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Nursing: A Concept-Based Approach to Learning Vol. 1 & 2, 5e **(Pearson)**
Module 1 Acid-Base Balance

The Concept of Acid-Base Balance

1) A client who has been fasting and has ketones in the urine is brought to the emergency department (ED) unconscious. 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.
B) Respiratory alkalosis involves an imbalance in the respiratory and metabolic processes of the body. It is caused by hyperventilation. Causes of respiratory alkalosis include anxiety, pain, stress, thyrotoxicosis, fever, infection, excessive heat, high altitudes, or an overdose of aspirin.
C) Metabolic alkalosis involves an imbalance in the metabolic processes of the body. It is caused by a decrease in hydrogen ions, a decrease in chloride ions, or an increase in bicarbonate. Metabolic alkalosis can also be caused by excessive vomiting, excessive use of loop diuretics, and excessive use of sodium bicarbonate.
D) Respiratory acidosis involves an imbalance in the respiratory and metabolic processes of the body. It is caused by a decreased respiratory rate, a decreased inhaled and exhaled volume of air, or blockage of the respiratory passageways. Causes of respiratory acidosis include overdose of a narcotic drug, lung diseases, or aspiration of a foreign body blocking an airway.
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 Domains and Competencies: 2.3 Integrate assessment skills in practice. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment | CJMM: Analyze Cues
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.

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2) The nurse is caring for a client in the emergency department. Which health condition will the nurse suspect that increases the client's risk for metabolic acidosis? **Select all that apply.**
A) Abdominal fistulas
B) Chronic obstructive pulmonary disease
C) Pneumonia
D) Chronic 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 condition such as an abdominal fistula which can cause the loss of bicarbonate from the intestine.
B) Chronic obstructive pulmonary disease places the client at risk for respiratory acidosis with the increased retention of carbon dioxide in the blood.
C) Pneumonia places 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 condition such as chronic renal failure. In this health problem, the kidneys are unable to excrete a normal amount of hydrogen ions in the urine. This results in an excessive amount of hydrogen ions in the blood, which produces metabolic acidosis.
E) Metabolic acidosis is rarely a primary disorder. It usually develops during the course of another condition such as hypovolemic shock. With a severe blood loss, there is a lack of blood flow throughout the body and a lack of oxygen in every cell. Adenosine triphosphate (ATP) must produce energy anaerobically without the presence of oxygen; lactic acid is a by-product. This produces systemic lactic acidosis, a type of metabolic acidosis.
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 Domains and Competencies: 2.3 Integrate assessment skills in practice. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment | CJMM: Analyze Cues
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3) A client with acute asthma has a Pa CO_2 of 48 mmHg, a pH of 7.31, and a normal H CO_3 arterial blood gas value. Which condition will the nurse associate with these values?
A) Metabolic acidosis
B) Respiratory alkalosis
C) Respiratory acidosis
D) Metabolic alkalosis
Answer: C
Explanation: A) Uncompensated metabolic acidosis has a decreased pH, normal $PaCO_2$, and decreased HCO_3.

B) Uncompensated respiratory alkalosis has an increased pH, decreased $PaCO_2$, and normal HCO_3.

C) If the pH is decreased and the $PaCO_2$ is increased with a normal HCO_3, it is uncompensated respiratory acidosis.
D) Uncompensated metabolic alkalosis has an increased pH, normal $PaCO_2$, and increased HCO_3.

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 Domains and Competencies: 2.4 Diagnose actual or potential health problems and needs. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment | CJMM: Recognize Cues
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) $PaCO_2$ 18 mmHg

C) HCO_3 8 mEq/L

D) $PaCO_2$ 48 mmHg

Answer: D
Explanation: A) A normal pH level is 7.35-7.45. A pH of less than 7.35 is acidosis.
B) A $PaCO_2$ level of 18 mmHg is low and is seen in respiratory alkalosis.

C) A HCO_3 level of 8 mEq/L is low and is most likely associated with metabolic acidosis.

D) 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 $PaCO_2$ will be elevated.

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 Domains and Competencies: 2.3 Integrate assessment skills in practice. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Evaluation | CJMM: Recognize Cues
Learning Outcome: 1.2. Differentiate alterations in acid-base balance.
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5) A client is diagnosed with chronic obstructive pulmonary disease. Which test would the nurse anticipate providing 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) Acid-base balance is assessed primarily by measuring arterial blood gases (ABGs). Arterial blood is most often used because it reflects acid-base balance throughout the entire body better than venous or capillary blood that has dispersed oxygen into the tissues and has collected carbon dioxide.
B) Pulse oximetry is a noninvasive test that evaluates the oxygen saturation level of blood.
C) Sputum studies can provide specific information about organisms in the sputum.
D) A bronchoscopy provides visualization of internal respiratory structures.
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 Domains and Competencies: 2.3 Integrate assessment skills in practice. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment | CJMM: Recognize Cues
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.

