

Nursing: A Concept-Based Approach to Learning Vol. 1 & 2, 3e (Pearson)

Module 1 Acid-Base Balance

The Concept of Acid-Base Balance

1) A client is brought to the emergency department (ED) after passing out in a local department store. The client has been fasting and has ketones in the urine. Which acid-base imbalance would the nurse expect to assess in this client?

- A) Metabolic acidosis
- B) Respiratory alkalosis
- C) Metabolic alkalosis
- D) Respiratory acidosis

Answer: A

Explanation: A) A client who is fasting is at risk for development of metabolic acidosis. The body recognizes fasting as starvation and begins to metabolize its own fatty acids into ketones, which are metabolic acids. Starvation would not result in respiratory acidosis or alkalosis or in metabolic alkalosis.

B) A client who is fasting is at risk for development of metabolic acidosis. The body recognizes fasting as starvation and begins to metabolize its own fatty acids into ketones, which are metabolic acids. Starvation would not result in respiratory acidosis or alkalosis or in metabolic alkalosis.

C) A client who is fasting is at risk for development of metabolic acidosis. The body recognizes fasting as starvation and begins to metabolize its own fatty acids into ketones, which are metabolic acids. Starvation would not result in respiratory acidosis or alkalosis or in metabolic alkalosis.

D) A client who is fasting is at risk for development of metabolic acidosis. The body recognizes fasting as starvation and begins to metabolize its own fatty acids into ketones, which are metabolic acids. Starvation would not result in respiratory acidosis or alkalosis or in metabolic alkalosis.

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Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.2. Differentiate alterations in acid-base balance.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

2) Which risk factors exhibited by the client presenting in the emergency department (ED) would place the client at risk for metabolic acidosis? Select all that apply.

- A) Abdominal fistulas
- B) Chronic obstructive pulmonary disease
- C) Pneumonia
- D) Acute renal failure
- E) Hypovolemic shock

Answer: A, D, E

Explanation: A) Metabolic acidosis is rarely a primary disorder. It usually develops during the course of another disease; presence of abdominal fistulas, which can cause excess bicarbonate loss; acute renal failure; and hypovolemic shock. Chronic obstructive pulmonary disease and pneumonia place the client at risk for respiratory acidosis with the increased retention of carbon dioxide in the blood.

B) Metabolic acidosis is rarely a primary disorder. It usually develops during the course of another disease; presence of abdominal fistulas, which can cause excess bicarbonate loss; acute renal failure; and hypovolemic shock. Chronic obstructive pulmonary disease and pneumonia place the client at risk for respiratory acidosis with the increased retention of carbon dioxide in the blood.

C) Metabolic acidosis is rarely a primary disorder. It usually develops during the course of another disease; presence of abdominal fistulas, which can cause excess bicarbonate loss; acute renal failure; and hypovolemic shock. Chronic obstructive pulmonary disease and pneumonia place the client at risk for respiratory acidosis with the increased retention of carbon dioxide in the blood.

D) Metabolic acidosis is rarely a primary disorder. It usually develops during the course of another disease; presence of abdominal fistulas, which can cause excess bicarbonate loss; acute renal failure; and hypovolemic shock. Chronic obstructive pulmonary disease and pneumonia place the client at risk for respiratory acidosis with the increased retention of carbon dioxide in the blood.

E) Metabolic acidosis is rarely a primary disorder. It usually develops during the course of another disease; presence of abdominal fistulas, which can cause excess bicarbonate loss; acute renal failure; and hypovolemic shock. Chronic obstructive pulmonary disease and pneumonia place the client at risk for respiratory acidosis with the increased retention of carbon dioxide in the blood.

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Cognitive Level: Applying

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.2. Differentiate alterations in acid-base balance.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

3) A child with acute asthma has a PaCO₂ of 48 mmHg, a pH of 7.31, and a normal HCO₃ blood gas value. The nurse interprets these findings as indicative of which condition?

- A) Metabolic acidosis
- B) Respiratory alkalosis
- C) Respiratory acidosis
- D) Metabolic alkalosis

Answer: C

Explanation: A) If the pH is decreased and the PaCO₂ is increased with a normal HCO₃, it is uncompensated respiratory acidosis. Uncompensated respiratory alkalosis has an increased pH, decreased PaCO₂, and normal HCO₃. Uncompensated metabolic acidosis has a decreased pH, normal PaCO₂, and decreased HCO₃. Uncompensated metabolic alkalosis has an increased pH, normal PaCO₂, and increased HCO₃.

B) If the pH is decreased and the PaCO₂ is increased with a normal HCO₃, it is uncompensated respiratory acidosis. Uncompensated respiratory alkalosis has an increased pH, decreased PaCO₂, and normal HCO₃. Uncompensated metabolic acidosis has a decreased pH, normal PaCO₂, and decreased HCO₃. Uncompensated metabolic alkalosis has an increased pH, normal PaCO₂, and increased HCO₃.

C) If the pH is decreased and the PaCO₂ is increased with a normal HCO₃, it is uncompensated respiratory acidosis. Uncompensated respiratory alkalosis has an increased pH, decreased PaCO₂, and normal HCO₃. Uncompensated metabolic acidosis has a decreased pH, normal PaCO₂, and decreased HCO₃. Uncompensated metabolic alkalosis has an increased pH, normal PaCO₂, and increased HCO₃.

D) If the pH is decreased and the PaCO₂ is increased with a normal HCO₃, it is uncompensated respiratory acidosis. Uncompensated respiratory alkalosis has an increased pH, decreased PaCO₂, and normal HCO₃. Uncompensated metabolic acidosis has a decreased pH, normal PaCO₂, and decreased HCO₃. Uncompensated metabolic alkalosis has an increased pH, normal PaCO₂, and increased HCO₃.

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Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Diagnosis

Learning Outcome: 1.2. Differentiate alterations in acid-base balance.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

4) The nurse is reviewing the latest arterial blood gas results for a client with metabolic alkalosis. Which result indicates that the metabolic alkalosis is compensated?

- A) pH 7.32
- B) PaCO₂ 18 mmHg
- C) HCO₃ 8 mEq/L
- D) PaCO₂ 48 mmHg

Answer: D

Explanation: A) A normal pH level is 7.35-7.45. A pH of less than 7.35 is acidosis. A PaCO₂ level of 18 mmHg is low and is seen in respiratory alkalosis. A HCO₃ level of 8 mEq/L is low and is most likely associated with metabolic acidosis. In metabolic alkalosis, there is an excess of bicarbonate. To compensate for this imbalance, the rate and depth of respirations decrease, leading to retention of carbon dioxide. The PaCO₂ will be elevated.

B) A normal pH level is 7.35-7.45. A pH of less than 7.35 is acidosis. A PaCO₂ level of 18 mmHg is low and is seen in respiratory alkalosis. A HCO₃ level of 8 mEq/L is low and is most likely associated with metabolic acidosis. In metabolic alkalosis, there is an excess of bicarbonate. To compensate for this imbalance, the rate and depth of respirations decrease, leading to retention of carbon dioxide. The PaCO₂ will be elevated.

C) A normal pH level is 7.35-7.45. A pH of less than 7.35 is acidosis. A PaCO₂ level of 18 mmHg is low and is seen in respiratory alkalosis. A HCO₃ level of 8 mEq/L is low and is most likely associated with metabolic acidosis. In metabolic alkalosis, there is an excess of bicarbonate. To compensate for this imbalance, the rate and depth of respirations decrease, leading to retention of carbon dioxide. The PaCO₂ will be elevated.

D) A normal pH level is 7.35-7.45. A pH of less than 7.35 is acidosis. A PaCO₂ level of 18 mmHg is low and is seen in respiratory alkalosis. A HCO₃ level of 8 mEq/L is low and is most likely associated with metabolic acidosis. In metabolic alkalosis, there is an excess of bicarbonate. To compensate for this imbalance, the rate and depth of respirations decrease, leading to retention of carbon dioxide. The PaCO₂ will be elevated.

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Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Evaluation

Learning Outcome: 1.2. Differentiate alterations in acid-base balance.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

5) A client has been admitted with chronic obstructive pulmonary disease. Diagnostic tests have been ordered. Which of the tests will provide the most accurate indicator of the client's acid-base balance?

- A) Arterial blood gases (ABGs)
- B) Pulse oximetry
- C) Sputum studies
- D) Bronchoscopy

Answer: A

Explanation: A) ABGs are done to assess alterations in acid-base balance caused by respiratory disorders, metabolic disorders, or both. A bronchoscopy provides visualization of internal respiratory structures. Sputum studies can provide specific information about bacterial organisms. Pulse oximetry is a noninvasive test that evaluates the oxygen saturation level of blood.

B) ABGs are done to assess alterations in acid-base balance caused by respiratory disorders, metabolic disorders, or both. A bronchoscopy provides visualization of internal respiratory structures. Sputum studies can provide specific information about bacterial organisms. Pulse oximetry is a noninvasive test that evaluates the oxygen saturation level of blood.

C) ABGs are done to assess alterations in acid-base balance caused by respiratory disorders, metabolic disorders, or both. A bronchoscopy provides visualization of internal respiratory structures. Sputum studies can provide specific information about bacterial organisms. Pulse oximetry is a noninvasive test that evaluates the oxygen saturation level of blood.

D) ABGs are done to assess alterations in acid-base balance caused by respiratory disorders, metabolic disorders, or both. A bronchoscopy provides visualization of internal respiratory structures. Sputum studies can provide specific information about bacterial organisms. Pulse oximetry is a noninvasive test that evaluates the oxygen saturation level of blood.

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Cognitive Level: Applying

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.5. Differentiate common assessment procedures and tests used to examine acid-base balance.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

6) The nurse is instructing a client with a history of acidosis on the use of sodium bicarbonate. Which client statement indicates that additional teaching is needed?

- A) "I should contact the doctor if I have any gastric discomfort with chest pain."
- B) "I need to purchase antacids without salt."
- C) "I should use the antacid for at least 2 months."
- D) "I should call the doctor if I get short of breath or start to sweat with this medication."

Answer: C

Explanation: A) The client should be instructed to immediately contact the primary healthcare provider if gastric discomfort occurs with chest pain or if dyspnea or diaphoresis occurs. The client should be instructed to use non-sodium antacids to prevent the absorption of excess sodium or bicarbonate into systemic circulation and to not use any bicarbonate antacid for longer than 2 weeks.

B) The client should be instructed to immediately contact the primary healthcare provider if gastric discomfort occurs with chest pain or if dyspnea or diaphoresis occurs. The client should be instructed to use non-sodium antacids to prevent the absorption of excess sodium or bicarbonate into systemic circulation and to not use any bicarbonate antacid for longer than 2 weeks.

C) The client should be instructed to immediately contact the primary healthcare provider if gastric discomfort occurs with chest pain or if dyspnea or diaphoresis occurs. The client should be instructed to use non-sodium antacids to prevent the absorption of excess sodium or bicarbonate into systemic circulation and to not use any bicarbonate antacid for longer than 2 weeks.

D) The client should be instructed to immediately contact the primary healthcare provider if gastric discomfort occurs with chest pain or if dyspnea or diaphoresis occurs. The client should be instructed to use non-sodium antacids to prevent the absorption of excess sodium or bicarbonate into systemic circulation and to not use any bicarbonate antacid for longer than 2 weeks.

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Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Pharmacological and Parenteral Therapies

Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care: patient/family/community preferences, values; coordination and integration of care; information, communication, and education; physical comfort and emotional support; involvement of family and friends transition and continuity. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Evaluation
Learning Outcome: 1.7 Summarize collaborative therapies used by interdisciplinary teams for clients with alterations in acid-base balance.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

7) The client is receiving sodium bicarbonate intravenously (IV) for correction of acidosis secondary to diabetic coma. The nurse assesses the client to be lethargic, confused, and breathing rapidly. Which is the nurse's priority response to the current situation?

A) Stop the infusion and notify the physician because the client is in alkalosis.

B) Decrease the rate of the infusion and continue to assess the client for symptoms of alkalosis.

C) Continue the infusion, because the client is still in acidosis, and notify the healthcare provider.

D) Increase the rate of the infusion and continue to assess the client for symptoms of acidosis.

Answer: C

Explanation: A) The client receiving sodium bicarbonate is prone to alkalosis; monitor for cyanosis, slow respirations, and irregular pulse. The client's symptoms do not indicate alkalosis so infusion should not be stopped. The client continues to exhibit signs of acidosis; symptoms of acidosis include lethargy, confusion, CNS depression leading to coma, and a deep, rapid respiration rate that indicates an attempt by the lungs to rid the body of excess acid, and the physician should be notified. The infusion should not be increased or decreased without a practitioner order.

B) The client receiving sodium bicarbonate is prone to alkalosis; monitor for cyanosis, slow respirations, and irregular pulse. The client's symptoms do not indicate alkalosis so infusion should not be stopped. The client continues to exhibit signs of acidosis; symptoms of acidosis include lethargy, confusion, CNS depression leading to coma, and a deep, rapid respiration rate that indicates an attempt by the lungs to rid the body of excess acid, and the physician should be notified. The infusion should not be increased or decreased without a practitioner order.

C) The client receiving sodium bicarbonate is prone to alkalosis; monitor for cyanosis, slow respirations, and irregular pulse. The client's symptoms do not indicate alkalosis so infusion should not be stopped. The client continues to exhibit signs of acidosis; symptoms of acidosis include lethargy, confusion, CNS depression leading to coma, and a deep, rapid respiration rate that indicates an attempt by the lungs to rid the body of excess acid, and the physician should be notified. The infusion should not be increased or decreased without a practitioner order.

D) The client receiving sodium bicarbonate is prone to alkalosis; monitor for cyanosis, slow respirations, and irregular pulse. The client's symptoms do not indicate alkalosis so infusion should not be stopped. The client continues to exhibit signs of acidosis; symptoms of acidosis include lethargy, confusion, CNS depression leading to coma, and a deep, rapid respiration rate that indicates an attempt by the lungs to rid the body of excess acid, and the physician should be notified. The infusion should not be increased or decreased without a practitioner order.

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Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Pharmacological and Parenteral Therapies

Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care: Patient/family/community preferences, values; Coordination and integration of care; Information, communication, and education; Physical comfort and emotional support; Involvement of family and friends Transition and continuity. | AACN Essential Competencies: IX.7. Provide appropriate patient teaching that reflects developmental state, age, culture, spirituality, patient preferences, and health literacy considerations to foster patient engagement in their care. | NLN Competencies: Relationship Centered Care: Effective communication. | Nursing Process: Evaluation

Learning Outcome: 1.7 Summarize collaborative therapies used by interdisciplinary teams for clients with alterations in acid-base balance.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

8) The nurse is preparing to analyze a client's arterial blood gas results. List the steps in the order that the nurse should follow when analyzing this laboratory test.

1. Look at the PaCO_2 .
2. Look at the pH.
3. Evaluate the relationship between pH and PaCO_2 .
4. Look for compensation.
5. Evaluate the pH, HCO_3 , and base excess for a possible metabolic problem.
6. Look at the bicarbonate.
7. Evaluate oxygenation

Answer: 2, 1, 3, 6, 5, 4, 7

Explanation:

1. The second step is to look at the PaCO_2 . If the PaCO_2 is <35 , then more carbon dioxide is being exhaled. If the PaCO_2 is >45 , then more carbon dioxide is being retained.
2. The pH is the first step and is analyzed to determine if acidosis or alkalosis is present. A pH of <7.35 is acidosis. A pH of >7.45 is alkalosis.
3. The third step is to evaluate the relationship between the pH and the PaCO_2 . This relationship could indicate a respiratory problem. If the pH is acidotic and the carbon dioxide level is greater than 45, then the client could be experiencing respiratory acidosis. If the pH is alkalotic and the carbon dioxide level is below 35, then the client could be experiencing respiratory alkalosis.
4. The sixth step is to look for compensation. Two things can occur in renal compensation. In respiratory acidosis, the kidneys retain HCO_3 to buffer the excess acid, so the HCO_3 is >26 mEq/L. In respiratory alkalosis, the kidneys excrete HCO_3 to minimize the alkalosis, so the HCO_3 is <22 mEq/L. Two things can also occur in respiratory compensation. In metabolic acidosis, the rate and depth of respirations increase, increasing carbon dioxide elimination, so the PaCO_2 is <35 mmHg. In metabolic alkalosis, respirations slow and carbon dioxide is retained, so the PaCO_2 is >45 mmHg.
5. The fifth step is to evaluate the pH, HCO_3 , and base excess for a possible metabolic problem. If the pH is <7.35 , the HCO_3 is <22 mEq/L, and the BE is less than -3 mEq/L, then low bicarbonate levels and high H^+ concentrations are causing metabolic acidosis. If the pH is >7.45 , the HCO_3 is >26 mEq/L, and the BE is greater than $+3$ mEq/L, then high bicarbonate levels are causing metabolic alkalosis.
6. The fourth step is to look at the bicarbonate level. If the bicarbonate level is <22 , then the levels are lower than normal. If the bicarbonate level is >26 , then the bicarbonate levels are higher than normal.
7. The final step is to evaluate oxygenation. If the PaO_2 is <80 mmHg, then the client is experiencing hypoxemia and possible hypoventilation. If the PaO_2 is >100 mmHg, then the client is hyperventilating.

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Cognitive Level: Analyzing

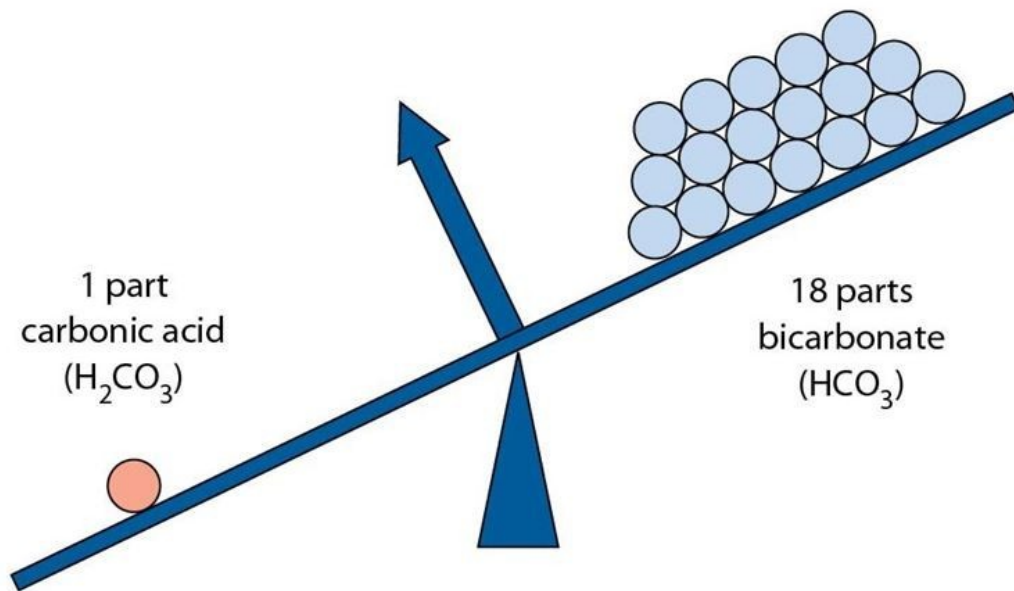
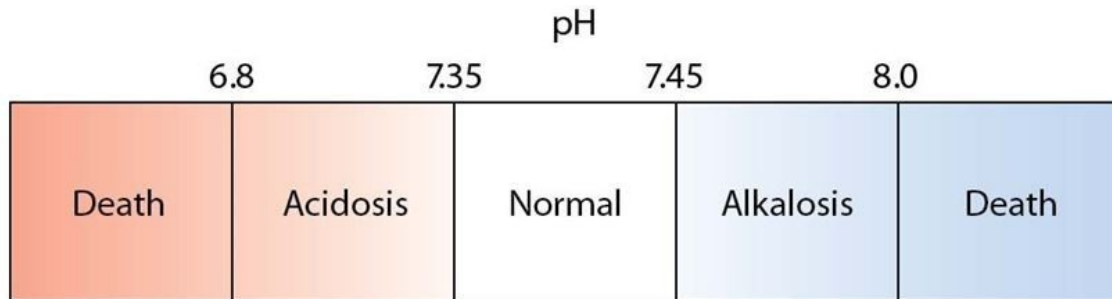
Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.5. Differentiate common assessment procedures and tests used to examine acid-base balance.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

9) The nurse is identifying a diagram to use to explain a client's acid-base balance. Which imbalance does the following diagram suggest is occurring with the client?



- A) Metabolic acidosis
- B) Metabolic alkalosis
- C) Respiratory acidosis
- D) Respiratory alkalosis

Answer: A

Explanation: A) In metabolic acidosis, the amount of bicarbonate decreases in relation to the amount of acid in the body. In metabolic alkalosis, there is an excess of bicarbonate in relation to the amount of hydrogen ions. Respiratory acidosis occurs when carbon dioxide is retained, increasing the amount of carbonic acid in the body. Respiratory alkalosis can occur when too much carbon dioxide is lost and carbonic acid levels fall.

B) In metabolic acidosis, the amount of bicarbonate decreases in relation to the amount of acid in the body. In metabolic alkalosis, there is an excess of bicarbonate in relation to the amount of hydrogen ions. Respiratory acidosis occurs when carbon dioxide is retained, increasing the amount of carbonic acid in the body. Respiratory alkalosis can occur when too much carbon dioxide is lost and carbonic acid levels fall.

C) In metabolic acidosis, the amount of bicarbonate decreases in relation to the amount of acid in the body. In metabolic alkalosis, there is an excess of bicarbonate in relation to the amount of hydrogen ions. Respiratory acidosis occurs when carbon dioxide is retained, increasing the amount of carbonic acid in the body. Respiratory alkalosis can occur when too much carbon dioxide is lost and carbonic acid levels fall.

D) In metabolic acidosis, the amount of bicarbonate decreases in relation to the amount of acid in the body. In metabolic alkalosis, there is an excess of bicarbonate in relation to the amount of hydrogen ions. Respiratory acidosis occurs when carbon dioxide is retained, increasing the amount of carbonic acid in the body. Respiratory alkalosis can occur when too much carbon dioxide is lost and carbonic acid levels fall.

