CLINICAL APPROACH TO HYPERTENSION

Goals and Objectives
1. Define hypertension and stages of HTN
2. Define terms for the vocabulary of HTN
3. Describe the scope of the problem of HTN
4. List the classic symptoms of HTN
5. List major complications of HTN
6. Describe appropriate follow up for preHTN and stages of HTN
7. Treatment of HTN: Diet/lifestyle/meds
8. Benefits of HTN treatment

Classification of Hypertension

<table>
<thead>
<tr>
<th>BP Classification</th>
<th>SBP mmHg</th>
<th>DBP mmHg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt;80</td>
<td>&lt;80</td>
</tr>
<tr>
<td>Prehypertension</td>
<td>80-89</td>
<td>&lt;80</td>
</tr>
<tr>
<td>Stage 1</td>
<td>90-99</td>
<td>≥90</td>
</tr>
<tr>
<td>Stage 2</td>
<td>≥100</td>
<td>≥100</td>
</tr>
</tbody>
</table>
Hypertension Changes

• 2017 by the American College of Cardiology/American Heart Association

• Replaced the accepted classifications laid out by JNC 8
Hypertension = High Blood Pressure

Hypertension > or = 130/80-89 mmHg

Systolic
maximum arterial pressure
during contraction of the left
ventricle
(force needed to open aortic valve)
systole (Greek): drawing together/contraction

Diastolic
resting pressure, the heart
relaxes
diastole (Greek): drawing apart

Definition and Diagnosis of HTN

- ≥ 130 mmHg systolic
  AND/OR
- ≥ 80-89 mmHg diastolic
- On 2 or more office visits
  AND/OR
- Current use of antihypertensive medications
Definition of Pre-Hypertension

- Systolic 120 – 129 mm Hg OR
- Diastolic 80 – 84 mm Hg
- 14 of all Americans
- LIFE STYLE modify

Case

Chief Concern:
"I was told my blood pressure should be rechecked by a doctor"

HPI: ES is a 42 yo man presenting to establish care. He recently got a flu shot and tetanus booster at a wellness fair through his company where he works. His Blood Pressure was elevated at 154/82. He denies chest pain or shortness of breath. He travels for his job. He exercises infrequently. He eats "out" on the road often and at home. His weight has gradually gone up over time. Last PCP visit was 10 years ago.

Case

PMH: none
PSH: arthroscopic knee surgery in his 30's
Medications: None
No Known Allergies
SH: Remote smoking history, does not currently smoke.
Drinks 7-10 drinks of alcohol per week. No illicit drug use
Fam Hx:
Mom healthy, Dad high blood pressure & heart attack at age 68
Case: PHYSICAL EXAMINATION

The BP by the nurse is 138/80.
Your repeat BP is 136/86 on the left arm; 134/86 right arm
Pulse 72 | WT 192 lb | Ht 68 in.

CV: RRR, no murmurs
Pulm: lungs clear, no crackles or wheezes
Abdomen: Soft, NT, ND, +BS, no organomegaly
Extremities: No edema.

Case: Learning

Given the history and lab data, what is the clinical diagnosis?

Stage I Hypertension

Definition / Diagnosis of HTN

- ≥ 130 mmHg systolic
- ≥ 80 mmHg diastolic
- On 2 or more office visits
- Current use of antihypertensive medications
Vocabulary

1. Essential HTN
2. Elevated Blood Pressure
3. White Coat HTN
4. Secondary HTN
5. Malignant HTN
6. Pseudo HTN
7. Isolated systolic HTN
8. Resistant HTN
9. Hypertensive crises
   A. Emergencies
   B. Urgencies

Hypertension History

- Essential? Because it was observed, thought is was essential...
- 1938 Mayo doctors describe "malignant HTN" as pts with HTN and papilledema – almost all were dead in one year
- 1967 VA cooperative Study
  * First clinical trial showing HTN Rx reduced CVD
- 1972 NIH launches HTN campaign to fight the "silent killer"
- 1976 Joint National Commission #1

