

## Hypertension (high blood pressure): Clinical Pearls for the Pharmacy Technician

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### Objectives

- Define hypertension and who is commonly affected by this condition
- Compare the treatment goals recommended in current clinical practice guidelines for specific populations
- Describe non-pharmacologic or lifestyle changes recommended for patients with elevated blood pressure
- List common medication classes that are used in the management of high blood pressure

### What is hypertension?

- A condition which the long-term force of the blood against the blood vessel walls is high enough to cause long term health problems
  - Coronary artery disease (CAD)
  - Stroke
  - Heart Failure
  - Renal failure
- 1/3 American adults have hypertension
  - 67 million adults (in 2015) based on JNC 8 (most common guideline)

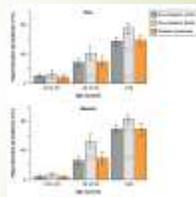


### What is hypertension? cont.

- 4<sup>th</sup> leading cause of death in the U.S.
- Accounts for 18% of cardiovascular disease deaths in Western countries
- Costs the nation \$47.5 billion each year
- According to the JNC 8, an adult >55 years old have ~90% chance of developing hypertension
  - Baby boomer population is 26% of U.S. population
    - Nearly 80 million individuals

### Epidemiology

- More prevalent in patients >60 compared to younger adults
- Common among men and women
  - African American patients more so than others
    - 41% African American population compared to 27% white population
  - Unclear why
    - Genetic, genetic, and environmental factors
    - Lower birth weights
- 82% with hypertension know
  - 76% take medications
  - 52% controlled (meet blood pressure goals set by guidelines)



### Epidemiology cont.

- Children are not exempt from hypertension
  - Increasing problem in the U.S.
  - 3.6% of children 3-18 years old have high blood pressure
    - Number is increasing due to obesity problem
      - 30% of male children and ~25% of female children who are obese have hypertension
    - Can occur in healthy weight children as well
  - Can treat other underlying problems to alleviate hypertension
    - Treating anxiety
    - Treating stress

## Goals of Therapy

- Where do we get the recent goals or bench marks?
  - Eighth Joint National Committee (JNC 8; most commonly used)
  - American College of Cardiology/ American Heart Association (ACC/AHA; most recently updated)

## Eighth Joint National Committee (JNC 8)

- Published in 2014
  - Evidence based guideline for the management of high blood pressure in adults
  - Based off of randomized control trials
- Guideline attended to 3 major questions:
  - Does initiating antihypertensive pharmacologic therapy at specific blood pressures improve health outcomes?
  - Do attempts to reach specific blood pressure goals with anti-hypertensives lead to improved health outcomes?
  - Do various antihypertensive drugs or classes differ in regards to specific health outcomes?

## JNC 8 cont.

- Guideline was able to provide 9 recommendations for hypertensive treatment with either strong, moderate, weak evidence, or expert opinion
  - When to initiate therapy (>150/90 mmHg in patients >60 years and older)
  - Target diastolic blood pressure in patients <60 years old is  $\geq$ 90 mmHg to initiate therapy
  - Target systolic blood pressure in patients <60 years old is  $\geq$ 140 mmHg to initiate therapy
  - Patients 18 years and older with chronic kidney disease (CKD) should be initiated on therapy with medication when the blood pressure is  $\geq$ 140/90 mmHg and should be treated to <140/90
  - Target blood pressure in patients with diabetes that are 18 and older is <140/90 mmHg

## JNC 8 cont.

- Recommendations cont.
  - Initial drug for nonblack patients (including diabetics) should be a thiazide-type diuretic, calcium channel blocker, angiotensin-converting enzyme inhibitor, or angiotensin receptor blocker
  - Initial drug for African American patients should be a thiazide diuretic or calcium channel blocker (including diabetics)
  - Patients 18 and older with CKD should initially or add on therapy should be an angiotensin-converting enzyme inhibitor, or angiotensin receptor blocker, regardless of race or diabetes
  - An algorithm is recommended for patients who do not achieve goals within one month, including addition of drugs and dose adjustments

