



Wolters Kluwer

When you have to be right

# **Introduction to Clinical Pharmacology**

## **Chapter 12**

### **Antifungal and Antiparasitic Drugs**

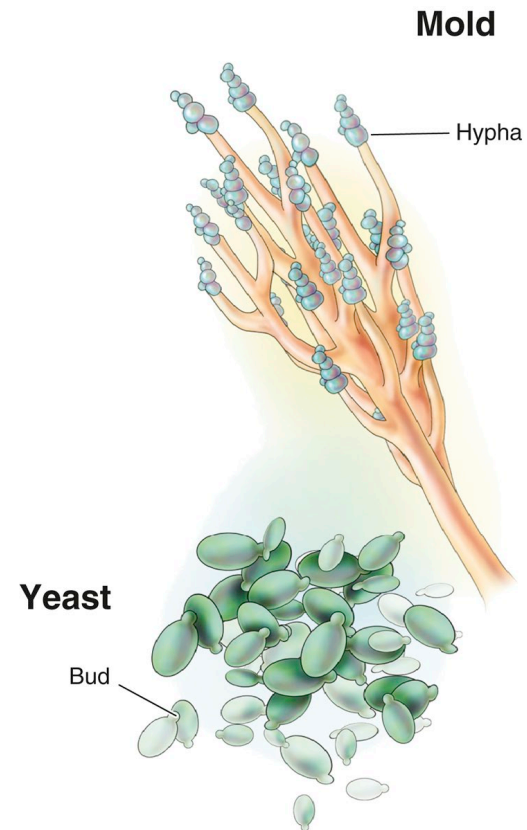
# Learning Objectives

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1. Differentiate between superficial and systemic fungal infections.
2. Compare and contrast helminthic infections, protozoal infections, and amebiasis.
3. Explain the uses, general drug actions, adverse reactions, contraindications, precautions, and interactions of antifungal and antiparasitic drugs.
4. Distinguish important preadministration and ongoing assessment activities the nurse should perform on the client receiving an antifungal and antiparasitic drug.
5. List nursing diagnoses particular to a client taking an antifungal and antiparasitic drug.
6. List possible goals for a client taking an antifungal and antiparasitic drug.
7. Examine ways to promote an optimal response to therapy, how to manage adverse reactions, and important points to keep in mind when educating the client and family about antifungal and antiparasitic drugs.

# What is a fungus?

- ❖ A single-celled colorless plant that lacks chlorophyll
- ❖ Fungal infections in humans are yeast- or mold-like and are called *mycotic infections*
- ❖ Superficial—(e.g., thrush—oral infection of *Candida albicans*)
- ❖ Systemic—(e.g., Cryptococcosis—disseminated infection with *Cryptococcus neoformans* that can affect lungs, meninges, skin, bones, and viscera)



# Antifungal Drugs—Actions

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- ❖ *Fungicidal or fungistatic*: action is related to their concentration in body tissues
- ❖ Some antifungal drugs (e.g., nystatin) are thought to have an effect on the cell membrane of the fungus
- ❖ Fluconazole is a fungistatic that works by depleting the sterols in the fungus cells

# Antifungal Drugs—Uses

- ❖ Used prophylactically to prevent fungal infection in immunocompromised clients
- ❖ Used to treat
  - superficial and deep fungal infections
  - systemic infections
  - superficial infections of nail beds and oral, anal, and vaginal areas



# Antifungal Drugs—Adverse Reactions

## ❖ Systemic Administration:

- Headache
- Rash
- Anorexia and malaise
- Abdominal, joint, or muscle pain
- Nausea, vomiting, diarrhea

## ❖ Topical Administration:

- Site irritation
- Burning
- Crusting or drainage



# Antifungal Drugs—Contraindications and Precautions

## ❖ Contraindicated in clients:

- with a history of allergies to the drug
- during pregnancy and lactation
- with severe liver disease (griseofulvin)
- with heart failure (itraconazole)

## ❖ Used cautiously in clients with:

- renal or hepatic dysfunction
- electrolyte imbalances or taking antineoplastic drugs (amphotericin B)
- penicillin allergy (griseofulvin)
- HIV or hypochlorhydria (itraconazole)



# Antifungal Drugs—Interactions\*

Interacting Drug	Common Use	Effect of Interaction
<b>Amphotericin B</b> corticosteroids	Reduce inflammation	Risk for severe hypokalemia
<b>Fluconazole</b> Oral hypoglycemics	Diabetes control	Increased effect of oral hypoglycemic
<b>Griseofulvin</b> Barbiturates	Sedation	Decreased effectiveness of sedative
<b>Fluconazole, ketoconazole, itraconazole, voriconazole or griseofulvin</b> Warfarin	Prevents blood clots	Increased risk of bleeding

\*There are many unique antifungal drug-drug interactions. See Table 12.3 in the textbook for a more extensive list.



