Toppersnotes
Unleash the topper in you

A to Z

NURSING OFFICER EXAM

For All State NHM, CHO & Nursing Officer Exams

Volume - 5

SIERRA INNOVATIONS

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1 CHAPTER

Pharmacology for Nurses

General Pharmacology

Introduction & Terminology

Term	Meaning	Exam Alert
Pharmacology	Science of drugs – study of interaction of chemicals with living systems	Definition-based MCQs
Pharmacokinetics	What the body does to the drug (ADME)	Absorption, Distribution, Metabolism, Excretion
Pharmacodynamics	What the drug does to the body	Receptors, Mechanism of action, Dose-response
Therapeutics	Use of drugs in prevention/treatment of disease	
Toxicology	Study of harmful effects of drugs	

- **Mnemonic** : **"Kinetic = body on drug, Dynamic = drug on body"**

Nursing Booster Point

- Pharmacokinetics guides **dose adjustment** (esp. in renal/hepatic disease).
- Pharmacodynamics explains **effect & side effects**.

Routes of Drug Administration

Route	Example	Advantages	Disadvantages
Oral	Tablets, Capsules	Safe, cheap	Slow, 1st pass metabolism
IV (Intravenous)	Antibiotics, Fluids	Rapid, 100% bioavailability	Risk of infection, anaphylaxis
IM (Intramuscular)	Vaccines, Analgesics	Moderate absorption	Painful
SC (Subcutaneous)	Insulin, Heparin	Self-administration	Irritation, variable absorption
Topical	Creams, Ointments	Local effect	Limited systemic use
Inhalation	Asthma drugs	Fast absorption	Technique-dependent
Sublingual	Nitroglycerin	No first pass metabolism	Bitter taste

Mnemonic : **"OIVISTS"** → Oral, IV, IM, SC, Topical, Sublingual, Inhalation.

Exam Alert :

- DOC for acute angina: **Sublingual Nitroglycerin** (bypasses 1st pass metabolism).
- Fastest route: **IV**.
- Slowest route: **Oral**.

Factors Affecting Drug Action

1. Age (newborns & elderly → altered metabolism)
2. Body weight
3. Gender & hormones
4. Route of administration
5. Renal & hepatic function
6. Drug interactions

Nursing Booster Point

- Check **renal function (creatinine clearance)** before nephrotoxic drugs (e.g., aminoglycosides).
- Adjust dose in **liver disease** (e.g., warfarin, phenytoin).

Adverse Drug Reactions (ADR)

Type	Name	Example	Exam Alert
A	Augmented (dose-related)	Hypoglycemia with insulin	Most common
B	Bizarre (idiosyncratic)	Penicillin allergy	Not dose-dependent
C	Chronic	Steroid → Cushing's	Long-term
D	Delayed	Carcinogenicity	Years later
E	End-of-use	Morphine withdrawal	On stopping drug

Mnemonic : **"ABCDE"** → Augmented, Bizarre, Chronic, Delayed, End-of-use.

Nursing Booster Point

- Always document **drug allergies** in patient file.
- Keep **resuscitation drugs ready** (adrenaline for anaphylaxis).

Drug Interactions

- **Pharmacokinetic** (ADME affected)
  - ✓ Example: Tetracycline + Milk → ↓ absorption.
- **Pharmacodynamic** (effect altered)
  - ✓ Example: Warfarin + Aspirin → ↑ bleeding.
- CYP450 inducer: Rifampicin.
- CYP450 inhibitor: Erythromycin.

Essential Drug Concepts

Term	Meaning	Example
Dose	Amount required to produce effect	Paracetamol 500 mg
Drug of Choice (DOC)	Best drug for condition	Penicillin – Syphilis
Half-life (t½)	Time for plasma concentration ↓ by 50%	Digoxin t½ = 36 hrs
Therapeutic Index (TI)	Safety margin = LD50/ED50	Narrow TI → Digoxin, Lithium

Nursing Booster Point

- Narrow TI drugs need **blood level monitoring**.
- Loading dose used in **emergencies** (e.g., Digoxin, Phenytoin).

Topic	Mnemonic/Key Point
Pharmacokinetics	**ADME** (Absorption, Distribution, Metabolism, Excretion)
Routes of administration	**OIVISTS**
ADR types	**ABCDE**
Fastest route	IV
Avoids 1st pass metabolism	Sublingual, Rectal, IV

Key Concepts in Pharmacology

Concept	Meaning	Example	Exam Alert
Pharmacokinetics	Study of what the body does to the drug (ADME process)	Absorption of oral paracetamol → metabolism in liver	
Pharmacodynamics	Study of what the drug does to the body (mechanism, receptor action, effect)	Morphine → activates opioid receptors → analgesia	

Bioavailability	Fraction of drug that reaches systemic circulation unchanged	IV = 100%, Oral < 100% (due to 1st pass)	
First-pass metabolism	Drug metabolized in liver before entering circulation → ↓ bioavailability	Nitroglycerin, Propranolol	
Half-life (t½)	Time taken for plasma drug concentration to fall by 50%	Digoxin t½ = 36 hrs	Determines dosing interval
Therapeutic Index (TI)	Ratio of toxic dose (LD50) to effective dose (ED50) → margin of safety	Digoxin, Lithium = narrow TI	Narrow TI = dangerous
Prodrug	Inactive drug converted to active form in body	Enalapril → Enalaprilat	

Mnemonic Kinetics = body on drug, Dynamics = drug on body

Nursing Booster Point

- Narrow TI drugs (e.g., **Digoxin, Lithium, Theophylline**) need **blood level monitoring**.
- First-pass metabolism → Sublingual/IV routes **bypass it**.

