Chapter 03: Fluid, Electrolytes, Acid-Base Balance, and Intravenous Therapy

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MULTIPLE CHOICE

1. The nurse uses a diagram to demonstrate how in dehydration the water is drawn into the plasma from the cells by which process?
   a. Distillation
   b. Diffusion
   c. Filtration
   d. Osmosis

ANS: D
The process of osmosis accomplishes the movement of water from the cells into the plasma, causing dehydration.

PTS: 1   DIF: Cognitive Level: Knowledge   REF: 32
OBJ: 3 (theory)   TOP: Dehydration   KEY: Nursing Process Step: Implementation
MSC: NCLEX: Physiological Integrity: Physiological Adaptation

2. The nurse assessing a patient with vomiting and diarrhea observes that the urine is scant and concentrated. Which controlling factor is responsible for compensatory reabsorption of water?
   a. Osmoreceptors in the hypothalamus
   b. Antidiuretic hormone in the posterior pituitary
   c. Baroreceptors in the carotid sinus
   d. Insulin from the pancreas

ANS: B
The antidiuretic hormone controls how much water leaves the body by reabsorbing water in the renal tubules.

PTS: 1   DIF: Cognitive Level: Comprehension   REF: 30
OBJ: 2 (theory)   TOP: Regulation of Body Fluids
KEY: Nursing Process Step: Implementation
MSC: NCLEX: Physiological Integrity: Physiological Adaptation

3. The nurse uses a picture to show how ions equalize their concentration by which passive transport process?
   a. Osmosis
   b. Filtration
   c. Titration
   d. Diffusion

ANS: D
Diffusion is the process by which substances move back and forth across compartment membranes until they are equally divided.

PTS: 1   DIF: Cognitive Level: Knowledge   REF: 31
OBJ: 2 (theory)   TOP: Diffusion   KEY: Nursing Process Step: Implementation
MSC: NCLEX: Physiological Integrity: Physiological Adaptation
4. Which term describes the active transport process that moves sodium and potassium into or out of cells?
   a. Filtration
   b. Sodium pump
   c. Diffusion
   d. Osmosis

   **ANS: B**
   The sodium pump is the mechanism by which sodium and potassium are moved into or out of cells regardless of the concentration.

   **PTS: 1**  
   **DIF: Cognitive Level: Knowledge**  
   **REF: 32**  
   **OBJ: 2 (theory)**  
   **TOP: Active Transport**  
   **KEY: Nursing Process Step: Implementation**  
   **MSC: NCLEX: Physiological Integrity: Physiological Adaptation**

5. The patient taking furosemide (Lasix) to correct excess edema shows a weight loss of 5.5 pounds in 24 hours. The nurse calculates that this weight loss is equivalent to how many liters (L) of fluid?
   a. 1 L
   b. 1.5 L
   c. 2.0 L
   d. 2.5 L

   **ANS: D**
   Each kilogram (2.2 pounds) of weight loss is equivalent to 1 liter of fluid. Therefore, 5.5 pounds ÷ 2.2 pounds = 2.5 liters.

   **PTS: 1**  
   **DIF: Cognitive Level: Application**  
   **REF: 33, Clinical Cues**  
   **OBJ: 1 (clinical)**  
   **TOP: Fluid Loss**  
   **KEY: Nursing Process Step: Assessment**  
   **MSC: NCLEX: Physiological Integrity: Physiological Adaptation**

6. The nurse is caring for a patient with a potassium level of 2.9 mEq/L. The nurse should carefully monitor the patient for which potential problem?
   a. Excessive urinary output
   b. Abdominal distention
   c. Increased reflexes
   d. Hyperactive bowel sounds

   **ANS: B**
   A potassium level lower than 3.5 mEq/L results in reduced urine output, cardiac dysrhythmia, muscle weakness, abdominal pain and distention, paralytic ileus, lethargy, and confusion.

