Hypertension
or
DOWN WITH HIGH BLOOD PRESSURE

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Oasis HealthLink
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Hypertension

Causes

- In Mid-Life (40 – 60 years)
  Increased peripheral resistance

- In Later Life – a consequence of aging
  Increased aortic stiffness
HYPERTENSION

Basic facts

- Prevalence – 50 million Americans (1 in 3 adults)
- Prevalence increases with aging (4 out of 5 – over age 75)
- African Americans – more common & more severe
- Runs in families
- Cause – unknown in 95%
- Symptoms – none
Hypertension
Differences between men and women

1. Less prevalent in women until the menopause – age 51

2. More prevalent in women among the aged

3. Risks
   More strokes in women
   More heart attacks and heart failure in men

4. Treatment goals and results the same
Mercury Sphygmomanometer
Aneroid Manometer
Automatic Oscillometric Manometer
Blood Pressure Measurement
Auscultatory Method

1. The patient should be relaxed and the arm must be supported. Ensure no tight clothing constricts the arm.

2. The cuff must be level with the heart. If arm circumference exceeds 33 cm, a large cuff must be used. Place stethoscope diaphragm over brachial artery.

3. The column of mercury must be vertical. Inflate to occlude the pulse. Deflate at 2 to 3 mm/sec. Measure systolic (first sound) and diastolic (disappearance) to nearest 2 mm Hg.
Auscultatory Blood Pressure Measurement
HYPERTENSION

Where to take the blood pressure

- Doctor’s office - good
  “white coat hypertension”
  “masked hypertension”

- Home – better - arm - not wrist or finger
  Electronic device - $40-70
  Stethoscope & cuff
  Pharmacy – free

- Ambulatory – best - 24 hour record
Definition of Hypertension

How High is High?

Upper Limit of Normal?
Normal distribution of SBP values in the general population.
Normal distribution of DBP values in the general population.

Pater C, Current Controlled Trials in Cardiovascular Medicine volume 6, Article number: 5 (2005)
# Categories of BP in Adults*

<table>
<thead>
<tr>
<th>BP Category</th>
<th>SBP</th>
<th>DBP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt;120 mm Hg</td>
<td>&lt;80 mm Hg</td>
</tr>
<tr>
<td>Elevated</td>
<td>120–129 mm Hg</td>
<td>&lt;80 mm Hg</td>
</tr>
<tr>
<td>Hypertension</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage 1</td>
<td>130–139 mm Hg</td>
<td>80–89 mm Hg</td>
</tr>
<tr>
<td>Stage 2</td>
<td>≥140 mm Hg</td>
<td>≥90 mm Hg</td>
</tr>
</tbody>
</table>

*Individuals with SBP and DBP in 2 categories should be designated to the higher BP category.

Table 6
## American and European Definitions and Guidelines

<table>
<thead>
<tr>
<th>Guideline Differences</th>
<th>American College of Cardiology/American Heart Association (ACC/AHA)</th>
<th>European Society of Cardiology/European Society of Hypertension (ESC/ESH)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level of blood pressure (BP) defining hypertension</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Office/Clinic BP</td>
<td>Systolic ≥ 130 mm Hg and/or Diastolic ≥ 80 mm Hg</td>
<td>Systolic ≥ 140 mm Hg and/or Diastolic ≥ 90 mm Hg</td>
</tr>
<tr>
<td>Daytime mean</td>
<td>≥ 130 mm Hg and ≥ 80 mm Hg</td>
<td>≥ 135 mm Hg and ≥ 85 mm Hg</td>
</tr>
<tr>
<td>Nighttime mean</td>
<td>≥ 110 mm Hg and ≥ 65 mm Hg</td>
<td>≥ 120 mm Hg and ≥ 70 mm Hg</td>
</tr>
<tr>
<td>24-hour mean</td>
<td>≥ 125 mm Hg and ≥ 75 mm Hg</td>
<td>≥ 130 mm Hg and ≥ 80 mm Hg</td>
</tr>
<tr>
<td>Home BP mean</td>
<td>≥ 130 mm Hg and ≥ 80 mm Hg</td>
<td>≥ 135 mm Hg and ≥ 85 mm Hg</td>
</tr>
<tr>
<td><strong>BP targets for treatment</strong></td>
<td>&lt; 130/80 mm Hg</td>
<td>Systolic targets &lt; 140 mm Hg and close to 130 mm Hg</td>
</tr>
<tr>
<td><strong>Initial Combination Therapy</strong></td>
<td>Initial single-pill combination therapy in patients &gt; 20/10 mm Hg above BP goal</td>
<td>Initial single-pill combination therapy in patients ≥ 140/90 mm Hg</td>
</tr>
<tr>
<td><strong>Hypertensive requiring intervention</strong></td>
<td>&gt; 130/80 mm Hg</td>
<td>≥ 140/90 mm Hg</td>
</tr>
</tbody>
</table>