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Cognitive Level: Remembering

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Planning

Learning Outcome: 1.2. Differentiate alterations in acid-base balance.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

10) The results of a client's arterial blood gas sample reveal an oxygen level of 72 mmHg. For which associated health problem should the nurse assess this client?

- A) Stress and coping
- B) Perfusion
- C) Fluid and electrolyte imbalance
- D) Cognition

Answer: D

Explanation: A) An oxygen level of less than 75 mmHg can be due to hypoventilation. This drop in oxygen will change the client's level of responsiveness. Perfusion is affected by a reduction in circulating fluids. With a fluid and electrolyte imbalance, there is another disorder affecting acid-base balance. This might not be affected by oxygen level. Stress and coping may need to be analyzed to determine how the client is coping with the anxiety related to low oxygen levels, but this is not directly a physiological health problem.

B) An oxygen level of less than 75 mmHg can be due to hypoventilation. This drop in oxygen will change the client's level of responsiveness. Perfusion is affected by a reduction in circulating fluids. With a fluid and electrolyte imbalance, there is another disorder affecting acid-base balance. This might not be affected by oxygen level. Stress and coping may need to be analyzed to determine how the client is coping with the anxiety related to low oxygen levels, but this is not directly a physiological health problem.

C) An oxygen level of less than 75 mmHg can be due to hypoventilation. This drop in oxygen will change the client's level of responsiveness. Perfusion is affected by a reduction in circulating fluids. With a fluid and electrolyte imbalance, there is another disorder affecting acid-base balance. This might not be affected by oxygen level. Stress and coping may need to be analyzed to determine how the client is coping with the anxiety related to low oxygen levels, but this is not directly a physiological health problem.

D) An oxygen level of less than 75 mmHg can be due to hypoventilation. This drop in oxygen will change the client's level of responsiveness. Perfusion is affected by a reduction in circulating fluids. With a fluid and electrolyte imbalance, there is another disorder affecting acid-base balance. This might not be affected by oxygen level. Stress and coping may need to be analyzed to determine how the client is coping with the anxiety related to low oxygen levels, but this is not directly a physiological health problem.

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Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Reduction of Risk Potential

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.3. Outline the relationship between acid-base balance and other concepts.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

11) The nurse is caring for a comatose client with metabolic acidosis. For which intervention will the nurse need to collaborate when caring for this client?

- A) Measuring vital signs
- B) Measuring intake and output
- C) The client's recent eating behaviors
- D) Identifying current oxygen saturation level

Answer: C

Explanation: A) For clients in severe distress, family members may need to be consulted for critical information such as recent eating habits and history of vomiting. Measuring vital signs, measuring intake and output, and identifying current oxygen saturation level are independent nursing actions.

B) For clients in severe distress, family members may need to be consulted for critical information such as recent eating habits and history of vomiting. Measuring vital signs, measuring intake and output, and identifying current oxygen saturation level are independent nursing actions.

C) For clients in severe distress, family members may need to be consulted for critical information such as recent eating habits and history of vomiting. Measuring vital signs, measuring intake and output, and identifying current oxygen saturation level are independent nursing actions.

D) For clients in severe distress, family members may need to be consulted for critical information such as recent eating habits and history of vomiting. Measuring vital signs, measuring intake and output, and identifying current oxygen saturation level are independent nursing actions.

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Cognitive Level: Understanding

Client Need/Sub: Safe and Effective Care Environment: Management of Care

Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care: Patient/family/community preferences, values; Coordination and integration of care; Information, communication, and education; Physical comfort and emotional support; Involvement of family and friends Transition and continuity. | AACN Essential Competencies: IX.7. Provide appropriate patient teaching that reflects developmental state, age, culture, spirituality, patient preferences, and health literacy considerations to foster patient engagement in their care. | NLN Competencies: Relationship Centered Care: Effective communication. | Nursing Process: Evaluation

Learning Outcome: 1.7. Summarize collaborative therapies used by interdisciplinary teams for clients with alterations in acid-base balance.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

12) Acid-base balance is critical to homeostasis and cellular function. One measurement of acid-base balance is the pH of the blood. Which ion is measured to determine the pH?

- A) Cl^-
- B) H^+
- C) Na^+
- D) HCO_3

Answer: B

Explanation: A) The pH measures the concentration of hydrogen ions (H^+) in the body. Sodium (Na^+) and chloride (Cl^-) concentrations are not related to pH. Bicarbonate (HCO_3) is a weak base that is used as a buffer to help maintain the proper pH, but it is not used to measure pH.

B) The pH measures the concentration of hydrogen ions (H^+) in the body. Sodium (Na^+) and chloride (Cl^-) concentrations are not related to pH. Bicarbonate (HCO_3) is a weak base that is used as a buffer to help maintain the proper pH, but it is not used to measure pH.

C) The pH measures the concentration of hydrogen ions (H^+) in the body. Sodium (Na^+) and chloride (Cl^-) concentrations are not related to pH. Bicarbonate (HCO_3) is a weak base that is used as a buffer to help maintain the proper pH, but it is not used to measure pH.

D) The pH measures the concentration of hydrogen ions (H^+) in the body. Sodium (Na^+) and chloride (Cl^-) concentrations are not related to pH. Bicarbonate (HCO_3) is a weak base that is used as a buffer to help maintain the proper pH, but it is not used to measure pH.

Page Ref: 3

Cognitive Level: Remembering

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.1. Analyze the physiology of acid-base balance.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

- 13) A client with a suspected acid-base imbalance has arterial blood gases tested. The test reveals a serum bicarbonate level of 22 mEq/L. The nurse understands that this bicarbonate level is
- A) slightly high.
 - B) slightly low.
 - C) extremely high.
 - D) within normal range.

Answer: B

Explanation: A) The normal serum bicarbonate level is 24-28 mEq/L. Therefore, the nurse would understand that the client's bicarbonate level is slightly low.

B) The normal serum bicarbonate level is 24-28 mEq/L. Therefore, the nurse would understand that the client's bicarbonate level is slightly low.

C) The normal serum bicarbonate level is 24-28 mEq/L. Therefore, the nurse would understand that the client's bicarbonate level is slightly low.

D) The normal serum bicarbonate level is 24-28 mEq/L. Therefore, the nurse would understand that the client's bicarbonate level is slightly low.

Page Ref: 4

Cognitive Level: Understanding

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.1. Analyze the physiology of acid-base balance.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

14) If a change in acid-base balance is due to hypoventilation or hyperventilation, the nurse will need to primarily focus on which concept related to acid-base balance?

- A) Oxygenation
- B) Perfusion
- C) Cognition
- D) Stress and coping

Answer: A

Explanation: A) Hypoventilation and hyperventilation are related to oxygenation. Respiratory rate helps regulate carbon dioxide pressures, which can contribute to acidosis or alkalosis. The nurse can help reverse respiratory acidosis or alkalosis by helping the client control their respiratory rate to restore normal oxygenation. Perfusion, cognition, and stress and coping do not directly relate to hypo- or hyperventilation.

B) Hypoventilation and hyperventilation are related to oxygenation. Respiratory rate helps regulate carbon dioxide pressures, which can contribute to acidosis or alkalosis. The nurse can help reverse respiratory acidosis or alkalosis by helping the client control their respiratory rate to restore normal oxygenation. Perfusion, cognition, and stress and coping do not directly relate to hypo- or hyperventilation.

C) Hypoventilation and hyperventilation are related to oxygenation. Respiratory rate helps regulate carbon dioxide pressures, which can contribute to acidosis or alkalosis. The nurse can help reverse respiratory acidosis or alkalosis by helping the client control their respiratory rate to restore normal oxygenation. Perfusion, cognition, and stress and coping do not directly relate to hypo- or hyperventilation.

D) Hypoventilation and hyperventilation are related to oxygenation. Respiratory rate helps regulate carbon dioxide pressures, which can contribute to acidosis or alkalosis. The nurse can help reverse respiratory acidosis or alkalosis by helping the client control their respiratory rate to restore normal oxygenation. Perfusion, cognition, and stress and coping do not directly relate to hypo- or hyperventilation.

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Cognitive Level: Remembering

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation

Learning Outcome: 1.3. Outline the relationship between acid-base balance and other concepts.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

15) When considering acid-base balance, health promotion should focus on

A) conducting yearly health screenings.

B) obtaining immunizations.

C) beginning an exercise regimen.

D) maintaining fluid balance.

Answer: D

Explanation: A) Both overhydration and dehydration can result in acid-base imbalances.

Therefore, health promotion should focus on maintaining fluid balance. Beginning an exercise regimen, obtaining immunizations, and conducting yearly health screenings are activities that can promote health in other areas.

B) Both overhydration and dehydration can result in acid-base imbalances. Therefore, health promotion should focus on maintaining fluid balance. Beginning an exercise regimen, obtaining immunizations, and conducting yearly health screenings are activities that can promote health in other areas.

C) Both overhydration and dehydration can result in acid-base imbalances. Therefore, health promotion should focus on maintaining fluid balance. Beginning an exercise regimen, obtaining immunizations, and conducting yearly health screenings are activities that can promote health in other areas.

D) Both overhydration and dehydration can result in acid-base imbalances. Therefore, health promotion should focus on maintaining fluid balance. Beginning an exercise regimen, obtaining immunizations, and conducting yearly health screenings are activities that can promote health in other areas.

Page Ref: 16-17

Cognitive Level: Remembering

Client Need/Sub: Health Promotion and Maintenance

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation

Learning Outcome: 1.4. Explain the promotion of healthy acid-base balance.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

16) The nurse performing a blood draw for arterial blood gases first performs a modified Allen test for what purpose?

- A) To reduce the risk of bleeding or bruising of the arm
- B) To determine if arterial puncture can safely be performed
- C) To determine the oxygen saturation of the blood in the artery
- D) To determine the pressure of the blood in the artery

Answer: B

Explanation: A) A modified Allen test is a measure of ulnar patency. The patient elevates the hand and repeatedly makes a fist while the examiner places digital occlusive pressure over the radial and ulnar arteries of the wrist. The hand will lose its normal color. Digital pressure is released from one artery while the other remains compressed. The return of color indicates that the hand has good collateral supply of blood and that arterial puncture can safely be performed. The modified Allen test does not measure oxygen saturation or artery pressure, and it does not reduce the risk of bleeding or bruising.

B) A modified Allen test is a measure of ulnar patency. The patient elevates the hand and repeatedly makes a fist while the examiner places digital occlusive pressure over the radial and ulnar arteries of the wrist. The hand will lose its normal color. Digital pressure is released from one artery while the other remains compressed. The return of color indicates that the hand has good collateral supply of blood and that arterial puncture can safely be performed. The modified Allen test does not measure oxygen saturation or artery pressure, and it does not reduce the risk of bleeding or bruising.

C) A modified Allen test is a measure of ulnar patency. The patient elevates the hand and repeatedly makes a fist while the examiner places digital occlusive pressure over the radial and ulnar arteries of the wrist. The hand will lose its normal color. Digital pressure is released from one artery while the other remains compressed. The return of color indicates that the hand has good collateral supply of blood and that arterial puncture can safely be performed. The modified Allen test does not measure oxygen saturation or artery pressure, and it does not reduce the risk of bleeding or bruising.

D) A modified Allen test is a measure of ulnar patency. The patient elevates the hand and repeatedly makes a fist while the examiner places digital occlusive pressure over the radial and ulnar arteries of the wrist. The hand will lose its normal color. Digital pressure is released from one artery while the other remains compressed. The return of color indicates that the hand has good collateral supply of blood and that arterial puncture can safely be performed. The modified Allen test does not measure oxygen saturation or artery pressure, and it does not reduce the risk of bleeding or bruising.

Page Ref: 9

Cognitive Level: Understanding

Client Need/Sub: Safe and Effective Care Environment: Safety and Infection Control

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation

Learning Outcome: 1.5. Differentiate common assessment procedures and tests used to examine acid-base balance.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

17) An intervention that can be implemented independently by the nurse caring for a client with an acid-base balance is

- A) monitoring intake and output.
- B) drawing blood for ABGs.
- C) giving sodium bicarbonate infusions.
- D) administering oxygen via nasal cannula.

Answer: A

Explanation: A) Monitoring intake and output is an independent nursing intervention that does not require a provider's orders. Drawing blood for ABGs, giving sodium bicarbonate infusions, and administering oxygen via nasal cannula are all actions that can be performed by the nurse, but they must first be ordered by a provider.

B) Monitoring intake and output is an independent nursing intervention that does not require a provider's orders. Drawing blood for ABGs, giving sodium bicarbonate infusions, and administering oxygen via nasal cannula are all actions that can be performed by the nurse, but they must first be ordered by a provider.

C) Monitoring intake and output is an independent nursing intervention that does not require a provider's orders. Drawing blood for ABGs, giving sodium bicarbonate infusions, and administering oxygen via nasal cannula are all actions that can be performed by the nurse, but they must first be ordered by a provider.

D) Monitoring intake and output is an independent nursing intervention that does not require a provider's orders. Drawing blood for ABGs, giving sodium bicarbonate infusions, and administering oxygen via nasal cannula are all actions that can be performed by the nurse, but they must first be ordered by a provider.

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Cognitive Level: Remembering

Client Need/Sub: Safe and Effective Care Environment: Management of Care

Standards: QSEN Competencies: II.A.1. Describe own strengths, limitations, and values in functioning as a member of a team. | AACN Essential Competencies: VI.1. Compare/contrast the roles and perspectives of the nursing profession with other care professionals on the healthcare team (i.e. scope of discipline, education and licensure requirements). | NLN Competencies: Teamwork: Scope of practice, roles, and responsibilities of health care team members, including overlaps. | Nursing Process: Implementation

Learning Outcome: 1.6. Analyze independent interventions nurses can implement for clients with alterations in acid-base balance.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

18) Why should a nurse take daily weights of a client with acid-base balance?

- A) It helps monitor oxygenation status.
- B) It helps monitor perfusion of organs.
- C) It helps monitor renal function.
- D) It helps monitor fluid balance.

Answer: D

Explanation: A) Fluid balance must be maintained to support acid-base balance. If a client rapidly gains weight, it is a sign of fluid overload. If a client rapidly loses weight, it is a sign of dehydration. Both of these conditions can alter the acid-base balance, so a client's weight should be monitored daily. A client's weight does not reflect oxygenation status or perfusion of organs. Daily weights can reflect renal function, but weight can fluctuate even if the kidneys are functioning properly.

B) Fluid balance must be maintained to support acid-base balance. If a client rapidly gains weight, it is a sign of fluid overload. If a client rapidly loses weight, it is a sign of dehydration. Both of these conditions can alter the acid-base balance, so a client's weight should be monitored daily. A client's weight does not reflect oxygenation status or perfusion of organs. Daily weights can reflect renal function, but weight can fluctuate even if the kidneys are functioning properly.

C) Fluid balance must be maintained to support acid-base balance. If a client rapidly gains weight, it is a sign of fluid overload. If a client rapidly loses weight, it is a sign of dehydration. Both of these conditions can alter the acid-base balance, so a client's weight should be monitored daily. A client's weight does not reflect oxygenation status or perfusion of organs. Daily weights can reflect renal function, but weight can fluctuate even if the kidneys are functioning properly.

D) Fluid balance must be maintained to support acid-base balance. If a client rapidly gains weight, it is a sign of fluid overload. If a client rapidly loses weight, it is a sign of dehydration. Both of these conditions can alter the acid-base balance, so a client's weight should be monitored daily. A client's weight does not reflect oxygenation status or perfusion of organs. Daily weights can reflect renal function, but weight can fluctuate even if the kidneys are functioning properly.

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Cognitive Level: Understanding

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.6. Analyze independent interventions nurses can implement for clients with alterations in acid-base balance.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

Exemplar 1.A Metabolic Acidosis

1) The nurse is analyzing the client's arterial blood gas report, which reveals a pH of 6.58. The client has just suffered a cardiac arrest. Which consequences of this pH value does the nurse consider for this client?

- A) Decreased cardiac output
- B) Increase magnesium levels
- C) Decreased free calcium in the ECT
- D) Increased myocardial contractility

Answer: A

Explanation: A) The nurse knows that severe acidosis (pH of 7.0 or less) depresses myocardial contractility, which leads to decreased cardiac output. Acid-base imbalances also affect electrolyte balance. In acidosis, calcium is released from its bonds with plasma proteins, increasing the amount of ionized (free) calcium in the blood. Magnesium levels may fall in acidosis.

B) The nurse knows that severe acidosis (pH of 7.0 or less) depresses myocardial contractility, which leads to decreased cardiac output. Acid-base imbalances also affect electrolyte balance. In acidosis, calcium is released from its bonds with plasma proteins, increasing the amount of ionized (free) calcium in the blood. Magnesium levels may fall in acidosis.

C) The nurse knows that severe acidosis (pH of 7.0 or less) depresses myocardial contractility, which leads to decreased cardiac output. Acid-base imbalances also affect electrolyte balance. In acidosis, calcium is released from its bonds with plasma proteins, increasing the amount of ionized (free) calcium in the blood. Magnesium levels may fall in acidosis.

D) The nurse knows that severe acidosis (pH of 7.0 or less) depresses myocardial contractility, which leads to decreased cardiac output. Acid-base imbalances also affect electrolyte balance. In acidosis, calcium is released from its bonds with plasma proteins, increasing the amount of ionized (free) calcium in the blood. Magnesium levels may fall in acidosis.

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Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Evaluation

Learning Outcome: 1.A.1. Analyze metabolic acidosis as it relates to acid-base balance.

Describe the pathophysiology of metabolic acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic acidosis.

2) The nurse is caring for a client who has been admitted with persistent diarrhea lasting 3 days. Which are appropriate nursing diagnoses for this client during the acute phase of the illness? Select all that apply.

- A) Decreased Cardiac Output
- B) Ineffective Airway Clearance
- C) Overflow Urinary Incontinence
- D) Knowledge Deficit
- E) Risk for Injury

Answer: A, E

Explanation: A) Metabolic acidosis decreases cardiac output by decreasing contractility, slowing the heart rate, and increasing the risk for dysrhythmias. The client with metabolic acidosis is also at risk for injury due to altered mental status. Appropriate nursing diagnoses during the acute phase of illness are Risk for Injury and Decreased Cardiac Output. The client may have a knowledge deficit, but this is not an appropriate nursing diagnosis during the acute phase of the illness. The client with metabolic acidosis is not at risk for Ineffective Airway Clearance or Overflow Urinary Incontinence.

B) Metabolic acidosis decreases cardiac output by decreasing contractility, slowing the heart rate, and increasing the risk for dysrhythmias. The client with metabolic acidosis is also at risk for injury due to altered mental status. Appropriate nursing diagnoses during the acute phase of illness are Risk for Injury and Decreased Cardiac Output. The client may have a knowledge deficit but this is not an appropriate nursing diagnosis during the acute phase of the illness. The client with metabolic acidosis is not at risk for Ineffective Airway Clearance or Overflow Urinary Incontinence.

C) Metabolic acidosis decreases cardiac output by decreasing contractility, slowing the heart rate, and increasing the risk for dysrhythmias. The client with metabolic acidosis is also at risk for injury due to altered mental status. Appropriate nursing diagnoses during the acute phase of illness are Risk for Injury and Decreased Cardiac Output. The client may have a knowledge deficit but this is not an appropriate nursing diagnosis during the acute phase of the illness. The client with metabolic acidosis is not at risk for Ineffective Airway Clearance or Overflow Urinary Incontinence.

D) Metabolic acidosis decreases cardiac output by decreasing contractility, slowing the heart rate, and increasing the risk for dysrhythmias. The client with metabolic acidosis is also at risk for injury due to altered mental status. Appropriate nursing diagnoses during the acute phase of illness are Risk for Injury and Decreased Cardiac Output. The client may have a knowledge deficit but this is not an appropriate nursing diagnosis during the acute phase of the illness. The client with metabolic acidosis is not at risk for Ineffective Airway Clearance or Overflow Urinary Incontinence.

E) Metabolic acidosis decreases cardiac output by decreasing contractility, slowing the heart rate, and increasing the risk for dysrhythmias. The client with metabolic acidosis is also at risk for injury due to altered mental status. Appropriate nursing diagnoses during the acute phase of illness are Risk for Injury and Decreased Cardiac Output. The client may have a knowledge deficit but this is not an appropriate nursing diagnosis during the acute phase of the illness. The client with metabolic acidosis is not at risk for Ineffective Airway Clearance or Overflow Urinary Incontinence.

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Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care: Patient/family/community preferences, values; Coordination and integration of care; Information, communication, and education; Physical comfort and emotional support; Involvement of family and friends Transition and continuity. | AACN Essential Competencies: IX.7. Provide appropriate patient teaching that reflects developmental state, age, culture, spirituality, patient preferences, and health literacy considerations to foster patient engagement in their care. | NLN Competencies: Relationship Centered Care: Effective communication. | Nursing Process: Evaluation

Learning Outcome: 1.A.7. Analyze metabolic acidosis as it relates to acid-base balance. Apply the nursing process in providing culturally competent care to an individual with metabolic acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic acidosis.

3) The nurse is caring for a client with metabolic acidosis. Which goals are appropriate for this client? Select all that apply.

- A) The client will maintain a respiratory rate of 30 or more.
- B) The client will describe preventative measure for the underlying chronic illness.
- C) The client will maintain baseline cardiac rhythm.
- D) The client will remain in a pH range from 7.25 to 7.35.
- E) The client will take potassium supplements to increase potassium levels.

Answer: B, C

Explanation: A) Planning for the client with metabolic acidosis involves identification and treatment of the underlying cause and restoration and maintenance of acid-base balance. The client should be able to describe preventative measures for the underlying chronic illness that caused the metabolic acidosis to occur and maintain the baseline cardiac rhythm. The pH should be maintained between 7.35 and 7.45. The client's respiratory rate should be within normal range for age and condition. Taking a potassium supplement may cause hyperkalemia, which decreases cardiac output and worsens metabolic acidosis.

B) Planning for the client with metabolic acidosis involves identification and treatment of the underlying cause and restoration and maintenance of acid-base balance. The client should be able to describe preventative measures for the underlying chronic illness that caused the metabolic acidosis to occur and maintain the baseline cardiac rhythm. The pH should be maintained between 7.35 and 7.45. The client's respiratory rate should be within normal range for age and condition. Taking a potassium supplement may cause hyperkalemia, which decreases cardiac output and worsens metabolic acidosis.

