Preventive Cardiology
What the Primary Care Nurse Practitioner Wants to Know

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Objectives

- Review risk factors for cardiovascular disease
- Identify strategies to modify risk
- Describe the impact of hypertension, hyperlipidemia and renal failure on the cardiovascular system
- Discuss the pharmacotherapy treatment of hypertension,and hyperlipidemia and its benefits in combatting cardiovascular disease

Primary Care Nurse Practitioner

- Patients with various cardiac problems are managed by the nurse practitioner in primary care.
- Improvements in chronic disease self –management have brought positive changes
- However, sub-optimal control continues to lead to significant morbidity and mortality
- The nurse practitioner can make a significant contribution at point of care by helping patients achieve better control with life-style changes
- Practice guidelines are an effective adjunct in htn mgt.

Encourage Adherence to a Healthy Lifestyle

- Diet low in fat, and sodium
- Emphasize: Vegetables, fruits, whole grains,
- Low fat dairy products, poultry,fish,legumes,
- Limit sweets, and red meat
- Maintain healthy body weight BMI 18.5-24.5
- Encourage regular aerobic physical activity
- Control HTN and diabetes when present.

- Stone, NJ, et al, 2013 ACC/AHA Guideline on the treatment of blood cholesterol to reduce atherosclerotic cardiovascular risk in adults

Burden of cardiovascular disease

- Cardiovascular diseases are the number one cause of death, globally
- An estimated 17.5 million died from CVDs in 2012
- 1 in 3 Americans die of heart disease and stroke
- Heart disease and stroke rank first and third
- In 2006, in the US, health care spending and lost productivity exceeded $400 Billion

- An overview of Cardiovascular Disease Burden in the United States Health Affairs Volume 26, Number 1 2007
- World Health Organization Fact sheet Jan 2015:

Risk factors

- Essential HTN accounts for 95% of HTN
- Identifiable causes of HTN accounts for 5% of HTN
- CVDs can be prevented by addressing behavioral risk factors such as:
- Tobacco use
- Harmful use of alcohol
- Unhealthy diet
- Obesity
- Physical inactivity

- World Health Organization Fact sheet January 2015

Effects of Behavioral Risk Factors

- Hypertension
- Hyperlipidemia
- These “intermediate risk factors” can be measured in the primary care setting
- These indicators present an increased risk for developing a heart attack, stroke, heart failure and kidney disease

- World Health Organization Fact sheet Jan 2015

Management of Hypertension

- Treatment Guidelines for Hypertension
- 2014 Evidence-Based Guideline for the Management of High Blood Pressure in Adults: Report From the Panel Members Appointed to the Eighth Joint National Committee (JNC8) Special Communication December 18,2013
- HTN, most common and preventable condition seen in primary care
- **Uncontrolled** HTN leads to MI, CVA, Renal Failure, and death
- Synopsis: Early detection and effective management is key in reducing disease burden

- doi:10.1001/jama.2013.284427 (JNC8)

Definition of Hypertension

- Hypertension is defined as a systolic blood pressure greater than or equal to140 or diastolic pressure greater than or equal to 90.

- Normal < 120/80
- Prehypertension Range SPB:120-139 DPB:80-89
- Hypertension:≥ 140/90
- Target blood pressure: goal is <140/90

Recommendations for HTN Management

- When do I start pharmacologic treatment?
- Recommendation 1
- General Population aged ≥60 :
- Initiate medication at (SPB) ≥150 or (DBP)≥90
- Treat to a goal (SPB) <150/90 and (DBP)<90
- If treatment is well tolerated, without adverse effects, and (SPB) <140, no need for adjustments

Recommendation 2

- In the general population <60 years of age
- Initiate medication to lower DBP ≥ 90 and treat to a goal of DBP <90 mm Hg.
- For ages 30-59 Recommendation Grade A
- For ages 18-29 Recommendation Grade E

doi:10.1001/jama.2013.284427 (JNC8)

Recommendation 3

- In the general population <60 years of age
- Initiate medication to lower BP at SBP ≥ 140 and
- Treat to a goal of SBP<140
- Expert opinion Grade E

doi:10.1001/jama.2013.284427 (JNC8)

Recommendation 4

- In the general population aged ≥ 18 with CKD
- initiate medication to lower BP at

  SBP ≥ 140 mmHg OR DBP ≥ 90 mm Hg

  treat to a goal SBP < 140 mm Hg and DBP <90 mm HG.

doi:10.1001/jama.2013.284427 (JNC8)