## JNC 8 cont.

- If initial treatment does not obtain therapeutic measures, there are 3 ways for pharmacologic management:
  - Strategy A: start 1 drug, titrate to maximum dose, and then add a 2<sup>nd</sup> drug
  - Strategy B: start 1 drug then add a 2<sup>nd</sup> drug before achieving maximum dose of the initial drug
  - Strategy C: begin with 2 drugs at the same time, either as separate pills or a combination pill
    - if patients blood pressure is 20/10 mmHg above treatment goal

## JNC 8 Blood Pressure Goals

- Goals for the JNC 8 are divided into age groups, and whether chronic kidney disease (CKD) and/or diabetes are present
  - General population (without diabetes or chronic kidney disease):
    - Age  $\geq$  60 have a goal of <150/90 mmHg
      - Tend to be more lenient with age
    - Age < 60 have a goal of <140/90 mmHg
  - Diabetes or chronic kidney disease (CKD) patients:
    - All ages with diabetes but NO CKD have a goal of <140/ 90 mmHg
    - All ages with CKD, with or without diabetes have a goal of <140/90 mmHg

## JNC 8 cont.

- Have the ability to add a number of adjunctive agents:
  - Beta-blockers
  - Vasodilators
  - Central-acting agents
  - Aldosterone antagonists
- Non-pharmacologic options for manage hypertension
  - Diet
  - Exercise

## American College of Cardiology/ American Heart Association (ACC/AHA)

- Less commonly used as the guideline of choice, but still prevalent
- Recently updated in November 2017
- Tightened the blood pressure definition
  - Normal blood pressure <120/80 mmHg
  - Elevated blood pressure 120-129/<80 mmHg
  - Stage 1 of hypertension 130-139/80-89 mmHg
  - Stage 2 of hypertension  $\geq$ 140/90 mmHg

## ACC/AHA cont.

- Mentions using  $\geq$  2 elevated readings on more than 2 occasions to stage the patients blood pressure
  - Cuff size important for accurate readings
  - Proper sedentary time before measurements
- States importance of screening and management of other cardiovascular risks from other health conditions to low fitness and smoking

## ACC/AHA cont.

- Requests screening for secondary hypertension
  - Other disease states that cause hypertension
  - Multiple medications that cause hypertensive effects
    - Including Over-the-Counter (OTC) products such as decongestants or caffeine
- Gives non-pharmacologic interventions to reduce blood pressure
- **Goal is to obtain a blood pressure of <130/80 mmHg**

## ACC/AHA cont.

- Discusses medication for special conditions
  - Before surgery
  - After surgery
  - Stroke patients
  - Heart failure patients
- More strict rules leads to more Americans being diagnosed with hypertension than previous guidelines
  - Paints a picture of a larger problem than previously shown

## Hypertension Treatment

- Non-pharmacologic options
- Pharmacologic options

## Non-pharmacologic

- Lifestyle management is a large part of blood pressure
- Managing other disease states
  - Controlling blood glucose
    - Increased levels can stress and damage blood vessels
  - Controlling lipid intake and lipid levels



## Non-pharmacologic

- Smoking cessation
  - 1.3 billion cigarette smokers in developed countries
    - Continued pace will lead to 1 billion deaths in 21<sup>st</sup> century
  - Patients who smoke are at an increased risk to elevated blood pressure
    - Can increase blood pressure 20 mmHg after first cigarette
    - 20 min after quitting, blood pressure starts to decrease
  - Offering cessation help to patients that are ready to quit leads to substantial change in blood pressure as well as overall health
  - If patient is ready, have information (print-out or brochure) available



## Non-pharmacologic cont.

- Physical activity
  - Exercise can lead to a long term decrease of resting blood pressure
  - Moderate-to-vigorous activity 3-4 times a week for 30-60 minutes
  - Encourage patients to start at low intensity if not able for more intense exercise
- Diet:
  - DASH diet:
  - Monitor or be conscious of alcohol consumption
  - Reducing sodium can lead to a reduction of blood pressure