C) Planning for the client with metabolic acidosis involves identification and treatment of the underlying cause and restoration and maintenance of acid-base balance. The client should be able to describe preventative measures for the underlying chronic illness that caused the metabolic acidosis to occur and maintain the baseline cardiac rhythm. The pH should be maintained between 7.35 and 7.45. The client's respiratory rate should be within normal range for age and condition. Taking a potassium supplement may cause hyperkalemia, which decreases cardiac output and worsens metabolic acidosis.

D) Planning for the client with metabolic acidosis involves identification and treatment of the underlying cause and restoration and maintenance of acid-base balance. The client should be able to describe preventative measures for the underlying chronic illness that caused the metabolic acidosis to occur and maintain the baseline cardiac rhythm. The pH should be maintained between 7.35 and 7.45. The client's respiratory rate should be within normal range for age and condition. Taking a potassium supplement may cause hyperkalemia, which decreases cardiac output and worsens metabolic acidosis.

E) Planning for the client with metabolic acidosis involves identification and treatment of the underlying cause and restoration and maintenance of acid-base balance. The client should be able to describe preventative measures for the underlying chronic illness that caused the metabolic acidosis to occur and maintain the baseline cardiac rhythm. The pH should be maintained between 7.35 and 7.45. The client's respiratory rate should be within normal range for age and condition. Taking a potassium supplement may cause hyperkalemia, which decreases cardiac output and worsens metabolic acidosis.

Page Ref: 16

Cognitive Level: Applying

Client Need/Sub: Physiological Integrity: Reduction of Risk Potential

Standards: QSEN Competencies: III.A.2 Describe EBP to include the components of research evidence, clinical expertise and patient/family values. | AACN Essential Competencies: IX.3.

Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN

Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Planning

Learning Outcome: 1.A.7. Analyze metabolic acidosis as it relates to acid-base balance. Apply the nursing process in providing culturally competent care to an individual with metabolic acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic acidosis.

4) The nurse is caring for a client admitted with renal failure and metabolic acidosis. Which clinical manifestation would indicate to the nurse that planned interventions to relieve the metabolic acidosis have been effective?

- A) Decreased respiratory depth
- B) Palpitations
- C) Increased deep tendon reflexes
- D) Respiratory rate of 38

Answer: A

Explanation: A) The client with metabolic acidosis will have an increased respiratory rate and depth, called Kussmaul respirations. Signs that care has been effective would include a decrease in the rate and depth of respirations. An increased respiratory rate, as indicated by a respiratory rate of 38, would indicate continued metabolic acidosis. Increased deep tendon reflexes and palpitations are not associated with metabolic acidosis.

B) The client with metabolic acidosis will have an increased respiratory rate and depth, called Kussmaul respirations. Signs that care has been effective would include a decrease in the rate and depth of respirations. An increased respiratory rate, as indicated by a respiratory rate of 38, would indicate continued metabolic acidosis. Increased deep tendon reflexes and palpitations are not associated with metabolic acidosis.

C) The client with metabolic acidosis will have an increased respiratory rate and depth, called Kussmaul respirations. Signs that care has been effective would include a decrease in the rate and depth of respirations. An increased respiratory rate, as indicated by a respiratory rate of 38, would indicate continued metabolic acidosis. Increased deep tendon reflexes and palpitations are not associated with metabolic acidosis.

D) The client with metabolic acidosis will have an increased respiratory rate and depth, called Kussmaul respirations. Signs that care has been effective would include a decrease in the rate and depth of respirations. An increased respiratory rate, as indicated by a respiratory rate of 38, would indicate continued metabolic acidosis. Increased deep tendon reflexes and palpitations are not associated with metabolic acidosis.

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Cognitive Level: Applying

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care: Patient/family/community preferences, values; Coordination and integration of care; Information, communication, and education; Physical comfort and emotional support; Involvement of family and friends Transition and continuity. | AACN Essential Competencies: IX.7. Provide appropriate patient teaching that reflects developmental state, age, culture, spirituality, patient preferences, and health literacy considerations to foster patient engagement in their care. | NLN Competencies: Relationship Centered Care: Effective communication. | Nursing Process: Evaluation

Learning Outcome: 1.A.4. Analyze metabolic acidosis as it relates to acid-base balance. Identify the clinical manifestations of metabolic acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic acidosis.

5) The nurse is caring for the client experiencing hypovolemic shock and metabolic acidosis. Which therapies would the nurse question if planned for this client? Select all that apply.

- A) Monitor weight on admission and discharge.
- B) Monitor ECG for conduction problems.
- C) Limit the intake of fluids.
- D) Administer sodium bicarbonate.
- E) Keep the bed in the locked and low position.

Answer: A, C

Explanation: A) The treatment for hypovolemic shock would include the administration of fluids, not limiting fluids. Patients being treated for hypovolemia and metabolic acidosis will require daily weights, not a weight on admission and then discharge. Administering sodium bicarbonate and monitoring ECGs are appropriate for the client with metabolic acidosis. The client recovering from hypovolemic shock and metabolic acidosis is at risk for injury, so the bed should be kept in the locked and low position.

B) The treatment for hypovolemic shock would include the administration of fluids, not limiting fluids. Patients being treated for hypovolemia and metabolic acidosis will require daily weights, not a weight on admission and then discharge. Administering sodium bicarbonate and monitoring ECGs are appropriate for the client with metabolic acidosis. The client recovering from hypovolemic shock and metabolic acidosis is at risk for injury, so the bed should be kept in the locked and low position.

C) The treatment for hypovolemic shock would include the administration of fluids, not limiting fluids. Patients being treated for hypovolemia and metabolic acidosis will require daily weights, not a weight on admission and then discharge. Administering sodium bicarbonate and monitoring ECGs are appropriate for the client with metabolic acidosis. The client recovering from hypovolemic shock and metabolic acidosis is at risk for injury, so the bed should be kept in the locked and low position.

D) The treatment for hypovolemic shock would include the administration of fluids, not limiting fluids. Patients being treated for hypovolemia and metabolic acidosis will require daily weights, not a weight on admission and then discharge. Administering sodium bicarbonate and monitoring ECGs are appropriate for the client with metabolic acidosis. The client recovering from hypovolemic shock and metabolic acidosis is at risk for injury, so the bed should be kept in the locked and low position.

E) The treatment for hypovolemic shock would include the administration of fluids, not limiting fluids. Patients being treated for hypovolemia and metabolic acidosis will require daily weights, not a weight on admission and then discharge. Administering sodium bicarbonate and monitoring ECGs are appropriate for the client with metabolic acidosis. The client recovering from hypovolemic shock and metabolic acidosis is at risk for injury, so the bed should be kept in the locked and low position.

Page Ref: 11-16

Cognitive Level: Applying

Client Need/Sub: Physiological Integrity: Reduction of Risk Potential

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation

Learning Outcome: 1.A.7. Analyze metabolic acidosis as it relates to acid-base balance. Apply the nursing process in providing culturally competent care to an individual with metabolic acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic acidosis.

6) A client with metabolic acidosis has been admitted to the unit from the emergency department (ED). The client is experiencing confusion and weakness. Which nursing intervention is the priority for this client?

- A) Placing the client in a high-Fowler position
- B) Protecting the client from injury
- C) Administering sodium bicarbonate
- D) Providing the client with appropriate skin care

Answer: B

Explanation: A) The client with metabolic acidosis may have symptoms of drowsiness, lethargy, confusion, and weakness. A priority of care would be preventing injury to the client. Medication administration is a physician order. Skin care would not be a priority on admission. The high-Fowler position would not be the safest position for the confused client.

B) The client with metabolic acidosis may have symptoms of drowsiness, lethargy, confusion, and weakness. A priority of care would be preventing injury to the client. Medication administration is a physician order. Skin care would not be a priority on admission. The high-Fowler position would not be the safest position for the confused client.

C) The client with metabolic acidosis may have symptoms of drowsiness, lethargy, confusion, and weakness. A priority of care would be preventing injury to the client. Medication administration is a physician order. Skin care would not be a priority on admission. The high-Fowler position would not be the safest position for the confused client.

D) The client with metabolic acidosis may have symptoms of drowsiness, lethargy, confusion, and weakness. A priority of care would be preventing injury to the client. Medication administration is a physician order. Skin care would not be a priority on admission. The high-Fowler position would not be the safest position for the confused client.

Page Ref: 16

Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Reduction of Risk Potential

Standards: QSEN Competencies: I.A.2. Describe EBP to include the components of research evidence, clinical expertise and patient/family values. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation

Learning Outcome: 1.A.7. Analyze metabolic acidosis as it relates to acid-base balance. Apply the nursing process in providing culturally competent care to an individual with metabolic acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic acidosis.

7) The nurse is preparing to teach a client with type 1 diabetes mellitus on the mechanism behind the development of ketoacidosis. List the order in which the nurse should provide this information.

1. Production of lactate and hydrogen ions
2. Tissue hypoxemia
3. Breakdown of fatty tissue
4. Reduction in intracellular glucose
5. Fatty acids converted to ketones

Answer: 2, 1, 4, 3, 5

Explanation:

Lactic acidosis develops due to tissue hypoxia and a shift to anaerobic metabolism by the cells. Lactate and hydrogen ions are produced, forming lactic acid. Starvation or lack of insulin leads to intracellular starvation of glucose. The lack of glucose or insulin to move glucose into the cells, causing the body to break down fatty tissue to meet metabolic needs. When fatty acids are broken down, these acids are converted to ketones, leading to the development of ketoacidosis.

Page Ref: 13-14

Cognitive Level: Applying

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation

Learning Outcome: 1.A.1. Analyze metabolic acidosis as it relates to acid-base balance.

Describe the pathophysiology of metabolic acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic acidosis.

8) The nurse identifies the diagnosis Risk for Injury as appropriate for a client with metabolic acidosis. Which strategies should the nurse use to support this diagnosis? Select all that apply.

- A) Apply wrist restraints and secure to the bed frame.
- B) Discuss chemical restraint use with the healthcare provider.
- C) Keep the bed in the lowest position.
- D) Keep bed side rails raised.
- E) Place a clock and calendar at the bedside.

Answer: C, D, E

Explanation: A) To reduce the client's risk for injury, the nurse should make sure the bed is kept in the lowest position and the side rails are raised. A clock and calendar at the bedside will help with orientation. Restraints are used in the event the client demonstrates harm to self or others.

Confusion or a risk for injury is not a reason to use wrist or chemical restraints.

B) To reduce the client's risk for injury, the nurse should make sure the bed is kept in the lowest position and the side rails are raised. A clock and calendar at the bedside will help with orientation. Restraints are used in the event the client demonstrates harm to self or others.

Confusion or a risk for injury is not a reason to use wrist or chemical restraints.

C) To reduce the client's risk for injury, the nurse should make sure the bed is kept in the lowest position and the side rails are raised. A clock and calendar at the bedside will help with orientation. Restraints are used in the event the client demonstrates harm to self or others.

Confusion or a risk for injury is not a reason to use wrist or chemical restraints.

D) To reduce the client's risk for injury, the nurse should make sure the bed is kept in the lowest position and the side rails are raised. A clock and calendar at the bedside will help with orientation. Restraints are used in the event the client demonstrates harm to self or others.

Confusion or a risk for Injury is not a reason to use wrist or chemical restraints.

E) To reduce the client's risk for injury, the nurse should make sure the bed is kept in the lowest position and the side rails are raised. A clock and calendar at the bedside will help with orientation. Restraints are used in the event the client demonstrates harm to self or others.

Confusion or a risk for injury is not a reason to use wrist or chemical restraints.

Page Ref: 16-17

Cognitive Level: Applying

Client Need/Sub: Safe and Effective Care Environment: Safety and Infection Control

Standards: QSEN Competencies: III.A.2 Describe EBP to include the components of research evidence, clinical expertise and patient/family values. | AACN Essential Competencies: IX.3.

Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN

Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Planning

Learning Outcome: 1.A.7. Analyze metabolic acidosis as it relates to acid-base balance. Apply the nursing process in providing culturally competent care to an individual with metabolic acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic acidosis.

9) Upon entering a room, the nurse quickly scans the environment and then immediately assesses the client for manifestations of metabolic acidosis. Which did the nurse observe to precipitate this client assessment?

- A) Client sleeping with the head of the bed flat
- B) Half of the client's lunch tray uneaten
- C) One formed stool in the bedside commode
- D) 2000 mL of intravenous 0.9% normal saline infused in 2 hours

Answer: D

Explanation: A) Excessive infusions of chloride-containing intravenous fluids can precipitate metabolic acidosis. The head of the bed's being flat might influence a client's oxygenation status; however, the client was not demonstrating a change in respiratory depth or rate. A reduction in oral intake does not cause metabolic acidosis. Eating half of a meal tray is not the same as starvation. Diarrhea can lead to the development of metabolic acidosis. One formed stool would not cause the nurse alarm.

B) Excessive infusions of chloride-containing intravenous fluids can precipitate metabolic acidosis. The head of the bed's being flat might influence a client's oxygenation status; however, the client was not demonstrating a change in respiratory depth or rate. A reduction in oral intake does not cause metabolic acidosis. Eating half of a meal tray is not the same as starvation. Diarrhea can lead to the development of metabolic acidosis. One formed stool would not cause the nurse alarm.

C) Excessive infusions of chloride-containing intravenous fluids can precipitate metabolic acidosis. The head of the bed's being flat might influence a client's oxygenation status; however, the client was not demonstrating a change in respiratory depth or rate. A reduction in oral intake does not cause metabolic acidosis. Eating half of a meal tray is not the same as starvation. Diarrhea can lead to the development of metabolic acidosis. One formed stool would not cause the nurse alarm.

D) Excessive infusions of chloride-containing intravenous fluids can precipitate metabolic acidosis. The head of the bed's being flat might influence a client's oxygenation status; however, the client was not demonstrating a change in respiratory depth or rate. A reduction in oral intake does not cause metabolic acidosis. Eating half of a meal tray is not the same as starvation. Diarrhea can lead to the development of metabolic acidosis. One formed stool would not cause the nurse alarm.

Page Ref: 14

Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.A.3. Analyze metabolic acidosis as it relates to acid-base balance.

Compare the risk factors and prevention of metabolic acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic acidosis.

10) During a home visit, the nurse evaluates care provided to a client with type 1 diabetes mellitus and a history of metabolic acidosis. Which outcome indicates that the care of this client has been successful?

- A) The client is injecting insulin into thigh muscle.
- B) The client is taking laxatives three times a week to ensure adequate bowel movements.
- C) The client is eating three balanced meals per day with two snacks.
- D) The client is taking aspirin 325 mg every 6 hours to treat arthritis pain.

Answer: C

Explanation: A) Adequate nutrition is necessary to prevent the buildup of acids in the blood. Incorrect administration of medication could cause a metabolic problem in the client with diabetes. The use of laxatives could cause diarrhea, which can lead to metabolic acidosis. Ingestion of high amounts of salicylate acid can lead to toxicity and the development of metabolic acidosis.

B) Adequate nutrition is necessary to prevent the buildup of acids in the blood. Incorrect administration of medication could cause a metabolic problem in the client with diabetes. The use of laxatives could cause diarrhea, which can lead to metabolic acidosis. Ingestion of high amounts of salicylate acid can lead to toxicity and the development of metabolic acidosis.

C) Adequate nutrition is necessary to prevent the buildup of acids in the blood. Incorrect administration of medication could cause a metabolic problem in the client with diabetes. The use of laxatives could cause diarrhea, which can lead to metabolic acidosis. Ingestion of high amounts of salicylate acid can lead to toxicity and the development of metabolic acidosis.

D) Adequate nutrition is necessary to prevent the buildup of acids in the blood. Incorrect administration of medication could cause a metabolic problem in the client with diabetes. The use of laxatives could cause diarrhea, which can lead to metabolic acidosis. Ingestion of high amounts of salicylate acid can lead to toxicity and the development of metabolic acidosis.

Page Ref: 7, 15

Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Reduction of Risk Potential

Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care: Patient/family/community preferences, values; Coordination and integration of care; Information, communication, and education; Physical comfort and emotional support; Involvement of family and friends Transition and continuity. | AACN Essential Competencies: IX.7. Provide appropriate patient teaching that reflects developmental state, age, culture, spirituality, patient preferences, and health literacy considerations to foster patient engagement in their care. | NLN Competencies: Relationship Centered Care: Effective communication. | Nursing Process: Evaluation

Learning Outcome: 1.A.7. Analyze metabolic acidosis as it relates to acid-base balance. Apply the nursing process in providing culturally competent care to an individual with metabolic acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic acidosis.

- 11) A common cause of metabolic acidosis is
- A) hyperventilation in a client with anxiety.
 - B) high blood glucose in a client with type 1 diabetes.
 - C) vomiting in a client with a gastrointestinal infection.
 - D) opiate overdose in a client with depression.

Answer: B

Explanation: A) High blood glucose that leads to diabetic ketoacidosis is a common cause of metabolic acidosis. Vomiting can lead to metabolic alkalosis, hyperventilation can lead to respiratory alkalosis, and opiate overdose can lead to respiratory acidosis.

B) High blood glucose that leads to diabetic ketoacidosis is a common cause of metabolic acidosis. Vomiting can lead to metabolic alkalosis, hyperventilation can lead to respiratory alkalosis, and opiate overdose can lead to respiratory acidosis.

C) High blood glucose that leads to diabetic ketoacidosis is a common cause of metabolic acidosis. Vomiting can lead to metabolic alkalosis, hyperventilation can lead to respiratory alkalosis, and opiate overdose can lead to respiratory acidosis.

D) High blood glucose that leads to diabetic ketoacidosis is a common cause of metabolic acidosis. Vomiting can lead to metabolic alkalosis, hyperventilation can lead to respiratory alkalosis, and opiate overdose can lead to respiratory acidosis.

Page Ref: 14, 15

Cognitive Level: Remembering

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.A.2. Analyze metabolic acidosis as it relates to acid-base balance. Describe the etiology of metabolic acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic acidosis.

12) A compensatory mechanism that may indicate to a nurse that a client is experiencing metabolic acidosis includes:

- A) headache.
- B) Kussmaul respirations.
- C) vomiting.
- D) decreased level of consciousness.

Answer: B

Explanation: A) Kussmaul respirations are deep and rapid respirations that are a compensatory mechanism during metabolic acidosis. Headache, vomiting, and decreased level of consciousness are all clinical manifestations of metabolic acidosis, but they are not compensatory mechanisms that the body uses to maintain acid-base balance during metabolic acidosis.

B) Kussmaul respirations are deep and rapid respirations that are a compensatory mechanism during metabolic acidosis. Headache, vomiting, and decreased level of consciousness are all clinical manifestations of metabolic acidosis, but they are not compensatory mechanisms that the body uses to maintain acid-base balance during metabolic acidosis.

C) Kussmaul respirations are deep and rapid respirations that are a compensatory mechanism during metabolic acidosis. Headache, vomiting, and decreased level of consciousness are all clinical manifestations of metabolic acidosis, but they are not compensatory mechanisms that the body uses to maintain acid-base balance during metabolic acidosis.

D) Kussmaul respirations are deep and rapid respirations that are a compensatory mechanism during metabolic acidosis. Headache, vomiting, and decreased level of consciousness are all clinical manifestations of metabolic acidosis, but they are not compensatory mechanisms that the body uses to maintain acid-base balance during metabolic acidosis.

Page Ref: 15

Cognitive Level: Understanding

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.A.4. Analyze metabolic acidosis as it relates to acid-base balance. Identify the clinical manifestations of metabolic acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic acidosis.

13) An alkalinizing solution often given intravenously to clients with severe acute metabolic acidosis is

- A) sodium bicarbonate.
- B) sodium chloride.
- C) potassium chloride.
- D) dextrose.

Answer: A

Explanation: A) Sodium bicarbonate is an alkalinizing solution often given intravenously to clients with severe acute metabolic acidosis. Sodium chloride and potassium chloride may worsen metabolic acidosis by increasing the chloride concentration. Dextrose may also worsen metabolic acidosis, especially in clients with type 1 diabetes, by increasing blood glucose levels and causing ketoacidosis.

B) Sodium bicarbonate is an alkalinizing solution often given intravenously to clients with severe acute metabolic acidosis. Sodium chloride and potassium chloride may worsen metabolic acidosis by increasing the chloride concentration. Dextrose may also worsen metabolic acidosis, especially in clients with type 1 diabetes, by increasing blood glucose levels and causing ketoacidosis.

C) Sodium bicarbonate is an alkalinizing solution often given intravenously to clients with severe acute metabolic acidosis. Sodium chloride and potassium chloride may worsen metabolic acidosis by increasing the chloride concentration. Dextrose may also worsen metabolic acidosis, especially in clients with type 1 diabetes, by increasing blood glucose levels and causing ketoacidosis.

D) Sodium bicarbonate is an alkalinizing solution often given intravenously to clients with severe acute metabolic acidosis. Sodium chloride and potassium chloride may worsen metabolic acidosis by increasing the chloride concentration. Dextrose may also worsen metabolic acidosis, especially in clients with type 1 diabetes, by increasing blood glucose levels and causing ketoacidosis.

Page Ref: 15-17

Cognitive Level: Remembering

Client Need/Sub: Physiological Integrity: Pharmacological and Parenteral Therapies

Standards: QSEN Competencies: III.A.2. Describe EBP to include the components of research evidence, clinical expertise and patient/family values. | AACN Essential Competencies: IX.3.

Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN

Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation

Learning Outcome: 1.A.5. Analyze metabolic acidosis as it relates to acid-base balance.

Summarize diagnostic tests and therapies used by interdisciplinary teams in the collaborative care of an individual with metabolic acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic acidosis.

14) The nurse is caring for a 3-month-old infant who presented to the emergency department (ED) with fever, diarrhea, vomiting, and diaper rash over the past 48 hours. Which symptom puts this client most at risk for metabolic acidosis?

