

# Senior Pharm Review

## Diuretics

### Loop Diuretics

- name: Furosemide (Lasix)
- expected outcomes: ↑VO, ↓BP, crackles, + edema; works in 5 min.
- mechanism of action: blocks reabsorption of Na and Cl in the loop of Henle to ↑ diuresis
- adverse effects: hypokalemia, hypotension, dizziness, dehydration, Na and Cl imbalance
- nursing considerations: monitor I+O, BP, edema, weight, lung sounds

### Thiazide Diuretics

- name: Hydrochlorothiazide (HCTZ)
- expected outcomes: same
- mechanism of action: blocks reabsorption of Na and Cl in distal tubule causing diuresis
- adverse effects: same
- nursing considerations: good first treatment for HTN, does not work well with ↓ blood flow to kidneys

## Blood Pressure Meds

### ACE Inhibitors

- names: "PRTL" captopril, lisinopril, enalapril
- expected outcomes: ↓BP and peripheral resistance

- mechanism of action: block conversion of angiotensin I to II resulting in  $\downarrow$  BP and peripheral resistance
- adverse effects: dry cough, headache, hypotension, dizziness, angioedema, anaphylaxis
- nursing considerations: first dose effect (severe orthostatic hypotension), risk of hyperkalemia, do not give during pregnancy or BP  $< 90/60$

### ARB's

- name: "SARTAN" losartan
- mechanism of action: blocks angiotensin II receptors in arteriole smooth muscle which causes vasodilation,  $\downarrow$  BP and peripheral resistance
- adverse effects: hypotension, dizziness, headache, low risk of angioedema
- nursing considerations: hold if BP  $< 90/60$ , don't give during pregnancy, risk for hyperkalemia, first dose effect

### Beta Blockers

- name: "LOL" metoprolol
- expected outcomes:  $\downarrow$  BP, HR, contractility
- mechanism of action: block the beta 1 receptors in the heart which causes  $\downarrow$  HR, conduction, and CO
- adverse effects: fatigue, bradycardia, hypotension bronchospasm (constriction)
- nursing considerations: taper if

discontinued, hold if HR < 60

## Calcium Channel Blockers

- names: amlodipine, diltiazem, verapamil
- expected outcomes: ↓ BP + afterload, ↓ force and speed of contraction
- mechanism of action: binds to calcium channels which causes vasodilation of smooth muscle and slowed cardiac depolarization
- adverse effects: hypotension, dizziness, headache, flushing, reflex tachycardia
- nursing considerations: watch for fall risk, monitor BP + HR, don't give if hepatic impairment

## Heart Meds

### Cardiac Glycosides

- name: Digoxin
- expected outcomes: ↑ contractility and cardiac output, ↓ HR
- mechanism of action: inhibit enzyme that pumps sodium out of cells in exchange for potassium resulting in ↑ release of calcium and force of contraction
- adverse effects: bradycardia, malaise, dizziness, headache, vision changes, ventricular dysrhythmias
- nursing considerations: narrow therapeutic index (0.5-2 ng/mL);

overdose can cause color changes,  
sensitivity to light, confusion, N+V;  
give Digibind when too high

## Nitrates

• name: Nitroglycerin

• expected outcomes: ↓ cardiac workload, ↓ preload ↑ O<sub>2</sub> supply to heart

• adverse effects: flushing, headache, hypotension, dizziness, reflex tachycardia

• mechanism of action: causes release of calcium ions in smooth muscle which leads to dilation of arterial and venous smooth muscle

• nursing considerations: can give SL, oral, transdermal, or IV; can develop resistance; used for angina

## Anticoagulants

normal

PT 20-30

ranges

INR 2-3

(on blood thinners)

PTT 60-80

## Salicylates

• name: Aspirin

• expected outcomes (for all): prophylactic clot prevention

• mechanism of action: reduce platelet aggregation by inhibiting COX-1 enzyme in platelets

• adverse effects: GI bleed

• nursing considerations: usually

body dose (81mg) for clot prevention;  
Clopidogrel similar but no GI risk

### Indirect thrombin inhibitor

- name: Heparin
- mechanism of action: activates enzyme anti-thrombin III which inhibits thrombin formation
- adverse effects: bleeding, Heparin-induced thrombocytopenia (increase in platelet aggregation)
- nursing considerations: monitor PTT levels, give Protamine if too high; Dalteparin + Enoxaparin don't change PTT