Routes of Drug Administration

Enteral (via GI tract)

- **Oral (PO)**
  - ✓ Example: Paracetamol, Antibiotics
  - ✓ Easy, cheap, safe
  - ✓ Slow absorption, first-pass effect
- **Sublingual**
  - ✓ Example: Nitroglycerin
  - ✓ Rapid, no first-pass metabolism
  - ✓ Limited drugs, bitter taste
- **Rectal**
  - ✓ Example: Suppositories (Paracetamol, Diazepam)
  - ✓ Useful in vomiting/unconscious pt.
  - ✓ Irritation, variable absorption

Parenteral (bypasses GI tract)

- **Intravenous (IV)**
  - ✓ Example: Antibiotics, Fluids
  - ✓ 100% bioavailability, immediate effect
  - ✓ Risk of infection, anaphylaxis
- **Intramuscular (IM)**
  - ✓ Example: Vaccines, Penicillin
  - ✓ Depot effect possible
  - ✓ Painful, local abscess risk
- **Subcutaneous (SC)**
  - ✓ Example: Insulin, Heparin
  - ✓ Self-administered
  - ✓ Limited volume, irritation risk
- **Intrathecal/Intracisternal**
  - ✓ Example: Anesthetics, Chemotherapy
  - ✓ Direct to CSF
  - ✓ High risk → only specialist use

Toppersnotes Unleash the topper in you

Topical / Local

- **Skin application**: Creams, Ointments
- **Eye/Ear drops**: Local infections
- **Inhalation**: Asthma inhalers, Anesthetics
- **Transdermal patches**: Nicotine, Fentanyl

Fastest & Slowest Routes

Route	Speed	Example
IV	Fastest	Adrenaline in cardiac arrest
Sublingual	Next fastest	Nitroglycerin
IM/SC	Moderate	Vaccines, Insulin
Oral	Slowest	Paracetamol

Routes that Avoid First-Pass Metabolism

- **Sublingual** (Nitroglycerin)
- **Rectal** (Suppositories – partial avoidance)
- **Parenteral** (IV, IM, SC)
- **Inhalation** (Asthma drugs)
- **Transdermal patches**

Mnemonic : **"Some Real Patients In Trouble"** → Sublingual, Rectal, Parenteral, Inhalation, Transdermal

Nursing Booster Point

- **DOC for acute angina** → Sublingual Nitroglycerin
- **Route with 100% bioavailability** → IV
- **Route preferred in unconscious patient** → IV or Rectal
- **Drugs with first-pass metabolism** → Propranolol, Nitroglycerin

Parenteral Routes – Injection Details

Route	Site	Angle of Insertion	Max Dose (Adults)	Needle Size (Gauge & Length)	Exam Alert
Intradermal (ID)	Inner forearm, upper back	**5–15°** (bevel up)	0.1 mL	26–27 G, 3/8 inch	TB test, allergy test
Subcutaneous (SC)	Outer upper arm, abdomen, thigh	**45°** (90° in obese pts)	1 mL	25–27 G, ½–5/8 inch	Insulin, Heparin
Intramuscular (IM)	Deltoid, Vastus lateralis, Gluteus medius	**90°**	Deltoid: 1 mL; Vastus/Gluteus: up to 3–5 mL	21–23 G, 1–1.5 inch	Vaccines, Antibiotics
Intravenous (IV)	Forearm veins, dorsum of hand	**25°**	No fixed limit	18–22 G, 1–1.5 inch	Emergency drugs, fluids
Intraosseous (IO)	Tibia, sternum (emergency)	**90°**	Depends on drug/fluid	Specialized IO needle	Used in shock, cardiac arrest
Intrathecal	Subarachnoid space (L3–L4)	**90°**	Small (≤5 mL)	22–25 G spinal needle	Spinal anesthesia, chemo

- **Angles of Injection → "5, 45, 90, 25"**
  - ✓ 5–15° = ID
  - ✓ 45° = SC
  - ✓ 90° = IM
  - ✓ 25° = IV
- **Max Dose Rule**
  - ✓ **ID = 0.1 mL**
  - ✓ **SC = 1 mL**
  - ✓ **IM = 5 mL**
  - ✓ **IV = unlimited**

Nursing Booster Point

- Always **aspirate before IM injection** (except vaccines, insulin, heparin).
- **Z-track technique** → prevents leakage/irritation (used for iron injections).
- **SC insulin** should be given with **insulin syringe (30G, short needle)**.
- **Rotate injection sites** to prevent lipodystrophy (esp. insulin, heparin).
- **Deltoid** → max 1 mL (common site for vaccines).
- **Vastus lateralis** → preferred site in infants.
- PPD test (Mantoux) injection: Intradermal, 0.1 mL, 26G, 5–15°.
- Heparin & Insulin: Given SC, NOT IM.
- DOC for infants IM site: Vastus lateralis.
- Z-track method: For **Iron dextran** injection.
- Angle for IV: 25°.

Category	**Drug Names**
Penicillins	Natural, Aminopenicillins, Antipseudomonal, Penicillinase-resistent
Cephalosporins	1st Gen, 2nd Gen, 3rd Gen, 4th Gen, 5th Gen
Carbapenems	Imipenem, Meropenem, Ertapenem
Monobactam	Aztreonam
Glycopeptides	Vancomycin, Teicoplanin
Aminoglycosides	Gentamicin, Amikacin, Streptomycin, Tobramycin, Neomycin
Tetracyclines	Tetracycline, Doxycycline, Minocycline
Macrolides	Erythromycin, Azithromycin, Clarithromycin
Lincosamides	Clindamycin
Sulfonamides	Sulfamethoxazole, Trimethoprim (Co-trimoxazole)
Fluoroquinolones	Ciprofloxacin, Levofloxacin, Moxifloxacin
Nitroimidazoles	Metronidazole, Tinidazole
Nitrofurans	Nitrofurantoin
Antitubercular	INH, Rifampicin, Pyrazinamide, Ethambutol, Streptomycin
Antifungals	Amphotericin B, Fluconazole, Itraconazole, Voriconazole, Griseofulvin
Antivirals	Acyclovir, Oseltamivir, Zidovudine (AZT)
Antimalarials	Chloroquine, Primaquine, Artemisinin combo

System	**Drug Categories**
Cardiovascular	Antihypertensives, Antianginals, Antiarrhythmics, Anticoagulants
Central Nervous System	Sedatives/Hypnotics, Antiepileptics, Antipsychotics, Antidepressants
Respiratory	Bronchodilators, Antiasthmatics, Antitussives, Expectorants
Gastrointestinal	Antiemetics, Antacids, H2 Blockers, PPIs, Laxatives, Antidiarrheals
Endocrine	Antidiabetic (Insulin, OHA), Thyroid & Antithyroid, Corticosteroids
Hematologic	Iron, Folic Acid, Vitamin B12, Erythropoietin
Chemotherapy	Antibiotics, Antifungals, Antivirals, Antimalarials, Antituberculars
Miscellaneous	Immunosuppressants, Vitamins, Minerals

