersensitivity to the drug and during pregnancy (Category C). The drug has exhibited embryotoxic and teratogenic effects in experimental animals. Albendazole is used cautiously in patients with hepatic impairment and during lactation. The effects of albendazole are increased with dexamethasone and cimetidine.

Mebendazole

Mebendazole is contraindicated in patients with known hypersensitivity. Mebendazole is also contraindicated during pregnancy (Category C). The drug, like albendazole, has exhibited embryotoxic and teratogenic effects in experimental animals. Administration of mebendazole with the hydantoins and carbamazepine may reduce plasma levels of mebendazole.

SUMMARY DRUG TABLE ANTHELMINTIC DRUGS

GENERIC NAME	TRADE NAME*	USES	ADVERSE REACTIONS	DOSAGE RANGES
albendazole *al-ben'-dah-zohl*	Albenza	Parenchymal neurocysticerosis due to pork tapeworms, hydatid disease (caused by the larval form of the dog tapeworm)	Abnormal liver function tests, abdominal pain, nausea, vomiting, headache, dizziness	≥60 kg: 400 mg BID: <60 kg: 15 mg/kg/d
mebendazole *me-ben'-dah-zole*	Vermox, *generic*	Treatment of whipworm, pinworm, roundworm, common and American hookworm	Transient abdominal pain, diarrhea	100 mg PO morning and evening for 3 consecutive d; pinworm: 100 mg PO as a single dose
pyrantel *pi-ran'-tel*	Antiminth, Reese's Pinworm	Treatment of pinworm and roundworm	Anorexia, nausea, vomiting, abdominal cramps, diarrhea, rash	11 mg/kg PO as a single dose
thiabendazole *thye-a-ben'-da-zole*	Mintezol	Treatment of threadworm	Hypersensitivity reactions, drowsiness, dizziness	<150 lb: 10 mg/lb per dose PO >150 lb: 1.5 g/dose PO Maximum daily dose, 3g

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

Pyrantel

Pyrantel is contraindicated in patients with known hypersensitivity. Pyrantel is used with caution in individuals with liver dysfunction, malnutrition, or anemia. Pyrantel is a Pregnancy Category C drug and is used during pregnancy only if the potential benefit outweighs the risk to the fetus. Pyrantel and piperazine are antagonists and should not be given together.

Thiabendazole

Thiabendazole is contraindicated in patients with known hypersensitivity. Thiabendazole is used with caution in patients with hepatic or renal disease. Thiabendazole is a Pregnancy Category C drug and is used during pregnancy only if the potential benefit outweighs the risk to the fetus. When thiabendazole is administered with the xanthine derivatives, the plasma level of the xanthine may increase to toxic levels. It is important to monitor xanthine plasma levels closely in case a dosage reduction is necessary.

NURSING PROCESS

The Patient Receiving an Anthelmintic Drug

ASSESSMENT

Preadministration Assessment

During the preadministration assessment, the nurse obtains vital signs before the first dose of the anthelmintic drug is given. The nurse also may need to weigh the patient if the drug's dosage is determined by weight or if the patient is acutely ill.

Ongoing Assessment

Unless ordered otherwise, the nurse should save all stools that are passed after the drug is given. It is important to visually inspect each stool for passage of the helminth. If stool specimens are to be saved for laboratory examination, the nurse follows hospital procedure for saving the stool and transporting it to the laboratory. If the patient is acutely ill or has a massive infection, it is important to monitor vital signs every 4 hours and measure and record fluid intake and output. The nurse observes the patient for adverse drug reactions, as well as severe episodes of diarrhea. It is important to notify the primary health care provider if these occur.

NURSING DIAGNOSES

The nursing diagnoses depend on the patient and the type of helminth infection. Drug-specific nursing diagnoses are highlighted in the Nursing Diagnoses Checklist. Other nursing diagnoses are discussed in depth in Chapter 4.

Nursing Diagnoses Checklist

- ✓ **Imbalanced Nutrition: Less Than Body Requirements** related to infestation with helminths or anthelmintic adverse drug reactions

PLANNING

The expected outcomes for the patient may include a reduction in anxiety, an optimal response to therapy, management of adverse reactions, and an understanding of and compliance with the prescribed therapeutic regimen.

IMPLEMENTATION

Promoting an Optimal Response to Therapy

The diagnosis of a helminth infection is made by examination of the stool for ova and all or part of the helminth. Several stool specimens may be necessary before the helminth is seen and identified. The patient history also may lead to a suspicion of a helminth infection, but some patients have no symptoms.

When a pinworm infection is suspected, the nurse takes a specimen from the anal area, preferably early in the morning before the patient gets out of bed. Specimens are taken by swabbing the perianal area with a cellophane tape swab.

Patients with massive helminth infections may or may not be acutely ill. The acutely ill patient requires hospitalization, but many individuals with helminth infections can be treated on an outpatient basis.

