Wolters Kluwer

When you have to be right

Introduction to Clinical Pharmacology

Chapter 11
Antiviral Drugs

Learning Objectives

1. Explain the uses, general drug actions, adverse reactions, contraindications, precautions, and interactions of antiviral drugs.
2. Distinguish important preadministration and ongoing assessment activities the nurse should perform on the client receiving an antiviral/antiretroviral drug.
3. List nursing diagnoses particular to a client taking an antiviral drug.
4. List possible goals for a client taking an antiviral/antiretroviral drug.
5. Examine ways to promote an optimal response to therapy and manage adverse reactions, and special considerations to keep in mind when educating the client and the family about the antiviral/antiretroviral drugs.

What is a virus?

- A tiny infectious organism that enters the body, attaches to host cells, and uses the host cell to replicate by releasing its own DNA and RNA inside the cell
- The host cell then releases more virus and the replicated viruses go and invade other cells
- There are over 200 viruses that are known to produce diseases like:
  - Influenza
  - Warts
  - Cold sores
  - West Nile virus
  - Hepatitis C

Drugs Used to Treat Viruses

- Antiviral
- Antiretroviral

Antiviral Drugs—Actions

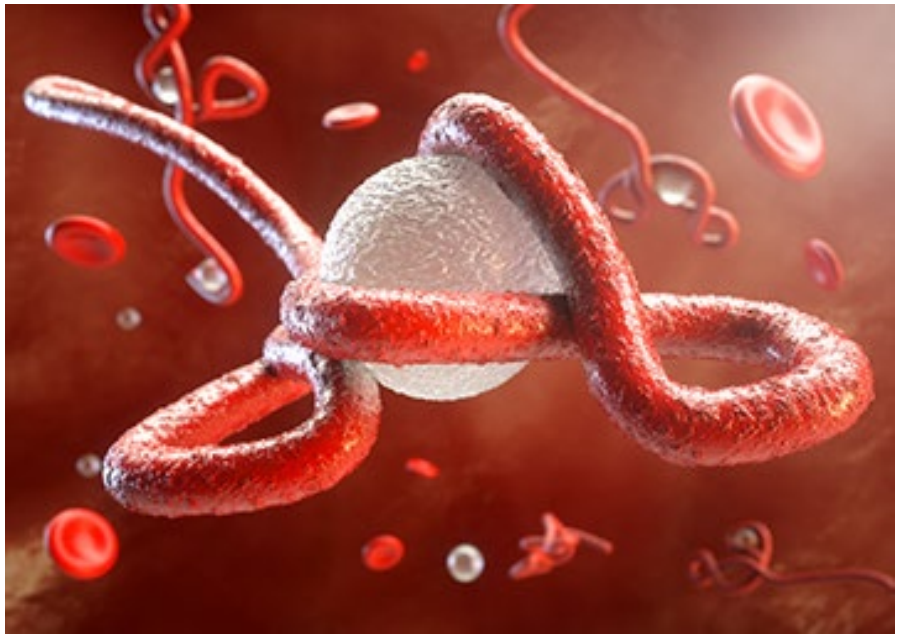
- Combat viral infections
- Target certain events that happen in the viral replication cycle which interfere with the virus's ability to reproduce in a cell
- Attempt to disable the protein part of the virus
- Viruses can develop resistance
- Development of antiviral drugs is difficult and expensive

Antiviral Drugs—Uses

- Used to treat some viral infections caused by:
  - Cytomegalovirus (CMV) such as retinitis
  - CMV prevention in transplant recipients
  - Hepatitis B and C
  - Influenza A and B
  - Respiratory syncytial virus (RSV)
- Unlabeled uses
  - Prevention of CMV and HSV infections after transplantation procedures
  - Varicella pneumonia

Antiviral Drugs—Practice Considerations

- New viral infections evolve frequently (Ebola and coronaviruses)
- New antivirals/antiretrovirals are constantly under development
- Nurses need to rely on reference materials to see where progress is in the battle against viral infections



Antivirals—Adverse Reactions

- Gastrointestinal System Reactions:
  - Nausea and vomiting
  - Diarrhea
- Other Reactions:
  - Headache
  - Rash
  - Fever
  - Insomnia

