

PNSG 2303
Pharmacology II
Anti-Infectives
Chapters
6, 7, 8, 9, 10, 11, 14, 15

**ANTI-INFECTIVE
AGENTS**

SULFONAMIDES
CHAPTER 6
PAGES 71-77

Sulfonamides

- First antibiotic drug developed.
- Antibacterial agent
- Action: bacteriostatic

SULFONAMIDES

- Uses:
 - Urinary tract infections
 - Topical agent for second and third degree burns.

SULFONAMIDES ADVERSE REACTIONS

- Hematological changes
- Abdominal pain
- Loss of appetite
- Fever/chills
- Urticaria
- Stomatitis
- Pruritus
- Crystalluria
- N/V/D
- Rash

SULFONAMIDES

- Stevens-Johnson syndrome



– A serious and sometimes fatal hypersensitivity reaction. Symptoms include lesions on the skin and mucous membranes, often starting on the face, in the mouth, on the lips, neck, or extremities. Will also experience fever, cough, muscular aches and pains.

SULFONAMIDES

- Contraindications:
 - Hypersensitivity to the drugs
 - Pregnancy/lactation
 - Children under the age of 2
 - Infections caused by group A beta-hemolytic streptococci.

SULFONAMIDES

- Precautions:
 - Renal/hepatic impairment
 - Bronchial asthma
 - Allergies to drugs

SULFONAMIDES

- Interactions:
 - When given with anticoagulants, may increase effects of the anticoagulant.
 - Sulfonamide and methotrexate: may cause bone marrow depression
 - Sulfonamide and hydantoin: dilantin level may be increased
 - May affect some oral hypoglycemic meds causing increased risk for hypoglycemic episodes.

Burn management

- Mafenide or silver sulfadiazine
- Clean and remove debris according to protocols or physician's order
- Apply with a sterile technique
- Apply cream 1/16 inch thick
- Keep patient away from any drafts of air
- Warn patient that stinging or burning may occur





PENICILLINS
CHAPTER 7
PAGE 79-89

PENICILLINS

- Discovered in 1928 by Sir Alexander Fleming while performing research on influenza.
- Not used clinically for treatment of infections until 1941.

PENICILLINS DRUG RESISTANCE

- Natural penicillins are less effective due to microorganisms developing drug-resistant strains.
- Certain bacteria can develop **PENICILLINASE** (an enzyme that can inactivate penicillin)

PENICILLINS

- Actions:
 - Bactericidal:
 - Destroy the bacteria
 - Bacteriostatic:
 - Slow or retard the multiplication of bacteria

PENICILLINS

- Uses:
 - Urinary tract infections
 - Septicemia
 - Meningitis
 - Intra-abdominal infections
 - Gonorrhoea
 - Syphilis
 - Pneumonia
 - Respiratory infections

PENICILLINS

- Prophylaxis use:
 - Against a potential secondary infection that can occur in a patient with a viral infection
 - Given for those at a high-risk for a potential infection
 - Rheumatic fever
 - Chronic ear infections

PENICILLINS ANVERSE REACTIONS

- Mild nausea
- Vomiting
- Diarrhea
- Sore tongue
- Sore mouth
- Fever
- Pain at injection site
- Hypersensitivity and Super infections

Hypersensitivity reactions

- Defined: allergic reaction within the body.
- S/S display 7-3 page 69
- Anaphylactic shock: severe hypersensitivity reaction

Anaphylactic shock

- S/S:
 - Severe hypotension
 - Loss of consciousness
 - Acute respiratory distress
 - Can be fatal if not treated emergently

PENICILLINS SUPERINFECTIONS

- Defined:
 - Disruption of the normal flora allowing uncontrolled growth of bacteria or fungal microorganisms.
- Can develop rapidly, and is potentially serious and even life threatening.