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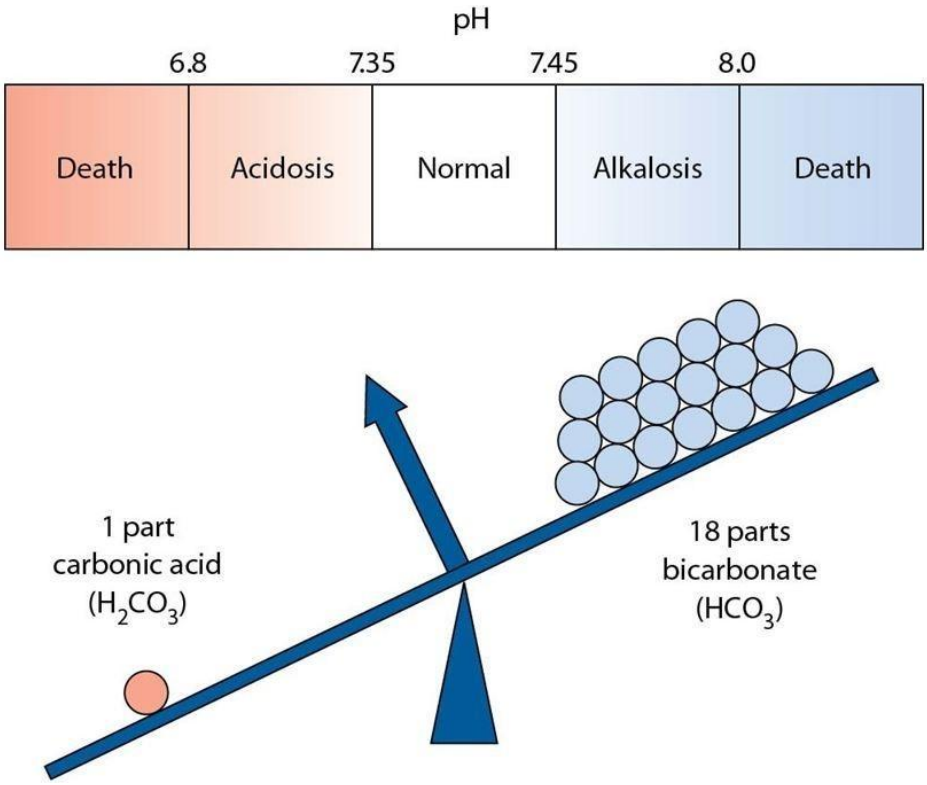
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6) The nurse is preparing to analyze an arterial blood gas to determine if a client has an acid-base imbalance. In which order will the nurse analyze this laboratory test?
1. Look at the $PaCO_2$.
2. Look at the pH.
3. Evaluate the relationship between pH and $PaCO_2$.
4. Look at the bicarbonate in relation to the pH.
Answer: 2, 1, 3, 4
Explanation: 1. The second step is to look at the $PaCO_2$. If the $PaCO_2$ is <40, then more carbon dioxide is being exhaled. If the $PaCO_2$ is >40, 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 40, then the client could be experiencing respiratory acidosis. If the pH is alkalotic and the carbon dioxide level is below 40, then the client could be experiencing respiratory alkalosis.
4. The fourth step is to look at the bicarbonate level in relation to the pH. If both the pH and bicarbonate level is decreased, then the client has metabolic acidosis. If the pH and bicarbonate levels are increased, the client has metabolic alkalosis.
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 Domains and Competencies: 2.3 Integrate assessment skills in practice. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment | CJMM: Analyze Cues
Learning Outcome: 1.5. Differentiate common assessment procedures and tests used to examine acid-base balance.
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7) The nurse is planning to instruct a client about a diagnosed acid-base imbalance. Which imbalance does the 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.
B) In metabolic alkalosis, there is an excess of bicarbonate in relation to the amount of hydrogen ions.
C) Respiratory acidosis occurs when carbon dioxide is retained, increasing the amount of carbonic acid in the body.
D) Respiratory alkalosis can occur when too much carbon dioxide is lost and carbonic acid levels fall.
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 Domains and Competencies: 2.3 Integrate assessment skills in practice. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment | CJMM: Recognize Cues
Learning Outcome: 1.2. Differentiate alterations in acid-base balance.
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8) The results of a client's arterial blood gas sample reveal an oxygen level of 72 mmHg. For which associated health problem would the nurse assess this client?
A) Stress and coping
B) Perfusion
C) Fluid and electrolyte imbalance
D) Cognition
Answer: D
Explanation: A) 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) Perfusion is affected by a reduction in circulating fluids.
C) With a fluid and electrolyte imbalance, there is another disorder affecting acid-base balance. This might not be affected by oxygen level.
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.
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 Domains and Competencies: 2.3 Integrate assessment skills in practice. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment | CJMM: Analyze Cues
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.

9) The nurse is caring for a client with metabolic acidosis who is comatose. 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) Measuring vital signs is an independent nursing action.
B) Measuring intake and output is an independent nursing action.
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.
D) Identifying current oxygen saturation level is an independent nursing action.
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. | AACN Domains and Competencies: 2.2 Communicate effectively with individuals. | NLN Competencies: Relationship Centered Care: Effective communication. | Nursing Process: Planning | CJMM: Generate Solutions
Learning Outcome: 1.7. Summarize collaborative therapies used by interprofessional teams for patients with alterations in acid-base balance.
MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

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10) The nurse is reviewing a client's arterial blood gas results. Which substance will the nurse focus on to determine the pH?