- A) Fever
- B) Diarrhea
- C) Vomiting
- D) Diaper rash

Answer: B

Explanation: A) Infants are more susceptible to metabolic acidosis from diarrhea due to significant losses of bicarbonate in the feces. Vomiting is more likely to result in metabolic alkalosis from loss of stomach acids. Fever and diaper rash do not directly contribute to metabolic acidosis.

B) Infants are more susceptible to metabolic acidosis from diarrhea due to significant losses of bicarbonate in the feces. Vomiting is more likely to result in metabolic alkalosis from loss of stomach acids. Fever and diaper rash do not directly contribute to metabolic acidosis.

C) Infants are more susceptible to metabolic acidosis from diarrhea due to significant losses of bicarbonate in the feces. Vomiting is more likely to result in metabolic alkalosis from loss of stomach acids. Fever and diaper rash do not directly contribute to metabolic acidosis.

D) Infants are more susceptible to metabolic acidosis from diarrhea due to significant losses of bicarbonate in the feces. Vomiting is more likely to result in metabolic alkalosis from loss of stomach acids. Fever and diaper rash do not directly contribute to metabolic acidosis.

Page Ref: 15

Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.A.6. Analyze metabolic acidosis as it relates to acid-base balance.

Differentiate care of clients with metabolic acidosis across the lifespan.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic acidosis.

15) An older adult client has a history of heart disease and dementia and takes several medications. His wife states that sometimes he forgets to take his medications, or he takes multiple doses of his medications, due to his dementia. An accidental overdose of which medication could result in metabolic acidosis?

- A) Losartan (an angiotensin II receptor blocker to reduce hypertension)
- B) Simvastatin (a statin to reduce blood cholesterol levels)
- C) Rivastigmine (a cholinesterase inhibitor to reduce symptoms of dementia)
- D) Aspirin (a salicylate to decrease risk of heart attack)

Answer: D

Explanation: A) Aspirin is salicylic acid, which could decrease the blood pH if taken in high quantities. Diuretics, some antidepressants, antiseizure medications, and angiotensin-converting enzyme (ACE) inhibitors could all affect the acid-base balance in an older adult, but acid-base balance is less affected by angiotensin II receptor blockers, statins, and cholinesterase inhibitors. B) Aspirin is salicylic acid, which could decrease the blood pH if taken in high quantities. Diuretics, some antidepressants, antiseizure medications, and angiotensin-converting enzyme (ACE) inhibitors could all affect the acid-base balance in an older adult, but acid-base balance is less affected by angiotensin II receptor blockers, statins, and cholinesterase inhibitors. C) Aspirin is salicylic acid, which could decrease the blood pH if taken in high quantities. Diuretics, some antidepressants, antiseizure medications, and angiotensin-converting enzyme (ACE) inhibitors could all affect the acid-base balance in an older adult, but acid-base balance is less affected by angiotensin II receptor blockers, statins, and cholinesterase inhibitors. D) Aspirin is salicylic acid, which could decrease the blood pH if taken in high quantities. Diuretics, some antidepressants, antiseizure medications, and angiotensin-converting enzyme (ACE) inhibitors could all affect the acid-base balance in an older adult, but acid-base balance is less affected by angiotensin II receptor blockers, statins, and cholinesterase inhibitors.

Page Ref: 15

Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Pharmacological and Parenteral Therapies

Standards: QSEN Competencies: I.A.4. Examine how the safety, quality and cost effectiveness of health care can be improved through the active involvement of patients and families. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Relationship Centered Care: Factors that contribute to or threaten health. | Nursing Process: Assessment

Learning Outcome: 1.A.6. Analyze metabolic acidosis as it relates to acid-base balance.

Differentiate care of clients with metabolic acidosis across the lifespan.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic acidosis.

Exemplar 1.B Metabolic Alkalosis

1) The client has been vomiting for several days. The nurse knows that the client is at risk for metabolic alkalosis because gastric secretions have which characteristic?

- A) Gastric secretions are green in color.
- B) Gastric secretions are alkaline.
- C) Gastric secretions are acidic.
- D) Gastric secretions have a foul smell.

Answer: C

Explanation: A) Metabolic alkalosis due to loss of hydrogen ions usually occurs because of vomiting or gastric suction. Gastric secretions are highly acidic (pH 1-3). When these are lost through vomiting or gastric suction, the alkalinity of body fluids increases. This increased alkalinity results from the loss of acid and from selective retention of bicarbonate by the kidneys as chloride is depleted. Gastric secretions are not alkaline. The color and odor of gastric secretions have no influence on the development of metabolic acidosis.

B) Metabolic alkalosis due to loss of hydrogen ions usually occurs because of vomiting or gastric suction. Gastric secretions are highly acidic (pH 1-3). When these are lost through vomiting or gastric suction, the alkalinity of body fluids increases. This increased alkalinity results from the loss of acid and from selective retention of bicarbonate by the kidneys as chloride is depleted. Gastric secretions are not alkaline. The color and odor of gastric secretions have no influence on the development of metabolic acidosis.

C) Metabolic alkalosis due to loss of hydrogen ions usually occurs because of vomiting or gastric suction. Gastric secretions are highly acidic (pH 1-3). When these are lost through vomiting or gastric suction, the alkalinity of body fluids increases. This increased alkalinity results from the loss of acid and from selective retention of bicarbonate by the kidneys as chloride is depleted. Gastric secretions are not alkaline. The color and odor of gastric secretions have no influence on the development of metabolic acidosis.

D) Metabolic alkalosis due to loss of hydrogen ions usually occurs because of vomiting or gastric suction. Gastric secretions are highly acidic (pH 1-3). When these are lost through vomiting or gastric suction, the alkalinity of body fluids increases. This increased alkalinity results from the loss of acid and from selective retention of bicarbonate by the kidneys as chloride is depleted. Gastric secretions are not alkaline. The color and odor of gastric secretions have no influence on the development of metabolic acidosis.

Page Ref: 19

Cognitive Level: Understanding

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.B.1. Analyze metabolic alkalosis as it relates to acid-base balance.

Describe the pathophysiology of metabolic alkalosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic alkalosis.

2) The nurse is caring for a client who has been admitted to the hospital for congestive heart failure. Which data collected during the nursing assessment indicate that the client is at risk for metabolic alkalosis? Select all that apply.

A) The client takes furosemide (Lasix) daily.

B) The client takes a baby aspirin once daily.

C) The client takes metformin daily.

D) The client frequently uses calcium carbonate (Tums) for acid indigestion.

E) The client takes acetaminophen as needed for pain.

Answer: A, D

Explanation: A) Excessive use of calcium carbonate and daily use of furosemide can cause metabolic alkalosis. Use of metformin is not associated with alkalosis. Overuse of aspirin can be associated with metabolic acidosis. Occasional use of acetaminophen is not associated with metabolic alkalosis.

B) Excessive use of calcium carbonate and daily use of furosemide can cause metabolic alkalosis. Use of metformin is not associated with alkalosis. Overuse of aspirin can be associated with metabolic acidosis. Occasional use of acetaminophen is not associated with metabolic alkalosis.

C) Excessive use of calcium carbonate and daily use of furosemide can cause metabolic alkalosis. Use of metformin is not associated with alkalosis. Overuse of aspirin can be associated with metabolic acidosis. Occasional use of acetaminophen is not associated with metabolic alkalosis.

D) Excessive use of calcium carbonate and daily use of furosemide can cause metabolic alkalosis. Use of metformin is not associated with alkalosis. Overuse of aspirin can be associated with metabolic acidosis. Occasional use of acetaminophen is not associated with metabolic alkalosis.

E) Excessive use of calcium carbonate and daily use of furosemide can cause metabolic alkalosis. Use of metformin is not associated with alkalosis. Overuse of aspirin can be associated with metabolic acidosis. Occasional use of acetaminophen is not associated with metabolic alkalosis.

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Cognitive Level: Applying

Client Need/Sub: Physiological Integrity: Reduction of Risk Potential

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.B.2. Analyze metabolic alkalosis as it relates to acid-base balance.

Describe the etiology of metabolic alkalosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic alkalosis.

3) An adolescent is hospitalized following several days of vomiting due to food poisoning. The nurse is planning to include which points when teaching the client's family at discharge? Select all that apply.

- A) Immunizations for the adolescent
- B) Nutritional patterns of the adolescent
- C) Signs and symptoms of metabolic alkalosis
- D) Proper food-handling techniques
- E) Normal laboratory values of the adolescent

Answer: C, D

Explanation: A) The family of anyone experiencing prolonged vomiting should be taught the signs and symptoms of metabolic alkalosis. In this case, the nurse would include teaching about proper methods of food handling to prevent further episodes of food poisoning. Food patterns of the adolescent are not the precipitating factor of the food poisoning, and immunizations would not prevent this disease. Unless the family asks, it is not necessary to teach normal laboratory findings.

B) The family of anyone experiencing prolonged vomiting should be taught the signs and symptoms of metabolic alkalosis. In this case, the nurse would include teaching about proper methods of food handling to prevent further episodes of food poisoning. Food patterns of the adolescent are not the precipitating factor of the food poisoning, and immunizations would not prevent this disease. Unless the family asks, it is not necessary to teach normal laboratory findings.

C) The family of anyone experiencing prolonged vomiting should be taught the signs and symptoms of metabolic alkalosis. In this case, the nurse would include teaching about proper methods of food handling to prevent further episodes of food poisoning. Food patterns of the adolescent are not the precipitating factor of the food poisoning, and immunizations would not prevent this disease. Unless the family asks, it is not necessary to teach normal laboratory findings.

D) The family of anyone experiencing prolonged vomiting should be taught the signs and symptoms of metabolic alkalosis. In this case, the nurse would include teaching about proper methods of food handling to prevent further episodes of food poisoning. Food patterns of the adolescent are not the precipitating factor of the food poisoning, and immunizations would not prevent this disease. Unless the family asks, it is not necessary to teach normal laboratory findings.

E) The family of anyone experiencing prolonged vomiting should be taught the signs and symptoms of metabolic alkalosis. In this case, the nurse would include teaching about proper methods of food handling to prevent further episodes of food poisoning. Food patterns of the adolescent are not the precipitating factor of the food poisoning, and immunizations would not prevent this disease. Unless the family asks, it is not necessary to teach normal laboratory findings.

Page Ref: 19-21

Cognitive Level: Analyzing

Client Need/Sub: Health Promotion and Maintenance

Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care: Patient/family/community preferences, values; Coordination and integration of care; Information, communication, and education; Physical comfort and emotional support; Involvement of family and friends Transition and continuity. | AACN Essential Competencies: IX.7. Provide appropriate patient teaching that reflects developmental state, age, culture, spirituality, patient preferences, and health literacy considerations to foster patient engagement in their care. | NLN Competencies: Relationship Centered Care: Effective communication. | Nursing Process: Evaluation

Learning Outcome: 1.B.7. Analyze metabolic alkalosis as it relates to acid-base balance. Apply the nursing process in providing culturally competent care to an individual with metabolic alkalosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic alkalosis.

4) The nurse is planning care for the client who has been admitted with metabolic alkalosis. Which are appropriate nursing diagnoses for this client during the acute phase of the illness? Select all that apply.

- A) Ineffective Health Maintenance
- B) Risk for Hypothermia
- C) Deficient Fluid Volume
- D) Risk for Impaired Gas Exchange
- E) Risk for Injury

Answer: C, D, E

Explanation: A) Respiratory compensation for metabolic alkalosis includes depression of the respiratory rate and reduction of the depth of respirations, leading to the retention of carbon dioxide. Patients with metabolic alkalosis often have an accompanying fluid volume deficit. With the fluid volume deficit, the client would experience hyperthermia. Ineffective health maintenance would not be a priority during the acute phase of the disease but, rather, a teaching opportunity before discharge depending on the cause of the metabolic alkalosis. The client is at risk for injury because of the associated muscle spasms and dizziness.

B) Respiratory compensation for metabolic alkalosis includes depression of the respiratory rate and reduction of the depth of respirations, leading to the retention of carbon dioxide. Patients with metabolic alkalosis often have an accompanying fluid volume deficit. With the fluid volume deficit, the client would experience hyperthermia. Ineffective health maintenance would not be a priority during the acute phase of the disease but, rather, a teaching opportunity before discharge depending on the cause of the metabolic alkalosis. The client is at risk for injury because of the associated muscle spasms and dizziness.

C) Respiratory compensation for metabolic alkalosis includes depression of the respiratory rate and reduction of the depth of respirations, leading to the retention of carbon dioxide. Patients with metabolic alkalosis often have an accompanying fluid volume deficit. With the fluid volume deficit, the client would experience hyperthermia. Ineffective health maintenance would not be a priority during the acute phase of the disease but, rather, a teaching opportunity before discharge depending on the cause of the metabolic alkalosis. The client is at risk for injury because of the associated muscle spasms and dizziness.

D) Respiratory compensation for metabolic alkalosis includes depression of the respiratory rate and reduction of the depth of respirations, leading to the retention of carbon dioxide. Patients with metabolic alkalosis often have an accompanying fluid volume deficit. With the fluid volume deficit, the client would experience hyperthermia. Ineffective health maintenance would not be a priority during the acute phase of the disease but, rather, a teaching opportunity before discharge depending on the cause of the metabolic alkalosis. The client is at risk for injury because of the associated muscle spasms and dizziness.

E) Respiratory compensation for metabolic alkalosis includes depression of the respiratory rate and reduction of the depth of respirations, leading to the retention of carbon dioxide. Patients with metabolic alkalosis often have an accompanying fluid volume deficit. With the fluid volume deficit, the client would experience hyperthermia. Ineffective health maintenance would not be a priority during the acute phase of the disease but, rather, a teaching opportunity before discharge depending on the cause of the metabolic alkalosis. The client is at risk for injury because of the associated muscle spasms and dizziness.

Page Ref: 20—21

Cognitive Level: Applying

Client Need/Sub: Physiological Integrity: Reduction of Risk Potential

Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care: Patient/family/community preferences, values; Coordination and integration of care; Information, communication, and education; Physical comfort and emotional support; Involvement of family and friends Transition and continuity. | AACN Essential Competencies: IX.7. Provide appropriate patient teaching that reflects developmental state, age, culture, spirituality, patient preferences, and health literacy considerations to foster patient engagement in their care. | NLN Competencies: Relationship Centered Care: Effective communication. | Nursing Process: Evaluation

Learning Outcome: 1.B.7. Analyze metabolic alkalosis as it relates to acid-base balance. Apply the nursing process in providing culturally competent care to an individual with metabolic alkalosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic alkalosis.

5) The nurse is planning care for the client with Cushing syndrome who has been admitted for complications related to the disease process. Which intervention should the nurse plan for this client to improve the impaired gas exchange?

- A) Monitor serum electrolytes.
- B) Schedule nursing activities to allow for periods of rest.
- C) Assess input and output accurately.
- D) Administer IV fluids per practitioner order.

Answer: B

Explanation: A) The client with Cushing syndrome is at risk for developing severe metabolic alkalosis that causes hypoxemia and limits energy reserves. Spacing nursing activities throughout the day allows the client ample rest time. The other interventions are aimed at the deficient fluid volume that may occur with metabolic alkalosis.

B) The client with Cushing syndrome is at risk for developing severe metabolic alkalosis that causes hypoxemia and limits energy reserves. Spacing nursing activities throughout the day allows the client ample rest time. The other interventions are aimed at the deficient fluid volume that may occur with metabolic alkalosis.

C) The client with Cushing syndrome is at risk for developing severe metabolic alkalosis that causes hypoxemia and limits energy reserves. Spacing nursing activities throughout the day allows the client ample rest time. The other interventions are aimed at the deficient fluid volume that may occur with metabolic alkalosis.

D) The client with Cushing syndrome is at risk for developing severe metabolic alkalosis that causes hypoxemia and limits energy reserves. Spacing nursing activities throughout the day allows the client ample rest time. The other interventions are aimed at the deficient fluid volume that may occur with metabolic alkalosis.

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Cognitive Level: Applying

Client Need/Sub: Physiological Integrity: Basic Care and Comfort

Standards: QSEN Competencies: III.A.2 Describe EBP to include the components of research evidence, clinical expertise and patient/family values. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation

Learning Outcome: 1.B.7. Analyze metabolic alkalosis as it relates to acid-base balance. Apply the nursing process in providing culturally competent care to an individual with metabolic alkalosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic alkalosis.

6) The nurse is preparing to discharge a client with congestive heart failure on furosemide (Lasix). The nurse determines that teaching has been effective if the client makes which statement?

- A) "I will use only sodium bicarbonate as my antacid."
- B) "I will restrict my intake of fluids."
- C) "I will use potassium supplements while I am taking Lasix."
- D) "I will take antacids only for my gastric discomforts."

Answer: C

Explanation: A) The client on furosemide (Lasix) may lose excess potassium, disposing the client toward metabolic alkalosis. The client is taught to refrain from the use of sodium antacids when prone to metabolic alkalosis. The client should consult with the primary care provider for gastric distress rather than self-medicate. The client who is prone to metabolic alkalosis is likely to have fluid deficits and would not be instructed to restrict fluids.

B) The client on furosemide (Lasix) may lose excess potassium, disposing the client toward metabolic alkalosis. The client is taught to refrain from the use of sodium antacids when prone to metabolic alkalosis. The client should consult with the primary care provider for gastric distress rather than self-medicate. The client who is prone to metabolic alkalosis is likely to have fluid deficits and would not be instructed to restrict fluids.

C) The client on furosemide (Lasix) may lose excess potassium, disposing the client toward metabolic alkalosis. The client is taught to refrain from the use of sodium antacids when prone to metabolic alkalosis. The client should consult with the primary care provider for gastric distress rather than self-medicate. The client who is prone to metabolic alkalosis is likely to have fluid deficits and would not be instructed to restrict fluids.

D) The client on furosemide (Lasix) may lose excess potassium, disposing the client toward metabolic alkalosis. The client is taught to refrain from the use of sodium antacids when prone to metabolic alkalosis. The client should consult with the primary care provider for gastric distress rather than self-medicate. The client who is prone to metabolic alkalosis is likely to have fluid deficits and would not be instructed to restrict fluids.

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Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Pharmacological and Parenteral Therapies

Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care: Patient/family/community preferences, values; Coordination and integration of care; Information, communication, and education; Physical comfort and emotional support; Involvement of family and friends Transition and continuity. | AACN Essential Competencies: IX.7. Provide appropriate patient teaching that reflects developmental state, age, culture, spirituality, patient preferences, and health literacy considerations to foster patient engagement in their care. | NLN Competencies: Relationship Centered Care: Effective communication. | Nursing Process: Evaluation

Learning Outcome: 1.B.7. Analyze metabolic alkalosis as it relates to acid-base balance. Apply the nursing process in providing culturally competent care to an individual with metabolic alkalosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic alkalosis.

7) A client with severe metabolic alkalosis is admitted to the unit. Which is the priority for the client?

- A) Administering medication for metabolic alkalosis
- B) Monitoring oxygen saturation
- C) Teaching the client the risk factors for metabolic alkalosis
- D) Setting goals for the client with metabolic alkalosis

Answer: B

Explanation: A) The priority for this client is monitoring oxygen saturation. The depressed respiratory drive that often accompanies metabolic alkalosis can lead to hypoxemia and impaired oxygenation of the tissues. Administering medications will be needed as a treatment, but the priority is to discover the cause. Teaching the client and setting goals are important aspects of nursing care but are not the priority.

B) The priority for this client is monitoring oxygen saturation. The depressed respiratory drive that often accompanies metabolic alkalosis can lead to hypoxemia and impaired oxygenation of the tissues. Administering medications will be needed as a treatment, but the priority is to discover the cause. Teaching the client and setting goals are important aspects of nursing care but are not the priority.

C) The priority for this client is monitoring oxygen saturation. The depressed respiratory drive that often accompanies metabolic alkalosis can lead to hypoxemia and impaired oxygenation of the tissues. Administering medications will be needed as a treatment, but the priority is to discover the cause. Teaching the client and setting goals are important aspects of nursing care but are not the priority.

D) The priority for this client is monitoring oxygen saturation. The depressed respiratory drive that often accompanies metabolic alkalosis can lead to hypoxemia and impaired oxygenation of the tissues. Administering medications will be needed as a treatment, but the priority is to discover the cause. Teaching the client and setting goals are important aspects of nursing care but are not the priority.

Page Ref: 21

Cognitive Level: Applying

Client Need/Sub: Physiological Integrity: Basic Care and Comfort

Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care: Patient/family/community preferences, values; Coordination and integration of care; Information, communication, and education; Physical comfort and emotional support; Involvement of family and friends Transition and continuity. | AACN Essential Competencies: IX.7. Provide appropriate patient teaching that reflects developmental state, age, culture, spirituality, patient preferences, and health literacy considerations to foster patient engagement in their care. | NLN Competencies: Relationship Centered Care: Effective communication. | Nursing Process: Evaluation

Learning Outcome: 1.B.7. Analyze metabolic alkalosis as it relates to acid-base balance. Apply the nursing process in providing culturally competent care to an individual with metabolic alkalosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic alkalosis.

8) A client with hyperaldosteronism is admitted to the unit and is at risk for impaired gas exchange. In which position should this client be placed to enhance gas exchange?

- A) Fowler position
- B) Prone position
- C) Left side-lying position
- D) Right Sims position

Answer: A

Explanation: A) The client with hyperaldosteronism with metabolic alkalosis will likely have reduced oxygenation. The Fowler position will facilitate alveolar ventilation with improved oxygenation. Side-lying and prone positions do not facilitate needed lung expansion.

B) The client with hyperaldosteronism with metabolic alkalosis will likely have reduced oxygenation. The Fowler position will facilitate alveolar ventilation with improved oxygenation. Side-lying and prone positions do not facilitate needed lung expansion.

C) The client with hyperaldosteronism with metabolic alkalosis will likely have reduced oxygenation. The Fowler position will facilitate alveolar ventilation with improved oxygenation. Side-lying and prone positions do not facilitate needed lung expansion.

D) The client with hyperaldosteronism with metabolic alkalosis will likely have reduced oxygenation. The Fowler position will facilitate alveolar ventilation with improved oxygenation. Side-lying and prone positions do not facilitate needed lung expansion.

