High Blood Pressure - Summary of JNC Six

Paul Evans DO
Introduction

• Hypertension treatment #1 reason for office visit for prescription
• Only 27% Americans with HTN have control (140/90 or lower)
• In > 65 years, over 50% have HTN
• Mortality rates declined for stroke and coronary heart disease but leveling off
• End stage renal disease and CHF increasing
Introduction

• Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure (JNC-VI) has new guidelines

• Blue ribbon panel From NIH, National Heart, Lung, and Blood Institute (www.nhlbi.nih.gov)

• Published 1997 (Kaplan N, Treatment of hypertension: insights from JNC-VI report : AFP October 15, 1998)
Objectives

- Recognize frequency and importance of high blood pressure in US population
- Define hypertension, high normal BP
- List risk factors for cardiovascular disease
- Recognize lifestyle modifications for HTN
- Learn initial and follow-up RX choices
### Hypertension

<table>
<thead>
<tr>
<th>Category</th>
<th>Systolic (mm Hg)</th>
<th>Diastolic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimal</td>
<td>&lt; 120</td>
<td>&lt; 80</td>
</tr>
<tr>
<td>Normal</td>
<td>&lt; 130</td>
<td>&lt; 85</td>
</tr>
<tr>
<td>High normal</td>
<td>130-139</td>
<td>85-89</td>
</tr>
<tr>
<td>Hypertension Stage 1</td>
<td>140-159</td>
<td>90-99</td>
</tr>
<tr>
<td>Stage 2</td>
<td>160-179</td>
<td>100-109</td>
</tr>
<tr>
<td>Stage 3</td>
<td>≥ 180</td>
<td>≥ 110</td>
</tr>
</tbody>
</table>
Hypertension - Initial Evaluation

- History and physical exam
- Establish cardiovascular risks
- Lab
  - CBC, UA, Chem 7, lipids, and ECG for screening
Additional Diagnostic Procedures - When?

• Poor response to drugs
• Well controlled BP that suddenly rises
• Stage 3
• Sudden onset HTN
Additional Diagnostic Procedures - When?

• History and physical abnormalities
  – paroxysmal HTN, HA, palpitations, pallor, perspiration (pheochromocytoma)
  – abdominal / flank bruits (renovascular dis.)
  – abdominal / flank masses (polycystic kidney)
  – delayed / absent femoral pulse (coarctation)
  – obesity, striae (Cushings)
Additional Diagnostic Procedures - When?

• Laboratory abnormalities
  – Hypokalemia (primary aldosteronism)
  – Hypercalcemia (hyperparathyroidism)
  – High creatinine / UA abnormality (renal parenchymal disease)
Cardiovascular Risk Stratification

• Major Risk Factors
  – smoking
  – dyslipidemia
  – DM
  – > 60
  – male or post menopausal female, fam. hx
  MI men< 55 or women < 65
Cardiovascular Risk Stratification

• Clinical CV Disease (CCD) / Target Organ Damage (TOD)
  – LVH, angina, MI, CHF, coronary revascularization
  – stroke / TIA
  – nephropathy, retinopathy, peripheral artery disease
Cardiovascular Risk Stratification

- Risk Group A (no risks, no TOD or CCD)
  - High normal and Stage 1
    - lifestyle modification up to 12 months
  - Stage 2 and 3
    - Drug therapy
Cardiovascular Risk Stratification

• Risk Group B (1 risk, no DM, no TOD or CCD)
  – High normal and Stage 1
    • lifestyle modification up to 6 months
  – Stage 2 and 3
    • drug therapy
Cardiovascular Risk Stratification

- Risk Group C (DM and/or TOD / CCD)
  - High normal and Stage 1
    - drug therapy
  - Stage 2 and 3
    - drug therapy
# Blood Pressure Follow-Up

At initial visit:

<table>
<thead>
<tr>
<th>Systolic</th>
<th>Diastolic</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 130</td>
<td>&lt; 85</td>
<td>✅ recheck 2 years</td>
</tr>
<tr>
<td>130-139</td>
<td>85-89</td>
<td>✅ recheck 1 year</td>
</tr>
<tr>
<td>140-159</td>
<td>90-99</td>
<td>✅ confirm in 2 months</td>
</tr>
<tr>
<td>160-179</td>
<td>100-109</td>
<td>✅ care within 1 month</td>
</tr>
<tr>
<td>≥ 180</td>
<td>≥ 110</td>
<td>✅ care immediate or in 1 week (clin. eval.)</td>
</tr>
</tbody>
</table>

---

---

---
White Coat Hypertension

- Up to 30% of patients with office readings > 140/90 have out of office readings < 135/85
- Little cardiovascular risk in 5-10 year F/U of this group
- With no nephropathy, no DX or RX of hypertension recommended
Lifestyle Modifications

- Weight loss if overweight
- Limit alcohol to < 1 ounce/day
- Exercise 30 - 45 min. “most days”
- Reduce Na (6 gm NaCl or 2.4 gm Na)
- Adequate K+ (90 mmol/day)
- Adequate Mg and Ca
- Stop smoking
- Reduce saturated fats and cholesterol
Oral Hypertension Drugs

• Diuretics (hydrochlorothiazide, metolazone)
  – short term
  – increase chol, glucose, urate, Ca
  – decrease K, Na, Mg
  – rarely photosensitivity, pancreatitis
  – loop diuretics (furosemide) not recommended first line
Oral Hypertension Drugs

- Adrenergic inhibitors
  - peripherals (guanadrel, guanethidine, reserpine)
    - postural hypotension, diarrhea
  - central alpha agonists (clonidine, guanabenz, guanfacine, methyldopa) - sedation, dry mouth, bradycardia,
  - alpha blockers (doxazosin, prazocin, terazocin)
    - postural hypotension
Oral Hypertension Drugs

• Adrenergic inhibitors
  – beta blockers (propanolol, atenolol, metoprolol, nadolol, pindolol, timolol) - bronchospasm, bradycardia, CHF, mask hypoglycemia, low exercise tolerance, fatigue
Oral Hypertension Drugs

• Adrenergic inhibitors
  – combined alpha and beta blockers
    (carvedilol, labetalol) - postural
    hypotension, bronchospasm

• Direct vasodilators
  – (hydralazine, minoxidil)
  – HA, tachycardia, fluid retention, lupus
    syndrome, hirsutism
Oral Hypertension Drugs

• Calcium channel blockers
  – dihydropyridines (nifedipine, amlodipine, felodipine, isradipine) - ankle edema, flushing, HA, gingival hyperplasia
  – non- dihydropyridines (diltiazem, verapamil, mibefradil) - conduction defects, worsening CHF, gingival hyperplasia
Oral Hypertension Drugs

- ACE inhibitors
  - (captopril, enalapril, lisinopril, benazapril, fosinopril, moexipril, quinapril, ramipril)
  - cough
  - rarely angioedema, hyperkalemia, rash, dysgusia, leukopenia
Oral Hypertension Drugs

• Angiotensin II receptor blockers
  – (losartan, valsartan, irbesartan
  – hyperkalemia, rarely angioedema
• Combinations
  – beta blocker and diuretic
  – ACE inhibitor and diuretic
  – CCB and ACE inhibitor
  – others
Drug Considerations

- Uncomplicated HTN - diuretic and beta blocker
- Heart Failure - ACE inhibitor, diuretic
- Isolated Systolic HTN - diuretic (preferred) then long acting dihydropyridine
- MI - beta blocker (non ISA) then ACE inhibitor (systolic dysfunction)
- DM Type 1 & proteinuria - ACE inhibitor
Hypertensive Crisis

- Hypertensive encephalopathy
- Intracranial hemorrhage
- Unstable angina
- Acute MI
- Acute LVH with pulmonary edema
- Dissecting aortic aneurysm
- Eclampsia
Hypertensive Crisis