PENICILLINS ADVERSE REACTIONS

- Anemia
- Thrombocytopenia
- Leukopenia
- Bone marrow depression
- Glossitis
- Stomatitis
- Gastritis
- N/V
- Abdominal pain
- Pain at injection site
- Phlebitis
- Dry mouth

PENICILLINS

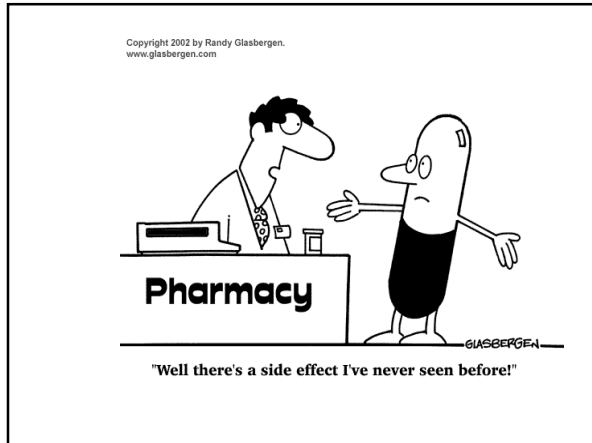
- Contraindications:
 - Patients with a history of hypersensitivity to penicillin or the cephalosporins.

PENICILLINS PRECAUTIONS

- Renal disease
- Pregnancy/lactation
- History of allergies
- Asthma
- Bleeding disorders
- Gastrointestinal disease

PENICILLINS INTERACTIONS

- Can decrease the effectiveness of some birth control pills containing estrogen
- Decrease in effectiveness of PCN when given with tetracycline
- Increase bleeding risks if taking anticoagulants
- PCN should be given 1 hour before or 2 hours after a meal



CEPHALOSPORINS CHAPTER 8

PAGES 91-98

CEPHALOSPORINS

- Structurally and chemically related to penicillin
- Divided into first, second, and third generation drugs.

CEPHALOSPORINS

- Actions:
 - Affect the bacterial cell wall, making it defective and unstable.

CEPHALOSPORINS

- Uses:
 - Pharyngitis
 - Tonsillitis
 - Otitis media
 - Lower respiratory infections
 - Urinary tract infections
 - Septicemia
 - Gonorrhoea

CEPHALOSPORINS ADVERSE REACTIONS

- Most common: GI disturbances
- Skin rashes
- Steven Johnson syndrome
- Hepatic and renal dysfunction
- malaise
- Aplastic anemia
- Epidermal necrosis
- Headache
- Dizziness
- Nephrotoxicity
- Fever

CEPHALOSPORINS

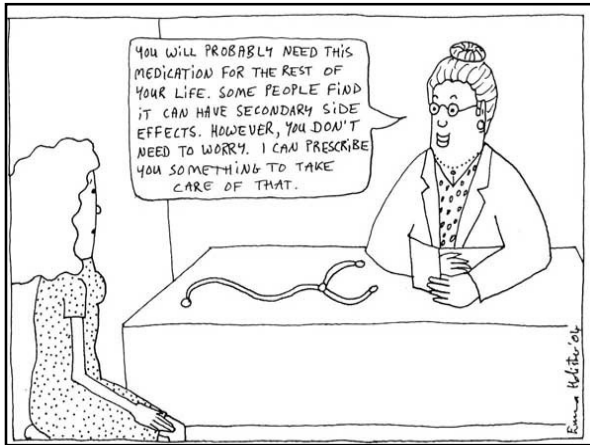
- Contraindications:
 - If a patient has a history of allergies to cephalosporins or penicillins.

CEPHALOSPORINS

- Precautions:
 - Renal or hepatic impairment
 - Bleeding disorders
 - Pregnancy/lactation

CEPHALOSPORINS

- Interactions:
 - Risk of nephrotoxicity increases when the cephalosporins are administered with the aminoglycosides.
 - The risk for bleeding increases when the cephalosporins are taken with anticoagulants
 - Alcohol when consumed within 72 hours after cephalosporins administered.
 - Flushing, throbbing in the head and neck, dyspnea, vomiting, sweating, chest pain, and hypotension.



