



NURSING 120

College Laboratory Guide

Fall 2014

Student Name _____

College Lab – Week 1

Objectives – Unit I – PERFUSION- related to alterations in perfusion

WEEKLY COURSE OBJECTIVES:

Exemplars used this week are HTN, CAD, and Acute MI

1. Identify factors and/or co-morbidities affecting and/or contributing to perfusion.
2. Identify commonly used treatments, identified by standards of care, for patients any condition that affects perfusion.
3. Explain common physical assessment procedures used to examine cardiovascular health across the life span.
4. Outline diagnostic and laboratory test to determine the patient's perfusion status as it relates to perfusion.
5. Explain the management of cardiovascular health and prevention of cardiovascular illness as it relates to perfusion.
6. Demonstrate the nursing process in providing culturally competent and caring interventions across the life span for individuals with conditions that affect perfusion.
7. Identify pharmacologic and non-pharmacologic interventions when caring for a patient with conditions that affect perfusion.

Skills/Demonstration

Skills/Assessment: Cardiac

- Review of the normal cardiac assessment.
- Assessment of normal and abnormal heart sound, landmarks for auscultation, and cardiovascular assessment ie pulse check, edema, JVD, and breath sounds.
- Demonstrate correct measurement of manual Blood Pressure, Heart Rate, Respirations, Temperature and O2 saturations.
- Applying Compression Stockings/TEDS

Assessment: Cardiac

Concept Book Nursing skills- 8.4, 8.5, 8.6

HESI Case Study: HTN and CAD

Videotape (if needed for review)

Performing Cardiac Assessment – (Springhouse, 2003) (35mins) – complete NCLEX questions.

Critical Thinking – Medication Administration

Pickar, G.D., Abernethy, A.P. (2008) *Dosage Calculations*. (8th ed.) Clifton Park: Thompson Delmar Learning

Math

- Review medication calculation.
- Metric system conversions
- PO medication
- IV medication drawn up into a syringe
- IV fluid in drip per minutes.

Week 1: Care of the Patient with hypertension:

1. Blood pressure is the product of _____ multiplied by _____.
2. Cardiac output is the product of _____ multiplied by _____.
3. Prolonged hypertension can cause significant damage to blood vessels in four “target organs”:
4. List serious consequences prolonged, uncontrolled hypertension on the body and its systems:
5. Give examples of conditions that can trigger a hypertensive emergency in which blood pressure must be immediately lowered:
6. List 7 modifiable risk factors for coronary artery disease:
7. Management of coronary artery disease requires therapeutic range of cholesterol and lipoproteins. An acceptable blood level of total cholesterol is _____, with an LDL/HDL ratio of _____. The desired level of LDL should be _____ mg/dL, and the HDL level should be greater than _____ mg/dL. Triglycerides should be less than _____mg/dL.

Case Study: George, a 45 year old has primary hypertension after serial blood pressure readings average 150/98.

1. Renal pathology associated with hypertension can be identified by:

- a. Urine output greater than 2,000 mL in 24 hours.
- b. A urine specific gravity of 1.005.
- c. Hyponatremia and decreased urine osmolality.
- d. Increased blood urea nitrogen and creatinine levels.

2. Health education for George includes advising him to:

- a. Adhere to his dietary regimen.
- b. Become involved in a regular of exercise.
- c. Take all medication as prescribed.
- d. Do all of the above.

3. George was prescribed the following angiotensin-converting enzyme (ACE) inhibitor, which has a rapid onset of action within 15 minutes.

- a. Ramipril (Altace)
- b. Captopril (Capoten)
- c. Benazepril (Lotensin)
- d. Enalapril (Vasotec)

4. An example of a potassium-sparing diuretic that might be prescribed later in the treatment of hypertension includes:

- a. Spironolactone (Aldactone)
- b. Hydrochlorothiazide (HCTZ)
- c. Metolazone (Zaroxolyn)
- d. Furesomide (Lasix)

5. The nurse is assessing for postural hypotension recognizes that the following is a positive sign:

- a. A heart rate of 5 to 20 beats per minute (bpm) above the resting rate
- b. A n unchanged diastolic blood pressure
- c. An increase of 10mm Hg reading
- d. An decrease of 5 mm Hg reading

Care of the patient with coronary artery disease:

1. An example of a beta blocker, administered to decrease automaticity, is frequently prescribed for patients with coronary artery disease includes:

- a. Diltiazem (Cardizem)
- b. Amiodarone (Cordarone)
- c. Metoprolol (Lopressor)
- d. Propafenone (Rythmol)

2. A non-modifiable risk factor for atherosclerosis is:

- a. Stress
- b. Obesity
- c. Positive family history
- d. Hyperlipidemia

3. The first heart sound is generated by:

- a. Closure of the aortic valve
- b. Closure of the atrioventricular valves
- c. Opening of the atrioventricular valves
- d. Opening of the pulmonic valve

Match the terminology associated with coronary atherosclerosis in column II with its function/characteristic listed in column I:

Column I:

1. ____ A principal blood lipid
2. ____ A risk factor that causes pulmonary damage
3. ____ The functional lesion of atherosclerosis
4. ____ Biochemical substances, soluble in fat, that accumulate within a blood vessel.
5. ____ A risk factor that is endocrine in origin.
6. ____ A risk factor associated with type A personality
7. ____ A risk factor related to weight gain.
8. ____ A recommended dietary restriction that is a risk factor for heart disease
9. ____ A symptom of myocardial ischemia
10. ____ A lifestyle habit that is considered a modifiable risk factor for heart disease

Column II

- a. Atheroma
- b. Obesity
- c. Chest pain
- d. Cholesterol
- e. Inactivity
- f. Lipids
- g. Smoking
- h. Diabetes
- i. fat
- j. stress

Problem

Compute the amount of medication that will be given to administer one dose of the following medication orders by using a proportion to obtain your answers.

Assume all tablets are scored, when necessary. Round all parenteral administration orders that are over 1 mL to one decimal place. Round all parenteral administration orders under 1 mL to two decimal places. Do not include zeros at the end of decimal numbers.

The problems and drug orders are presented for practice only, and actual prescribed dosages will vary according to a patient's age, condition, reaction, additional medications, and other factors.

1. Order: Axid 0.3 g p.o. at h.s.
Supply: Axid 150 mg capsules
Give: _____ capsules

2. Order: Amoxil 0.25 g p.o. q.8h
Supply: 80 mL bottle of reconstituted Amoxil oral suspension, 125 mg/5 mL
Give: _____ mL or _____ teaspoons

3. Order: Augmentin 375 mg p.o. q.8h
Supply: 75 mL bottle of reconstituted Augmentin, 250 mg/5 mL
Give: _____ mL

4. Order: Klonopin 500 mcg p.o. t.i.d.
Supply: Bottle of 100 tablets of Klonopin, 0.5 mg per tablet
Give: _____ tablet(s)

5. Order: nitroglycerin gr $\frac{1}{100}$ SL stat
Supply: 0.4 mg and 0.6 mg tablets
Give: _____ tablet, give _____ tablet(s)

6. Order: vitamin B₁₂ 100,000 U IM qd. for 3 days
Supply: 2 mL vial of vitamin B₁₂ with 50,000 U/mL
Give: _____ mL

7. Order: thiamine HCl 20 mg IM t.i.d.
Supply: 10 mL multiple dose vial of vitamin B₁ (thiamine HCl) 100 mg/mL
Give: _____ mL
8. Order: ascorbic acid 150 mg IM qd.
Supply: 2 mL ampule of vitamin C (ascorbic acid) 250 mg/mL
Give: _____ mL
9. Order: heparin 7500 U SC q.8h
Supply: heparin 10,000 U/mL
Give: _____ mL
10. Order: methylprednisolone acetate 100 mg IM once per week
Supply: methylprednisolone acetate suspension, 80 mg/mL
Give: _____ mL

Ratio & Proportion Answer Section

PROBLEM

1. ANS:

$$0.3 \text{ g} = 0.3 \times 1000 = 300 \text{ mg}$$

$$\frac{300 \text{ mg}}{150 \text{ mg}} \times 1 \text{ capsules} = 2 \text{ capsules}$$

2. ANS:

$$0.25 \text{ g} = 0.25 \times 1000 = 250 \text{ mg}$$

$$\frac{250 \text{ mg}}{125 \text{ mg}} \times 5 \text{ mL} = 10 \text{ mL}$$

$$10 \text{ mL} = 10 \div 5 = 2 \text{ t}$$

3. ANS:

$$\frac{375 \text{ mg}}{250 \text{ mg}} \times 5 \text{ mL} = 7.5 \text{ mL}$$

4. ANS:

$$0.5 \text{ mg} = 0.5 \times 1000 = 500 \text{ mcg}$$

$$\frac{500 \text{ mcg}}{500 \text{ mcg}} \times 1 \text{ tablet} = 1 \text{ tablet}$$

5. ANS:

$$\text{gr } \frac{1}{100} = \frac{1}{100} \times 60 = 0.6 \text{ mg}$$

Select 0.6 mg tablets, and give 1 tablet

6. ANS:

$$\frac{100,000 \text{ U}}{50,000 \text{ U}} \times 1 \text{ mL} = 2 \text{ mL}$$

7. ANS:

$$\frac{20 \text{ mg}}{100 \text{ mg}} \times 1 \text{ mL} = 0.2 \text{ mL}$$

8. ANS:

$$\frac{150 \text{ mg}}{250 \text{ mg}} \times 1 \text{ mL} = 0.6 \text{ mL}$$

9. ANS:

$$\frac{7500 \text{ U}}{10,000 \text{ U}} \times 1 \text{ mL} = 0.75 \text{ mL}$$

10. ANS:

$$\frac{100 \text{ mg}}{80 \text{ mg}} \times 1 \text{ mL} = 1.25 = 1.3 \text{ mL}$$

Week 1 Math – Calculating IV Solution Rates

IV Solutions & IV Flow Rate Calculations

Multiple Choice

Identify the letter of the choice that best completes the statement or answers the question.