The diagnosis of a helminth infection is often distressing to patients and their family. The nurse should allow time to explain the treatment and future preventive measures, as well as to allow the patient or family members to discuss their concerns or ask questions.

Depending on hospital policy, as well as the type of helminth infection, linen precautions may be necessary. The nurse wears gloves when changing bed linens, emptying bedpans, or obtaining or handling stool specimens. It is important to wash hands thoroughly after removing the gloves. The nurse instructs the patient to wash the hands thoroughly after personal care and use of the bedpan.

ADMINISTERING AN ANTHELMINTIC DRUG. The method of administration of an anthelmintic drug may vary somewhat from the administration of other drugs. To achieve an optimal response to therapy, it is most important that the drug be given as directed by the primary health care provider, drug label, or package insert. Display 16-1 provides specific instructions for administering anthelmintic drugs.

Monitoring and Managing Adverse Reactions

The nurse monitors the patient taking an anthelmintic drug closely for adverse reactions.

DISPLAY 16-1 ● Instructions for Administering Anthelmintics

- Albendazole—The drug is given as tablets twice a day with meals for a course of 8 to 30 days.
- Mebendazole—The patient may chew, swallow whole, or mix the tablets with food. The patient should take these drugs with foods high in fat to increase absorption. The nurse should make sure a complete blood count is obtained before therapy and periodically during therapy because mebendazole can cause leukopenia or thrombocytopenia.
- Pyrantel—The patient can take this drug anytime without regard to meal or time of day. The patient may take the drug with milk or fruit juices.
- Thiabendazole—The patient takes this drug with food to minimize gastrointestinal upset and distress.

RISK FOR IMBALANCED NUTRITION. Gastrointestinal upset may occur, causing nausea, vomiting, abdominal pain, and diarrhea. Taking the drug with food often helps to alleviate the nausea. The patient may require frequent, small meals of easily digested food. The nurse considers the patient's food preferences and encourages the patient to eat nutritious, balanced meals. If vomiting is present, the primary health care provider may prescribe an antiemetic or a different anthelmintic agent. If diarrhea is present, the nurse notifies the primary health care provider because a change in the drug regimen may be needed. The nurse keeps a record of the number, consistency, color, and frequency of stools. The nurse monitors the fluid intake and output. It is important to keep the patient clean and the room free of odor.

Educating the Patient and Family

When an anthelmintic is prescribed on an outpatient basis, the nurse gives the patient or a family member complete instructions about taking the drug, as well as household precautions that should be followed until the helminth is eliminated from the intestine. The nurse develops a patient education plan to include the following:

- Report any symptoms of infection (low-grade fever or sore throat) or thrombocytopenia (easy bruising or bleeding).
- Follow the dosage schedule exactly as printed on the prescription container. (See Administering an Anthelmintic Drug for the directions specific for each drug.) It is absolutely necessary to follow the directions for taking the drug to eradicate the helminth.
- Follow-up stool specimens will be necessary because this is the only way to determine the success of drug therapy.
- To prevent reinfection and the infection of others in the household, change and launder bed linens and undergarments daily, separately from those of other members of the family.
- Daily bathing (showering is best) is recommended. Disinfect toilet facilities daily, and disinfect the bathtub or shower stall immediately after bathing. Use the disinfectant recommended by the primary health care provider or use chlorine bleach. Scrub the surfaces thoroughly and allow the disinfectant to remain in contact with the surfaces for several minutes.
- Wash the hands thoroughly after urinating or defecating and before preparing and eating food. Clean under the fingernails daily and avoid putting fingers in the mouth or biting the nails.
- Albendazole can cause serious harm to a developing fetus. Use a barrier contraceptive during the course of therapy and for 1 month after discontinuing the therapy.

EVALUATION

- The therapeutic effect is achieved.
- Adverse reactions are identified, reported to the primary health care provider, and managed successfully using appropriate nursing interventions.
- The infection is resolved.
- Stool specimens or perineal swabs are negative for parasites.
- The patient verbalizes an understanding of the therapeutic regimen modalities and the importance of continued follow-up testing.
- The patient describes or lists measures used to prevent the spread of infection to others.
- The patient verbalizes the importance of complying with the prescribed treatment regimen and preventive measures.

ANTIMALARIAL DRUGS

Malaria is transmitted from person to person by a certain species of the *Anopheles mosquito*. The four different protozoans causing malaria are *Plasmodium falciparum, P. malariae, P. ovale*, and *P. vivax*. Drugs used to treat or prevent malaria are called antimalarial drugs. Three antimalarial drugs are discussed in the chapter: chloroquine, doxycycline, and quinine sulfate. Other examples of antimalarial drugs in use today are listed in the Summary Drug Table: Antimalarial Drugs.