   **PTS: 1**  
   **DIF: Cognitive Level: Application**  
   **REF: 41, Table 3-4**  
   **OBJ: 15 (clinical)**  
   **TOP: Hypokalemia**  
   **KEY: Nursing Process Step: Assessment**  
   **MSC: NCLEX: Physiological Integrity: Basic Care and Comfort**

7. While the nurse is washing the face of a patient in renal failure, the patient demonstrates a spasm of the lips and face. Which laboratory value corresponds with the nurse’s assessment findings?
   a. Potassium of 3.4 mEq/L
b. Calcium of 7.9 mg/dL  
c. Sodium of 140 mEq/L  
d. Phosphorus of 2.8 mg/dL

ANS: B  
Chvostek sign is a signal of hypocalcemia. It occurs when the facial nerve is tapped or stroked about an inch in front of the earlobe and results in unilateral twitching of the face. Hypocalcemia occurs when the calcium level drops below 8.4. A potassium level of 3.4 mEq/L and a sodium level of 140 mEq/L are findings within normal limits. A patient in renal failure is most likely to have a high phosphorus level rather than a low phosphorus level, and 2.8 mg/dL is within the range consistent with hypophosphatemia.

PTS: 1  
OBJ: 4 (theory)  
TOP: Chvostek Sign  
KEY: Nursing Process Step: Assessment  
MSC: NCLEX: Health Promotion and Maintenance: Prevention and Early Detection of Disease

8. Which finding is most important for the nurse to confirm prior to hanging an intravenous (IV) bag containing potassium?
   a. Verify a blood pressure of at least 60 mm Hg diastolic.  
   b. Check for urine output of at least 30 mL/hr.  
   c. Ensure filter placement on the IV line.  
   d. Verify a pulse of at least 50 beats/min.

ANS: B  
An adequate urine output must be present prior to the administration of potassium to ensure adequate excretion of potassium, preventing hyperkalemia.

PTS: 1  
OBJ: 10 (theory)  
TOP: Administration of IV Potassium  
KEY: Nursing Process Step: Assessment  
MSC: NCLEX: Physiological Integrity: Reduction of Risk Potential

9. Which statement demonstrates that the patient accurately understands the nurse’s teaching related to a low-sodium diet?
   a. “I can have all the dried fruits I want.”  
   b. “I’m looking forward to a tall glass of tomato juice.”  
   c. “I’m going to eat my favorite avocado and orange salad.”  
   d. “I’m going to eat a cheeseburger with extra ketchup.”

ANS: C  
Avocado and oranges have no significant sodium content. Dried fruits, tomato juice, cheese, and ketchup are foods with high sodium content that should be limited or avoided.

PTS: 1  
OBJ: 4 (clinical)  
TOP: Low-Sodium Diet  
KEY: Nursing Process Step: Evaluation  
MSC: NCLEX: Physiological Integrity: Basic Care and Comfort

10. The nurse is caring for an 80-year-old patient. Which finding is the best early indicator of dehydration in this patient?
   a. Reduced skin turgor
The nurse understands that this patient’s age places him at greater risk for dehydration. Constipation is the best early indicator of dehydration in the older adult. Older adults have age-related poor skin turgor. Increased temperature and thirst are later signs of dehydration.

11. The patient with long-term obstructive pulmonary disease has a pH of 7, HCO$_3^-$ of 18 mEq/L, and a PaCO$_2$ of 40 mm Hg. These laboratory values are consistent with which acid-base imbalance?
   a. Respiratory alkalosis
   b. Metabolic alkalosis
   c. Respiratory acidosis
   d. Metabolic acidosis

   ANS: D
   These results are indicative of metabolic acidosis.

12. The nurse is caring for a young patient with asthma. Which activity should the nurse encourage in order to help prevent respiratory acidosis?
   a. Engage in deep-breathing exercises every 2 hours.
   b. Drink 8 ounces of fluid every 4 hours.
   c. Ambulate for 15 minutes twice a day.
   d. Sleep with the head of the bed elevated 45 degrees.