TETRACYCLINES MACROLIDES LINCOSAMIDES

CHAPTER 9
PAGES 99-107

TETRACYCLINES

- Broad-spectrum antibiotic
- Composed of natural and semisynthetic compounds
- Useful in infections that show sensitivity to the drug
 - Cholera
 - Rocky mountain spotted fever
 - typhus

TETRACYCLINES

- Actions:
 - Inhibit bacterial protein synthesis
 - This is a process necessary for reproduction of the microorganism
 - Bacteriostatic
 - Slowing or retarding the multiplication of bacteria

TETRACYCLINES

- Uses:
 - Infections caused by gram-negative and gram-positive organisms.
 - Used when PCN is contraindicated with intestinal amebiasis, and some skin and soft tissue infections.
 - Uncomplicated urethral, endocervical, or rectal infections
 - Used with other treatments for severe acne and peptic ulcer disease

TETRACYCLINES ADVERSE REACTIONS

- N/V/D
- Epigastric distress
- Stomatitis
- Sore throat
- Photosensitivity reaction
- May cause permanent yellow, gray-brown discoloration of the teeth.
- Skin rash

TETRACYCLINES

- Contraindications:
 - Hypersensitivity to the drug
 - Pregnancy/lactation
 - Children under the age of 9

TETRACYCLINES

- Precautions:
 - Patients with renal function impairment
 - Doses greater than 2 grams can be extremely damaging to the liver
 - Check expiration date before giving
 - If degradation of the drug occurs, the drug becomes extremely toxic to the kidneys

TETRACYCLINES

- Interactions:
 - Antacids
 - High calcium foods
 - Oral anticoagulants
 - Oral contraceptives
 - digoxin

MACROLIDES

- Used against a wide variety of pathogenic organisms.
- Used especially with infections of the respiratory and genital tract.

MACROLIDES

- Actions:
 - Bacteriostatic or bactericidal
 - Binds to cell membranes and cause changes in protein function

MACROLIDES

- Uses:
 - For wide range of gram-negative and gram-positive microorganisms
 - Acne vulgaris
 - Upper respiratory infections

MACROLIDES

- Adverse reactions:
 - N/V/D
 - Abdominal pain
 - Cramping
 - Pseudomembranous colitis

MACROLIDES

- Contraindications:
 - Hypersensitivity to macrolides
 - Pre-existing liver disease

MACROLIDES

- Precautions:
 - Pregnancy/lactation
 - Patients with liver dysfunction

MACROLIDES

- Interactions:
 - Increases serum levels of digoxin
 - Increases the effects of anticoagulants
 - May increase serum theophylline levels
 - Decrease in therapeutic activity with
 - Clindamycin
 - Lincomycin
 - chloramphenicol

LINCOSAMIDES

- Used against gram-positive organisms
- Because of potential of high toxicity:
 - Used only for the treatment of serious infections in which penicillin and erythromycin are not effective

LINCOSAMIDES

- Actions:
 - Causing death to susceptible bacteria through inhibiting protein synthesis

LINCOSAMIDES

- Uses:
 - Gram-negative and gram-positive microorganisms
 - Used for more serious infections usually in conjunction with other medications

LINCOSAMIDES ADVERSE REACTIONS

- Abdominal pain
- Blood dyscrasias
- Esophagitis
- Pseudo-membranous colitis
- N/V/D
- Skin rash

