



**HEALTH PROFESSIONS**

**NURSING PROGRAM**

**ALTERATIONS IN HEALTH IV**

**NRS 235**

**LAB MANUAL**

**FALL 2017**

Welcome to NRS 235! This will be an exciting course for you because you will be building on the concepts that you already learned in the previous courses. Additionally, you will be transitioning into practice. NRS 235 is a continuation of concepts. However, you will now be applying these concepts patients with high acuity acute and chronic complex conditions across the lifespan. You also will continue to develop critical thinking and clinical judgment skills when caring for the adult and pediatric patients. Please use this lab manual to prepare for class. The faculty at MCCC are here for your success. Please let us know how we can foster your success throughout this last semester as you transition to the professional RN.

Have a great semester!

## Week 1

### Concept: Perfusion

#### Drug calculations:

1. Norepinephrine- Norepinephrine is to be started via IV infusion. It is mixed 4 mg in 250 mL of NS to infuse at 5 mcg/min. How many mL/hr would you set the pump?
2. Dopamine- A dopamine drip is to be started. It comes prepared from the pharmacy as 400 mg in 250 mL D5W. You are to start it at 5 mcg/kg/min. The patient weighs 121 lbs. How many mL/hr would you set the pump?
3. Dobutamine- A dobutamine drip is ordered. It comes prepared 1 g in 250 mL of NS. The patient weighs 242 lbs. You are to start the medication at 20 mcg/kg/min. How many mL/hr would you set the pump?
4. Isoproterenol- This drug comes prepared from the pharmacy as 1mg in 250 mL in D5W. The patient weighs 242 lbs. You are to start the medication at 5 mcg/min. How many mL/hr would you set the pump?
5. Nitroglycerin- Nitroglycerin comes prepared 50 mg in 250 D5W. The physician orders it to be administered at 10mcg/min. How many mL/hr would you set the pump?
6. Nitroprusside- Nitroprusside comes prepared in 50 mg in 100 mL of NS. The patient weighs 110 lbs. The medication is to be started at 10 mcg/kg/min. What will you set the pump?
7. Albumin 5%- Albumin needs to be given to your patient on a pump. It comes prepared 5 g in 100 mL of NS to be given over 1 hour. How many mL/hr would you set the pump?

## **CASE STUDY Pediatric Shock Case Study**

Kevin is an 8 y/o school age child who lives with his parents and 2 older brothers, ages 14 and 16. Kevin's brothers take care of him after school until his parents come home about 5:30pm. Kevin plays outdoors with his friends after school each day in his back yard. His brothers are very responsible and keep close watch over their younger brother. Today is the awards presentation at school immediately following classes and his mother and brothers attend the ceremony. Because their mother is driving Kevin home, his brothers have the opportunity to spend time with their friends and their father will pick them up after work. As Kevin and his mother are driving home, a large truck runs a red light hitting their vehicle in the side where Kevin is sitting and causing multiple trauma to Kevin. His mother receives some contusions and abrasions and is taken to the hospital by EMS with Kevin. Both were wearing seat restraints.

Kevin is admitted to the pediatric intensive care unit (PICU) in critical condition. After his brief admission assessment, he has an IV infusion of LR at 200 mL per hour. His admitting diagnosis is multiple trauma and shock. He is placed on a cardiac monitor, is intubated and placed on a mechanical ventilator, a triple lumen catheter, an arterial line is placed, a NGT is placed and an indwelling urinary catheter is placed. His VS upon arrive to the PICU are:

**Temp. 35 C (95 F)**

**HR 130**

**Resp 45**

**BP 110/50**

1. What is the significance of Kevin's VS?
2. What is the pathophysiology of shock?
3. What are the different types of shock and what type and stage of shock do you think Kevin is experiencing and why?
4. What complications can occur as a result of shock?
5. What other assessment data would be helpful for the nurse to have to prepare Kevin's care plan?
6. What are the priorities of care for Kevin on admission?
7. Discuss the rationales for Kevin's IV fluid.
8. What is the rationale for placing Kevin on a Mechanical ventilator?
9. Discuss the purpose of the placement of Kevin's CVP line and Arterial line?
10. Discuss the rationale for both continuous pulse oximetry and arterial blood gases?
11. What is the health care provider's rationale for placing the NGT?

12. Kevin's parents stay at his bedside constantly. His mother says to you, "I am so afraid my baby is not going to make it and it's my entire fault. If I had just been watching the traffic closer, maybe this never would have happened." She weeps as her husband tries to console her. How can you therapeutically respond to Kevin's mother?
13. Kevin's brothers visit him regularly and even though he is not responsive, they talk to home about school and bring him cards and messages from his classmates. They bring in a CD player and play some of the current music he likes. Discuss the potential effects of his brothers' visit.
14. Kevin's mother actively participates in his ADLS including bathing, mouth care, and ROM. Discuss the importance of Kevin's mother participating in his care.
15. After 1 week in the PICU Kevin's MAP 90 mmHg and he is being weaned from the vent. His O2 sats are 100% on 30%. Discuss the significance of these findings. How can Kevin's family assist during the time Kevin is being weaned from the vent?
16. Kevin condition has stabilized and is being prepared for transfer to the pediatric surgical unit. He complains of being tired and according to his parents, "He has been so cranky lately even though he's been getting better." Discuss your impression of Kevin's behavior, why he is behaving that way, and suggestions for how his parents can deal with it.
17. On the nursing unit, referrals are made to the hospital school and recreation therapy for Kevin. Discuss the rationale for these referrals.

## Case Study

## The Client with Heart Failure

A 74-year-old woman is admitted to the hospital with heart failure. She had been growing progressively weaker and had ankle edema, dyspnea on exertion, and three-pillow orthopnea. On admission, she is severely dyspneic and can answer questions only with one-word phrases. She is diaphoretic, with a heart rate of 132 beats/min, and blood pressure 98/70. She is extremely anxious.

The nurse performs a physical assessment of the client with heart failure and defers questions until the client has gained some relief as a result of emergency interventions. The priority assessments are as follows:

1. Considering the process of congestive heart failure, explain the symptoms she is having.

Your client's presenting symptoms are as follows:

2. Based on assessment, identify nursing diagnoses for this client.
3. The physician orders the following items for this client. (Start an IV, then give dobutamine 3 mg/kg/hr IV; Furosemide (Lasix) 40 mg IV stat; Digoxin 0.5 mg PO stat, then 0.125 every 6 hours for three doses, with ECG before doses 3 and 4; Morphine 2 mg IV stat and then 2 mg IV every 1 to 2 hours prn; Oxygen 4 L/min per nasal cannula; Schedule for an echocardiogram; No added salt diet; Weigh daily and monitor input and output) Explain the rationale for these medications and treatments.

## Week 2

### Concept: Sensory Perception, Mobility

#### Drug Calculations:

- 1) Cardizem 250 mg in 250 mL of 0.9% NaCl to infuse at 10mg/hr. How many mL/hr will you set the pump?
- 2) Heparin 25,000 units in 500ml 0.9% NaCl to infuse at 1150units/hr. How many mL/hr will you set the pump?
- 3) You are to administer 40 mg of IV solumedrol. This medication comes prepared as 125 mg of solumedrol in 2 mL of NaCl. How many mL would you give?
- 4) Dopamine 800mg in 250mL of D5%W to infuse at 10mcg/kg/min. The patient weighs 83kg. How many mL/hr would you give?
- 5) Dobutamine 250mg in 250ml of D5%W to infuse at 10mcg/kg/min. The patient weighs 62kg. How many mL/hr would you give?
- 6) Lidocaine 1 g in 250 mL of D5%W to infuse at 2mg/min. How many mL/hr would you give?
- 7) Nitroglycerine 50mg in 250mL D5%W to infuse at 10mcg/min. How many mL/hr would you give?
- 8) Levophed (norepinephrine) 4mg in 250 mL NaCl to infuse at 25 mL/hr. How many mcg/min would you infuse this medication?

