

# Antiviral Drugs

## Key Terms

anticholinergic effects  
exacerbations  
granulocytopenia

remissions  
retinitis

## Chapter Objectives

On completion of this chapter, the student will:

- Discuss the uses, general drug action, adverse reactions, contraindications, precautions, and interactions of antiviral drugs.
- Discuss important preadministration and ongoing assessment activities the nurse should perform on the patient receiving an antiviral drug.
- List some nursing diagnoses particular to a patient taking an antiviral drug.
- List possible goals for a patient taking an antiviral drug.
- Discuss ways to promote an optimal response to therapy, how to manage adverse reactions, and special considerations to keep in mind when educating the patient and the family about the antiviral drugs.

More than 200 viruses have been identified as capable of producing disease. Acute viruses, such as the common cold, have a rapid onset and quick recovery. Chronic viral infections, such as acquired immunodeficiency syndrome (AIDS), have recurrent episodes of **exacerbations** (increases in severity of symptoms of the disease) and **remissions** (periods of partial or complete disappearance of the signs and symptoms). Display 14-1 describes the viruses discussed in this chapter.

Although viral infections are common, for many years only a limited number of drugs were available for their treatment. Over the past several years, the number of antiviral drugs has increased significantly. Several of the antiviral drugs will be discussed in greater detail than others. These include acyclovir (Zovirax), amantadine (Symmetrel), didanosine (Videx), ribavirin (Virazole), zanamivir (Relenza), and zidovudine (AZT, Retrovir). The Summary Drug Table: Antiviral Drugs presents a more complete listing of the antiviral drugs currently in use.

## ACTIONS

Viruses can reproduce only within a living cell. A virus consists of either DNA or RNA surrounded by a protein shell. The virus is capable of reproducing only when it



## Herbal Alert: Lemon Balm

Lemon balm is a perennial herb with heart-shaped leaves that has been used for hundreds of years. Its scientific name is *Melissa officinalis*. Traditionally the herb has been used for Graves' disease (see Chap. 51), as a sedative, antispasmodic, and an antiviral agent. When used topically, lemon balm has antiviral activity against herpes simplex virus (HSV). No adverse reactions have been reported when lemon balm is used topically.

uses the body's cellular material (Fig. 14-1). Most antiviral drugs act by inhibiting viral DNA or RNA replication in the virus, causing viral death.

## USES

Although infections caused by a virus are common, antiviral drugs have limited use because they are effective against only a small number of specific viral infections.

General uses of the antiviral drugs include the treatment of:

- Initial and recurrent mucosal and cutaneous herpes simplex virus (HSV) 1 and 2 infections in

## DISPLAY 14-1 • Description of Viral Infections

### CYTOMEGALOVIRUS (CMV)

- CMV, a virus of the herpes family, is a common viral infection. Healthy individuals may become infected yet have no symptoms. However, immunocompromised patients (such as those with HIV or cancer) may have the infection. Symptoms include malaise, fever, pneumonia, and superinfection. Infants may acquire the virus from the mother while in the uterus, resulting in learning disabilities and mental retardation. CMV can infect the eye, causing retinitis. Symptoms of CMV retinitis are blurred vision and decreased visual acuity. Visual impairment is irreversible and can lead to blindness if untreated.

### HERPES SIMPLEX VIRUS (HSV)

- HSV is divided into HSV-1, which causes oral, ocular, or facial infections, and HSV-2, which causes genital infection. However, either type can cause disease at either body site. HSV-1 causes painful vesicular lesions in the oral mucosa, face, or around the eyes. HSV-2 or genital herpes is usually transmitted by sexual contact and causes painful vesicular lesions on the mucous membranes of the genitalia. Vaginal lesions may appear as mucous patches with grayish ulcerations. The patient may appear irritable, lethargic, and jaundiced, and may have difficulty breathing or experience seizures. The lesions usually heal within 2 weeks. Immunosuppressed patients may develop a severe systemic disease.

### HERPES ZOSTER

- Herpes zoster (shingles) is caused by the varicella (chickenpox) virus. It is highly contagious. The virus causes chickenpox in the child and is easily spread via the respiratory system. Recovery from childhood chickenpox results in the infection lying dormant in the nerve cells. The virus may become reactivated later in life as the older adult's immune system

weakens or the individual becomes ill with other disorders. The lesions of herpes zoster appear as pustules along a sensory nerve route. Pain often continues for several months after the lesions have healed.

### HUMAN IMMUNODEFICIENCY VIRUS (HIV)

- HIV or AIDS is a type of viral infection transmitted through an infected person's bodily secretions, such as blood or semen. HIV destroys the immune system, causing the body to develop opportunistic infections such as Kaposi's sarcoma, *Pneumocystis carinii* pneumonia, or tuberculosis. Symptoms include chills and fever, night sweats, dry productive cough, dyspnea, lethargy, malaise, fatigue, weight loss, and diarrhea.