ACTIONS

The plasmodium causing malaria must enter the mosquito to develop, reproduce, and be transmitted. When the mosquito bites a person infected with malaria, it ingests the male and female forms (**gametocytes**) of the plasmodium. The gametocytes mate in the mosquito's

SUMMARY DRUG TABLE ANTIMALARIAL DRUGS

GENERIC NAME	TRADE NAME*	USES	ADVERSE REACTIONS	DOSAGE RANGES
atovaquone and proquanil HCl *uh-toe'-vuh-kwone*	Malarone	Prevention and treatment of malaria	Headache, fever, myalgia, abdominal pain, diarrhea	Prevention: 1--2 d before travel 1 tablet PO per day during period of exposure and for 7 days after exposure. Treatment: 4 tablets PO daily for 3 d
chloroquine *klor'-oh-kwin*	Aralen	Treatment and prevention of malaria	Hypotension, electrocardiographic changes, headache, nausea, vomiting, anorexia, diarrhea, abdominal cramps, visual disturbances	Treatment: *Dose expressed as base.* 160–200 mg (4–5 mL) IM and repeat in 6 h if necessary. Prevention: 300 mg PO weekly; treatment: initially 600 mg PO and 300 mg PO 6 h later, then 300 mg/d PO for 2 d
doxycycline *dox-i-sye'-kleen*	Monodox, Vibramycin, Vibra-Tabs, *generic*	Short-term prevention of malaria	Photosensitivity, anorexia, nausea, vomiting, diarrhea, superinfection, rash	100 mg PO QD
halofantrine *hay'-low-fan-trin*	Halfan	Treatment of malaria	Abdominal pain, nausea, vomiting, anorexia, diarrhea, dizziness	500 mg PO q6h for 3 doses, repeat dose regimen in 7 days
hydroxychloroquine sulfate *hye-drox-ee-klor'-oh-kwin*	Plaquenil Sulfate	Prevention and treatment of malaria	Same as chloroquine	*Dose expressed as base.* Prevention: 310 mg PO weekly; treatment: initially 620 mg PO, and 310 mg 6 h later, then 310 mg/d PO for 2 d
mefloquine hydrochloride *me'-flow-kwin*	Lariam	Prevention and treatment of malaria	Vomiting, dizziness, disturbed sense of balance, nausea, fever, headache, visual disturbances	Prevention: 250 mg/wk PO for 4 wk, then 250 mg PO every other week; treatment: 5 tablets PO as a single dose
primaquine phosphate *prim'-a-kween*	*generic*	Treatment of malaria	Nausea, vomiting, epigastric distress, abdominal cramps	*Dose expressed as base.* 15 mg/d PO for 14 d
pyrimethamine *peer-i-meth'-a-mine*	Daraprim	Prevention and treatment of malaria	Nausea, vomiting, hematologic changes, anorexia	Prevention: 25 mg PO once weekly; treatment: 50 mg/d for 2 days
quinine sulfate *kwi'-nine*	*generic*	Treatment of malaria	Cinchonism, vertigo, hematologic changes, skin rash, visual disturbances	260–650 mg TID for 6–12 days
sulfadoxine and pyrimethamine *sul-fa-dox'-een peer-i-meth'-a-meen*	Fansidar	Prevention and treatment of malaria	Hematologic changes, nausea, emesis, headache, hypersensitivity reactions, Stevens-Johnson syndrome	Prevention: 1 tablet PO weekly or 2 tablets every 2 wk; treatment: 2–3 tablets PO as a single dose

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

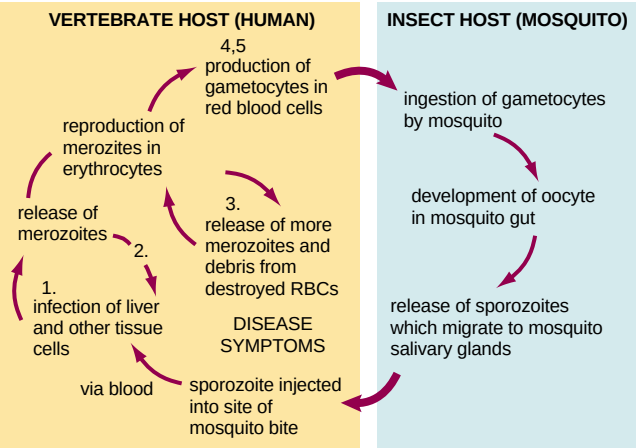

FIGURE 16-1. Life cycle of the malarial parasite. Points numbered on the illustration indicate the location in the malarial life cycle where specific drugs might be effective. (**1**) Chlorguanide, pyrimethamine, and primaquine used for causal prophylaxis. (**2**) Primaquine used to prevent relapses. (**3**) Drugs against the erythrocytic phase: potent action—chloroquine, amodiaquine, quinine; limited action—primaquine and chlorguanide. (**4**) Gametocidal drugs: primaquine. (**5**) Gametocyte-sterilizing drugs: chlorguanide, pyrimethamine.

stomach and ultimately form **sporozoites** (an animal reproductive cell) that make their way to the salivary glands of the mosquito. When the mosquito bites a non-infected person, the sporozoites enter the person's bloodstream and lodge in the liver and other tissues. The sporozoites then undergo asexual cell division and reproduction and form **merozoites** (cells formed as a result of asexual reproduction). The merozoites then divide asexually and enter the red blood cells of the person, where they form the male and female forms of the plasmodium. The symptoms of malaria (shaking, chills, and fever) appear when the merozoites enter the individual's red blood cells.