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Cognitive Level: Understanding

Client Need/Sub: Physiological Integrity: Basic Care and Comfort

Standards: QSEN Competencies: III.A.2 Describe EBP to include the components of research evidence, clinical expertise and patient/family values. | AACN Essential Competencies: IX.3.

Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN

Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation

Learning Outcome: 1.B.7. Analyze metabolic alkalosis as it relates to acid-base balance. Apply the nursing process in providing culturally competent care to an individual with metabolic alkalosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic alkalosis.

9) While reviewing laboratory results, the nurse notes that a client's potassium level is 2.8 mEq/L and chloride level is 100 mEq/L. Based on this data, which intervention does the nurse plan for this client?

- A) Preparing to administer 0.9% sodium chloride infusion
- B) Measuring for nasogastric tube insertion
- C) Discussing potassium chloride replacement therapy with the healthcare provider
- D) Reviewing implications of transfusing with ammonium chloride

Answer: C

Explanation: A) Treatment of metabolic alkalosis includes restoring normal fluid volume and administering potassium chloride. The potassium restores serum and intracellular potassium levels, allowing the kidneys to conserve hydrogen ions more effectively. Because the chloride level is within normal limits, an infusion of 0.9% sodium chloride is not indicated. A nasogastric tube is not indicated for this client. There is not enough information to support the use of ammonium chloride for this client, as it is indicated to treat severe metabolic alkalosis.

B) Treatment of metabolic alkalosis includes restoring normal fluid volume and administering potassium chloride. The potassium restores serum and intracellular potassium levels, allowing the kidneys to conserve hydrogen ions more effectively. Because the chloride level is within normal limits, an infusion of 0.9% sodium chloride is not indicated. A nasogastric tube is not indicated for this client. There is not enough information to support the use of ammonium chloride for this client, as it is indicated to treat severe metabolic alkalosis.

C) Treatment of metabolic alkalosis includes restoring normal fluid volume and administering potassium chloride. The potassium restores serum and intracellular potassium levels, allowing the kidneys to conserve hydrogen ions more effectively. Because the chloride level is within normal limits, an infusion of 0.9% sodium chloride is not indicated. A nasogastric tube is not indicated for this client. There is not enough information to support the use of ammonium chloride for this client, as it is indicated to treat severe metabolic alkalosis.

D) Treatment of metabolic alkalosis includes restoring normal fluid volume and administering potassium chloride. The potassium restores serum and intracellular potassium levels, allowing the kidneys to conserve hydrogen ions more effectively. Because the chloride level is within normal limits, an infusion of 0.9% sodium chloride is not indicated. A nasogastric tube is not indicated for this client. There is not enough information to support the use of ammonium chloride for this client, as it is indicated to treat severe metabolic alkalosis.

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Cognitive Level: Evaluating

Client Need/Sub: Physiological Integrity: Pharmacological and Parenteral Therapies

Standards: QSEN Competencies: III.A.2 Describe EBP to include the components of research evidence, clinical expertise and patient/family values. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Planning

Learning Outcome: 1.B.5. Analyze metabolic alkalosis as it relates to acid-base balance.

Summarize diagnostic tests and therapies used by interdisciplinary teams in the collaborative care of an individual with metabolic alkalosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic alkalosis.

10) The nurse identifies the diagnosis Risk for Impaired Gas Exchange to guide the care of a client with metabolic alkalosis. Which assessment data supports this nursing diagnosis? Select all that apply.

- A) Respiratory rate 8 per minute
- B) Oxygen saturation 89%
- C) Urine output 25 mL/hr
- D) Restlessness and agitation
- E) Weight loss of 3 kg overnight

Answer: A, B, D

Explanation: A) Respiratory compensation for metabolic alkalosis depresses the respiratory rate and reduces the depth of breathing to promote carbon dioxide retention. The depressed respiratory drive associated with metabolic alkalosis can lead to hypoxemia and impaired oxygenation of tissues. Oxygen saturation levels of less than 90% indicate significant oxygenation problems. Changes in mental status or behavior may be early signs of hypoxia. Urine output less than 30 mL/hr would indicate fluid volume deficit. Weight is used as an indicator of fluid balance. A rapid weight change would indicate fluid volume deficit.

B) Respiratory compensation for metabolic alkalosis depresses the respiratory rate and reduces the depth of breathing to promote carbon dioxide retention. The depressed respiratory drive associated with metabolic alkalosis can lead to hypoxemia and impaired oxygenation of tissues. Oxygen saturation levels of less than 90% indicate significant oxygenation problems. Changes in mental status or behavior may be early signs of hypoxia. Urine output less than 30 mL/hr would indicate fluid volume deficit. Weight is used as an indicator of fluid balance. A rapid weight change would indicate fluid volume deficit.

C) Respiratory compensation for metabolic alkalosis depresses the respiratory rate and reduces the depth of breathing to promote carbon dioxide retention. The depressed respiratory drive associated with metabolic alkalosis can lead to hypoxemia and impaired oxygenation of tissues. Oxygen saturation levels of less than 90% indicate significant oxygenation problems. Changes in mental status or behavior may be early signs of hypoxia. Urine output less than 30 mL/hr would indicate fluid volume deficit. Weight is used as an indicator of fluid balance. A rapid weight change would indicate fluid volume deficit.

D) Respiratory compensation for metabolic alkalosis depresses the respiratory rate and reduces the depth of breathing to promote carbon dioxide retention. The depressed respiratory drive associated with metabolic alkalosis can lead to hypoxemia and impaired oxygenation of tissues. Oxygen saturation levels of less than 90% indicate significant oxygenation problems. Changes in mental status or behavior may be early signs of hypoxia. Urine output less than 30 mL/hr would indicate fluid volume deficit. Weight is used as an indicator of fluid balance. A rapid weight change would indicate fluid volume deficit.

E) Respiratory compensation for metabolic alkalosis depresses the respiratory rate and reduces the depth of breathing to promote carbon dioxide retention. The depressed respiratory drive associated with metabolic alkalosis can lead to hypoxemia and impaired oxygenation of tissues. Oxygen saturation levels of less than 90% indicate significant oxygenation problems. Changes in mental status or behavior may be early signs of hypoxia. Urine output less than 30 mL/hr would indicate fluid volume deficit. Weight is used as an indicator of fluid balance. A rapid weight change would indicate fluid volume deficit.

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Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care: Patient/family/community preferences, values; Coordination and integration of care; Information, communication, and education; Physical comfort and emotional support; Involvement of family and friends Transition and continuity. | AACN Essential Competencies: IX.7. Provide appropriate patient teaching that reflects developmental state, age, culture, spirituality, patient preferences, and health literacy considerations to foster patient engagement in their care. | NLN Competencies: Relationship Centered Care: Effective communication. | Nursing Process: Evaluation

Learning Outcome: 1.B.7. Analyze metabolic alkalosis as it relates to acid-base balance. Apply the nursing process in providing culturally competent care to an individual with metabolic alkalosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic alkalosis.

11) A client is admitted with manifestations of metabolic alkalosis. Which diagnostic test findings support the admitting diagnosis? Select all that apply.

- A) Serum glucose level 142 mg/dL
- B) Blood pH 7.47 and bicarbonate 34 mEq/L
- C) Intravenous pyelogram shows kidney stones
- D) Bilateral lower lobe infiltrates noted on chest x-ray
- E) Electrocardiogram changes consistent with hypokalemia

Answer: B, E

Explanation: A) In metabolic alkalosis, the blood pH will be greater than 7.45 and the bicarbonate level greater than 26 mEq/L. The ECG pattern shows changes similar to those seen with hypokalemia. Serum glucose levels, kidney stones, and lower lobe infiltrates are not associated with metabolic alkalosis.

B) In metabolic alkalosis, the blood pH will be greater than 7.45 and the bicarbonate level greater than 26 mEq/L. The ECG pattern shows changes similar to those seen with hypokalemia. Serum glucose levels, kidney stones, and lower lobe infiltrates are not associated with metabolic alkalosis.

C) In metabolic alkalosis, the blood pH will be greater than 7.45 and the bicarbonate level greater than 26 mEq/L. The ECG pattern shows changes similar to those seen with hypokalemia. Serum glucose levels, kidney stones, and lower lobe infiltrates are not associated with metabolic alkalosis.

D) In metabolic alkalosis, the blood pH will be greater than 7.45 and the bicarbonate level greater than 26 mEq/L. The ECG pattern shows changes similar to those seen with hypokalemia. Serum glucose levels, kidney stones, and lower lobe infiltrates are not associated with metabolic alkalosis.

E) In metabolic alkalosis, the blood pH will be greater than 7.45 and the bicarbonate level greater than 26 mEq/L. The ECG pattern shows changes similar to those seen with hypokalemia. Serum glucose levels, kidney stones, and lower lobe infiltrates are not associated with metabolic alkalosis.

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Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care: Patient/family/community preferences, values; Coordination and integration of care; Information, communication, and education; Physical comfort and emotional support; Involvement of family and friends Transition and continuity. | AACN Essential Competencies: IX.7. Provide appropriate patient teaching that reflects developmental state, age, culture, spirituality, patient preferences, and health literacy considerations to foster patient engagement in their care. | NLN Competencies: Relationship Centered Care: Effective communication. | Nursing Process: Evaluation

Learning Outcome: 1.B.5. Analyze metabolic alkalosis as it relates to acid-base balance.

Summarize diagnostic tests and therapies used by interdisciplinary teams in the collaborative care of an individual with metabolic alkalosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic alkalosis.

12) During an assessment, the nurse becomes concerned that a client is at risk for developing metabolic alkalosis. What did the nurse assess that caused this concern?

- A) Daily ingestion of a banana with breakfast
- B) Daily weight consistent
- C) Daily use of sodium bicarbonate for gastric upset
- D) Daily use of prescribed nonsteroidal anti-inflammatory drugs (NSAIDs) for arthritic pain

Answer: C

Explanation: A) Excess bicarbonate usually occurs as a result of ingesting antacids that contain bicarbonate, such as sodium bicarbonate or Alka-Seltzer. Daily ingestion of a banana would prevent the development of hypokalemia from the daily use of sodium bicarbonate. Consistent daily weights would indicate fluid balance. Daily use of NSAIDs would not support the development of metabolic alkalosis.

B) Excess bicarbonate usually occurs as a result of ingesting antacids that contain bicarbonate, such as soda bicarbonate or Alka-Seltzer. Daily ingestion of a banana would prevent the development of hypokalemia from the daily use of sodium bicarbonate. Consistent daily weights would indicate fluid balance. Daily use of NSAIDs would not support the development of metabolic alkalosis.

C) Excess bicarbonate usually occurs as a result of ingesting antacids that contain bicarbonate, such as soda bicarbonate or Alka-Seltzer. Daily ingestion of a banana would prevent the development of hypokalemia from the daily use of sodium bicarbonate. Consistent daily weights would indicate fluid balance. Daily use of NSAIDs would not support the development of metabolic alkalosis.

D) Excess bicarbonate usually occurs as a result of ingesting antacids that contain bicarbonate, such as soda bicarbonate or Alka-Seltzer. Daily ingestion of a banana would prevent the development of hypokalemia from the daily use of sodium bicarbonate. Consistent daily weights would indicate fluid balance. Daily use of NSAIDs would not support the development of metabolic alkalosis.

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Cognitive Level: Analyzing

Client Need/Sub: Health Promotion and Maintenance

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.B.3. Analyze metabolic alkalosis as it relates to acid-base balance.

Compare the risk factors and prevention of metabolic alkalosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic alkalosis.

13) During a home visit, the nurse evaluates teaching provided to a client recently hospitalized for metabolic alkalosis. Which observation indicates that additional teaching is required?

- A) Drinks 2 cups of black coffee each day.
- B) Consumes one orange each day with breakfast.
- C) Ingests bicarbonate of soda after each meal.
- D) Monitors and tracks daily weights.

Answer: C

Explanation: A) The indiscriminate ingestion of sodium bicarbonate is a risk factor for the development of metabolic alkalosis. Black coffee is not associated with the development of metabolic alkalosis. Oranges contain potassium, which is beneficial to prevent the development of metabolic alkalosis. Tracking of daily weights would help detect a fluid imbalance, which is associated with metabolic alkalosis.

B) The indiscriminate ingestion of sodium bicarbonate is a risk factor for the development of metabolic alkalosis. Black coffee is not associated with the development of metabolic alkalosis. Oranges contain potassium, which is beneficial to prevent the development of metabolic alkalosis. Tracking of daily weights would help detect a fluid imbalance, which is associated with metabolic alkalosis.

C) The indiscriminate ingestion of sodium bicarbonate is a risk factor for the development of metabolic alkalosis. Black coffee is not associated with the development of metabolic alkalosis. Oranges contain potassium, which is beneficial to prevent the development of metabolic alkalosis. Tracking of daily weights would help detect a fluid imbalance, which is associated with metabolic alkalosis.

D) The indiscriminate ingestion of sodium bicarbonate is a risk factor for the development of metabolic alkalosis. Black coffee is not associated with the development of metabolic alkalosis. Oranges contain potassium, which is beneficial to prevent the development of metabolic alkalosis. Tracking of daily weights would help detect a fluid imbalance, which is associated with metabolic alkalosis.

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Cognitive Level: Analyzing

Client Need/Sub: Health Promotion and Maintenance

Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care: Patient/family/community preferences, values; Coordination and integration of care; Information, communication, and education; Physical comfort and emotional support; Involvement of family and friends Transition and continuity. | AACN Essential Competencies: IX.7. Provide appropriate patient teaching that reflects developmental state, age, culture, spirituality, patient preferences, and health literacy considerations to foster patient engagement in their care. | NLN Competencies: Relationship Centered Care: Effective communication. | Nursing Process: Evaluation

Learning Outcome: 1.B.3. Analyze metabolic alkalosis as it relates to acid-base balance. Compare the risk factors and prevention of metabolic alkalosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic alkalosis.

14) Clinical manifestations of metabolic alkalosis are similar to signs of

- A) hypocalcemia.
- B) hypokalemia.
- C) hypercalcemia.
- D) hyperkalemia.

Answer: A

Explanation: A) Manifestations of metabolic alkalosis result from decreased calcium ionization and are similar to those of hypocalcemia. They include numbness and tingling around the mouth, fingers, and toes; dizziness; Trousseau sign; and muscle spasm. Clinical manifestations of metabolic alkalosis are not similar to those of hypercalcemia or hyper- or hypokalemia.

B) Manifestations of metabolic alkalosis result from decreased calcium ionization and are similar to those of hypocalcemia. They include numbness and tingling around the mouth, fingers, and toes; dizziness; Trousseau sign; and muscle spasm. Clinical manifestations of metabolic alkalosis are not similar to those of hypercalcemia or hyper- or hypokalemia.

C) Manifestations of metabolic alkalosis result from decreased calcium ionization and are similar to those of hypocalcemia. They include numbness and tingling around the mouth, fingers, and toes; dizziness; Trousseau sign; and muscle spasm. Clinical manifestations of metabolic alkalosis are not similar to those of hypercalcemia or hyper- or hypokalemia.

D) Manifestations of metabolic alkalosis result from decreased calcium ionization and are similar to those of hypocalcemia. They include numbness and tingling around the mouth, fingers, and toes; dizziness; Trousseau sign; and muscle spasm. Clinical manifestations of metabolic alkalosis are not similar to those of hypercalcemia or hyper- or hypokalemia.

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Cognitive Level: Remembering

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.B.4. Analyze metabolic alkalosis as it relates to acid-base balance.

Identify the clinical manifestations of metabolic alkalosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic alkalosis.

15) A newborn with pyloric stenosis has symptoms of projectile vomiting, leading to significant weight loss, dehydration, and metabolic alkalosis. What client teaching is necessary for the parents in caring for the infant until surgery to correct the defect?

- A) Monitoring for hyperventilation to detect changes in health status
- B) Breastfeeding techniques to reverse weight loss and dehydration
- C) Positioning of the infant to prevent aspiration
- D) Performing percussion and postural drainage to clear the airways

Answer: C

Explanation: A) Complications related to aspiration of vomitus can be prevented by correct positioning of the infant. Parents should be taught correct positioning so they can care for the infant at home or when the nurse is not in the room. Hyperventilation leads to respiratory alkalosis and is usually unrelated to pyloric stenosis. Because pyloric stenosis blocks passage of food from the stomach to the small intestines, increasing oral intake will not be beneficial to the infant, so breastfeeding techniques are irrelevant at this time. Percussion and postural drainage are more relevant to lung diseases such as cystic fibrosis, not a gastrointestinal (GI) disorder such as pyloric stenosis.

B) Complications related to aspiration of vomitus can be prevented by correct positioning of the infant. Parents should be taught correct positioning so they can care for the infant at home or when the nurse is not in the room. Hyperventilation leads to respiratory alkalosis and is usually unrelated to pyloric stenosis. Because pyloric stenosis blocks passage of food from the stomach to the small intestines, increasing oral intake will not be beneficial to the infant, so breastfeeding techniques are irrelevant at this time. Percussion and postural drainage are more relevant to lung diseases such as cystic fibrosis, not a gastrointestinal (GI) disorder such as pyloric stenosis.

C) Complications related to aspiration of vomitus can be prevented by correct positioning of the infant. Parents should be taught correct positioning so they can care for the infant at home or when the nurse is not in the room. Hyperventilation leads to respiratory alkalosis and is usually unrelated to pyloric stenosis. Because pyloric stenosis blocks passage of food from the stomach to the small intestines, increasing oral intake will not be beneficial to the infant, so breastfeeding techniques are irrelevant at this time. Percussion and postural drainage are more relevant to lung diseases such as cystic fibrosis, not a gastrointestinal (GI) disorder such as pyloric stenosis.

D) Complications related to aspiration of vomitus can be prevented by correct positioning of the infant. Parents should be taught correct positioning so they can care for the infant at home or when the nurse is not in the room. Hyperventilation leads to respiratory alkalosis and is usually unrelated to pyloric stenosis. Because pyloric stenosis blocks passage of food from the stomach to the small intestines, increasing oral intake will not be beneficial to the infant, so breastfeeding techniques are irrelevant at this time. Percussion and postural drainage are more relevant to lung diseases such as cystic fibrosis, not a gastrointestinal (GI) disorder such as pyloric stenosis.

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Cognitive Level: Applying

Client Need/Sub: Safe and Effective Care Environment: Safety and Infection Control

Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care: Patient/family/community preferences, values; Coordination and integration of care; Information, communication, and education; Physical comfort and emotional support; Involvement of family and friends Transition and continuity. | AACN Essential Competencies: IX.7. Provide appropriate patient teaching that reflects developmental state, age, culture, spirituality, patient preferences, and health literacy considerations to foster patient engagement in their care. | NLN Competencies: Relationship Centered Care: Effective communication. | Nursing Process: Evaluation

Learning Outcome: 1.B.6. Analyze metabolic alkalosis as it relates to acid-base balance.

Differentiate care of clients with metabolic alkalosis across the lifespan.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic alkalosis.

Exemplar 1.C Respiratory Acidosis

1) The nurse assumes care for a client who was brought to the hospital after a morphine overdose. What acid-base imbalance does the nurse expect to observe in this client?

- A) Respiratory alkalosis
- B) Respiratory acidosis
- C) Metabolic alkalosis
- D) Metabolic acidosis

Answer: B

Explanation: A) Morphine is a narcotic and generally acts to decrease or suppress respirations; therefore, this client is probably hypoventilating. The expected acid-base imbalance would be respiratory acidosis. Respiratory alkalosis, metabolic acidosis, and metabolic alkalosis are caused by many conditions, none of which are related to this client's morphine overdose.

B) Morphine is a narcotic and generally acts to decrease or suppress respirations; therefore, this client is probably hypoventilating. The expected acid-base imbalance would be respiratory acidosis. Respiratory alkalosis, metabolic acidosis, and metabolic alkalosis are caused by many conditions, none of which are related to this client's morphine overdose.

C) Morphine is a narcotic and generally acts to decrease or suppress respirations; therefore, this client is probably hypoventilating. The expected acid-base imbalance would be respiratory acidosis. Respiratory alkalosis, metabolic acidosis, and metabolic alkalosis are caused by many conditions, none of which are related to this client's morphine overdose.

D) Morphine is a narcotic and generally acts to decrease or suppress respirations; therefore, this client is probably hypoventilating. The expected acid-base imbalance would be respiratory acidosis. Respiratory alkalosis, metabolic acidosis, and metabolic alkalosis are caused by many conditions, none of which are related to this client's morphine overdose.

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Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Pharmacological and Parenteral Therapies

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.C.1. Analyze respiratory acidosis as it relates to acid-base balance.

Describe the pathophysiology of respiratory acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with respiratory acidosis.

2) The nurse is caring for a client who has been admitted to the unit with respiratory failure and respiratory acidosis. Which data from the nursing history would the nurse suspect contributed to the client's current state of health?

- A) Use of ibuprofen for the control of pain
- B) A recent trip to South America
- C) Aspiration pneumonia
- D) Recent recovery from a cold virus

Answer: C

Explanation: A) Aspiration of a foreign body and acute pneumonia would put the client at risk for respiratory acidosis. A recent trip to South America would not constitute a respiratory risk factor. Recent recovery from a cold would not likely put the client at risk. Ibuprofen does not pose a threat to the respiratory health of the client.

B) Aspiration of a foreign body and acute pneumonia would put the client at risk for respiratory acidosis. A recent trip to South America would not constitute a respiratory risk factor. Recent recovery from a cold would not likely put the client at risk. Ibuprofen does not pose a threat to the respiratory health of the client.

C) Aspiration of a foreign body and acute pneumonia would put the client at risk for respiratory acidosis. A recent trip to South America would not constitute a respiratory risk factor. Recent recovery from a cold would not likely put the client at risk. Ibuprofen does not pose a threat to the respiratory health of the client.

D) Aspiration of a foreign body and acute pneumonia would put the client at risk for respiratory acidosis. A recent trip to South America would not constitute a respiratory risk factor. Recent recovery from a cold would not likely put the client at risk. Ibuprofen does not pose a threat to the respiratory health of the client.

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Cognitive Level: Applying

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.C.3. Analyze respiratory acidosis as it relates to acid-base balance. Compare the risk factors and prevention of respiratory acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with respiratory acidosis.