Epidemiology

World Health Organization: Hypertension

- Top ten cause of death in 2012*
  * Does not account for the role in ischemic heart disease and Stroke (M and S)
- 23% prevalence: elevated blood pressure in adults age ≥18 in 2014, globally
- 17 million cardiovascular deaths annually (14% of all deaths)
  * Complications of hypertension account for 9.4 million
- Responsible for 53% of cerebrovascular disease
- Responsible for 45% of ischemic heart disease
Epidemiology: USA

- 30% of American Population
- >50% aged 65 or older
- HTN #2 reason for office visits
- $4.86 billion per year in cost
Epidemiology of Health Disparity

• Prevalence higher in African Americans
  > Caucasians > Mexican Americans

• "Compared to whites, blacks also develop high blood pressure earlier in life."

• Nearly 80% of deaths due to cardiovascular disease occur in low- and middle-income countries. (Global, WHO)

Epidemiologic Impact

• Primary or contributing cause of death > 120,000 in 2014
  > 1,000 deaths each day

• First heart attack: About 7 of every 10 people having their first heart attack have high blood pressure.

• First stroke: About 8 of every 10 people having their first stroke have high blood pressure.

• Chronic (long lasting) heart failure: About 7 of every 10 people with chronic heart failure have high blood pressure.

Hypertension

Essential HTN = Idiopathic

• 90% of cases

• "Multifactorial"
  • Age
  • Stress
  • Weight
  • Blood glucose
  • Smoking
  • Caffeine
  • Cardiopulmonary fitness

Covered in other lectures

Secondary HTN (~5%)

• Renal
  • Chronic Renal Failure (CRF)
  • Renal compensatory
  • Renal hypertrophy

• Adrenal
  • Adrenal hypertrophy

• Pregnancy

• Hypothyroid
  • Hypothyroidism

• Cardiovascular
  • Congestive heart failure

• Neuro
  • TIA
White Coat Hypertension

- BP is higher in the office than at home
  - Blood pressure that is consistently elevated by office readings but does not meet diagnostic criteria for hypertension based on out-of-office readings
- Confirm the diagnosis?
  - Self measurement of BP
  - Verify accuracy of home machine
  - Ambulatory BP monitoring
    - Monitor every 15-30 min
    - Awake and asleep
    - Profile over day

Office versus Home BP readings

Malignant HTN

- Rare - 1-5% with HTN
- Can occur without preexisting HTN
- Pathology = Hyperplastic arteriolosclerosis
- More likely in
  - Younger
  - Males
  - African Americans
- BP > 200/120 mmHg with signs and symptoms
  - HA, NV
  - Encephalopathy (confusion, convulsions, coma)
  - Retina: papilledema, hemorrhages
  - Renal Failure
Pseudohypertension

- Peripheral arteries become very rigid from advanced (often calcified) arteriosclerosis, the cuff has to be at a higher pressure to compress the artery
- Diabetes Mellitus
- Chronic Renal failure
- Peripheral Artery Disease

Isolated Systolic HTN

As adults age, systolic BP tends to rise while diastolic BP tends to fall

Defined as
- SBP >160 mm Hg with...
- variable DBP <1=90, <=95, or <=110 mm Hg

Widened Pulse Pressure

Resistant HTN

- Failure to reach goal BP in pts who are adhering to full doses or an appropriate three-drug regimen that includes a diuretic. [JNC 7, ACC/AHA 2017]
  - ...or when control is achieved, but requires 4 or more medications.
- Should prompt a survey / consideration for secondary causes
Hypertensive Urgency

- Severe elevation in BP **WITHOUT** acute end-organ damage
  - ≥180/110 mmHg, often with headache
  - Most are inadequately treated or nonadherent
  - Can be sent home from office/ED with F/U
    - Confirm pressure is reproducible (i.e. short acting meds, repeat reading)
    - Or if you are aware of the chronicity of the patient's pressures
    - Or, if you have an acute causaeplplanation