Antimalarial drugs interfere with, or are active against, the life cycle of the plasmodium, primarily when it is present in the red blood cells. Destruction at this stage of the plasmodium life cycle prevents the development of the male and female forms of the plasmodium. This in turn keeps the mosquito (when the mosquito bites an infected individual) from ingesting the male and female forms of the plasmodium, thus effectively ending the plasmodium life cycle (Fig. 16-1).

USES

Two terms are used when discussing the uses of antimalarial drugs:

1. Suppression—the prevention of malaria
2. Treatment—the management of a malarial attack

Not all antimalarial drugs are effective in suppressing or treating all four of the Plasmodium species that cause malaria. In addition, resistant strains have developed, and some antimalarial drugs are no longer effective against some of these strains. The primary health care provider must select the antimalarial drug that reportedly is effective, at present, for the type of malaria the individual either has (treatment) or could be exposed to (prevention) in a specific area of the world.

Chloroquine (Aralen) is also used in the treatment of extraintestinal amebiasis (see section on Amebicides). Doxycycline is also used to treat infections caused by *Neisseria gonorrhoeae, Treponema pallidum, Listeria monocytogenes, Clostridium*, and *Bacillus anthracis* when penicillin is contraindicated. Quinine also may be used for the prevention and treatment of nocturnal leg cramps.

ADVERSE REACTIONS

Chloroquine

The adverse reactions associated with the administration of chloroquine (Aralen HCl and phosphate) and hydroxychloroquine include hypotension, electrocardiographic changes, visual disturbances, headache, nausea, vomiting, anorexia, diarrhea, and abdominal cramps.

Doxycycline

Doxycycline (Vibramycin) is an antibiotic belonging to the tetracycline group of antibiotics. The adverse reactions associated with this drug are discussed in Chapter 9 and include photosensitivity, anorexia, nausea, and vomiting.

Quinine

The use of quinine can cause cinchonism at full therapeutic doses. **Cinchonism** is a group of symptoms associated with quinine, including tinnitus, dizziness, headache, gastrointestinal disturbances, and visual disturbances. These symptoms usually disappear when the dosage is reduced. Other adverse reactions include hematologic changes, vertigo, and skin rash.

CONTRAINDICATIONS, PRECAUTIONS, AND INTERACTIONS

Chloroquine

Chloroquine is contraindicated in patients with known hypersensitivity. It is a good idea to use chloroquine cautiously in patients with hepatic disease or bone marrow depression and during pregnancy. Children are very sensitive to chloroquine, and the drug should be used with extreme caution in children.

Because the effects of chloroquine during pregnancy (Pregnancy Category C) are unknown, this drug is given only when clearly needed and the potential benefits outweigh potential hazards to the fetus. There is an increased risk of hepatotoxicity when chloroquine is administered with other hepatotoxic drugs.

Foods that acidify the urine (cranberries, plums, prunes, meats, cheeses, eggs, fish, and grains) may increase excretion and decrease the effectiveness of chloroquine.

Doxycycline

Doxycycline is contraindicated in patients with known hypersensitivity. Because the effects of doxycycline during pregnancy (Category D) are unknown, this drug is contraindicated during pregnancy. The drug is used cautiously in patients with renal or hepatic impairment and during lactation. There is a decreased absorption of the drug when administered with antacids or iron. There is a decrease of the therapeutic effects of doxycycline when the drug is administered with barbiturates, phenytoins, and carbamazepine. There is an increased risk of digoxin toxicity when digoxin is administered with doxycycline.

Quinine

Quinine is contraindicated in patients with known hypersensitivity. The drug is also contraindicated in pregnant women (Pregnancy Category X) and in patients with myasthenia gravis (may cause respiratory distress and dysphagia). Quinine absorption is delayed when administered with antacids containing aluminum. Plasma digitalis levels may increase when digitalis preparations and quinine are given concurrently. Plasma levels of warfarin are increased when administered with quinine.

NURSING PROCESS

The Patient Receiving an Antimalarial Drug

ASSESSMENT

Preadministration Assessment

When an antimalarial drug is given to a hospitalized patient for treatment of malaria, the preadministration assessment includes vital signs and a summary of the nature and duration of the symptoms. Laboratory tests may be ordered for the diagnosis of malaria. Additional laboratory tests, such as a complete blood count, may be ordered to determine the patient's general health status.

