Impact of HTN in Society

- Worldwide epidemic
- About 70 M American adults (29%) have HTN (1:3 ratio)
- 52% of people with HTN have their condition under control.
- Nearly 1 of 3 American adults has pre-HTN
- In 2013, >360,000 American deaths r/t HTN (i.e. ~1,000 deaths/day)
- HTN costs the nation $46 B each year.
- Incidence ↑ in children due to obesity

(www.cdc.gov, 2015)

Impact of HTN, cont.

- The “Silent Killer”
  - HTN is usually not associated with symptoms, which would usually prompt individuals to seek medical help.
  - Unfortunately, severe target organ damage can occur.
- Major risk factor for heart attack, stroke, heart failure, and kidney failure.
Impact of HTN, cont.

• African-Americans, Mexican-Americans, and Native Americans have higher incidence of HTN than Caucasians.
• Higher incidence in southeastern US – “Stroke Belt” regardless of ethnicity as compared with other areas in the country.

Impact of HTN, cont.

• Prevalence ↑ with age.
• Not considered a normal part of aging, but common among >60 year old adults.
• Older adults are more prone to drug overdosing/toxicity due to ↓ renal function.
• Isolated Systolic HTN are more common in older adults.

What is Hypertension?

• Sustained elevation of BP
• ≥ 140/90 mm Hg
• Not a single reading
• Present on at least 2 occasions
Classification of HTN

- Essential or Primary
  - Elevated BP without identified cause and accounts for 90% to 95% of all cases of HTN
  - Contributing factors:
    - ↑SNS, overproduction of Na+-retaining hormones, Na+ intake, obesity, excessive alcohol intake, DM

Classification of HTN, cont.

- Secondary
  - Elevated BP with a specific cause that can often be identified and corrected
  - 5% to 10% in adults
  - >80% on children
  - Causes:
    - Coarctation/narrowing of the aorta, renal diseases, endocrine disorders, neurologic disorders, sleep apnea, medications, PIH, pheochromocytoma

Classification of BP


<table>
<thead>
<tr>
<th>Category</th>
<th>SBP mmHg</th>
<th>DBP mmHg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt;120</td>
<td>&lt;80</td>
</tr>
<tr>
<td>Prehypertension</td>
<td>120-139</td>
<td>or 80-89</td>
</tr>
<tr>
<td>Hypertension, Stage 1</td>
<td>140-159</td>
<td>or 90-99</td>
</tr>
<tr>
<td>Hypertension, Stage 2</td>
<td>≥160</td>
<td>or ≥ 100</td>
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</tbody>
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Pathophysiology of HTN

• Heredity
  – Strongly familial
  – Epidemiological studies
    • 30% genetic factor in various population
  – Familial shared lifestyle
    • dietary factor
    • activities

Cardiac Output and Systemic/Peripheral Vascular Resistance

Pathophysiology of HTN, cont.

• Water and sodium retention
  – High sodium intake causes water retention
  – To some degree, Na⁺ triggers the development of HTN
    • Recent research study - 2014
  “An Unsavory Truth: Sugar, More than Salt, Predisposes to Hypertension and Chronic Disease”
  by James J. DiNicolantonio, PharmD & James H. O’Keefe, MD
Renin-Angiotensin-Aldosterone System

Pathophysiology of HTN, cont.

- Stress and increased sympathetic nervous system activity
  - Vasoconstriction
  - HR
  - Renin release

- Insulin resistance and hyperinsulinemia
  - Present in primary HTN
  - High insulin stimulates SNS
  - Impairs nitric oxide-mediated vasodilatation
Pathophysiology of HTN, cont.

- Endothelial cell dysfunction
  - Endothelin produces prolonged vasoconstriction
  - Dysfunction causes ↓vasodilator response to nitric oxide

Risk Factors

- Gender
  - Men – prevalent in young adulthood and early middle age
  - Women – prevalent after age 55
- Age
  - BP rises progressively with increasing age.