3) A school-age client is admitted to the hospital with respiratory acidosis. Which chronic lung illness in the client's health history does the nurse suspect is causing the current diagnosis?

- A) Cystic fibrosis
- B) Aspiration
- C) Hyperthyroidism
- D) Pneumonia

Answer: A

Explanation: A) Chronic lung disease such as asthma and cystic fibrosis put the child at risk for respiratory acidosis. Pneumonia and aspiration are both acute lung conditions. Hyperthyroidism is a disorder that results in metabolic acidosis.

B) Chronic lung disease such as asthma and cystic fibrosis put the child at risk for respiratory acidosis. Pneumonia and aspiration are both acute lung conditions. Hyperthyroidism is a disorder that results in metabolic acidosis.

C) Chronic lung disease such as asthma and cystic fibrosis put the child at risk for respiratory acidosis. Pneumonia and aspiration are both acute lung conditions. Hyperthyroidism is a disorder that results in metabolic acidosis.

D) Chronic lung disease such as asthma and cystic fibrosis put the child at risk for respiratory acidosis. Pneumonia and aspiration are both acute lung conditions. Hyperthyroidism is a disorder that results in metabolic acidosis.

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Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care: Patient/family/community preferences, values; Coordination and integration of care; Information, communication, and education; Physical comfort and emotional support; Involvement of family and friends Transition and continuity. | AACN Essential Competencies: IX.7. Provide appropriate patient teaching that reflects developmental state, age, culture, spirituality, patient preferences, and health literacy considerations to foster patient engagement in their care. | NLN Competencies: Relationship Centered Care: Effective communication. | Nursing Process: Evaluation

Learning Outcome: 1.C.2. Analyze respiratory acidosis as it relates to acid-base balance.

Describe the etiology of respiratory acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with respiratory acidosis.

4) A client is admitted to the unit with chronic obstructive pulmonary disease. Blood gas analysis indicates respiratory acidosis. Based on this data, the nurse plans care based on which priority diagnosis?

- A) Impaired Gas Exchange
- B) Ineffective Airway Clearance
- C) Impaired Mobility
- D) Anxiety

Answer: A

Explanation: A) Impaired Gas Exchange is the priority nursing diagnosis for the client with respiratory acidosis. Interventions are aimed at restoring effective alveolar ventilation and gas exchange. Anxiety and Ineffective Airway Clearance are both appropriate nursing diagnoses but not priority for the client with respiratory acidosis. There is no evidence to support the nursing diagnosis Impaired Mobility for this client.

B) Impaired Gas Exchange is the priority nursing diagnosis for the client with respiratory acidosis. Interventions are aimed at restoring effective alveolar ventilation and gas exchange. Anxiety and Ineffective Airway Clearance are both appropriate nursing diagnoses but not priority for the client with respiratory acidosis. There is no evidence to support the nursing diagnosis Impaired Mobility for this client.

C) Impaired Gas Exchange is the priority nursing diagnosis for the client with respiratory acidosis. Interventions are aimed at restoring effective alveolar ventilation and gas exchange. Anxiety and Ineffective Airway Clearance are both appropriate nursing diagnoses but not priority for the client with respiratory acidosis. There is no evidence to support the nursing diagnosis Impaired Mobility for this client.

D) Impaired Gas Exchange is the priority nursing diagnosis for the client with respiratory acidosis. Interventions are aimed at restoring effective alveolar ventilation and gas exchange. Anxiety and Ineffective Airway Clearance are both appropriate nursing diagnoses but not priority for the client with respiratory acidosis. There is no evidence to support the nursing diagnosis Impaired Mobility for this client.

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Cognitive Level: Applying

Client Need/Sub: Physiological Integrity: Basic Care and Comfort

Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care: Patient/family/community preferences, values; Coordination and integration of care; Information, communication, and education; Physical comfort and emotional support; Involvement of family and friends Transition and continuity. | AACN Essential Competencies: IX.7. Provide appropriate patient teaching that reflects developmental state, age, culture, spirituality, patient preferences, and health literacy considerations to foster patient engagement in their care. | NLN Competencies: Relationship Centered Care: Effective communication. | Nursing Process: Evaluation

Learning Outcome: 1.C.7. Analyze respiratory acidosis as it relates to acid-base balance. Apply the nursing process in providing culturally competent care to an individual with respiratory acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with respiratory acidosis.

5) The nurse is preparing discharge instructions for an older adult client recovering from respiratory acidosis caused by restrictive lung disease and pneumonia. Which topics should the nurse include in the discharge teaching for this client? Select all that apply.

- A) Obtain annual influenza immunization.
- B) Engage in frequent hand washing.
- C) Avoid crowds.
- D) Cover the nose and mouth when coughing.
- E) Restrict fluids.

Answer: A, B, C, D

Explanation: A) For the client with a history of chronic lung disease and pneumonia, the nurse should instruct on the importance of receiving annual influenza immunizations, frequent hand washing, avoiding crowds, and covering the nose and mouth when coughing. Fluids should be encouraged to ensure that respiratory secretions are thin.

B) For the client with a history of chronic lung disease and pneumonia, the nurse should instruct on the importance of receiving annual influenza immunizations, frequent hand washing, avoiding crowds, and covering the nose and mouth when coughing. Fluids should be encouraged to ensure that respiratory secretions are thin.

C) For the client with a history of chronic lung disease and pneumonia, the nurse should instruct on the importance of receiving annual influenza immunizations, frequent hand washing, avoiding crowds, and covering the nose and mouth when coughing. Fluids should be encouraged to ensure that respiratory secretions are thin.

D) For the client with a history of chronic lung disease and pneumonia, the nurse should instruct on the importance of receiving annual influenza immunizations, frequent hand washing, avoiding crowds, and covering the nose and mouth when coughing. Fluids should be encouraged to ensure that respiratory secretions are thin.

E) For the client with a history of chronic lung disease and pneumonia, the nurse should instruct on the importance of receiving annual influenza immunizations, frequent hand washing, avoiding crowds, and covering the nose and mouth when coughing. Fluids should be encouraged to ensure that respiratory secretions are thin.

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Cognitive Level: Applying

Client Need/Sub: Health Promotion and Maintenance

Standards: QSEN Competencies: III.A.2 Describe EBP to include the components of research evidence, clinical expertise and patient/family values. | AACN Essential Competencies: IX.3.

Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN

Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation

Learning Outcome: 1.C.7. Analyze respiratory acidosis as it relates to acid-base balance. Apply the nursing process in providing culturally competent care to an individual with respiratory acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with respiratory acidosis.

6) The nurse is caring for a client who is being mechanically ventilated. The current ventilator settings are: respiratory rate, 25 breaths per minute; tidal volume, 600 mL; FiO₂, 30%; humidification 30 mg H₂O/L. After being ventilated for 2 hours, arterial blood gas analysis reveals a pH of 7.20 and a PaCO₂ of 49 mmHg. Which change in ventilator settings should the nurse anticipate?

- A) Increase in humidification of inspired air
- B) Decrease of FiO₂ from 30% to 25%
- C) Increased respiratory rate to 30 breaths per minute
- D) Decreased tidal volume of each breath

Answer: C

Explanation: A) This client is exhibiting respiratory acidosis that is not corrected by the current ventilator settings. This client needs to "blow off" more CO₂; therefore, the respiratory rate would be increased. Both decreasing the FiO₂ and decreasing the tidal volume would decrease the amount of CO₂ expelled. Humidification has no effect on the amount of CO₂ expelled.

B) This client is exhibiting respiratory acidosis that is not corrected by the current ventilator settings. This client needs to "blow off" more CO₂; therefore, the respiratory rate would be increased. Both decreasing the FiO₂ and decreasing the tidal volume would decrease the amount of CO₂ expelled. Humidification has no effect on the amount of CO₂ expelled.

C) This client is exhibiting respiratory acidosis that is not corrected by the current ventilator settings. This client needs to "blow off" more CO₂; therefore, the respiratory rate would be increased. Both decreasing the FiO₂ and decreasing the tidal volume would decrease the amount of CO₂ expelled. Humidification has no effect on the amount of CO₂ expelled.

D) This client is exhibiting respiratory acidosis that is not corrected by the current ventilator settings. This client needs to "blow off" more CO₂; therefore, the respiratory rate would be increased. Both decreasing the FiO₂ and decreasing the tidal volume would decrease the amount of CO₂ expelled. Humidification has no effect on the amount of CO₂ expelled.

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Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.2 Describe EBP to include the components of research evidence, clinical expertise, and patient/family values. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Evaluation

Learning Outcome: 1.C.5. Analyze respiratory acidosis as it relates to acid-base balance.

Summarize diagnostic tests and therapies used by interdisciplinary teams in the collaborative care of an individual with respiratory acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with respiratory acidosis.

7) The nurse is preparing to admit a client with acute pneumonia who is experiencing severe respiratory acidosis. Which treatments does the nurse anticipate as appropriate for this client? Select all that apply.

- A) Administer oxygen prn.
- B) Administer digoxin for heart failure.
- C) Encourage up to 3 L of fluids per day.
- D) Place in a prone position.
- E) Reposition frequently.

Answer: A, C, E

Explanation: A) The client with acute pneumonia and respiratory acidosis may require oxygen administration to improve gas exchange, increased fluid intake to thin secretions, and frequent repositioning to preventing the pooling of respiratory sections. There is not enough evidence to know whether the client is experiencing heart failure as a result of the acute pneumonia. The client should be placed in the Fowler or semi-Fowler rather than the prone position.

B) The client with acute pneumonia and respiratory acidosis may require oxygen administration to improve gas exchange, increased fluid intake to thin secretions, and frequent repositioning to preventing the pooling of respiratory sections. There is not enough evidence to know whether the client is experiencing heart failure as a result of the acute pneumonia. The client should be placed in the Fowler or semi-Fowler rather than the prone position.

C) The client with acute pneumonia and respiratory acidosis may require oxygen administration to improve gas exchange, increased fluid intake to thin secretions, and frequent repositioning to preventing the pooling of respiratory sections. There is not enough evidence to know whether the client is experiencing heart failure as a result of the acute pneumonia. The client should be placed in the Fowler or semi-Fowler rather than the prone position.

D) The client with acute pneumonia and respiratory acidosis may require oxygen administration to improve gas exchange, increased fluid intake to thin secretions, and frequent repositioning to preventing the pooling of respiratory sections. There is not enough evidence to know whether the client is experiencing heart failure as a result of the acute pneumonia. The client should be placed in the Fowler or semi-Fowler rather than the prone position.

E) The client with acute pneumonia and respiratory acidosis may require oxygen administration to improve gas exchange, increased fluid intake to thin secretions, and frequent repositioning to preventing the pooling of respiratory sections. There is not enough evidence to know whether the client is experiencing heart failure as a result of the acute pneumonia. The client should be placed in the Fowler or semi-Fowler rather than the prone position.

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Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Basic Care and Comfort

Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care: Patient/family/community preferences, values; Coordination and integration of care; Information, communication, and education; Physical comfort and emotional support; Involvement of family and friends Transition and continuity. | AACN Essential Competencies: IX.7. Provide appropriate patient teaching that reflects developmental state, age, culture, spirituality, patient preferences, and health literacy considerations to foster patient engagement in their care. | NLN Competencies: Relationship Centered Care: Effective communication. | Nursing Process: Evaluation

Learning Outcome: 1.C.7. Analyze respiratory acidosis as it relates to acid-base balance. Apply the nursing process in providing culturally competent care to an individual with respiratory acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with respiratory acidosis.

8) The nurse is providing care to a client recently extubated for treatment of aspiration pneumonia and respiratory acidosis. Which action by the nurse provides an optimum environment for this client?

- A) Allowing family members to remain with client as much as possible
- B) Restraining the client
- C) Placing the client in a side-lying position
- D) Administering narcotics for pain

Answer: A

Explanation: A) The client with respiratory acidosis often experiences anxiety. This client would benefit from having a family member in the room to provide reassurance. Restraining the client will increase levels of agitation. The client with respiratory failure would benefit most from the semi-Fowler or Fowler position to increase ventilation. Narcotics will depress the respirations and increase respiratory acidosis. A nonnarcotic pain reliever would be considered if this client were experiencing pain.

B) The client with respiratory acidosis often experiences anxiety. This client would benefit from having a family member in the room to provide reassurance. Restraining the client will increase levels of agitation. The client with respiratory failure would benefit most from the semi-Fowler or Fowler position to increase ventilation. Narcotics will depress the respirations and increase respiratory acidosis. A nonnarcotic pain reliever would be considered if this client were experiencing pain.

C) The client with respiratory acidosis often experiences anxiety. This client would benefit from having a family member in the room to provide reassurance. Restraining the client will increase levels of agitation. The client with respiratory failure would benefit most from the semi-Fowler or Fowler position to increase ventilation. Narcotics will depress the respirations and increase respiratory acidosis. A nonnarcotic pain reliever would be considered if this client were experiencing pain.

D) The client with respiratory acidosis often experiences anxiety. This client would benefit from having a family member in the room to provide reassurance. Restraining the client will increase levels of agitation. The client with respiratory failure would benefit most from the semi-Fowler or Fowler position to increase ventilation. Narcotics will depress the respirations and increase respiratory acidosis. A nonnarcotic pain reliever would be considered if this client were experiencing pain.

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Cognitive Level: Applying

Client Need/Sub: Psychosocial Integrity

Standards: QSEN Competencies: III.A.2 Describe EBP to include the components of research evidence, clinical expertise and patient/family values. | AACN Essential Competencies: IX.3.

Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN

Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation

Learning Outcome: 1.C.7. Analyze respiratory acidosis as it relates to acid-base balance. Apply the nursing process in providing culturally competent care to an individual with respiratory acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with respiratory acidosis.

9) The nurse is reviewing prescriptions written for a client with chronic respiratory acidosis. Which prescription should the nurse question prior to implementation?

- A) Keep head of the bed elevated to 40-degree angle.
- B) Dextrose 5% and 0.45% normal saline at 100 mL per hour
- C) Consult Respiratory Therapy for breathing treatments four times a day.
- D) Oxygen 6 liters per minute per nasal cannula

Answer: D

Explanation: A) In clients with chronic respiratory acidosis, oxygen is administered cautiously to prevent carbon dioxide narcosis. Adequate hydration such as intravenous fluids is important to promote removal of respiratory secretions. Pulmonary hygiene measures such as breathing treatments may be instituted. Elevating the head of the bed promotes oxygenation.

B) In clients with chronic respiratory acidosis, oxygen is administered cautiously to prevent carbon dioxide narcosis. Adequate hydration such as intravenous fluids is important to promote removal of respiratory secretions. Pulmonary hygiene measures such as breathing treatments may be instituted. Elevating the head of the bed promotes oxygenation.

C) In clients with chronic respiratory acidosis, oxygen is administered cautiously to prevent carbon dioxide narcosis. Adequate hydration such as intravenous fluids is important to promote removal of respiratory secretions. Pulmonary hygiene measures such as breathing treatments may be instituted. Elevating the head of the bed promotes oxygenation.

D) In clients with chronic respiratory acidosis, oxygen is administered cautiously to prevent carbon dioxide narcosis. Adequate hydration such as intravenous fluids is important to promote removal of respiratory secretions. Pulmonary hygiene measures such as breathing treatments may be instituted. Elevating the head of the bed promotes oxygenation.

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Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Basic Care and Comfort

Standards: QSEN Competencies: III.A.2 Describe EBP to include the components of research evidence, clinical expertise and patient/family values. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Planning

Learning Outcome: 1.C.7. Analyze respiratory acidosis as it relates to acid-base balance. Apply the nursing process in providing culturally competent care to an individual with respiratory acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with respiratory acidosis.

10) A client with pneumonia develops respiratory acidosis. Based on provider's orders, which medications should the nurse prepare to administer to this client? Select all that apply.

- A) The loop diuretic furosemide (Lasix), 20 mg by mouth twice a day
- B) The antibiotic amoxicillin, 1 gram intravenous every 6 hours
- C) The bronchodilator albuterol, inhaler 2 puffs every 4 hours
- D) The anxiolytic diazepam (Valium), 2 mg by mouth at bedtime for sleep
- E) Potassium chloride 20 mEq in 100 mL 0.9% normal saline intravenous every day

Answer: B, C

Explanation: A) Bronchodilator drugs such as an albuterol inhaler may be administered to open the airways, and antibiotics such as amoxicillin may be prescribed to treat respiratory infections. Benzodiazepines such as diazepam are central nervous system depressants and would adversely affect this client's respiratory rate, adversely affecting respiratory acidosis. Potassium chloride is indicated in the treatment of metabolic alkalosis.

B) Bronchodilator drugs such as an albuterol inhaler may be administered to open the airways, and antibiotics such as amoxicillin may be prescribed to treat respiratory infections. Benzodiazepines such as diazepam are central nervous system depressants and would adversely affect this client's respiratory rate, adversely affecting respiratory acidosis. Potassium chloride is indicated in the treatment of metabolic alkalosis.

C) Bronchodilator drugs such as an albuterol inhaler may be administered to open the airways, and antibiotics such as amoxicillin may be prescribed to treat respiratory infections. Benzodiazepines such as diazepam are central nervous system depressants and would adversely affect this client's respiratory rate, adversely affecting respiratory acidosis. Potassium chloride is indicated in the treatment of metabolic alkalosis.

D) Bronchodilator drugs such as an albuterol inhaler may be administered to open the airways, and antibiotics such as amoxicillin may be prescribed to treat respiratory infections. Benzodiazepines such as diazepam are central nervous system depressants and would adversely affect this client's respiratory rate, adversely affecting respiratory acidosis. Potassium chloride is indicated in the treatment of metabolic alkalosis.

E) Bronchodilator drugs such as an albuterol inhaler may be administered to open the airways, and antibiotics such as amoxicillin may be prescribed to treat respiratory infections. Benzodiazepines such as diazepam are central nervous system depressants and would adversely affect this client's respiratory rate, adversely affecting respiratory acidosis. Potassium chloride is indicated in the treatment of metabolic alkalosis.

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Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Pharmacological and Parenteral Therapies

Standards: QSEN Competencies: III.A.2 Describe EBP to include the components of research evidence, clinical expertise and patient/family values. | AACN Essential Competencies: IX.3.

Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN

Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Planning

Learning Outcome: 1.C.5. Analyze respiratory acidosis as it relates to acid-base balance.

Summarize diagnostic tests and therapies used by interdisciplinary teams in the collaborative care of an individual with respiratory acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with respiratory acidosis.

11) A client is admitted to the emergency department (ED) for treatment of an overdose. The client's arterial blood gas results indicate acute respiratory acidosis. Which substance found on the nurse's review of the toxicology analysis is most likely the cause for the client's current condition?

- A) Cocaine (a stimulatory anesthetic)
- B) Marijuana (a cannabinoid)
- C) Oxycodone (a narcotic)
- D) PCP (a dissociative anesthetic)

Answer: C

Explanation: A) Oxycodone is an opiate narcotic. Excessive use or overdose of narcotic substances can lead to respiratory depression and respiratory acidosis. Cocaine is a stimulant. Marijuana does not depress the central nervous system or respiratory center. PCP is a hallucinogenic agent.

B) Oxycodone is an opiate narcotic. Excessive use or overdose of narcotic substances can lead to respiratory depression and respiratory acidosis. Cocaine is a stimulant. Marijuana does not depress the central nervous system or respiratory center. PCP is a hallucinogenic agent.

C) Oxycodone is an opiate narcotic. Excessive use or overdose of narcotic substances can lead to respiratory depression and respiratory acidosis. Cocaine is a stimulant. Marijuana does not depress the central nervous system or respiratory center. PCP is a hallucinogenic agent.

D) Oxycodone is an opiate narcotic. Excessive use or overdose of narcotic substances can lead to respiratory depression and respiratory acidosis. Cocaine is a stimulant. Marijuana does not depress the central nervous system or respiratory center. PCP is a hallucinogenic agent.

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Cognitive Level: Evaluating

Client Need/Sub: Physiological Integrity: Pharmacological and Parenteral Therapies

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.C.2. Analyze respiratory acidosis as it relates to acid-base balance.

Describe the etiology of respiratory acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with respiratory acidosis.

12) The nurse suspects a client with one functioning lung is developing chronic respiratory acidosis. Which manifestation did the nurse most likely assess in this client?

- A) Warm, flushed skin
- B) Daytime sleepiness
- C) Irritability
- D) Blurred vision

Answer: B

Explanation: A) The manifestations of acute and chronic respiratory acidosis differ. The client with chronic respiratory acidosis will demonstrate daytime sleepiness. The client with acute respiratory acidosis may demonstrate warm, flushed skin, irritability, and blurred vision from the acute decline in oxygenation.

B) The manifestations of acute and chronic respiratory acidosis differ. The client with chronic respiratory acidosis will demonstrate daytime sleepiness. The client with acute respiratory acidosis may demonstrate warm, flushed skin, irritability, and blurred vision from the acute decline in oxygenation.

C) The manifestations of acute and chronic respiratory acidosis differ. The client with chronic respiratory acidosis will demonstrate daytime sleepiness. The client with acute respiratory acidosis may demonstrate warm, flushed skin, irritability, and blurred vision from the acute decline in oxygenation.

D) The manifestations of acute and chronic respiratory acidosis differ. The client with chronic respiratory acidosis will demonstrate daytime sleepiness. The client with acute respiratory acidosis may demonstrate warm, flushed skin, irritability, and blurred vision from the acute decline in oxygenation.

Page Ref: 23

Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.C.4. Analyze respiratory acidosis as it relates to acid-base balance.

Identify the clinical manifestations of respiratory acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with respiratory acidosis.

13) The nurse instructs a client with a history of acute respiratory acidosis and lung infections on ways to prevent further episodes of the health problem. Which client statement indicates that teaching has been effective?

- A) "I will limit drinking alcohol to the evening hours only."
- B) "I will limit my intake of bananas and oranges."
- C) "I will take prescribed antibiotics until my symptoms subside."
- D) "I will receive the annual influenza vaccination."

Answer: D

Explanation: A) The nurse should discuss ways to avoid future episodes of acute respiratory infections by encouraging the client to receive immunization against pneumococcal pneumonia and influenza. Alcohol is a central nervous system depressant, which can adversely affect respiratory status and lead to the development of respiratory acidosis. The ingestion of bananas and oranges will not promote the development of respiratory acidosis. The client should be instructed to complete a full course of antibiotics prescribed to treat infections.