Ongoing Assessment

If the patient is hospitalized with malaria, the nurse takes the vital signs every 4 hours or as ordered by the primary health care provider. The nurse observes the patient every 1 to 2 hours for the symptoms of malaria (headache, nausea, muscle aching, and high fever). Improvement or exacerbation of signs and symptoms of malaria is documented and reported to the primary health care provider. Antipyretics may be ordered for fever. If the patient is acutely ill, the nurse carefully measures and records the fluid intake and output. In some instances, intravenous fluids may be required.

Nursing Diagnoses Checklist

- ✓ **Risk for Injury** related to adverse reactions
- ✓ **Risk for Imbalanced Nutrition: Less Than Body Requirements** related to adverse drug reactions or disease process (malaria)
- ✓ **Disturbed Sensory Perception: Visual** related to adverse drug reactions

NURSING DIAGNOSES

The specific nursing diagnoses for a patient receiving an antimalarial depend on the reason for administration (prevention or treatment) of the antimalarial drug. Drug-specific nursing diagnoses are highlighted in the Nursing Diagnoses Checklist.

PLANNING

The expected outcomes for the patient may include an optimal response to therapy, maintenance of adequate nutrition, management of common adverse reactions, and an understanding of and compliance with the prescribed therapeutic or prevention regimen.

IMPLEMENTATION

Promoting an Optimal Therapeutic Response

When administering an antimalarial drug such as chloroquine for prophylaxis (prevention), therapy should begin 2 weeks before exposure and continue for 6 to 8 weeks after the client leaves the area where malaria is prevalent. Initial treatment with quinine may be given parenterally. When administered intravenously (IV), quinine should be well diluted and administered slowly. The nurse must frequently examine the injection site and areas along the vein because quinine is irritating to the vein. Parenteral injection of chloroquine is avoided because the drug can cause respiratory distress, shock, and cardiovascular collapse when given intramuscularly or IV. If chloroquine must be given parenterally, the route should be changed to oral as soon as possible.

RISK FOR IMBALANCED NUTRITION. Patients receiving an antimalarial drug may experience nausea. Good nutrition

is essential in the healing process. The nurse assists patients to identify food preferences and aversions and helps them in planning a nutritious diet. The nurse can consult a registered dietitian if necessary. If the patient is hospitalized with an active case of malaria, the nurse keeps the room environment clean and pleasant during mealtime. Meals should be nutritious and attractively served. Several small meals may be preferable to three large meals.

Monitoring and Managing Adverse Reactions

The nurse monitors for adverse reactions associated with the antimalarial drugs, such as dizziness, hypotension, and visual disturbances. Other adverse reactions are listed in the Summary Drug Table: Antimalarial Drugs.

RISK FOR INJURY. Some patients experience dizziness and hypotensive episodes when taking antimalarial drugs. The nurse should frequently monitor blood pressure if the patient is hospitalized. If dizziness occurs, the nurse may need to assist the patient with ambulation. The nurse instructs the patient to rise slowly from a reclining position, sit a few minutes before standing, and stand a few minutes before beginning to walk. When the patient is taking these drugs on an outpatient basis, the nurse instructs the patient to avoid driving or performing hazardous tasks if dizziness occurs.

DISTURBED SENSORY PERCEPTION: VISUAL. The patient taking chloroquine may experience a number of visual disturbances, such as disturbed color vision, blurred vision, night blindness, diminished visual fields, or optic atrophy. The nurse questions the patient about visual disturbances.

Nursing Alert

The nurse reports any visual disturbance in patients taking chloroquine to the primary health care provider. Irreversible retinal damage has occurred in patients on long-term therapy with these drugs.

Frequent ophthalmic examinations are necessary for patients receiving long-term or high-dose regimens of chloroquine. When vision is affected, the patient is assessed for the extent of visual impairment. If treated outside the hospital, it is important to instruct the patient not to drive until assessed by an ophthalmologist. Environmental safety is accomplished by measures such as positioning doors and furniture so they are out of walkways, removing scatter rugs, placing items frequently used in convenient places, and strategically placing grab bars to aid in maintaining balance. Assistance with ambulation may be necessary.

Educating the Patient and Family

When an antimalarial drug is prescribed for the prevention (suppression) of malaria, the nurse thoroughly reviews the drug regimen with the patient. When the drug is to be taken once a week, the nurse advises patients to select a day of the week that will best remind them to take the drug. The nurse emphasizes the importance of taking the drug exactly as prescribed because failure to take the drug on an exact schedule will not give protection against malaria.

The patient must have a complete understanding of the therapeutic regimen. The nurse reviews the drug dosage schedule with the patient and stresses the importance of adhering to the prescribed dosage schedule.