1. A patient's order for IV fluid states that NS is to be infused. Which of the following IV fluids should be given?
 - a. 0.9% Sodium Chloride
 - b. 0.45% Sodium Chloride
 - c. 0.225% Sodium Chloride
 - d. 5% Dextrose
2. A patient's order for IV fluid states the D₅W is to be infused. Which of the following IV fluids should be given?
 - a. 5% Dextrose with Normal Saline
 - b. 5% Dextrose with Lactated Ringer's Solution
 - c. 5% Dextrose with 0.45% Sodium Chloride
 - d. 5% Dextrose
3. A patient's order for IV fluid states that D₅NS is to be infused. Which of the following IV fluids should be given?
 - a. 5% Dextrose
 - b. 0.9% Sodium Chloride
 - c. 5% Dextrose with 0.9% Sodium Chloride
 - d. Lactated Ringer's Solution
4. A patient's order for IV fluid states that D₅LR is to be infused. Which of the following IV fluids should be given?
 - a. 5% Dextrose with Lactated Ringer's Solution
 - b. 5% Dextrose and 0.45% Sodium Chloride with 20 mEq KCl/L
 - c. 5% Dextrose with 0.225% Sodium Chloride
 - d. 0.45% Sodium Chloride
5. What is the ratio of the weight of dextrose to the volume of IV fluid in D₅W?
 - a. 5 grams of dextrose to 1 liter of IV fluid
 - b. 5 milligrams of dextrose to 1 milliliter of IV fluid
 - c. 5 milligrams of dextrose to 1 liter of IV fluid
 - d. 5 grams of dextrose to 100 mL of IV fluid
6. What is the ratio of the weight of sodium chloride to the volume of IV fluid in NS?
 - a. 0.9 grams of sodium chloride to 100 mL of IV fluid
 - b. 0.009 grams of sodium chloride to 1 milliliter of IV fluid
 - c. 0.9 grams of sodium chloride to 1 liter of IV fluid
 - d. 0.9 milligrams of sodium chloride to 100 mL of IV fluid

IV Solutions & IV Flow Rate Calculations

Answer Section

MULTIPLE CHOICE

1. ANS: A
2. ANS: D
3. ANS: C
4. ANS: A
5. ANS: D
6. ANS: A

PROBLEM

7. ANS:

$$\frac{\text{mL}}{\text{h}} = \frac{1200 \text{ mL}}{10 \text{ h}} = 120 \text{ mL/h}$$

8. ANS:

$$1.5 \text{ mL} = 1.5 \times 1000 = 1500 \text{ mL}$$

$$\frac{\text{mL}}{\text{h}} = \frac{1500 \text{ mL}}{20 \text{ h}} = 75 \text{ mL/h}$$

9. ANS:

$$\frac{1000 \text{ mL}}{10 \text{ h}} = 100 \text{ mL/h}$$

$$\frac{\text{mL/h}}{\text{drop factor constant}} = \text{gtt/min}$$

$$\frac{100 \text{ mL}}{6 \text{ h}} = 16.6 = 17 \text{ gtt/min}$$

10. ANS:

$$\frac{1000 \text{ mL}}{8 \text{ h}} = 125 \text{ mL/h}$$

$$\frac{\text{mL/h}}{\text{drop factor constant}} = \text{gtt/min}$$

$$\frac{125 \text{ mL/h}}{3} = 41.6 = 42 \text{ gtt/min}$$

College Lab – Week 2

Objectives – Unit 2 – PERFUSION- related to alterations in perfusion

WEEKLY COURSE OBJECTIVES:

Exemplars used this week are Heart Failure/Atrial Fibrillation, Cardiomyopathies, Valvular Disorders, Congenital Heart Defects

1. Identify factors and/or co-morbidities affecting and/or contributing to perfusion.
2. Identify commonly used treatments, identified by standards of care, for patients any condition that affects perfusion.
3. Explain common physical assessment procedures used to examine cardiovascular health across the life span.
4. Outline diagnostic and laboratory test to determine the patient's perfusion status as it relates to perfusion.
5. Explain the management of cardiovascular health and prevention of cardiovascular illness as it relates to perfusion.
6. Demonstrate the nursing process in providing culturally competent and caring interventions across the life span for individuals with conditions that affect perfusion.
7. Identify pharmacologic and non-pharmacologic interventions when caring for a patient with conditions that affect perfusion.

Skills/Demonstration:

Skills/Assessment: **Cardiac**

- Demonstrate correct measurement of manual Blood Pressure, Heart Rate, Respirations, Temperature and O2 saturations.
- Steps to Delegation (READ Articles the 5 Rights of Delegation and Joint Statement on Delegation American Nurses Association (ANA) and the National Council of State Boards of Nursing (NCSBN))
- As a class complete HESI Case study Congenital Heart Defect

Assessment: Cardiac / Peripheral vascular/peripheral pulses

Concept Book Nursing skills- 3.2 thru 3.12

HESI case study: Congenital Heart Defects & Heart Failure with Atrial Fibrillation

Critical Thinking – Medication Administration:

Pickar, G.D., Abernethy, A.P. (2008) *Dosage Calculations*. (8th ed.) Clifton Park: Thompson Delmar Learning

Math:

- Weight based Heparin infusion. Bolus of medication and use of a protocol.
- Weight based Medication mcg/kg/hour
mL/kg/hour
mg/kg/hour
- IV medication delivered using a Pump.

Week 2: Care of the patient with alterations in Perfusion

Examining associations: Read each analogy, then add the best response in the space provided:

1. The pulmonary artery : lungs :: Aorta : .
2. Epicardium : outer layer of cells lining the heart :: : the heart muscle itself.
3. Apical area of the heart : fifth intercostal space :: Erb's point : .
4. The first heart sound : closure of the mitral and tricuspid valves :: the second heart sound : closure of .
5. Murmurs : malfunctioning valves :: friction rubs : .

Care of the Patient with Chest Pain

Mr. Anderson, a 45-year old executive with a major oil firm. Lately he has experienced frequent episodes of chest pressure that are relieved with rest. Today his pain was not relieved with rest. His wife called 911 and he is being evaluated in the ED.

1. **Lumen narrowing with atherosclerosis is caused by:**
 - a. Atheroma formation on the intima.
 - b. Scarred endothelium.
 - c. Thrombus formation.
 - d. All of the above.
2. **The pain of angina pectoris is produced primarily by:**
 - a. Coronary vasoconstriction.
 - b. Movement of thromboemboli.
 - c. Myocardial ischemia.
 - d. The presence of atheromas.
3. **Mr. Anderson received sublingual nitroglycerin immediately upon arrival to the ED. The nurse informs him that this medication should work within:**
 - a. 3 to 4 minutes.
 - b. 10 to 15 minutes.
 - c. 30 minutes.
 - d. 60 minutes.

4. **Mr. Anderson is given a beta-adrenergic blocker orally. This medication administration is based on the scientific rationale supporting this drug's ability to:**
 - a. Block sympathetic impulses to the heart.
 - b. Elevate blood pressure.
 - c. Increase myocardial contractility.
 - d. Induce bradycardia.

5. **Mr. Anderson is deemed a candidate for percutaneous coronary angioplasty (PRCA) based on the extent of the coronary blockage. The procedure is performed on patients who:**
 - a. Have compromised left ventricular function.
 - b. Have had angina for more than 3 years.
 - c. Have at least 70% occlusion of a major coronary artery.
 - d. Have questionable left ventricular function.

Care of the Patient with Heart Failure

Match the type of ventricular heart failure listed in Column II with its associated pathophysiology in Column I by placing either an "a" or "b" :

Column I

Column II

- | | |
|---|------------------------------|
| 1. ____ Fatigability | a. Left-sided heart failure |
| 2. ____ Dependent edema | b. Right-sided heart failure |
| 3. ____ Pulmonary congestion predominates | |
| 4. ____ <u>Distended neck veins</u> | |
| 5. ____ <u>Ascites</u> | |
| 6. ____ <u>Dyspnea from fluid in alveoli</u> | |
| 7. ____ <u>Orthopnea</u> | |
| 8. ____ <u>Hepatomegaly</u> | |
| 9. ____ <u>Cough that may be blood-tinged</u> | |
| 10. ____ <u>Nocturia</u> | |

Multiple Choice:

- 1. The dominant function in cardiac failure is:**
 - a. Ascites.
 - b. Hepatomegaly.
 - c. Inadequate tissue perfusion.
 - d. Nocturia.

- 2. On assessment, the nurse knows that the presence of pitting edema indicates fluid retention of at least:**
 - a. 4 lb.
 - b. 6 lb.
 - c. 8 lb.
 - d. 10 lb.

- 3. The diagnosis of heart failure is usually confirmed by:**
 - a. Chest x-ray.
 - b. An echocardiogram.
 - c. An electrocardiogram.
 - d. Ventriculogram

- 4. A key diagnostic laboratory test for heart failure is the:**
 - a. Blood urea nitrogen (BUN).
 - b. Complete blood count (CBC).
 - c. B-type natriuretic peptide. (BNP).
 - d. Serum electrolyte counts.

- 5. The goal of collaborative care for heart failure includes (Circle all that are correct):**
 - a. Decreasing oxygen needs of the heart.
 - b. Increasing cardiac output by strengthening muscle contraction.
 - c. Reducing the amount of circulating blood.
 - d. Increasing cardiac output by decreasing peripheral vascular resistance.

- 6. The patient in congestive heart failure is often prescribed Digoxin, cardiac glycoside that strengthens cardiac contraction and increases vagal tone. The nurse knows to check the Digoxin level prior to initiating or continuing Digoxin. A therapeutic digoxin level should be within:**
 - a. 0.25 to 0.35 mg/mL
 - b. 0.30 to 4.0 mg/mL
 - c. 0.5 to 20. Mg/mL
 - d. 2.5 to 4.9 mg/mL

College Lab – Week 3

Objectives – Unit 3 – PERFUSION- related to alterations in perfusion

WEEKLY COURSE OBJECTIVES:

Exemplars used this week are Deep Vein Thrombosis and Pulmonary Embolism (DVT & PE), Peripheral Arterial/Venous Disorders

1. Identify factors and/or co-morbidities affecting and/or contributing to perfusion.
2. Identify commonly used treatments, identified by standards of care, for patients any condition that affects perfusion.
3. Explain common physical assessment procedures used to examine cardiovascular health across the life span.
4. Outline diagnostic and laboratory test to determine the patient's perfusion status as it relates to perfusion.
5. Explain the management of cardiovascular health and prevention of cardiovascular illness as it relates to perfusion.
6. Demonstrate the nursing process in providing culturally competent and caring interventions across the life span for individuals with conditions that affect perfusion.
7. Identify pharmacologic and non-pharmacologic interventions when caring for a patient with conditions that affect perfusion.