### INFLUENZA

- Influenza, commonly called the "flu," is an acute respiratory illness caused by influenza viruses A and B. Symptoms include fever, cough, sore throat, runny or stuffy nose, headache, muscle aches, and extreme fatigue. Most people recover within 1 to 2 weeks. Influenza may cause severe complications such as pneumonia in children, the elderly, and other vulnerable groups. The viruses causing influenza continually change over time, which enables them to evade the immune system of the host. These rapid changes in the most commonly circulating types of influenza virus necessitate annual changes in the composition of the "flu" vaccine.

### RESPIRATORY SYNCYTIAL VIRUS (RSV)

- RSV infection is highly contagious and infects mostly children, causing bronchiolitis and pneumonia. Infants younger than 6 months are the most severely affected. In adults, RSV causes colds and bronchitis, with fever, cough, and nasal congestion. When RSV affects immunocompromised patients, the consequences can be severe and sometimes fatal.

immunocompromised patients, encephalitis, and herpes zoster.

- Human immunodeficiency virus (HIV) (combined with other drugs)
- Cytomegalovirus (CMV) **retinitis** (inflammation of the retina of the eye)
- Genital herpes
- Influenza A respiratory tract illness
- Respiratory syncytial virus (RSV), a severe lower respiratory tract infection
- Viral herpes infections

Specific uses for the antiviral drugs are listed in the Summary Drug Table: Antiviral Drugs.

## Unlabeled Uses

Because there are a limited number of antiviral drugs and more than 200 viral diseases, the primary health care provider may decide to prescribe an antiviral drug for an unlabeled use even though documentation of its effectiveness is lacking. Approval by the Food and Drug Administration (FDA) is necessary for a drug to be prescribed. On occasion, the use of a drug for a specific dis-

order or condition may be under investigation or may be approved for use in another country. In this instance, the drug may be prescribed by the primary health care provider for the condition under investigation. The use of the drug for a specific disorder or condition that is not officially approved by the FDA is called an "unlabeled use." Examples of unlabeled uses of the antiviral drugs include treatment of CMV and HSV infections after transplant and varicella pneumonia; the treatment of CMV retinitis in immunocompromised patients; and the use of ribavirin for influenza A and B (aerosol form), acute and chronic hepatitis, herpes genitalis, and measles (oral form).

## GENERAL ADVERSE REACTIONS

Antiviral drugs are given systemically or as topical drugs. When used systemically these drugs may be administered orally or intravenously (IV). Rapid IV administration can result in crystalluria (presence of crystals in the urine). The most common adverse reactions when these drugs are administered systemically