A) Cl^-

B) H^+

C) Na^+

D) HCO_3

Answer: B

Explanation: A) Chloride (Cl^-) concentrations are not related to pH.

B) The pH measures the concentration of hydrogen ions (H^+) in the body.

C) Sodium (Na^+) concentrations are not related to pH.

D) 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.

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 Domains and Competencies: 2.3 Integrate assessment skills in practice. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment | CJMM: Analyze Cues

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

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

11) A client with a suspected acid-base imbalance has an arterial blood gases bicarbonate level of 18 mEq/L. In which way will the nurse interpret this result?

A) Slightly high

B) Slightly low

C) Extremely high

D) Within normal range

Answer: B

Explanation: A) The normal serum bicarbonate level is 22-26 mEq/L. A value of 18 mEq/L is not slightly high.

B) The normal serum bicarbonate level is 22-26 mEq/L. A value of 18 mEq/L is slightly low.

C) The normal serum bicarbonate level is 22-26 mEq/L. A value of 18 mEq/L is not extremely high.

D) The normal serum bicarbonate level is 22-26 mEq/L. A value of 18 mEq/L is not within the normal range.

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 Domains and Competencies: 2.3 Integrate assessment skills in practice. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment | CJMM: Analyze Cues

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

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

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12) The nurse notes that a client's acid-base balance reflects a change in ventilation. On which concept will the nurse focus when planning care for this client?
A) Oxygenation
B) Perfusion
C) Cognition
D) Stress and coping
Answer: A
Explanation: A) A change in ventilation–hypoventilation or hyperventilation–is related to oxygenation. Respiratory rate helps regulate carbon dioxide pressures, which can contribute to acidosis or alkalosis.
B) Perfusion, does not directly relate to a change in ventilation.
C) Cognition does not directly relate to a change in ventilation.
D) Stress and coping do not directly relate to a change in ventilation.
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 Domains and Competencies: 2.3 Integrate assessment skills in practice. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Planning | CJMM: Generate Solutions
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.

13) The nurse is reviewing a client's acid-base balance. Which factor will the nurse prioritize as a health promotion activity?
A) Conducting yearly health screenings.
B) Obtaining immunizations.
C) Beginning an exercise regimen.
D) Maintaining fluid balance.
Answer: D
Explanation: A) Conducting yearly health screenings are activities that can promote health in other areas.
B) Obtaining immunizations is an activity that can promote health in other areas.
C) Beginning an exercise regimen is an activity 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.
Cognitive Level: Applying
Client Need/Sub: Health Promotion and Maintenance
Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Domains and Competencies: 2.8 Promote self-care management. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation | CJMM: Take Action
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.

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14) A client needs to have a sample of arterial blood for blood gas analysis. For which reason will the modified Allen test be performed before drawing the blood?
A) Reduce the risk of bleeding or bruising of the arm
B) Determine if arterial puncture can safely be performed
C) Measure the oxygen saturation of the blood in the artery
D) Estimate the pressure of the blood in the artery
Answer: B
Explanation: A) The modified Allen test does not reduce the risk of bleeding or bruising.
B) A modified Allen test is a measure of ulnar patency. The client 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.
C) The modified Allen test does not measure oxygen saturation.
D) The modified Allen test does not estimate artery pressure.
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 Domains and Competencies: 2.3 Integrate assessment skills in practice. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation | CJMM: Analyze Cues
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.

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15) The nurse is caring for a client with an acid-base imbalance. Which intervention will the nurse complete independently?
A) Monitoring intake and output
B) Drawing blood for ABGs
C) Providing a sodium bicarbonate infusion
D) Administering oxygen via nasal cannula
Answer: A
Explanation: A) Monitoring intake and output is an independent nursing intervention that does not require a healthcare provider's orders.
B) Drawing blood for ABGs is an action that can be performed by a nurse who is trained to do so, but must first be ordered by a healthcare provider.
C) Providing a sodium bicarbonate infusion can be performed by the nurse, but must first be ordered by a healthcare provider.
D) Administering oxygen via nasal cannula can be performed by the nurse, but must first be ordered by a healthcare provider.
Cognitive Level: Applying
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 Domains and Competencies: 2.6 Demonstrate accountability for care delivery. | NLN Competencies: Teamwork: Scope of practice, roles, and responsibilities of healthcare team members, including overlaps. | Nursing Process: Implementation | CJMM: Take Action
Learning Outcome: 1.6. Plan and implement culturally congruent nursing care for an individual with acid-base balance alterations.
MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

16) The nurse is caring for a client with acid-base imbalance. For which reason will the nurse measure the client's daily weight?
A) Monitor oxygenation status
B) Monitor perfusion of organs
C) Monitor renal function
D) Monitor fluid balance
Answer: D
Explanation: A) A client's weight does not reflect oxygenation status.
B) A client's weight does not reflect perfusion of organs.
C) 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.
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 Domains and Competencies: 2.6 Demonstrate accountability for care delivery. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment | CJMM: Recognize Cues
Learning Outcome: 1.6. Plan and implement culturally congruent nursing care for an individual with acid-base balance alterations.
MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