Skills/Demonstration:

Skills/Assessment:

- Spike and prime IV tubing
- Flush IV Sites
- Calculate drip rate and set drip rate on IV tubing.
- Prepare for a sterile dressing change.
- Donning sterile gloves
- PICC line dressing change, flush and care of.

Assessment: Cardiac / Peripheral vascular/peripheral pulses

Concept Book Nursing skills- 3.2 thru 3.12, 4.13, 4.19 (as it pertains to a PICC line dressing change)

HESI Case Study: DVT

Critical Thinking – Medication Administration

Pickar, G.D., Abernethy, A.P. (2008) *Dosage Calculations*. (8th ed.) Clifton Park: Thompson Delmar Learning

Math:

- Weight based Heparin infusion. Bolus of medication and use of a protocol.
- Weight based Medication mcg/kg/hour
mL/kg/hour
mg/kg/hour

IV medication delivered using a Pump.

Week 3 – Care of the patient with alterations in Perfusion

Care of the Patient with Venous thrombosis and Pulmonary Embolism:

- 1. A significant cause of venous thrombosis is:**
 - a. Altered blood coagulation.
 - b. Stasis of blood.
 - c. Vessel wall injury.
 - d. All of the above.

- 2. Clinical manifestations of deep vein obstruction include:**
 - a. Edema and limb pain.
 - b. Ankle engorgement.
 - c. Leg circumference difference.
 - d. All of the above.

- 3. When administering heparin anticoagulant therapy, the nurse needs to monitor the clotting time to make certain that it is within the therapeutic range of:**
 - a. One to two times the normal control.
 - b. Two to three times the normal control.
 - c. 3.5 times the normal control.
 - d. 4.5 times the normal control.

- 4. When caring for a patient who has started anticoagulant therapy with warfarin (Coumadin), the nurse knows not to expect therapeutic benefits for:**
 - a. At least 12hours.
 - b. The first 24 hours.
 - c. 2 to 3 days.
 - d. 3 to 5 days.

- 5. List the classic triad (Virchow's) of factors associated with the development of venous thromboembolism:**

Care of the Patient with peripheral vascular disease:

- 1. The most important factor in regulating the caliber of blood vessels, which determines resistance to flow, is:**

- a. Hormonal secretion.
- b. Independent arterial wall activity.
- c. The influence of circulating chemicals.
- d. The sympathetic nervous system.

2. Clinical manifestations of acute venous insufficiency include all of the following except:

- a. Cool and cyanotic skin.
- b. Initial absence of edema.
- c. Sharp pain that may be relieved by the elevation of the extremity.
- d. Numbness and tingling in the affected extremity.

3. Probably the strongest risk factor for the development of atherosclerotic lesions is:

- a. Cigarette smoking.
- b. Lack of exercise.
- c. Obesity.
- d. Stress.

4. The hallmark symptom of peripheral arterial occlusive disease is:

5. List six clinical symptoms associated with acute arterial embolism:

Matching:

Match the type of vessel insufficiency listed in column II with its associated symptom listed in column I:

Column I

Column II

- | | |
|--|----------------------------|
| 1. ___ Intermittent claudication. | a. Arterial insufficiency. |
| 2. ___ Paresthesia. | b. Venous insufficiency. |
| 3. ___ Dependent rubor. | |
| 4. ___ Cold, pale extremity. | |
| 5. ___ Ulcers of lower legs and ankles. | |
| 6. ___ Muscle fatigue and cramping. | |
| 7. ___ Diminished or absent pulses. | |
| 8. ___ Reddish-blue discoloration with dependency. | |

Week 3 – Intravenous Heparin Therapy (cont'd)

IV Heparin Therapy

Heparin Medication Dosage Administration Questions - - for practice:

Bolus by Body weight:

5. A patient with deep vein thrombosis who weighs 163 pounds is ordered to have a heparin bolus of 80 units per kg followed by an infusion. Calculate the dosage of the heparin bolus to be administered.

6. A patient with a pulmonary embolism who weighs 209 pounds is ordered to have a heparin bolus of 90 units per kg followed by an infusion. Calculate the dosage of the heparin bolus to be administered.

Flow Rate: (ml's per hour)

1. The physician orders a continuous infusion of 25,000 units of heparin in 250 mL of D₅W at 600 units per hour. Please calculate the flow rate?

Ratio and proportion (extremes by the means):

2. An order read heparin 40,000 units in 1 L of D5W to infuse at 1,000 units/hour. Calculate the flow rate.

Units Per Hour:

3. A patient is receiving 20,000 units of heparin in 1,000 mL of D5W by continuous infusion at 30mL/hr. What heparin dose is he receiving?

4. A patient is receiving 25,000 units of heparin in 500 mL NS by continuous infusion at 18 mL/hr. What heparin dose is he receiving?

ANSWER KEY: Try working the problem before checking the key

Bolus by Body weight:

5. A patient with deep vein thrombosis who weighs 163 pounds is ordered to have a heparin bolus of 80 units per kg followed by an infusion. Calculate the dosage of the heparin bolus to be administered.

Step 1 – convert pounds to kilograms:

$$163 / 2.2 = 74 \text{ kgs.}$$

Step 2 – calculate dose in units: $74 \times 80 = 5920$ units

Step 3 – calculate mL dosage $1000\text{U} : 1\text{ml} :: 5920 \text{ u} : \text{X mL}$

$$1000\text{U} \times \text{XmL} = 5920\text{U}$$

$$\mathbf{X \text{ mL} = 5920 / 1000 = 5.9 \text{ mL bolus}}$$

6. A patient with a pulmonary embolism who weights 209 pounds is ordered to have a heparin bolus of 90 units per kg followed by an infusion. Calculate the dosage of the heparin bolus to be administered.

Step 1 – Convert pounds to kgs $209 / 2.2 = 95 \text{ kg}$

Step 2 – Calculate dose in units: $95 \times 90 = 8,550$ units

Step 3 – Calculate mL dosage $1000\text{U} : 1 \text{ mL} :: 8,550\text{u} : \text{X mL}$

$$1000\text{U} \times \text{XmL} = 8,550\text{U}$$

$$\mathbf{XmL = 8.55mL}$$

Flow Rate:

1. The physician orders a continuous infusion of 25,000 units of heparin in 250 mL of D₅W at 600 units per hour. Please calculate the flow rate?

Ratio and proportion:

25,000 units : 250 mL :: 600 units : x mL (answer should be in mL/hr – using infusion pump)

$$25,000 \text{ u} \times X = 600 \text{ units/hr} \times 250 \text{ mL}$$

$$25,000 \text{ u}X = 150,000$$

$$X = 150,000 / 25,000 = \mathbf{6 \text{ mL/hr}}$$

2. An order read heparin 40,000 units in 1 L of D5W to infuse at 1,000 units/her. Calculate the flow rate.

40,000 U : 1000 mL :: 1,000U x X mL

$$40,000U \times X = 1000\text{mL} \times 1,000\text{u}$$

$$40,000 \text{ U} = 1,000,000$$

$$X\text{mL} = 1,000,000 / 40,000 = \mathbf{25\text{mL/hr}}$$

Units Per Hour:

3. A patient is receiving 20,000 units of heparin in 1,000 mL of D5W by continuous infusion at 30mL/hr. What heparin dose is he receiving?

20,000 u : 1,000 :: XU : 30mL

$$1,000\text{mL} \times XU = 20,000\text{U} \times 30\text{mL}$$

$$1,000 \times XU = 600,000$$

$$XU = 600,000 / 1,000 = \mathbf{600\text{units/hr}}$$

4. A patient is receiving 25,000 units of heparin in 500 mL NS by continuous infusion at 18 mL/hr. What heparin dose is he receiving?

25,000u : 500 mL :: XU : 18 mL/hr

$$500\text{mL} \times X = 25,000\text{U} \times 18 \text{ mL/hr}$$

$$500\text{mL} \times X = 450,000\text{U}$$

$$xU = 450,000 / 500 = \mathbf{900\text{units per hour}}$$

College Lab -- Week 4

**Objectives – Unit 4 – Oxygenation-
related to alterations in oxygenation**

Exemplars used this week are Influenza, Pneumonia, Tuberculosis (TB), Respiratory Syncytial Virus Syndrome (RSV), Croup

WEEKLY COURSE OBJECTIVES:

1. Identify factors and/or co-morbidities affecting and/or contributing to these exemplars and how it affects oxygenation.
2. Identify commonly used treatments, identified by standards of practice, for patients with these exemplars.
3. Explain common physical assessment procedures used to examine respiratory health across the life span.
4. Outline diagnostic and laboratory test to determine the patient's perfusion status as it relates to these exemplars.
5. Explain the management of respiratory health and prevention of cardiovascular illness as it relates to exemplars.
6. Demonstrate the nursing process in providing culturally competent and caring interventions across the life span for individuals with these exemplars.
7. Identify pharmacologic and non-pharmacologic interventions when caring for a patient with these exemplars.

Skills/Demonstration/Return Demonstration:

- Normal Respiratory assessment.
- Assessment findings of a patient in respiratory distress. Differences in infant, toddler, adult assessment finding when respiratory distress.
- Abnormal breath sound and the causes.
- Inserting and maintaining a nasopharyngeal airway.
- Different methods to deliver oxygen, how to place and maintain.
- Tracheotomy Care
- Infection prevention and an education plan for community. Adult and Children
- Nebulizer Treatment - bronchodilators
- Oxygen therapy – T-piece; Trach mist collar; Venti-mask

Concept Book Nursing skills-7.2, 7.5, 7.6, 7.8, 7.10, 7.13, 7.14, 7.19 thru 7.22 (as it relates to a patient with a tracheostomy)

HESI Case Study: RSV

Videotape (if needed for a review)

- “Performing Respiratory Assessment” (Springhouse, 2002) – (30 mins) complete questions & discuss

Critical Thinking –

Medication Administration: Can review any math that was not finished from week 3

College Lab – Week 5

**Objectives – Unit 5 – Oxygenation-
related to alterations in oxygenation**

Exemplars used this week are

WEEKLY COURSE OBJECTIVES:

1. Identify factors and/or co-morbidities affecting and/or contributing to these exemplars and how it affects oxygenation.
2. Identify commonly used treatments, identified by standards of practice, for patients with these exemplars.
3. Explain common physical assessment procedures used to examine respiratory health across the life span.
4. Outline diagnostic and laboratory test to determine the patient's perfusion status as it relates to these exemplars.
5. Explain the management of respiratory health and prevention of cardiovascular illness as it relates to exemplars.
6. Demonstrate the nursing process in providing culturally competent and caring interventions across the life span for individuals with these exemplars.
7. Identify pharmacologic and non-pharmacologic interventions when caring for a patient with these exemplars.

