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2016 Hypertension Update

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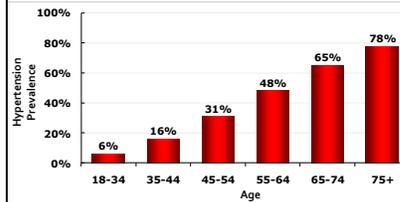
Classification of Hypertension

BP Classification	Systolic BP (mmHg)	Diastolic BP (mmHg)	Treatment
Normal	< 120	And < 80	Lifestyle modification
Pre-hypertensive	120-139	Or 80 - 89	Lifestyle modification
Hypertensive	> 140	> 90	Lifestyle modification +/- Medication

Disclosures

- We have no relevant financial disclosures
- The opinions expressed are our own, not those of the United States Navy

Prevalence of Hypertension in the United States by Age Group*



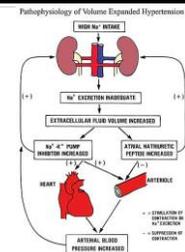
*Based on data from the 1999-2000 National Health and Nutrition Examination Survey. Hypertension is defined as blood pressure $\geq 140/90$ mm Hg or as receiving antihypertensive treatment.
Flegal, et al. Hypertension. 2004;44(3):R4-44.

Objectives

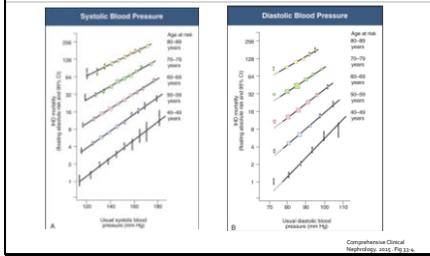
- After this program, you should be able to:
 - State emphatically that treating hypertension is important (and explain why)
 - Explain the guideline-driven approach to the diagnosis of hypertension
 - Select a target blood pressure for specific patients in your population
 - Choose the most effective treatment options for your patient and describe the evidence supporting your decision

Pathogenesis of Hypertension

- Volume expansion from high sodium, low potassium diet
- Renal compensatory factors
- Genetic factors limiting sodium excretion
- Vascular factors increase peripheral resistance
- "Reset" normal pressure



Ischemic Heart Disease



Treatment Works

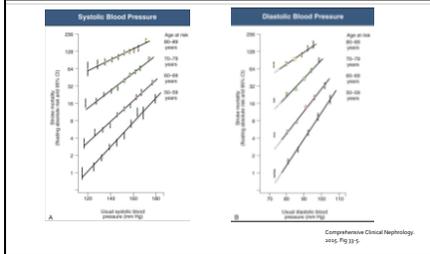
Meta-analysis: 68 RCTs; 245,885 pts; 4.3y FU

- SBP/DBP by 10/5 mm Hg for 5 years:

Complication	% Risk Reduction	NNT x 5 years
CVD Events	27%	40
Heart Failure	45%	81
Stroke	32%	58
MI	18%	160
Mortality	13%	125
Dementia	??	??

J Hypertension 2014; 32:2285

Stroke Mortality



HTN Treatment and Control

- NHANES – improved, yet disappointing:

	1980	2012
Aware	51%	83%
Treated	31%	77%
Controlled (<140/90)	10%	54%
- Blacks		41%
- Hispanics		34%

Circulation 2015; 131:e86
JACC 2012; 60:599
JAMA 2010; 303:2

Effects of Treatment

- Reduction of events:
 - Stroke: 35-40%
 - Myocardial infarction: 20-25%
 - Heart failure: over 50%
- Treatment of 11 patients with Stage I hypertension over 10 years will prevent one death

Neal B, et al. Lancet. 2000;356:1955-64.
Ogden LG, et al. Hypertension. 2000;35:539-43

Diagnosis of Hypertension

- 2015 USPSTF Guidelines
 - "Convincing evidence" that ambulatory monitoring is best method to diagnose HTN
 - Home monitoring is better than office monitoring
 - At minimum, confirm in office with 2 measurements/day at least a week apart

Population	Recommendation	Grade (Strength)
Adults aged 18 years or older	The USPSTF recommends screening for high blood pressure in adults aged 18 years or older. The USPSTF recommends obtaining measurements outside of the clinic or setting for diagnosis (confirmation before starting treatment) over the Clinical Competitiveness initiative.	A

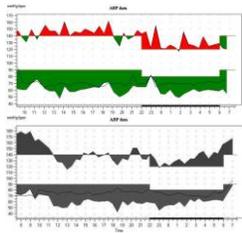
Ann Intern Med 2015;163:778-86

Ambulatory Blood Pressure Monitor

Definitions:

- HTN: > 135/85 mmHg
- Normal: <130/80 mmHg
- Daytime: <135/85 mmHg
- Nighttime: < 120/70 mmHg

- Available by consult to nephrology or cardiology



Treatment of Hypertension

- Lifestyle modifications
- Pharmacotherapy

Initial Evaluation

- History and physical
- Chemistry panel
 - Sodium, potassium, bicarbonate
 - Creatinine
 - Glucose
 - +/- Uric acid
- Lipid panel
- Urinalysis +/- albumin/creatinine ratio
- Electrocardiogram