Antivirals—Contraindications and Precautions

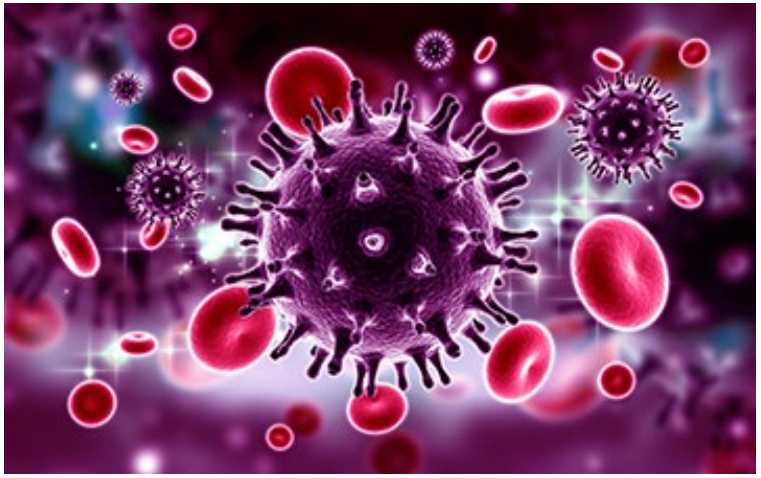
- Contraindicated in clients:
  - with a history of allergies to the drug or other antivirals
  - Cidofovir should not be given to clients who have renal impairment or in combinations with medications that are nephrotoxic (aminoglycosides)
  - Ribavirin should not be used in clients with unstable cardiac disease
  - pregnancy (pregnancy category B and C) and lactation
- Used cautiously in clients with:
  - Renal impairment
  - Low blood cell counts
  - History of epilepsy (rimantadine)
  - History of respiratory disease (zanamivir)
  - HBV (exacerbation of hepatitis after discontinuing adefovir dipivoxil or entecavir)

Antivirals—Interactions

Interacting Drug	Common Use	Effect of Interaction
Probenecid	Gout treatment	Increased serum levels of the antivirals
Cimetidine	Gastric upset, heartburn	Increased serum level of the antiviral valacyclovir
Ibuprofen	Pain relief	Increased serum level of the antiviral adefovir
Imipenem-cilastatin	Anti-infective agent	With ganciclovir only, increased risk of seizures
Anticholinergic agents	Management of bladder spasms	Increased adverse reactions of anticholinergic agent
Theophylline	Management of respiratory problems	With acyclovir only, increased serum level of theophylline

What is a retrovirus?

- Retroviruses attack the host cell just like a virus except the difference that the RNA is the primary component of the virus
- Contain reverse transcriptase that is used to turn the RNA of the virus into DNA—helps to produce more of the virus
- Example: human immunodeficiency virus (HIV)
- Retrovirus mutation happens more frequently
- Highly active antiretroviral therapy (HAART)—due to rapid mutation, a multidrug approach is often used



Antiretroviral Drugs—Actions

- Entry inhibitors prevent the attachment or fusion of HIV to a host cell for initial entry
- Nonnucleoside reverse transcriptase inhibitors latch on to the reverse transcriptase molecule and block the ability to make viral DNA
- Integrase inhibitors prevent enzymes from inserting HIV genetic material into the cell's DNA
- Reverse transcriptase inhibitors block the reverse transcriptase enzyme so HIV material cannot change into DNA in the new cell—no new copies of HIV
- Protease inhibitors block the protease enzyme so new viral particles cannot mature

Antiretroviral Drugs—Uses

- Used to treat some viral infections caused by:
  - Hepatitis B
  - HIV
  - Acquired immunodeficiency syndrome (AIDS)
- Used to prevent HIV infection:
  - Combination of emtricitabine and tenofovir disoproxil

Antiretroviral Drugs—Adverse Reactions

- Gastrointestinal System Reactions:
  - Nausea and vomiting
  - Diarrhea
  - Altered taste
- Other Reactions:
  - Headache, fever, chills
  - Rash
  - Numbness and tingling in the circumoral area, peripherally, or both

Antiretroviral Drugs—Contraindications and Precautions

- Contraindicated in clients:
  - with a history of allergies to the drug or other antiretrovirals
  - who are lactating
  - who are taking medications that interact with the antiretroviral drugs
- Used cautiously in clients with:
  - diabetes mellitus
  - hepatic impairment
  - history of bladder or kidney stone formation
  - older adults taking didanosine—increased risk of pancreatitis
  - sulfonamide allergy (fosamprenavir and amprenavir)

Antiretrovirals—Interactions

Interacting Drug	Common Use	Effect of Interaction
Antifungals	Eliminate or manage fungal infections	Increased serum level of the antiretroviral
clarithromycin	Treat bacterial infections	Increased serum level of both drugs
sildenafil	Treat erectile dysfunction	Increased adverse reactions of sildenafil
Opioid analgesics	Pain relief	Risk of toxicity with ritonavir
Anticoagulants, anticonvulsants, and antiparasitic agents	Prevent blood clots, seizures, & parasitic infections respectively	Decreased effectiveness when taking ritonavir
Interleukins	Prevent severely low platelet counts usually related to chemotherapy	Risk of antiretroviral toxicity

Antiretrovirals—Interactions continued

Interacting Drug	Common Use	Effect of Interaction
Fentanyl	Analgesia, used typically with procedures requiring anesthesia	Increased serum level of fentanyl
Oral contraceptives	Birth control	Decreased effectiveness of birth control
Rifampin	Pulmonary tuberculosis	With efavirenz nevirapine only, decreased serum levels of antivirals

Pharmacology in Practice Exercise #1

- Why are viruses so difficult to treat even with the use of antiviral medications? Select all that apply.