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Exemplar 1.A Metabolic Acidosis

1) A client recovering from cardiac arrest has an arterial blood gas pH of 6.58. Which explanation will the nurse suspect is the reason for this pH level?
A) Increased lactic acid level
B) Decreased carbohydrates for fuel
C) Decreased renal perfusion
D) Increased loss of bicarbonate
Answer: A
Explanation: A) Lactic acidosis is a common type of acidosis in hospitalized clients and develops with excess production or diminished excretion of lactic acid from the blood. Lactic acid is produced by anaerobic metabolism of glucose which occurs in cardiac arrest.
B) Lactic acid would increase in a client with diabetes when there is a lack of carbohydrates to be used for fuel.
C) The low pH that develops after a cardiac arrest is not due to decreased renal perfusion. The change in pH because of renal perfusion is due to an imbalance in bicarbonate level.
D) The low pH that occurs after a cardiac arrest is not caused by a loss of bicarbonate. Bicarbonate loss occurs in severe diarrhea and gastrointestinal disorders.
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 Domains and Competencies: 2.4 Diagnose actual or potential health problems and needs. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment | CJMM: Analyze Cues
Learning Outcome: 1.A. 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.

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2) A client is admitted with persistent diarrhea lasting 3 days. Which problems will the nurse identify for this client during the acute phase of the illness? **Select all that apply.**
A) Potential for decreased cardiac output
B) Problems clearing the airway
C) Inability to control urine output
D) Lack of information about the health problem
E) Risk for falls
Answer: A, E
Explanation: A) Metabolic acidosis decreases cardiac output by decreasing contractility, slowing the heart rate, and increasing the risk for dysrhythmias.
B) The client with metabolic acidosis will not have problems clearing the airway.
C) The client with metabolic acidosis will not have a problem with controlling urine output.
D) The client may have a lack of information about the health problem but this is not the priority during the acute phase of the illness.
E) The client with metabolic acidosis is at risk for injury from falls due to altered mental status.
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. | AACN Domains and Competencies: 2.4 Diagnose actual or potential health problems and needs. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Diagnosis | CJMM: Generate Solutions
Learning Outcome: 1.A. Analyze metabolic acidosis as it relates to acid-base balance. Provide culturally responsive 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.

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3) The nurse is caring for a client with metabolic acidosis. Which goals would the nurse identify 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 measures 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) The client's respiratory rate should be within normal range for age and condition.
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.
C) The client should be able to describe preventative measures to maintain the baseline cardiac rhythm.
D) The pH should be maintained between 7.35 and 7.45.
E) Taking a potassium supplement may cause hyperkalemia, which decreases cardiac output and worsens metabolic acidosis.
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 Domains and Competencies: 2.5 Develop a plan of care. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Planning | CJMM: Generate Solutions
Learning Outcome: 1.A. Analyze metabolic acidosis as it relates to acid-base balance. Provide culturally responsive 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.

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4) The nurse is caring for a client with renal failure and metabolic acidosis. Which clinical manifestation would indicate to the nurse that actions to relieve 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.
B) Palpitations are not associated with metabolic acidosis.
C) Increased deep tendon reflexes are not associated with metabolic acidosis.
D) An increased respiratory rate, as indicated by a respiratory rate of 38, would indicate continued metabolic acidosis.
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. | AACN Domains and Competencies: 2.7 Evaluate outcomes of care. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Evaluation | CJMM: Evaluate Outcomes
Learning Outcome: 1.A. 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.

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5) The nurse is caring for a client with hypovolemic shock and metabolic acidosis. Which therapies would the nurse question 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) Clients being treated for hypovolemia and metabolic acidosis will require daily weights, not a weight on admission and then discharge.
B) Monitoring ECGs are appropriate for the client with metabolic acidosis.
C) The treatment for hypovolemic shock would include the administration of fluids, not limiting fluids.
D) Administering sodium bicarbonate is appropriate for the client with metabolic acidosis.
E) 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.
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 Domains and Competencies: 2.5 Develop a plan of care. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation | CJMM: Take Action
Learning Outcome: 1.A. Analyze metabolic acidosis as it relates to acid-base balance. Provide culturally responsive 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 is experiencing confusion and weakness. Which nursing intervention would be 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 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.
C) Medication administration is a physician order.
D) Skin care would not be a priority on admission.
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 Domains and Competencies: 2.5 Develop a plan of care. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Planning | CJMM: Take Action
Learning Outcome: 1.A. Analyze metabolic acidosis as it relates to acid-base balance. Provide culturally responsive care to an individual with metabolic acidosis.
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7) The nurse is teaching a client with type 1 diabetes 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 causes 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.
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 Domains and Competencies: 2.2 Communicate effectively with individuals. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation | CJMM: Take Action
Learning Outcome: 1.A. Analyze metabolic acidosis as it relates to acid-base balance. Describe the pathophysiology of metabolic acidosis.
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8) A client with metabolic acidosis is at risk for an injury. Which strategies should the nurse use to prevent the client from experiencing an injury? **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 upper bed side rails raised.
E) Place a clock and calendar at the bedside.
Answer: C, D, E
Explanation: A) Restraints are used in the event the client demonstrates harm to self or others.
B) A risk for injury is not a reason to use chemical restraints.
C) To reduce the client's risk for injury, the nurse should make sure the bed is kept in the lowest position.
D) To reduce the client's risk for injury, the nurse should make sure the upper side rails are raised. Raising all side rails is a form of restraint that cannot be done without a provider's order.
E) A clock and calendar at the bedside will help with orientation.
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 Domains and Competencies: 2.5 Develop a plan of care. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Planning | CJMM: Take Action
Learning Outcome: 1.A. Analyze metabolic acidosis as it relates to acid-base balance. Provide culturally responsive care to an individual with metabolic acidosis.
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9) Upon entering a room, the nurse quickly scans the environment and then immediately assesses the client for manifestations of metabolic acidosis. Which observation caused the nurse to make this 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) 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.
B) A reduction in oral intake does not cause metabolic acidosis. Eating half of a meal tray is not the same as starvation.
C) 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.
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 Domains and Competencies: 2.3 Integrate assessment skills in practice. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment | CJMM: Analyze Cues
Learning Outcome: 1.A. 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.