# Nursing Process—Client Receiving an Antifungal Drug #1

## ❖ Preadministration Assessment

## ❖ Objective Data

- Vital signs
- Description of the infection—describe the plaques or sores and the drainage/discharge
- Weight—for a systemic antifungal



# Nursing Process—Client Receiving an Antifungal Drug #2

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- ❖ Preadministration Assessment (continued)
- ❖ Subjective Data
  - Current symptoms of the infection
  - Allergy history
  - Drug history—other antifungals or home remedies the client has tried

# Pharmacology in Practice Exercise #1

- ❖ A nurse is required to assess a client for symptoms of a systemic mycotic infection. In which body part is a systemic mycotic infection most likely to be found?
- a) Spleen
  - b) Lungs
  - c) Toe
  - d) Heart



# Nursing Process—Client Receiving an Antifungal Drug #3

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## ❖ Ongoing Assessment

- If administered systemically, carefully observe the client every 2 to 4 hours for adverse drug reactions
- If administered topically, instruct the client to look for signs of improvement and adverse reactions both minor and severe

# Nursing Process—Client Receiving an Antifungal Drug #4

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## ❖ Nursing Diagnoses

- Impaired Comfort related to intravenous administration of amphotericin B
- Altered Tissue Perfusion: Renal related to adverse reactions of the antifungal drug

# Nursing Process—Client Receiving an Antifungal Drug #5

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## ❖ Planning

- Expected client outcomes depend on the reason for administration of the antifungal drug but may include:
  - Therapeutic response to the antifungal drug
  - Management of common adverse drug reactions
  - Confidence and understanding of the prescribed medication regimen

# Nursing Process—Client Receiving an Antifungal Drug #6

## ❖ Implementation

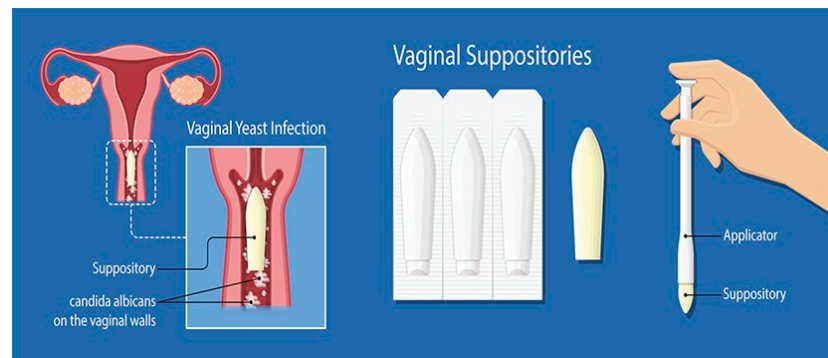
- Promoting an optimal response to therapy
  - Amphotericin B
    - give under close supervision
    - protect IV solution from exposure to light
    - administer immediately after the drug is reconstituted
    - renal damage is the most serious adverse reaction to the use of amphotericin B—hence, serum creatinine levels and BUN levels are checked frequently



# Nursing Process—Client Receiving an Antifungal Drug #7

## ❖ Implementation

- Promoting an optimal response to therapy
  - Nonsystemic Antifungal Infection Preparations
    - inspect the area at the time of each topical application
    - if administered vaginally, question the client regarding any discomfort or other sensations experienced—applicator is contraindicated in pregnancy
    - oral solutions—instruct client to swish in the mouth for as long as possible, gargle, and then swallow the solution
    - evaluate and chart the client's response to therapy daily
    - evaluate clients understanding of the specific medication instructions