When an antimalarial drug is used for prevention of malaria and taken once a week, the patient must take the drug on the same day each week. The program of prevention is usually started 1 week before departure to an area where malaria is prevalent.

The following additional information is relevant to specific antimalarial drugs:

Chloroquine: Take this drug with food or milk. Avoid foods that acidify the urine (cranberries, plums, prunes, meats, cheeses, eggs, fish, and grains). This drug may cause diarrhea, loss of appetite, nausea, stomach pain, or vomiting. Notify the primary health care provider if these symptoms become pronounced. Chloroquine may cause a yellow or brownish discoloration to the urine; this is normal and will go away when the drug therapy is discontinued. Notify the primary health care provider if any of the following occur:

- Visual changes
- Ringing in the ears
- Difficulty in hearing
- Fever
- Sore throat
- Unusual bleeding or bruising
- Unusual color (blue-black) of the skin
- Skin rash
- Unusual muscle weakness

Doxycycline: This drug can cause photosensitivity. Even relatively brief exposure to sunlight may cause sunburn. Avoid exposure to the sun by wearing protective clothing (eg, long-sleeved shirts and wide-brimmed hats) and by using a sunscreen.

Quinine: Take this drug with food or immediately after a meal. Do not drive or perform other hazardous tasks requiring alertness if blurred vision or dizziness occurs. If the tablet or capsule is difficult to swallow, do not chew the tablet or open the capsule because the drug is irritating to the stomach. If itching, rash, fever, difficult breathing, or vision problems occur, stop taking the drug and notify the primary health care provider.

EVALUATION

- The therapeutic effect is achieved.
- Adverse reactions are identified, reported to the health care provider, and managed using appropriate nursing interventions.
- The patient verbalizes the importance of complying with the prescribed therapeutic or prophylactic regimen.
- The patient verbalizes an understanding of the prophylaxis or treatment schedule.

AMEBICIDES

Amebicides (drugs that kill amebas) are used to treat amebiasis caused by the parasite *E. histolytica*. An ameba is a one-celled organism found in soil and water. Examples of amebicides are listed in the Summary Drug Table: Amebicides.

ACTIONS AND USES

These drugs are amebicidal (ie, they kill amebas). There are two types of amebiasis: intestinal and extraintestinal. In the intestinal form, the ameba is confined to the intestine. In the extraintestinal form, the ameba is found outside of the intestine, such as in the liver. The extraintestinal form of amebiasis is more difficult to treat.

Iodoquinol (Yodoxin) and metronidazole (Flagyl) are used to treat intestinal amebiasis. Metronidazole is also used to treat infections caused by susceptible microorganisms and is discussed in Chapter 11. Paromomycin is an aminoglycoside with amebicidal activity and is used to treat intestinal amebiasis. Chloroquine hydrochloride (Aralen) is used to treat extraintestinal amebiasis.

ADVERSE REACTIONS

Chloroquine

Hypotension, electrocardiographic changes, headache, nausea, vomiting, anorexia, diarrhea, abdominal cramps, and psychic stimulation can occur with the use of chloroquine hydrochloride or phosphate.

Iodoquinol

Various types of skin eruptions, nausea, vomiting, fever, chills, abdominal cramps, vertigo, and diarrhea can occur with administration of iodoquinol.

SUMMARY DRUG TABLE AMEBICIDES

GENERIC NAME	TRADE NAME*	USES	ADVERSE REACTIONS	DOSAGE RANGES
chloroquine hydrochloride *klor'-oh-kwin*	Aralen	Extraintestinal amebiasis when oral therapy not feasible	Hypotension, electrocardiographic (ECG) changes, headache, nausea, vomiting, anorexia, diarrhea, abdominal cramps, psychic stimulation, visual disturbances	*Dose expressed as base.* 160–200 mg/d IM for 10–12 d
chloroquine phosphate *klor'-oh-kwin*	Aralen Phosphate, *generic*	Extraintestinal amebiasis when oral therapy not feasible	Hypotension, ECG changes, headache, nausea, vomiting, anorexia, diarrhea, abdominal cramps, psychic stimulation	1 g (600 mg base)/d for 2 d, then 500 mg (300 mg base)/d for 2–3 wk
iodoquinol *eye-oh-doe-kwin'-ole*	Yodoxin	Treatment of intestinal amebiasis	Skin eruptions, nausea, vomiting, fever, chills, abdominal cramps, vertigo, diarrhea	650 mg PO TID after meals for 20 d
metronidazole *me-troe-ni'-da-zole*	Flagyl, *generic*	Treatment of intestinal amebiasis	Headache, nausea, peripheral neuropathy, disulfiram-like interaction with alcohol	750 mg PO TID for 5–10 d
paromomycin *par-oh-moe-mye'-sin*	Humatin	Treatment of intestinal amebiasis	Nausea, vomiting, diarrhea	25–35 mg/kg/d in 3 divided doses with meals for 5–10 d

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

Metronidazole

Convulsive seizures, headache, nausea, and peripheral neuropathy (numbness and tingling of the extremities) have been reported with the use of metronidazole.