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10) During a home visit, the nurse evaluates care provided to a client with type 1 diabetes 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) Incorrect administration of medication could cause a metabolic problem in the client with diabetes.
B) The use of laxatives could cause diarrhea, which can lead to metabolic acidosis.
C) Adequate nutrition is necessary to prevent the buildup of acids in the blood.
D) Ingesting high amounts of salicylate acid can lead to toxicity and the development of metabolic acidosis.
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. | AACN Domains and Competencies: 2.7 Evaluate outcomes of care. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Evaluation | CJMM: Evaluate Outcomes
Learning Outcome: 1.A. Analyze metabolic acidosis as it relates to acid-base balance. Provide culturally responsive 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) The nurse is preparing a teaching tool about metabolic acidosis. Which information will the nurse include that explains a common cause of this condition?
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) Hyperventilation can lead to respiratory alkalosis.
B) High blood glucose that leads to diabetic ketoacidosis is a common cause of metabolic acidosis.
C) Vomiting can lead to metabolic alkalosis.
D) Opiate overdose can lead to respiratory acidosis.
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 Domains and Competencies: 2.2 Communicate effectively with individuals. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation | CJMM: Take Action
Learning Outcome: 1.A. Analyze metabolic acidosis as it relates to acid-base balance. Describe the etiology of metabolic acidosis.
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12) The nurse is caring for a client with metabolic acidosis. Which assessment finding indicates to the nurse that the client is experiencing a compensatory mechanism to the disorder?
A) Headache
B) Kussmaul respirations
C) Vomiting
D) Decreased level of consciousness
Answer: B
Explanation: A) Headache is a clinical manifestation of metabolic acidosis, but is not a compensatory mechanism 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.
C) Vomiting is a clinical manifestation of metabolic acidosis, but is not a compensatory mechanism that the body uses to maintain acid-base balance during metabolic acidosis.
D) Decreased level of consciousness is a clinical manifestation of metabolic acidosis, but is not a compensatory mechanism that the body uses to maintain acid-base balance during metabolic acidosis.
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 Domains and Competencies: 2.3 Integrate assessment skills in practice. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment | CJMM: Analyze Cues
Learning Outcome: 1.A. Analyze metabolic acidosis as it relates to acid-base balance. Identify the clinical manifestations of metabolic acidosis.
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13) The nurse is caring for a client with metabolic acidosis. Which medication will the nurse expect to be prescribed for this client?
A) Sodium bicarbonate
B) Sodium chloride
C) Potassium chloride
D) Dextrose
Answer: A
Explanation: A) Sodium bicarbonate is often given intravenously to clients with severe acute metabolic acidosis. It raises the pH of the blood.
B) Sodium chloride may worsen metabolic acidosis by increasing the chloride concentration.
C) Potassium chloride may worsen metabolic acidosis by increasing the chloride concentration.
D) Dextrose may worsen metabolic acidosis, especially in clients with type 1 diabetes, by increasing blood glucose levels and causing ketoacidosis.
Cognitive Level: Applying
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 Domains and Competencies: 2.6 Demonstrate accountability for care delivery. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Planning | CJMM: Take Action
Learning Outcome: 1.A. Analyze metabolic acidosis as it relates to acid-base balance. Summarize diagnostic tests and therapies used by interprofessional 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) A 3-month-old infant is experiencing fever, diarrhea, vomiting, and diaper rash for 48 hours. Which symptom would the nurse identify that increases the client's risk for metabolic acidosis?
A) Fever
B) Diarrhea
C) Vomiting
D) Diaper rash
Answer: B
Explanation: A) Fever does 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.
C) Vomiting is more likely to result in metabolic alkalosis from loss of stomach acids.
D) Diaper rash does not directly contribute to metabolic acidosis.
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 Domains and Competencies: 2.3 Integrate assessment skills in practice. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment | CJMM: Analyze Cues
Learning Outcome: 1.A. Analyze metabolic acidosis as it relates to acid-base balance. Differentiate care of patients 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.