### Vitamin K Antagonist

- name: Warfarin
- mechanism of action: inhibits formation of vitamin K which inhibits synthesis of clotting factors
- adverse effects: bleeding
- nursing considerations: monitor PT and INR, give vitamin K if too high

### Cholesterol Meds

normal	total cholesterol: <200
cholesterol	LDL: <130
levels	HDL: >60
	triglycerides: <150

### Hmg-CoA Reductase Inhibitors

- name: "STATIN" atorvastatin
- expected outcomes: significant drop

- in LDL, ↑ HDL, ↓ triglycerides
- mechanism of action: inhibits HMG-CoA reductase which results in lower cholesterol synthesis
  - adverse effects: headache, abdominal cramping, diarrhea, rhabdomyolysis (muscle breakdown)
  - nursing considerations: educate patients to watch for muscle/joint pain, monitor cholesterol levels, monitor liver function tests, don't give during pregnancy

### Bile Acid Sequestrants

- name: cholestyramine
- expected outcome: 20% drop in LDL
- mechanism of action: bind to bile acid to form large complexes that cannot be reabsorbed in small intestine, so cholesterol is excreted in feces
- adverse effects: abdominal pain, bloating, diarrhea, constipation, gas
- nursing considerations: watch nutrition, give 1 hour before or 4 hours after other meds

### Fibric Acid Drugs

- names: gemfibrozil, fenofibrate
- expected outcomes: ↓ triglycerides
- mechanism of action: activate the enzyme lipoprotein lipase which ↑ breakdown and elimination of

- triglyceride rich particles in plasma
- adverse effects: heartburn, diarrhea, abdominal pain, N+V
  - nursing considerations: given sometimes with STATINS

### Cholesterol Absorption Inhibitor

- name: Ezetimibe
- mechanism of action: reduce the absorption of dietary and biliary cholesterol through the intestines

### Bronchodilators

#### Beta-Adrenergic Agents

- names: albuterol (short acting), salmeterol (long acting)
- mechanism of action: activate the SNS
- adverse effects: dizziness, tremor, nervousness, cardiac

#### Anticholinergics

- names: ipratropium, tiotropium
- mechanism of action: block PNS, cause bronchodilation
- adverse effects: dry mouth, headache, blurry vision

### Anti-Inflammatories and Cough + Cold Meds

#### Corticosteroids

- names: inhaled - beclomethasone, fluticasone; pill - prednisone, solu-medrol
- mechanism of action: ↓ inflammation

- by inhibiting release and synthesis of inflammatory mediators
- adverse effects: risk for fungal infections, HTN, hyperglycemia, ↓ immunity, bone abnormalities

### Leukotriene Modifiers

- names: Zafirlukast, Montelukast
- mechanism of action: reduces inflammatory symptoms
- adverse effect: headache

### Mucolytics

- names: Mucomyst (Acetylcysteine), Budesonide
- mechanism of action: loosen thick bronchial secretions

### BPH and Urinary Meds

#### 5 Alpha Reductase Inhibitor

- name: Finasteride
- mechanism of action: blocks 5 alpha reductase, the enzyme that converts testosterone into dihydrotestosterone; this hormone signals prostate growth, so blocking it shrinks the prostate → better urine flow
- adverse effects: N+V, headache, rash, sexual dysfunction
- nursing considerations: pregnancy category X



## Alpha-Adrenergic Blockers

- name: "-osin" doxazosin, terazosin, tamsulosin (Flomax)
- mechanism of action: block alpha receptors of bladder neck → relaxing of smooth muscle and opening of urethra lumen
- adverse effects: headache, dizziness, fatigue, hypotension (good for pts with high BP)
- nursing considerations: watch for first dose effect (drop in BP), give first dose at bedtime, don't abruptly stop

## Urinary Anticholinergics

- names: oxybutynin, tolterodine, fesoterodine
- expected outcomes: relieve symptoms of incontinence
- mechanism of action: block parasympathetic system muscarinic receptors in the bladder
- adverse effects: sympathetic responses (dry mouth, tachycardia, etc.)
- nursing considerations: do not use in pts with urinary retention, b7 obstruction, or glaucoma