## CASE STUDY

**Chief Complaint:** 19-year-old man with broken back.

**History:** Allen Dexter, a 19-year-old college student, was rock climbing when he fell 30 feet to the ground. Paramedics arriving at the scene found him lying in the supine position, unable to move any extremities and complaining of neck pain. He was awake, alert, and oriented to his current location, the date and day of the week, and the details of his fall. His responses to questioning were appropriate. He complained that he could not feel his arms and legs. His pupils were equal and reactive to light. He showed no other signs of injury except for several scrapes on his arms. His vital signs revealed a blood pressure of 110 / 72, heart rate of 82 beats per minute, respirations of 18 per minute. The paramedics applied a cervical collar, placed him on a back board, immobilized his head, and transported him to the trauma center by helicopter.

Upon examination at the hospital, Allen had minimal biceps brachii stretch reflexes, but no triceps or wrist extensor reflexes. All other muscle stretch reflexes in the upper and lower extremities were absent. His perception of sensory stimuli ended bilaterally at an imaginary line drawn across his chest about 3 inches above the nipples (i.e. everything below felt numb). He had some sensation in his arms, but could not localize touch or describe texture with any consistency there. He was able to raise his shoulders and tighten his biceps brachii slightly in each arm, but could not raise either arm against gravity. His lower extremities were flaccid, despite attempts to move them. Vital signs were taken again at the hospital and were as follows: blood pressure=94 / 55; heart rate=64; respiratory rate=24 (with shallow breathing). His oral temperature was 102.2 degrees F. His color was dusky and his skin was warm and dry to the touch.

X-rays taken upon arrival revealed a fractured vertebra at a particular location. A chest X-ray showed a decreased lung expansion upon inhalation. Blood tests were normal, with the exception of a respiratory acidosis (blood pH = 7.25). The neurosurgeons immobilized his neck by inserting tongs into the skull above the ears to hold his neck in a position so that no further injury could occur. Allen was transferred to intensive care and his condition was stabilized.

A physical examination four days later revealed normal vital signs and no change in his arm strength or sensation, but also marked spasms and exaggerated stretch reflexes of the lower extremities. He also had urinary incontinence which required the placement of a Foley catheter connected to a urine collection bag.

### Questions:

1. Why did Allen's heart rate and blood pressure fall in this time of emergency (i.e. at a time when you'd expect just the opposite homeostatic responses)?

2. Upon admission to the hospital, Allen's breathing was rapid and shallow. Can you explain why?

3. Why did Allen lose some sensation in his arms and all sensation from the upper trunk down?

4. Why did Allen have dry skin and a fever upon admission to the hospital?

5. Based upon the physical exam findings, which vertebral bone do you think was fractured? Give reasons for your answer.

6. What is the normal pH of the blood? Why was Allen's blood pH below normal?

7. What is the primary muscle of respiration? What nerve innervates this muscle?

8. Which spinal nerves contribute neurons to the nerve you named in question #7?

9. By four days after the injury, some of Allen's signs and symptoms had changed. Allen's arm muscles were still flaccid, yet his leg muscles had become spastic and exhibited exaggerated stretch reflexes. Use your knowledge of motor neural pathways to explain these findings.

10. Why did Allen suffer from urinary incontinence?

## Week 3

### Concept: Oxygenation

#### A. Drug Calculations:

1. Order-Dexamethasone 1 mg  
Drug available-Dexamethasone 0.5 mg per tablet
  
2. Order-Tagamet 0.6g  
Drug available-Tagamet 300 mg per tablet
  
3. Order: Penicillin G procaine 225,000 units IM q 12h.  
The label on the vial reads 400,000 units per milliliter. How many mLs will you administer? **(Show all your work. Round to the nearest 10th. Circle your final answer.)**
  
4. Order:Amikin (amikacin sulfate) 300 mg IVPB in 100 mL DW to infuse in 1h.  
The drop factor is 10 gtt/mL. Calculate the rate in drops per minute. **(Round to the whole number and circle your answer).**
  
5. Heparin 4,500 units subcutaneous q8h.  
**Available:5,000 units/mL. How many mLs will you administer?  
(Show all your work. Round to the nearest 10<sup>th</sup>. Circle your final answer.)**

## **CASE STUDY Chest Trauma and Acute Respiratory Distress Syndrome**

A 36-year-old woman is brought to the hospital following a head-on car accident. She was unrestrained and sustained a blunt injury to the chest from hitting the steering wheel. Initially, she is asymptomatic. Initial orders include a stat chest x-ray, arterial blood gases, and oxygen at 4 L/minute via Venturi mask.

1. What other assessments should be made when she arrives in the ED?
2. Gradually over the next 24 hours, she develops difficulty breathing, hypoxemia, and secretions increase. The nurse notifies the physician who orders an arterial blood gas and a chest x-ray. The chest x-ray obtained in the ED showed no abnormalities; however, the repeat x-ray now shows a hazy opacity in the lobes and the physician makes a diagnosis of pulmonary contusion. What physical assessments will accompany this diagnosis?
3. Arterial blood gas results show: Pao<sub>2</sub> 68 mm Hg, Paco<sub>2</sub> 32 mm Hg, and pH 7.53. What do these values suggest?
4. What interventions should be implemented based on the laboratory results?
5. The patient temporarily responds to the high-flow oxygen therapy, but later the nurse notes that the patient demonstrates hyperpnea, grunting respiration, cyanosis, pallor, and intercostal and substernal retractions, with a change in mental status. The nurse suspects ARDS and calls the physician to obtain an order for which primary laboratory study used to establish this diagnosis?
6. Discuss the pathophysiology of ARDS.
7. The patient is intubated for respiratory failure. Describe how the nurse would secure the ET in place.
8. The patient is placed on a respirator with PEEP. Why is PEEP necessary?
9. Explain the rationale for the use of corticosteroids, antibiotics, and colloids in the management of the patient with ARDS.

## **Interventions for Critically Ill Patients with Respiratory Problems**

### **CRITICAL THINKING CHALLENGE**

The client is a 36-year-old woman who had a laminectomy yesterday for a ruptured lumbar disk. She has had pain for several months and has been unable to participate in her usual exercise program. She smokes one pack of cigarettes per day and drinks about two glasses of wine per week. Her other medications include oral contraceptives, ibuprofen PRN for joint and muscle pain, and sumatriptan (Imitrex) several times a month for migraine headaches. When you go to assess her this morning, she tells you that she is nauseated and having some chest pain.

1. What risk factors does she have for a pulmonary embolism?
2. For what other clinical manifestations should you assess?
3. Is oxygen by mask appropriate for this client? Why or why not?
4. What other actions should you initiate?

### **CRITICAL THINKING CHALLENGE 2**

A patient with a PE is going home. She will continue warfarin therapy for at least 1 month.

1. What will you tell this client about warfarin therapy?
2. Is this client still at risk for a PE? Why or why not?
3. How can this client reduce her risk for PE?