Antibiotics – Classification

A. Based on Mechanism of Action

Mechanism	Drug Examples	Mnemonic
Cell wall synthesis inhibitors	Penicillins, Cephalosporins, Carbapenems, Vancomycin	**"Pen Ce Ca Va"**
Protein synthesis inhibitors (30S)	Aminoglycosides, Tetracyclines	**"AT 30"**
Protein synthesis inhibitors (50S)	Macrolides, Chloramphenicol, Clindamycin, Linezolid	**"50 MACC"**
DNA/RNA inhibitors	Fluoroquinolones, Rifampicin, Metronidazole	
Folate synthesis inhibitors	Sulfonamides, Trimethoprim	**"Sulfa-Trim"**

Penicillins

Drug	Dose	DOC (Drug of Choice)	Side Effects
Penicillin G (IV/IM)	4–24 MU/day	Syphilis, Rheumatic fever prophylaxis	Allergy (rash → anaphylaxis)
Penicillin V (oral)	250–500 mg	Strept throat	Allergy
Ampicillin/Amoxicillin	500 mg 8hrly	Enterococci, H. influenzae, UTI	Diarrhea, allergy
Piperacillin + Tazobactam	4.5 g IV	Pseudomonas infections	Allergy, nephritis

Nursing Booster

- Always check **allergy history** before giving penicillin.
- Emergency drug for penicillin anaphylaxis = **Adrenaline (Epinephrine)**.

Exam Alert

- DOC for **Syphilis** = Penicillin G.
- Cross-reactivity with **Cephalosporins** in allergy.

Cephalosporins (Generations)

Generation	Drugs	Spectrum	Exam Alert
1st	Cefazolin, Cephalexin	Gram +ve	Surgical prophylaxis (Cefazolin)
2nd	Cefuroxime	G+ve + some G–ve	Respiratory infections
3rd	Ceftriaxone, Ceftazidime	More G–ve	DOC: Meningitis (Ceftriaxone)
4th	Cefepime	Broad spectrum	Pseudomonas
5th	Ceftaroline	MRSA coverage	Only cephalosporin for MRSA

Mnemonic : **"1st = skin, 3rd = brain, 5th = MRSA"**

Aminoglycosides

Drug	DOC	Side Effects	Nursing Alert
Gentamicin	Severe G–ve infections	Nephrotoxicity, Ototoxicity	Monitor renal function
Amikacin	Resistant TB	Same as above	Peak & trough levels
Streptomycin	1st line TB (alt)	Ototoxicity (vestibular)	Avoid in pregnancy

Mnemonic : **"GNATS"** → Gentamicin, Neomycin, Amikacin, Tobramycin, Streptomycin.

Exam Alert

- Streptomycin → TB, contraindicated in **pregnancy** (fetal deafness).

Macrolides

Drug	DOC	Side Effects	Nursing Alert
Erythromycin	Atypical pneumonia	GI upset	Take after food
Azithromycin	Chlamydia, RTI	QT prolongation	Monitor ECG
Clarithromycin	H. pylori	Metallic taste	

Mnemonic : **"ACE"** → Azithro, Clarithro, Erythro.

Exam Alert

- DOC for **Atypical pneumonia (Mycoplasma)** = Macrolides.

Anti-Tubercular Drugs (First Line)

Drug	Dose	Side Effects	Nursing Alert
Isoniazid (INH)	5 mg/kg/day	Hepatitis, peripheral neuropathy	Give Pyridoxine (Vit B6)
Rifampicin	10 mg/kg/day	Orange-red urine, hepatitis	Stains contact lenses
Pyrazinamide	25 mg/kg/day	Hepatotoxic, hyperuricemia	Avoid alcohol
Ethambutol	15 mg/kg/day	Optic neuritis (red-green blindness)	Eye exam regularly
Streptomycin	15 mg/kg/day	Ototoxicity	Avoid in pregnancy

Mnemonic : **"PRIEST"** → Pyrazinamide, Rifampicin, INH, Ethambutol, Streptomycin.

Exam Alert

- DOC for **TB in pregnancy** = INH + Rifampicin + Ethambutol.
- Ethambutol → **red-green color blindness**.

Antifungal Drugs

Drug	DOC	Side Effects
Amphotericin B	Systemic mycoses	Nephrotoxicity ("Ampho-terrible")
Fluconazole	Cryptococcal meningitis, Candida	Hepatotoxicity
Griseofulvin	Dermatophytosis	Headache, hepatotoxicity

Antiviral Drugs

Drug	DOC	Side Effects
Acyclovir	Herpes infections	Nephrotoxicity
Oseltamivir	Influenza A & B	Nausea, vomiting
Zidovudine (AZT)	HIV (first NRTI)	Bone marrow suppression

Antimalarial Drugs

Drug	Use	Exam Alert
Chloroquine	DOC – P. vivax, P. ovale	Not effective in falciparum resistance
Artemisinin (ACT)	DOC – P. falciparum	Used with lumefantrine
Primaquine	Radical cure (kills hypnozoites in liver)	Contraindicated in G6PD deficiency

Mnemonic : **"CAP"** → Chloroquine, Artemisinin, Primaquine.