Skills/Demonstration

- Tracheotomy Care (cont'd)
- PICC line dressing change (cont'd)
- Assessment: Breath Sounds (cont'd)
- Tracheostomy care and suctioning (cont'd)

Concept Book Nursing skills-7.2, 7.5, 7.6, 7.8, 7.10, 7.13, 7.14, 7.19 thru 7.22 (as it relates to a patient with a tracheostomy)

HESI Case study: Cystic Fibrosis & COPD with Pneumonia

Videotape (if needed for review)

- "Pediatric Assessment" (Wiley & Wong, 1996) (from library) (20 mins)
- "Pediatric Medication Administration" (from library) (35 mins)

Critical Thinking – Medication Administration General math at the end of the work lab guide. And pediatric weight based

8. Primary causes for an acute exacerbation of COPD are:
9. To help prevent infections in patients with COPD, the nurse should recommend vaccination against two bacterial organisms:
10. The strongest predisposing factor for asthma is:
11. The most common symptoms of asthma include:
12. Complications of asthma include:

Care of the Patient with COPD Case Study:

Maria, who has had COPD for 25 years, is admitted to the hospital with a diagnosis of bronchitis.

- 1. During assessment, the nurse notes the presence of a “barrel chest”, which the nurse knows is caused by:**
 - a. A compensatory expansion of the bronchial airway.
 - b. A decrease in intrapleural pressure,
 - c. “air trapping” in the lungs.
 - d. A progressive increase in vital capacity.
- 2. The nurse recognizes the need to be alert for the major presenting symptom of COPD, which is:**
 - a. Bradypnea.
 - b. Dyspnea.
 - c. Expiratory wheezing.
 - d. Fatigue.

- 3. Arterial blood gas measurements that are consistent with a diagnosis of COPD are:**
- a. pH 7.32; paO₂ 70mm Hg; PaCO₂ 50 mm Hg.
 - b. pH7.37; PaO₂ 90 mmHg; PaCO₂ 42 mm Hg.
 - c. pH 7.39; PaO₂ 80 mm Hg; PaCO₂ 35 mm Hg.
 - d. pH 7.40; PaO₂ 85 mmHg; PaCO₂ 42 mm Hg.
- 4. Oxygen is prescribed for Maria. The nurse knows that the most effective delivery system is:**
- a. A rebreathing bag that delivers oxygen at a concentration grater than 60%.
 - b. An oxygen mask set at 8 L/min.
 - c. A nasal cannula set at 6l/MIN.
 - d. A Venturi mask that delivers a predictable oxygen flow at about 24%.
- 5. In planning care for Maria, which interventions are best to implement? (Select all that apply)**
- a. Provide rest periods between activities, such as bathing, meals, and ambulation.
 - b. Place the patient in a supine position after meals to allow for rest.
 - c. Schedule drug administration around routine activities to increase adherence to
Arrange chairs in strategic locations to allow the patient to walk and rest.
 - d. Encourage the patient to have an annual flue vaccination.

Week 5 Math: Pediatric Weight-Based Problems

Math Problem:

Compute the requested information. Round all parenteral administration orders that are over 1 mL to one decimal place. Round all parenteral administration orders under 1 mL to two decimal places. Do not include zeros at the end of decimal numbers.

The problems and drug orders are presented for practice only, and actual prescribed dosages will vary according to a patient's age condition, reaction, additional medications, and other factors.

Use the following information about a child and his order to compute answers.

A pediatrician has ordered Ampicillin 50 mg/kg/day p.o. divided q.6h for a child who weighs 44 lb.

1. How many kilograms does the child weigh? _____ kg
2. How many milligrams should the child receive per dose? _____ mg
3. How many milligrams should the child receive per day? _____ mg
4. The pharmacy has supplied reconstituted Ampicillin, with a supply dosage of 500 mg/5 mL. How many milliliters should be given per q.6h dose? _____ mL

Use the following information about a child and her order to compute answers.

Mandy, a child who weighs 15 kilograms, is to be given amoxicillin. The recommended dosage of amoxicillin for children is 20 to 40 mg/kg/day p.o. in equally divided doses administered q.8h.

5. What is the recommended range of milligrams of medication for this child per q.8h dose?
minimum: _____ mg maximum: _____ mg

6. The pediatrician has ordered *amoxicillin 125 mg p.o. q.8h* for Mandy.
The available supply of amoxicillin is 125 mg/5 mL.
Is her order within the recommended range for this medication? (yes/no) _____

If so, how many mL of amoxicillin should be given per q.8h administration? _____ mL

7. How many teaspoonfuls of amoxicillin should be given per q.8h administration? _____ t
Use the following information about a child and his order to compute answers.

The recommended dosage of Rocephin is 50 to 100 mg/kg/day divided into two equal doses. The physician has ordered Rocephin 200 mg IM b.i.d. for a child who weighs 5000 g. The Rocephin vial contains 1 g of medication that must be reconstituted with 3.6 mL of diluent to yield 1 g/4 mL

8. Compute the recommended minimum and maximum amount of milligrams that the child should receive per day.

minimum: _____ mg maximum: _____ mg

9. Compute the recommended minimum and maximum amount of milligrams that the child should receive per dose.

minimum: _____ mg maximum: _____ mg

10. Is the order within the recommended range? (yes/no) _____

If so, compute the number of milliliters of Rocephin that should be administered per dose.
____mL.

Pediatric & Adult Dosages Based on Body Weight

Answer Section

PROBLEM

- ANS:
 $44 \text{ lb} = 44 \div 2.2 = 20 \text{ kg}$
- ANS:
per day, $20 \text{ kg} \times 50 \text{ mg/kg} = 1000 \text{ mg}$
- ANS:
q.6h = every 6 hours, which is given 4 times per day.
$$\frac{1000 \text{ mg}}{4 \text{ doses}} = 250 \text{ mg per dose}$$
- ANS:
$$\frac{250 \text{ mg}}{500 \text{ mg}} \times 5 \text{ mL} = 2.5 \text{ mL}$$
- ANS:
q.8h = every 8 hours, which is given 3 times per day.
per day minimum
$$\frac{300 \text{ mg}}{3 \text{ doses}} = 100 \text{ mg per dose}$$

per day maximum
$$\frac{600 \text{ mg}}{3 \text{ doses}} = 200 \text{ mg per dose}$$
- ANS:
Yes, 125 mg per dose is within 100 mg to 200 mg per dose.
$$\frac{125 \text{ mg}}{125 \text{ mg}} \times 5 \text{ mL} = 5 \text{ mL}$$
- ANS:
 $5 \text{ mL} = 1 \text{ t}$
- ANS:
 $5000 \text{ g} = 5000 \div 1000 = 5 \text{ kg}$
per day, minimum
 $5 \text{ kg} \times 50 \text{ mg/kg} = 250 \text{ mg}$
per day, maximum
 $5 \text{ kg} \times 100 \text{ mg/kg} = 500 \text{ mg}$

9. ANS:
per dose, minimum

$$\frac{250 \text{ mg}}{2 \text{ doses}} = 125 \text{ mg per dose}$$

per dose, maximum

$$\frac{500 \text{ mg}}{2 \text{ doses}} = 250 \text{ mg per dose}$$

10. ANS:
Yes, the ordered amount of 200 mg per dose, b.i.d. is within the recommended range of 125 mg to 250 mg per dose, given twice per day.

$$\frac{200 \text{ mg}}{1000 \text{ mg}} \times 4 \text{ mL} = 0.8 \text{ mL}$$

General Math Review

Multiple Choice

Identify the letter of the choice that best completes the statement or answers the question.

- _____ 1. A patient's order for IV fluid states the D₅W is to be infused. Which of the following IV fluids should be given?
- | | |
|--|---|
| a. 5% Dextrose with Normal Saline | c. 5% Dextrose with 0.45% Sodium Chloride |
| b. 5% Dextrose with Lactated Ringer's Solution | d. 5% Dextrose |
- _____ 2. A patient's order for IV fluid states that D₅NS is to be infused. Which of the following IV fluids should be given?
- | | |
|-------------------------|--|
| a. 5% Dextrose | c. 5% Dextrose with 0.9% Sodium Chloride |
| b. 0.9% Sodium Chloride | d. Lactated Ringer's Solution |
- _____ 3. What is the ratio of the weight of dextrose to the volume of IV fluid in D₅W?
- | | |
|---|--|
| a. 5 grams of dextrose to 1 liter of IV fluid | c. 5 milligrams of dextrose to 1 liter of IV fluid |
| b. 5 milligrams of dextrose to 1 milliliter of IV fluid | d. 5 grams of dextrose to 100 mL of IV fluid |

Completion

Complete each sentence or statement.

Convert each of the given quantities to the equivalent unit indicated. Your answers must be in the proper form for the metric, household, or apothecary system measurement requested in the question.

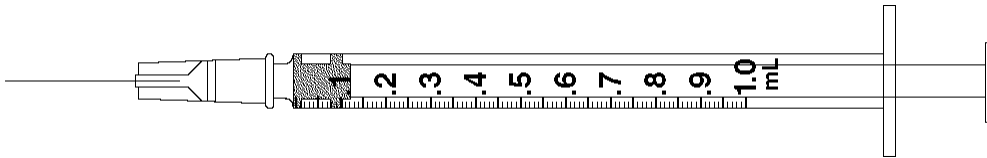
Convert each of the given quantities to the equivalent unit indicated.