# Nursing Process—Client Receiving an Antifungal Drug #8

## ❖ Implementation

- Monitoring and Managing Client's Needs
  - Impaired Comfort: Medication Administration
    - Use precautions when administering amphotericin B intravenously
    - Inform the client before the drug is given that the side effects can be uncomfortable and provide warm blankets
    - Administer the prescribed premedications before the antifungal are to help ease the reaction (antipyretics, antihistamines, or antiemetics)
    - Monitor vital signs carefully during the first 30 minutes to 1 hour of treatment and then every 2-4 hours during therapy



# Nursing Process—Client Receiving an Antifungal Drug #9

## ❖ Implementation

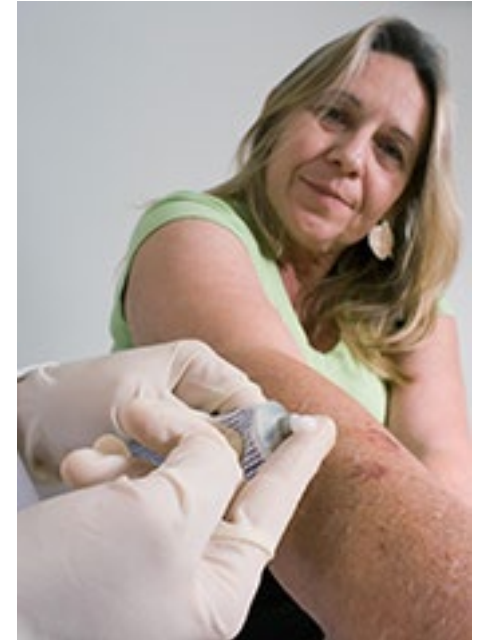
- Monitoring and Managing Client's Needs
  - Altered Tissue Perfusion: Renal
    - Carefully monitor fluid intake and output
    - If client has known renal disease, monitor urine output hourly
    - Monitor serum creatinine levels, and BUN levels. If BUN exceeds 40 mg/dL or serum creatinine exceeds 3 mg/dL notify the provider
    - Gerontologic alert: renal impairment and fluconazole



# Nursing Process—Client Receiving an Antifungal Drug #10

## ❖ Implementation—Educating the Client and Family

- Develop a teaching plan for the client and family to include:
  - Need to keep the topical fungal infection area clean and apply the ointment or cream only as directed (don't increase or decrease amount or frequency of application)
  - Drug/infection specific teaching (examples):
    - Itraconazole—take with food
    - Miconazole—wear a panty liner, continue taking the drug even during menstruation, avoid intercourse during treatment or use a condom



# Nursing Process—Client Receiving an Antifungal Drug #11

## ❖ Evaluation

- Was the therapeutic response achieved? Is there evidence of the management of infection?
- Were adverse reactions: identified, reported, and managed?
  - Client reports comfort without fever or chills
  - Kidney perfusion maintained
- Did client and family express confidence and demonstrate understanding of drug regimen?

# What is a parasite?

- ❖ Parasite—an organism that lives in or on another organism
- ❖ Helminthiasis is the term used for invasion of the body by parasitic worms
- ❖ Protozoal infections occur when there is an invasion into the body of single-celled parasites or malaria



# Helminthic and Protozoal Infections and Amebiasis

- ❖ Helminthic infections: invasion of body by parasitic worms
  - Anthelmintic drugs kill the parasites
- ❖ Protozoal infections: single-cell parasites
  - Antiprotozoal drugs work to inhibit DNA synthesis, effectively killing the organism
- ❖ Amebiasis is a parasitic gastrointestinal disorder

# Anthelmintic Drugs—Actions and Uses

- ❖ Albendazole: interferes with synthesis, resulting in death of larva; used to treat larval forms of pork tapeworm and liver, lung, and peritoneum disease caused by dog tapeworm
- ❖ Mebendazole: blocks glucose uptake by helminth; used to treat whipworm, pinworm, roundworm, American hookworm, and common hookworm
- ❖ Pyrantel: ability to paralyze helminth; used to treat roundworm and pinworm

# Anthelmintic Drugs—Adverse Reactions

## ❖ Generalized Adverse Reactions:

- Drowsiness, dizziness
- Nausea and vomiting
- Abdominal pain, cramps
- Diarrhea



## ❖ Other Information:

- Adverse reactions are usually mild
- Rash can be a serious reaction with pyrantel which is an over-the-counter drug