## NCLEX AND DECISION-MAKING CHALLENGES

You are assigned to care for a 60-year-old woman who is in the medical intensive care unit (MICU) for community-acquired pneumonia requiring mechanical ventilation. She is a 1 pack per day (ppd) smoker and does not use alcohol or recreational drugs. Before admission, she had several days with shortness of breath (SOB), a productive cough, and generalized fatigue. While in the MICU, she was on strict bedrest because of mechanical ventilatory support. Her drugs include erythromycin for community-acquired pneumonia, hydromorphone (Dilaudid) as needed for pain, and acetaminophen (Tylenol) as needed for fever. Two hours ago, she was extubated, and the mechanical ventilation discontinued. As you begin your morning physical assessment, you notice that she is agitated, confused, and tachycardic, and has tachypneic breathing at 35 times per minute; her oxygen saturation by pulse oximetry is 86%.

1. What should be your first action?
2. What risk factors does she have for a pulmonary embolism?
3. For what other manifestations should you assess?
4. Is oxygen by mask appropriate for this patient? Why or why not?
5. What other actions should you take?

### SKILL 13.11: Inserting an Oropharyngeal Airway

Procedure	Performed		Comments
	Yes	No	
1. Gathered equipment and supplies. Introduced self, explained what procedure was to be done and why. Performed hand hygiene, following infection control measures, and verified client's identity. Provided privacy. Provided comfort and safety for client and self, including raising bed to appropriate height for procedure.			
2. Assured that client was unresponsive and had NO gag reflex.			
3. Selected appropriate size airway (length was from corner of mouth to corner of ear tragus).			
4. Donned gloves.			
5. Gently opened client's mouth with crossed finger technique, placed own thumb on client's lower teeth and index finger on the upper teeth and gently pushed them apart. Used modified jaw thrust to insert tube, if necessary.			
6. Performed oral suctioning.			
7. Held tongue down with tongue depressor and advanced airway to back of tongue OR advanced airway upside down (curved upward) and, as airway passed uvula, rotated the airway 180degrees.			
8. Checked that concave curve fit over tongue and that it extended from the lips to the pharynx, displacing the tongue anteriorly.			
9. Taped top and bottom of airway in position.			
10. Positioned client on side to facilitate drainage.			
11. Returned bed to lowest height. Removed gloves and discarded and performed hand hygiene.			
12. Observed position of airway and evaluated quality of client's spontaneous breathing.			

**SKILL 13.12: Inserting a Nasopharyngeal Airway (Nasal Trumpet)**

Procedure	Performed		Comments
	Yes	No	
1. Gathered supplies. Introduced self, explained what procedure was to be done and why. Performed hand hygiene, following infection control measures, and verified client's identity. Provided privacy. Provided comfort and safety for client and self, including raising bed to appropriate height for procedure.			
2. Selected appropriate size tube (length from tip of nose to earlobe and lumen slightly narrower than client's naris).			
3. Donned gloves.			
4. Lubricated entire length of tube.			
5. Inserted entire tube gently through naris, following anatomical line of nasal passage. If obstructed, tried other naris.			
6. Verified position. a. Felt exhaled air through tube opening. b. Inspected for tube tip behind uvula.			
7. Taped top and bottom of tube in position if necessary to prevent injury to lips, teeth, tongue, and posterior pharynx.			
8. Positioned client on side to facilitate drainage of secretions.			
9. Returned bed to lowest height. Removed gloves, discarded, and performed hand hygiene.			
10. Continued to monitor position of airway and client's response.			
11. Suctioned upper airway PRN using clean technique.			

**SKILL 13.13: Assisting with Endotracheal Intubation**

Procedure	Performed		Comments
	Yes	No	
1. Gathered equipment and supplies. Introduced self, explained what procedure was to be done and why. Performed hand hygiene, following infection control measures, and verified client's identity. Provided privacy. Provided comfort and safety for client and self, including raising bed to appropriate height for procedure.			
2. Determined client had no protective airway reflexes. Brought crash cart to client's doorway. Assisted rapid response team as needed.			
3. Donned clean gloves and personal protective gear.			
4. Placed client in flat supine position with pillow under shoulders to hyperextend neck and help open airway. Positioned so that mouth, pharynx and trachea were aligned.			
5. Restrained client's wrists only if necessary.			
6. Premedicated client as ordered.			
7. Preoxygenated client for several minutes, using bag-valve-mask.			
8. Attached bag-valve-mask, provide ventilation, and looked for chest to rise.			
9. Checked tube placement using CO <sub>2</sub> detector.			
10. Placed stethoscope over epigastrium.			
11. Auscultated lung fields for bilateral breath sounds.			
12. Marked tube at level of client's front teeth and taped securely with twill or adhesive tape or Velcro holder or Endotube stabilizer.			
13. Rechecked tube placement with the previous measures (steps 8-10).			

16. Placed bite block or oral airway if ET tube had been positioned orally.			
17. Attached O <sub>2</sub> source to ET tube.			
18. Discarded disposable equipment, removed protective gear, gloves, and performed hand hygiene. Returned bed to lowest height.			
19. Positioned client in position as ordered.			
20. Obtained chest x-ray to confirm tracheal placement of ETT tube.			
21. Placed call bell and writing material within client's reach (as indicated).			
22. Repositioned and retaped ETT every 4 hours: right, center, left, then repeat (using Velcro or Endotube stabilizer).			

## Week 4

### Concept: Intracranial regulation

#### Drug Calculations:

- 1) The physician ordered Norepinephrine (Levophed) for a patient who is septic with a low blood pressure. The levophed is mixed 4mg in 250mL D5W. Levophed is to be started at 10mcg/min. Please calculate the rate of flow. \_\_\_\_\_ mL/hr.
- 2) Ordered is amiodorone. It is mixed 900 mg in 500 mL D5W. The physician wants the medication started at 0.5mg/min. Calculate the rate of flow. \_\_\_\_\_ ml/hr.
- 3) Ordered is Dopamine. The physician wants the medication started at 5mcg/kg/min. The medication is prepared 400mg/250 mL D5W. The patient weighs 150lbs. Calculate the rate of flow. \_\_\_\_\_ ml/hr.
- 4) The patient is receiving Dopamine 800mg/250mL D5W. You notice the infusion pump set at 46mL/hr. The patient weighs 69 kg. How many mcg/kg/min is the medication actually infusing?
- 5) Heparin is to be infused at 960 units/hr. The medication is prepared 25,000/250 mL D5W. Calculate the rate of flow \_\_\_\_\_ mL/hr.

## GLASCOW COMA SCALE

1. What are the three components of the Glasgow Coma Scale?

- A.  Eyes, Motor, Memory
- B.  Eyes, Motor, Pain
- C.  Eyes, Verbal, Motor

2. Each of the three components of the Glasgow Coma Scale have a number of steps. Which of these are the correct combinations?