   ANS: A
   Deep breathing blows off CO$_2$, which reduces the acid ions, thus preventing respiratory acidosis. Drinking fluids prevents dehydration and keeps secretions moist and thin, and sleeping with the head of the bed elevated will ease breathing and improve gas exchange. Ambulating 15 minutes twice a day does not have an impact on respiratory acidosis.

13. The patient who has had diarrhea for the last 3 days has blood gases of pH of 7.1, HCO$_3^-$ of 20 mEq/L, and PCO$_2$ of 36 mm Hg. These laboratory values are consistent with which acid-base imbalance?
   a. Respiratory alkalosis
   b. Metabolic alkalosis
c. Respiratory acidosis  
d. Metabolic acidosis  

ANS: D  
Metabolic acidosis shows a low pH, low HCO₃⁻, and normal CO₂.  

PTS: 1  DIF: Cognitive Level: Application  REF: 46  
OBJ: 8 (theory)  TOP: Metabolic Acidosis  
KEY: Nursing Process Step: Assessment  MSC: NCLEX: Health Promotion and Maintenance

14. The nurse is caring for a patient with metabolic acidosis. Which assessment finding reveals that the compensatory mechanism to correct this imbalance is in effect?  
a. Increased urinary output  
b. Reduced abdominal distention  
c. Kussmaul respirations  
d. Decreased blood pressure  

ANS: C  
Kussmaul respirations, or deep and rapid respirations, are blowing off carbon dioxide to reduce an acidic state.

PTS: 1  DIF: Cognitive Level: Application  REF: 47  
OBJ: 7 (theory)  TOP: Metabolic Acidosis  
KEY: Nursing Process Step: Assessment  MSC: NCLEX: Physiological Integrity: Physiological Adaptation

15. The nurse assesses the patient’s IV insertion site and observes that the vein is hard, the skin is red and tender, and a blood return in the IV line. After removing the IV catheter, which action should the nurse take next?  
a. Obtain an arm board to properly secure the IV.  
b. Elevate the arm above the level of the heart.  
c. Clean the site with alcohol and apply cool compresses.  
d. Apply a warm moist pack.  

ANS: D  
These are signs and symptoms of phlebitis and should be treated with a warm moist pack to increase blood flow to the area. The IV has been discontinued, so an arm board for stabilization is unnecessary. Elevation of the arm would be helpful to reduce swelling. A cool compress would be indicated for other issues related to IV infusion problems, such as extravasation.

PTS: 1  DIF: Cognitive Level: Application  REF: 51  
OBJ: 18 (clinical)  TOP: Phlebitis  KEY: Nursing Process Step: Implementation  
MSC: NCLEX: Physiological Integrity: Basic Care and Comfort

16. Because there are no IV pumps available for the immediate infusion of an IV medication, the nurse must calculate the flow rate for 500 mL to run for 4 hours, using a set that delivers 15 gtt/mL. Which flow rate is correct?  
a. 30 gtt/min  
b. 35 gtt/min  
c. 40 gtt/min  
d. 45 gtt/min
500 mL to be given in 4 hours equals 125 mL/hr. 125 mL ÷ 60 minutes = 2 mL/min × 15 gtt/mL = 30 gtt/min.

17. The count of the solution in the IV container at the beginning of the shift is 800 mL. A new 1000-mL bag was hung during the shift and has 650-mL left at the end of the shift. What amount should the nurse record as the IV fluid intake for the shift?
   a. 1000 mL
   b. 1050 mL
   c. 1100 mL
   d. 1150 mL

ANS: D
800 mL + 350 mL from second bag = 1150 mL.

18. After selecting an appropriate fluid, which action should the nurse take to correctly flush a PRN lock?
   a. Flush forcefully to clear the lumen.
   b. Use slow, gentle pressure to clear the lumen.
   c. Flush hard enough to clear resistance.
   d. Aspirate for blood return prior to flushing.

