

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

MULTIPLE CHOICE

1. The nurse uses a diagram to demonstrate how in dehydration the water is drawn into the plasma from the cells by the process of:
 - 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.

DIF: Cognitive Level: Comprehension REF: 32-33 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. The nurse explains that the compensatory reabsorption of water is controlled by:
 - 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.

DIF: Cognitive Level: Knowledge REF: 31-32 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 the passive transport process of:
 - 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.

DIF: Cognitive Level: Comprehension REF: 32 OBJ: 3 (theory)

TOP: Diffusion KEY: Nursing Process Step: Implementation

MSC: NCLEX: Physiological Integrity: Physiological Adaptation

4. The nurse explains that the active transport process that is able to move sodium and potassium into or out of cells is:

- 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.

DIF: Cognitive Level: Comprehension REF: 33 OBJ: 3 (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 this weight loss to be the excretion of approximately _____ liters of fluid.
- a. 1.0
 - b. 1.5
 - c. 2.0
 - d. 2.5

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.

DIF: Cognitive Level: Application REF: 35 OBJ: 1 (clinical)
 TOP: Fluid Loss KEY: Nursing Process Step: Assessment
 MSC: NCLEX: Physiological Integrity: Physiological Adaptation

6. When the nurse assesses a potassium level of 2.9 mEq/L in the patient with vomiting and diarrhea, the nurse will be alert for:
- 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.

DIF: Cognitive Level: Application REF: 42 | Table 3-4
 OBJ: 4 (theory) 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. The nurse examines the recent electrolyte levels to assess the level of:
- a. potassium.
 - b. calcium.
 - c. sodium.
 - d. magnesium.

ANS: B

Chvostek's 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.

DIF: Cognitive Level: Analysis

REF: 44

OBJ: 4 (theory)

TOP: Chvostek's Sign

KEY: Nursing Process Step: Assessment

MSC: NCLEX: Health Promotion and Maintenance: Prevention and Early Detection of Disease

8. Prior to hanging an IV containing potassium, the nurse will confirm that there is a:
- blood pressure of at least 60 mm Hg diastolic.
 - urine output of at least 30 mL/hr.
 - filter on the IV line.
 - 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.

DIF: Cognitive Level: Application

REF: 44 | Safety Alert

OBJ: 10 (theory) TOP: Administration of IV Potassium

KEY: Nursing Process Step: Assessment

MSC: NCLEX: Physiological Integrity: Reduction of Risk Potential

9. The nurse determines there is no need for further instruction related to a low-sodium diet when the patient says:
- "I can have all the dried fruits I want."
 - "I'm looking forward to a tall glass of tomato juice."
 - "I'm going to eat my favorite avocado and orange salad."
 - "I'm going to eat a cheeseburger with extra catsup."

ANS: C

Avocado and oranges have no significant sodium content. Dried fruits, tomato juice, cheese, and catsup are high in sodium.

DIF: Cognitive Level: Application

REF: 41 | Nutrition Considerations

OBJ: 4 (clinical) TOP: Low-Sodium Diet

KEY: Nursing Process Step: Evaluation

MSC: NCLEX: Physiological Integrity: Basic Care and Comfort

10. Because the 80-year-old patient is prone to dehydration related to the age-related change of decreased thirst and kidney function, the nurse monitors for the earliest sign of dehydration, which is:
- reduced skin turgor.
 - constipation.
 - increased temperature.
 - thirst.

ANS: B

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.

DIF: Cognitive Level: Analysis

REF: 35

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. From this laboratory information, the nurse assesses the patient is in:
- respiratory alkalosis.
 - metabolic alkalosis.
 - respiratory acidosis.
 - metabolic acidosis.

ANS: D

These results are indicative of metabolic acidosis.

DIF: Cognitive Level: Analysis REF: 47-48 | Table 3-5
OBJ: 3 (clinical) TOP: Respiratory Acidosis
KEY: Nursing Process Step: Assessment MSC: NCLEX: Health Promotion and Maintenance

12. To help prevent respiratory acidosis in a young person with asthma, the nurse would encourage:
- deep-breathing exercises every 2 hours.
 - drinking 8 ounces of fluid every 4 hours.
 - ambulating for 15 minutes twice a day.
 - sleeping 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.

DIF: Cognitive Level: Analysis REF: 47-48 | Table 3-5
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. The nurse recognizes these values indicate:
- respiratory alkalosis.
 - metabolic alkalosis.
 - respiratory acidosis.
 - metabolic acidosis.

ANS: D

Metabolic acidosis shows a low pH, low HCO_3^- , and normal CO_2 .

DIF: Cognitive Level: Application REF: 47-48 | Table 3-5
OBJ: 8 (theory) TOP: Metabolic Acidosis
KEY: Nursing Process Step: Assessment MSC: NCLEX: Health Promotion and Maintenance

14. The nurse can record that the compensatory mechanism for the correction of metabolic acidosis is in effect when the nurse observes:

- a. increased urinary output.
- b. reduced abdominal distention.
- c. Kussmaul's respirations.
- d. decreased blood pressure.

ANS: C

Kussmaul's respirations, or deep and rapid respirations, are blowing off carbon dioxide to reduce an acidotic state.

DIF: Cognitive Level: Application REF: 48 OBJ: 3 (clinical)
 TOP: Metabolic Acidosis KEY: Nursing Process Step: Assessment
 MSC: NCLEX: Physiological Integrity: Physiological Adaptation

15. The nurse assessing the IV insertion site finds the vein hard, the skin red and tender, and a blood return in the IV line. The most effective intervention after removing the IV catheter is to:
- a. notify the charge nurse.
 - 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. Notifying the charge nurse is not the most effective intervention and may not be necessary according to facility policy, elevation of the arm would be helpful for swelling, and a cool compress would be indicated for other issues related to IV infusion problems such as extravasation.