LINCOSAMIDES

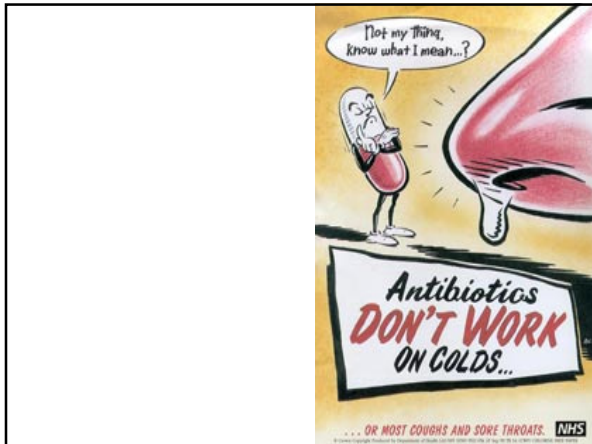
- Contraindications:
 - Hypersensitivity to lincosamides
 - Minor infections
 - Lactation
 - Infancy

LINCOSAMIDES

- Precautions:
 - Gastrointestinal disorders
 - Renal disease
 - Liver impairment
 - Myasthenia gravis

LINCOSAMIDES

- Interactions:
 - Decreased absorption when aluminum or kaolin is given
 - Neuromuscular blocking drug is enhanced leading to severe respiratory depression



FLUOROQUINOLONES
&
AMINOGLYCOSIDES
CHAPTER 10
PAGES 109-117

FLUOROQUINOLONES &
AMINOGLYCOSIDES

These are 2 groups of broad-spectrum antibiotics that would be more effective against more resistant pathogens.

FLUOROQUINOLONES

- Actions:
 - Interfere with an enzyme needed by bacteria for the synthesis of DNA which prevents cell production.

FLUOROQUINOLONES

- Uses:
 - Lower resp. infections
 - Skin infections
 - UTI
 - Sexually transmitted diseases
 - Infections of the eye

FLUOROQUINOLONES ADVERSE REACTIONS

- Superinfections
- Pseudomembranous Colitis
- Nausea
- Diarrhea
- Abdominal pain
- Dizziness
- Photosensitivity reaction

FLUOROQUINOLONES

- Contraindications:
 - Hypersensitivity of fluoroquinolones
 - Children younger than 18 years old
 - Pregnant women (Category C)
 - Life-styles that would not adhere to the precautions of photosensitivity reaction.

FLUOROQUINOLONES

- Precautions:
 - Renal impairment
 - History of seizures
 - Geriatric patients
 - Patients on dialysis

FLUOROQUINOLONES

- Interactions:
 - Theophylline
 - Cimetidine
 - Oral anticoagulant
 - NSAIDS
 - Cardiac drugs that increase the QT interval

AMINOGLYCOSIDES

- Actions:
 - Block a step in protein synthesis necessary for bacterial multiplication.

AMINOGLYCOSIDES

- Uses:
 - Suppressing gastrointestinal bacteria
 - Pre-op intestinal procedures
 - Hepatic coma
 - Reduces the number of ammonia forming bacteria in the intestines which in turn, will lower ammonia levels in the blood.

AMINOGLYCOSIDES ADVERSE REACTIONS

- Nephrotoxicity
 - Proteinuria
 - Hematuria
 - Decrease urine output
- Ototoxicity
 - Tinnitus
 - Dizziness
 - Roaring of the ears
 - Vertigo
 - Hearing loss
- Neurotoxicity
 - Numbness
 - Tingling
 - Tremors/muscle twitching
 - Oral/peripheral paresthesia
 - Muscle weakness
- N/V/D
- Superinfections/pseudo-membranous colitis

AMINOGLYCOSIDES

- Contraindications:
 - Hypersensitivity to aminoglycosides
 - Pre-existing hearing loss
 - Myasthenia gravis
 - Parkinsonism
 - Lactation/pregnancy
 - Long-term therapy
 - Except: streptomycin for management of tuberculosis

AMINOGLYCOSIDES

- Precautions:
 - Renal failure
 - Elderly clients
 - Neuromuscular disorders

AMINOGLYCOSIDES

- Interactions:
 - Cephalosporins
 - Loop diuretics
 - General anesthesia



MISCELLANEOUS
ANTI-INFECTIVES

CHAPTER 11

PAGES 119-126

LINEZOLID (ZYVOX)