# Anthelmintic Drugs—Contraindications and Precautions

## ❖ Contraindicated in clients:

- with a history of hypersensitivity to the drug
- during pregnancy (pregnancy category C)
- who are taking medications that interact with the antiretroviral drugs

## ❖ Used cautiously in clients with:

- lactation
- hepatic or renal impairment
- malnutrition
- anemia



# Anthelmintic Drugs—Interactions

Interacting Drug	Common Use	Effect of Interaction
<b>albendazole</b>		
dexamethasone	Inflammation or immunosuppression	Increased effectiveness of albendazole
cimetidine	Relief of GI problems such as heartburn	Increased effectiveness of albendazole
<b>mebendazole</b>		
hydantoins and carbamazepine	Seizure control	Lower levels of mebendazole

# Antiprotozoal Drugs—Actions and Uses

## ❖ Actions:

- Interfere with life cycle of the plasmodium, prevent development of plasmodium, prevent the mosquito from ingesting the plasmodium

## ❖ Used for the treatment of:

- malaria (*Plasmodium falciparum*)
- giardiasis
- toxoplasmosis
- intestinal amebiasis
- sexually transmitted infections
- Pneumocystis pneumonia (PCP)

# Antiprotozoal Drugs—Adverse Reactions

## ❖ Gastrointestinal Adverse Reactions:

- Anorexia
- Nausea and vomiting
- Abdominal cramps
- Diarrhea

## ❖ Other Reactions:

- Headache and dizziness
- Visual disturbance or tinnitus
- Hypotension and changes in electrocardiogram
- Cinchonism
- Peripheral neuropathy
- Nephrotoxicity and ototoxicity



# Antiprotozoal Drugs—Contraindications and Precautions

## ❖ Contraindicated in clients:

- with a history of hypersensitivity to the drug
- during pregnancy (pregnancy category B, C, D, and X)
- who have myasthenia gravis

## ❖ Used cautiously in clients with:

- children
- lactating clients
- hepatic or renal disease
- bone marrow suppression
- blood dyscrasias
- seizure disorders
- bowel disease
- history of alcohol dependency
- mental health issues (mefloquine)



# Antiprotozoal Drugs—Interactions #1

Interacting Drug	Common Use	Effect of Interaction
antacids	GI upset	Decreased absorption of antimalarial
Iron	Treats anemia	Decreased absorption of antimalarial
digoxin	Treats cardiac disease	Increased risk of digoxin toxicity
cimetidine	Management of GI upset or heartburn	Decreased metabolism of metronidazole
phenobarbital	Sedative	Increased metabolism of metronidazole
<b>quinine</b>		
warfarin	Seizure control	Lower levels of mebendazole

# Antiprotozoal Drugs—Interactions #2

Interacting Food	Common Use	Effect of Interaction
chloroquine		
Foods that acidify the urine (cranberries, plums, prunes, meats, cheeses)	Dietary/nutrition	Decrease the effectiveness of the antimalarial drug

# Nursing Process—Client Receiving an Antiparasitic Drug #12

## ❖ Preadministration Assessment

## ❖ Objective Data

- General client appearance
- Vital signs
- Collection of stool specimens

## ❖ Subjective Data

- Description of bowel movements
- History of travel or routine





# Nursing Process—Client Receiving an Antiparasitic Drug #13

## ❖ Ongoing Assessment

- Inspect each stool for the passage of the helminth
- If hospitalized, save each stool for transport to the lab per facility protocol
- Acutely ill: monitor vital signs every 4 hours and record fluid intake/output
- Observe client for adverse reactions and notify health care provider



# Nursing Process—Client Receiving an Antiparasitic Drug #14

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## ❖ Nursing Diagnoses

- Diarrhea related to parasitic invasion of body
- Hypovolemia/Dehydration related to parasitic invasion in body
- Malnutrition related to adverse effects of drug therapy
- Ineffective Airway Clearance related to adverse effects of drug therapy

# Nursing Process—Client Receiving an Antiparasitic Drug #15

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## ❖ Planning

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

# Nursing Process—Client Receiving an Antiparasitic Drug #16

## ❖ Implementation

- Promoting an optimal response to therapy
  - Instruct client and family in methods to prevent spreading infection
  - Isolation precautions per facility policy, safe handling of stool, and proper soiled bed linen handling
  - Pentamidine—client placed in a reclining or supine position
  - Instruct client that chloroquine therapy for malarial prophylaxis—should begin 2 weeks prior to potential exposure and continue for 6 to 8 weeks after leaving the area of potential exposure