4. 3500 g = _____ kg
5. 125 mg = _____ g
6. 250 mcg = _____ mg
7. $\text{gr } \frac{1}{4} =$ _____ mg
8. 15 t = _____ mL

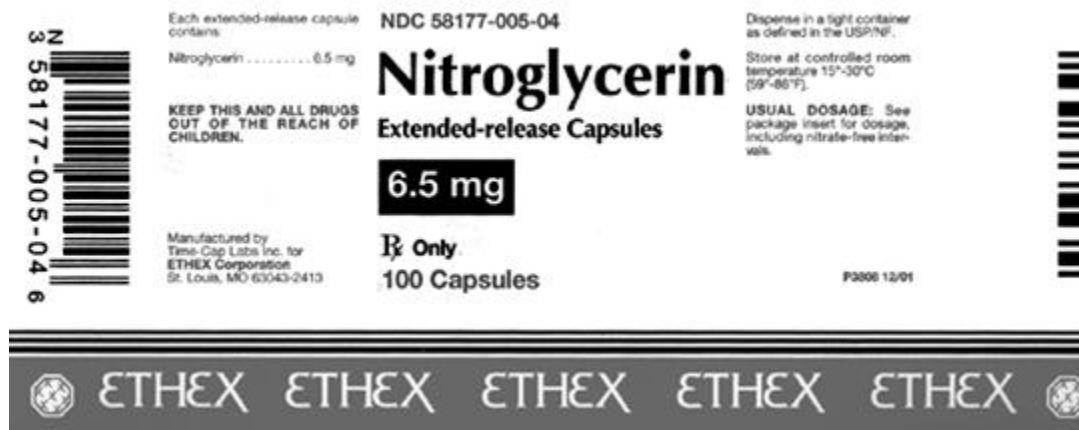
Short Answer

Draw an arrow to point to the volume that corresponds to the dose to be administered with the given equipment.

9. Administer 0.75 mL

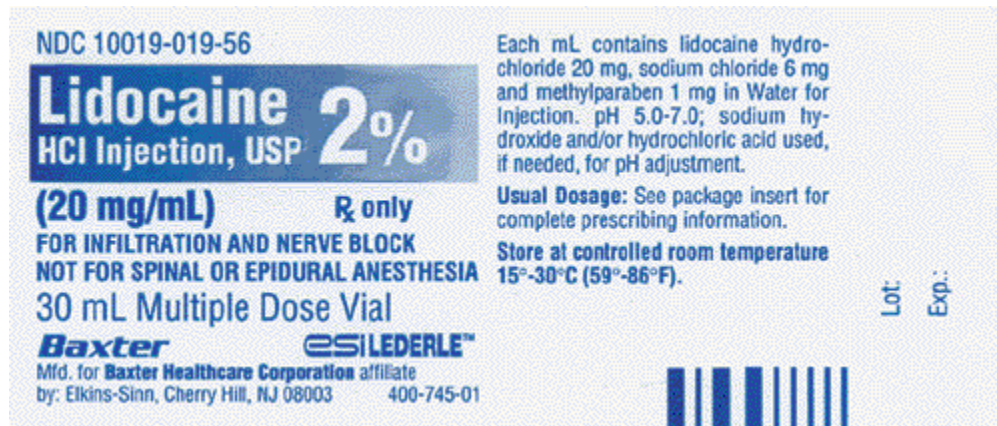


Identify the following, using the given label.



10. Dosage strength: _____

Identify the following, using the given label.



11. The supply dosage is _____ g per _____ mL.

Compute the amount of medication you will give to administer one dose of the following medication orders. Assume all tablets are scored, when necessary. The problems and drug orders are presented for practice only, and actual prescribed dosages will vary according to a patient's age, condition, reaction, additional medications, and other factors.

12. Order: Axid 0.15 g p.o. b.i.d.
 Supply: Bottle containing 60 capsules of Axid, 150 mg per capsule
 Give: _____ capsule(s)

Compute the amount of medication that will be given to administer one dose of the following medication orders. Round all parenteral administration orders that are over 1 mL to one decimal place. Round all parenteral administration orders under 1 mL to two decimal places. Do not include zeros at the end of decimal numbers. The problems and drug orders are presented for practice only, and actual prescribed dosages will vary according to a patient's age, condition, reaction, additional medications, and other factors.

13. Order: Librium 30 mg IM q.6h p.r.n., anxiety
 Supply: Librium 100 mg/2 mL
 Give: _____ mL

Problem

Complete the following.

14. Arrange the following fractions from *smallest* to *largest*: $\frac{7}{16}$, $\frac{3}{16}$, $\frac{5}{16}$

Perform the indicated operations. Reduce fractions in answers to lowest terms.

15. $2\frac{1}{2} \div \frac{3}{4}$

	Decimal	Fraction	Percent	Ratio
1.	0.05			
2.		$\frac{1}{8}$		
3.			45%	
4.				3:10

16. Complete row 3 in the table above.

Solve for X. Round answers to two decimal places.

17. $\frac{X}{5} = \frac{1}{8}$

Compute the amounts of solutes and solvents for the following solutions.

18. 200 mL of 50% betadine solution using stock betadine and NS

_____ mL stock betadine solution _____ mL NS

Explain how you would prepare the following formulas for the indicated time periods using the given supplies.

19. Give 90 mL of $\frac{1}{2}$ strength Enfamil orally every 4 hours for one day.
Available supply is 6-ounce cans of Enfamil.

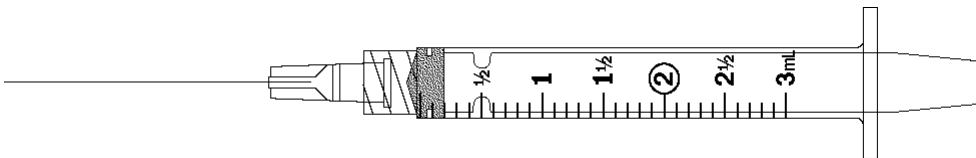
Use the following information:

A nurse needs to prepare $\frac{1}{4}$ strength Enfamil for several infants in the nursery. The supply is 8-ounce cans of Enfamil.

20. How much sterile water should be mixed with each 8-ounce can of Enfamil in order to prepare the $\frac{1}{4}$ strength solution?

For questions 11 through 15, specify the amount of diluent to add and the resulting solution concentration. Calculate the amount to give and indicate the dose with an arrow on the accompanying syringe. Finally, make a reconstitution label, if required.

21. Order: *Tazidime 300 mg IM q.6h*
Reconstitute with _____ mL diluent for a total solution volume of _____ mL with a concentration of _____ mg/mL.
Give: _____ mL



For I.M. or I.V. Use

CAUTION: Addition of diluent generates pressure within the vial. Vent slowly. For I.V. solution—Dilute with at least 5 ml Sterile Water for Injection or other approved diluent. **SHAKE WELL TO DISSOLVE.** See literature.

For I.M. solution—Add 1.5 ml of an approved diluent. **SHAKE WELL TO DISSOLVE.** Provides an approximate volume of 1.8 ml (280 mg per ml). For dosage and administration see literature.

Prior to Reconstitution: Protect from light. Store at 5° to 86°F.

After Reconstitution: Store in a refrigerator and use within 7 days. If kept at room temperature, use within 24 hours. Once reconstituted, light protection is not needed. Each vial contains: 500 mg of Cefazidime and 59 mg of Sodium Carbonate. Sodium content: approximately 27 mg (1.2 mEq) of sodium per vial.

WV 4622 AMX
Eli Lilly & Co., Indianapolis, IN 46285, U.S.A.
Exp. Date/Control No.

NDC 0002-7230-01
VIAL No. 7230



TAZIDIME®
CEFTAZIDIME FOR INJECTION, USP

Equivalent to
500 mg
Cefazidime Activity



22. Order: *Kefzol 150 mg IM q.8h*
 Reconstitute with _____ mL diluent for a total solution volume of _____ mL with a concentration of _____ mg/mL.
 Give: _____ mL



NDC 0002-1498-01 Vial No. 768 For I.M. or I.V. USE. YN0775ITAMX

KEFZOL®
CEFAZOLIN FOR INJECTION, USP
1 g
Rx only
New Product Appearance

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Protect from Light.
For I.M. use add 2.5 mL Sterile Water for Injection. **SHAKE WELL**
Provides an approximate volume of 3.0 mL (330 mg per mL).
For I.V. use see accompanying literature.
Each vial contains sterile Cefazolin Sodium equivalent to 1 gram of Cefazolin.
The sodium content is 48 mg (2.1 mEq) per gram of Cefazolin.
Usual Adult Dose: 250 mg to 1 g every six to eight hours. See accompanying literature.
Prior to reconstitution: Store at 25°C (77°F) (see insert).
After reconstitution: Kefzol is stable for 24 hours at room temperature or for 10 days if refrigerated (5°C or 41°F). See accompanying literature.

Exp. Date/Control No.:

Manufactured by Eli Lilly Italia S.p.A.
Sesto Fiorentino (Firenze), Italy
for Eli Lilly and Company
Indianapolis, IN 46285, USA

Compute the amount of medication that will be given to administer one dose of the following medication orders. Round all parenteral administration orders that are over 1 mL to one decimal place. Round all parenteral administration orders less than 1 mL to two decimal places. Do not include zeros at the end of decimal numbers. The problems and drug orders are presented for practice only, and actual prescribed dosages will vary according to a patient's age, condition, reaction, additional medications, and other factors.

23. Order: *Claforan 1 g IM q.12h*
 Supply: Vial containing 6 mL of reconstituted Claforan, 330 mg/mL
 Give: _____ mL

24. Order: *cefazolin sodium 750 mg IM q.8h*

Supply: 1 g vial of cefazolin sodium with instructions to add 2.5 mL of diluent to produce 3 mL of medication supplying 330 mg/mL

Give: _____ mL

Compute the amount of medication that will be given to administer one dose of the following medication orders by using a proportion to obtain your answers.

Assume all tablets are scored, when necessary. Round all parenteral administration orders that are over 1 mL to one decimal place. Round all parenteral administration orders under 1 mL to two decimal places. Do not include zeros at the end of decimal numbers.