## SUMMARY DRUG TABLE ANTIVIRAL DRUGS

GENERIC NAME	TRADE NAME*	USES	ADVERSE REACTIONS	DOSAGE RANGES
abacavir sulfate <i>ab-ah-kav'-ear</i>	Ziagen	HIV infection	Nausea, vomiting, diarrhea, anorexia, liver dysfunction	300 mg BID
acyclovir <i>ay-sye'-kloe-ver</i>	Zovirax	Herpes simplex, herpes zoster	Nausea, vomiting, diarrhea, headache, dizziness, lethargy, confusion, rashes, crystalluria, phlebitis	Oral, 200 mg q4h while awake for a total of 5 capsules/d; IV, 5–10 mg/kg q8h; topical, apply to lesions q3h
amantadine <i>a-man'-ta-deen</i>	Symmetrel, generic	Prevention and treatment of influenza A; Parkinson's disease	Nausea, vomiting, diarrhea, dizziness, hypotension, blurred vision, psychosis, urinary retention	200 mg/d PO or 100 mg PO BID; up to 400 mg/d
amprenavir <i>am-prenn'-ah-veer</i>	Agenerase	HIV infection, in combination with other antivirals	Asthenia, peripheral and circumoral paresthesias, nausea, vomiting, diarrhea, anorexia, abdominal pain, rash, hyperglycemia, hypertriglyceridemia	1200 mg PO BID
cidofovir <i>si-doh'-foh-vir</i>	Vistide	Retinitis in patients with AIDS	Headache, nausea, vomiting, diarrhea, anorexia, dyspnea, alopecia, rash, neutropenia, nephrotoxicity	5 mg/kg IV once a wk for 2 wk, then once every 2 wk for maintenance
delavirdine <i>dell-ah-vur'-den</i>	Rescriptor	Same as amprenavir	Headache, asthenia, malaise, paresthesia, nausea, diarrhea, rash	400 mg PO TID
didanosine <i>dye-dan'-oh-sin</i>	Videx	HIV infection	Headache, rhinitis, cough, nausea, rash, vomiting, anorexia, hepatotoxicity, pancreatitis, peripheral neuropathy	For patients with creatinine clearance (Ccr) $\geq$ 60 mL/min and weighing $\geq$ 60 kg, 400 mg/d or 200 mg BID; weighing < 60 kg, 250 mg/d or 125 mg BID; weighing $\geq$ 60 kg, 250 mg BID in buffered powder; weighing < 60 kg, 167 mg BID in buffered powder
docosanol <i>doe-koe-nah-zole</i>	Abreva	HSV types 1 and 2	Headache, skin irritation	Apply to lesions 5 times/d
efavirenz <i>ef-ah-vi'-renz</i>	Sustiva	HIV infection	Erythema, pruritus, dizziness, fatigue, nausea, vomiting	200–600 mg/d PO
famciclovir <i>fam-sye'-kloe-vir</i>	Famvir	Acute herpes zoster, HSV type 2	Fatigue, fever, nausea, vomiting, diarrhea, sinusitis, constipation, headache	Herpes zoster: 500 mg PO q8h for 7 d; HSV-2: 125 mg PO BID for 5 d
foscarnet <i>foss-kar'-net</i>	Foscavir	cytomegalovirus (CMV) retinitis; acyclovir-resistant HSV types 1 and 2	Headache, seizures, nausea, vomiting, diarrhea, anemia, abnormal renal function tests	CMV retinitis: 60 mg/kg IV q8h for 2–3 wk; maintenance dose, 90–120 mg/kg IV; HSV: 40 mg/kg IV q8–12h
ganciclovir <i>gan-sye'-kloe-vir</i>	Cytovene, Vitraser	CMV retinitis	Hematologic changes, fever, rash, anemia	5 mg/kg IV q12h for 14–21 d, then QD
imiquimod <i>im-ee'-kwee-mod</i>	Aldara	External genitalia and perianal warts	Local skin irritation, itching, excoriation/flaking	Apply externally 3 times/wk
indinavir <i>in-din'-ah-ver</i>	Crixivan	HIV infection	Headache, nausea, vomiting, diarrhea, hyperbilirubinemia, cough, dysuria, acne	800 mg PO q8h
lamivudine <i>la-ah-vev'-den</i>	3TC, Epivir	HIV infection (combined with zidovudine)	Headache, asthenia, nausea, diarrhea, agranulocytopenia, nasal congestion, cough, fever, rash, pancreatitis, hepatomegaly	150 mg PO BID

(continued)

## SUMMARY DRUG TABLE ANTIVIRAL DRUGS (Continued)

GENERIC NAME	TRADE NAME*	USES	ADVERSE REACTIONS	DOSAGE RANGES
lopinavir/ ritonavir <i>low-pin'-ah-veer/ rih-ton'-ah-veer</i>	Kaletra	Same as amprenavir	Same as amprenavir	400 mg lopinavir/100 mg ritonavir PO BID; 533 mg lopinavir/133 mg ritonavir PO BID
nelfinavir <i>nell-fin'-a-veer</i>	Viracept	Same as amprenavir	Diarrhea, nausea, GI pain, rash, dermatitis	750–1250 mg PO BID
nevirapine <i>neh-vear'-ah-peen</i>	Viramune	Same as amprenavir	Rash, fever, headache, nausea, stomatitis, liver dysfunction, paresthesia	200 mg PO QD or BID
oseltamivir <i>oh-sell-tam'-ih-veer</i>	Tamiflu	Treatment of influenza A and B	Nausea, vomiting, diarrhea, abdominal pain, dizziness, headache, cough	75–150 mg/d PO
penciclovir <i>pen-sye'-kloe-ver</i>	Denavir	HSV types 1 and 2	No significant adverse reactions reported; headache, taste perversion	Apply q2h while awake for 4d
ribavirin <i>rye-ba-vye'-rin</i>	Virazole	Severe lower respiratory tract infections (infants and young children)	Worsening of pulmonary status, bacterial pneumonia, hypotension	Administered by aerosol with special aerosol generator
rimantadine HCL <i>ri-man'-ta-deen</i>	Flumadine	Influenza A virus	Light-headedness, dizziness, insomnia, nausea, anorexia	100 mg/d PO BID
ritonavir <i>ri-ton'-ah-ver</i>	Norvir	HIV infection	Peripheral and circumoral paresthesias, nausea, vomiting, diarrhea, anorexia, dysuria	600 mg PO BID
saquinavir, saquinavir mesylate <i>sa-kwen'-a-veer</i>	Fortovase, Invirase	HIV infection in combination with other drugs	Headache, nausea, GI pain, diarrhea, asthenia, elevated CPK	Fortovase: Six 200-mg capsules PO TID invirase: Three 200-mg capsules PO TID
stavudine <i>stay-vev'-den</i>	Zerit	HIV infection	Headache, nausea, diarrhea, fever, agranulocytopenia	40 mg PO q12h
valacyclovir <i>val-ah-sye'-kloe-ver</i>	Valtrex	HSV type 2; herpes zoster	Nausea, dizziness, headache, vomiting, anorexia, diarrhea	HSV type 2: 500 mg PO BID for 5 d; herpes zoster: 1 g PO TID for 7 d
valganciclovir <i>val-gan-si'-kloe-ver</i>	Valcyte	CMV retinitis	Headache, insomnia, diarrhea, nausea, vomiting, neutropenia, fever	900 mg PO BID
vidarabine <i>vy-dare'-ah-been</i>	Ara-A, Vira-A	Keratitis, keratoconjunctivitis caused by HSV types 1 and 2	Burning, itching, irritation, tearing, sensitivity to light	Ophthalmic ointment: 0.5 inch into lower conjunctival sac 2–5 times daily
zalcitabine <i>zal-cye'-tay-been</i>	Hivid	Combination therapy with zidovudine in advanced HIV	Nausea, vomiting, oral ulcers, peripheral neuropathy, headache, diarrhea, congestive heart failure	0.75 mg with 200 mg zidovudine q8h
zanamivir <i>zan-am'-ah-ver</i>	Relenza	Influenza virus	Nausea, headache, diarrhea, anorexia, rhinitis, flulike symptoms, rash, bronchospasm	2 inhalations BID q12h
zidovudine (AZT) <i>zid-o-vev'-den</i>	Retrovir	HIV infection	Asthenia, malaise, weakness, headache, anorexia, diarrhea, nausea, abdominal pain, dizziness, insomnia, anemia, agranulocytosis	100 mg q4h PO; 1–2 mg/kg IV q4h