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15) An older adult client with heart disease and dementia takes several medications. 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) Acid-base balance is less affected by angiotensin II receptor blockers.
B) Acid-base balance is less affected by statins.
C) Acid-base balance is less affected by cholinesterase inhibitors.
D) Aspirin is salicylic acid, which could decrease the blood pH if taken in high quantities.
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 Domains and Competencies: 5.2 Contribute to a culture of patient safety. | NLN Competencies: Relationship Centered Care: Factors that contribute to or threaten health. | Nursing Process: Assessment | CJMM: Recognize Cues
Learning Outcome: 1.A. Analyze metabolic acidosis as it relates to acid-base balance. Differentiate care of patients 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.

16) 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.
B) The client should be instructed to use non-sodium antacids to prevent the absorption of excess sodium or bicarbonate into systemic circulation.
C) The client should be instructed 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 dyspnea or diaphoresis occurs.
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. | AACN Domains and Competencies: 5.2 Contribute to a culture of patient safety. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Evaluation | CJMM: Evaluate Outcomes
Learning Outcome: 1.A. Analyze metabolic acidosis as it relates to acid-base balance. Provide culturally responsive care to an individual with metabolic acidosis.
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17) A client is receiving sodium bicarbonate intravenously (IV) for correction of acidosis secondary to diabetic coma. Which action will the nurse take when the client develops lethargy, confusion, and rapid respirations?
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's symptoms do not indicate alkalosis so infusion should not be stopped.
B) The client receiving sodium bicarbonate is prone to alkalosis; monitor for cyanosis, slow respirations, and irregular pulse.
C) 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.
D) The infusion should not be increased or decreased without a practitioner order.
Cognitive Level: Applying
Client Need/Sub: Physiological Integrity: Pharmacological and Parenteral Therapies
Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care. | AACN Domains and Competencies: 2.3 Integrate assessment skills in practice. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation | CJMM: Take Action
Learning Outcome: 1.A. Analyze metabolic acidosis as it relates to acid-base balance. Provide culturally responsive care to an individual with metabolic acidosis.
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Exemplar 1.B Metabolic Alkalosis

1) A client has been vomiting for several days. Which characteristic of gastric secretions would the nurse identify that increases the client's risk of developing metabolic alkalosis?
A) Green in color
B) Are alkaline
C) Are acidic
D) Have a foul smell
Answer: C
Explanation: A) The color of gastric secretions has no influence on the development of metabolic acidosis.
B) Gastric secretions are not alkaline.
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.
D) The odor of gastric secretions has no influence on the development of metabolic acidosis.
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 Domains and Competencies: 2.3 Integrate assessment skills in practice. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment | CJMM: Recognize Cues
Learning Outcome: 1.B. 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.

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2) The nurse is caring for a client with congestive heart failure. Which assessment data would indicate to the nurse that the client is at risk for metabolic alkalosis? **Select all that apply.**
A) Takes furosemide (Lasix) daily
B) Takes a baby aspirin once daily
C) Takes metformin daily
D) Uses calcium carbonate (Tums) for acid indigestion
E) Takes acetaminophen as needed for pain
Answer: A, D
Explanation: A) The use of a diuretic to remove excess fluid also increases the renal excretion of hydrogen ions, increasing the risk of alkalosis.
B) Overuse of aspirin can be associated with metabolic acidosis.
C) Use of metformin is not associated with alkalosis.
D) Excessive use of calcium carbonate can cause metabolic alkalosis.
E) Use of acetaminophen is not associated with metabolic alkalosis.
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 Domains and Competencies: 2.3 Integrate assessment skills in practice. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment | CJMM: Recognize Cues
Learning Outcome: 1.B. 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.

