Hypertension Update

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Overview

• Background
• Diagnosis
• Management
• Guideline Comparison
### Background

**• Importance**

- In 2010, hypertension was the leading cause of death and disability-adjusted life years worldwide.
- In the US, second only to cigarettes as preventable cause of death
- 25% of cardiovascular events attributable to hypertension in ARIC


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### Background

**• Importance**

- Half with hypertension do not have adequate control

### Background

#### Prevalence
- 32% under JNC-8/ current ACP/AAFP
- 46% under recent AHA/ACC

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#### Complex & Interdependent relationship between modifiable & fixed risk factors

**Modifiable**
- Cigarette smoke exposure
- Diabetes
- Dyslipidemia
- Obesity
- Lack of physical activity
- Poor diet

**Fixed**
- Male
- Family History
- Low SES
- OSA
- Stress
- Chronic Kidney disease
- Age

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Diagnosis

• Proper Blood Pressure Assessment
  ✓ 1: Patient preparation
  ✓ 2: Proper technique

Diagnosis

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  ✓ 2: Proper technique
  ✓ 3: Proper measurements


Diagnosis

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  ✓ 1: Patient preparation
  ✓ 2: Proper technique
  ✓ 3: Proper measurements
  ✓ 4: Good documentation

Diagnosis

- Proper Blood Pressure Assessment
  - 1: Patient preparation
  - 2: Proper technique
  - 3: Proper measurements
  - 4: Good documentation
  - 5: Average readings


- Proper Blood Pressure Assessment
  - 1: Patient preparation
  - 2: Proper technique
  - 3: Proper measurements
  - 4: Good documentation
  - 5: Average readings
  - 6: Give patient the numbers

Diagnosis

• Definitions (AHA/ACC):
  ✓ -> Normal <120/80mmHg
  ✓ -> Elevated blood pressure: 120-129mmHg/<80mmHg
  ✓ -> Stage 1 HTN: 130-139mmHg or diastolic 80-89mmHg
  ✓ -> Stage 2 HTN: 140mmHg or greater systolic, 90mmHg or greater diastolic


Diagnosis

• Other methods:
  • Ambulatory Blood Pressure Monitoring
    ✓ -> 24-hour mean of 125/75mmHg or more
    ✓ -> Awake mean of 130/80mmHg or more
    ✓ -> Asleep mean of 110/65mmHg or more


### Diagnosis

- **Other methods:**
  - **Ambulatory Blood Pressure Monitoring**
    - $\rightarrow$ 24-hour mean of 125/75 mmHg or more
    - $\rightarrow$ Awake mean of 130/80 mmHg or more
    - $\rightarrow$ Asleep mean of 110/65 mmHg or more
  
- **Home Blood Pressure Monitoring**


### Diagnosis

- **“What’s more important, the top number or the bottom number?”**
  - $\checkmark$ Under age 50: diastolic matters more

Diagnosis

• “What’s more important, the top number or the bottom number?”
  ✓ Under age 50: diastolic matters more
  ✓ Over age 50: systolic/pulse pressure is greater predictor of events


Diagnosis

• Clinical Evaluation-History
  ✓ Organ damage
  ✓ Risk factors
  ✓ Lifestyle
  ✓ Medications
  ✓ Substance abuse

### Diagnosis

#### Clinical Evaluation-Physical Exam
- End-organ damage
- Fundoscopic exam

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### Diagnosis

#### Clinical Evaluation-Lab Testing
- Electrolytes with calcium and creatinine
- Fasting glucose
- Urinalysis
- Complete Blood Count
- Thyroid testing-TSH
- Lipids
- Electrocardiogram
- Use labs & clinic data to calculate 10-year ASCVD risk (ACC/AHA)

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Diagnosis

• Clinical Evaluation-Lab Testing
  ✓ Additional depending on circumstance:
    • Urine albumin to creatinine ratio
    • Echocardiogram
    • Secondary Hypertension


Diagnosis

• Risk Factors
  ✓ Primary
  ✓ Secondary

## Diagnosis

### Primary Risk Factors

- Family history—about 30% of population variation is due to genetic factors, and twice as common if at least 1 parent has it
- Age
- Sodium intake
- Obesity
- Physical activity level
- Race
- Alcohol
- Kidney mass