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

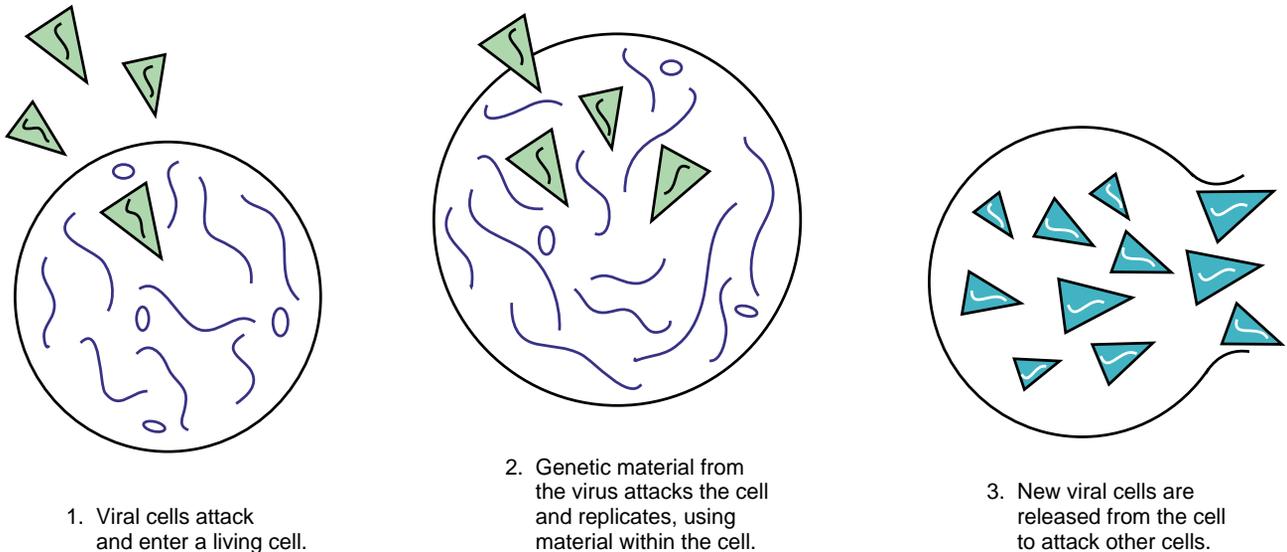


FIGURE 14-1. Viral infection.

are gastrointestinal disturbances, such as nausea, vomiting, diarrhea, and anorexia. When administered topically, the antiviral drugs can cause transient burning, stinging, and pruritus at the application site. The Summary Drug Table: Antiviral Drugs lists adverse reactions associated with other antiviral drugs.

## ADVERSE REACTIONS FOR SPECIFIC DRUGS

### Acyclovir

Acyclovir is available for use orally, topically, and parenterally (for IV use). When given IV, acyclovir can cause phlebitis, lethargy, confusion, tremors, skin rashes, nausea, and crystalluria. Side effects when given orally include nausea, vomiting, diarrhea, headache, dizziness, and skin rashes. Topical administration causes transient burning, stinging, and pruritus.

### Amantadine

Adverse reactions of amantadine include gastrointestinal upset with nausea and vomiting, anorexia, asthenia (weakness, loss of strength), constipation, depression, visual disturbances, psychosis, urinary retention, and orthostatic hypotension.