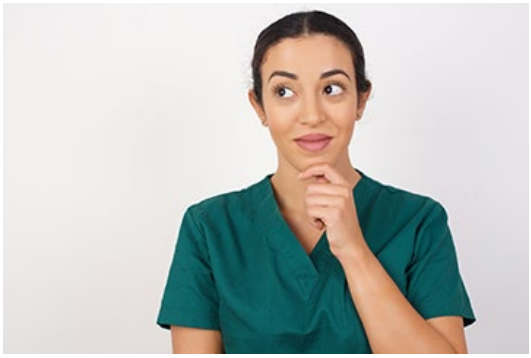
a) Viruses are tiny

b) Viruses can develop resistance to antiviral drugs

c) Viruses have a hard-to-penetrate outer layer

d) Viruses are large

e) Viruses replicate inside human cells



Nursing Process—Client Receiving an Antiviral/Antiretroviral Drug #1

- **Preadministration Assessment**
- **Objective** Data
  - Description of general appearance
  - Resistance to infection (complete blood count)
  - Vital signs
  - Female clients—pregnancy test/inquire about lactation
  - Inspect the body for signs of lesions as a baseline
  - Take photographs of any lesions as a baseline

Nursing Process—Client Receiving an Antiviral/Antiretroviral Drug #2

- **Preadministration Assessment (continued)**
- **Subjective** Data
  - Type and duration of symptoms
  - Remedies attempted before seeking care
  - Exposure to ill individuals if immunocompromised

Nursing Process—Client Receiving an Antiviral/Antiretroviral Drug #3

- Ongoing Assessment
  - Depends on the reason for giving the antiviral/antiretroviral drug
  - Make frequent assessments for improvements of signs and symptoms and compare to baseline
  - Monitor and report any adverse reactions

Nursing Process—Client Receiving an Antiviral/Antiretroviral Drug #4

Nursing Diagnoses

Risk for Malnutrition related to adverse reaction of antiviral drugs

Risk for Impaired Skin Integrity related to initial infection, adverse drug reactions, and administration of the antiviral drug

Risk for Injury related to the client's mental status, peripheral neuropathy, and generalized weakness

Body Image Disturbance related to body fat redistribution

Acute Pain related to kidney or bladder stones or inflammation caused by antiviral drugs

Nursing Process—Client Receiving an Antiviral/Antiretroviral Drug #5

- **Planning**
  - Expected client outcomes depend on the reason for administration of the antiviral drug but may include:
    - Optimal response to therapy
    - Management of common adverse drug reactions
    - Confidence and understanding and adherence to the prescribed medication regimen

Nursing Process—Client Receiving an Antiviral/Antiretroviral Drug #6

- Implementation
  - Promoting an optimal response to therapy
    - Allow time for the client and family members to ask questions about diagnosis, prognosis, and treatment methods
    - If drug will be given at home via IV, allow extra time for questions
    - Ribavirin: discard and replace the solution in the SPAG-2 aerosol generator every 24 hours; monitor respiratory function closely throughout therapy; is a pregnancy category X drug
    - Check recommended infusion rate prior to administration of IV antiviral to avoid toxicity by too rapid of an infusion

Pharmacology in Practice Exercise #2

- A primary health care provider has prescribed 5400 mg of foscavir per day to be administered IV. The strength of the drug in the available solution is 24 mg/mL. How many mL of the solution in the syringe pump will the pharmacist have prepared for the nurse to administer one 5400-mg dose?

a) 250 mL

b) 225 mL

c) 275 mL

d) 200 mL

Nursing Process—Client Receiving an Antiviral/Antiretroviral Drug #7

- **Implementation**
  - Monitoring and Managing Client Needs
    - **Risk for Malnutrition**
      - Many of the drugs can be given without regard to food except didanosine
      - Offer frequent small meals with soft nonirritating foods
      - Offer frequent sips of carbonated beverages or hot tea
      - Keep atmosphere clean and free of odors
      - Provide good oral care before and after meals
      - Consider taking the medication at bedtime—ask provider
      - Notify provider of sever nausea or vomiting