### Secondary Risk Factors

- Oral contraceptives
- NSAIDs
- Antidepressants
- Corticosteroids
- Decongestants
- Weight-loss medications
- Antacids with sodium
- Erythropoietin
- Cyclosporine/tacrolimus
- Stimulants
- Atypical antipsychotics
- Anti-angiogenesis
- Tyrosine Kinase inhibitors
- Illegal drugs
- Kidney disease
- Hyperaldosteronism
- Renovascular
- Obstructive Sleep Apnea
- Pheochromocytoma
- Cushing’s syndrome
- Endocrine disorders
- Coarctation of the aorta


### Diagnosis

- **Complications**
  - Left ventricular hypertrophy
  - Heart Failure
  - Stroke-ischemic & hemorrhagic
  - Coronary Artery Disease
  - Chronic Kidney Disease/End-Stage Renal Disease

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### Management

- **Lifestyle**
- **Medications**

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Management

• **Lifestyle**
  - Salt restriction: ~5mmHg systolic/2.5mmHg diastolic
  - Increased potassium intake via diet
  - Weight loss: ~1mmHg/lb lost
  - DASH diet: combination of low-salt, high potassium, magnesium, calcium, protein, fiber, low fat/cholesterol, reduced by 6mmHg systolic/4mmHg diastolic
  - Exercise: 3-4x40 minutes for 12 weeks can get 4-6/3mmHg
  - Limit daily alcohol intake: 2 or fewer for men, 1 or fewer for women


Management

• **Medication**
  - Effective on outcomes

Management

• Medication-where to start?

✓ Thiazide diuretics
✓ Long-acting calcium channel blockers eg amlodipine (CCB)
✓ Angiotensin converting enzyme inhibitors (ACE-I)
✓ Angiotensin receptor blockers (ARB)

Management

• Special cases:
  ✓ Black patients-best evidence for starting with thiazide or CCB
  ✓ Diabetic nephropathy or any chronic kidney disease with proteinuria-ACE-I/ARB
  ✓ Don’t start with a beta blocker anymore, unless they have coronary artery disease or systolic heart failure

**Management**

- **Sequential Management**
  - ✓ 15mmHg+ above goal: start with 2 agents
  - ✓ 2 is not enough: go to 3 (ACE-I/ARB, thiazide, CCB)
  - ✓ 3 is not enough: “drug-resistant hypertension"
  - ✓ 4 drugs+: resistant hypertension


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**Guideline Comparison: Definition**

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<thead>
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<th>ACP/AAFP</th>
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<td>&gt;150/90mmHg</td>
<td>Stage II</td>
<td></td>
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<tr>
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<td>Stage I</td>
<td>Does not specifically define hypertension/prehypertension</td>
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## Conclusion

- Hypertension is prevalent
- Consequences are severe
- Proper diagnosis is key
- Intervention is effective
- Guidelines are a guide
Case #1

- 45 year-old African American man
- No medical problems
- Father and mother both had hypertension
- BMI = 25
- BP = 150/90

Case #2

- 50 year-old woman
- Just moved to your community
- Systolic heart failure; EF = 35%
- Current medication: diltiazem
- BP = 148/84
Case #3

- 65 year-old man with diabetes
- Medications: metformin & glyburide
- BP 136/86
- Creatinine = 1.8 with GFR = 35
- Urinalysis = 450 mg/dl protein

Case #4

- 70 year-old woman with paroxysmal atrial fibrillation causing palpitations and dizziness
- Episodes occur 1-2 times per month and last 10-20 minutes
- BP = 154/92
**Case #5**

- 30 year-old woman
- Essential hypertension diagnosed at 25
- Treatment: hydrocholothiazide + Lisinopril
- Now 6 weeks pregnant
- BP = 120/70

**Case #6**

- 70 year-old man
- Normal health
- BP = 166/78
## Case #7

- 55 year-old man
- Reports home BP < 130/80
- BP on arrival to clinic = 144/96