### Didanosine

Adverse reactions reported with didanosine include headache, peripheral neuropathy, rhinitis, cough, diarrhea, nausea, vomiting, anorexia, hepatotoxicity, and pancreatitis.

### Ribavirin

Ribavirin is given by inhalation and can cause worsening of respiratory status, hypotension, and ocular irritation, including erythema (redness of skin), conjunctivitis, and blurred vision.

### Zanamivir

Common adverse effects include headache, nausea, diarrhea, anorexia, rhinitis, and flu-like symptoms. The most serious adverse reactions are related to respiratory effects and include severe bronchospasm that may lead to death.

### Zidovudine

Adverse reactions associated with zidovudine include headache, weakness, malaise, nausea, abdominal pain, and diarrhea. Hematologic changes include anemia and **granulocytopenia** (low levels of granulocytes, a type of white blood cell, in the blood).

## GENERAL CONTRAINDICATIONS, PRECAUTIONS, AND INTERACTIONS

All antiviral drugs are contraindicated in patients with previous hypersensitivity to the individual antiviral drug. The antiviral drugs are also contraindicated in patients with congestive heart failure, seizures, renal disease, and during lactation. The antiviral drugs are given with caution in patients with renal impairment and require dosage adjustments. Antivirals are used with caution in children, during pregnancy (except ribavirin, a Pregnancy Category X drug), and during lactation.

Other contraindications and precautions are listed below, according to the specific drug. Numerous interactions are possible with the antiviral drugs. Only the most significant interactions are listed for selected drugs. The nurse should consult an appropriate source for a more extensive listing of interactions.

### Acyclovir

This drug is used cautiously in patients with pre-existing neurologic, renal, hepatic, respiratory, or fluid and electrolyte abnormalities. The nurse gives the drug with caution to patients with a history of seizures. Acyclovir is a Pregnancy Category C drug and is used cautiously during pregnancy and lactation. Incidences of extreme drowsiness have occurred when acyclovir is given with zidovudine. There is an increased risk of nephrotoxicity when acyclovir is administered with other nephrotoxic drugs. When administered with amphotericin B, the risk of nephrotoxicity is increased. Administration with probenecid causes a decrease in the renal excretion of acyclovir, prolonging the effects of acyclovir and increasing the risk of drug toxicity.

### Amantadine

Amantadine is used cautiously in patients with seizure disorders, psychiatric problems, renal impairment, and cardiac disease. Amantadine is a Pregnancy Category B drug and is used cautiously during pregnancy and lactation. Concurrent use of antihistamines, phenothiazines, tricyclic antidepressants, disopyramide, and quinidine may increase the **anticholinergic effects** (dry mouth, blurred vision, constipation) of amantadine.

### Didanosine

This drug is used cautiously in patients with peripheral vascular disease, neuropathy, chronic pancreatitis, or impaired liver function. Didanosine is a Pregnancy Category B drug and is used cautiously during pregnancy and lactation. There may be a decrease in the effectiveness of dapsone in preventing *Pneumocystis carinii* pneumonia when didanosine is administered with dapsone. Use of didanosine with zalcitabine may cause additive neuropathy. Absorption of didanosine is decreased when it is administered with food.

### Ribavirin

Ribavirin may be teratogenic and embryotoxic (Pregnancy Category X) and is contraindicated during pregnancy, in patients with chronic obstructive pulmonary disease (COPD), and during lactation. Ribavirin is used cautiously at all times during administration of the drug. Ribavirin may antagonize the antiviral

action of zidovudine and potentiate the hematologic toxic effects of zidovudine. When ribavirin is used concurrently with digitalis, the risk of digitalis toxicity increases.

### Zanamivir

Zanamivir is used cautiously with pregnancy (Category C), lactation, asthma, COPD, or other underlying respiratory diseases. No significant drug interactions have been reported with the use of zanamivir.

### Zidovudine

This drug is used cautiously in patients with bone marrow depression or severe hepatic or renal impairment. Zidovudine is a Pregnancy Category C drug and is used cautiously during pregnancy and lactation. There is an increased risk of bone marrow depression when zidovudine is administered with antineoplastic drugs, other drugs causing bone marrow depression, and in patients having or recently taking radiation therapy. An additive neurotoxicity may occur when zidovudine is administered with acyclovir. Clarithromycin decreases blood levels of zidovudine. The blood levels of zidovudine are increased when it is given with lamivudine.

## NURSING PROCESS

### ● The Patient Receiving an Antiviral Drug

#### ASSESSMENT

##### *Preadministration Assessment*

Preadministration assessment of the patient receiving an antiviral drug depends on the patient's symptoms or diagnosis. These patients may have a serious infection that causes a decrease in their natural defenses against disease. Before administering the antiviral drug, the nurse determines the patient's general state of health and resistance to infection. The nurse then records the patient's symptoms and complaints. In addition, the nurse takes and records the patient's vital signs. Additional assessments may be necessary in certain types of viral infections or in patients who are acutely ill. For example, in patients with HSV 1 or 2 the nurse inspects the areas of the body affected with the lesions (eg, the mouth, face, eyes, or genitalia) before treatment for comparison during treatment.

