

# Bullet Point Nursing

## Hypertension pharmacology

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### Principles of hypertensive pharmacotherapeutics

- Diagnosis of hypertension is when a blood pressure has a systolic over 130 **or** a diastolic over 80
  - Per the 2017 AHA/ACC guidelines
- Multiple low-dose agents are preferred versus high dose of a single agent
- Monotherapy is limited to how much it can decrease the blood pressure
  - Roughly 10-20mm/hg systolic decrease per medication at standard dose
- Pharmacotherapy should always be used in conjunction with lifestyle modifications
  - Reduce salt intake
  - Increase exercise. At least 150 minutes per week of aerobic activity
  - Decrease weight (If needed)
  - Quit smoking (If applicable)
  - Reduce alcohol consumption (If applicable)
  - Reduce caffeine intake (If applicable)
- Always educate your patient on the basic pathophysiology of hypertension
  - Most patients are asymptomatic and require adequate education to promote medication compliance
- Many hypertension medications are available in combination of two medications
- Most HTN medications are not safe in pregnancy
  - Provider must ensure they are not pregnant when starting regimen and are on adequate means of pregnancy prevention
- Higher doses increase side effects without proportional therapeutic benefit
- Resistant hypertension is when target goal is not achieved with three appropriately dosed medications
  - Ensure compliance
  - Consider white coat syndrome
  - This patient should be referred to a hypertension specialist
- Caution in rapidly lowering the blood pressure in hypertensive urgency / emergency
- You must assess the patient's blood pressure before and after administering any HTN drug
- Always titrate and taper antihypertensive medications

### First line agents:

- ACEI/ARB
- Thiazide diuretics
- Calcium channel blockers (Dihydropyridines)

### Alternative agents:

- Beta blockers

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- Alpha one blockers
- Alpha two agonists
- Direct vasodilators
- Renin blockers
- Sodium nitroprusside

## **Drug class: Angiotensin Converting Enzyme Inhibitors (ACEI)**

- Drugs:
  - Lisinopril (Zestril)
  - Captopril (Capoten)
- MOA: Inhibit the conversion of angiotensin one to angiotensin two
- Indications: HTN, ACS, chronic kidney disease, stroke prevention, and heart failure
- SE/AE: Kidney injury, angioedema, cough, and hyperkalemia
  - Captopril can cause neutropenia
- Black Box warning: Teratogenic

## **Drug class: Angiotensin Receptor Blockers (ARB)**

- Drugs:
  - Losartan (Cozaar)
  - Valsartan (Diovan)
- MOA: Inhibits angiotensin two receptors
- Indications: HTN and kidney disease
- SE/AE: Kidney injury and hyperkalemia
- Less likely to have a cough and angioedema versus ACEI
- Black Box warning: Teratogenic

## **Drug class: Thiazide Diuretics**

- Drugs:
  - Hydrochlorothiazide (HCTZ)
  - Chlorthalidone
- MOA: Blocks reabsorption of sodium and chloride in the early distal convoluted tubule
- Indications: HTN and edema
- Most prescribed class of diuretics
- Chlorthalidone is more potent than HCTZ
- HCTZ is available in combination with many medications such as lisinopril and losartan

## **Drug class: Calcium Channel Blockers (CCB) - dihydropyridines**

- Drugs:
  - Amlodipine (Norvasc)
  - Nifedipine (Cardene)
- MOA: Inhibits calcium resulting in relaxation of vascular smooth muscle and vasodilation
- Indications: HTN
- SE/AE: Edema, orthostatic hypotension,

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- Often used as first line treatment for hypertension in African Americans
- This class of drugs can be subdivided into dihydropyridines and non-dihydropyridines
- These drugs do not impact the heart rate

## **Drug class: Calcium Channel Blockers (CCB) - non-dihydropyridines**

- Drugs:
  - Verapamil
  - Diltiazem (Cardizem)
- MOA: Relaxation of vascular smooth muscle and vasodilation also decreases cardiac cellular excitability and contractility
- Indications: Angina, atrial fibrillation, HTN, and SVT
- SE/AE: Dysrhythmias
- Assess HR and BP prior to admin
- Not a first line agent for HTN

## **Drug class: Direct vasodilators**

- Drug:
  - Hydralazine
- MOA: Directly dilates arteries
- Indications: Heart failure, hypertensive urgency, and HTN
- SE/AE: Lupus like syndrome, reflex tachycardia and hypotension
- Very common to get a headache when taking this medication
- Isosorbide dinitrate is another vasodilator that is often given together due to dilating veins
  - Bidil is a combination medication of hydralazine with isosorbide dinitrate

## **Drug name: Sodium Nitroprusside (Nipride)**

- MOA: Directly dilates arteries and veins
- Indications: Acute heart failure and acute hypertension
- SE/AE: Cyanide toxicity and hypotension
- Black Box warning: For the two SE/AE noted above
- IV route only

## **Drug class: Alpha two agonist**

- Drug:
  - Clonidine
  - Methyldopa
- MOA: Stimulates alpha two adrenergic receptor reducing sympathetic stimulation
- Indications: Hypertension
- SE/AE: Drowsiness
- Methyldopa is considered relatively safe in pregnancy

## **Drug class: Renin blocker**

- Drugs:

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- Aliskiren
- MOA: Inhibits renin
- Indications: HTN
- Alternative agent, never first line
- Black Box warning: Teratogenic

## **Drug class: Alpha one adrenergic antagonists**

- Drugs:
  - Doxazosin (Cardura)
  - Prazosin (Minipress)
- MOA: Inhibits alpha one receptors
- Indications: BPH and HTN
- SE/AE: Orthostatic hypotension and reflex tachycardia, ED, fatigue
- Other A1 antagonists are used only for BPH such as tamsulosin

## **Drug class: Beta adrenergic antagonists (Beta blockers)**

- Drugs:
  - Propranolol
  - Metoprolol
  - Labetalol
- MOA: Blocks beta one receptors
- Indications: Angina, HTN, heart failure, AMI, dysrhythmias, migraines prevention, anxiety
- SE/AE: Fatigue, ED
- Black Box warning: Abrupt discontinuation can cause adverse cardiac effects
- Can be divided into nonselective, cardioselective, and including vasodilating effects
  - Caution in those with underlying pulmonary conditions, can cause bronchoconstriction
  - Especially with nonselective
- One of the safest options for HTN in pregnancy
- Assess HR and BP prior to admin

*Additional options not discussed here are potassium sparing diuretics and loop diuretics*

*Ask about CAMS as many can affect blood pressure*

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## References

- 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. (2018) *Journal of the American College of Cardiology*; 71: e127-e248
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