- A.  Eyes 5 Verbal 4 Motor 6
- B.  Eyes 4 Verbal 5 Motor 5
- C.  Eyes 4 Verbal 5 Motor 6

3. What possible sequence of responses is assessed in the eye component?

- A.  Spontaneous, To Sound, To Pressure, None
- B.  Spontaneous, None, To Pain, To Sound
- C.  To Pressure, None, To Spoken Word, Spontaneous

4. In each component of the Glasgow Coma Scale the 'Best Response' is,

- A.  No response
- B.  Spontaneous
- C.  A normal response

5. When assessing a patient, you should:

- A.  Observe, Move, Feel, Rate
- B.  Check, Observe, Stimulate, Rate
- C.  Look, Feel, Rate, Stimulate

6. When assessing a patient, what is the reason for the CHECK step in the assessment?

- A.  To listen for sounds from the patient

- B.  To identify factors that may interfere with the assessment
- C.  To look at the previous Glasgow Coma Scale assessment on the patient's chart

7. If when you approach the patient they are awake and looking at you, how would you record this on the Glasgow Coma Scale?

- A.  Spontaneous eye opening
- B.  Orientated
- C.  Obeying commands

8. You are called to see a patient who has fallen through a plate glass door. As you approach the patient you observe that their eyes are extremely swollen and they are unable to open them. How would you record the eye component of the scale?

- A.  None
- B.  To pain
- C.  Eyes Not testable (NT)

9. A 45 year old man called Hamish is admitted to the Emergency Department on Sunday 1 January 2014 after being assaulted. When you ask the patient to tell you his name, where he is and what the date is, he answers, Hamish, Hospital, December. How would you record this finding?

- A.  Orientated
- B.  Confused
- C.  Words

10. You are assessing the motor component of a patient's Glasgow Coma Scale. They are unable to obey commands but bend their elbow when their finger nail bed is stimulated. What do you do next?

- A.  Record 'Normal Flexion'
- B.  Apply supraorbital notch pressure
- C.  Apply a trapezius Pinch

11. A patient reacts to supraorbital pressure by moving their hand up to his face. How would you record this response?

- A.  Normal Flexion
- B.  Extension
- C.  Localises

12. Normal flexion, where a patients elbow bends and their arm moves rapidly away from their body and from a stimulus, is given what number in the Glasgow Coma Scale?

- A.  Motor 2
- B.  Motor 4
- C.  Motor 1

13. If you were told by a colleague that their assessment of a patient's Glasgow Coma Scale was E2, V3, M5, how would you interpret this?

- A.  The patient's eyes open to sound, they are orientated and able to obey commands
- B.  The patient's eyes open to pressure, they can utter some words but do not form sentences, and they are able to localise to trapezius pinch.
- C.  The patient's eyes open spontaneously; they are orientated and able to obey commands

14. In which of these scenarios of assessment of the motor component of the Glasgow Coma Scale is the best response on the patient's right-hand side?

- A.  R arm localises, L arm flexing
- B.  R arm no response, L arm extension
- C.  R arm localises, L arm obeys commands

## **Week 5**

### **PEDS HESI exam.**

### **Complete the pediatric practice HESI exams under the Evolve case studies.**

Also, to help you prepare for the pediatric HESI, the HESI Online course has a whole section on pediatrics for you to review.

This pediatric HESI exam will only be given on Wednesday, September 27, 2017. Please make plans to take this HESI exam even if your scheduled lab is on Friday.

## Week 6

### Concept: Perfusion

#### A. Drug Calculations:

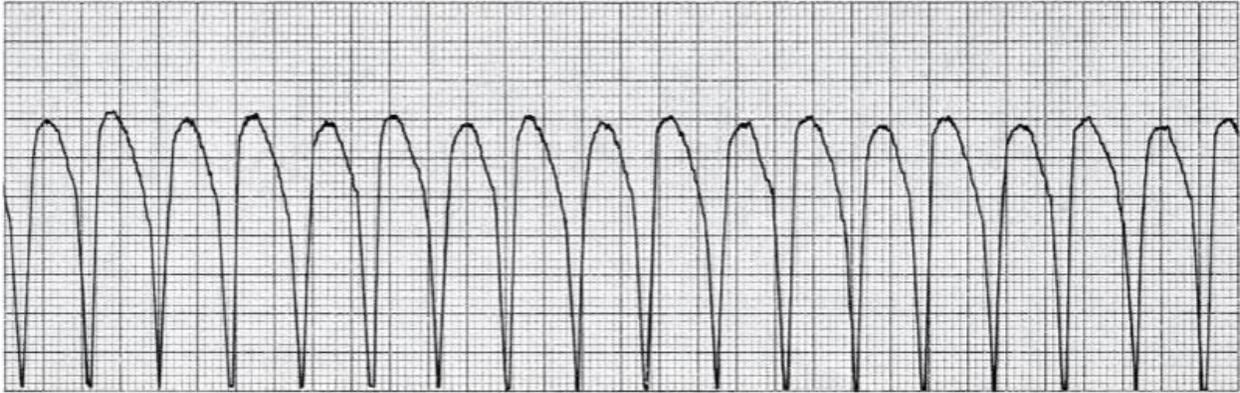
1. Dopamine 400 mg in 250 mL D<sub>5</sub>W to infuse at 5 mcg/kg/min. The patient's weight is 110 pounds. How many mL/hour would this be on an infusion pump?
2. A Dopamine drip (400mg in 250 cc of IV fluid) is infusing on your 80 kg patient at 20 mL/hour. How many mcg/kg/min are infusing for this patient?
3. A Nitroglycerin drip is ordered for your patient to control his chest pain. The concentration is 100 mg in 250 mL D<sub>5</sub>W. The order is to begin the infusion at 20 mcg/min. What is the rate you would begin the infusion on the infusion pump?
4. A Nitroglycerin drip (100mg in 250 cc D<sub>5</sub>W) is infusing on your patient at 28 mL/hour on the infusion pump. How many mcg/min is your patient receiving?
5. A procainamide drip is ordered (2gms in 250 mL D<sub>5</sub>W) to infuse at 4 mg/min. The patient weighs 165 pounds. Calculate the drip rate in mL/hour for which the infusion pump will be set at.
6. A Lidocaine drip is infusion on your 90 kg patient at 22 mL/hour. The Lidocaine concentration is 2 grams in 250 cc of D<sub>5</sub>W. How many mg/min is your patient receiving?

## Case Study The Patient with a Dysrhythmia

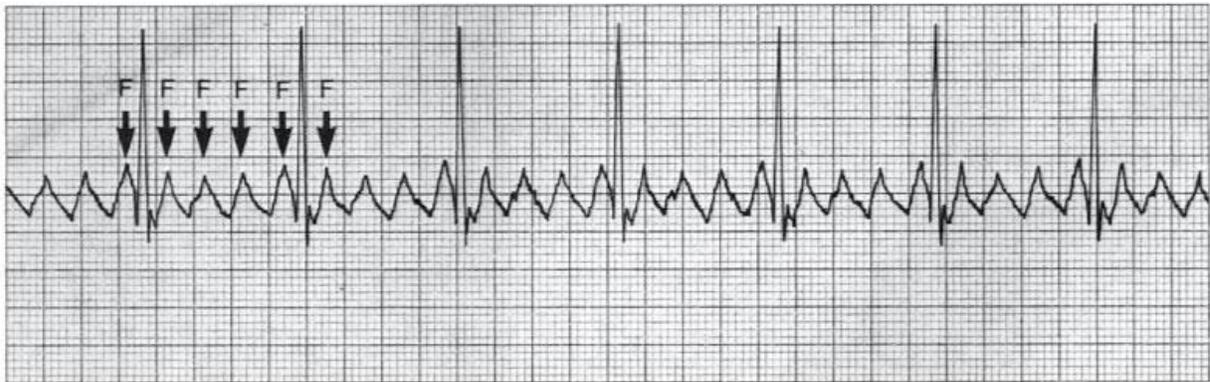
A 78-year-old woman is admitted to a telemetry unit directly from her physician's office for evaluation and management of congestive heart failure. She has a history of systemic hypertension and chronic moderate mitral regurgitation. Her medication orders include furosemide (Lasix) 80 mg PO four times a day, digoxin 0.125 mg PO daily, and diltiazem (Cardizem) 60 mg PO three times a day. Your initial assessment of the client reveals a pulse rate that is rapid and very irregular. The client is restless, her skin is pale and cool, she states she is dizzy when she stands up, and she is slightly short of breath. Her blood pressure is 106/88. She is short of breath and anxious. Her ECG monitor pattern shows uncontrolled atrial fibrillation, with a rate ranging from 150 to 170 beats per minute. Her oxygen saturation level is 90%.