##### *Ongoing Assessment*

The ongoing assessment depends on the reason for giving the antiviral drug. It is important to make a daily assessment for improvement of the signs and symptoms

### Nursing Diagnoses Checklist

- ✓ **Risk for Imbalanced Nutrition: Less than Body Requirements** related to adverse reaction of antiviral drugs
- ✓ **Risk for Impaired Skin Integrity** related to initial infection, adverse drug reactions, IV administration of the antiviral drug
- ✓ **Risk for Injury** related to adverse reactions of the drug
- ✓ **Risk for Infection** related to inadequate defense mechanisms (immunosuppression)

identified in the initial assessment. The nurse monitors for and reports any adverse reactions from the antiviral drug. It also is important to inspect the IV site several times a day for redness, inflammation, or pain. The nurse should report any signs of phlebitis (inflammation of the vein).

### NURSING DIAGNOSES

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

### PLANNING

The expected outcomes for the patient depend on the reason for administration of the antiviral drug but may include an optimal response to therapy, management of adverse reactions, and an understanding of and compliance with the prescribed treatment regimen.

### IMPLEMENTATION

#### *Promoting an Optimal Response to Therapy*

Because these drugs may be used in the treatment of certain types of severe and sometimes life-threatening viral infections, the patient may be concerned about the diagnosis and prognosis. The nurse should allow the patient time to talk and ask questions about methods of treatment, especially when the drug is given IV. It is important to explain the treatment methods to the patient and family members.

The antiviral drugs are not given intramuscularly or subcutaneously. It is important to prepare the antiviral drugs according to the manufacturer's directions. The administration rate is ordered by the primary health care provider. The nurse takes care to prevent trauma because even slight trauma can result in bruising if the platelet count is low. If injections are given, pressure is applied at the injection site to prevent bleeding. Occasionally, headache or a slight fever may occur in patients taking antiviral drugs. An analgesic may be prescribed to manage these effects.

**ACYCLOVIR.** Treatment with acyclovir is begun as soon as symptoms of herpes simplex appear. The drug may be given topically, orally, or intravenously. When the drug is given orally, the nurse may give the drug without regard to food. However, if GI upset occurs, acyclovir is administered with food. Patients with a history of congestive heart failure may not be able to tolerate an increase in fluids, so it is important to monitor them closely to prevent fluid overload. Neurologic symptoms such as seizures may occur with the administration of acyclovir. When the drug is administered topically, the nurse should use a finger cot or glove to prevent spread of infection.

**AMANTADINE.** The nurse administers this drug for the prevention or treatment of respiratory tract illness caused by influenza A virus. Some patients are prescribed this drug to manage extrapyramidal effects caused by drugs used to treat Parkinsonism (See Chaps. 29 and 32). The nurse should protect the capsules from moisture to prevent deterioration. When the drug is administered for symptoms of influenza, it is important to start therapy within 24 to 48 hours after symptoms begin.

**DIDANOSINE.** For patients with HIV infection who cannot tolerate zidovudine or who have exhibited decreased therapeutic effect with zidovudine, the nurse should administer this drug to the patient with an empty stomach (at least 1 hour before or 2 hours after meals). The tablets are not swallowed whole; the patient should chew them or crush and mix them thoroughly with at least 1 oz of water. The nurse mixes buffered powder with 4 oz of water (not juice), stirs until dissolved, and gives it to the patient to drink immediately. The nurse avoids generating dust when preparing the medication. When cleaning up powdered products, a wet mop or damp sponge is used. The surface is cleaned with soap and water.

**RIBAVIRIN.** The nurse gives ribavirin by inhalation using a small particle aerosol generator (SPAG-2 aerosol generator). It is important to discard and replace the solution every 24 hours. Treatment with ribavirin lasts for at least 3 days, but not more than 7, for 12 to 18 h/d. Women of childbearing age should not take this drug because evidence links it to birth defects.

**ZANAMIVIR.** This drug is available as a powder blister for inhalation. The usual dose is 2 inhalations (one 5-mg blister per inhalation) administered with a Diskhaler device. The drug should be started within 2 days' onset of flu symptoms. The drug is taken every 12 hours.

**ZIDOVUDINE.** The nurse assesses the patient for an increase in severity of symptoms of HIV and for symptoms

of opportunistic infections. Capsules and syrup should be protected from light.

### Monitoring and Managing Adverse Reactions

Serious adverse reactions can occur in patients taking antiviral drugs. The nurse must notify the primary health care provider of any adverse reactions to these drugs.