Risk Factors, cont.

- Race
  - African-Americans have the highest prevalence
- Lifestyle
  - Sedentary
- Family history
  - Genetics
Complications with HTN:
Target organ diseases

- Cerebrovascular disease
  - Retinopathy
- Hypertensive heart disease
  - i.e. CAD, LVH, HF
- Aortic aneurysm
- PVD
- Neuropathy

Atherosclerosis

- Ischemic Stroke
  - 450,000 per year
- Heart Attack
  - 1 million per year
- Peripheral Arterial Disease (PAD)
  - 8 million

Nursing Process
Assessment

• Subjective
  – Past health history
  – Medications
    • Oral contraceptives may rise BP
  – Functional health patterns

• Objective
  – Physical examination – neurological, CV, musculoskeletal, renal
  – Most people with HTN have no symptoms
  – Accurate BP-taking

Assessment, cont.

• Diagnostic studies
  – Assess risk factors & comorbidities
  – Determine identifiable causes of HTN
  – Assess presence of target organ damage
  – Obtain lab tests:
    • CBC, UA, serum electrolytes (specifically K+, Ca++), fasting blood glucose, BUN, Creat

Assessment, cont.

– ECG – may show evidence of ischemic heart disease and LVH
– Echocardiogram – may show evidence of structural heart disease and LVH
Common Nursing Diagnoses

- Ineffective health maintenance
- Anxiety
- Sexual dysfunction
- Ineffective therapeutic regimen management
- Disturbed body image

Collaborative Interventions

- Primary – to “retain” wellness
  - Risk factor stratification and treatment
  - Independent nursing intervention
    - Role of the nurse in screening and teaching

Collaborative Interventions, cont.

- Secondary Interventions – to “attain” wellness
  - Drug therapy
    - Monitor for effectiveness, contraindications, and side effects
    - Over 60 medications are available for treating HTN.
    - Currently, there are more medication options than there were years ago.
Selected Drug Classifications for HTN Treatment

Diuretics
- Drugs that promote the excretion of water and electrolytes by the kidneys.

Types:
- **Thiazide/thiazide-like diuretics**
  - e.g. hydrochlorothiazide/Hydrodiuril/HCTZ
  - Inhibit NaCl reabsorption in distal convoluted tubule
  - Inexpensive and work effectively.
  - Recommended for Stage 1 HTN.

- **Thiazide, cont.**
  - Monitor K+ level; especially on elderly.
  - If taking NSAIDs, they may reduce the effect of these diuretics.
  - Avoid if allergic to sulfa drugs, since they are sulfonamide derivatives.

- **Thiazide and Related Diuretics**
  - Metolazone (quinazoline diuretic)
    - Inhibits sodium reabsorption in distal tubule
    - low doses metolazone significantly potentiates the diuretic effects of furosemide.
    - natriuretic and diuretic effects of combined treatment with furosemide and metolazone has been highly effective in reducing fluid retention
      - Recommended in cases of kidney failure & when other diuretics are not effective
• **Loop diuretics**
  - e.g. furosemide/Lasix
  - Work primarily on the ascending Loop of Henle to ↑excretion of Na⁺, Cl⁻, and H₂O
  - Most potent diuretics
  - Monitor electrolytes, especially if pt. is on digoxin.
  - Hypokalemia can cause digitalis toxicity

• **Potassium-sparing diuretics**
  - e.g. spironolactone/Aldactone
  - Act primarily in the collecting duct renal tubules to promote Na⁺ & H₂O excretion and K⁺ retention
  - Caution with hyperkalemic pts.
Selected Drug Classifications, cont.

Beta-blockers
- e.g. propanolol/Inderal, metoprolol/Lopressor, atenolol/Tenormin

The “lols”
- Block beta-adrenergic receptor sites in the heart.
- Thus, ↓ heart rate and contractility.
- Widely used for Stages 1 and 2 HTN.
- Contraindicated for pts with preexisting bradycardia, COPD or asthma (causes bronchospasm for “nonselective BB”).
- NSAIDs can ↓ effectiveness.