## Antispasmodics

- names: dicyclomine, hyoscyamine, Mirabegron (bladder), nebuterine (IBS)

- expected outcomes: prevent spasms of stomach, intestines, or urinary bladder
- mechanism of action: block action of acetylcholine to prevent impulses from the PNS from reaching smooth muscle and causing spasms
- adverse effects: same as anticholinergics

## Gastric Meds

### Antiemetics

- serotonin antagonists: block serotonin receptors on chemoreceptor trigger zone; used for chemo, radiation, and post-op nausea
  - names: Ondansetron (Zofran), Granisetron (Kytrel)
- dopamine antagonists: block dopamine receptors in chemoreceptor trigger zone; same uses
  - names: prochlorperazine (Compazine), Promethazine (Phenergan), metoclopramide (Reglan - ↑ GI emptying)
  - adverse effects: hypotension, extra pyramidal symptoms (muscle spasms), drowsiness, dizziness

### Histamine 2 Blockers

- names: ranitidine, famotidine (Pepcid)
- mechanism of action: blocks H<sub>2</sub> receptors of the parietal cells in the stomach which reduces acid secretion and concentration

- nursing considerations: don't give within an hour of antacids

### Proton Pump Inhibitors

- names: pantoprazole, omeprazole
- mechanism of action: blocks the final step of acid production
- nursing considerations: do not open or crush capsules, used for short term treatment

### Pain Meds

#### Opioid Analgesics

- names: hydromorphone (Dilaudid), morphine, hydrocodone, codeine, meperidine, fentanyl (strongest)
- expected outcomes: ↓ pain, ↑ ability to do ADL's
- mechanism of action: altered perception of pain by activating CNS opioid receptors. doesn't treat cause
- adverse effects: respiratory depression, orthostatic hypotension, constipation, sedation, nausea, urinary retention, itching
- nursing considerations: hold if RR < 12, may give preventative stool softeners; oxycodone = immediate release, oxycotin = long acting; if overdose (RR < 10 and unconscious) give naloxone (Narcan)

## NSAIDs

- names: ibuprofen, ketorolac, naproxen
- expected outcomes: analgesia, anti-inflammatory, ↓ platelet aggregation anti-pyretic, mild-moderate pain relief
- mechanism of action: inhibit pain receptors at nociceptor level
- adverse effects: N+V, GI bleed, hepatotoxicity
- nursing considerations: GI bleed risk increases with history of PUD, anticoagulant use, corticosteroid use, smoking, alcohol, H. pylori infection; acetaminophen inhibits Cox in CNS not periphery, no risk of GI bleed (give Acetylcysteine if overdose)

## Insulins and oral Hypoglycemics

### Insulin

- expected outcomes: keep blood glucose in optimal range, lower potassium level
- mechanism of action: bind to glucose and transport out of blood to cells
- signs of hypoglycemia: increased HR, sweating, anxiety, cool clammy skin, headache, confusion
- very rapid insulin - insulin lispro (Humalog), insulin aspart (Novolog)

- onset < 15 minutes, peak 1-2 hours
- regular fast - Novolin R, Humulin R
  - onset 30-60 min SC, 15 min IV;
  - peak 2-4 hours
- intermediate - NPH, Novolin N, Humulin N
  - onset 2-4 hours, peak 4-8 hours
- long acting - Lantus, Levemir
  - onset 1-2 hours, no peak

### Biguanides

- name: metformin
- expected outcomes: keep HbA1C < 6.5% and FBS < 110
- mechanism of action: keeps liver from producing more glucose, ↑ muscle cells reuptake of glucose
- adverse effects: N+V, metallic taste, lactic acidosis; does not cause hypoglycemia
- nursing considerations: don't give 2 days before or after x-rays with contrast; symptoms of lactic acidosis: weakness, tired, slow HR, cold, muscle pain, SOB

### Sulfonylurea

- names: glyburide, glipizide
- mechanism of action: stimulate release of insulin from pancreas and increase cell sensitivity to insulin
- adverse effects: hypoglycemia, GI symptoms, skin hypersensitivity, blood disorders, pregnancy level C