**ACYCLOVIR.** When given IV, acyclovir can cause crystalluria (presence of crystals in the urine) and mental confusion. The nurse helps the patient maintain adequate hydration to prevent crystalluria by encouraging the patient to drink 2000 to 3000 mL of fluid each day (if the disease condition permits). In addition, the nurse should give careful attention to assessing the mental status of the patient.

**AMANTADINE.** The nurse should monitor the patient for the occurrence of drowsiness, dizziness, light-headedness, or mood changes (irritability or mood change).

**DIDANOSINE.** Although rare, pancreatitis and peripheral neuropathy are possible adverse reactions seen with didanosine. The nurse must be alert for symptoms of pancreatitis (nausea, vomiting, abdominal pain, jaundice, elevated enzymes) and for signs of peripheral neuropathy (numbness, tingling, or pain in the feet or hands). It is important to immediately report these signs to the primary health care provider.

**RIBAVIRIN.** This drug can cause worsening of the respiratory status. Sudden deterioration of respiratory status can occur in infants receiving ribavirin. It is important to monitor respiratory function closely throughout therapy. The nurse should immediately report any worsening of respiratory function to the primary health care provider.

**ZANAMIVIR.** There is a risk for bronchospasm in patients with asthma or COPD. A fast-acting bronchodilator should be on hand in case bronchospasm occurs. Zanamivir use should be discontinued and the primary health care provider notified promptly if respiratory symptoms worsen.

**ZIDOVUDINE.** With zidovudine, bone marrow depression may occur, making the patient susceptible to infection and easy bruising. The patient is protected against individuals with upper respiratory infection. All caregivers are reminded to use good handwashing technique. The nurse takes care to prevent trauma because even slight trauma can result in bruising if the platelet count is low. If injections are given, pressure is applied at the injection site to prevent bleeding.

**NUTRITIONAL IMBALANCE.** The antiviral drugs may cause anorexia, nausea, or vomiting. These effects range from mild to severe. The patient may be able to tolerate small, frequent meals with soft, nonirritating foods if nausea is mild. Frequent sips of carbonated beverages or hot tea may be helpful for others. It is important to keep the atmosphere clean and free of odors. The nurse provides good oral care before and after meals. If nausea is severe or the patient is vomiting, the nurse notifies the primary health care provider.

**IMPAIRED SKIN INTEGRITY.** The nurse monitors the skin lesions carefully for worsening or improvement. Should the lesions not improve, the nurse informs the primary health care provider. Accurate observation and documentation is essential. If an antiviral drug is administered topically, the nurse uses gloves when applying to avoid spreading the infection. These drugs may also cause a rash as an adverse reaction. The nurse notes and reports any rash to the primary health care provider. When administering the drug by the IV route, the nurse must closely observe the injection site for signs of phlebitis, and depending on the patient's symptoms, the nurse monitors vital signs every 4 hours or as ordered by the primary health care provider.

**RISK FOR INJURY.** Some patients with a viral infection are acutely ill. Others may experience fatigue, lethargy, dizziness, or weakness as an adverse reaction to the antiviral agent. The nurse monitors these patients carefully. Call lights are placed in a convenient place for the patient and are answered promptly by the nurse. If fatigue, dizziness, or weakness is present, the patient may require assistance with ambulation or activities of daily living. The nurse plans activities so as to provide adequate rest periods.

**RISK FOR INFECTION IN IMMUNOSUPPRESSED PATIENTS.** When patients are immunosuppressed, they are at increased risk for bacterial or other infection. The patient is protected against individuals with upper respiratory infection. All caregivers are reminded to use good handwashing technique.

### Nursing Alert

*Patients receiving antiviral drugs for HIV infections may continue to develop opportunistic infections and other complications of HIV. The nurse monitors all patients closely for signs of infection such as fever (even low-grade fever), malaise, sore throat, or lethargy.*

### Educating the Patient and Family

When an antiviral drug is given orally, the nurse explains the dosage regimen to the patient and family.

The nurse instructs the patient to take the drug exactly as directed and for the full course of therapy. If a dose is missed, the patient should take it as soon as remembered but should not double the dose at the next dosage time. Any adverse reactions should be reported to the primary health care provider or the nurse. The patient must understand that these drugs do not cure viral infections but should decrease symptoms and increase feelings of well-being.

The nurse instructs patients to report any symptoms of infection such as an elevated temperature (even a slight elevation), sore throat, difficulty breathing, weakness, or lethargy. The patient must be aware of possible signs of pancreatitis (nausea, vomiting, abdominal pain, jaundice [yellow discoloration of the skin or eyes]) and peripheral neuritis (tingling, burning, numbness, or pain in the hands or feet). Any indication of pancreatitis or peripheral neuritis must be reported at once.