Hypertensive Emergency

- Severe elevation in BP **WITH** acute end-organ damage
  - Hypertensive Encephalopathy
  - Intracerebral/Subarachnoid hemorrhage
  - Acute MI/ACS
  - Acute LV failure
  - Acute aortic dissection
  - Renal crisis (Collagen vascular disease)
  - Acute glomerulonephritis
  - Microangiopathic hemolytic anemia
  - Requires hospitalization to lower BP
  - IV medication
    - given in ICU/Step-down unit

Hypertensive Emergency **Immediate lowering of BP**

1. Reduce up to 25% (10-20%) in the first hour
2. 160/100 – 110 over next 2-6 hours
3. Transition to oral medications after target pressure stabilizes

Exceptions:
- Dissecting Aneurysm – rapidly (20mins) lowered to 130-110 mmHg
- Acute phase of ischemic stroke • reperfusion candidates
- Preeclampsia/ed eclampsia
- Phaeochromocytoma
Clinical Manifestations

- List of the classic symptoms of HTN ...
- HTN = “silent killer”
- 30% are unaware they have HTN
- Often no symptoms until end organ damage

Diagnosis of Hypertension

- So how do we identify hypertensive patients?
- Screening
  - All patients get their blood pressure measured
- Risk factors
Risk Factors for Hypertension

Diagnosing Hypertension

• Who and why does the patient have high blood pressure?

Diagnosis of Hypertension

• Basic Tests
  • Fasting blood glucose
  • Serum potassium, creatinine, or the corresponding estimated GFR, and calcium
  • CEC
  • Lipid profile, after 8-to-12-hour fast
  • TSH
  • Urinalysis

• Optional Tests to Consider
  • EKG
  • UA Acid
  • Microalbumin/Cr. ratio
Complications of Hypertension

- Direct relationship between BP and cardiovascular disease
  - Continuous
  - Consistent
  - Independent of other risk factors

- No evidence of a BP threshold
  - CV mortality increased progressively throughout range of BP
  - Risk of CVD beginning at 115/75 mmHg and doubles with each increment of 20/10 mmHg up to 185/115 mmHg

Ischemic Heart Disease & BP

Stroke Mortality & BP
Sequelae of Hypertension

- Untreated:
  - 50% die of ischemic Heart Disease (HD) or Heart Failure
  - 33% more die of stroke (CVA-cerebrovascular accident)
- Cardiac hypertrophy
- Heart failure
- Multi-infarct dementia / Small vessel ischemia
- Aortic dissection
- End stage renal failure
- Retinopathy

Benefits of Lowering Blood Pressure

- For each 10 mmHg decrease in systolic BP:
  - ...30% decrease risk of heart mortality
  - ...40% decrease risk of stroke mortality
- Antihypertensive therapy reduces:
  - Stroke by 33-44%
  - MI by 20-25%
  - CHF by 35%
- Stage 1 HTN (130-139/80-89 mmHg):
  - Reduce systolic BP 11 mmHg over 30 yrs, prevents 1 death for every 11 treated

Treatment of Hypertension

- Lifestyle modifications
- Medications
- Treat underlying condition / secondary cause
Case: Learning

Stage I Hypertension in a 51 y/o Male with BMI 29.1

What interventions have proven to be useful at this stage?
- Aggressive lifestyle modifications
  - Diet, exercise, weight loss
- What are the dietary modifications should he have been making?
  - Reduced salt intake
  - Dash diet – high fruits and vegetable, low fat, reduce alcohol

Lifestyle Modification

- Diet
  - Healthy choices
  - Low fat
  - Healthy Portion
  - Reduce Alcohol Consumption
- Exercise
  - Cardiovascular Fitness vs "active"
  - Heart rate to 120 bpm for at least 20 mins
- Weight loss
  - See above
  - Set small goals – baby steps
- Smoking Cessation
Lifestyle Modification

<table>
<thead>
<tr>
<th>Modification</th>
<th>Approximate B/P reduction (mmHg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight reduction</td>
<td>5-20 mmHg/10 kg weight loss</td>
</tr>
<tr>
<td>Adopt DASH eating plan</td>
<td>8-14 mmHg</td>
</tr>
<tr>
<td>Dietary sodium reduction</td>
<td>2-8 mmHg</td>
</tr>
<tr>
<td>Physical activity</td>
<td>4-9 mmHg</td>
</tr>
<tr>
<td>Moderation of alcohol consumption</td>
<td>2-4 mmHg</td>
</tr>
</tbody>
</table>

Lifestyle Motivation

- When motivating a patient, find what he or she values... or fears!
- Heart Attack
  - High Pressure
  - High Cholesterol
  - High Sugar
  - Smoking!