Recommendation 5

- Population age ≥ 18 years with diabetes, initiate medication to lower BP at SBP ≥ 140 mm Hg or DBP ≥ 90 mm Hg.
- Treat to a goal SBP<140 mm Hg. and goal DPB <90 mm Hg.
- Expert opinion Grade E

doi:10.1001/jama.2013.284427

Recommendation 6

- In the general nonblack population, including those with diabetes
- Initial antihypertensive treatment includes:
- Thyazide-type diuretic,CCB, ACEI,or ARB
- Grade B recommendation

doi:10.1001/jama.2013.284427 (JNC8)

Recommendation 7

- In the general black population, including those with diabetes, initial antihypertensive treatment should include a thiazide-type diuretic or CCB
- For the general black population:
- Moderate recommendation-Grade B;
- For black patients with diabetes:
- Weak Recommendation, Grade C

doi:10.1001/jama.2013.284427 (JNC8)

Recommendation 8

- In the population aged ≥18 years with CKD, initial (or add-on) antihypertensive treatment should include an ACEI or ARB to improve kidney outcomes. This applies to all CKD patients with hypertension regardless of race or diabetes status.

doi:10.1001/jama.2013.284427 (JNC8)

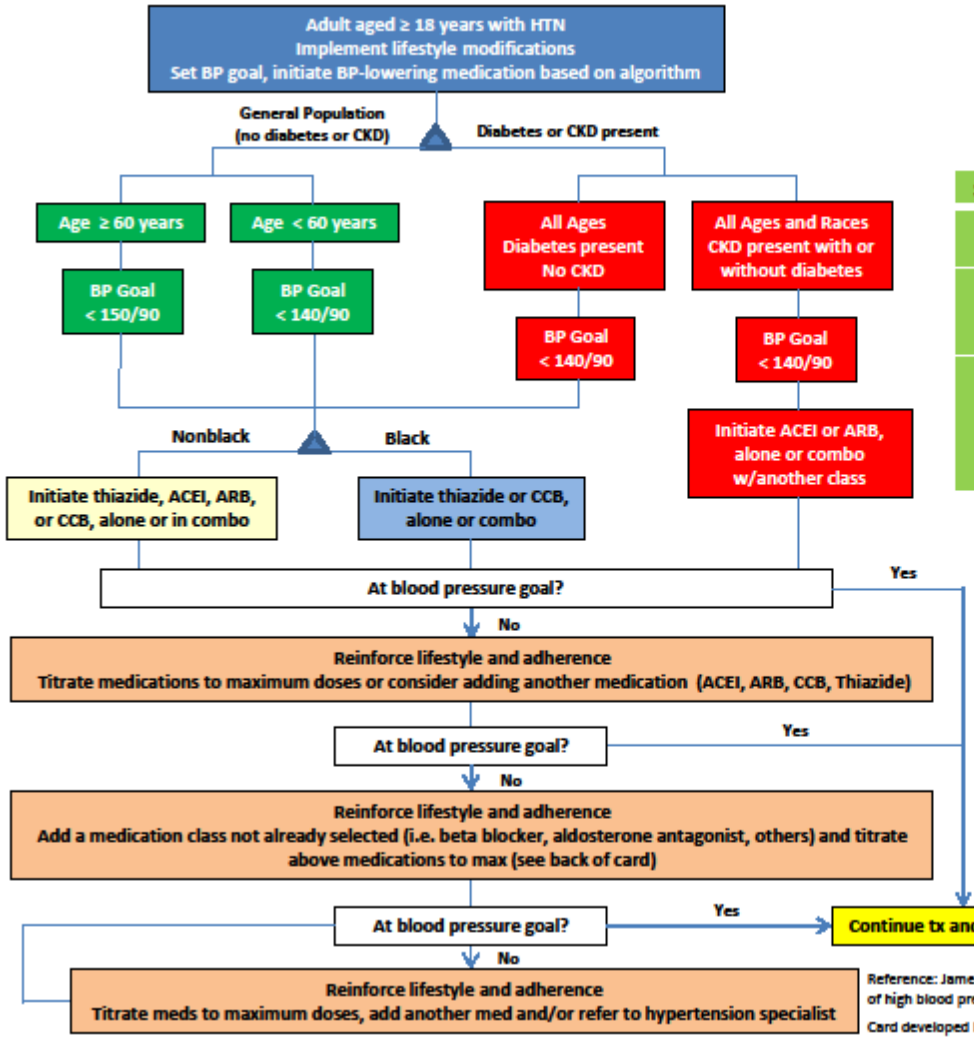
Recommendation 9

- The main objective of HTN treatment is to attain and maintain goal BP.
- If goal BP is not achieved within a month of treatment :
- Increase the dose of the initial drug or add a second drug from the following classifications:
- Thiazide-type diurectic, CCB, ACEI, ARB
- Continue to assess BP and adjust regimen until goal BP is reached.
- If goal BP can not be obtained with 3 drugs, use drugs from other classes or refer.