Group	DOC	Key Side Effect
Penicillin G	Syphilis	Allergy
Ceftriaxone	Meningitis	Hypersensitivity
Gentamicin	Severe G–ve	Nephro + Ototoxic
Azithromycin	Atypical pneumonia	QT prolongation
INH	TB	Neuropathy
Rifampicin	TB	Orange urine
Ethambutol	TB	Optic neuritis
Amphotericin B	Systemic mycoses	Nephrotoxicity
Acyclovir	Herpes	Nephrotoxicity
Artemisinin	Falciparum malaria	Well tolerated

Drug	Typical adult dose (exam)	DOC / Indication	Common SEs	Pregnancy/Lactation	Nursing care / Monitoring	Exam alert
Penicillin G (IV/IM)	2–4 MU q4–6h (total up to 18–24 MU/day)	Syphilis, severe streptococcal infections	Hypersensitivity (rash → anaphylaxis), GI upset	Safe in pregnancy (if indicated)	Ask allergy history; have resuscitation & epinephrine ready	DOC for syphilis
Amoxicillin (PO)	500 mg TID or 875 mg BD	Otitis media, H. pylori (combo)	Diarrhea, rash	Generally safe	Finish full course; observe for allergy	Causes pseudomembranous colitis (C. diff) risk
Piperacillin-Tazobactam (IV)	4.5 g q6–8h	Pseudomonas & broad hospital infections	Allergy, bleeding (rare), renal dose adjust	Use if benefits > risks	Monitor renal function, infusion site	Anti-pseudomonal penicillin

Key nursing tips: always ask about penicillin allergy. For anaphylaxis — stop drug, maintain airway, give IM/IV epinephrine, call for help.

CEPHALOSPORINS (by generation)

Gen	Example	Typical dose (exam)	Spectrum / DOCs	SEs / Special
1st	Cefazolin (IV), Cephalexin (PO)	Cefazolin 1 g IV q8–12h	Gram + → surgical prophylaxis	Allergy (cross-reactivity with penicillin in ~<10%)
3rd	Ceftriaxone	1–2 g IV once daily (or 2 g q12h in severe)	Meningitis, gonorrhoea	Biliary sludging in neonates (avoid neonates with hyperbilirubinemia)
4th	Cefepime	1–2 g IV q12h	Broad G-, Pseudomonas	Dose adjust in renal failure
5th	Ceftaroline	600 mg IV q12h	MRSA (unique cephalosporin)	Newer agent

Nursing care: check allergy status; ceftriaxone IV with adequate hydration; monitor for diarrhea (C. diff).

CARBAPENEMS & MONOBACTAM

- **Imipenem/Cilastatin** (500 mg q6–8h IV) — very broad, severe hospital infections.
- **Meropenem** (1 g q8h IV) — used for severe G−, anaerobes.
- **Aztreonam** — monobactam active vs Gram-negatives (useful in penicillin-allergic pts).
- **SEs/monitoring:** Seizure risk higher with imipenem (dose-adjust in renal failure). Monitor renal function.

GLYCOPEPTIDES — VANCOMYCIN

Drug	Dose	Indication	SEs	Monitoring / Nursing
Vancomycin	**15–20 mg/kg IV q8–12h (dosing by actual body weight)** — many exam Qs: 15 mg/kg q12h common	MRSA, serious Gram + infections	"Red-man syndrome" (infusion rxn), nephrotoxicity, ototoxicity	Infuse slowly (at least 60 min for typical doses), monitor troughs (institutional policy), monitor renal function & hearing

Exam tip: slow infusion to prevent red-man (flushing) — treat by slowing infusion and antihistamine.

AMINOGLYCOSIDES

Drug	Typical dosing (exam)	Indications	Major SEs	Nursing/monitoring
Gentamicin	Traditional: 1–2.5 mg/kg q8h; Extended interval: 5–7 mg/kg once daily	Severe Gram-negative sepsis, synergy for endocarditis	**Nephrotoxicity, Ototoxicity**	Peak & trough levels (if TDM available); monitor renal function & hearing; hydrate patient

Special: Avoid in pregnancy (fetal ototoxicity e.g., streptomycin). NCLEX priority: monitor urine output & creatinine.

TETRACYCLINES & CHLORAMPHENICOL

Drug	Dose (exam)	Indication	SEs	Special
Doxycycline	100 mg PO/IV BD	Rickettsial infections, acne, atypical pneumonias	Photosensitivity, esophageal irritation	Avoid in pregnancy & children (tooth discoloration)
Tetracycline	250–500 mg q6h	Similar	Same cautions	Avoid with milk/antacids (↓absorption)
Chloramphenicol	50–100 mg/kg/day divided	Severe typhoid (resource-limited)	Aplastic anemia, gray baby syndrome in neonates	Use only when no alternatives; monitor CBC

Nursing: Patient teaching — avoid sun, take with full glass of water, do not take with calcium-containing foods.

MACROLIDES & LINCOSAMIDES

Drug	Dose (exam)	Indication	SEs	Notes
Azithromycin	500 mg day 1 then 250 mg day 2–5 or 500 mg daily for 3 days	Atypical pneumonia, chlamydia	GI upset, QT prolongation (rare)	Less CYP effect than erythromycin
Erythromycin	250–500 mg q6h	MAC, GI motility agent	GI cramping, QT prolongation; CYP inhibitor	Take with food to reduce GI upset
Clindamycin	300–450 mg q6–8h	Anaerobic infections, PCP prophylaxis alternative	**C. difficile colitis** risk	Monitor for severe diarrhea

Exam alert: Macrolides are DOC for atypical pneumonia (Mycoplasma); clindamycin associated with C. diff — stop drug if severe diarrhea.

SULFONAMIDES & TRIMETHOPRIM

Drug	Dose (exam)	Use	SEs	Caution
Co-trimoxazole (TMP-SMX)	DS tablet (TMP 160 mg/SMX 800 mg) BD	UTI, PCP treatment/prophylaxis	Rash, Stevens-Johnson (rare), bone marrow suppression, hyperkalemia	Avoid in pregnancy (near term) & with folate deficiency; monitor CBC, renal fxn

Nursing: Monitor CBC, signs of hypersensitivity, advise sun protection.

FLUOROQUINOLONES

Drug	Dose (exam)	Use	SEs	Special
Ciprofloxacin	500–750 mg BD	Complicated UTI, enteric fever, Pseudomonas (some strains)	Tendinopathy/tendon rupture, QT prolongation, CNS effects	Avoid in pregnancy & children (tendon/cartilage) unless benefits > risk

Nursing: Encourage hydration; avoid antacids/iron/dairy within 2–4 hours of dose (↓absorption).

