Chapter 23
Drugs for Hypertension

Cardiovascular Disease (CVD)
- Includes conditions of heart and blood vessels
- Hypertension is most common form of CVD
- Most frequent causes of death in U.S

Blood Pressure Changes throughout Lifespan
- “Normal” B/P at one age; abnormal as we age

Hypertension: Classified into Three Categories
- Prehypertension
- Stage 1
- Stage 2

Target Organs Affected by Untreated Hypertension
- Heart
- Brain
- Kidneys
- Retina

Media Directory
Slide 37 Nifedipine Animation
Slide 41 Doxazosin Animation
**Disease Progression Related to Organs**

- Heart failure
- TIA and/or cerebral vascular accident
- Renal failure
- Visual impairment and blindness

**Cardiac Output**

- Determined by
  - Stroke volume
  - Heart rate
- Medications that affect cardiac output, stroke volume, heart rate influence blood pressure

**Peripheral Resistance**

- Friction in arteries as blood flows through vascular system
- Greater resistance in arteries yields higher blood pressure
- Medications that affect vascular smooth muscles may lower or raise B/P
- Autonomic nervous system plays role in controlling peripheral resistance

**Blood Volume**

- Total amount of blood in vascular system
- Increased blood volume increases blood pressure
- Medications that affect blood volume may lower or raise B/P

**Central and Autonomic Nervous Systems**

- Regulate blood pressure
  - Vasomotor center
  - Baroreceptors
  - Chemoreceptors

*Figure 23.3* Hormonal and nervous factors influencing blood pressure.
Emotions Affect Blood Pressure

• Stress and anger increase
• Depression and lethargy decrease

Endocrine System

• Regulates blood pressure
• Natural hormones affect blood pressure daily
  – Epinephrine and norepinephrine injections raise B/P
  – Antidiuretic hormone raises B/P by raising blood volume

Assessment of Client’s Lifestyle

• Dietary habits
• Exercise or activity regimen
• Use of medication

Genetic Factors That May Contribute to Client’s Hypertension Risk

• Race
• Gender
• Family history of hypertension

Environmental Factors That May Contribute to Client’s Hypertension Role

• Tobacco use, high-fat diets, obesity
• Excessive sodium intake or alcohol consumption
• Sedentary lifestyle

Factors That Can Help Control Blood Pressure

• Losing weight
• Limiting foods high in fat and sodium
• Limiting use of tobacco and alcohol
• Beginning an exercise program
Primary Antihypertensive Agents

- Diuretics
- Angiotensin-converting enzyme (ACE) inhibitors
- Angiotensin II receptor blockers
- Beta-adrenergic antagonists
- Calcium channel blockers

Secondary Antihypertensive Agents

- Alpha1-adrenergic antagonist
- Alpha2-adrenergic agonists
- Direct-acting vasodilators

Role of Nurse

- Obtain complete health history
- Obtain vital signs
- Do physical examination
- Obtain blood and urine specimens for analysis

Key Assessment and Monitoring Points for Nonpotassium-Sparing Diuretics

- Orthostatic hypotension
- Laboratory electrolyte values, especially potassium level, and daily weights
- Intake and output assessment of edema and signs of fluid overload
- Client’s ability to safely ambulate
- Photosensitivity
- Possible need to increase potassium in diet or with supplements

Key Assessment and Monitoring Points for Potassium-Sparing Diuretics

- Use of salt substitutes and potassium-rich foods
- Use in pregnant and lactating women
- History of gout and kidney stones
- Uric-acid levels
- Gynecomastia and hirsutism for spironolactone (Aldactone)

Key Assessment and Monitoring Points for Thiazide-like Diuretics

- Laboratory values (CBC, electrolytes, chemistry panel)
- Blood-glucose and uric-acid levels
- Possible need to increase potassium in diet or with supplements
- Pregnancy and lactation, systemic lupus erythematosus, and use of digoxin
**Key Assessment and Monitoring Points for Loop Diuretics**

- Severe potassium loss
- Hypovolemia
- Hypotension
- Hearing loss (these drugs are ototoxic)
- Glucose and uric-acid levels

**Key Assessment and Monitoring Points for CCBs (continued)**

- Obtain ECG, heart rate, and B/P prior to therapy
- During therapy, monitor heart rate and B/P regularly
- Health history specific for heart dysrhythmias and pregnancy
- Signs of CHF and reflex tachycardia

**Key Assessment and Monitoring Points for CCBs (continued)**

- IV administration, special concern
- Dizziness, headache, flushing are minor side effects
- Avoid drinking grapefruit juice

**Key Assessment and Monitoring Points for Renin-Angiotensins**

- Baseline vital signs
- Hypotension
- Angioedema
- Neutropenia or agranulocytosis

**Key Assessment and Monitoring Points for Renin-Angiotensins (continued)**

- Hypokalemia
- Dizziness, light-headedness, headache
- Tickling, nonproductive cough
- Pregnancy-risk category D