ANS: B
The standard of care utilizes slow, gentle pressure. The nurse should stop the flush if resistance is met. Resistance may indicate a clot and force would break the clot loose. Aspiration is not necessary.

19. The nurse is caring for a patient who has been on total parenteral nutrition (TPN) for 48 hours. Which action demonstrates effective nursing care?
   a. Checking the patient’s blood glucose level according to facility protocol.
   b. Increasing the infusion rate if the prescribed intake falls behind.
   c. Informing the patient that TPN can only be administered via a central line for 1 week.
   d. Monitoring the peripheral IV site of TPN infusion for signs of infiltration at least every 8 hours.

ANS: A
The hypertonic solution causes difficulty with glucose tolerance, so monitoring of blood glucose level is imperative. The infusion rate should never be increased to “catch up” because of the likelihood of fluid overload caused by the hypertonicity of the TPN. TPN can be administered for more than 1 week and it is almost always administered via a central line rather than a peripheral line.

20. The nurse is assessing a patient with renal failure and notes fatigue, muscle cramps, confusion, and headache. Which laboratory abnormality corresponds with these findings?
   a. Potassium of 3.3 mEq/L
   b. Sodium of 129 mEq/L
   c. Calcium of 8.2 mg/dL
   d. Chloride of 105 mEq/L

   ANS: B
   The patient is demonstrating signs and symptoms of hyponatremia; therefore, the nurse should assess the patient’s sodium level.

MULTIPLE RESPONSE

21. The nurse is assessing the hydration status of the patient. Which action(s) demonstrates knowledge of proper assessment? (Select all that apply.)
   a. Monitoring the patient’s daily weight.
   b. Assessing the patient’s skin turgor on the back of the hand.
   c. Checking the patient’s blood glucose level four times a day.
   d. Assessing for skin tenting on the patient’s forehead.
   e. Asking the patient if he is experiencing thirst.

   ANS: A, D, E
   The skin of the abdomen, forearm, sternum, forehead, and thigh can be “tented” as a test for skin turgor by gently pinching up a fold of skin and observing the delay in return to normal. Assessment of skin turgor is not reliable on the back of the hand. Weight and experiencing thirst can be indicators of hydration status, along with further assessment. The patient’s blood glucose level is not an assessment parameter for hydration status.

22. The nurse is caring for a patient that has a potassium level of 5.0. The nurse should carefully monitor the patient for which signs and symptoms? (Select all that apply.)
   a. Muscle weakness
b. Cardiac dysrhythmias  
c. Decreased reflexes  
d. Urinary retention  
e. Hypotension  

ANS: A, B, E  

Normal potassium level is 3.5 to 5.0 mEq/L. Because the patient is on the highest end of normal, the nurse should monitor for signs of hyperkalemia. Muscle weakness, cardiac dysrhythmias, and hypotension are signs of hyperkalemia. Decreased reflexes and urinary retention are signs of hypokalemia.

PTS: 1  DIF: Cognitive Level: Application  REF: 43  
OBJ: 15 (clinical)  TOP: Hyperkalemia  
KEY: Nursing Process Step: Assessment  MSC: NCLEX: Health Promotion and Maintenance

23. The primary care provider writes an order for the patient to receive an IV of a solution that has the same osmotic pressure as intracellular fluid. The nurse would correctly question which IV order(s)? (Select all that apply.)  
a. 5% dextrose in water  
b. 0.45% sodium chloride  
c. 5% dextrose in 0.9% sodium chloride  
d. Lactated Ringer solution  
e. 0.9% sodium chloride  

ANS: B, C  
The solution being prescribed is an isotonic solution. 5% dextrose in water, lactated Ringer solution, and 0.9% sodium chloride are all isotonic solutions, whereas 0.45% sodium chloride is a hypotonic solution, and 5% dextrose in 0.9% sodium chloride is a hypertonic solution.