METRONIDAZOLE & NITROIMIDAZOLES

Drug	Dose (exam)	Use	SEs	Exam-critical teaching
Metronidazole	500 mg PO/IV q8h	Anaerobic infections, trichomonas, giardiasis	Metallic taste, GI upset, disulfiram-like reaction with alcohol	**Avoid alcohol during and 48–72 hrs after therapy** (severe nausea/vomiting)

NITROFURANTOIN (UTI)

- **Dose:** 50–100 mg PO BD (typical) for uncomplicated UTI.
- **Indication:** Uncomplicated cystitis (not for pyelonephritis).
- **SEs:** Pulmonary reactions, peripheral neuropathy, GI upset.
- **Special:** Avoid in renal impairment and late pregnancy (near term).

ANTI-TUBERCULAR — FIRST LINE

Mnemonic: PRIEST — Pyrazinamide, Rifampicin, Isoniazid (INH), Ethambutol, Streptomycin.

Drug	Common adult dose (typical exam)	Key SEs	Special / Nursing
Isoniazid (INH)	300 mg PO daily (5 mg/kg/day up to 300 mg)	Hepatotoxicity, peripheral neuropathy	Give Pyridoxine (Vit B6) 10–25 mg/day to prevent neuropathy; monitor LFTs
Rifampicin	600 mg PO daily	Hepatotoxicity, orange-red discoloration of body fluids, CYP450 inducer	Teach patient about urine discoloration; monitor LFTs; many drug interactions (lowers OCP levels, warfarin)
Pyrazinamide	15–30 mg/kg daily (often 20–25 mg/kg)	Hepatotoxicity, hyperuricemia → gouty attacks	Monitor LFTs, uric acid
Ethambutol	15 mg/kg daily	Optic neuritis (red–green color vision loss)	Baseline and periodic vision testing; avoid in small children who cannot report vision changes
Streptomycin	15 mg/kg IM daily	Ototoxicity, nephrotoxicity	Avoid in pregnancy (fetal ototoxicity); monitor hearing & renal function

Regimens & exam pointers: First-line short course (2 months HRZE → 4 months HR) is commonly tested. INH prophylaxis for latent TB usually 300 mg daily x 6–9 months (varies).

ANTIFUNGALS

Drug	Dose (exam)	Use	SEs	Nursing
Amphotericin B (conventional)	0.6–1.0 mg/kg/day IV (test style)	Systemic mycoses (cryptococcal, severe systemic)	**Nephrotoxicity, infusion reactions (fever, chills)**	Pre-hydrate, give antipyretic/antihistamine before infusion; monitor renal fxn & electrolytes (K+, Mg2+)
Fluconazole	150 mg PO single dose (vaginal candidiasis) or 200–400 mg OD for systemic	Candida, cryptococcus	Hepatotoxicity	Monitor LFTs; dose adjust in renal impairment
Itraconazole / Voriconazole	Variable	Aspergillus, invasive infections	Hepatotoxicity, visual disturbances (voriconazole)	Many drug interactions (CYP450)

Nursing: Amphotericin B = "Ampho-terrible" — monitor kidney and electrolytes.

ANTIVIRALS

Drug	Dose (exam)	Use	SEs	Nursing
Acyclovir (oral)	400 mg TID for HSV	Herpes simplex; severe IV dosing 5–10 mg/kg q8h	Nephrotoxicity (IV), GI upset	IV: ensure hydration; monitor renal fxn
Oseltamivir	75 mg BD for 5 days (typical)	Influenza A & B (start within 48 hr)	Nausea, vomiting	Start early for best effect
Zidovudine (AZT)	Variable (ART regimens)	Part of ART for HIV	Bone marrow suppression	ART monitoring per protocol (not usually NCLEX detailed)

Exam tip: Antivirals for influenza work best started within 48 hours of symptom onset.

ANTIMALARIALS

Drug	Dose (exam)	Use	SEs	Special
Chloroquine	500 mg base initial (regimens vary)	Sensitive P. vivax/ovale; not reliable in resistant falciparum areas	Pruritus (esp. in dark-skinned pts), retinopathy with long term	Check local resistance patterns
Artemisinin-based combination therapy (ACT)	Regimen dependent (e.g. artemether-lumefantrine)	P. falciparum (resistant areas)	Generally well tolerated	Primaquine needed for radical cure of vivax/ovale
Primaquine	15 mg base daily x 14 days (typical)	Kills hepatic hypnozoites (P. vivax/ovale)	Hemolysis in G6PD deficiency	**Check G6PD before giving primaquine** — exam favorite

Exam alert: Primaquine → **G6PD deficiency risk** (hemolysis).

QUICK SPECTRUM & SPECIAL LISTS

- **Covers MRSA:** Vancomycin, Ceftaroline, Linezolid.
- **Covers Pseudomonas:** Piperacillin-tazobactam, Ceftazidime, Cefepime, Meropenem, Ciprofloxacin, Aminoglycosides.
- **Anaerobic coverage:** Metronidazole, Clindamycin, Carbapenems.
- **Atypical organisms (Mycoplasma, Chlamydia):** Macrolides, Doxycycline, Fluoroquinolones.

COMMON DRUG INTERACTIONS

- **Rifampicin** — powerful CYP inducer: reduces effectiveness of OCPs, warfarin (↓ INR), many antiretrovirals.
- **Macrolides (erythromycin/clarithromycin)** — CYP inhibitors: ↑ levels of statins, warfarin → watch bleeding, rhabdomyolysis risk.
- **Fluoroquinolones & Macrolides** — can prolong QT interval (caution with other QT-prolonging drugs).
- **Warfarin interactions** — many antibiotics (TMP-SMX, erythromycin, metronidazole) ↑ bleeding risk — monitor INR.

Nursing considerations

- **Allergies:** Always check for penicillin/cephalosporin allergy. Document and use alternatives (eg. macrolide if allergic).
- **Infusion reactions:** Vancomycin → slow infusion, watch for red-man. Amphotericin B → premedicate & hydrate.
- **Nephrotoxic meds:** Aminoglycosides, vancomycin, amphotericin B → monitor urine output, BUN/Cr, electrolytes; avoid combining nephrotoxins.
- **Ototoxic meds:** Aminoglycosides, high-dose vancomycin → check hearing & balance.
- **Hepatotoxic meds:** INH, rifampicin, pyrazinamide, some azoles — monitor LFTs; avoid alcohol.
- **C. difficile risk:** Clindamycin, broad-spectrum cephalosporins, fluoroquinolones — monitor for watery diarrhea; STOP antibiotic and report fever, abdominal pain.
- **Patient teaching:** finish the course, report rash/shortness of breath, avoid alcohol with metronidazole, explain normal urine discoloration with rifampicin.