Lifestyle Modification

Modification	Recommendation	Average Systolic BP Reduction Range Achieved with Intervention *
Weight reduction	Maintain normal body weight (BMI = 18.5-24.9 kg/m ²)	5-20 mm Hg/10 kg
DASH eating plan	Adopt a diet rich in fruits, vegetables, and low-fat dairy products with reduced content of saturated and total fat	8-14 mm Hg
Dietary sodium restriction	Reduce dietary sodium intake to 100 mmol/day (2.4 g sodium or 6 g sodium chloride)	2-8 mm Hg
Aerobic physical activity	Regular aerobic physical activity (e.g., brisk walking) at least 30 minutes, most days of the week	4-9 mm Hg
Moderation of alcohol consumption	Men: limit to 2 drinks 1 per day, women and lighter-weight persons: limit to 1 drink per day	2-4 mm Hg

Comprehensive Clinical Nephrology, 2013, Table 9-1

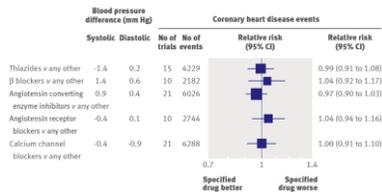
Clues to Possible Secondary HTN

- Severe or resistant hypertension
- Acute rise in BP
- Age < 30 yrs
- Flushing
- Headaches
- Palpitations
- Weight changes
- Sleep disturbances
- Hypokalemia
- Hypercalcemia
- Abnormal creatinine, hematuria, proteinuria

Medication Options

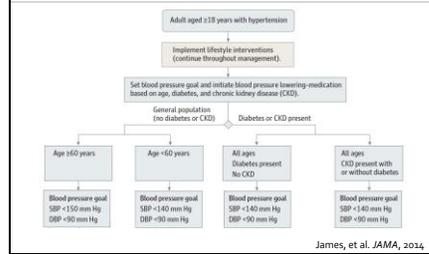
Diuretics	Adrenergic blocker	Vasodilators
Thiazides Chlorthalidone Hydrochlorothiazide Metolazone Hydrochlorothiazide	Peripheral/renin Guanethrel Guanethidine Reserpine	Direct ACE-I Hydralazine Minoxidil Enalapril Lisinopril Fosinopril Lisinopril Moxipril Quinopril Perindopril Ramipril Trandolapril
Loops Bumetanide Furosemide Torsemide	Beta-blockers Acebutolol Atenolol Bisoprolol Carvedilol Metoprolol Nadolol Nebivolol Pindolol Propranolol Timolol	Calcium channel blocker Amlodipine Felodipine Isradipine Nifedipine Nimodipine Nitroglycerin Diltiazem Verapamil
Mineralocorticoid receptor antagonists Spironolactone Eplerenone	Central alpha-agonists Clonidine Guanabenz Guanfacine Methyldopa	ARB Candesartan Eprosartan Irbesartan Losartan Olmesartan Telmisartan Valsartan
Potassium-sparing diuretics Amiloride Triamterene	Alpha-blockers Doxazosin Prazosin Terazosin	Direct renin antagonists Aliskiren

Overall – All Medications Work



BMJ 2009; 338:b1665

Hypertension: 2014 EBG (JNC8)

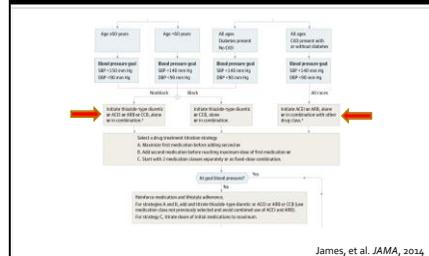


James, et al. JAMA, 2014

Treatment Summary

- While controversy abounds...**ANY** treatment reaching goal is critical
 - Consider thiazide, ACE-I, or CCB first line
 - Consider thiazide or CCB in black patients
 - Consider ACE in diabetic/CKD patients
- Not recommended: beta-blockers, hydralazine, clonidine until 3 first line options exhausted

Hypertension: 2014 EBG

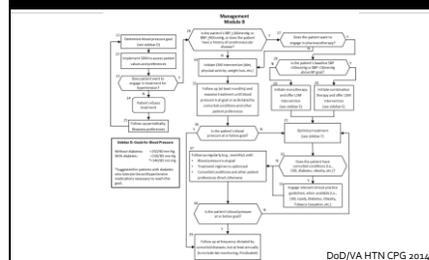


James, et al. JAMA, 2014

Guideline Updates

- VA/DoD HTN CPG 2014
- JNC-8 Panel: JAMA 2014; 311:507
- JNC-8 Minority Panels: Ann Int Med 2014; 160:449
- AHA/ACC/CDC Advisory: J Am Coll Card 2014; 63(12):1230
- Am Society of Hypertension: J Clin Hypertens 2014; 16:134
- Canadian Hypertension Education Program: Can J Card 2014; 30:485
- Joint British Societies 3: Heart 2014; 100 (Suppl 2):1
- ESH/ESC: J Hypertens 2013; 31:1281
- Japanese Society of Hypertension: Hypertension Res 2014; 37:253
- KDIGO Blood Pressure Work Group: Kid Int 2012; Suppl 2
- ADA: Diabetes Care 2015; 38 (Suppl 1):S49
- Taiwan Hypertension Society: J Clin Med Assoc; on-line 12/26/2014