Beta blockers, cont.

Types:
1. Nonselective
   - e.g. propanolol (Inderal)
     - Inhibit beta<sub>1</sub> (↓ HR, as a result BP decreases), & beta<sub>2</sub> (brochoconstriction) receptors
2. Cardio selective
   - e.g. atenolol (Tenormin), metoprolol (Lopressor)
   - Inhibit beta<sub>1</sub> & not beta<sub>2</sub> receptor
   - No bronchoconstriction

Selected Drug Classifications, cont.

ACE inhibitors
- e.g. enalapril/Vasotec, captopril/Capoten

The “prils”
- ↓ conversion of angiotensin I to angiotensin II; prevent A-II-mediated vasoconstriction
- Recommended for pts when diuretics and beta-blockers are contraindicated or ineffective.
- S/E of hyperkalemia; do not use with K<sup>+</sup> sparing diuretics
- Chronic cough and tickling in the throat are sometimes noted.
Angiotensin II Receptor Blockers (ARBs)

- e.g. losartan (Cozaar), valsartan (Diovan)

The “tans”

• ARBs block the chemical receptors for angiotensin II on the small arteries (arterioles).
• Therefore, the angiotensin cannot cause these arteries to constrict, which lowers the blood pressure.

Selected Drug Classifications, cont.

Calcium-channel blockers
- e.g. amlodipine/Norvasc, verapamil/Calan, nifedipine/Procardia

The “pines”

• Block movement of Ca** into cells, causing vasodilation, ↓HR, contractility, and SVR.
• Recommended for pts who are unable to take diuretics and beta blockers, or when they are ineffective.

Selected Drug Classifications, cont.

Adrenergic inhibitors/Centrally acting agents
- e.g. clonidine/Catapres, Catapres TTS (7-day patch)

• Inhibit the SNS, thus causing dilation of the peripheral blood vessels
• Utilized if other drugs are ineffective in controlling HTN.
• S/E of fluid retention; may be given with diuretics
• Patch is given due to fewer side effects & better compliance.
Selected Drug Classifications, cont.

Direct Vasodilators
- e.g. sodium nitroprusside /Nipride, hydralazine/Apresoline
  • Direct arterial vasodilation; reduces SVR and BP.
  • IV use for HTN crisis
  • S/E of acute hypotension (Nipride)
  • Caution: nervous system stimulation may occur leading to tachycardia

JNC8 (Eight Joint National Committee) Hypertension Guideline Management Algorithm
- see separate handout
**Hypertensive Crisis**

- Severe and abrupt elevation in BP
- $\geq 180/120$ mm Hg
- Can trigger endothelial damage $\rightarrow$ release of vasoconstricting substance $\rightarrow$ can lead to life threatening damage to target organs
- Most common on “non compliant” patients and cocaine users

**Hypertensive Crisis, cont.**

- Manifestations depend on the target organ damage
  - Signs of neurologic dysfunction, retinal damage, heart failure, pulmonary edema, and renal failure
- MAP is the parameter used to monitor patient.
  - $\text{MAP} = \text{DBP} + \frac{1}{3} \text{ Pulse pressure}$
- Normal MAP: 70-100 mm Hg

**Hypertensive Crisis, cont.**

- Treatment (ICU setting)
  - ↓ MAP 10% to 20% in first 2 hrs., then gradually over the next 24 hrs.
  - IV vasodilators - e.g., Nipride, NTG, Hyperstat, Apresoline, etc.
  - IV drug titration to prevent hypotension
  - Intra-arterial line or automated BP monitoring machine, ECG monitoring
Hypertensive Crisis, cont.