Paromomycin

This drug has relatively few adverse reactions. The most common include nausea, vomiting, and diarrhea. The more serious adverse reactions, although rare, are nephrotoxicity and ototoxicity.

CONTRAINDICATIONS, PRECAUTIONS, AND INTERACTIONS

Chloroquine

Chloroquine is contraindicated in patients with known hypersensitivity. Precautions and interactions for chloroquine are provided in the discussion of the drug in the Antimalarial Drugs section.

Iodoquinol

Iodoquinol is contraindicated in patients with known hypersensitivity. Iodoquinol is used with caution in patients with thyroid disease and during pregnancy and lactation. Iodoquinol may interfere with the results of thyroid function tests. This interference not only occurs during therapy, but may last as long as 6 months after iodoquinol therapy is discontinued.

Metronidazole

Metronidazole is contraindicated in patients with known hypersensitivity. Metronidazole is contraindicated during the first trimester of pregnancy (Category B). Metronidazole is given during the second and third trimesters of pregnancy. Metronidazole is used cautiously in patients with blood dyscrasias, seizure disorders, and severe hepatic impairment. The patient must avoid alcohol while taking metronidazole.

When metronidazole is administered with cimetidine, the metabolism of metronidazole is decreased; when it is administered with phenobarbital, the metabolism is increased, possibly causing a decrease in the effectiveness of metronidazole. Metronidazole increases the effects of warfarin.

Paromomycin

Paromomycin is contraindicated in patients with known hypersensitivity. Paromomycin is given with caution during pregnancy. Paromomycin is used with caution in patients with bowel disease. High doses and prolonged therapy are avoided because the drug may be absorbed in large amounts by patients with bowel disease, causing ototoxicity and renal impairment.

NURSING PROCESS

The Patient Receiving an Amebicide

ASSESSMENT

Preadministration Assessment

Diagnosis of amebiasis is made by examining the stool, as well as by considering the patient's symptoms. Once the patient has received a diagnosis of amebiasis, local health department regulations often require investigation into the source of infection. A thorough history of foreign travel is necessary. If the patient has not traveled to a foreign country, further investigation of the patient's lifestyle, such as local travel, use of restaurants, and the local water supply (especially well water) may be necessary to identify the source of the infection. In addition, it is common practice to test immediate family members for amebiasis.

Before the first dose of an amebicide is given, the nurse records the patient's vital signs and weight. The nurse evaluates the general physical status of the patient and looks for evidence of dehydration, especially if severe vomiting and diarrhea have occurred.

Ongoing Assessment

If the patient is acutely ill or has vomiting and diarrhea, the nurse measures the fluid intake and output and observes the patient closely for signs of dehydration. If dehydration is apparent, the nurse notifies the primary health care provider. If the patient is or becomes dehydrated, oral or IV fluid and electrolyte replacement may be necessary. The nurse takes vital signs every 4 hours or as ordered by the primary health care provider.

NURSING DIAGNOSES

The specific nursing diagnoses used depend on the type of amebiasis and the condition of the patient. Drug-specific nursing diagnoses are highlighted in the Nursing Diagnoses Checklist. More general nursing diagnoses are discussed in greater depth in Chapter 4.

Nursing Diagnoses Checklist

- ☑ **Diarrhea** related to amebiasis
- ☑ **Risk for Deficient Fluid Volume** related to amebiasis
- ☑ **Imbalanced Nutrition: Less Than Body Requirements** related to adverse effects of drug therapy

PLANNING

The expected outcomes for the patient may include an optimal response to therapy, management of common adverse reactions, an absence of diarrhea, maintenance of an adequate intake of fluids, maintenance of adequate nutrition, an understanding of the therapeutic regimen (hospitalized patients), and an understanding of and compliance with the prescribed therapeutic regimen (outpatients).

IMPLEMENTATION

Promoting an Optimal Response to Therapy

The patient with amebiasis may or may not be acutely ill. Nursing management depends on the condition of the patient and the information obtained during the initial assessment.

Isolation is usually not necessary, but hospital policy may require isolation procedures. Stool precautions are usually necessary. The nurse washes the hands thoroughly after all patient care and the handling of stool specimens.

Monitoring and Managing Adverse Reactions

The nurse monitors the patient for adverse reactions associated with the amebicides such as diarrhea and gastrointestinal upsets. Other adverse reactions are listed on the Summary Drug Table: Amebicides.

DIARRHEA AND DEFICIENT FLUID VOLUME. The nurse records the number, character, and color of stools passed. Daily stool specimens may be ordered to be sent to the laboratory for examination. The nurse immediately delivers all stool specimens saved for examination to the laboratory because the organisms die (and therefore cannot be seen microscopically) when the specimen cools. The nurse should inform laboratory personnel that the patient has amebiasis because the specimen must be kept at or near body temperature until examined under a microscope.