B) The nurse should discuss ways to avoid future episodes of acute respiratory infections by encouraging the client to receive immunization against pneumococcal pneumonia and influenza. Alcohol is a central nervous system depressant, which can adversely affect respiratory status and lead to the development of respiratory acidosis. The ingestion of bananas and oranges will not promote the development of respiratory acidosis. The client should be instructed to complete a full course of antibiotics prescribed to treat infections.

C) The nurse should discuss ways to avoid future episodes of acute respiratory infections by encouraging the client to receive immunization against pneumococcal pneumonia and influenza. Alcohol is a central nervous system depressant, which can adversely affect respiratory status and lead to the development of respiratory acidosis. The ingestion of bananas and oranges will not promote the development of respiratory acidosis. The client should be instructed to complete a full course of antibiotics prescribed to treat infections.

D) The nurse should discuss ways to avoid future episodes of acute respiratory infections by encouraging the client to receive immunization against pneumococcal pneumonia and influenza. Alcohol is a central nervous system depressant, which can adversely affect respiratory status and lead to the development of respiratory acidosis. The ingestion of bananas and oranges will not promote the development of respiratory acidosis. The client should be instructed to complete a full course of antibiotics prescribed to treat infections.

Page Ref: 26

Cognitive Level: Analyzing

Client Need/Sub: Health Promotion and Maintenance

Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care: Patient/family/community preferences, values; Coordination and integration of care; Information, communication, and education; Physical comfort and emotional support; Involvement of family and friends Transition and continuity. | AACN Essential Competencies: IX.7. Provide appropriate patient teaching that reflects developmental state, age, culture, spirituality, patient preferences, and health literacy considerations to foster patient engagement in their care. | NLN Competencies: Relationship Centered Care: Effective communication. | Nursing Process: Evaluation

Learning Outcome: 1.C.7. Analyze respiratory acidosis as it relates to acid-base balance. Apply the nursing process in providing culturally competent care to an individual with respiratory acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with respiratory acidosis.

14) The nurse is planning care for an older client with respiratory acidosis. Which intervention should the nurse include in this client's plan of care?

- A) Administer prescribed intravenous fluids carefully.
- B) Administer intravenous sodium bicarbonate.
- C) Maintain adequate hydration.
- D) Reduce environmental stimuli.

Answer: C

Explanation: A) In respiratory acidosis, there are a drop in the blood pH, a reduced level of oxygen, and retention of carbon dioxide. The body needs to be well-hydrated so that pulmonary secretions can be removed to improve oxygenation. Careful administration of intravenous fluids is important in the older client with metabolic alkalosis because older clients are at risk because of their fragile fluid and electrolyte status. Sodium bicarbonate is indicated in the treatment of metabolic acidosis. Reducing environmental stimuli would be appropriate for the client with respiratory alkalosis.

B) In respiratory acidosis, there are a drop in the blood pH, a reduced level of oxygen, and retention of carbon dioxide. The body needs to be well-hydrated so that pulmonary secretions can be removed to improve oxygenation. Careful administration of intravenous fluids is important in the older client with metabolic alkalosis because older clients are at risk because of their fragile fluid and electrolyte status. Sodium bicarbonate is indicated in the treatment of metabolic acidosis. Reducing environmental stimuli would be appropriate for the client with respiratory alkalosis.

C) In respiratory acidosis, there are a drop in the blood pH, a reduced level of oxygen, and retention of carbon dioxide. The body needs to be well-hydrated so that pulmonary secretions can be removed to improve oxygenation. Careful administration of intravenous fluids is important in the older client with metabolic alkalosis because older clients are at risk because of their fragile fluid and electrolyte status. Sodium bicarbonate is indicated in the treatment of metabolic acidosis. Reducing environmental stimuli would be appropriate for the client with respiratory alkalosis.

D) In respiratory acidosis, there are a drop in the blood pH, a reduced level of oxygen, and retention of carbon dioxide. The body needs to be well-hydrated so that pulmonary secretions can be removed to improve oxygenation. Careful administration of intravenous fluids is important in the older client with metabolic alkalosis because older clients are at risk because of their fragile fluid and electrolyte status. Sodium bicarbonate is indicated in the treatment of metabolic acidosis. Reducing environmental stimuli would be appropriate for the client with respiratory alkalosis.

Page Ref: 24

Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care: Patient/family/community preferences, values; Coordination and integration of care; Information, communication, and education; Physical comfort and emotional support; Involvement of family and friends Transition and continuity. | AACN Essential Competencies: IX.7. Provide appropriate patient teaching that reflects developmental state, age, culture, spirituality, patient preferences, and health literacy considerations to foster patient engagement in their care. | NLN Competencies: Relationship Centered Care: Effective communication. | Nursing Process: Evaluation

Learning Outcome: 1.C.7. Analyze respiratory acidosis as it relates to acid-base balance. Apply the nursing process in providing culturally competent care to an individual with respiratory acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with respiratory acidosis.

15) Acute respiratory acidosis can lead to _____, which affects neurological function and the cardiovascular system.

- A) hypercapnia
- B) carbon dioxide narcosis
- C) hypoventilation
- D) hyperventilation

Answer: A

Explanation: A) In acute respiratory acidosis, increased carbon dioxide levels, also called hypercapnia, can affect neurological function and the cardiovascular system. Carbon dioxide narcosis occurs in chronic respiratory acidosis. Hypoventilation causes respiratory acidosis; it doesn't result from respiratory acidosis. Hyperventilation is related to respiratory alkalosis, not respiratory acidosis.

B) In acute respiratory acidosis, increased carbon dioxide levels, also called hypercapnia, can affect neurological function and the cardiovascular system. Carbon dioxide narcosis occurs in chronic respiratory acidosis. Hypoventilation causes respiratory acidosis; it doesn't result from respiratory acidosis. Hyperventilation is related to respiratory alkalosis, not respiratory acidosis.

C) In acute respiratory acidosis, increased carbon dioxide levels, also called hypercapnia, can affect neurological function and the cardiovascular system. Carbon dioxide narcosis occurs in chronic respiratory acidosis. Hypoventilation causes respiratory acidosis; it doesn't result from respiratory acidosis. Hyperventilation is related to respiratory alkalosis, not respiratory acidosis.

D) In acute respiratory acidosis, increased carbon dioxide levels, also called hypercapnia, can affect neurological function and the cardiovascular system. Carbon dioxide narcosis occurs in chronic respiratory acidosis. Hypoventilation causes respiratory acidosis; it doesn't result from respiratory acidosis. Hyperventilation is related to respiratory alkalosis, not respiratory acidosis.

Page Ref: 22

Cognitive Level: Remembering

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.C.1. Analyze respiratory acidosis as it relates to acid-base balance. Describe the pathophysiology of respiratory acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with respiratory acidosis.

16) Decreased level of consciousness in acute respiratory acidosis is often due to hypercapnia causing:

- A) decreased pulse rate.
- B) hyperventilation.
- C) cerebral vasodilation.
- D) neurotransmitter disturbances.

Answer: C

Explanation: A) Hypercapnia causes cerebral vasodilation, which results in headache, blurred vision, irritability, mental cloudiness, and decreased level of consciousness. The pulse rate is elevated in acute respiratory acidosis, not decreased. Respiratory acidosis is caused by hypoventilation, not hyperventilation. Neurotransmitter disturbances are unrelated to respiratory acidosis.

B) Hypercapnia causes cerebral vasodilation, which results in headache, blurred vision, irritability, mental cloudiness, and decreased level of consciousness. The pulse rate is elevated in acute respiratory acidosis, not decreased. Respiratory acidosis is caused by hypoventilation, not hyperventilation. Neurotransmitter disturbances are unrelated to respiratory acidosis.

C) Hypercapnia causes cerebral vasodilation, which results in headache, blurred vision, irritability, mental cloudiness, and decreased level of consciousness. The pulse rate is elevated in acute respiratory acidosis, not decreased. Respiratory acidosis is caused by hypoventilation, not hyperventilation. Neurotransmitter disturbances are unrelated to respiratory acidosis.

D) Hypercapnia causes cerebral vasodilation, which results in headache, blurred vision, irritability, mental cloudiness, and decreased level of consciousness. The pulse rate is elevated in acute respiratory acidosis, not decreased. Respiratory acidosis is caused by hypoventilation, not hyperventilation. Neurotransmitter disturbances are unrelated to respiratory acidosis.

Page Ref: 23

Cognitive Level: Understanding

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.C.4. Analyze respiratory acidosis as it relates to acid-base balance. Identify the clinical manifestations of respiratory acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with respiratory acidosis.

Exemplar 1.D Respiratory Alkalosis

1) A client is admitted to the hospital with sudden, severe abdominal pain. The client is diagnosed with respiratory alkalosis. Which arterial blood gas value does the nurse document to support this diagnosis?

- A) pH is 7.33 and PaCO₂ is 36.
- B) pH is 7.51 and HCO₃ is 30.
- C) pH is 7.47 and PaCO₂ is 25.
- D) pH is 7.35 and PaO₂ is 88.

Answer: C

Explanation: A) Acute pain usually causes hyperventilation, which causes the PaCO₂ to drop and the client to experience respiratory alkalosis. The pH would denote alkalosis and would be higher than 7.45. HCO₃ would trend downward as the kidneys begin to compensate for the alkalosis by excreting HCO₃. The PaO₂ is likely to be normal unless the client has been hyperventilating for a long time and is beginning to tire.

B) Acute pain usually causes hyperventilation, which causes the PaCO₂ to drop and the client to experience respiratory alkalosis. The pH would denote alkalosis and would be higher than 7.45. HCO₃ would trend downward as the kidneys begin to compensate for the alkalosis by excreting HCO₃. The PaO₂ is likely to be normal unless the client has been hyperventilating for a long time and is beginning to tire.

C) Acute pain usually causes hyperventilation, which causes the PaCO₂ to drop and the client to experience respiratory alkalosis. The pH would denote alkalosis and would be higher than 7.45. HCO₃ would trend downward as the kidneys begin to compensate for the alkalosis by excreting HCO₃. The PaO₂ is likely to be normal unless the client has been hyperventilating for a long time and is beginning to tire.

D) Acute pain usually causes hyperventilation, which causes the PaCO₂ to drop and the client to experience respiratory alkalosis. The pH would denote alkalosis and would be higher than 7.45. HCO₃ would trend downward as the kidneys begin to compensate for the alkalosis by excreting HCO₃. The PaO₂ is likely to be normal unless the client has been hyperventilating for a long time and is beginning to tire.

Page Ref: 24

Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.D.1. Analyze respiratory alkalosis as it relates to acid-base balance. Describe the pathophysiology of respiratory alkalosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic alkalosis.

2) The client is admitted to the emergency department (ED) with symptoms of a panic attack, including hyperventilation. Based on this data, the nurse plans care for which health problem?

- A) Hypoventilation
- B) Vomiting
- C) Respiratory alkalosis
- D) Memory loss

Answer: C

Explanation: A) Anxiety disorders increase the risk for the acid-base imbalance respiratory alkalosis, due to hyperventilation that accompanies anxiety and panic attacks. The client with anxiety does not necessarily have vomiting or memory loss as risk factors. Anxiety and panic attacks will lead to hyperventilation, not hypoventilation.

B) Anxiety disorders increase the risk for the acid-base imbalance respiratory alkalosis, due to hyperventilation that accompanies anxiety and panic attacks. The client with anxiety does not necessarily have vomiting or memory loss as risk factors. Anxiety and panic attacks will lead to hyperventilation, not hypoventilation.

C) Anxiety disorders increase the risk for the acid-base imbalance respiratory alkalosis, due to hyperventilation that accompanies anxiety and panic attacks. The client with anxiety does not necessarily have vomiting or memory loss as risk factors. Anxiety and panic attacks will lead to hyperventilation, not hypoventilation.

D) Anxiety disorders increase the risk for the acid-base imbalance respiratory alkalosis, due to hyperventilation that accompanies anxiety and panic attacks. The client with anxiety does not necessarily have vomiting or memory loss as risk factors. Anxiety and panic attacks will lead to hyperventilation, not hypoventilation.

Page Ref: 27

Cognitive Level: Understanding

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation

Learning Outcome: 1.C.2. Analyze respiratory alkalosis as it relates to acid-base balance.

Describe the etiology of respiratory alkalosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic alkalosis.

3) The nurse is providing care to an older adult client diagnosed with respiratory alkalosis. The nurse states to the client, "Look into my eyes and breathe with me so that we can slow down your breathing rate." The client continues to look down and refuses to make eye contact with the nurse. The client's daughter later asks you to teach her how to help her mother to control her breathing. When documenting this client's care, which statement is appropriate for the nurse to include?

- A) "The client is noncompliant with suggested treatment plan."
- B) "The client is unable to understand and follow directions."
- C) "The client did not feel comfortable making eye contact during nursing care."
- D) "The client's daughter may be abusive."

Answer: C

Explanation: A) A method that is often used to control breathing for client's experiencing hyperventilation is eye contact with the nurse during breathing exercises. However, some clients may feel uncomfortable making eye contact for personal reasons. Documenting this finding in the medical record is appropriate. Saying the client is noncompliant is nontherapeutic and labels the client. There is no indication that the client does not understand the instructions. The client's daughter wishes to help her mother control her breathing. This is not indicative of abuse.

B) A method that is often used to control breathing for client's experiencing hyperventilation is eye contact with the nurse during breathing exercises. However, some clients may feel uncomfortable making eye contact for personal reasons. Documenting this finding in the medical record is appropriate. Saying the client is noncompliant is nontherapeutic and labels the client. There is no indication that the client does not understand the instructions. The client's daughter wishes to help her mother control her breathing. This is not indicative of abuse.

C) A method that is often used to control breathing for client's experiencing hyperventilation is eye contact with the nurse during breathing exercises. However, some clients may feel uncomfortable making eye contact for personal reasons. Documenting this finding in the medical record is appropriate. Saying the client is noncompliant is nontherapeutic and labels the client. There is no indication that the client does not understand the instructions. The client's daughter wishes to help her mother control her breathing. This is not indicative of abuse.

D) A method that is often used to control breathing for client's experiencing hyperventilation is eye contact with the nurse during breathing exercises. However, some clients may feel uncomfortable making eye contact for personal reasons. Documenting this finding in the medical record is appropriate. Saying the client is noncompliant is nontherapeutic and labels the client. There is no indication that the client does not understand the instructions. The client's daughter wishes to help her mother control her breathing. This is not indicative of abuse.

Page Ref: 29

Cognitive Level: Analyzing

Client Need/Sub: Psychosocial Integrity

Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care: Patient/family/community preferences, values; Coordination and integration of care; Information, communication, and education; Physical comfort and emotional support; Involvement of family and friends Transition and continuity. | AACN Essential Competencies: IX.7. Provide appropriate patient teaching that reflects developmental state, age, culture, spirituality, patient preferences, and health literacy considerations to foster patient engagement in their care. | NLN Competencies: Relationship Centered Care: Effective communication. | Nursing Process: Evaluation

Learning Outcome: 1.D.7. Analyze respiratory alkalosis as it relates to acid-base balance. Apply the nursing process in providing culturally competent care to an individual with respiratory alkalosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic alkalosis.

4) The nurse is planning care for a client who has been admitted to the unit with a salicylate overdose. When preparing the plan of care, the nurse considers which to be a priority nursing diagnosis?

- A) Ineffective Breathing Pattern
- B) Powerlessness
- C) Risk for Injury
- D) Impaired Mobility

Answer: A

Explanation: A) The client with a salicylate overdose is at risk for hyperventilation, which can lead to respiratory alkalosis. There is not enough information to know whether the client's mobility is impaired. Risk for Injury and Powerlessness are diagnoses to be considered for this client, but the highest priority is respiratory function.

B) The client with a salicylate overdose is at risk for hyperventilation, which can lead to respiratory alkalosis. There is not enough information to know whether the client's mobility is impaired. Risk for Injury and Powerlessness are diagnoses to be considered for this client, but the highest priority is respiratory function.

C) The client with a salicylate overdose is at risk for hyperventilation, which can lead to respiratory alkalosis. There is not enough information to know whether the client's mobility is impaired. Risk for Injury and Powerlessness are diagnoses to be considered for this client, but the highest priority is respiratory function.

D) The client with a salicylate overdose is at risk for hyperventilation, which can lead to respiratory alkalosis. There is not enough information to know whether the client's mobility is impaired. Risk for Injury and Powerlessness are diagnoses to be considered for this client, but the highest priority is respiratory function.

Page Ref: 27

Cognitive Level: Applying

Client Need/Sub: Physiological Integrity: Basic Care and Comfort

Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care: Patient/family/community preferences, values; Coordination and integration of care; Information, communication, and education; Physical comfort and emotional support; Involvement of family and friends Transition and continuity. | AACN Essential Competencies: IX.7. Provide appropriate patient teaching that reflects developmental state, age, culture, spirituality, patient preferences, and health literacy considerations to foster patient engagement in their care. | NLN Competencies: Relationship Centered Care: Effective communication. | Nursing Process: Evaluation

Learning Outcome: 1.D.7. Analyze respiratory alkalosis as it relates to acid-base balance. Apply the nursing process in providing culturally competent care to an individual with respiratory alkalosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic alkalosis.

5) The client with an anxiety disorder is ready to be discharged from the unit. What should the nurse plan to teach this client and family in preparation for discharge? Select all that apply.

A) Refer the client for counseling.

B) Instruct the client to eat foods high in acid.

C) Teach the client the signs of impending panic attack.

D) Advise the client to breathe into a paper bag when feeling anxious.

E) Instruct the client to breathe slowly.

Answer: A, C, E

Explanation: A) Teaching the client to breathe slowly helps the client manage hyperventilation at home. The client with an anxiety disorder should be referred to counseling to assist with management of the disorder and should be taught signs of an impending panic attack. Eating foods high in acid will not counteract the results of hyperventilation. The use of paper bags has been a recommended treatment for hyperventilation; however, it can also cause hypoxia.

B) Teaching the client to breathe slowly helps the client manage hyperventilation at home. The client with an anxiety disorder should be referred to counseling to assist with management of the disorder and should be taught signs of an impending panic attack. Eating foods high in acid will not counteract the results of hyperventilation. The use of paper bags has been a recommended treatment for hyperventilation; however, it can also cause hypoxia.

C) Teaching the client to breathe slowly helps the client manage hyperventilation at home. The client with an anxiety disorder should be referred to counseling to assist with management of the disorder and should be taught signs of an impending panic attack. Eating foods high in acid will not counteract the results of hyperventilation. The use of paper bags has been a recommended treatment for hyperventilation; however, it can also cause hypoxia.

D) Teaching the client to breathe slowly helps the client manage hyperventilation at home. The client with an anxiety disorder should be referred to counseling to assist with management of the disorder and should be taught signs of an impending panic attack. Eating foods high in acid will not counteract the results of hyperventilation. The use of paper bags has been a recommended treatment for hyperventilation; however, it can also cause hypoxia.

E) Teaching the client to breathe slowly helps the client manage hyperventilation at home. The client with an anxiety disorder should be referred to counseling to assist with management of the disorder and should be taught signs of an impending panic attack. Eating foods high in acid will not counteract the results of hyperventilation. The use of paper bags has been a recommended treatment for hyperventilation; however, it can also cause hypoxia.

Page Ref: 27, 28-29

Cognitive Level: Applying

Client Need/Sub: Psychosocial Integrity

Standards: QSEN Competencies: III.A.2 Describe EBP to include the components of research evidence, clinical expertise and patient/family values. | AACN Essential Competencies: IX.3.

Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN

Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation

Learning Outcome: 1.D.7. Analyze respiratory alkalosis as it relates to acid-base balance. Apply the nursing process in providing culturally competent care to an individual with respiratory alkalosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic alkalosis.

6) The nurse has completed discharge teaching for a client with an anxiety disorder. Which client statement indicates that client teaching about respiratory alkalosis has been effective?

- A) "I will see my counselor on a regular basis."
- B) "I will breathe faster when I am feeling anxious."
- C) "I will eat more bananas at breakfast."
- D) "I will not take antacids when I have heartburn."

Answer: A

Explanation: A) The client understands that reducing anxiety can reduce hyperventilation and respiratory alkalosis. Seeing a counselor can help the client develop alternative strategies for dealing with anxiety. Eating bananas is more appropriate for the client at risk for metabolic alkalosis who is on diuretics. Breathing faster will increase hyperventilation. Taking too many antacids is associated with metabolic alkalosis.

B) The client understands that reducing anxiety can reduce hyperventilation and respiratory alkalosis. Seeing a counselor can help the client develop alternative strategies for dealing with anxiety. Eating bananas is more appropriate for the client at risk for metabolic alkalosis who is on diuretics. Breathing faster will increase hyperventilation. Taking too many antacids is associated with metabolic alkalosis.

C) The client understands that reducing anxiety can reduce hyperventilation and respiratory alkalosis. Seeing a counselor can help the client develop alternative strategies for dealing with anxiety. Eating bananas is more appropriate for the client at risk for metabolic alkalosis who is on diuretics. Breathing faster will increase hyperventilation. Taking too many antacids is associated with metabolic alkalosis.

D) The client understands that reducing anxiety can reduce hyperventilation and respiratory alkalosis. Seeing a counselor can help the client develop alternative strategies for dealing with anxiety. Eating bananas is more appropriate for the client at risk for metabolic alkalosis who is on diuretics. Breathing faster will increase hyperventilation. Taking too many antacids is associated with metabolic alkalosis.

Page Ref: 29

Cognitive Level: Analyzing

Client Need/Sub: Psychosocial Integrity

Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care: Patient/family/community preferences, values; Coordination and integration of care; Information, communication, and education; Physical comfort and emotional support; Involvement of family and friends Transition and continuity. | AACN Essential Competencies: IX.7. Provide appropriate patient teaching that reflects developmental state, age, culture, spirituality, patient preferences, and health literacy considerations to foster patient engagement in their care. | NLN Competencies: Relationship Centered Care: Effective communication. | Nursing Process: Evaluation

Learning Outcome: 1.D.7. Analyze respiratory alkalosis as it relates to acid-base balance. Apply the nursing process in providing culturally competent care to an individual with respiratory alkalosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic alkalosis.