– Bed rest, hourly urine output monitoring, neuro checks
– Once the crisis is resolved, determine the cause.
– Requires appropriate management and extensive education to avoid future crises

Teaching Guidelines

• Disease process
  – Causative risk factors
    • Modifiable vs. Non-modifiable
  – Consequences of untreated HTN
    • Target organ damage
• Disease prevention
  – Work on modifiable risk factors

Teaching Guidelines, cont.

• Misconceptions
  – Patient feels “sick” when he is hypertensive.
  – Patient has a “hyper” personality.
  – Elevated DBP is more important than SBP.
  – HTN can be cured.
  – Patient cannot live a normal life.
  – High cholesterol means HTN.

“Just a Little Heart Attack”
Teaching Guidelines, cont.

• Medications
  – Plan regular and convenient times for taking meds
  – Usually dosages are started low and adjusted as needed.
  – Dosages for elderly are less than for younger adults
  – Abrupt withdrawal of meds can cause severe HTN reaction.
  – Side effects of meds are often temporary, e.g. hypotension, dizziness, drowsiness, N/V/D

• If sexual problems occur, inform health care provider.
• Emphasize that dosages and meds can be changed if not effective and causing adverse side effects.
• Do not double dose if dose is missed.
• Supplement diet with high K⁺ when taking K⁺-losing diuretics.

Teaching, cont.

– 3 hrs after taking meds, avoid hot baths, strenuous exercise and excessive amount of alcohol
– Explain how to minimize orthostatic hypotension
– Caution about high risk over-the-counter meds
**Teaching Guidelines, cont.**

Home BP monitoring
- Ambulatory BP monitoring
  - Indicated for evaluation of “white coat HTN”
  - Absence of 10-20% BP decrease during sleep may indicate increased CVD risk.
- Patient self-check
  - Daily log
  - Provides information on response to therapy
  - Help improve adherence to therapy & useful for evaluating “white coat HTN”

**Concepts on Lifestyle Modifications**

- Encourage healthy lifestyles for all individuals
- Prescribe lifestyle modifications for all patients with prehypertension and hypertension.

  *(US DHS, 2007)*

**Lifestyle Management for HTN**

- Weight loss
- Smoking cessation
- Modification of alcohol consumption
- Stress management
**DASH - “Dietary Approaches to Stop Hypertension”**

- **Eating plan**
  - Several servings of fish each week; plenty of fruits and vegetables;↑whole grains; drink plenty of water
  - ↑K⁺, Mg⁺⁺, CHON, fibers
  - ↓saturated fats and cholesterol

**DASH - Sodium Reduction**

- < 2.4 g of sodium/day
- Avoid processed foods, i.e. canned and frozen dinners
- JNC8 recommends <1,500 mg/day

**DASH Food Pyramid**

- Increase physical activity
  - 3 to 4 sessions a week
  - Lasting on average 40 minute per session
  - Involving moderate to vigorous intensity physical activities
Case Study: Primary Hypertension

Roger is a 45-year old African American man with a diagnosis of hypertension. At the clinic, his BP was found to be 180/120 mm Hg.

Subjective data
- Father died of stroke at age 52
- Mother was alive but with HTN
- States that he feels fine and is not a “hyper” person

Subjective data, cont.
- Smokes one pack of cigarettes daily
- Drinks a six-pack of beer on Friday and Saturday nights
- States that his BP medication interferes with sexual relationships

Objective data

Physical examination
- Retinopathy
- Sustained apical pulse palpable in the 4th ICS just lateral to the midclavicular line

Diagnostic studies
- ECG: LVH
- UA: protein 31 mg/dl
- Serum creat: 1.6 mg/dl

Collaborative care
- Low sodium diet
- HCTZ 12.5 mg/day
Critical Thinking Questions

• What risk factors for HTN does Roger have?
• What evidence of target organ damage is present?
• What misconceptions about HTN should be corrected?

Critical Thinking, cont.

• Based on the assessment data presented, state one or more appropriate nursing diagnoses. What are the collaborative problems?
• What areas would you focus on in teaching this patient about his illness? Specify non-pharmacological strategies to lower his BP