The nurse includes the following information in the teaching plan for specific antiviral drugs:

- **Acyclovir:** This drug is not a cure for herpes simplex, but it will shorten the course of the disease and promote healing of the lesions. The drug will not prevent the spread of the disease to others. Topical application should not exceed the frequency prescribed. Apply this drug with a finger cot or gloves and cover all lesions. Do not have sexual contact while lesions are present. Notify the primary health care provider if burning, stinging, itching, or rash worsens or becomes pronounced.
- **Amantadine:** Do not drive a car or do work for which mental alertness is necessary until the effect of the drug is apparent because vision and coordination can be affected. Rise slowly from a prone to a sitting position to decrease the possibility of lightheadedness caused by orthostatic hypotension. Report changes such as nervousness, tremors, slurred speech, or depression. Some patients are on an alternate dosage schedule. If this is the situation, it is important to mark the calendar to designate the days the drug is to be taken.
- **Didanosine:** Take this drug on an empty stomach because food decreases absorption. Follow the instructions for administration carefully. Crush the drug and mix it with water. Discontinue use of the drug and notify the primary health care provider if any numbness or tingling of the extremities is experienced. Report any signs of abdominal pain, nausea, or vomiting. Didanosine is not a cure for AIDS and does not prevent the spread of the disease, but it may decrease the symptoms of AIDS.
- **Ribavirin:** The patient is told that this drug is given with a small-particle aerosol generator. Any worsening of respiratory function, dizziness, confusion, or shortness of breath should be reported. If a child is taking this drug it is important for any female caregivers to know that the drug is a Pregnancy Category X drug and women of childbearing age should take care not to inhale the drug. It may be necessary for the mother or other females of childbearing age who have direct contact with the child to observe respiratory precautions while the child is taking the drug.
- **Zanamivir:** This drug is taken every 12 hours for 5 days using a Diskhaler delivery system. If a bronchodilator is also prescribed, the bronchodilator is used before the zanamivir if both are prescribed at the same time. The drug may cause dizziness. The patient should use caution if driving an automobile or operating dangerous machinery. Treatment with this drug does not decrease the risk of transmission of the “flu” to others.
- **Zidovudine:** This drug may cause dizziness. Avoid activities requiring alertness until the drug response is known. This drug does not cure AIDS and does not prevent transmission to others. Notify the primary health care provider if fever, sore throat, or signs of infection occur. The primary health care provider may prescribe frequent blood tests to monitor for a decrease in the immune response indicating the need to decrease the dosage or to discontinue use of the drug for a period of time.

## EVALUATION

- The therapeutic effect is achieved and symptoms of disease process subside or diminish.
- Adverse reactions are identified, reported to the primary health care provider, and managed successfully through nursing interventions.
- The patient and family demonstrate an understanding of the drug regimen.
- The patient verbalizes the importance of complying with the prescribed treatment regimen.

## ● Critical Thinking Exercises

1. *A young mother is concerned because her 2-month-old daughter has received a diagnosis of RSV. The infant is receiving inhalation treatments with ribavirin. The mother questions this treatment. Describe how the nurse could explain treatment with ribavirin to the mother. Discuss what possible effects the drug could have on the infant and on the mother.*
2. *Ms. Jenkins, age 77 years, has herpes zoster. The primary health care provider prescribes acyclovir 200 mg every 4 hours while awake. Discuss what information you would give Ms. Jenkins concerning herpes zoster, the drug regimen, and the possible adverse reactions.*

3. Jim, age 25 years, has recently received a diagnosis of HIV infection and is placed on a treatment regimen of zidovudine and lamivudine. Determine what information you would give him concerning the drugs he will be taking. What adverse reactions would you discuss with Jim?

### ● Review Questions

- Which of the following adverse reactions would the nurse expect in a patient receiving acyclovir by the oral route?
    - nausea and vomiting
    - constipation and urinary frequency
    - conjunctivitis and blurred vision
    - nephrotoxicity
  - Which of the following would the nurse report immediately in a 3-month-old patient receiving ribavirin?
    - any worsening of the respiratory status
    - refusal to take foods or fluids
    - drowsiness
    - constipation
  - The nurse is administering didanosine properly when \_\_\_\_\_.
    - tablets are crushed and mixed thoroughly with 1 oz of water
    - the drug is prepared for subcutaneous injection
    - the drug is given with meals
    - the drug is given mixed with orange juice or apple juice
4. Intravenous administration of acyclovir can result in \_\_\_\_\_.
  - shock
  - crystalluria
  - cardiac arrest
  - hypertensive crisis

### ● Medication Dosage Problems

- The patient is prescribed amantadine 200 mg. The drug is available in 100-mg tablets. The nurse administers \_\_\_\_\_.
- A patient is prescribed 2 inhalations of zanamivir. The drug is available as one 5-mg blister per inhalation and is to be given with a Diskhaler device. How many milligrams will the nurse administer with 2 inhalations?
- The nurse is to administer 100 mg of zidovudine PO. The drug is available as syrup 50 mg/5 mL. The nurse administers \_\_\_\_\_.