Nursing Booster Point

1. **PRIEST** → Pyrazinamide, Rifampicin, Isoniazid, Ethambutol, Streptomycin (TB).
2. **GNATS** → Gentamicin, Neomycin, Amikacin, Tobramycin, Streptomycin (aminoglycosides).
3. **Penicillin G** is DOC for **syphilis**.
4. **INH** → Give **Vit B6 (pyridoxine)** to prevent peripheral neuropathy.
5. **Rifampicin** → **orange-red discoloration of urine/secretions** — reassure the patient.
6. **Ethambutol** → **red–green color blindness** — test vision periodically.
7. **Streptomycin** → contraindicated in pregnancy (fetal ototoxicity).
8. **Vancomycin** → infuse slowly to avoid **red-man syndrome**; monitor troughs & renal function.
9. **Metronidazole** + **alcohol** → disulfiram-like reaction (severe vomiting) — avoid alcohol.
10. **Primaquine** → **check G6PD** before use (hemolysis risk).
11. **Clindamycin** → high risk of **C. difficile** — stop if severe diarrhea.
12. **Aminoglycosides** → monitor **kidney function & hearing** — TDM if available.
13. **Fluoroquinolones** → tendon rupture risk; avoid strenuous activity in elderly.
14. **Ceftriaxone** → avoid in neonates with hyperbilirubinemia (risk of kernicterus).
15. **Antibiotics + Warfarin** → many antibiotics potentiate warfarin → **monitor INR** closely.
16. Spectrum reminders: **"MRSA needs VANC"** (Vancomycin)
17. Pseudomonas lovers: **"Pip, Ceftaz, FQ, Aminogly"**
18. TB drugs: **PRIEST**

Autonomic Nervous System Drugs

Category	Examples
Cholinergic (Parasympathomimetics)	Direct: Pilocarpine, Bethanechol, Indirect (Anticholinesterases): Neostigmine, Physostigmine
Anticholinergics (Parasympatholytics)	Atropine, Hyoscine, Ipratropium, Glycopyrrolate
Adrenergic Agonists (Sympathomimetics)	Alpha agonists: Phenylephrine, Midodrine, Beta agonists: Dobutamine, Salbutamol
Adrenergic Blockers (Sympatholytics)	Alpha blockers: Prazosin, Phenoxybenzamine, Beta blockers: Propranolol, Atenolol

Cholinergic Drugs (Parasympathomimetics)

Classification

- **Direct-acting:** Pilocarpine, Bethanechol
- **Indirect-acting (Anticholinesterases):** Neostigmine, Physostigmine, Pyridostigmine
-

Drug	Usual Dose	DOC / Use	Side Effects	Special Considerations	Nursing Care
Bethanechol	10–50 mg PO	Urinary retention (post-op, postpartum)	Diarrhea, sweating, bradycardia	Contraindicated in asthma & PUD	Monitor BP, HR, I/O
Pilocarpine	Eye drops (1–2%)	DOC for acute glaucoma	Blurred vision, headache	Local use only	Teach proper eye instillation
Neostigmine	0.5–2.5 mg IM/IV	Myasthenia gravis, postop ileus	Salivation, cramps, bradycardia	Avoid in asthma	Keep **atropine ready** (antidote)

Exam Alerts

- DOC for **acute glaucoma** → Pilocarpine
- DOC for **Myasthenia gravis** → Neostigmine/Pyridostigmine
- Antidote for **organophosphate poisoning** → Atropine + Pralidoxime

Anticholinergic Drugs (Parasympatholytics)

Examples

Atropine, Hyoscine, Ipratropium, Glycopyrrolate

Drug	Dose	DOC / Use	Side Effects	Nursing Care
Atropine	0.6–1 mg IV (max 2 mg)	DOC in bradycardia, organophosphate poisoning	Dry mouth, blurred vision, urinary retention	Monitor HR, avoid overheating
Ipratropium	Inhaler 20–40 mcg	COPD, asthma	Dry mouth, throat irritation	Rinse mouth after inhalation
Hyoscine (Scopolamine)	Patch	Motion sickness	Drowsiness, dry mouth	Advise on sedation risk

Mnemonic → "Hot as a hare, dry as a bone, blind as a bat, red as a beet, mad as a hatter" (anticholinergic toxicity)

Exam Alerts

- DOC for **bradycardia** → Atropine
- DOC for **OP poisoning** (symptomatic relief) → Atropine
- Inhaled **Ipratropium** used for **COPD**

Adrenergic Drugs (Sympathomimetics)

Classification

- **Alpha agonists:** Phenylephrine, Midodrine
- **Beta agonists:** Dobutamine (β1), Salbutamol (β2)
- **Mixed:** Adrenaline, Noradrenaline, Dopamine

Drug	Dose	DOC / Use	Side Effects	Nursing Care
Adrenaline (Epinephrine)	0.5 mg IM (anaphylaxis)	DOC for anaphylaxis, cardiac arrest	Tachycardia, hypertension	IM mid-thigh preferred
Noradrenaline (Norepinephrine)	IV infusion (2–12 mcg/min)	Shock (septic)	Severe vasoconstriction, ischemia	Monitor BP continuously
Dopamine	IV infusion (2–10 mcg/kg/min)	Shock, heart failure	Arrhythmia, tachycardia	Titrate dose
Dobutamine	IV infusion (2–20 mcg/kg/min)	Acute HF, cardiogenic shock	Tachycardia, arrhythmias	Continuous cardiac monitoring
Salbutamol (Albuterol)	Inhaler 100–200 mcg	DOC for acute asthma attack	Tremor, tachycardia, hypokalemia	Teach inhaler use, monitor HR

Exam Alerts

- DOC for **Anaphylaxis** → Epinephrine IM
- DOC for **Acute asthma** → Salbutamol inhaler
- DOC for **Septic shock** → Noradrenaline

Adrenergic Blockers (Sympatholytics)