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3) An adolescent has been vomiting for several days because of food poisoning. Which information will the nurse include when teaching the parents about the illness? **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) Immunizations would not prevent the illness.
B) Food patterns of the adolescent are not the precipitating factor of the food poisoning.
C) The family of anyone experiencing prolonged vomiting should be instructed on the signs and symptoms of metabolic alkalosis.
D) The nurse would include teaching about proper methods of food handling to prevent further episodes of food poisoning.
E) It is not necessary to teach normal laboratory findings.
Cognitive Level: Applying
Client Need/Sub: Health Promotion and Maintenance
Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care. | AACN Domains and Competencies: 2.8 Promote self-care management. | NLN Competencies: Relationship Centered Care: Effective communication. | Nursing Process: Implementation | CJMM: Take Action
Learning Outcome: 1.B. Analyze metabolic alkalosis as it relates to acid-base balance. Provide culturally responsive care to an individual with metabolic alkalosis.
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4) The nurse is planning care for a client with metabolic alkalosis. Which problems will the nurse identify for this client? **Select all that apply.**
A) Nutritional deficits
B) Altered vital signs
C) Potential for fluid volume deficiency
D) Ineffective breathing pattern
E) Fall risk
Answer: B, C, D, E
Explanation: A) The reason for the metabolic alkalosis needs to be identified. Nutritional deficits may not be appropriate.
B) Clients with metabolic alkalosis often have accompanying disorders that would affect the vital signs.
C) Clients with metabolic alkalosis often have an accompanying deficiency in fluid volume.
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.
E) The client is at risk for injury because of the associated muscle spasms and dizziness.
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. | AACN Domains and Competencies: 2.5 Develop a plan of care. | NLN Competencies: Relationship Centered Care: Factors that contribute to or threaten health. | Nursing Process: Planning | CJMM: Generate Solutions
Learning Outcome: 1.B. Analyze metabolic alkalosis as it relates to acid-base balance. Provide culturally responsive care to an individual with metabolic alkalosis.
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5) A client with Cushing syndrome is experiencing complications from the condition. Which intervention to improve gas exchange should the nurse add to the client's plan of care?
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 the healthcare provider's order
Answer: B
Explanation: A) Monitoring serum electrolytes would address an alteration in fluid volume.
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.
C) Monitoring intake and output will address an alteration in fluid volume.
D) Intravenous fluids will address an alteration in fluid volume.
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 Domains and Competencies: 2.5 Develop a plan of care. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Planning | CJMM: Take Action
Learning Outcome: 1.B. Analyze metabolic alkalosis as it relates to acid-base balance. Provide culturally responsive 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) A client with heart failure is prescribed furosemide (Lasix). Which client statement indicates that teaching provided by the nurse was effective?
A) "I will use only sodium bicarbonate as my antacid."
B) "I will restrict my intake of fluids."
C) "I will use potassium supplements as prescribed."
D) "I will take antacids only for my gastric discomforts."
Answer: C
Explanation: A) The client should be instructed to refrain from the use of sodium antacids when prone to metabolic alkalosis.
B) 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.
D) The client should consult with the primary care provider for gastric distress rather than self-medicate.
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. | AACN Domains and Competencies: 2.7 Evaluate outcomes of care. | NLN Competencies: Relationship Centered Care: Effective communication. | Nursing Process: Evaluation | CJMM: Evaluate Outcomes
Learning Outcome: 1.B. Analyze metabolic alkalosis as it relates to acid-base balance. Provide culturally responsive care to an individual with metabolic alkalosis.
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7) A client is diagnosed with severe metabolic alkalosis. Which action will the nurse prioritize for this client?
A) Administering medication to treat the disorder
B) Monitoring oxygen saturation
C) Teaching the client the risk factors for the condition
D) Setting goals with the client
Answer: B
Explanation: A) Administering medications will be needed as a treatment, but the priority is to discover the cause.
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.
C) Teaching the client is an important aspect of nursing care but is not the priority.
D) Setting goals is an important aspect of nursing care but is not the priority.
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. | AACN Domains and Competencies: 2.5 Develop a plan of care. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Planning | CJMM: Generate Solutions
Learning Outcome: 1.B. Analyze metabolic alkalosis as it relates to acid-base balance. Provide culturally responsive 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) The nurse is caring for a client with hyperaldosteronism. In which position should this client be placed to enhance gas exchange?
A) Fowler
B) Prone
C) Left side-lying
D) Right Sims
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.
B) The prone position will not facilitate lung expansion.
C) Side-lying positions do not promote lung expansion.
D) Sims or a side-lying position will not promote lung expansion.
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 Domains and Competencies: 2.6 Demonstrate accountability for care delivery. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation | CJMM: Take Action
Learning Outcome: 1.B. Analyze metabolic alkalosis as it relates to acid-base balance. Provide culturally responsive 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.

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9) The nurse notes that a client has a potassium level of 2.8 mEq/L and chloride level of 100 mEq/L. Which action will the nurse take?
A) Prepare to administer 0.9% sodium chloride infusion
B) Measure for nasogastric tube insertion
C) Notify the healthcare provider
D) Review the use of ammonium chloride
Answer: C
Explanation: A) Because the chloride level is within normal limits, an infusion of 0.9% sodium chloride is not indicated.
B) A nasogastric tube is not indicated for this client.
C) Because the client's potassium level is low, the healthcare provider should be notified.
D) There is not enough information to support the use of ammonium chloride for this client, as it is indicated to treat severe metabolic alkalosis.
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 Domains and Competencies: 2.4 Diagnose actual or potential health problems and needs. NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation | CJMM: Take Action
Learning Outcome: 1.B. Analyze metabolic alkalosis as it relates to acid-base balance. Summarize diagnostic tests and therapies used by interprofessional 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.