The nurse observes the patient with severe or frequent episodes of diarrhea for symptoms of a fluid volume deficit. The primary health care provider is notified if signs of dehydration become apparent because IV fluids may be necessary.

IMBALANCED NUTRITION. Because most amebicides cause gastrointestinal upsets, particularly nausea, the maintenance of adequate nutrition is important. A discussion of eating habits, food preferences, and food aversions will assist in meal planning. The nurse monitors body weight daily to identify any changes (increase or decrease). The nurse should make sure that meals are well balanced nutritionally, appetizing, and attractively served. Small frequent meals (five to six daily) may be more appealing than three large meals. The nurse may consult the dietitian if necessary.

Educating the Patient and Family

The nurse stresses the importance of completing the full course of treatment. The nurse should provide the following information to patients receiving an amebicide on an outpatient basis:

- Follow directions: Take the drug exactly as prescribed. Complete the full course of therapy to eradicate the ameba. Failure to complete treatment may result in a return of the infection.
- Prevention: Follow measures to control the spread of infection. Wash hands immediately before eating or preparing food and after defecation.
- Chef/waitstaff: Food handlers should not resume work until a full course of treatment is completed and stools do not contain the ameba.
- Chloroquine: Notify the primary health care provider if any of the following occurs: ringing in the ears, difficulty hearing, visual changes, fever, sore throat, or unusual bleeding or bruising.
- Iodoquinol: Notify the primary health care provider if nausea, vomiting, or other gastrointestinal distress becomes severe.
- Metronidazole: This drug may cause gastric upset. Take this drug with food or meals. Avoid the use of alcohol, in any form, until the course of treatment is completed. The ingestion of alcohol may cause a mild to severe reaction, with symptoms of severe vomiting, headache, nausea, abdominal cramps, flushing, and sweating. These symptoms may be so severe that hospitalization may be required.
- Paromomycin: Take this drug three times a day with meals. Report any ringing in the ears, dizziness, severe gastrointestinal upset, decrease in urinary output, or other urinary difficulties.

EVALUATION

- The therapeutic effect is achieved.
- Adverse reactions are identified, reported to the primary health care provider, and managed successfully through nursing interventions.
- Bowel elimination is normal.
- The patient verbalizes an understanding of the therapeutic modalities and importance of continued follow-up care.
- The patient verbalizes the importance of complying with the prescribed therapeutic regimen.

● *Critical Thinking Excercises*

1. *While he was living outside the country for 3 years, Mr. Evans became infected with a helminth. The parasite has been identified and the appropriate drug prescribed. Discuss the points you would include in a teaching plan for this patient.*

2. *A child in a family of four children is found to have pinworms. Determine what you would include in a teaching plan to prevent the spread of pinworms to other family members.*
3. *Explain what precautions should be taken when administering paromomycin.*
4. *Mr. Adkins, age 68 years, is being treated with metronidazole for intestinal amebiasis. He tells you that he lives alone, eats out for most of his meals, and likes to have a glass of wine before retiring. Analyze what information would be most important for you to give Mr. Adkins before he begins taking metronidazole.*

● Review Questions

1. When discussing the adverse reactions of the anthelmintic, the nurse correctly states that _____.
   - **A.** patients must be closely observed for 2 hours after the drug is given
   - **B.** adverse reactions are usually mild when recommended doses are used
   - **C.** most patients experience severe adverse reaction and must be monitored closely
   - **D.** there are no adverse reactions associated with these drugs

2. A patient asks how antimalarial drugs prevent or treat malaria. The nurse correctly responds that this group of drugs _____.
   - **A.** kills the mosquito that carries the protozoa
   - **B.** interferes with the life cycle of the protozoa causing malaria
   - **C.** ruptures the red blood cells that contain merozoites
   - **D.** increases the body's natural immune response to the protozoa

3. When explaining the drug regimen to a patient who will be taking chloroquine for the prevention of malaria the nurse instructs the patient _____.
   - **A.** to take the drug on an empty stomach
   - **B.** to protect the skin from the sun because the drug can cause a severe sunburn
   - **C.** therapy should begin 2 weeks before exposure
   - **D.** to take the drug with a citrus drink to enhance absorption

4. While administering paromomycin, the nurse monitors the patient for which of the following adverse reactions?
   - **A.** ototoxicity
   - **B.** cinchonism
   - **C.** convulsions
   - **D.** hypertension

● Medication Dosage Problems

1. Pyrantel 360 mg is prescribed. The drug is available in 180-mg capsules. The nurse administers _____.
2. Hydroxychloroquine 0.4 g is ordered. The drug is available in 200-mg tablets. The nurse administers _____.