Different Approaches

- Caucasian
- Black
- Young
- Senior Population
- Senior Population and Black Population sensitive to salt intake
- Respond to diuretics

JNC 8 Hypertension Guideline Algorithm



Initial Drugs of Choice for Hypertension

- ACE inhibitor (ACEI)
- Angiotensin receptor blocker (ARB)
- Thiazide diuretic
- Calcium channel blocker (CCB)

Strategy	Description
A	Start one drug, titrate to maximum dose, and then add a second drug.
B	Start one drug, then add a second drug before achieving max dose of first
C	Begin 2 drugs at same time, as separate pills or combination pill. **Initial combination therapy is recommended if BP is greater than 20/10mm Hg above goal**

Lifestyle changes:

- Smoking Cessation
- Control blood glucose and lipids
- Diet
  - ✓Eat healthy (i.e., DASH diet)
  - ✓Moderate alcohol consumption
  - ✓Reduce sodium intake to no more than 2,400 mg/day
- Physical activity
  - ✓Moderate-to-vigorous activity 3-4 days a week averaging 40 min per session.

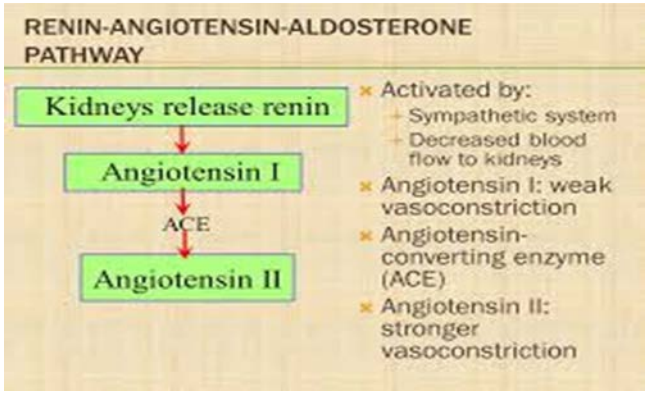
Reference: James PA, Ortiz E, et al. 2014 evidence-based guideline for the management of high blood pressure in adults: (JNC8). JAMA. 2014 Feb 5;311(5):507-20

Card developed by Cole Glenn, Pharm.D. & James L Taylor, Pharm.D.

Renin Angiotensin-Aldosterone System

- Reduced blood flow to the kidneys causes the kidneys to release renin, this leads to the production of angiotensin I. ACE leads to the conversion of angiotensin I to angiotensin II, a vaso-constrictor, which increases the blood pressure

- Blood pressure is partially controlled by the negative feedback system (Renin - Angiotensin pathway) illustrated below. Many drugs for treating hypertension function by blocking the conversion of angiotensin I to angiotensin II (ACE inhibitors).



Antihypertensive Agents
Four classes of drugs recommended as first line agents

- Thiazide-type diuretics
- Angiotensin converting enzymes
- Angiotensin receptor blockers
- Calcium Channel Blockers
- Alone or in combination

Ace Inhibitors

- Effective at inhibiting the Renin-Angiotensin Aldosterone System (RAAS)
- Reduces the vessel tone and thereby, lowers the blood pressure.
- Lowers peripheral vascular resistance
- Improve cardiac output
- Renin: most potent vasoconstrictor known to man.
- Who makes lots of renin?
- Young Caucasian Males

Ace Inhibitors

- Captopril — Initial dose=12.5-25 mg BID to TID. Increase q 1-2 weeks
- Enalapril — Initial dose=5 mg. daily, 20 mg daily to BID
- Lisinopril — Initial dose=10 mg target dose=40 mg. daily

Angiotensin Receptor Blockers

- Act by blocking the Angiotensin II AT1receptor site.
- An effective alternative in patients with heart failure who can not tolerate ACE inhibitors (Runge)
- Telmisartan/Ramipril Study
- Telmisartan/equivalent to ramipril in patients with vascular disease
- Less angioedema
- The combination of the two: more adverse effects without an increase in benefit.