**Key Assessment and Monitoring Points for Adrenergic Antagonists**

- Baseline vital signs, B/P response
- Hold medication for pulse below 60 and B/P below 90/60 mm/Hg
- ECG, heart rate and rhythm
- Watch for heart block and rebound hypertension
Key Assessment and Monitoring Points for Adrenergic Antagonists (continued)

- Routine blood-glucose monitoring for diabetics
- Alpha1, alpha2, and beta-blocker specific effects
- Pregnancy-risk categories B and C

Key Assessment and Monitoring Points for Direct Vasodilators

- In emergency: monitor V/S, ECG, and pulse oximetry continuously
- Contraindicated for:
  - Hypersensitivity, coronary artery disease
  - Rheumatic mitral-valve disease, cerebrovascular disease
  - Renal insufficiency, systemic lupus erythematosus

Key Assessment and Monitoring Points for Direct Vasodilators (continued)

- Priapism
- IV diazoxide (Hyperstat): monitor sodium and water output
- Minoxidil (Loniten): monitor for orthohypotension

Key Assessment and Monitoring Points for Direct Vasodilators (continued)

- Nitroprusside IV
  - Only mix with 5% dextrose in water
  - Drug extremely light sensitive, only stable for 24 hours
  - Can be used for hypertensive emergencies during labor and delivery

Diuretics

- Prototype drug: hydrochlorothiazide (HydroDiuril).
- Mechanism of action: to increase amount of urine produced and excreted
- Primary use: for mild to moderate hypertension
- Adverse effects: electrolyte imbalances, especially loss of potassium

Calcium Channel Blockers

- Prototype drug: nifedipine (Procardia)
- Mechanism of action: to cause vasodilation, decreasing B/P
- Primary use: for hypertension and angina
- Adverse effects: include dizziness, headache, flushing
Drugs Affecting Renin-Angiotensin System

- Angiotensin-converting enzyme (ACE) inhibitors
  - Prototype drug: enalapril (Vasotec)
  - Mechanism of action: to decrease blood volume
  - Primary use: for hypertension
  - Adverse effects: persistent cough and hypotension

Drugs Affecting Renin-Angiotensin System

- Angiotensin-receptor blockers (ARBs)
  - Prototype drug: losartan potassium (Cozaar)
  - Mechanism of action: to block angiotensin receptors in arterial smooth muscle and adrenal glands
  - Primary use: for hypertension
  - Adverse effect: hypotension

Adrenergic Antagonists

- Prototype drug: doxazosin (Cardura)
- Mechanism of action: to block affects of the sympathetic nervous system leading to vasodilation
- Primary use: hypertension
- Adverse effects: orthostatic hypotension, dizziness, nausea, bradycardia, dry mouth

Direct Vasodilators

- Prototype drug: hydralazine (Apresoline)
- Mechanism of action: to cause vasodilation by direct relaxation of arterial smooth muscle
- Primary use: for severe hypertension and hypertension crisis
- Adverse effects: reflex tachycardia, sodium and fluid retention
Drugs for Hypertension

• **Assessment**
  - Take client’s B/P in each arm for baseline
  - Assess client’s height and weight
  - Obtain blood and urine samples as ordered by physician
  - Obtain nursing history, including lifestyle, current medications, dietary habits
  - Assess client’s and family’s knowledge of hypertension and medication regimen

• **Nursing Diagnoses**
  - Decreased cardiac output related to excessive or prolonged systemic vascular resistance
  - Knowledge deficit regarding condition, therapeutic regimen, and potential side effects of medications
  - Ineffective therapeutic-regimen management related to complexity of therapy and cost of medications
  - Risk for sexual dysfunction related to side effects of medications

• **Planning**
  - **Goals**
    - Exhibit a reduction in systolic/diastolic blood pressure
    - Client is able to explain hypertension and needed medications
    - Client is able to verbalize ability to follow prescribed therapy

• **Implementation**
  - Encourage compliance
  - Provide education regarding medication regimen

• **Evaluation**
  - **Ideal outcome criteria**
    - Lowered B/P with limited side effects
    - Client able to verbalize importance of taking prescribed medications

**Diuretics for Hypertension**

Table 23.4 Diuretics for Hypertension
Calcium Channel Blockers for Hypertension

Table 23.5 Calcium Channel Blockers for Hypertension

ACE Inhibitors and Angiotensin II Receptor Blockers for Hypertension

Table 23.6 ACE Inhibitors and Angiotensin II Receptor Blockers for Hypertension

Adrenergic Antagonists for Hypertension

Table 23.7 Adrenergic Antagonists for Hypertension

Table 23.7b Adrenergic Antagonists for Hypertension

Direct-acting Vasodilators for Hypertension

Table 23.8 Direct-acting Vasodilators for Hypertension