## Non-pharmacological effects on hypertension

**Lifestyle modifications help lower blood pressure in the general population**

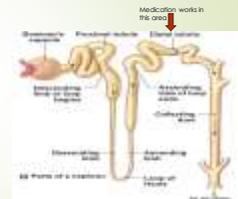
Modification	Recommendation	Lower Systolic Blood Pressure Change
Weight reduction	Reduce weight 10% (weight loss 10-15 kg)	-6.22 mm Hg (-1.48 kg) to -8.22 mm Hg (-1.68 kg)
DASH	High potassium, low sodium, low fat diet with reduced saturated fat and cholesterol	-6 to -11 mm Hg
Physical activity	At least 30 minutes each day	-4 to -8 mm Hg
Alcoholic alcohol consumption	Limit to 1 drink per day	-2 to 4 mm Hg
Sodium restriction	<100 mmol per day (<2300 mg per day of sodium, potassium and chloride)	-2 to 8 mm Hg

## Pharmacologic

- First-line options:
  - Thiazide diuretics
  - Angiotensin Converting Enzyme Inhibitors (ACE inhibitors)
  - Angiotensin Receptor Blockers (ARB's)
  - Calcium Channel Blockers (CCB)
- Add-on therapy:
  - Beta-blockers
  - Vasodilators
  - Centrally-acting agents
  - Aldosterone antagonists

## First-line pharmacologic

- Thiazide diuretics:
  - Hydrochlorothiazide (HCTZ) 12.5-50 mg/day
  - Chlorthalidone 12.5-25 mg/day
  - Indapamide 1.25-2.5 mg/day
- Side effects:
  - Hypokalemia (low potassium)
  - Hyponatremia (low sodium)
  - Frequent urination
  - Hypotension (low blood pressure)
  - Orthostatic hypotension (next side)
  - Hypercalcemia (increased calcium)
  - Hyperglycemia (increased glucose)

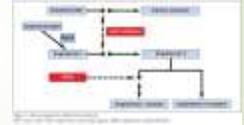


## Orthostatic hypotension

- Also referred to as postural hypotension
- A decrease in blood pressure that occurs when standing up after sitting or lying
  - Sensation described as dizzy or lightheaded
    - Can be accompanied with nausea or blurry vision
  - Patients can faint
    - Can last for minutes
- Important to address due to other complications
  - Falls
  - Stroke (drastic swings in blood pressure can cause a stroke)

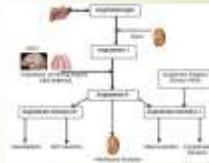
## First-line pharmacologic

- ACE Inhibitors: (ends in -pril)
  - Lisinopril 2.5-40 mg/day
  - Enalapril 5-20 mg/day
  - Captopril 50-200 mg/day
  - Ramipril 5-10 mg/day
- Side effects:
  - Dry cough
  - Hypotension
  - Orthostatic hypotension
  - Dizziness
  - Headache
  - Hypertalemia
  - Angioedema (swelling of face and lips)



## First-line pharmacologic

- ARB's (end in -sartan):
  - Candesartan 4-32 mg/day
  - Losartan 50-100 mg/day
  - Valsartan 40-320 mg/day
  - Irbesartan 75-300 mg/day
  - Olmesartan 20-40 mg/day
- Side effects:
  - Backache
  - Dizziness
  - Nasal congestion
  - Angioedema (less common than ACE inhibitors)

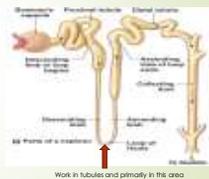


## First-line pharmacologic

- Calcium Channel Blockers (CCBs)
  - Dihydropyridines:
    - Amlodipine 2.5 mg-10 mg/day
    - Nifedipine ER 100-200 mg/day
  - Non-dihydropyridines:
    - Diltiazem ER 180-360 mg/day
    - Verapamil ER 240-480 mg/day
- Side effects:
  - Peripheral edema (fluid retention and swelling in arms and legs)
  - Dizziness
  - Headache

## Add-on pharmacologic

- Loop diuretics:
  - Furosemide 40-160 mg/day
  - Torsemide 10-40 mg/day
- Side effects:
  - Hyperuricemia (increased urine output)
  - Loss of appetite
  - Orthostatic hypotension
  - Hypomagnesemia (low magnesium)