A. Alpha Blockers

- **Prazosin** (HTN, BPH)
- **Phenoxybenzamine** (Pheochromocytoma)

B. Beta Blockers

- **Non-selective:** Propranolol
- **Cardio-selective (β1):** Metoprolol, Atenolol
- **Mixed (α+β):** Labetalol, Carvedilol

Drug	Dose	DOC / Use	Side Effects	Nursing Care
Propranolol	40–80 mg BD	HTN, thyrotoxicosis, migraine prophylaxis	Bradycardia, bronchospasm	Avoid in asthma; monitor HR, BP
Metoprolol	25–100 mg OD	Angina, HTN, MI	Bradycardia, fatigue	Safer in asthma vs propranolol
Labetalol	IV bolus 20 mg	Hypertensive emergencies	Hypotension, dizziness	Monitor BP closely

Exam Alerts

- DOC for **pheochromocytoma (pre-op)** → Phenoxybenzamine
- DOC for **thyrotoxic crisis tachycardia** → Propranolol
- DOC for **HTN in pregnancy** → Labetalol

Condition	Drug of Choice (DOC)
Acute Glaucoma	Pilocarpine
Urinary Retention	Bethanechol
Myasthenia Gravis	Neostigmine / Pyridostigmine
Organophosphate Poisoning	Atropine + Pralidoxime

Toppersnotes
Unleash the topper in you

Bradycardia	Atropine IV
Motion Sickness	Hyoscine (Scopolamine)
COPD (maintenance)	Ipratropium
Anaphylaxis	Adrenaline (IM)
Cardiac Arrest	Adrenaline (IV/IO)
Septic Shock	Noradrenaline (IV infusion)
Cardiogenic Shock	Dobutamine
Acute Asthma Attack	Salbutamol (inhaler)
Pheochromocytoma (pre-op)	Phenoxybenzamine
HTN in Pregnancy / Crisis	Labetalol
Thyrotoxic Crisis (tachycardia)	Propranolol

DOC (Drug of Choice)

Condition / Use	**Drug of Choice (DOC)**	**Special Note (Exam / Nursing Alert)**
Acute Glaucoma	**Pilocarpine (cholinergic)**	Causes pupil constriction (miosis), ↓ IOP
Urinary Retention (post-op, postpartum)	**Bethanechol (cholinergic)**	Contraindicated in **asthma, PUD**
Myasthenia Gravis	**Neostigmine / Pyridostigmine**	Anticholinesterase → improves muscle strength
Organophosphate Poisoning	**Atropine + Pralidoxime (2-PAM)**	Atropine = symptomatic, Pralidoxime = reactivates enzyme
Bradycardia (symptomatic)	**Atropine IV**	0.6–1 mg IV (max 2 mg), monitor HR
Motion Sickness	**Hyoscine (Scopolamine)**	Available as transdermal patch
COPD / Asthma (maintenance)	**Ipratropium (anticholinergic)**	Used with Salbutamol in COPD
Anaphylaxis	**Adrenaline (Epinephrine) IM**	0.5 mg IM in mid-thigh; life-saving
Cardiac Arrest	**Adrenaline IV/IO**	Given during CPR as per ACLS protocol
Septic Shock	**Noradrenaline IV infusion**	Potent vasoconstrictor; monitor BP continuously
Cardiogenic Shock	**Dobutamine (β1 agonist)**	Increases contractility (inotrope)
Acute Asthma Attack	**Salbutamol (β2 agonist inhaler)**	Rapid relief; monitor HR & K+
Pheochromocytoma (pre-op)	**Phenoxybenzamine (α-blocker)**	Irreversible alpha-blocker; prevents crisis
Hypertension in Pregnancy / Hypertensive Crisis	**Labetalol (α+β blocker)**	Safer in pregnancy
Thyrotoxic Crisis (tachycardia)	**Propranolol (non-selective β-blocker)**	Controls symptoms, not thyroid hormone

Nursing Booster Point

1. **Bethanechol** → DOC for **urinary retention**, contraindicated in asthma.
2. **Pilocarpine** → DOC for **acute glaucoma**.
3. **Neostigmine** → DOC for **Myasthenia gravis**.
4. **Atropine** → DOC for **bradycardia & OP poisoning**.

5. **Mnemonic: Anticholinergic toxicity = "Hot as hare, Dry as bone, Blind as bat, Red as beet, Mad as hatter."**
6. **Epinephrine IM (0.5 mg)** → DOC for **anaphylaxis** (mid-thigh).
7. **Noradrenaline IV infusion** → DOC for **septic shock**.
8. **Salbutamol inhaler** → DOC for **acute asthma** (teach inhaler use).
9. **Phenoxybenzamine** → DOC for **pheochromocytoma (pre-op)**.
10. **Labetalol** → DOC for **hypertensive crisis in pregnancy**.

CARDIOVASCULAR DRUGS

Antihypertensives

Classification

- **Diuretics** → Thiazides (Hydrochlorothiazide), Loop (Furosemide), K^+ sparing (Spironolactone)
- **ACE inhibitors** → Enalapril, Captopril, Ramipril
- **ARBs** → Losartan, Valsartan, Telmisartan
- **Beta-blockers** → Propranolol, Metoprolol, Atenolol
- **Calcium Channel Blockers (CCB)** → Amlodipine, Verapamil, Diltiazem
- **Centrally acting** → Clonidine, Methyldopa
- **Vasodilators** → Hydralazine, Sodium Nitroprusside

Drug Table

Drug	Dose (typical)	DOC / Use	Side Effects	Nursing Care
Methyldopa	250–500 mg PO	HTN in pregnancy	Sedation, hemolytic anemia	Monitor BP, safe in pregnancy
Labetalol	20–80 mg IV bolus	Hypertensive emergency, pregnancy	Hypotension, dizziness	Monitor BP closely
Hydrochlorothiazide	12.5–25 mg PO OD	Mild HTN	Hypokalemia, ↑uric acid	Monitor K^+, BP
Furosemide	20–40 mg PO/IV	CHF, pulmonary edema	Hypokalemia, dehydration, ototoxicity	Strict I/O, monitor electrolytes
Enalapril	2.5–20 mg PO	HTN, CHF	Cough, hyperkalemia, angioedema	Avoid in pregnancy, monitor K^+
Losartan	50–100 mg PO	HTN, diabetic nephropathy	Dizziness, hyperkalemia	Better tolerated vs ACE-I
Amlodipine	5–10 mg PO	HTN, angina	Pedal edema, hypotension	Monitor BP, HR