The problems and drug orders are presented for practice only, and actual prescribed dosages will vary according to a patient's age, condition, reaction, additional medications, and other factors.

25. Order: Amoxil 125 mg po. q.8h

Supply: Bottle of Amoxil (powdered medication) with the instructions to add 12 mL of water to obtain a pediatric oral suspension of 50 mg/mL

Give: _____ mL

26. Order: Augmentin 375 mg po. q.8h

Supply: 75 mL bottle of reconstituted Augmentin, 250 mg/5 mL

Give: _____ mL

27. Order: thiamine HCl 20 mg IM t.i.d.

Supply: 10 mL multiple dose vial of vitamin B₁ (thiamine HCl) 100 mg/mL

Give: _____ mL

28. Order: heparin 7500 U SC q.8h

Supply: heparin 10,000 U/mL

Give: _____ mL

Compute the requested information. Round all parenteral administration orders that are over 1 mL to one decimal place. Round all parenteral administration orders under 1 mL to two decimal places. Do not include zeros at the end of decimal numbers.

The problems and drug orders are presented for practice only, and actual prescribed dosages will vary according to a patient's age condition, reaction, additional medications, and other factors.

Use the following information about a child and his order to compute answers.

A pediatrician has ordered Ampicillin 50 mg/kg/day p.o. divided q.6h for a child who weighs 44 lb.

34. After 6 hours, 200 mL of IV fluid remains. If necessary and if allowable, reset the IV so that it is completed on time.

What would the adjusted rate have to be? Adjusted rate, is allowable: _____ gtt/min

Determine the BSA for each of the following children using the BSA computation formulas given in the textbook. Include two decimal places with your answers.

35. Tommy, who is 35 inches tall and weighs 40 lbs

Compute the daily rate of pediatric maintenance fluids for the following children, using the following guidelines:

100 mL/kg/day for the first 10 kg of body weight
50 mL/kg/day for the next 10 kg of body weight
20 mL/kg/day for each kg above 20 kg of body weight

36. Reggie, who weighs 24 kg _____ mL/day

37. A patient's order for Pepcid states that she should receive an IV bolus of 20 mg Pepcid diluted in NS to a total volume of 10 mL which is to be injected over 2 minutes. The supply is Pepcid 10 mg/mL.

Compute the volume of Pepcid and the volume of NS.

Pepcid: _____ mL NS: _____ mL

The following questions refer to your patient who is on IV heparin therapy according to the “Standard Weight Based Heparin Protocol” noted below. The patient weighs 144 pounds. On admission the patient’s APTT is 30 seconds. You initiate IV heparin therapy at 1130 on 06/06/XX. Record your answers in the spaces below unless provided with the “Standard Weight Based Heparin Protocol Worksheet” by your instructor.

Standard Weight Based Heparin Protocol

For all patients on heparin drips:

1. Weight in KILOGRAMS. Required for order to be processed: _____ kg
 2. Heparin 25,000 U in 250 mL of 1/2 NS. Boluses to be given as 1000 U/mL.
 3. APTT q.6h or 6 hours after rate change; q.d. after two consecutive therapeutic APTTs.
 4. CBC initially and repeat every _____ day(s).
 5. Obtain APTT and PT/INR on day one prior to initiation of therapy.
 6. Guaiac stool initially then every _____ day(s) until heparin discontinued. Notify if positive.
 7. Neuro checks every _____ hours while on heparin. Notify physician of any changes.
 8. D/C APTT and CBC once heparin drip is discontinued unless otherwise ordered.
 9. Notify physician of any bleeding problems.
 10. Bolus with 80 U/kg. Start drip at 18 U/kg/h.
 11. If APTT is < 35 secs: Rebolus with 80 U/kg and increase rate by 4 U/kg/h
 12. If APTT is 36–44 secs: Rebolus with 40 U/kg and increase rate by 2 U/kg/h
 13. If APTT is 45–75 secs: Continue current rate
 14. If APTT is 76–90 secs: Decrease rate by 2 U/kg/h
 15. If APTT is > 90 secs: Hold heparin for 1 hour and decrease rate by 3 U/kg/h
-

38. According to the protocol/sample orders, how often should the patient’s APPT be checked?

q. _____ h

At 1730, the patient’s APPT id 38 seconds, Rebolus with heparin

_____ U (_____ mL)

How much should you change the infusion rate?

_____ increase or _____ decrease heparin _____ U/h and _____ ml/h

The new infusion rate will be heparin _____ mL/h.

General Review Answer Section

MULTIPLE CHOICE

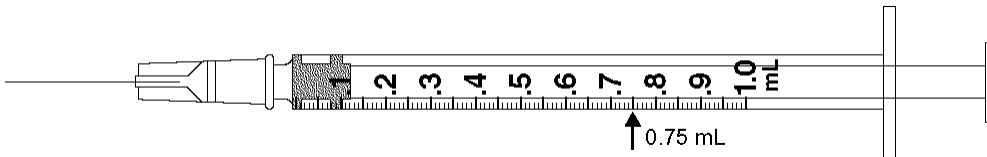
1. ANS: D
2. ANS: C
3. ANS: D

COMPLETION

4. ANS: $3500 \text{ g} = 3500 \div 1000 = 3.5 \text{ kg}$
5. ANS: $125 \text{ mg} = 125 \div 1000 = 0.125 \text{ mg}$
6. ANS: $250 \text{ mcg} = 250 \div 1000 = 0.25 \text{ mg}$
7. ANS: $\text{gr } \frac{1}{4} = \frac{1}{4} \times 60 = 15 \text{ mg}$
8. ANS: $15 \text{ t} = 15 \times 5 = 75 \text{ mL}$

SHORT ANSWER

9. ANS:



10. ANS:
6.5 mg per capsule
11. ANS:
 $2\% = 2 \text{ g per } 100 \text{ mL}$
12. ANS:
 $0.15 \text{ g} = 0.15 \times 1000 = 150 \text{ mg}$
 $\frac{150 \text{ mg}}{150 \text{ mg}} \times 1 \text{ capsule} = 1 \text{ capsule}$
13. ANS:
 $\frac{30 \text{ mg}}{100 \text{ mg}} \times 2 \text{ mL} = 0.6 \text{ mL}$

PROBLEM

14. ANS:
 $\frac{3}{16}, \frac{5}{16}, \frac{7}{16}$

15. ANS:

$$2\frac{1}{2} \div \frac{3}{4} = \frac{5}{2} \div \frac{3}{4} = \frac{5}{2} \times \frac{4}{3} = \frac{10}{3} = 3\frac{1}{3}$$

16. ANS:

$$0.45, \frac{9}{20}, 9:20$$

17. ANS:

$$\frac{X}{5} = \frac{1}{8}$$

$$8X = 5$$

$$\frac{8X}{8} = \frac{5}{8}$$

$$X = \frac{5}{8}$$

Change $\frac{5}{8}$ to a decimal:

$$\begin{array}{r} 0.625 \\ 8 \overline{) 5.000} \\ \underline{48} \\ 20 \\ \underline{16} \\ 40 \end{array}$$

Rounded to two decimal places, $X = 0.63$

18. ANS:

$$D \times Q = 50\% \times 200 \text{ mL} = 100 \text{ mL stock betadine solution}$$

$$200 \text{ mL} - 100 \text{ mL} = 100 \text{ mL NS}$$

19. ANS:

$$90 \text{ mL} = \frac{90}{30} = 3 \text{ ounces per administration every 4 hours} = 6 \text{ administrations for one day}$$

$$3 \times 6 = 18 \text{ ounces total for the six administrations}$$

$$D \times Q = \frac{1}{2} \times 18 = 9 \text{ ounces (1 } \frac{1}{2} \text{ cans) of Enfamil}$$

$$18 \text{ ounces} - 9 \text{ ounces} = 9 \text{ ounces sterile water}$$

Give 3 ounces of the solution per administration.

20. ANS:

$$\frac{1}{4} \text{ strength} = 1 \text{ part Enfamil to 4 parts of solution}$$

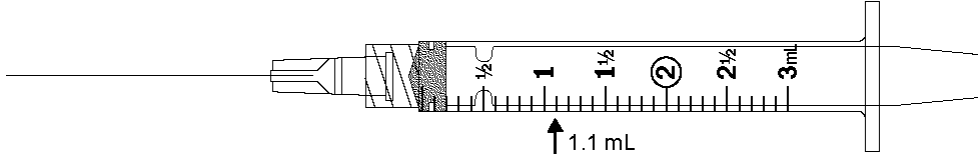
$$4 \text{ parts solution} - 1 \text{ part Enfamil} = 3 \text{ parts sterile water}$$

$$3 \text{ parts sterile water} = 3 \times 8 = 24 \text{ ounces of sterile water.}$$

21. ANS:

Reconstitute with 1.5 mL diluent for a total solution volume of 1.8 mL with a concentration of 280 mg/mL.