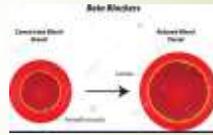


## Add-on pharmacologic

- Potassium sparing diuretics:
  - Spironolactone 25-50 mg/day
  - Torsemide 100 mg/day
  - Amlolide 5-10 mg/day
- Side effects:
  - Gynecomastia (enlarged breasts in men)
  - Diarrhea
  - Nausea
  - Vomiting
  - Hypertalemia
  - Hyperuricemia
  - Hypocalcemia
  - Hyponatremia

## Add-on pharmacologic

- Beta-blockers ending in (-ol)
- Metoprolol succinate 30-100 mg/day
- Metoprolol tartrate 100-200 mg/day
- Propranolol 40-100 mg/day
- Carvedilol 12.5-50 mg/day
- Labetalol 200-600 mg/day
- Atenolol 20-50 mg/day
- Bisoprolol 5-10 mg/day
- Side effects:
  - Bradycardia (slow heart rate)
  - Hypotension
  - Hypoglycemia (low blood sugar, commonly observed mental status)
  - Diarrhea
  - Fatigue
  - Erectile dysfunction in men



## Add-on pharmacologic

- Vasodilators:
  - Hydralazine 50-200 mg/day
    - Side effects:
      - Fluid retention
      - Nausea
      - Numbness
      - Headache
      - Loss of appetite
  - Minoxidil 5-10 mg/day
    - Side effects:
      - Hypertrichosis
      - Fluid retention
      - Hypernatremia (increased sodium)

## Add-on pharmacologic

- Vasodilators cont.:
  - Terazosin: 1-5 mg daily
  - Doxazosin: 1-4 mg at bedtime
  - Side effects:
    - Orthostatic hypotension
    - Peripheral edema
    - Dizziness
    - Headache
    - Fatigue

## Add-on pharmacologic

- Centrally-acting Agents:
  - Clonidine 0.2-0.4 mg/day
    - Available in weekly transdermal patch for resistance hypertension
    - Side effects:
      - Dizziness
      - Headache
      - Fatigue
  - Methyldopa 500-1,000 mg/day
    - Side effects:
      - Dizziness
      - Headache
      - Erectile dysfunction (men)
      - Reduced libido (male and female)

## Add-on pharmacologic

- Central-acting agents cont.
  - Guanfacine: 1-3 mg daily
    - Side effects:
      - Slight reduction of heart rate (5 beats per min.)
      - Orthostatic hypotension
      - Constipation
      - Xerostomia (dry mouth)
      - Dizziness
      - Fatigue
      - Headache
      - Drowsiness

## Questions to ask patients

- Have you been checking your blood pressure regularly?
- If so, what are the numbers?
- If not, would you mind taking your blood pressure today to check the numbers?
- Do you know what your blood pressure goal is?
- How are you taking the medication?
- When you take this medication, do you ever get lightheaded or dizzy?
- When do you take this medication?
- Are you having any undesired effects when you take this medication?

## Questions to ask patients cont.

- If smoking:
  - Have you ever thought about quitting?
  - Would you like information on smoking cessation?
  - Would you like to talk to a pharmacist about quitting?
- Are you using other ways to help lower your blood pressure with your medicine? If so, what?
  - Great question to discuss non-pharmacologic ways to live a healthier lifestyle.
    - DASH
    - Activity
    - Salt and alcohol restriction

## Commonly used medication classed based off indications

- Heart failure: ACE or ARB + Beta-blocker + diuretic + spironolactone (depending on ejection fraction)
- Post-heart attack: ACE or ARB AND Beta-blocker
- Coronary artery disease: ACE, BB, diuretic, CCB
- Diabetes: ACE or ARB, CCB, diuretic
- CKD: ACE or ARB
- Recurrent stroke prevention: ACE, diuretic
- Pregnancy: labetalol (first line), nifedipine, methyldopa

## Conclusion

- High blood pressure is a significant concern in the U.S.
- Causes other long term problems and is the 4<sup>th</sup> leading cause of death in the U.S.
- We have 2 commonly used guidelines that have some key differences previously mentioned
- Non-pharmacologic options are available to lower of blood pressure
- While many different pharmacologic options and classes, there are algorithms used to make these choices easier
- Recognizing adverse effects that the patient experiencing can help ensure optimal patient safety

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