- Actions:
 - Binds to a site on a specific ribosomal RNA and prevents the formation of a component necessary to duplicate bacteria.
- Uses:
 - VRE
 - Nosocomial/community acquired pneumonia
 - Pneumonia
 - Skin infections including MRSA

LINEZOLID

- Adverse reaction:
 - NV/D
 - Headache
 - Insomnia
 - Fatigue
 - Depression
 - Nervousness
 - Photosensitivity

LINEZOLID

- Contraindications:
 - Allergies: cephalosporins and penicillins
 - Renal failure
 - Children under 3 yrs. of age
 - Pregnancy/lactation
- Precautions:
 - CNS/seizure disorders
 - Renal/hepatic failure
- Interactions:
 - Probenecid

CARBAPENEMS

- Action:
 - Inhibits synthesis of the bacterial cell wall and causes the death of susceptible cells.
- Uses:
 - Intra-abdominal infections
 - Bacterial meningitis
 - Endocarditis
 - Septicemia
 - Community acquired pneumonia

CARBAPENEMS

- Adverse reactions:
 - Headache
 - N/V/D
 - Anorexia
 - Abdominal pain
 - Generalized pain
 - Flatulence
 - Rash
 - Superinfections
 - Abscess/phlebitis to injection site

CARBAPENEMS

- Contraindications:
 - Allergy to cephalosporins and PCNs
 - Renal failure
 - Pregnancy/lactation
 - Children younger 3 months
- Precautions:
 - CNS disorders
 - Seizures
 - Renal/hepatic failure
- Interactions:
 - Probenecid

METRONIDAZOLE (Flagyl)

- Actions:
 - Disrupts DNA and protein synthesis in susceptible organisms
- Uses:
 - Intra-abdominal infections
 - Bone infections
 - Soft tissue infections
 - Lower resp. infections
 - Gynecologic infections
 - CNS infections

METRONIDAZOLE

- Adverse reactions:
 - NV/D
 - Anorexia
 - Seizures
 - Numbness of extremities
 - Thrombophlebitis
 - Hypersensitivity reactions

METRONIDAZOLE

- Contraindications:
 - Hypersensitivity
 - First trimester of pregnancy
- Precautions:
 - Blood dyscrasias
 - Seizure disorders
 - Hepatic dysfunction
- Interactions:
 - Cimetidine
 - Phenobarbital
 - Warfarin

PENTAMIDINE ISETHIONATE (PENTAM 300 & NEBUPENT)

- Actions:
 - Unknown
- Uses:
 - Pneumonia
 - Pneumonia with AIDS

SPECTINOMYCIN

- Action:
 - Interferes with bacterial protein synthesis

- Uses:
 - Treatment of gonorrhea

SPECTINOMYCIN ADVERSE REACTIONS

- Soreness at site of injection
- Chills

- Urticaria
- Fever

- Dizziness
- Hypersensitivity reactions

- Rash

SPECTINOMYCIN

- Contraindications:
 - Known hypersensitivity
 - Infants

- Precaution:
 - Safe use in pregnancy/lactation not known

- Interactions:
 - None known

VANCOMYCIN

- Action:
 - Inhibits bacterial cell wall synthesis

- Uses:
 - Serious gram-positive that do not respond to other meds.
 - Effective in treating Clostridium difficile

VANCOMYCIN ADVERSE REACTIONS

- Nephrotoxicity
- Ototoxicity
- Nausea
- Chills
- Fever
- Urticaria
- Sudden drop in BP with parenteral admin.
- Skin rashes

VANCOMYCIN

- Contraindications:
 - Known hypersensitivity

- Precautions:
 - Renal impairment
 - Hearing impairment
 - Pregnancy/lactation

- Interactions:
 - Additive effects when given with ototoxic/nephrotoxic drugs.