Exam Alerts

- DOC for **HTN in pregnancy → Methyldopa / Labetalol**
- DOC for **Hypertensive emergency → Labetalol / Sodium Nitroprusside**
- **ACE inhibitors contraindicated in pregnancy**

Antianginal Drugs

Classification

- **Nitrates** → Nitroglycerin (NTG), Isosorbide dinitrate
- **Beta-blockers** → Metoprolol, Atenolol
- **CCBs** → Verapamil, Amlodipine

Drug Table

Drug	Dose	DOC / Use	Side Effects	Nursing Care
Nitroglycerin SL	0.3–0.6 mg SL	Acute angina attack	Headache, hypotension	Sit/lie before use, store in dark container
Isosorbide dinitrate	10–40 mg PO	Angina prophylaxis	Tolerance, headache	Ensure nitrate-free period
Metoprolol	25–100 mg PO	Angina prophylaxis	Bradycardia, fatigue	Monitor HR, BP

Exam Alerts

- DOC for **acute angina attack → Sublingual Nitroglycerin**
- **Avoid nitrates + Sildenafil (Viagra)** → severe hypotension

Antiarrhythmic Drugs

Vaughan Williams Classification

- **Class I (Na^+ blockers):** Quinidine, Lidocaine
- **Class II (β-blockers):** Propranolol, Metoprolol
- **Class III (K^+ blockers):** Amiodarone
- **Class IV (Ca^{2+} blockers):** Verapamil, Diltiazem

Drug Table

Drug	DOC / Use	Side Effects	Nursing Care
Amiodarone	Atrial/ventricular arrhythmias	Pulmonary fibrosis, thyroid dysfunction, corneal deposits	Monitor LFTs, TFTs, CXR
Lidocaine (IV)	Ventricular arrhythmias (post-MI)	CNS toxicity	Monitor ECG, neuro status
Verapamil	SVT	Constipation, hypotension	Monitor BP, avoid in HF

Exam Alerts

- DOC for **PSVT (stable) → Adenosine IV**
- DOC for **Ventricular arrhythmia post-MI → Lidocaine**

Heart Failure Drugs

Drug	Dose	DOC / Use	Side Effects	Nursing Care
Digoxin	0.25 mg PO/IV	CHF, Atrial fibrillation	Nausea, bradycardia, yellow vision	Monitor HR, ECG, digoxin levels (0.5–2 ng/mL)
Furosemide	20–40 mg IV	Pulmonary edema	Hypokalemia	Monitor K^+, I/O
Spironolactone	25–50 mg PO	CHF (K^+ sparing)	Gynecomastia, hyperkalemia	Monitor K^+

Exam Alerts

- Antidote for **Digoxin toxicity → Digoxin-specific Fab (Digibind)**
- Hold Digoxin if **HR < 60 bpm**

Anticoagulants & Antiplatelets

Drug	Use	Side Effects	Nursing Care
Heparin (IV/SC)	DVT, PE, MI	Bleeding, HIT	Monitor aPTT (2–2.5× normal), antidote = Protamine

Warfarin (PO)	DVT, AF, prosthetic valves	Bleeding	Monitor INR (2–3), antidote = Vitamin K
Aspirin	Antiplatelet (MI, stroke prevention)	GI upset, bleeding	Give with food, monitor GI
Clopidogrel	Antiplatelet (post-stent, MI)	Bleeding	Monitor platelet count

Exam Alerts

- Antidote for **Heparin** → Protamine
- Antidote for **Warfarin** → Vitamin K
- DOC in **acute STEMI** → Aspirin + Clopidogrel + Heparin

Nursing Booster Point

1. **Methyldopa / Labetalol** → DOC for **HTN in pregnancy**
2. **Labetalol / Nitroprusside** → DOC in **hypertensive emergency**
3. **Nitroglycerin SL** → DOC for **acute angina attack** (sit before taking)
4. **Avoid Nitrates + Sildenafil** → severe hypotension
5. **Amiodarone** → monitor **thyroid, liver, lungs, eyes** (many toxicities)
6. **Digoxin** → hold if HR < 60; monitor **yellow vision** = toxicity
7. **Digoxin antidote** → Digibind
8. **Heparin antidote** → Protamine; **Warfarin antidote** → Vitamin K
9. **Heparin monitoring** → aPTT; **Warfarin monitoring** → INR
10. **Aspirin (chewable)** → DOC in **acute MI**
11. **Labetalol** → DOC for **pregnancy HTN & emergencies**

INFLAMMATION & ANTI-INFLAMMATORY DRUGS

Pathophysiology

- Cell damage/injury
- Cell membrane destruction → **phospholipids** (phospholipase enzyme)
- **Arachidonic acid** (20C essential fatty acid)
- **Prostaglandins (PG)** → vasodilation, uterine contraction, gastric protection
- **Prostacyclin (PGI_2)** → vasodilator, inhibits platelet aggregation, ↑ body temp
- **Thromboxane A_2** → vasoconstriction, platelet aggregation

Signs of Inflammation (Virchow's Cardinal Signs)

1. **Rubor** → Redness
2. **Tumor** → Swelling
3. **Dolor** → Pain
4. **Calor** → Local heat ↑
5. **Functio laesa** → Loss of function (added by Virchow)

Classes of Anti-Inflammatory Drugs

Class	Examples	MOA	Key Uses
Corticosteroids	Dexamethasone, Betamethasone, Prednisone, Prednisolone, Hydrocortisone, Budesonide	Inhibit phospholipase → ↓ Arachidonic acid	Allergy, asthma, RDS (fetal lung), organ transplant, SLE, nephrotic syndrome
NSAIDs (COX inhibitors)	Aspirin, Ibuprofen, Diclofenac, Indomethacin, Etoricoxib, Valdecoxib, Mefenamic acid	COX inhibition → ↓ Prostaglandins	Fever, pain, arthritis, acute gout, PDA closure