1. Given the assessment findings, what should you do first?
2. What additional physical assessment techniques would you perform?
3. Because the length of time the client has been in atrial fibrillation is unknown, what potential complication may occur if cardioversion is attempted?
4. Based on your answer for number 3, what should be done before elective cardioversion is attempted?
5. What other medical therapy might this client receive before elective cardioversion is done?
6. Later that evening, the client calls the nurse because she feels "like something terrible is going to happen." She complains of chest pain, has increased shortness of breath, and has coughed up blood-tinged sputum. What do you suspect? What is the first thing the nurse should do, and what further assessments should be performed at this time?

Please identify the rhythms and how to treat them.

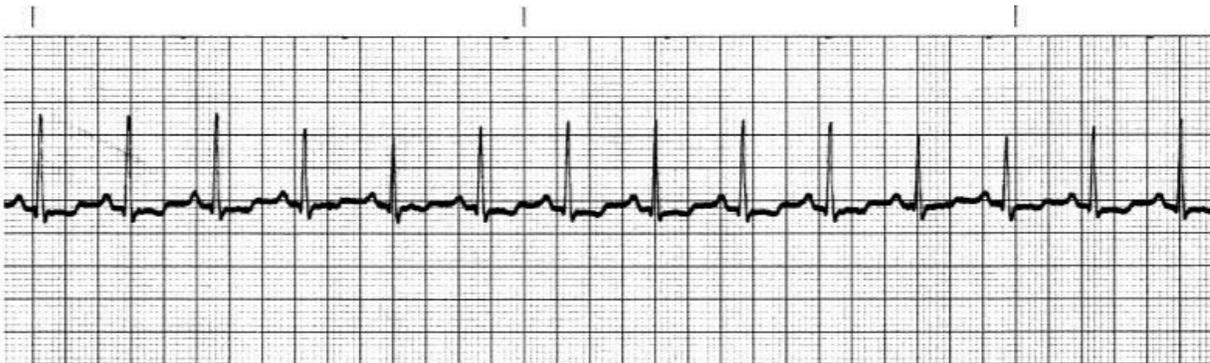


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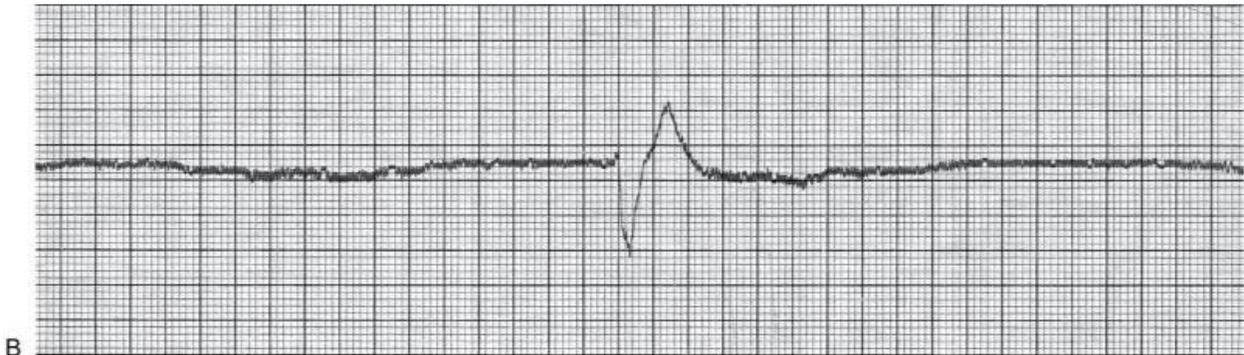


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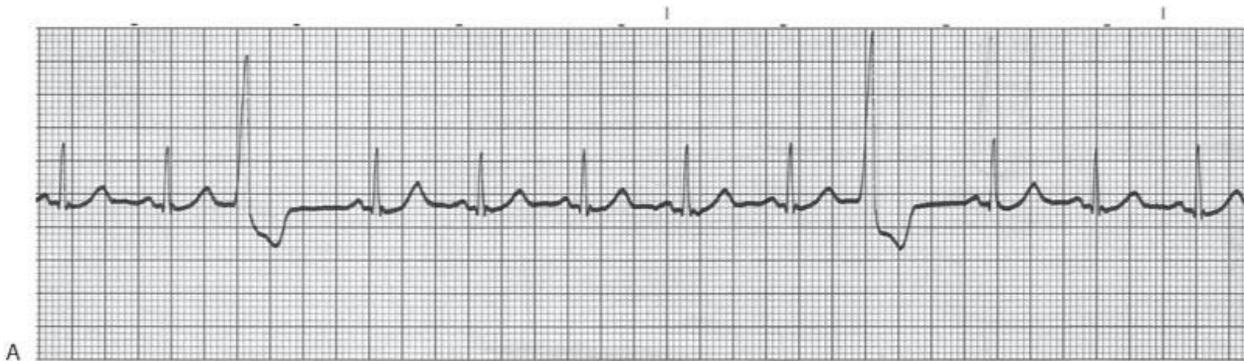
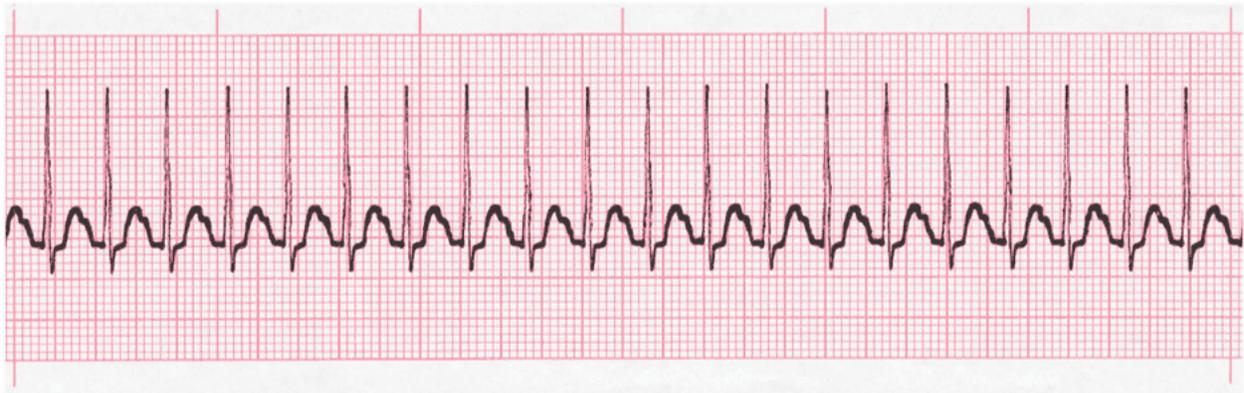
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## **Week 7**

### **MED/SURG HESI EXAM**

You must complete one of the three HESI comprehensive exams under case studies to prepare for the med/surg HESI exam. This med/surg HESI exam will only be given on Wednesday, October 11, 2017. Please make plans to take this HESI exam even if your scheduled lab is on Friday.