ANTIVIRAL DRUGS

CHAPTER 14
Pages 141-152

VIRUSES

- Over 200 viruses have been identified as capable of producing disease.
- Over the past few years, more antiviral medication has been developed.

ANTIVIRAL DRUGS

- Action:
 - Inhibits viral DNA/RNA replication in the virus causing viral death.
- Uses:
 - HSV
 - HIV
 - CMV
 - Genital Herpes
 - Influenza A
 - RSV
 - Viral Herpes Infections

ANTIVIRAL DRUGS GENERAL SIDE EFFECTS

- Crystalluria
- Anorexia
- GI disturbances
- Burning
- N/V/D
- Stinging
- Pruritus

ANTIVIRAL DRUGS

- Contraindications
 - Hypersensitivity
- Precautions
 - Renal impairment –may require dose adjustments
 - Children/pregnancy/lactation
- Interactions
 - Drug specific

ACYCLOVIR

- Neurologic symptoms such as seizures may occur with the administration of Acyclovir.

ACYCLOVIR ADVERSE REACTION

- IV
 - Phlebitis
 - Lethargy
 - Confusion
 - Tremors
 - Skin rashes
 - Nausea
 - Crystalluria
- ORALLY
 - N/V/D
 - Headache
 - Dizziness
 - Skin rashes
- TOPICAL
 - Burning
 - Stinging
 - Pruritus

ANTIRETROVIRALS

- HIV: is considered a retro-virus
- RNA: primary component instead of DNA
- Multi-drug therapy used to control these types of infections.

ANTIRETROVIRALS

- Adverse Reaction:
 - NVD & altered taste
 - HA, fever, rash, numbness around mouth
- Contraindications:
 - Allergies
 - Lactation
 - Numerous medications
- Precautions:
 - Diabetes, hepatic prob., preg., sulfonamide allergy



ANTIFUNGAL DRUGS

CHAPTER 15

Pages 153-162

ANTIFUNGAL DRUGS

- Fungus: a colorless plant that lacks chlorophyll
- Humans: infection may be yeast-like or mold-like
- Range from superficial fungal infections to deep systemic fungal infections

ANTIFUNGAL DRUGS

- Ex. of superficial infections:
 - Athlete's foot
 - Jock itch
 - Ringworm
 - Nail fungus
 - Yeast infections
- Ex. of deep systemic infections:
 - Lungs
 - Blood

ANTIFUNGAL DRUGS

- Actions:
 - Fungicidal: able to destroy fungi
 - Fungistatic: able to slow or retard the multiplication of fungi

ANTIFUNGAL DRUGS

- Adverse Reactions:
 - Irritation
 - Redness/Rash
 - Abdominal pain (vaginal use)
 - HA
 - Anorexia
 - NVD
 - Muscle pain

ANTIFUNGAL DRUGS

- Contraindications:
 - Allergy
 - Pregnancy/lactation unless life threatening
- Precautions:
 - Renal/liver impairment
- Interactions:
 - Depends on the individual drug

ONGOING ASSESSMENT

- Topical application:
 - Nurse instructs patient to look for signs of adverse reaction and report any reaction to the physician.

PATIENT EDUCATION

- Ringworm Infection:
 - Keep all towels and wash clothes separate from other members of the family to avoid spreading the infection.
 - Keep affected area clean and dry.

AMPHOTERICIN B

- Adverse reactions:
 - Fever
 - Chills/shaking
 - Headache
 - Malaise
 - Anorexia
 - Joint/muscle pain
 - Abnormal renal function
 - N/V
 - Anemia

AMPHOTERICIN B

- Contraindications:
 - Hypersensitivity
- Interactions:
 - Digoxin
 - Nephrotoxic drugs
 - Miconazole
- Precautions:
 - Renal dysfunction
 - Electrolyte imbalances
 - Antineoplastic drugs
 - Pregnancy/lactation