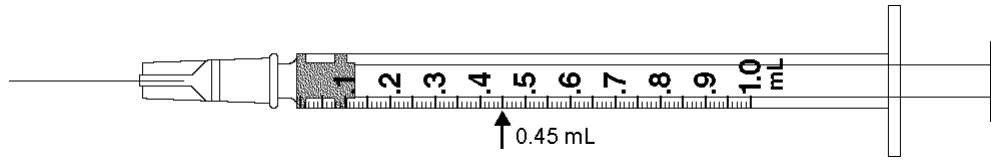
$$\frac{300 \text{ mg}}{280 \text{ mg}} \times 1 \text{ mL} = 1.07 \text{ mL} = 1.1 \text{ mL}$$



22. ANS:

Reconstitute with 2.5 mL diluent (sterile water for injection) for a total solution volume of 3 mL with a concentration of 330 mg/mL.

$$\frac{150 \text{ mg}}{300 \text{ mg}} \times 1 \text{ mL} = 0.454 \text{ mL} = 0.45 \text{ mL}$$



23. ANS:

$$1 \text{ g} = 1000 \text{ mg}$$

$$\frac{1000 \text{ mg}}{330 \text{ mg}} \times 1 \text{ mL} = 3.03 = 3 \text{ mL}$$

24. ANS:

$$\frac{750 \text{ mg}}{330 \text{ mg}} \times 1 \text{ mL} = 2.27 = 2.3 \text{ mL}$$

25. ANS:

$$\frac{125 \text{ mg}}{50 \text{ mg}} \times 1 \text{ mL} = 2.5 \text{ mL}$$

26. ANS:

$$\frac{375 \text{ mg}}{250 \text{ mg}} \times 5 \text{ mL} = 7.5 \text{ mL}$$

27. ANS:

$$\frac{20 \text{ mg}}{100 \text{ mg}} \times 1 \text{ mL} = 0.2 \text{ mL}$$

28. ANS:

$$\frac{7500 \text{ U}}{10,000 \text{ U}} \times 1 \text{ mL} = 0.75 \text{ mL}$$

29. ANS:

$$2.5 \text{ mL} = 2.5 + 5 = \frac{1}{2} t$$

30. ANS:

$$5000 \text{ g} = 5000 \div 1000 = 5 \text{ kg}$$

per day, minimum

$$5 \text{ kg} \times 50 \text{ mg/kg} = 250 \text{ mg}$$

per day, maximum

$$5 \text{ kg} \times 100 \text{ mg/kg} = 500 \text{ mg}$$

31. ANS:

NS = 0.9% sodium chloride

= 0.9 g sodium chloride per 100 mL of solution

$$\frac{0.9 \text{ g}}{100 \text{ mL}} = \frac{X \text{ g}}{1000 \text{ mL}}$$

$$100X = 900$$

$$\frac{100X}{100} = \frac{900}{100}$$

$$X = 9 \text{ g}$$

1 liter of NS contains 9 g of sodium chloride

32. ANS:

$$2 \text{ L} = 2000 \text{ mL}$$

$$\frac{\text{mL}}{\text{h}} = \frac{2000 \text{ mL}}{24 \text{ h}} = 83.3 = 83 \text{ mL/h}$$

33. ANS:

$$\frac{V}{T} \times C = R$$

$$\frac{50 \text{ mL}}{20 \text{ min}} \times \frac{20 \text{ gtt}}{\text{mL}} = 50 \text{ gtt/min}$$

34. ANS:

$$\frac{\text{mL}}{\text{h}} = \frac{200 \text{ mL}}{2 \text{ h}} = 100 \text{ mL/h}$$

$$\frac{\text{mL/h}}{\text{drop factor constant}} = \frac{100 \text{ mL/h}}{4} = 25 \text{ gtt/min}$$

or,

$$\frac{V}{T} \times C = R$$

$$\frac{200 \text{ mL}}{120 \text{ min}} \times \frac{15 \text{ gtt}}{\text{mL}} = 25 \text{ gtt/min}$$

35. ANS:

$$\begin{aligned} \text{BSA} &= \sqrt{\frac{35 \times 40}{3131}} \\ &= \sqrt{0.447} \\ &= 0.668 = 0.67 \text{ m}^2 \end{aligned}$$

36. ANS:

$$\begin{aligned} 10 \text{ kg} \times 100 \text{ mL/kg} &= 1000 \text{ mL per day for the first 10 kg} \\ 10 \text{ kg} \times 50 \text{ mL/kg} &= 500 \text{ mL per day for the next 10 kg} \\ 4 \text{ kg} \times 20 \text{ mL/kg} &= 80 \text{ mL per day for the remaining 4 kg} \\ \hline &= 1580 \text{ mL per day} \end{aligned}$$

37. ANS:

$$\frac{D}{H} \times Q = X$$

$$\frac{20 \text{ mg}}{10 \text{ mg}} \times 1 \text{ mL} = 2 \text{ mL of the supplied Pepcid solution}$$

10 mL total IV solution – 2 mL Pepcid solution – 8 mL NS.

38. ANS:

6 h

$$40 \text{ U/kg} \times 70 \text{ kg} = 2800 \text{ U or } 2.8 \text{ mL}$$

Increase rate by 2 U/kg/h

$$2 \text{ U/kg/h} \times 70 \text{ kg} = 140 \text{ U/h}$$

$$\text{Increase } \frac{140 \text{ U/h}}{100 \text{ U}} \times 1 \text{ mL} = 1.4 \text{ mL/h}$$

$$12.6 \text{ mL/h} + 1.4 \text{ mL/h} = 14 \text{ mL/h}$$

Answers to Critical Thinking and Case Study Questions:

Week 1 Answers:

Week 1: Exemplar: Care of the Patient with perfusion risk factors – hypertension.

1. Blood pressure is the product of cardiac output (CO) multiplied by peripheral resistance (PVR).
2. Cardiac output is the product of heart rate (HR) multiplied by stroke volume (SV).
3. Prolonged hypertension can cause significant damage to blood vessels in four “target organs”:

Heart, kidneys, brain, eyes

4. List serious consequences prolonged, uncontrolled hypertension on the body and its systems:

Myocardial infarction, heart failure, renal failure, stroke, impaired vision, left ventricular hypertrophy.

5. Give examples of conditions that can trigger a hypertensive emergency in which blood pressure must be immediately lowered:

Acute myocardial infarction, a dissecting aortic aneurysm, intracranial hemorrhage, hypertension associated with pregnancy.

6. List 7 modifiable risk factors for coronary artery disease:

Hyperlipidemia, cigarette smoking, obesity, hypertension, diabetes mellitus, metabolic syndrome, physical inactivity.

7. Management of coronary artery disease requires a therapeutic range of cholesterol and lipoproteins.

An acceptable blood level of total cholesterol is less than 200 mg/dL, with an LDL/HDL ratio of 3.5 to 1. T

The desired level of LDL should be less than 100 mg/dL, and the HDL level should be greater than 60 mg/dL.

Triglycerides should be less than 150 mg/dL.

Case Study: George, a 45 year old has primary hypertension after serial blood pressure readings average 150/98.

1. Renal pathology associated with hypertension can be identified by:

- e. Urine output greater than 2,000 mL in 24 hours.
- f. A urine specific gravity of 1.005.
- g. Hyponatremia and decreased urine osmolality.
- h. Increased blood urea nitrogen and creatinine levels.***

6. Health education for George includes advising him to:

- e. Adhere to his dietary regimen.
- f. Become involved in a regular of exercise.
- g. Take all medication as prescribed.
- h. Do all of the above.***

7. George was prescribed the following angiotensin-converting enzyme (ACE) inhibitor, which has a rapid onset of action within 15 minutes.

- e. Altace
- f. Capoten***
- g. Lotensin
- h. Vasotec

8. An example of a potassium-sparing diuretic that might be prescribed later in the treatment of hypertension includes:

- e. Spironolactone (Aldactone)***
- f. Mykrox
- g. Zaroxolyn
- h. Furesomide (Lasix)

9. The nurse is assessing for postural hypotension recognizes that the following is a positive sign:

- e. A heart rate of 5 to 20 beats per minute (bpm) above the resting rate
- f. A n unchanged diastolic blood pressure
- g. An increase of 10mm Hg reading***
- h. An decrease of 5 mm Hg reading

Care of the patient with coronary artery disease:

- 4. An example of a beta blocker, administered to decrease automaticity, is frequently prescribed for patients with coronary artery disease includes:**
 - e. Cardizem
 - f. Cordarone
 - g. Metoprolol (Lopressor)***
 - h. Rythmol

- 5. A non-modifiable risk factor for atherosclerosis is:**
 - e. Stress
 - f. Obesity
 - g. Positive family history***
 - h. Hyperlipidemia

- 6. The first heart sound is generated by:**
 - e. Closure of the aortic valve
 - f. Closure of the atrioventricular valves***
 - g. Opening of the atrioventricular vales
 - h. Opening of the pulmonic valve

Match the terminology associated with coronary atherosclerosis in column II with its function/characteristic listed in column I:

Column I:

- 1. d - A principal blood lipid**
- 2. g - A risk factor that causes pulmonary damage**
- 3. a - The functional lesion of atherosclerosis**
- 4. f - Biochemical substances, soluble in fat, that accumulate within a blood vessel.**
- 5. h - A risk factor that is endocrine in origin.**
- 6. j - A risk factor associated with type A personality**
- 7. b - A risk factor related to weight gain.**
- 8. i - A recommended dietary restriction that is a risk factor for heart disease**
- 9. c - A symptom of myocardial ischemia**
- 10. e - A lifestyle habit that is considered a modifiable risk factor for heart disease**

Column II

a. Atheroma	a. Inactivity	i. Fat
b. Obesity	b. Lipids	j. stress
c. Chest pain	c. Smoking	
d. cholesterol	d. diabetes mellitus	

Week 2 Answers:

Examining associations: Read each analogy, then add the best response in the space provided:

6. The pulmonary artery : lungs :: Aorta : arterial system through the body.
7. Epicardium : outer layer of cells lining the heart :: Myocardium : the heart muscle itself.
8. Apical area of the heart : fifth intercostal space :: Erb's point : 3rd intercostal space.
9. The first heart sound : closure of the mitral and tricuspid valves :: the second heart sound : closure of the aortic and pulmonic valve.
10. Murmurs : malfunctioning valves :: friction rubs : abrasion of the pericardial surfaces.

Exemplar: Care of the Patient with Chest Pain

Mr. Anderson, a 45-year old executive with a major oil firm. Lately he has experienced frequent episodes of chest pressure that are relieved with rest. Today his pain was not relieved with rest. His wife called 911 and he is being evaluated in the ED.

6. **Lumen narrowing with atherosclerosis is caused by:**
 - e. Atheroma formation on the intima.
 - f. Scarred endothelium.
 - g. Thrombus formation.
 - h. All of the above.***
7. **The pain of angina pectoris is produced primarily by:**
 - e. Coronary vasoconstriction.***
 - f. Movement of thromboemboli.
 - g. Myocardial ischemia.
 - h. The presence of atheromas.
8. **Mr. Anderson received sublingual nitroglycerin immediately upon arrival to the ED. The nurse informs him that this medication should work within:**
 - e. 3 to 4 minutes.***
 - f. 10 to 15 minutes.
 - g. 30 minutes.
 - h. 60 minutes.