## Week 8

### Concept: Elimination

#### CASE STUDY

#### URINARY TRACT INFECTION

Shelly Homes is a 4 y/o preschooler who lives with her parents and younger brother. She and her brother attend a local daycare center during the week while their parents are at work. In the evenings, she and her brother take a bath. After the bath, their parents read to them before bedtime at 8:00pm. Shelly's daycare class includes many children her age and she enjoys playing outside with them. Although snack times are planned, Shelly would rather play and does not always finish her beverages.

Shelly's mother calls the pediatric clinic in town and tells the nurse that Shelly has been running a fever of 101 F for the past 2 days. Although her temperature decreased to 99 F with Tylenol, it returns to 101 F within 4 hours of each dose. Furthermore, her mother also has noticed that Shelly complains that it hurts when "I go pee-pee". Shelly's mother also has noticed that her daughter seems to be in the bathroom every hour. She makes an appointment to see the pediatrician this afternoon.

1. What is the significance of Shelly's clinical manifestations?
2. What other assessment data would be helpful for the nurse to have to prepare Shelly's care plan?
3. What are Shelly's anatomic risk factors for developing a UTI?
4. What are the relationship between Shelly's hygiene habits and her risk for developing a UTI?
5. How does Shelly's level of growth and development places her at risk for the developing a UTI?
6. Shelly's urine culture is positive for Escherichia coli. What is the significance of this finding?
7. What are the priorities for Shelly's care?
8. Shelly is prescribed trimethoprim-sulfamethoxazole 60mg every 12 hours for 10 days. What is this drug and is her prescribed dose safe? Shelly weighs 33 lbs.
9. What are the teaching priorities for Shelly and her mother prior to her leaving the clinic?
10. Shelly is scheduled for a return visit to the clinic in 2 weeks. What is the purpose of this appointment?

## CASE STUDY

### Acute Pyelonephritis Case

Mrs. Reese is a 27 year old female who had a sudden onset of abdominal pain at 2:00am. The pain became so severe that she went to the ER. Upon her arrival to the ER, she described her pain as a constant ache in her lower right quadrant of her abdomen that radiates across the flank of her lower back. She rates her pain a 9 out of 10 on a 0-10 pain scale. She is also complaining of nausea and has vomited 3 times prior to arrival. She is febrile and complaining of chills.

#### Assessment:

Mrs. Reese's vital signs are BP 118/60, HR 108, RR 24, and temp. 40 C (104.1F) Her oxygen saturation is 100% on room air. The nurse asks Mrs. Reese if she has noticed any recent changes in her voiding, such as burning, frequency, or feeling as if she is unable to empty her bladder completely. The nurse also asks Mrs. Reese if she has had a fever in the days prior to coming to the hospital. Mrs. Reese states, "Now that I think about it, I have been going to the bathroom more often than usual, and it smelled a little funny. The other day I noticed a dull pain in my lower back. I figured it was from picking up my daughter. Yesterday I remember thinking I felt warm, but my daughter was getting into something and I got distracted and never took my temperature."

Upon physical examination, Mrs. Reese's skin is warm, and her face is flushed. Her abdomen is slightly distended and tender on palpation. Her bowel sounds are hypoactive in all four quadrants. She is admitted with a suspected diagnosis of acute pyelonephritis. Mrs. Reese will be hospitalized for a few days. She expressed concern to the nurse stating, "I need to hurry up and get better. My husband works two jobs, and my parents can only stay at my house for a day or two to care for my daughter. I need to get home as soon as possible. My daughter needs me."

Intravenous (IV) fluids are prescribed as ½ normal saline (1/2 NS) at 100 mL per hour. Diagnostic tests include a complete blood count with differential (CBC with diff), comprehensive metabolic panel (CMP), urinalysis with culture and sensitivity (U/A C& S), X-ray of the kidneys, ureters, and bladder (KUB) with intravenous pyelography (IVP), and blood cultures X 2 sites. Medications prescribed include ketorolac tromethamine, ondansetron hydrochloride, and levofloxin.

Results of the CBC include a white blood cell (WBC) count of 14,200 cells/mm<sup>3</sup>. Her CMP results are all within normal limits. The urinalysis reveals the presence of a large amount of occult blood, protein 30mg/dL, 6-10 WBCs, 21-30 red blood cells, moderate mucous and moderate amount of bacteria. The urine culture and sensitivity is positive for Escherichia coli

(E. coli) bacteria. The KUB with IVP shows normal urinary structures without the presence of stones or obstructions.

1. While in the ER, the nurse asks Mrs. Reese if she has noticed any recent changes in her voiding or a fever in the days prior to hospitalization. Explain how the assessment data relates to Mrs. Reese's admitting diagnosis?
2. Women are more likely to experience a UTI up until age 50 years, when the risk is similar in both genders. Explain why women are at increased risk and why older men experience more UTI's than younger men do?
3. Discuss the pathophysiology of acute pyelonephritis and identify the most common organism causing this infection?
4. Identify the risk factors that placed Mrs. Reese at greater risk for the development of acute pyelonephritis.
5. What are the characteristic clinical manifestations of pyelonephritis?
6. Mrs. Reese has a KUB with IVP. Explain this diagnostic test. How do the results help the health care provider to confirm the admitting diagnosis?
7. Mrs. Reese has no known allergies. She has been prescribed the following medications, ketorolac tromethamine, ondansetron hydrochloride, and levofloxin. Provide a rationale for why each medication has been included as part of her medical management and any potential contraindication(s) of her taking these medications.
8. The nurse is designing Mrs. Reese's plan of care. Identify three priority nursing diagnoses for inclusion in the plan.
9. The nurse places highest priority on the nursing diagnosis acute pain r/t inflammation and irritation of urinary tract. State an outcome goal appropriate for Mrs. Reese and at least two nursing interventions to help achieve the goal.
10. Two days later, Mrs. Reese is afebrile and her nausea and vomiting have resolved. She is being discharged on an oral antibiotic. Provide the patient with education about her prescribed antibiotic and symptoms that warrant notification of her health care provider.
11. While the nurse is discontinuing the IV access, Mrs. Reese asks, "My doctor said that there is a chance I could get sick with this infection again. Is there anything I can do to help prevent that?" Offer Mrs. Reese at least five health promotion behaviors to help prevent a UTI and recurrent acute pyelonephritis.

12. Mrs. Reese asks the nurse, “I heard if you drink cranberry juice it can cure a urinary tract infection. Is this true?” How will the nurse respond and what are three other complimentary therapies that the nurse might suggest?

## **CASE STUDY**

### **Chronic Renal Failure**

Mr. Rossi is a 58 year old male diagnosed with diabetic nephropathy 10 years ago. He is now in end stage renal failure and has recently started continuous ambulatory peritoneal dialysis (CAPD) in his home.

On a snowy day in February, the visiting nurse has come to see Mr. Rossi and his wife to reinforce instructions regarding the proper technique for peritoneal dialysis and to assess how the Rossi’s are coping. When the nurse arrives, Mr. Rossi is resting comfortably in a reclining chair with a bottle of diet cola on the tray next to his chair. The nurse has concerns about Mr. Rossi’s diet, and during the home visit, the nurse observes several behaviors that indicate a need for further teaching.