## Thyroid and Adrenal Drugs

### Thyroid Replacement Hormone

- name: levothyroxine
- expected outcome: treat hypothyroidism
- mechanism of action: synthetic form of T4 ↑ metabolic rate
- adverse effects: too high dose can cause S+S of hyperthyroidism (nervousness, chest pain, diarrhea)
- nursing considerations: monitor T3, T4, TSH, and weigh regularly

### Antithyroid Drug

- name: propylthiouracil
- expected outcome: stop body making thyroid hormone
- adverse effects: nausea, rash, numbness, leukopenia, agranulocytosis

### Corticosteroids (Adrenal)

- names: hydrocortisone, prednisone, dexamethasone
- expected outcomes: restore normal hormone levels in pts with adrenal insufficiency
- mechanism of action: restores deficient levels of corticosteroids, block inflammatory mediators
- adverse effects: can develop Cushing's; long term use: ↓ immunity, peptic ulcers, osteoporosis, behavior and

- eye changes, metabolic changes
- nursing considerations: keep to lowest amount possible, taper if discontinued, ↑ during times of stress

## Bone and Joint Meds

### Biphosphonates

- name: Alendronate (Fosamax)
- mechanism of action: suppress osteoclastic activity in bones, promote ↑ bone density
- adverse effects: hypocalcemia

### Selective Estrogen Receptor Modulators (SERMs)

- used in post-menopausal women
- mechanism of action: activate estrogen receptors to ↓ bone breakdown
- adverse effects: menopausal symptoms (not flash, weight gain)

### Disease Modifying Anti-Rheumatic Drugs (DMARD)

- names: adalimumab, methotrexate
- mechanism of action: slow progression of rheumatoid arthritis and reduce permanent damage to joints
- nursing considerations: can cause blood dyscrasias (cell levels drop), liver damage, and severe lung infections

### Biologics

- names: Humira, Xeljanz, -umab
- mechanism of action: reduce immune

- response that causes joint damage
- adverse effects: ↑ risk of infection, hypersensitivity reactions
  - nursing considerations: test for TB before starting; also used for UC, Crohn's, psoriasis, MS, lupus + more

## Antibiotics, Antivirals, + Antifungals

### Penicillins

- names: "cillin" ampicillin, amoxicillin
- adverse effects: urticaria (rash), pruritus (itching), diarrhea, nausea, nephrotoxicity, anaphylaxis
- nursing considerations: possible cross-sensitivity with cephalosporins; ↓ effectiveness of oral contraceptives

### Cephalosporins

- names: "cef" cefazolin, cefepime
- adverse effects: urticaria, pruritus, diarrhea, cramping, nephrotoxicity, anaphylaxis
- nursing considerations: cross sensitivity with penicillins

### Macrolides

- names: azithromycin, clarithromycin
- adverse effects: nausea, diarrhea, cramping, ototoxicity, hepatotoxicity, anaphylaxis, pseudomembranous colitis (diarrhea)



## Sulfonamides

- name: sulfamethoxazole - trimethoprim
- adverse effects: rash, photosensitivity, nausea, anaphylaxis, Stevens-Johnson's
- nursing considerations: commonly used for UTIs, high levels of resistance, don't use in pregnancy or infancy

## Aminoglycosides

- names: Amikacin, Gentamicin, Tobramycin
- adverse effects: rash, nausea, diarrhea, nephrotoxic, ototoxic, anaphylaxis

## Quinolones

- names: "floxacin" moxifloxacin, ciprofloxacin
- adverse effects: nausea, headache, diarrhea, rash, anaphylaxis, pseudomembranous colitis, tendonitis / tendon rupture

## Antifungals

- names: Amphotericin B, Nystatin (Mycostatin), "-azoles" Fluconazole
- adverse effects: Ampho B - hypokalemia, hypomagnesemia, fever, chills, nausea, HA, nephrotoxic, hepatotoxic, blood disorders:
  - azoles - fever, chills, rash, N/V/D, hepatotoxicity, anaphylaxis