# Nursing Process—Client Receiving an Antiparasitic Drug #17

## ❖ Implementation

- Monitoring and Managing Client's Needs
  - Diarrhea
    - Take daily stool specimens to lab if ordered
    - Document the number, consistency, color, and frequency of stools
    - Stool specimens must be kept at or near body temperature



# Nursing Process—Client Receiving an Antiparasitic Drug #18

## ❖ Implementation

- Monitoring and Managing Client Needs
  - Hypovolemia/Dehydration
    - Monitor fluid intake and output
    - Keep the client clean and room free of odor
    - Notify provider of signs of dehydration
    - Encourage oral fluids
    - IV fluid and electrolyte replacement if indicated and ordered by provider



# Nursing Process—Client Receiving an Antiparasitic Drug #19

## ❖ Implementation

### ○ Monitoring and Managing Client Needs

#### ■ Malnutrition

- Give medication with food to help with GI adverse effects (nausea)
- Encourage frequent small meals of easily digested food
- Assess client's eating habits, food preferences, and food aversions
- Take a daily weight and monitor for any changes
- Ensure that meals are nutritionally well-balanced, appetizing, and attractively served
- Refer to registered dietitian if indicated



# Nursing Process—Client Receiving an Antiparasitic Drug #20

## ❖ Implementation

- Monitoring and Managing Client Needs
  - Ineffective Airway Clearance
    - Bronchospasm can occur with inhaled treatments of pentamidine
    - Administer a bronchodilator if prescribed by the primary health care provider prior to the pentamidine treatment
    - Teach client and family proper administration of pentamidine and care of the respiratory equipment





# Nursing Process—Client Receiving an Antiparasitic Drug #21

## ❖ Implementation—Educating the Client and Family

- Develop a teaching plan for the client and family to include:
  - Educate client and family in the complete instructions on taking the drug and to follow provider orders exactly
  - Follow up stool specimens
  - Proper clothing and linen washing, disinfections of toilet facilities daily
  - Daily bathing
  - Thorough handwashing



# Nursing Process—Client Receiving an Antiparasitic Drug #22

## ❖ Implementation—Educating the Client and Family

- Develop a teaching plan for the client and family to include:
  - Instruction specific to occupation (food handlers and childcare workers)
  - Report adverse reactions
  - Considerations for pregnant clients or clients using contraception



# Turn and Talk—Case Study #1

- ❖ A 24-year-old woman presents today complaining of irritation and soreness in her mouth and throat. She is 2 years status post kidney transplant. Current medications include prednisone 5 mg every day, tacrolimus 1 mg twice a day, mycophenolate mofetil 500 mg two capsules twice a day, warfarin 5 mg every day, enalapril 10 mg every day, simvastatin 10 mg every day, Ortho Novum 7/7/7 every day, Advair (fluticasone and salmeterol combination inhaler) 250/50 one inhalation twice a day, and albuterol inhaler two puffs every 4 to 6 hours as needed for wheezing and shortness of breath.
- 1. Which of the client's medications or medical conditions put her at risk for a fungal infection?
- 2. The physician diagnoses the client with oral candidiasis and prescribes nystatin suspension 1 teaspoonful four times a day for 7 days. How should the nurse counsel her to use the suspension as part of the nurse's teaching plan?



## Turn and Talk—Case Study #2

- ❖ A 24-year-old woman presents today complaining of irritation and soreness in her mouth and throat. She is 2 years status post kidney transplant. Current medications include prednisone 5 mg every day, tacrolimus 1 mg twice a day, mycophenolate mofetil 500 mg two capsules twice a day, warfarin 5 mg every day, enalapril 10 mg every day, simvastatin 10 mg every day, Ortho Novum 7/7/7 every day, Advair (fluticasone and salmeterol combination inhaler) 250/50 one inhalation twice a day, and albuterol inhaler two puffs every 4 to 6 hours as needed for wheezing and shortness of breath
- ❖ What adverse effects should the nurse tell the client to expect?
- ❖ Under what circumstances should the nurse tell the client to contact the physician?