1. Briefly discuss how Mr. Rossi’s past medical history increased his risk of developing renal failure.
2. Describe the physiologic changes in the kidneys that lead to chronic renal failure (CRF).
3. What is glomerular filtration rate (GFR)? How is GFR measured and what is the normal range in a healthy adult?
4. According to the national Kidney Foundation’s five- stage classification system of chronic kidney disease, which stage of CKD is Mr. Rossi in, and what would you anticipate his GFR to be?
5. Briefly describe the changes in urine output characteristic of ESRD.
6. Briefly explain how peritoneal dialysis clears the body of excess water and waste products of metabolism. Describe three main types of peritoneal dialysis.
7. What are some advantages of peritoneal dialysis as compared to hemodialysis? Discuss why peritoneal dialysis is more favorable for Mr. Rossi than the hemodialysis treatment option.
8. Mrs. Rossi shows the nurse where they have cleared a clean space in their garage to store the supplies for Mr. Rossi’s dialysis. What should the nurse remind the Rossis to do before attaching the dialysate to Mr. Rossi’s peritoneal catheter?
9. The nurse asks Mrs. Rossi about the last few meals she prepared for her husband. Mrs. Rossi indicates the following meals:
  - a. Whole grain cereal with milk, orange juice, and a banana

- b. A roast beef sandwich with cheese and mayonnaise
- c. White bread toast, apple juice, and tea
- d. A peanut butter and jelly sandwich with diet cola

Clarify to Mrs. Smith which of these meals was the most appropriate for Mr. Rossi regarding his renal diet and your concerns about the other meals she prepared.

10. The Nurse notices that by the reclining chair where Mr. Rossi sits is a 2 liter bottle of diet cola. Why is the nurse concerned?
11. Who should the visiting nurse arrange to meet with the Rossis to provide additional teaching regarding appropriate food and beverage choices for a patient with renal failure?
12. Mrs. Rossi asks the nurse, "Someone at church said I should watch that my husband does not fall. They said he could break his hip very easily because people with bad kidney disease have very brittle bones. Is that true?" Help the nurse explain why patients with renal failure develop changes in their bones and offer some examples of renal osteodystrophy that may develop.
13. Identify 5 priority nursing diagnoses for Mr. Rossi.
14. The nurse reminds Mr. Rossi that he is at risk of becoming anemic. Briefly explain to him why he is at risk and what are the signs and symptoms he should report to his health care provider.
15. The nurse notices a napkin on the kitchen table with two calcium carbonate (Tums) tablets on it. When the nurse asks Mr. Rossi if he is taking his Tums with every meal, he replies, "Sometimes I remember. Sometimes I forget. I figure it is not a problem if I forget once in a while. I don't have any symptoms of heart burn anyway." In lay terminology, how might the nurse explain to Mr. Rossi the importance of taking his Tums with every meal?
16. Mrs. Rossi calls the visiting nurse to report that "When my husband's solution was drained out of his belly today, I noticed it was cloudy looking and he has a fever of 102 F (38.9 C)." Briefly discuss the common complication of peritoneal dialysis that Mr. Rossi appears to have developed. What should the nurse tell the Rossis to do?
17. Discuss the lifestyle changes imposed upon the patient who is on peritoneal dialysis and how these changes may affect the patient's quality of life.

## Week 9

### Concept: Tissue Integrity

1. A 32-year-old man is intoxicated and was witnessed to trip and fall into a bonfire. He is rushed to the ED via EMS. He is breathing adequately, there are no signs of smoke inhalation. IV access is obtained and routine labs are pending. NG suction has been placed. He is assessed to have sustained 2nd and 3rd degree burns to 15% of his body. He weighs 192 lbs. No fluids have yet been given. What should the starting fluid rate be?

2. A man who weighs 65 kg sustains second and third degree burns over both of his lower extremities when his pants catch on fire. When examined shortly thereafter, it is ascertained that virtually all of the skin from both groins to the tip of the toes, front and back, has burned. According to the **modified** Parkland formula, what is the approximate total amount of IV fluid that can be expected to require during the first 24 hours post-burn?

3. A 220 pound male has second and third degree burns on his whole chest and abdomen, the front of both legs and the front of his right arm. Using the rule of nines we determine what his total body surface area was involved in the burn. What is the amount of fluid required in the first 24 hours?

4. A 138 pound female with second degree circumferential burns to both her legs. She also has third degree burns to her full back and the back of her head. What is her percentage of burn and what is the amount of fluid she would need in the first 8 hours?

5. A 39-year-old man, who weighs approximately 160 pounds, was trapped inside his burning house and sustained full-thickness burns to approximately 40% of his body. On the basis of the Parkland formula, how much IV crystalloid solution should he receive within the first hour?

### **Burn Case Study**

**Chief Complaint:** 8-year-old girl admitted for severe second- and third-degree burns following her rescue from a burning house.

**History:** Angela Creighton, an 8-year-old white female, was transported by ambulance to the emergency room after being rescued from her burning house. She was asleep at night when a spark from the family fireplace started a fire, leaving her trapped in her bedroom. By the time the fire rescue squad arrived, she had suffered severe burns and excessive smoke inhalation.

In the emergency room, Angela was unconscious. She had second-degree burns over 5% of her body and third-degree burns over 15% of her body -- both covering her thoracic and abdominal regions and her right elbow. Her vital signs were quite unstable: blood pressure = 55 / 35; heart rate = 210 beats / min.; and respiratory rate = 40 breaths / min. She was quickly deteriorating from circulatory failure. Two IVs were inserted and fluids were administered through each. Her vital signs stabilized and she was transported to the pediatric intensive care unit (ICU).

Angela regained consciousness the following morning, surprisingly complaining of only minor pain over her trunk. Following debridement of her burns and application of a broad-spectrum, topical antibiotic, a plastic epidermal graft was applied over the burned areas. Despite treatment with a broad-spectrum antibiotic, she developed a systemic staphylococcal infection, necessitating a switch to a different antibiotic.

Angela began a long, slow recovery. Her position in bed had to be changed every 2 hours to prevent the formation of decubitus ulcers. She lost 9 pounds over the next 3 weeks, despite nasogastric tube feeding of 5000 calories per day. After 9 weeks, sheets of cultured epidermal cells were grafted to her regenerating dermal layer. By the 15th week of her hospitalization, her epidermal graft was complete, and she was back on solid foods, her antibiotics were discontinued, and she was discharged from the hospital with a rehabilitation plan for both physical and occupational therapy at home, as well as twice-weekly visits by a nurse.

### **1. Questions:**

1. Briefly describe the three major layers that make up healthy skin.

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2. Briefly describe the extent of damage seen in first-degree burns, second-degree burns, and third-degree burns.

3. Why was this girl relatively pain-free when she woke up?

4. Explain why this patient's blood pressure was so low and her heart rate so high upon arrival at the emergency room.

5. Why was it important to immediately administer intravenous fluids to this girl?

6. What is a "broad-spectrum" antibiotic, and why did she need it? Is healthy skin normally colonized by bacteria?

7. Why was skin-grafting necessary in this patient? (Why not just let the skin heal on its own?)

8. Describe the series of events that occur in skin which is healing with the help of a skin-graft.

9. Why are bedridden patients at risk for developing decubitus ulcers? Where on the body do such ulcers most commonly occur?

