Chapter 03: Fluid, Electrolytes, Acid-Base Balance, and Intravenous Therapy
deWit: Medical-Surgical Nursing: Concepts & Practice, 3rd Edition

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 DIF: Cognitive Level: Analysis REF: 43, Table 3-4
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 DIF: Cognitive Level: Application REF: 43, Safety Alert
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 DIF: Cognitive Level: Application REF: 43, Nutrition Considerations
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

b. Constipation
c. Increased temperature
d. Thirst

ANS: B
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.

PTS: 1 DIF: Cognitive Level: Analysis REF: 33-34
OBJ: 5 (theory) TOP: Dehydration in the Older Adult
KEY: Nursing Process Step: Assessment
MSC: NCLEX: Health Promotion and Maintenance: Prevention and Early Detection of Disease

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.

PTS: 1 DIF: Cognitive Level: Application REF: 46
OBJ: 15 (clinical) TOP: Respiratory Acidosis
KEY: Nursing Process Step: Assessment MSC: NCLEX: Health Promotion and Maintenance

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.

PTS: 1 DIF: Cognitive Level: Analysis REF: 46
OBJ: 8 (theory) TOP: Respiratory Acidosis
KEY: Nursing Process Step: Implementation
MSC: NCLEX: Health Promotion and Maintenance: Prevention and Early Detection of Disease

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 HCO_3^-, and normal CO_2.

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 acidotic 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

ANS: A
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.

PTS: 1 DIF: Cognitive Level: Application REF: 53
OBJ: 12 (theory) TOP: Calculation of IV Flow Rate
KEY: Nursing Process Step: Implementation
MSC: NCLEX: Physiological Integrity: Basic Care and Comfort

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.

    PTS: 1 DIF: Cognitive Level: Application REF: 53-54
    OBJ: 12 (theory) TOP: Calculating IV Fluid Intake
    KEY: Nursing Process Step: Implementation
    MSC: NCLEX: Physiological Integrity: Basic Care and Comfort

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.

    PTS: 1 DIF: Cognitive Level: Application REF: 54
    OBJ: 18 (clinical) TOP: Flushing PRN Lock
    KEY: Nursing Process Step: Implementation
    MSC: NCLEX: Physiological Integrity: Basic Care and Comfort

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.

PTS: 1 DIF: Cognitive Level: Application REF: 55
OBJ: 19 (clinical) TOP: TPN KEY: Nursing Process Step: Assessment
MSC: NCLEX: Health Promotion and Maintenance

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.

    PTS: 1 DIF: Cognitive Level: Application REF: 40, Table 3-4
    OBJ: 15 (clinical) TOP: Hyponatremia
    KEY: Nursing Process Step: Evaluation
    MSC: NCLEX: Safe, Effective Care Environment: Management of Care

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.

    PTS: 1 DIF: Cognitive Level: Application REF: 33
    OBJ: 13 (clinical) TOP: Assessment Data: Skin Turgor
    KEY: Nursing Process Step: Implementation
    MSC: NCLEX: Physiological Integrity: Basic Care and Comfort

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.

PTS: 1 DIF: Cognitive Level: Comprehension REF: 32
OBJ: 5 (theory) TOP: Insensible Loss
KEY: Nursing Process Step: Implementation
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

kidneys; buffer; respiratory

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

28. ANS: D PTS: 1 DIF: Cognitive Level: Analysis
REF: 43 OBJ: 4 (theory) TOP: Hypocalcemia
KEY: Nursing Process Step: Implementation
MSC: NCLEX: Physiological Integrity: Physiological Adaptation
29. ANS: A PTS: 1 DIF: Cognitive Level: Analysis
REF: 43 OBJ: 4 (theory) TOP: Hypocalcemia
KEY: Nursing Process Step: Implementation
MSC: NCLEX: Physiological Integrity: Physiological Adaptation
30. ANS: B PTS: 1 DIF: Cognitive Level: Analysis
REF: 43 OBJ: 4 (theory) TOP: Hypocalcemia
KEY: Nursing Process Step: Implementation
MSC: NCLEX: Physiological Integrity: Physiological Adaptation
31. ANS: E PTS: 1 DIF: Cognitive Level: Analysis
REF: 43 OBJ: 4 (theory) TOP: Hypocalcemia
KEY: Nursing Process Step: Implementation
MSC: NCLEX: Physiological Integrity: Physiological Adaptation
32. ANS: C PTS: 1 DIF: Cognitive Level: Analysis
REF: 43 OBJ: 4 (theory) TOP: Hypocalcemia
KEY: Nursing Process Step: Implementation
MSC: NCLEX: Physiological Integrity: Physiological Adaptation