7) The nurse is reviewing new orders written for a client experiencing respiratory alkalosis. Which orders would be appropriate for this client's care needs? Select all that apply.

- A) Oxygen 2 liters via face mask
- B) Restrict fluids to 2 liters per day.
- C) Admit to a private room.
- D) Infuse 1 ampule of sodium bicarbonate now.
- E) Draw arterial blood gases.

Answer: C, E

Explanation: A) The client has respiratory alkalosis, which is caused by hyperventilation. Additional oxygen is not required. A fluid restriction is not required in the treatment of respiratory alkalosis. Management of respiratory alkalosis focuses on correcting the imbalance and treating the underlying cause. It is important to create a calm, quiet, low-stimulation environment to reduce the client's anxiety or panic. Sodium bicarbonate is used in the treatment of respiratory and metabolic acidosis. Arterial blood gases must be ordered prior to beginning medication or oxygen therapy.

B) The client has respiratory alkalosis, which is caused by hyperventilation. Additional oxygen is not required. A fluid restriction is not required in the treatment of respiratory alkalosis. Management of respiratory alkalosis focuses on correcting the imbalance and treating the underlying cause. It is important to create a calm, quiet, low-stimulation environment to reduce the client's anxiety or panic. Sodium bicarbonate is used in the treatment of respiratory and metabolic acidosis. Arterial blood gases must be ordered prior to beginning medication or oxygen therapy.

C) The client has respiratory alkalosis, which is caused by hyperventilation. Additional oxygen is not required. A fluid restriction is not required in the treatment of respiratory alkalosis. Management of respiratory alkalosis focuses on correcting the imbalance and treating the underlying cause. It is important to create a calm, quiet, low-stimulation environment to reduce the client's anxiety or panic. Sodium bicarbonate is used in the treatment of respiratory and metabolic acidosis. Arterial blood gases must be ordered prior to beginning medication or oxygen therapy.

D) The client has respiratory alkalosis, which is caused by hyperventilation. Additional oxygen is not required. A fluid restriction is not required in the treatment of respiratory alkalosis. Management of respiratory alkalosis focuses on correcting the imbalance and treating the underlying cause. It is important to create a calm, quiet, low-stimulation environment to reduce the client's anxiety or panic. Sodium bicarbonate is used in the treatment of respiratory and metabolic acidosis. Arterial blood gases must be ordered prior to beginning medication or oxygen therapy.

E) not required. A fluid restriction is not required in the treatment of respiratory alkalosis. Management of respiratory alkalosis focuses on correcting the imbalance and treating the underlying cause. It is important to create a calm, quiet, low-stimulation environment to reduce the client's anxiety or panic. Sodium bicarbonate is used in the treatment of respiratory and metabolic acidosis. Arterial blood gases must be ordered prior to beginning medication or oxygen therapy.

Page Ref: 28-29

Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Basic Care and Comfort

Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care: Patient/family/community preferences, values; Coordination and integration of care; Information, communication, and education; Physical comfort and emotional support; Involvement of family and friends Transition and continuity. | AACN Essential Competencies: IX.7. Provide appropriate patient teaching that reflects developmental state, age, culture, spirituality, patient preferences, and health literacy considerations to foster patient engagement in their care. | NLN Competencies: Relationship Centered Care: Effective communication. | Nursing Process: Evaluation

Learning Outcome: 1.D.5. Analyze respiratory alkalosis as it relates to acid-base balance.

Summarize diagnostic tests and therapies used by interdisciplinary teams in the collaborative care of an individual with respiratory alkalosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic alkalosis.

8) The nurse is caring for the client with a history of anxiety who is experiencing chest pain, palpitations, and dyspnea. Which intervention would be a priority for this client?

A) Providing educational material for the client's medical diagnosis

B) Ordering a regular diet for the client

C) Reassuring the client that symptoms will resolve

D) Asking Respiratory Therapy to set up a mechanical ventilator

Answer: C

Explanation: A) The client will require reassurance from the nurse that the symptoms being experienced are not those of a heart attack and that the symptoms will resolve when the breathing pattern returns to normal. Ordering the diet and instructing the respiratory therapist are done by the healthcare provider. Providing teaching for the client becomes a priority when the client is recovering from the illness.

B) The client will require reassurance from the nurse that the symptoms being experienced are not those of a heart attack and that the symptoms will resolve when the breathing pattern returns to normal. Ordering the diet and instructing the respiratory therapist are done by the healthcare provider. Providing teaching for the client becomes a priority when the client is recovering from the illness.

C) The client will require reassurance from the nurse that the symptoms being experienced are not those of a heart attack and that the symptoms will resolve when the breathing pattern returns to normal. Ordering the diet and instructing the respiratory therapist are done by the healthcare provider. Providing teaching for the client becomes a priority when the client is recovering from the illness.

D) The client will require reassurance from the nurse that the symptoms being experienced are not those of a heart attack and that the symptoms will resolve when the breathing pattern returns to normal. Ordering the diet and instructing the respiratory therapist are done by the healthcare provider. Providing teaching for the client becomes a priority when the client is recovering from the illness.

Page Ref: 28-29

Cognitive Level: Analyzing

Client Need/Sub: Psychosocial Integrity

Standards: QSEN Competencies: III.A.2 Describe EBP to include the components of research evidence, clinical expertise and patient/family values. | AACN Essential Competencies: IX.3.

Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN

Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation

Learning Outcome: 1.D.7. Analyze respiratory alkalosis as it relates to acid-base balance. Apply the nursing process in providing culturally competent care to an individual with respiratory alkalosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic alkalosis.

9) A client with metabolic alkalosis is experiencing numbness around the mouth and tingling of the fingers. What should the nurse explain as the reason for these manifestations?

A) "Because you are breathing so fast, the oxygen is not getting to your nerve endings."

B) "Your health problem affects calcium in your body, which causes the tingling around your mouth and fingers."

C) "You have a buildup of carbon dioxide in your blood."

D) "You don't have enough potassium in your body, so the tingling around your mouth and fingers will occur."

Answer: B

Explanation: A) Alkalosis increases binding of extracellular calcium to albumin, reducing ionized calcium levels. As a result, neuromuscular excitability increases, and manifestations similar to hypocalcemia develop. These manifestations include circumoral and distal extremity paresthesias. Rapid breathing is not reducing the amount of oxygen reaching the nerve endings. Excessive carbon dioxide would lead to acidosis. Respiratory alkalosis is not caused by an imbalance of serum potassium.

B) Alkalosis increases binding of extracellular calcium to albumin, reducing ionized calcium levels. As a result, neuromuscular excitability increases, and manifestations similar to hypocalcemia develop. These manifestations include circumoral and distal extremity paresthesias. Rapid breathing is not reducing the amount of oxygen reaching the nerve endings. Excessive carbon dioxide would lead to acidosis. Respiratory alkalosis is not caused by an imbalance of serum potassium.

C) Alkalosis increases binding of extracellular calcium to albumin, reducing ionized calcium levels. As a result, neuromuscular excitability increases, and manifestations similar to hypocalcemia develop. These manifestations include circumoral and distal extremity paresthesias. Rapid breathing is not reducing the amount of oxygen reaching the nerve endings. Excessive carbon dioxide would lead to acidosis. Respiratory alkalosis is not caused by an imbalance of serum potassium.

D) Alkalosis increases binding of extracellular calcium to albumin, reducing ionized calcium levels. As a result, neuromuscular excitability increases, and manifestations similar to hypocalcemia develop. These manifestations include circumoral and distal extremity paresthesias. Rapid breathing is not reducing the amount of oxygen reaching the nerve endings. Excessive carbon dioxide would lead to acidosis. Respiratory alkalosis is not caused by an imbalance of serum potassium.

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Cognitive Level: Applying

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation

Learning Outcome: 1.D.4. Analyze respiratory alkalosis as it relates to acid-base balance. Identify the clinical manifestations of respiratory alkalosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic alkalosis.

10) A client with injuries from a motor vehicle crash is intubated for respiratory support. The nurse notes that the client is fighting the ventilator and attempting to pull out the endotracheal tube. What should the nurse do to reduce this client's risk of developing respiratory alkalosis?

A) Administer a sedative as prescribed.

B) Apply wrist restraints.

C) Teach the client to take slow, deep breaths.

D) Discuss removing the endotracheal tube with the healthcare provider.

Answer: A

Explanation: A) For a client being mechanically ventilated, the only way to reduce rapid respirations might be to provide a sedative. Applying wrist restraints to a client who is demonstrating anxiety with an endotracheal tube might increase the client's anxiety. The client is being mechanically ventilated, which means there is a problem with maintaining the airway. The client will not be able to take slow, deep breaths at this time. The reason for the endotracheal tube is to maintain the client's airway after chest trauma. Removing the tube could lead to a collapse of the airway and a life-threatening situation.

B) For a client being mechanically ventilated, the only way to reduce rapid respirations might be to provide a sedative. Applying wrist restraints to a client who is demonstrating anxiety with an endotracheal tube might increase the client's anxiety. The client is being mechanically ventilated, which means there is a problem with maintaining the airway. The client will not be able to take slow, deep breaths at this time. The reason for the endotracheal tube is to maintain the client's airway after chest trauma. Removing the tube could lead to a collapse of the airway and a life-threatening situation.

C) For a client being mechanically ventilated, the only way to reduce rapid respirations might be to provide a sedative. Applying wrist restraints to a client who is demonstrating anxiety with an endotracheal tube might increase the client's anxiety. The client is being mechanically ventilated, which means there is a problem with maintaining the airway. The client will not be able to take slow, deep breaths at this time. The reason for the endotracheal tube is to maintain the client's airway after chest trauma. Removing the tube could lead to a collapse of the airway and a life-threatening situation.

D) For a client being mechanically ventilated, the only way to reduce rapid respirations might be to provide a sedative. Applying wrist restraints to a client who is demonstrating anxiety with an endotracheal tube might increase the client's anxiety. The client is being mechanically ventilated, which means there is a problem with maintaining the airway. The client will not be able to take slow, deep breaths at this time. The reason for the endotracheal tube is to maintain the client's airway after chest trauma. Removing the tube could lead to a collapse of the airway and a life-threatening situation.

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Cognitive Level: Applying

Client Need/Sub: Physiological Integrity: Pharmacological and Parenteral Therapies

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation

Learning Outcome: 1.D.5. Analyze respiratory alkalosis as it relates to acid-base balance.

Summarize diagnostic tests and therapies used by interdisciplinary teams in the collaborative care of an individual with respiratory alkalosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic alkalosis.

11) The nurse is evaluating care provided to a client with respiratory alkalosis. Which outcomes indicate that nursing care has been effective for this client? Select all that apply.

- A) Respiratory rate 18 and regular
- B) Sleeping through the night
- C) Gait steady
- D) Consistent body weight
- E) Using prescribed bronchodilators

Answer: A, B, C, D

Explanation: A) Appropriate outcomes for the care of a client with respiratory alkalosis include normal respiratory rate and rhythm, no episodes of injuries, and maintenance of fluid balance. Ability to sleep through the night would indicate a reduction in anxiety, which is a risk factor for the development of respiratory alkalosis. Bronchodilators are not used to treat this acid-base imbalance.

B) Appropriate outcomes for the care of a client with respiratory alkalosis include normal respiratory rate and rhythm, no episodes of injuries, and maintenance of fluid balance. Ability to sleep through the night would indicate a reduction in anxiety, which is a risk factor for the development of respiratory alkalosis. Bronchodilators are not used to treat this acid-base imbalance.

C) Appropriate outcomes for the care of a client with respiratory alkalosis include normal respiratory rate and rhythm, no episodes of injuries, and maintenance of fluid balance. Ability to sleep through the night would indicate a reduction in anxiety, which is a risk factor for the development of respiratory alkalosis. Bronchodilators are not used to treat this acid-base imbalance.

D) Appropriate outcomes for the care of a client with respiratory alkalosis include normal respiratory rate and rhythm, no episodes of injuries, and maintenance of fluid balance. Ability to sleep through the night would indicate a reduction in anxiety, which is a risk factor for the development of respiratory alkalosis. Bronchodilators are not used to treat this acid-base imbalance.

E) Appropriate outcomes for the care of a client with respiratory alkalosis include normal respiratory rate and rhythm, no episodes of injuries, and maintenance of fluid balance. Ability to sleep through the night would indicate a reduction in anxiety, which is a risk factor for the development of respiratory alkalosis. Bronchodilators are not used to treat this acid-base imbalance.

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Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care: Patient/family/community preferences, values; Coordination and integration of care; Information, communication, and education; Physical comfort and emotional support; Involvement of family and friends Transition and continuity. | AACN Essential Competencies: IX.7. Provide appropriate patient teaching that reflects developmental state, age, culture, spirituality, patient preferences, and health literacy considerations to foster patient engagement in their care. | NLN Competencies: Relationship Centered Care: Effective communication. | Nursing Process: Evaluation

Learning Outcome: 1.D.7. Analyze respiratory alkalosis as it relates to acid-base balance. Apply the nursing process in providing culturally competent care to an individual with respiratory alkalosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic alkalosis.

12) A client is brought to the emergency department (ED) with rapid breathing after learning of a family member being killed in a house fire. What should the nurse do first to help this client?

- A) Coach to slow the breathing.
- B) Move to a quiet, calm environment.
- C) Provide a sedative.
- D) Ask for a psychiatric consultation.

Answer: B

Explanation: A) Nursing care is focused on reducing anxiety through manipulation of the environment to reduce stimuli and to create a sense of peace. This restful environment will help the client breathe more slowly and effectively. Once the environment is controlled, the nurse can begin to implement interventions to help the client slow the breathing rate. A sedative may be prescribed; however, this would not be the first intervention. A psychiatric consult might be indicated for someone with a history of anxiety or panic attacks that lead to the development of respiratory alkalosis. Because this client has had a shock, a psychiatric consultation would not be indicated at this time.

B) Nursing care is focused on reducing anxiety through manipulation of the environment to reduce stimuli and to create a sense of peace. This restful environment will help the client breathe more slowly and effectively. Once the environment is controlled, the nurse can begin to implement interventions to help the client slow the breathing rate. A sedative may be prescribed; however, this would not be the first intervention. A psychiatric consult might be indicated for someone with a history of anxiety or panic attacks that lead to the development of respiratory alkalosis. Because this client has had a shock, a psychiatric consultation would not be indicated at this time.

C) Nursing care is focused on reducing anxiety through manipulation of the environment to reduce stimuli and to create a sense of peace. This restful environment will help the client breathe more slowly and effectively. Once the environment is controlled, the nurse can begin to implement interventions to help the client slow the breathing rate. A sedative may be prescribed; however, this would not be the first intervention. A psychiatric consult might be indicated for someone with a history of anxiety or panic attacks that lead to the development of respiratory alkalosis. Because this client has had a shock, a psychiatric consultation would not be indicated at this time.

D) Nursing care is focused on reducing anxiety through manipulation of the environment to reduce stimuli and to create a sense of peace. This restful environment will help the client breathe more slowly and effectively. Once the environment is controlled, the nurse can begin to implement interventions to help the client slow the breathing rate. A sedative may be prescribed; however, this would not be the first intervention. A psychiatric consult might be indicated for someone with a history of anxiety or panic attacks that lead to the development of respiratory alkalosis. Because this client has had a shock, a psychiatric consultation would not be indicated at this time.

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Cognitive Level: Applying

Client Need/Sub: Psychosocial Integrity

Standards: QSEN Competencies: III.A.2 Describe EBP to include the components of research evidence, clinical expertise and patient/family values. | AACN Essential Competencies: IX.3.

Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN

Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation

Learning Outcome: 1.D.7. Analyze respiratory alkalosis as it relates to acid-base balance. Apply the nursing process in providing culturally competent care to an individual with respiratory alkalosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic alkalosis.

13) A client begins to hyperventilate after learning that a breast biopsy was positive for cancer. After a few minutes, the client loses consciousness. Which action by the nurse is the priority?

- A) Begin cardiopulmonary resuscitation.
- B) Raise the side rails on the bed.
- C) Notify the physician.
- D) Insert an intravenous access device.

Answer: B

Explanation: A) The nurse should protect the client from injury. If hyperventilation continues to the point where the client loses consciousness, respirations will return to normal, as will acid-base balance. The nurse should ensure the client's safety and raise the side rails on the bed. The client does not need cardiopulmonary resuscitation. The physician may need to be notified; however, the client's safety is a priority. The client is not critically ill, and an intravenous access device is not indicated at this time.

B) The nurse should protect the client from injury. If hyperventilation continues to the point where the client loses consciousness, respirations will return to normal, as will acid-base balance. The nurse should ensure the client's safety and raise the side rails on the bed. The client does not need cardiopulmonary resuscitation. The physician may need to be notified; however, the client's safety is a priority. The client is not critically ill, and an intravenous access device is not indicated at this time.

C) The nurse should protect the client from injury. If hyperventilation continues to the point where the client loses consciousness, respirations will return to normal, as will acid-base balance. The nurse should ensure the client's safety and raise the side rails on the bed. The client does not need cardiopulmonary resuscitation. The physician may need to be notified; however, the client's safety is a priority. The client is not critically ill, and an intravenous access device is not indicated at this time.

D) The nurse should protect the client from injury. If hyperventilation continues to the point where the client loses consciousness, respirations will return to normal, as will acid-base balance. The nurse should ensure the client's safety and raise the side rails on the bed. The client does not need cardiopulmonary resuscitation. The physician may need to be notified; however, the client's safety is a priority. The client is not critically ill, and an intravenous access device is not indicated at this time.

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Cognitive Level: Applying

Client Need/Sub: Safe and Effective Care Environment: Safety and Infection Control

Standards: QSEN Competencies: III.A.2 Describe EBP to include the components of research evidence, clinical expertise and patient/family values. | AACN Essential Competencies: IX.3.

Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN

Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation

Learning Outcome: 1.D.7. Analyze respiratory alkalosis as it relates to acid-base balance. Apply the nursing process in providing culturally competent care to an individual with respiratory alkalosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic alkalosis.

14) The most common disorder that increases a client's risk for respiratory alkalosis is:

- A) a respiratory disorder.
- B) an anxiety disorder.
- C) a cardiovascular disorder.
- D) a congenital disorder.

Answer: B

Explanation: A) Anxiety with hyperventilation is the most common cause of respiratory alkalosis. Therefore, anxiety disorders increase the risk for respiratory alkalosis. Respiratory disorders are more likely to lead to respiratory acidosis. Cardiovascular disorders and congenital disorders do not usually lead to respiratory alkalosis.

B) Anxiety with hyperventilation is the most common cause of respiratory alkalosis. Therefore, anxiety disorders increase the risk for respiratory alkalosis. Respiratory disorders are more likely to lead to respiratory acidosis. Cardiovascular disorders and congenital disorders do not usually lead to respiratory alkalosis.

C) Anxiety with hyperventilation is the most common cause of respiratory alkalosis. Therefore, anxiety disorders increase the risk for respiratory alkalosis. Respiratory disorders are more likely to lead to respiratory acidosis. Cardiovascular disorders and congenital disorders do not usually lead to respiratory alkalosis.

D) Anxiety with hyperventilation is the most common cause of respiratory alkalosis. Therefore, anxiety disorders increase the risk for respiratory alkalosis. Respiratory disorders are more likely to lead to respiratory acidosis. Cardiovascular disorders and congenital disorders do not usually lead to respiratory alkalosis.

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Cognitive Level: Remembering

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.D.3. Analyze respiratory alkalosis as it relates to acid-base balance.

Compare the risk factors and prevention of respiratory alkalosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic alkalosis.

15) A 2-month-old infant has been diagnosed with pneumonia with respiratory alkalosis. The provider also suspects that the infant is suffering from paresthesias of the hands and feet, because the infant pulls away and cries when his extremities are touched. What client teaching can the nurse provide the parents to comfort the infant with paresthesias?

- A) Postural drainage techniques
- B) Massage techniques
- C) Breastfeeding techniques
- D) Swaddling techniques

Answer: D

Explanation: A) Comfort measures that may be successful for infants experiencing paresthesias include swaddling, calming touch, and speaking with a quiet voice. A mother of a 2-month-old infant likely already understands breastfeeding techniques if she breastfeeds the infant. Massage techniques will likely cause additional discomfort for the infant; calming touch is needed instead. Postural drainage techniques are used to clear the airway, not comfort the infant.

B) Comfort measures that may be successful for infants experiencing paresthesias include swaddling, calming touch, and speaking with a quiet voice. A mother of a 2-month-old infant likely already understands breastfeeding techniques if she breastfeeds the infant. Massage techniques will likely cause additional discomfort for the infant; calming touch is needed instead. Postural drainage techniques are used to clear the airway, not comfort the infant.

C) Comfort measures that may be successful for infants experiencing paresthesias include swaddling, calming touch, and speaking with a quiet voice. A mother of a 2-month-old infant likely already understands breastfeeding techniques if she breastfeeds the infant. Massage techniques will likely cause additional discomfort for the infant; calming touch is needed instead. Postural drainage techniques are used to clear the airway, not comfort the infant.

D) Comfort measures that may be successful for infants experiencing paresthesias include swaddling, calming touch, and speaking with a quiet voice. A mother of a 2-month-old infant likely already understands breastfeeding techniques if she breastfeeds the infant. Massage techniques will likely cause additional discomfort for the infant; calming touch is needed instead. Postural drainage techniques are used to clear the airway, not comfort the infant.

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Cognitive Level: Applying

Client Need/Sub: Physiological Integrity: Basic Care and Comfort

Standards: QSEN Competencies: III.A.2 Describe EBP to include the components of research evidence, clinical expertise and patient/family values. | AACN Essential Competencies: IX.3. Implement holistic, patient-centered care that reflects an understanding of human growth and development, pathophysiology, pharmacology, medical management and nursing management across the health-illness continuum, across lifespan, and in all healthcare settings. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation

Learning Outcome: 1.D.6. Analyze respiratory alkalosis as it relates to acid-base balance. Differentiate care of clients with respiratory alkalosis across the lifespan.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic alkalosis.