10. Why did the patient lose so much weight despite being on a very high-calorie diet?

11. What long-term problems may the patient have as a result of extensive scar tissue formation over her trunk and her right elbow?

## Week 10

### Concept: Inflammation, immunity, and infection

#### Drug Calculations:

1. An IV of NS 1,000 mL is to infuse over 7 hours. The drop factor is 15 gtt/mL. Calculate the flow rate in gtt/min. **Drops are to be rounded to the nearest whole number.**

2. Order: Zosyn 2.25mg in 500 mL D<sub>5</sub>W IV to infuse in six hours. At what rate in mL/h will you set the pump? **Round at the end to the nearest 10<sup>th</sup>**

3. Order: Levaquin 500mg IV q.8h.

The label on the vial reads 40mg/mL. How many mL will you administer? **Round at the end to the nearest 10<sup>th</sup>**

4. Heparin 7,200 units subcutaneous q8h

**Available:**5,000 units/mL in a multidose vial

How many milliliters will you give? \_\_\_\_\_  
**Round at the end to the nearest 10<sup>th</sup>**

5. Order: *Ampicillin 175 mg. IV q.8h.*

The directions on the package state: "Reconstitution of the single-use vial with 2 mL yields 250 mg/6 mL." How many milliliters will you administer? **Round at the end to the nearest 10<sup>th</sup>**

6. Humulin R insulin 50 units in 500 mL of 0.9% sodium chloride to infuse at 7 units/hr  
How many hours will the IV infuse? \_\_\_\_\_

How many mL/hr will be infused? **Round at the end to the nearest 10<sup>th</sup>**

\_\_\_\_\_

7. **Ordered** : amiodarone drip. It is mixed 900mg in 500mL D5W. The physician wants the medication started at 0.5mg/min. How many mL/hr would you infuse?

**(Show all your work. Round to the nearest 10<sup>th</sup>. Circle your final answer.)**

8. Order: **clonazepam** (Klonopin) 500 mcg p.o.

Supply: Klonopin 0.25 mg per tablet. How many tablets will you give?

**(Show all your work. Circle your final answer.)**

9. The physician orders IV Propofol 100mcg/kg/min. Your patient weighs 165 lb. How many mcg/min should the patient receive? **(Show all your work. Circle your final answer.)**

10. The physician orders the patient to receive heparin 1500 units/hr of a solution containing 30,000 units/1L. At what rate would you set the IV using a 60gtt/mL administration set? Answer should be in both mL/hr and gtts/min.

## Hypovolemic Shock Case Study

Andrew Jones is a 34 year old convenience store clerk who sustained a gunshot wound to the right chest during a robbery. When the paramedics arrive, his BP was barely palpable at 50 mmHg. His heart rate was 130, and his RR was 35. His skin was pale, cold, and clammy with delayed capillary refill, his radial pulse was weak and thready, and he was unresponsive. His respirations were deep and rapid and supplemental O<sub>2</sub> was give via a 100% NRB. Two 14 gauge peripheral IV lines were started and LR was started wide open.

Upon arrival in the ED, Mr. Jones' SBP was 90 mmHg systolic , HR 120, and RR 26. He was restless and responded only to pain. His skin was pale and cool, and his capillary refill had a defined delay. His chest expansion was unequal and his breath sounds were grossly diminished on the right side. Chest Xray confirmed a right pneumothorax. Labs and a type and cross were drawn and sent.

A 36F chest tube was inserted in the right 8<sup>th</sup> intercostal space in the midaxillary line. Fifteen hundred ml of blood immediately evacuated, with continued bloody drainage up to 2500ml in 30 minutes.

Mr. Jones admission ABG (on 100% NRB mask) and CBC were as follows:

pH 7.21	Hgb 8.2
PaCO <sub>2</sub> 45	Hct 24.1
PaO <sub>2</sub> 91	Platelets 263
SaO <sub>2</sub> 95%	RBC 2.17
HCO <sub>3</sub> 15	WBC 5.8

A foley catheter was inserted and 100ml clear yellow urine was drained. LR continued wide open and patient had received 6 liters IVF and 4 units of O- blood was rapidly infused over 30 minutes prior to going to the OR.

In the OR a right thoracotomy with right pneumonectomy was performed, with repair to the right axillary artery. Mr. Jones received 14L of crystalloid, 20 units of PRBC, 6 units of FFP, and 10 units of Platelets. He was transferred to the CTCU.

Upon arrival to the unit Mr. Jones is still sedated and intubated. He is hemodynamically stable with a BP 110/70, HR 96, and CVP of 10. His vent settings are AC 12, TV 700, FiO<sub>2</sub> 80%, Peep 5. He is not assisting ventilation at this time. His skin is warm and dry, pulses are palpable, and

capillary refill is normal. The nurse notes that his thoracotomy dressing is blood-soaked and diffuse oozing is apparent from all insertion sites. Significant clinical data are as follows:

PT 18.7	Hgb 10.1	Platelets 108
PTT 71.9	Hct 32	RBC 4.6
Fibrinogen 78	WBC 6	

1. Define hypovolemic shock.
2. Was Mr. Jones in hypovolemic shock when the paramedics arrived? What clinical manifestations of hypovolemic shock did he exhibit?
3. Why was LR the fluid of choice for Mr. Jones' initial fluid resuscitation?
4. What other fluids might be considered in initial resuscitation of hypovolemic shock?
5. What is the preferred route of vascular access for fluid resuscitation in hypovolemic shock?
6. A CVP line is inserted in the patient's right subclavian vein during surgery. What are the potential complications of a CVP insertion?

Four hours after admission to the CTCU, Mr. Jones' BP dropped to 72/50, his HR rose to 120, and his CVP was 3mmHg. He received 2 L of LR over the next hour, at which time his BP was 86/60, HR 112, and CVP 5mmHg. His urine output for the last hour was 15 ml. A Pulmonary Artery Catheter was inserted.

7. Placement of a pulmonary artery catheter allows for accurate and detailed cardiopulmonary assessment. What hemodynamic alterations would be expected in hypovolemic shock?

Mr. Jones initial hemodynamic profile revealed the following:

CVP 2

BP 88/66

CO 4

8. What therapy would be appropriate at this point?

9. During the initial resuscitative period, Mr. Jones received 4 units of PRBC. WHY?
10. What is autotransfusion? Would it be useful in this case?
11. What factors in Mr. Jones' case indicate a coagulopathy?
12. What are other complications of massive blood transfusions?
13. When Mr. Jones arrived in the ED, his pH was 7.21, PaCO<sub>2</sub> 45, PaO<sub>2</sub> 91, and HCO<sub>3</sub> 15. What was his acid-base status? What was the etiology of the acid-base balance?
14. List the major compensatory mechanisms in hypovolemic shock and briefly explain each:
  - a. Sympathetic Response
  - b. Renin-Angiotensin-Aldosterone System
  - c. Synthesis of Antidiuretic Hormone
15. Mr. Jones hypovolemia resulted from hemorrhage. What are the common causes of hypovolemic shock?
16. What are the possible renal complications of hypovolemic shock?
17. What are the nursing diagnoses apply in this case?

**Week 11-15 NO lab. Students will have HESI Exams during their scheduled lab time except for week 13 when they will attend the HESI Live Review Course. This course is on November 27, 28, and 29 from 4-10pm. All students are expected to attend.**