MECHANICAL: PUSHES BLOOD FROM HEAD TO TOES AND BACK

The Human Heart and Circulation
Overview of Anatomy and Physiology

- Cardiac cycle
  - A complete heartbeat
    - Atria contract while ventricles relax
    - Ventricles contract while atria relax
  - Systole
    - Phase of contraction (picture next slide)
  - Diastole
    - Phase of relaxation
    - Period between contraction of the atria or ventricles during which the blood enters the relaxed chambers
IF THE PLUMBING IS PLUGGED OR DISEASED

- Blood vessels
  - Capillaries
    - Tiny blood vessels joining arterioles and veins
  - Arteries
    - Large vessels carrying blood away from the heart
    - Carry enriched oxygen or arterial blood
  - Veins
    - Vessels that convey blood from the capillaries to the heart carrying venous blood, de-saturated of oxygen

Circulation

- Coronary blood supply
  - Right and left coronary arteries
    - Branch off of the aorta
    - Encircle the heart like a crown
    - Supply the myocardium with blood
  - Coronary veins
    - Return the venous blood to the coronary sinus, then to the right atrium
How many people need and receive heart transplants?

- There were 2,210 heart transplants performed in the United States in 2007 and 2,192 in 2006.
- Each year thousands more adults would benefit from a heart transplant if more donated hearts were available.
- As of May 30, 2008, the one-year survival rate was 87.5 percent for males and 85.5 percent for females; the three-year survival rate was about 78.8 percent for males and 76.0 percent for females. The five-year survival rate was 72.3 percent for males and 67.4 percent for females.

Heart and Lung Transplants

- Heart-and-lung transplant operations have been performed since 1980 in the United States. Since 1995, between 30 and 70 heart-lung transplants are performed each year, according to the United Network for Organ Sharing (UNOS).

Risk factors for MI
Diagnostic Examinations
- Diagnostic imaging
  - Fluoroscopy
  - Angiogram
  - Aortogram
- Cardiac catheterization and angiography
- Electrocardiography

Disorders of the Cardiovascular System
- Modifiable risk factors
  - Smoking
  - Hyperlipidemia
  - Hypertension
  - Diabetes mellitus
  - Obesity
  - Sedentary lifestyle
  - Stress
  - Psychosocial factors

Disorders of the Cardiovascular System
- Cardiac Arrest
  - No cardiac output
  - Signs and symptoms: abrupt loss of consciousness with no response to stimuli; absence of pulse and blood pressure
  - Treatment: cardiopulmonary resuscitation (CPR) and advanced cardiac life support (ACLS)
Disorders of the Heart

• Coronary atherosclerotic heart disease
  – Coronary artery disease (CAD)
    • A variety of conditions that obstruct blood flow in the coronary arteries
  – Atherosclerosis (picture next slide)
    • A common arterial disorder characterized by yellowish plaques of cholesterol, lipids, and cellular debris in the inner layers of the walls of the arteries

Progressive development of coronary atherosclerosis.

Normal blood flow
Coronary artery
Disorders of the Heart

• Angina
  – Etiology/pathophysiology
    • Cardiac muscle is deprived of oxygen
  
  Clinical manifestations/assessment
  • Pain (usually relieved by rest)
  • Dyspnea
  • Anxiety: apprehension
  • Diaphoresis
  • Nausea

Disorders of the Heart

• Angina
  – Medical management
    • Medications
      – Dilate coronary arteries and decrease workload of heart
      – Nitroglycerin
      – Beta-adrenergic blocking agents
      – Calcium channel blockers
Disorders of the Heart

• Angina
  – Medical management/nursing interventions
  – Surgical interventions
    – Coronary artery bypass graft (CABG)
    – Coronary angioplasty (PTCA)
    – Stent placement

Disorders of the Heart

• Myocardial infarction
  • Also known as a Heart Attack
  • Etiology/pathophysiology
    – Occlusion of a major coronary artery or one of its branches with subsequent necrosis (death) of myocardium

Disorders of the Heart

• Heart Attack
  • Clinical manifestations/assessment
    • Pain (not relieved by rest, position, or nitroglycerin)
    • Nausea
    • SOB; dizziness; weakness
    • Diaphoresis
    • Pallor—ashen color
    • Sense of impending doom
A, Saphenous vein. Aortocoronary

B, Saphenous artery bypass.

Figure 48-13
Coronary artery bypass graft.

Disorders of the Heart

• Heart failure
  – Etiology/pathophysiology
    • Abnormal condition characterized by circulatory congestion resulting from the heart’s inability to act as an effective pump
    • Remember it must pump from head to toe and back
Disorders of the Heart

- Valvular heart disease
  - Etiology/pathophysiology
  - Heart valves are compromised and do not open and close properly
    - Stenosis: means to stiffen
    - Insufficiency

- Endocarditis
  - Etiology/pathophysiology
  - Infection or inflammation of the inner membranous lining of the heart
Disorders of the Heart

- **Myocarditis**
  - Inflammation of the myocardium
  - Rheumatic heart disease
  - Viral, bacterial, or fungal infection

Disorders of the Peripheral Vascular System

- Arterial assessment
  - PATCHES
    - P = Pulses
    - A = Appearance
    - T = Temperature
    - C = Capillary refill
    - H = Hardness
    - E = Edema
    - S = Sensation

- Venous assessment
  - First symptom is usually edema
  - Dark pigmentation
  - Dryness and scaling
  - Ulcerations
  - Pain, aching, and cramping
    - Usually relieved by rest or elevation
Disorders of the Peripheral Vascular System

• Hypertension
  – Etiology/pathophysiology
    • A sustained elevated systolic blood pressure greater than 140 mm Hg and/or a sustained elevated diastolic blood pressure greater than 90 mm Hg.

Disorders of the Peripheral Vascular System

• Hypertension (continued)
  – Clinical manifestations/assessment
    • Headache; blurred vision
    • Epistaxis
    • Angina
  – Medical management/nursing interventions
    • Antihypertensive medications; diuretics
    • Diet: weight control, reduction of saturated fats, and low sodium
    • No smoking

Blood Clot - Thrombus

A blood clot forms when blood cells and fibrin strands clump together. A clot that blocks blood flow is called a thrombus.
Disorders of the Peripheral Vascular System

- Arterial aneurysm (picture next slide)
  - Etiology/pathophysiology
    - Enlarged, dilated portion of an artery
    - Causes: arteriosclerosis; trauma; congenital
  - Clinical manifestations/assessment
    - Asymptomatic
    - Large pulsating mass
    - Pain, if large enough to press on other structures


Disorders of the Peripheral Vascular System

- Thrombophlebitis
  - Etiology/pathophysiology
    - Inflammation of a vein in conjunction with the formation of a thrombus
    - Risk factors: venous stasis, hypercoagulability, trauma of a blood vessel, immobilization after surgery
  - Clinical manifestations/assessment
    - Pain
    - Edema
    - Positive Homans’ sign
    - Erythema, warmth, and tenderness along the vein
Figure 48-22

Deep vein thrombophlebitis.


Disorders of the Peripheral Vascular System

• Thrombophlebitis (continued)
  – Medical management/nursing interventions
    • Superficial
      – Bedrest
      – Moist heat
      – Elevate extremity
      – NSAIDs
        » Motrin
        » Aspirin

• Deep
  – Bedrest
  – Anticoagulants
  – Fibrinolytics
  – Elevate extremity
  – Antithrombosis stockings
  – Surgery: thrombectomy; vena cava umbrella (Greenfield filter)