Smoking Cessation Dr. Evans’ Method

1. Address the nicotine addiction
   - Nicotine replacement: patch, gum, lozenge
   - Medication: Wellbutrin or Chantix
2. Address Behavior Modification
   - Identify triggers: the WHY?
   - When are you smoking your cigarettes?
   - Plan your day without the cigarettes
3. Address Muscle Memory
   - Dum Dums
   - Squeeze ball

Disclaimer: Dr. Evans, himself has never actually quit smoking himself.

Don't Quit Today!

A. Pick your Quit Date
   - No stash left anywhere
B. Tell everyone in your circle
C. Three Part Plan ready
   - Launch!
Goals of Treatment

- JNC8 or 2014 Hypertension Guidelines

ACC / AHA 2017 Recommendations

Case: Learning

After four months he has lost 5 lbs from diet and exercise efforts and his BP is 142/90. You review the lifestyle modifications that he has been focused upon. He has been most successful at increasing his exercise. His diet is largely unchanged.

What other interventions would be appropriate at this time?
**Case: Learning**

After four months he has lost 5 lbs from diet and exercise efforts and his BP is 138/88. You review the lifestyle modifications that he has been focused upon. He has been most successful at increasing his exercise. His diet is largely unchanged.

What other interventions would be appropriate at this time? Starting dual antihypertensive agent would be reasonable.

**Antihypertensive Agents**

- **Thiazide Diuretic**
  - Hydrochlorothiazide
  - Chlorthalidone

- **ACE Inhibitors**
  - Lisinopril, Enalapril, Captopril, benazepril

- **ARB**
  - Losartan, valsartan, candesartan

- **Beta Blockers**
  - Metoprolol, atenolol, carvedilol, labetalol, esmolol

- **Calcium Channel Blockers**
  - Diltiazem, verapamil, amiodipine, nifedipine,
Appropriate (Initial) Follow up

- Have the patient return with 2-4 weeks
  - This is not urgent
  - Monitor for side effects:
    - potassium level, low blood pressure, sexual function, energy, urination
- Follow up at 3 months
  - Assess for on-going need
  - Lifestyle changes?
  - Check renal function/potassium

Case: Learning

When should you have him return to you to assess his blood pressure?

- A. 1 Month
- B. Annually
- C. Wait 6 months

Maintenance

- After BP at goal and stable, follow-up visits at 6-months
- More frequent visits for stage 2 HTN or with co-morbidities
  - Heart Failure, Diabetes Mellitus, CAD, CVA
- Serum potassium and creatinine monitored 1-2 times per year.
Hypertension Management

- 2/3 of all patients will need multiple agents
- Dose adjustment first
  - Maximize single agent if possible prior to adding second agent
- Continue to address modifiable risk factors

Resistant Hypertension

- Improper BP measurement
- Excess sodium intake
- Inadequate diuretic therapy
- Medication
  - Inadequate doses
  - Drug actions and interactions (e.g., nonsteroidal anti-inflammatory drugs (NSAIDs), illicit drugs, sympathomimetics, oral contraceptives)
  - Over-the-counter (OTC) drugs and herbal supplements
- Excess alcohol intake

Achieving Adherence

- Good communication
  - Can they read? know how and when to take meds
  - Do they understand? do they know what the problem is
  - Do they believe? they feel fine
- Recognizing barriers
  - Cost, the $4lis
  - Timing of visits
  - Frequency of visits
  - Medication side effects — daily impact
Sources and references