DIF: Cognitive Level: Application REF: 54 | Table 3-7
 OBJ: 6 (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. The flow rate should be _____ gtt/min.
- a. 30
 - b. 35
 - c. 40
 - d. 45

ANS: A

500 mL to be given in 4 hours equals 125 mL/hr. $125 \text{ mL} \div 60 \text{ minutes} = 2 \text{ mL/min} \times 15 \text{ gtt/mL} = 30 \text{ gtt/min}$.

DIF: Cognitive Level: Application REF: 53-55 OBJ: 10 (clinical)
 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. The nurse reports the IV fluid intake for the shift as _____ mL.
- a. 1000

- b. 1050
- c. 1100
- d. 1150

ANS: D

800 mL + 350 mL from second bag = 1150 mL.

DIF: Cognitive Level: Comprehension REF: 55 OBJ: 9 (theory)
TOP: Calculating IV Fluid Intake KEY: Nursing Process Step: Implementation
MSC: NCLEX: Physiological Integrity: Basic Care and Comfort

18. The nurse flushing a PRN lock will select the appropriate fluid and will clear the lumen by:
- a. flushing forcefully to clear.
 - b. using slow, gentle pressure.
 - c. flushing hard enough to clear resistance.
 - d. aspirating prior to flushing.

ANS: B

The use of slow, gentle pressure and stopping the flush if resistance is met is the standard of care. Resistance may indicate a clot and force would break the clot loose. Aspiration is not necessary.

DIF: Cognitive Level: Application REF: 55-56 OBJ: 6 (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. The nurse demonstrates the most effective nursing care by:
- a. checking the patient's blood glucose level according to facility protocol.
 - b. speeding up the solution 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 TPN is almost always administered via a central line rather than a peripheral line.

DIF: Cognitive Level: Application REF: 57 OBJ: 7 (clinical)
TOP: Total Parenteral Nutrition 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. The nurse will monitor the patient's _____ level.
- a. potassium
 - b. sodium
 - c. calcium
 - d. chloride

ANS: B

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

DIF: Cognitive Level: Application REF: 42 | Table 3-4

OBJ: 7 (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. The nurse demonstrates knowledge of proper assessment techniques by: (*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 4 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 "tenting" 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.

DIF: Cognitive Level: Application REF: 34 | Box 3-2 OBJ: 1 (clinical)

TOP: Assessment Data: Skin Turgor KEY: Nursing Process Step: Implementation

MSC: NCLEX: Physiological Integrity: Basic Care and Comfort

22. The patient has a potassium level of 5.0. The nurse closely monitors the patient for: (*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.

DIF: Cognitive Level: Application REF: 42-44 | Table 3-4

OBJ: 3 (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 of the following IV orders? (*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's solution
- e. 0.9% sodium chloride

ANS: B, C

The solution being prescribed is an isotonic solution. 5% dextrose in water, Lactated Ringer's 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.

DIF: Cognitive Level: Analysis REF: 50 | 52 | Table 3-6

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. Upon obtaining orders from the primary care provider, the nurse would question which orders: (*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), 2 tabs, by mouth after first occurrence of nausea and vomiting.
 - c. Administer Lactated Ringer's solution, IV, at 100 mL/hr.
 - d. Monitor the patient's intake and output every 4 hours.
 - e. Obtain patient's weight every morning and record.

ANS: A, B, C

The patient's intake and output and weight are indicators of hydration status and should be monitored. 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.

DIF: Cognitive Level: Analysis REF: 34 | Box 3-2, 37 | Table 3-2, 52 | Table 3-6

OBJ: 4 (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.

DIF: Cognitive Level: Comprehension REF: 50 | 52 | 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.

DIF: Cognitive Level: Comprehension REF: 34 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

respiratory; buffer; kidneys

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

DIF: Cognitive Level: Comprehension REF: 46 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 is: (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 GI tract.
28. Step 1
29. Step 2
30. Step 3
31. Step 4
32. Step 5

28. ANS: D DIF: Cognitive Level: Analysis REF: 44
OBJ: 4 (theory) TOP: Hypocalcemia
KEY: Nursing Process Step: Implementation
MSC: NCLEX: Physiological Integrity: Physiological Adaptation
29. ANS: A DIF: Cognitive Level: Analysis REF: 44
OBJ: 4 (theory) TOP: Hypocalcemia
KEY: Nursing Process Step: Implementation
MSC: NCLEX: Physiological Integrity: Physiological Adaptation

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30. ANS: B DIF: Cognitive Level: Analysis REF: 44
OBJ: 4 (theory) TOP: Hypocalcemia
KEY: Nursing Process Step: Implementation
MSC: NCLEX: Physiological Integrity: Physiological Adaptation
31. ANS: E DIF: Cognitive Level: Analysis REF: 44
OBJ: 4 (theory) TOP: Hypocalcemia
KEY: Nursing Process Step: Implementation
MSC: NCLEX: Physiological Integrity: Physiological Adaptation
32. ANS: C DIF: Cognitive Level: Analysis REF: 44
OBJ: 4 (theory) TOP: Hypocalcemia
KEY: Nursing Process Step: Implementation
MSC: NCLEX: Physiological Integrity: Physiological Adaptation