## Antivirals

- names: "vir" acyclovir
- adverse effects: N/V/D, HA, hallucinations, nephrotoxicity, thrombocytopenic purpura, hemolytic uremic syndrome

## Scabicides

- names: Permethrin (RID/Nix/Elimite), lindane, pyrethrin
- nursing considerations: meds can be oral/systemic or topical; apply ointment to entire skin surface and leave on for 8-14 hours

## Cytotoxic Antineoplastic Drugs (AKA chemo)

- mechanism of action: targets all rapidly dividing cells in body
- adverse effects: hair loss, GI upset, pancytopenia, immunosuppression
- nursing considerations: use PPE (gown, mask, gloves) when handling chemo, watch for extravasation

## Psych Meds

### Meds for Depression

can treat depression and anxiety

- tricyclic antidepressants
  - inhibit reuptake of serotonin + norepinephrine
  - lethal in overdose, causes arrhythmias
  - amitriptyline
- MAOIs (monoamine oxidase inhibitors)
  - used for atypical + treatment resistant depression

- risk for hypertensive crisis if eat tyramine (cheese, processed meat, alcohol, avocados, figs, raisins, bananas, chocolate)
- phenelzine
- SSRI's (selective serotonin reuptake inhibitors)
  - lower side effect profile, minimal toxicity
  - side effects: N+V, weight changes, agitation, restlessness, sexual
  - risk of serotonin syndrome (muscle twitch, tachycardia, HTN, fever, sweating)
  - avoid grapefruit juice
  - sertraline, fluoxetine, citalopram, escitalopram, paroxetine, fluvoxamine
- SNRI's (serotonin norepinephrine reuptake inhibitors)
  - more activating = increased energy
  - monitor for HTN, withdrawal symptoms
  - venlafaxine, desvenlafaxine, duloxetine
- trazadone
  - used for insomnia, risk of priapism
- NDRI's (norepinephrine dopamine reuptake inhibitors)
  - weaker blocker of serotonin, potent blocker of norepinephrine, partial blocker of dopamine reuptake
  - contraindicated in eating disorders + seizures
  - bupropion
- mirtazepine
  - ↑ noradrenergic and serotonergic neurotransmission, blocks specific serotonin receptors to ↓ serotonergic side effects
  - helps eat + sleep, often given to elderly

## Meds for Anxiety

- benzodiazepines
  - ↑ GABA availability
  - can cause addiction, sedation, respiratory depression; don't quit cold turkey, don't take if pregnant, struggle with addiction, children + elderly
  - lorazepam, alprazolam, clonazepam, diazepam
- bupirone
  - serotonin 1A partial antagonist
- hydroxyzine
  - similar to benadryl

## Meds for Schizophrenia

- major side effects: EPS ( tardive dyskinesia → involuntary movements, parkinsonism, dystonia → impaired movements, akathisia → restlessness, neuroleptic malignant syndrome), metabolic syndrome, ↑ prolactin, orthostatic hypotension, sedation
- Typical (1st gen) Antipsychotics
  - dopamine antagonist
  - greatest risk of EPS
  - helps positive symptoms only (delusions, hallucinations, altered speech)
  - Haloperidol, Fluphenazine, chlorpromazine
  - give Benadryl for EPS, useAIMS scale
  - antipsychotics can also treat bipolar

- Atypical (2nd gen) Antipsychotics
  - minimally block dopamine and potentially block serotonin receptors
  - ↓ side effects, EPS
  - effective for positive + negative symptoms (lack of energy, ↓ interest, flat affect)
  - quetiapine, clozapine, risperidone, aripiprazole, olanzapine, ziprasidone, lurasidone

## Meds for Bipolar

- Lithium Carbonate
  - first line agent for bipolar
  - when sodium ↑, lithium level ↓
    - with dehydration, diuretic use, and ↓ sodium intake (+NSAID use) toxicity can occur
  - therapeutic index 0.6-1.2, also test kidney + thyroid function
  - toxicity: slurred speech, muscle weakness, fine hand tremor, N+V, thirst, polyuria
- anticonvulsants
  - valproate (Depakote): ↑GABA; monitor liver, platelets, drug level
  - lamotrigine: risk of rash/SJS
  - carbamazepine: many drug interactions; monitor liver, platelets, drug level