### Table 7. Prevalence of Hypertension Based on 2 SBP/DBP Thresholds*†

<table>
<thead>
<tr>
<th></th>
<th>SBP/DBP ≥130/80 mm Hg or Self-Reported Antihypertensive Medication†</th>
<th>SBP/DBP ≥140/90 mm Hg or Self-Reported Antihypertensive Medication†</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Men (n=4717)</td>
<td>Women (n=4906)</td>
</tr>
<tr>
<td>Overall, crude</td>
<td>46%</td>
<td>43%</td>
</tr>
<tr>
<td>Overall, age-sex adjusted</td>
<td>48%</td>
<td>43%</td>
</tr>
<tr>
<td>Age group, y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20–44</td>
<td>30%</td>
<td>19%</td>
</tr>
<tr>
<td>45–54</td>
<td>50%</td>
<td>44%</td>
</tr>
<tr>
<td>55–64</td>
<td>70%</td>
<td>63%</td>
</tr>
<tr>
<td>65–74</td>
<td>77%</td>
<td>75%</td>
</tr>
<tr>
<td>75+</td>
<td>79%</td>
<td>85%</td>
</tr>
<tr>
<td>Race-ethnicity§</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Hispanic white</td>
<td>47%</td>
<td>41%</td>
</tr>
<tr>
<td>Non-Hispanic black</td>
<td>59%</td>
<td>56%</td>
</tr>
<tr>
<td>Non-Hispanic Asian</td>
<td>45%</td>
<td>36%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>44%</td>
<td>42%</td>
</tr>
</tbody>
</table>

The prevalence estimates have been rounded to the nearest full percentage.
*130/80 and 140/90 mm Hg in 9623 participants (≥20 years of age) in NHANES 2011–2014.
HYPERTENSION

Risks – target organs

- Heart – Heart failure
  Heart attack
  Abnormal rhythm – atrial fibrillation
- Brain – stroke
- Kidney – failure
- Other
Main complications of persistent high blood pressure:

**Brain:**
- Cerebrovascular accident (strokes)
- Hypertensive encephalopathy:
  - confusion
  - headache
  - convulsion

**Retina of eye:**
- Hypertensive retinopathy

**Heart:**
- Myocardial infarction (heart attack)
- Hypertensive cardiomyopathy:
  - heart failure

**Blood:**
- Elevated sugar levels

**Kidneys:**
- Hypertensive nephropathy:
  - chronic renal failure
HYPERTENSION

What you CAN’T do about it

– Family
– Age
– Gender
– Where you live
– Race
HYPERTENSION

What you CAN do about it

– Obesity – lose weight
– High salt (sodium) intake
  < 2.0 grams per day
– Sedentary style – exercise
– Alcohol – less than 2 drinks/day
– Smoking – stop!!
– Caffeine in large amounts
  Coffee < 8 oz cup per day
ITEMS THAT RAISE BLOOD PRESSURE

- Nasal decongestants
- Cold Tablets
- Appetite suppressants
- Cocaine
- Caffeine
- Alcohol
- Oral contraceptives
- Steroids
- Antidepressants
- Non-steroidal
  - Anti-inflammatory agents (NSAIDS)
HYPERTENSION

Drugs – principles of use

– Diuretics
– ACE inhibitors & blockers
– Calcium channel blockers
– Vasodilators
– Beta blockers
– Nerve blockers

Compliance
TREATMENT IN WOMEN vs MEN

- Combined study of 20,000 women vs 20,000 men
- Overall benefits – same
- Women – mostly stroke prevention
- Men – stroke & heart prevention
Figure 2. Percent decline in age-adjusted mortality rates for stroke by gender and race: United States, 1970–2000

Figure 3. Percent decline in age-adjusted mortality rates for coronary heart disease by gender and race: United States, 1970–2000

Hypertension
Summary

1. Silent Killer – a thief in the night

2. Highly prevalent – especially among the elderly

3. Systolic pressure more important than diastolic pressure
   - especially with aging

4. Blood pressure measurements variable – not precise

5. Upper level of normal systolic blood pressure uncertain
   - approximately 130 mmHg

6. Treatment – get the blood pressure down – it works!
   Life style changes
   Medication
Pharmacologic Agents

1. Thiazide Diuretics
2. Angiotensin Converting Enzyme Inhibitors
3. Angiotensin Receptor Blockers
4. Calcium Channel Blockers
5. Aldosterone Receptor Antagonists
6. Vasodilators
7. Adrenergic Receptor Antagonists
   (α, β, combined)
8. Renin Inhibitors
9. α2 Adrenergic Receptor Agonists
10. Endothelin Receptor Blockers
11. Neprilysin Inhibitor (Sacubitril)
Where to take the Blood Pressure?

1. Office/Clinic
   “White Coat Hypertension”
   “Masked Hypertension”

2. Home Blood Pressure
   “Next Best”

3. Ambulatory Blood Pressure
   “The Best”