- Yusuf S. et al. Telmisartan,Ramipril, or both in patients at high risk for vascular events. NEJM 2008 358:1547-1558

Angiotensin Receptor Blockers

- Valsartan — Initial dose:40–80 mg, target dose=160–320
- Losartan — Initial 50 mg, target dose 100 mg./day
- Candesartan — Initial dose 4 mg, 12–32 mg. daily
- Irbesartan — Initial dose 75 mg, target dose= 300 mg
- Eprosartan — Initial dose 600 mg, target dose=400–800 mg

Chlorthalidone

- Thiazide type diuretic rec. as first line therapy
- Monotherapy or stepped care approach
- Twice as potent as HCTZ
- Long half life: 45-60 hours
- HCTZ half life 16-24 hours
- Will require therapy for hypokalemia
- Preferred diuretic in patients at high risk for cardiovascular event.

Hypertension 2011 57 (4) 689-694

HCTZ

- Superior in preventing 1 or more major forms CVD
- Primary choice in HTN management
- Most commonly prescribed thiazide-type diuretic
- Less expensive

- ALLHAT Trial JAMA, 2002- Vol 288, No.23 2981-2997

Calcium Channel Blockers

- Inhibits calcium ion influx into vascular smooth muscle and myocardium
- Causes peripheral vasodilatory action
- Dilates coronary arteries
- Prolongs AV Node refractory period; reduce heart rate
- Side effects: dizziness, edema, headache; proteinuria
- Diltiazem and verapamil: use cautiously
- Avoid in patients with heart blocks
- Avoid in patients taking beta-blockers

Calcium Channel Blockers

- 2 groups of calcium antagonists
- Dihydropyridines (DHPs)
- Non-Dihydropyridines (non-DHPS

Calcium Channel Blockers

Dihydropyridine

Amlodipine Initial dose 2.5 mg, target dose=10mg daily

Nitrendapine Initial dose=10mg, target dose=20mg daily to BID

Non-dihydropyridine

Diltiazem ER Initial dose=120-180 mg, target dose=360mg. Daily

Statin Drugs

- Treatment of blood cholesterol to reduce atherosclerotic cardiovascular risk in adults
- Most ASCVD preventable: healthy lifestyle
- Effective treatment of HTN and cholesterol
- Tool to measure risk assessment formulated
- ASCVD Risk Estimator preferred
- Measured: women, hispanic whites, blacks
- Framingham equations calc. caucasian males

Stone, NJ, et al, 2013 ACC/AHA Guideline on the treatment of blood cholesterol to reduce atherosclerotic cardiovascular risk in adults

Statin Drugs

- Recommendation: Use ASCVD Tool to guide
- Statin initiation.
- Risk calculations are cumbersome and
- Result in underidentifying high risk individuals and
- Overidentifying high risk individuals
- Recommend: Statin treatment for adults
- With a 10 year ASCVD $\geq$ 7.5%

Reduction in ASCVD events from statin therapy

- Four groups benefitting:
- Clinical ASCVD:
- Acute coronary syndrome
- Myocardial Infarction
- Stable angina
- Coronary or other arterial

Statin Benefit Groups

- Clinical ASCVD
- LDL-C levels $\geq$ 190mg/dl, no secondary causes
- Primary prevention age 40-75: Diabetes and
- LDL-C Levels 70 to 189 mg/dl
- 40-75 years old without diabetes and LDL-C 70-189mg. dl
- With a 10 year ASCVD $\geq$ 7.5% when statins are used for primary prevention

Statin Drugs

- Statins are first choice
- Only class to demonstrate reductions in mortality
- In primary and secondary prevention
- Cholesterol synthesis occurs mainly at night
- Advise patient to take medication at HS

Statin Drugs

- Atorvastin 10-20 mg. High Intensity: 40-80
- Rosuvastin 5- 10mg. :20-40
- Simvaststin 20-40
- Pravastatin 40-80
- Lovastatin 40 mg
- Fluvastatin 40 mg BID
- Pitavastatin 2-4 mg
- Caution: Simvastatin at 80 mg=Myopathy

Statin Therapy

High Intensity	Moderate Intensity	Low Intensity
Daily dose lowers LDL-C levels by <50%	Daily dose lowers LDL-C by 30-50%	Daily dose lowers LDL-C by 30%
Atorvastatin	Atorvastatin	Simvastatin 10
Rosuvastatin 20-40 mg.	Rosuvastatin	Pravastatin 10-20
	Simvaststin	Lovastatin 20
	Pravastatin 40-80 mg	Pitavastatin 1 mg
	Lovastatin	Fluvastatin 40 mg.
	Fluvastatin	
	Pitavastatin	