Nursing Process—Client Receiving an Antiviral/Antiretroviral Drug #8

- **Implementation**
  - Monitoring and Managing Client Needs
    - **Risk for Impaired Skin Integrity**
      - Monitor any skin lesions carefully for worsening (notify provider) or improvement
      - Topical administration—use gloves to avoid spreading the infection; monitor for adverse reactions such as rash
      - IV administration closely observe the injection site for signs of phlebitis; prevent bruising, monitor vital signs every 4 hours or per provider orders

Nursing Process—Client Receiving an Antiviral/Antiretroviral Drug #9

- Implementation
  - Monitoring and Managing Client Needs
    - Risk for Injury
      - Monitor acutely ill clients carefully due to fatigue, lethargy, dizziness, weakness, and assess for adverse reactions
      - Place call lights in a convenient place for the client
      - Plan activities with adequate rest periods
      - Watch for signs of peripheral neuropathy

Nursing Process—Client Receiving an Antiviral/Antiretroviral Drug #10

- Implementation
  - Monitoring and Managing Client Needs
    - Disturbed Body Image
      - Clients taking protease inhibitors can experience redistribution of body fat (thinner arms and legs and rounder abdomen/enlarged breasts or behind the neck)
      - Spend time with clients
      - Encourage clients to verbalize their feelings regarding any change in appearance

Nursing Process—Client Receiving an Antiviral/Antiretroviral Drug #11

- Implementation
  - Monitoring and Managing Client Needs
    - Acute Pain
      - Assess clients for pain when performing routine vital signs check
      - Explore any pain for location and intensity
      - Be aware that GI symptoms/pain can be a sign of pancreatitis
      - Report to the provider any sudden onset of pain

Pharmacology in Practice Exercise #3

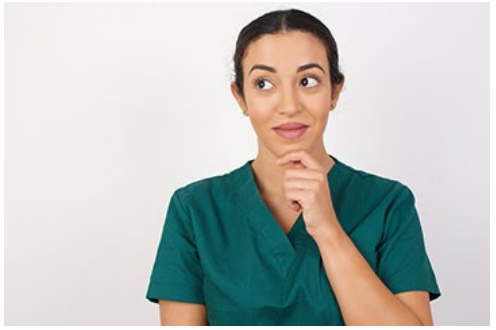
- A nurse is caring for a client who is on an antiretroviral therapy for HIV. The client has developed anorexia and nausea due to the different drugs. Which of the following interventions should the nurse perform in the given situation?

a) Reduce frequency of meals but increase quantity of meals

b) Ensure that the client's diet includes soft, nonirritating foods

c) Keep the atmosphere clean and free of odors

d) Provide good oral care before and after meals



Nursing Process—Client Receiving an Antiviral/Antiretroviral Drug #12

- Implementation—Educating the Client and Family
  - Develop a teaching plan for the client and family to include:
    - Explain the dosage regimen and advise to take the drug as prescribed only
    - If a dose is missed take the drug as soon as possible but do not double dose
    - Educate the client of potential adverse reactions, and explain the necessity of contacting the primary health care provider immediately if symptoms for adverse reactions occur

Nursing Process—Client Receiving an Antiviral/Antiretroviral Drug #13

- Implementation—Educating the Client and Family (continued)
  - Develop a teaching plan for the client and family to include:
    - Educate the client that drugs do not cure viral infections but that they will shorten the course of the disease or promote healing
    - Educate the client that the drugs will not prevent the spread of infection to others
    - No sexual contact while lesions are present on the genitalia
    - Notify the provider of adverse reactions
    - Photosensitivity precautions when indicated
    - Some drugs can affect mental status—safety regarding driving, standing and when to report symptoms to provider

Nursing Process—Client Receiving an Antiviral/Antiretroviral Drug #14

- Evaluation
  - Was the therapeutic response achieved? Is there evidence of the management of infection and viral load?
  - Were adverse reactions: identified, reported, and managed?
    - Client maintains adequate nutrition status
    - Skin is intact and free of inflammation, irritation, infection, or ulcerations
    - No evidence of injury
    - Perceptions of body changes are managed successfully
    - Client is free of pain
  - Did client and family express confidence and demonstrate understanding of drug regimen?

Turn and Talk—Case Study

- A 55-year-old client has been diagnosed HIV positive for 5 years. The client is currently taking the antiretroviral combination drug, Atripla—one tablet by mouth daily. They present to the physician's office complaining of pain in the mouth with white patches on the tongue and cheeks
- Define the antivirals in the medication—Atripla. While triaging the client, what information should the nurse obtain?
- The client tells the nurse they started taking St. John's wort having heard it had antiviral effects and they felt a bit depressed lately. What should the nurse tell the client about the St. John's wort?
- The physician writes a prescription for the client to receive fluconazole (Diflucan) 200 mg on day 1 and 100 mg on days 2 through 14. What should the nurse tell the client?