- Elevated BP alone without symptoms rarely requires emergency therapy!
- Urgency = use fast-acting oral drugs
- Emergency:
  - goal = reduce BP 25% in 2 hours, then 160/100 in 6 hours (avoid fast falls)
  - monitor Q 15-30 minutes
  - routine SL nifedipine “not appropriate”
**Hypertensive Crisis**

- **Vasodilators**
  - sodium nitroprusside - N&V, twitching, sweating, cyanide intoxication (caution high intracranial pressure)
  - nicardipine - tachycardia, HA, flushing, phlebitis (caution CHF, ischemia)
  - NTG - for coronary ischemia
  - others
Hypertensive Crisis

- Adrenergic inhibitors
  - labetalol (N&V, scalp tingling, burn throat, heart block, orthostasis) - not in acute CHF
  - esmolol - (nausea, hypotension) - use in aortic dissection
  - phentolamine (tachycardia, flushing, HA) - use in catecholamine excess
Other Lifestyle Factors

- Fats - little affect BP, but good for cardiovascular health
- Caffeine - acute raise, but not chronic (tolerance)
- Relaxation and biofeedback - little longterm lower BP
- Smoking / tobacco - higher BP
- Other - garlic/onion, protein, not proven
Not At Goal Blood Pressure?

• Inadequate response / well tolerated
  – add second agent different class
  – diuretic if not already used
  – continue adding, consider referral

• No response/troublesome side effects
  – substitute from other class
  – continue adding, consider referral
Not At Goal Blood Pressure?

- Pseudoresistance
  - white coat HTN, pseudoHTN, cuff
- Drug related causes
  - dose, combination, interactions, food, cocaine, antidepressants, NSAIDs
- Associated conditions - smoking, obesity, sleep apnea, insulin resistance, etoh, anxiety, pain, arteritis
Improving Compliance

- Educate patient and family re: goals
- Home BP measurement
- Care inexpensive / simple (long acting)
- Encourage lifestyle modifications
- Least side effects possible - monitor / change when needed
- Encourage positive attitude!
- Visits with nurse / teams
Other Considerations

• Ethnic issues
  – higher Stage 3, stroke, CHD, renal complications in African Americans
  – slightly higher rate in American Indians
  – Hispanics rate slightly less
  – African Americans do better with diuretics/CCB, and worse ACE inhibitors than general population
Other Considerations

- Children and adolescents
  - 95% or higher considered elevated
  - dose adjusted for weight, careful titration
  - ACE inhibitors and angiotensin II receptor blockers not used in pregnant or sexually active girls (neonatal problem)
  - watch for anabolic steroid use
Other Considerations

• Women
  – BCP use, especially obese/>35
  – pregnancy - diuretics, methyldopa, most others OK
  – preeclampsia - no benefit ASA or calcium
  – HRT is OK with HTN meds (monitor)
Other Considerations

- Elderly
  - SBP better predictor of prognosis
  - elevated pulse pressure good predictor
  - pseudoHTN (vessel stiffness)
  - orthostasis
  - isolated SHTN - use diuretics first
  - goal = 140/90 although 160 “intermediate goal” in systolic HTN
New Factors in HTN

- Endothelial dysfunction
  - endothelium is regulatory
  - EDRF (endothelial derived relaxing factor) causes dilitation-releases NO3
  - damage to endothelium - no dilitalation response to Epinephrine e.g. in morning
  - lowering LDL increases arterial dilation, not just less obstruction
New Factors in HTN

- Free radicals
  - research suggests damage to endothelium
  - reduce nitric oxide
  - ACE inhibitors also may reduce free radicals
Summary

- Hypertension is common & important
- Stage 1,2,3 and “high normal BP” defined
- Lifestyle modifications emphasized
- Treatment goal = inexpensive & simple
- Treatment reduces M & M