HTN Meds

- **Adrenergic Drugs**
  - Centrally acting alpha 2 agonist
    - Clonidine, guanacine, methildopa
      - Work by stimulating the alpha 2 receptors in the brain. These receptors actually reduce sympathetic outflow.
      - Secondly they affect the kidneys reducing the activity of renin.
      - Decrease HR
  - Alpha 2 agonists Side effects
    - Peripheral edema, sedation, depression, Headache, dry mouth, decreased libido.
    - Watch-out: Hepatotoxicity, Hemolytic anemia, granulocytopenia.

- **Peripheral Acting Adrenergic drugs**
  - **Alpha 1 blockers**
    - Doxazosin, prazosin, terazosin
      - Dilate arteries and veins =low BP
      - Also increase urinary flow rates and decrease outflow obstruction by preventing smooth muscle contraction in the bladder neck and urethra : BPH.
      - Dosage must be increased gradually Q2wks
  - **Alpha 1 adrenergic antagonists**
    - Side Effects
      - Orthostatic hypotension, dizziness, headache, fatigue
      - First-dose phenomenon, tachycardia, dyspnea

- **Beta Blockers**
  - Beta cardioselective V.S. non-cardioselective?
  - Beta blockers ending with –olol
    - metoprolol, atenolol, propranolol, nadolol
  - Watch-out for hypotension, CHF, bronchospasms, and impotence.
ACE inhibitors.
- Currently 10 ACE Inhibitors on the market.
  - captopril, benazepril, enalapril, fosinopril, lisinopril, moexipril, perindopril, quinapril, ramipril, and trandolapril.
- Captopril and enalapril short half-life.
- Captopril and Lisinopril are the only two ACE inhibitors that are not prodrugs. (use with liver failure patients.)
- Enalapril (Vasotec) is the only IV drug.

ACE Inhibitors
- Pregnancy Category C or D
- Many are combined with diuretic and CCB
- Work by preventing A1 to A2
- A2 induces Aldosterone secretion
- Aldosterone stimulates Na and H20 reabsorption. (Stopping this, lowers BP)

ACE inhibitors
- Also: prevent the breakdown of the vasodilating substance bradykinin and substance P
  - If they don’t get broken down they cause vasodilation = lower BP.

ACE inhibitors Indications:
- HTN
- Decrease SVR
- Stop the progression of left ventricular hypertrophy
- Decrease the morbidity HF patients.
- Protective effect on the kidneys they reduce glomerular filtration pressure
- Drug of choice for diabetics.

ACE inhibitors Contraindications
- Allergy
- Angioedema (laryngeal swelling)
- Baseline K level 5mEq/L
  - Drug may cause hyperkalemia!!!
- No lactating women children or pts with bilateral renal artery stenosis.

Adverse Effects ACE Inhibitors.
- Fatigue, dizziness, mood changes, headaches
- Dry nonproductive cough
- First dose hypotension
- Can worsen CHF in renin angio dependent pts and cause renal failure.
ACE Inhibitors

- Interactions:
  - Other diuretics and HTN drug may drop BP
  - Potassium sparring diuretics can cause K+ levels

Angiotensin II Receptor Blockers

- Note that bradykinins and sub P rise with the use of ACE inhibitors which sometimes cause the adverse effects such as cough. If they do, patients are switched over to ARB II blockers.

ARBs

- Block A2 or vasoconstriction & the secretion of aldosterone
- Not sure if they have the same cardio and Kidney protection like ACE inhibitors.

ARBs

- Contra: allergy, pregnancy, lactation
- Caution: use with elderly and renal dysfunction

ARBs Adverse Effects (sartan)

- Upper respiratory infections
- Headache
- Occ. Dizziness, insomnia, diarrhea, dyspnea, heartburn, nasal congestion, back pain and fatigue
- Rarely: anxiety, muscle pain, sinusitis, cough
- Hyperkalemia, but less than ACE I.

Calcium Channel Blockers.

- Three chemical classes
  - Phenylalkylamines (verapamil=Calan, Isoptin)
  - Benzothiazepines (diltiazem=Cardizem,Dilacor, Tiazac)
  - Dihydropyridines (amlodipine=Norvasc, nifedipine=Adalat, Procardia and other).
CCB what do they do?
- Prevent calcium from entering cells.
- Relaxation of the smooth muscle that surrounds coronary arteries.
- Dilation of arteries throughout the body (decrease SVR)
- Negative inotropic effects
- Negative chronotropic effects.

CCB's Contraindications
- Acute MI
- 2nd 3rd degree AV blocks.
- Hypotension

CCB's Adverse Effects
- Overexpression of their therapeutic effects.
- Hypotension, palpitations, tachycardia, or bradycardia, heart failure, constipation, nausea, dermatitis, dyspnea, rash, flushing, peripheral edema, wheezing.

CCB therapeutic Indications
- Angina
- Hypertension
- SVT
- Coronary Artery spasms
- Short term management of A-fib, A-flutter
- Migraine headaches
- Raynaud's disease (PVD)
- Nimodipine is indicated solely for cerebral artery spasms associated with aneurysm rupture.

CCB's Interactions
- Cyclosporine (can low the dose) with diltiazem
- Grapefruit can reduce the metabolism of calcium channel blockers

Drug interactions with CCBs
- B-blockers = additive effects
- Digoxin interference with elimination with possible dig. Toxicity.
- H2 blockers may decrease clearance of CCBs thus elevating levels of CCBs and their effects.
Vasodilators (direct acting)
- Work directly on smooth muscle not thru the adrenergic receptors.
- Examples: diazoxide(a), sodium nitroprusside(a&v), hydralazine(a), minoxidil(a)
- Group with many side-effects and currently better choices of meds.

Anti-hypertension drugs.
- Nursing actions
  - Check BP if systolic below 90-100 careful
  - Check HR if less than 60 careful. Call MD

Diuretic Drugs
- Carbonic Anhydrase Inhibitors
  - Not commonly used.
- Loop Diuretics
  - Lasix, bumex, ethacrynic acid
- Osmotic Diuretics
  - Mannitol
- Potassium Sparing diuretics
  - Amiloride, spironolactone, triamterene
    - Competes with aldosterone.
- Thiazide & Thiazide like
  - Hctz

Basic Tx of Heart Failure
ABC’s (D&N too) of Cardiac drugs
- Preload
- Afterload
- Cardiac Output

Membrane potential.
- K inside
- Calcium and Sodium on the Outside

Class 1 Na Channel Blockers
Class II Beta blockers.

Class III K+ channel blockers

Class IV CCB’s

- Then
- Diuretics and
- Nitrates.