Hypertension: DOD/VA



DoD/VA HTN CPG 2014

Guideline Comparison

	2014, EBG	2014, DOD-VA CPG
Starting treatment:		
Age over 60, no DM	> 150/90 mmHg	> 160 mmHg (SBP)
Age 18 – 59, no DM	> 90 mmHg (DBP)	> 90 mmHg (DBP)
Age 18 +, with DM	> 140/90 mmHg	
Goals on treatment:		
Age over 60, no DM	< 150/90 mmHg	< 150 mmHg (SBP)
Age 18 – 59, no DM	< 140/90 mmHg	< 90 mmHg (DBP)
Age 18 +, with DM	< 140/90 mmHg	< 150/85 mmHg (strong) < 140/85 mmHg (weak)

- DoD-VA CPG recommends thiazide diuretic as first-line therapy

James, et al. *JAMA*, 2014
DoD/VA HTN CPG 2014

SPRINT

- RCT: 9361 patients with SBP > 130 mmHg and "elevated cardiovascular risk", age >50
 - Target BP < 120 mmHg versus <140 mmHg
 - Primary Outcome: MI, CVA, HF, death from CVD cause
 - 2.8 versus 1.8 drugs to reach goal
- Trial stopped early: less primary outcome in intensive arm
 - 1.65%/year versus 2.19%/year

SPRINT. *NEJM*. Online 11/9/2015

Hypertension Management

- Why the drastic change from past guidelines?
 - Framing of the clinical question
 - Literature search limitations
 - Trial data: SHEP, MRC, EWP, HYVET, STOP-HTN, ALLHAT, Syst-Eur
- **But WAIT!** SPRINT Trial – intensive versus standard BP control in patients >50!

SPRINT – Medication Usage

Medication	Intensive Control (%)	Usual Control (%)
ACE-I/ARB	76.7	55.2
Diuretic	67	42.9
Calcium Channel Blocker	57.1	35.4
Beta Blocker	41.1	30.8
4+ medications	24.3	6.9

SPRINT. *NEJM*. Online 11/9/2015

ACCORD-BP

- RCT: 4733 patients with SBP > 130 mmHg and diabetes mellitus type II; age >40 (55 no CAD)
 - With CAD, or 2+ risk factors
 - Target BP < 120 mmHg versus <140 mmHg
 - Primary Outcome: MI, CVA, death from CVD
 - 3.4 versus 2.1 drugs to reach goal
- **No significant difference** in primary outcome
 - 1.87%/year versus 2.09%/year

Cushman. *NEJM*. 2010;362:1575-85

SPRINT

- My thoughts:
 - Stopped early...maybe before harms of intensive treatment were clear
 - More hypotension, electrolyte abnormality, renal failure, syncope
 - Was heart failure effected by diuretic use?
 - 25% RR reduction, but small absolute risk reduction
 - Overall high risk group (ASCVD risk of 20%)

SPRINT. *NEJM*. Online 11/9/2015

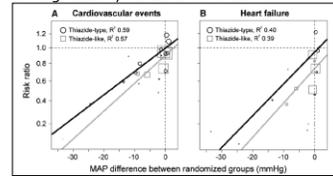
HOPE-3

- RCT: 12,705 patients with at least one CAD risk factor; age > 55 (men), >65 (women)
 - Excluded patients with known CAD
 - Candesartan/HCTZ (16/12.5 mg) versus placebo
 - Primary Outcome: MI, CVA, death from CVD
- No significant difference in primary outcome
 - 4.1% versus 4.4% (p=0.40; CI 0.79-1.10)
- No benefit to addition of for empiric treatment in at-risk group

HOPE3. NEJM. Online 4/2/2016

My Conclusion

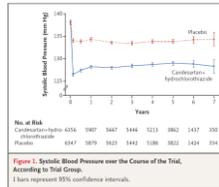
- Chlorthalidone (thiazide-type diuretic) effective at reducing CVD beyond BP reduction



Hypertension. 2015;65:1033-44

HOPE-3

- Benefit seen in pre-specified subgroup: BP >143.5 mmHg
- Benefit seen from addition of rosuvastatin



HOPE3. NEJM. Online 4/2/2016

Treatment Pearls (or thoughts)

- Consider ambulatory monitoring for diagnosis and treatment effect
- Diuretic (chlorthalidone) should be 1st or 2nd line.
- Treatment goals will remain controversial. Benefit is greatest at highest starting BP.
- EVERYONE should feel comfortable with medication titration (at every encounter)

My Conclusions

- Intensive control (<120 mmHg) likely to benefit some moderate to high risk, older patients
- Benefit to intensive control small; **greatest benefit is to reduction less than 150 mmHg**
- Side effects and harms of intensive control will likely limit wide-spread adoption
- Remember the importance of appropriate diuretic use

Thank You For Your Time!