9. **Mr. Anderson is given a beta-adrenergic blocker orally. This medication administration is based on the scientific rationale supporting this drug's ability to:**
- e. **Block sympathetic impulses to the heart.***
 - f. Elevate blood pressure.
 - g. Increase myocardial contractility.
 - h. Induce bradycardia.
10. **Mr. Anderson is deemed a candidate for percutaneous coronary angioplasty (PRCA) based on the extent of the coronary blockage. The procedure is performed on patients who:**
- e. Have compromised left ventricular function.
 - f. Have had angina for more than 3 years.
 - g. **Have at least 70% occlusion of a major coronary artery.***
 - h. Have questionable left ventricular function.

Exemplar: Care of the Patient with Heart Failure

Match the type of ventricular heart failure listed in Column II with its associated pathophysiology in Column I by placing either an "a" or "b" :

<u>Column I</u>	<u>Column II</u>
1. <u> a </u> Fatigability	a. Left-sided heart failure
2. <u> b </u> Dependent edema	b. Right-sided heart failure
3. <u> a </u> Pulmonary congestion predominates	
4. <u> b </u> Distended neck veins	
5. <u> b </u> Ascites	
6. <u> a </u> Dyspnea from fluid in alveoli	
7. <u> a </u> Orthopnea	
8. <u> b </u> Hepatomegaly	
9. <u> a </u> Cough that may be blood-tinged	
10. <u> b </u> Nocturia	

Multiple Choice:

7. The dominant function in cardiac failure is:

- e. Ascites.
- f. Hepatomegaly.
- g. Inadequate tissue perfusion.***
- h. Nocturia.

8. On assessment, the nurse knows that the presence of pitting edema indicates fluid retention of at least:

- e. 4 lb.
- f. 6 lb.
- g. 8 lb.
- h. 10 lb.***

9. The diagnosis of heart failure is usually confirmed by:

- e. Chest x-ray.
- f. An echocardiogram.***
- g. An electrocardiogram.
- h. Ventriculogram

10. A key diagnostic laboratory test for heart failure is the:

- e. Blood urea nitrogen (BUN).
- f. Complete blood count (CBC).
- g. B-type natriuretic peptide. (BNP).***
- h. Serum electrolyte counts.

11. The goal of collaborative care for heart failure includes (Circle all that are correct):

- e. Decreasing oxygen needs of the heart.***
- f. Increasing cardiac output by strengthening muscle contraction.***
- g. Reducing the amount of circulating blood.***
- h. Increasing cardiac output by decreasing peripheral vascular resistance.***

12. The patient in congestive heart failure is often prescribed Digoxin, cardiac glycoside that strengthens cardiac contraction and increases vagal tone. The nurse knows to check the Digoxin level prior to initiating or continuing Digoxin. A therapeutic digoxin level should be within:

- e. 0.25 to 0.35 mg/mL
- f. 0.30 to 4.0 mg/mL
- g. 0.5 to 2.0 mg/mL***
- h. 2.5 to 4.9 mg/mL

Week 3 Answers –

6. A significant cause of venous thrombosis is:

- a. Altered blood coagulation.
- b. Stasis of blood.
- c. Vessel wall injury.
- d. All of the above.***

7. Clinical manifestations of deep vein obstruction include:

- a. Edema and limb pain.
- b. Ankle engorgement.
- c. Leg circumference difference.
- d. All of the above.***

8. When administering heparin anticoagulant therapy, the nurse needs to monitor the clotting time to make certain that it is within the therapeutic range of:

- a. 1 to 1.5 times the normal control.
- b. 1.5 to 2.5 times the normal control.***
- c. 3.5 times the normal control.
- d. 4.5 times the normal control.

9. When caring for a patient who has started anticoagulant therapy with warfarin (Coumadin), the nurse knows not to expect therapeutic benefits for:

- a. At least 12 hours.
- b. The first 24 hours.
- c. 2 to 3 days.
- d. 3 to 5 days.***

10. List the classic triad (Virchow's) of factors associated with the development of venous thromboembolism: venous stasis, vessel wall injury, altered blood coagulation.

Care of the Patient with peripheral vascular disease:

6. The most important factor in regulating the caliber of blood vessels, which determines resistance to flow, is:

- e. Hormonal secretion.
- f. Independent arterial wall activity.
- g. The influence of circulating chemicals.
- h. The sympathetic nervous system.***

7. Clinical manifestations of acute venous insufficiency include all of the following except:

- e. Cool and cyanotic skin.
- f. Initial absence of edema.***
- g. Sharp pain that may be relieved by the elevation of the extremity.
- h. Numbness and tingling in the affected extremity.

8. Probably the strongest risk factor for the development of atherosclerotic lesions is:

- e. Cigarette smoking.***
- f. Lack of exercise.
- g. Obesity.
- h. Stress.

9. The hallmark symptom of peripheral arterial occlusive disease is:

Intermittent claudication

10. List six clinical symptoms associated with acute arterial embolism:

Pain, pallor, pulselessness, paresthesia, poikilothermia (coldness), and paralysis.

Matching:

Match the type of vessel insufficiency listed in column II with its associated symptom listed in column I:

Column I

Column II

9. a - Intermittent claudication. a. Arterial insufficiency.
10. b - Paresthesia. b. Venous insufficiency.
11. a- Dependent rubor.
12. a - old, pale extremity.
13. b - Ulcers of lower legs and ankles.
14. a - Muscle fatigue and cramping.
15. a - Diminished or absent pulses.
16. a - Reddish-blue discoloration with dependency.

Week 4 Answers:

1. List 7 possible causes of Atelectasis:

Effects of anesthesia or analgesia; supine positioning; chest wall splinting because of pain; abdominal distention; abdominal obesity; retained secretions; reduced lung volumes due to musculoskeletal or neurologic disorders.

2. List 7 possible clinical manifestations of Atelectasis:

Dyspnea, cough, sputum production, tachycardia; tachypnea; pleural pain; central cyanosis

3. List 7 nursing interventions that can be used to prevent Atelectasis:

Frequent turning; early mobilization; coughing & deep breathing; incentive spirometry; suctioning; postural drainage; aerosol nebulizer treatments; chest percussion.

4. The diagnosis of hospital-acquired pneumonia is usually associated with the presence of one of three conditions:

1. Impaired host defenses
2. Inoculum of organisms that reach the lower respiratory tract.
3. Presence of a highly virulent organism.

5. Name three common pathogens that cause community acquired pneumonia:

1. **Streptococcus pneumoniae**
 2. **Haemophilus influenza**
 3. **Staphylococcus aureus**
6. **Pneumonia tends to occur in patients with one or more of these underlying disorders:**
1. **Alcoholism; 2. COPD; 3. AIDS; 4. diabetes mellitus;**
 5. **heart failure**
7. **Three complications of pneumonia include:**
1. **Hypotension**
 - 2 **Shock**
 - 3 **Respiratory failure**

Week 5 Answers:

1. **Chronic airway inflammation in COPD results in:**

Chronic inflammation that results in the following: increased goblet cells and enlarged submucosal glands (proximal airways), inflammation and airway narrowing (peripheral airways), and a narrowing of the airway lumen.

2. **Define the term emphysema:**

Emphysema is an abnormal distention of the air spaces, beyond the terminal bronchioles, that results in destruction of the walls of the alveoli.

3. **A genetic risk factor for COPD is:**

A deficiency in alpha-antitrypsin, an enzyme inhibitor that protects the lungs.

4. **Primary symptoms associated with the progressive disease of obstructive lung disease are:**

Chronic cough, sputum production, and dyspnea on exertion.

5. **List major factors that determine the clinical course and survival of patients with obstructive lung disease:**

History of cigarette smoking; passive smoking exposure; age; rate of decline in FEV1; hypoxemia; weight loss; reversibility of airflow obstruction; pulmonary artery pressure; and resting heart rate.

6. **The single most cost effective intervention to reduce the risk for developing COPD or slow its progression is:**

Cessation of smoking

7. **List three ways that bronchodilators relieve bronchospasm:**

Alter smooth muscle tone; reduce airway obstruction; improve alveolar ventilation.

8. **Primary causes for an acute exacerbation of COPD are:**

Tracheobronchial infection; air pollution.

9. To help prevent infections in patients with COPD, the nurse should recommend vaccination against two organisms:

Streptococcus pneumoniae; Haemophilus influenzae

10. The most common symptoms of asthma include:

Allergy; cough; wheezing; dyspnea

11. Complications of asthma include:

Status asthmaticus; respiratory failure; pneumonia, Atelectasis

Emphysema Case Study: (correct answers highlighted):

Maria, who has had COPD for 25 years, is admitted to the hospital with a diagnosis of bronchitis.

1. During assessment, the nurse notes the presence of a “barrel chest”, which the nurse knows is caused by:
 - a. A compensatory expansion of the bronchial airway.
 - b. A decrease in intrapleural pressure,
 - c. Air trapping” in the lungs.***
 - d. A progressive increase in vital capacity.

2. The nurse recognizes the need to be alert for the major presenting symptom of COPD, which is:
 - a. Bradypnea.
 - b. Dyspnea.***
 - c. Expiratory wheezing.
 - d. Fatigue.

3. Arterial blood gas measurements that are consistent with a diagnosis of COPD are:
 - a. pH 7.32; paO2 70mm Hg; PaCO2 50 mm Hg.***
 - b. pH7.37; PaO2 90 mmHg; PaCO2 42 mm Hg.
 - c. pH 7.39; PaO2 80 mm Hg; PaCO2 35 mm Hg.
 - d. pH 7.40; PaO2 85 mmHg; PaCO2 42 mm Hg.

4. Oxygen is prescribed for Maria. The nurse knows that the most effective delivery system is:
 - e. A rebreathing bag that delivers oxygen at a concentration grater than 60%.
 - f. An oxygen mask set at 8 L/min.
 - g. A nasal cannula set at 6l/MIN.
 - h. A Venturi mask that delivers a predictable oxygen flow at about 24%.***

5. In planning care for Maria, which interventions are best to implement? (Select all that apply)
- a. **Provide rest periods between activities, such as bathing, meals, and ambulation.***
 - b. Place the patient in a supine position after meals to allow for rest.
 - c. **Schedule drug administration around routine activities to increase adherence to drug therapy.***
 - d. **Arrange chairs in strategic locations to allow the patient to walk and rest.***
 - e. **Encourage the patient to have an annual flu vaccination. ***