PTS: 1  DIF: Cognitive Level: Analysis  REF: 48-49  
OBJ: 11 (theory)  TOP: Isotonic Solutions  
KEY: Nursing Process Step: Implementation  
MSC: NCLEX: Physiological Integrity: Basic Care and Comfort

24. The nurse is caring for a newly admitted patient with uncontrolled nausea and vomiting. The patient has a history of alcoholism and diabetes. After receiving these orders from the health care provider, which order(s) should the nurse question? (Select all that apply.)  
a. Administer 10 mg prochlorperazine maleate (Compazine), IM every 4 to 6 hours for nausea and vomiting.  
b. Administer diphenoxylate atropine (Lomotil), two tabs, by mouth after first occurrence of nausea and vomiting.  
c. Administer furosemide (Lasix) 40 mg by slow IV push.  
d. Monitor the patient’s intake and output every 4 hours.  
e. Obtain patient’s weight every morning and record.  

ANS: A, B, C
A primary concern in a patient with uncontrolled vomiting includes monitoring hydration status. Intake and output and daily weights are indicators of hydration status and should be assessed. Prochlorperazine maleate (Compazine) should not be given with alcohol intake. Because the patient has a history of alcoholism, it would be best to administer an antiemetic that is not contraindicated with possible alcohol intake. Diphenoxylate atropine (Lomotil) is an antidiarrheal, not an antiemetic. Lasix is a powerful loop diuretic that would exacerbate the patient’s volume depletion.

PTS: 1 DIF: Cognitive Level: Analysis 
REF: 33, Box 3-2, 36, Table 3-2, 50, Table 3-6 OBJ: 13 (clinical) 
TOP: Hydration Status KEY: Nursing Process Step: Implementation 
MSC: NCLEX: Physiological Integrity: Physiological Adaptation

**COMPLETION**

25. The nurse demonstrates knowledge of IV solutions by identifying that the IV solution which provides free water, as well as 340 calories/L, is ____________.

ANS: 10% dextrose in water

10% dextrose in water provides free water with no electrolytes and 340 calories/L.

PTS: 1 DIF: Cognitive Level: Comprehension REF: 50, Table 3-6 OBJ: 12 (theory) TOP: IV Fluids KEY: Nursing Process Step: Implementation 
MSC: NCLEX: Physiological Integrity: Basic Care and Comfort

26. The nurse explains to the 85-year-old patient with a temperature that, with each degree of fever, the body loses _____% of water.

ANS: 10

With each degree of fever, the body has an insensible loss of 10% of its water.

MSC: NCLEX: Physiological Integrity: Physiological Adaptation

27. The nurse reminds the patient that the three body mechanisms that attempt to compensate to correct acid-base imbalances are the __________ system, the __________ system, and the __________.

ANS: buffer; respiratory; kidneys

buffer; kidneys; respiratory

respiratory; buffer; kidneys

respiratory; kidneys; buffer

kidneys; respiratory; buffer
The buffer system, the respiratory system, and the kidneys contribute unique compensations to correct an acid-base imbalance.

PTS: 1 DIF: Cognitive Level: Comprehension REF: 44
OBJ: 8 (theory) TOP: Acid-Base Compensatory Mechanisms
KEY: Nursing Process Step: Implementation
MSC: NCLEX: Physiological Integrity: Physiological Adaptation

MATCHING

_The nurse explains that the chain of events that results in hypocalcemia for the patient in early renal failure occurs in which order? (Match the events to the proper sequence.)_

a. Loss of calcium ions
b. Vitamin D not activated
c. Bone loss
d. Retention of phosphates
e. Loss of absorption of calcium from the gastrointestinal tract

28. Step 1
29. Step 2
30. Step 3
31. Step 4
32. Step 5

KEY: Nursing Process Step: Implementation
MSC: NCLEX: Physiological Integrity: Physiological Adaptation

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