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10) A client with metabolic alkalosis is at risk for an ineffective breathing pattern. Which data did the nurse use to add this problem to the client's care plan? **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.
B) 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.
C) Urine output less than 30 mL/hr would indicate fluid volume deficit.
D) Changes in mental status or behavior may be early signs of hypoxia.
E) Weight is used as an indicator of fluid balance. A rapid weight change would indicate fluid volume deficit.
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. | AACN Domains and Competencies: 2.4 Diagnose actual or potential health problems and needs. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment | CJMM: Prioritize Hypothesis
Learning Outcome: 1.B. Analyze metabolic alkalosis as it relates to acid-base balance. Provide culturally responsive care to an individual with metabolic alkalosis.
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11) A client is experiencing symptoms of metabolic alkalosis. Which diagnostic test findings support this health condition? **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) Serum glucose levels 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.
C) Kidney stones are not associated with metabolic alkalosis.
D) Lower lobe infiltrates are not associated with metabolic alkalosis.
E) The ECG pattern shows changes similar to those seen with hypokalemia.
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. | AACN Domains and Competencies: 2.4 Diagnose actual or potential health problems and needs. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Diagnosis | CJMM: Prioritize Hypothesis
Learning Outcome: 1.B. Analyze metabolic alkalosis as it relates to acid-base balance. Summarize diagnostic tests and therapies used by interprofessional 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. Which finding caused the nurse to have this concern?
A) Ingestion of a banana with breakfast
B) Consistent daily weights
C) Daily use of sodium bicarbonate for gastric upset
D) Use of prescribed nonsteroidal anti-inflammatory drugs (NSAIDs) for arthritic pain
Answer: C
Explanation: A) Ingestion of a banana would prevent the development of hypokalemia.
B) Consistent daily weights would indicate fluid balance.
C) Excess bicarbonate usually occurs as a result of ingesting antacids that contain bicarbonate, such as soda bicarbonate or Alka-Seltzer.
D) The use of NSAIDs would not support the development of metabolic alkalosis.
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 Domains and Competencies: 2.4 Diagnose actual or potential health problems and needs. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment | CJMM: Prioritize Hypothesis
Learning Outcome: 1.B. Analyze metabolic alkalosis as it relates to acid-base balance. Compare the risk factors and prevention of metabolic alkalosis.
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13) During a home visit, the nurse evaluates teaching provided to a client recovering from 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) Black coffee is not associated with the development of metabolic alkalosis.
B) Oranges contain potassium, which is beneficial to prevent the development of metabolic alkalosis.
C) The indiscriminate ingestion of sodium bicarbonate is a risk factor for the development of metabolic alkalosis.
D) Tracking of daily weights would help detect a fluid imbalance, which is associated with metabolic alkalosis.
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. | AACN Domains and Competencies: 2.4 Diagnose actual or potential health problems and needs. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Evaluation | CJMM: Evaluate Outcomes
Learning Outcome: 1.B. 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) The nurse is assessing a client with metabolic alkalosis. Which electrolyte imbalance will the nurse associate with the symptoms of this disorder?
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.
B) Manifestations of metabolic alkalosis are not similar to those of hypokalemia.
C) Manifestations of metabolic are not similar to those of hypercalcemia.
D) Manifestations of metabolic alkalosis are not similar to those of hyperkalemia.
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 Domains and Competencies: 2.3 Integrate assessment skills in practice. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment | CJMM: Analyze Cues
Learning Outcome: 1.B. 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.

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15) A newborn with pyloric stenosis has projectile vomiting, causing weight loss, dehydration, and metabolic alkalosis. Which teaching would the nurse provide to the parents until surgery occurs 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 the infant to prevent aspiration
D) Performing percussion and postural drainage to clear the airways
Answer: C
Explanation: A) Hyperventilation leads to respiratory alkalosis and is usually unrelated to pyloric stenosis.
B) 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.
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 available.
D) Percussion and postural drainage are more relevant to lung diseases such as cystic fibrosis, not a gastrointestinal (GI) disorder such as pyloric stenosis.
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. | AACN Domains and Competencies: 2.2 Communicate effectively with individuals. | NLN Competencies: Relationship Centered Care: Effective communication. | Nursing Process: Implementation | CJMM: Take Action
Learning Outcome: 1.B. Analyze metabolic alkalosis as it relates to acid-base balance. Differentiate care of patients 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.

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Exemplar 1.C Respiratory Acidosis

1) The nurse is caring for a client recovering from a morphine overdose. Which acid-base imbalance does the nurse expect to be diagnosed for this client?
A) Respiratory alkalosis
B) Respiratory acidosis
C) Metabolic alkalosis
D) Metabolic acidosis
Answer: B
Explanation: A) Respiratory alkalosis is 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.
C) Metabolic alkalosis is caused by many conditions, none of which are related to this client's morphine overdose.
D) Metabolic acidosis is caused by many conditions, none of which are related to this client's morphine overdose.
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 Domains and Competencies: 2.3 Integrate assessment skills in practice. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment | CJMM: Recognize Cues
Learning Outcome: 1.C. Analyze respiratory acidosis as it relates to acid-base balance. Describe the pathophysiology of respiratory acidosis.
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2) A client with respiratory failure is diagnosed with respiratory acidosis. Which data from the 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) Ibuprofen does not pose a threat to the respiratory health of the client.
B) A recent trip to South America would not constitute a respiratory risk factor.
C) Aspiration of a foreign body and acute pneumonia would put the client at risk for respiratory acidosis.
D) Recent recovery from a cold would not likely put the client at risk.
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 Domains and Competencies: 2.3 Integrate assessment skills in practice. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment | CJMM: Recognize Cues
Learning Outcome: 1.C. 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 diagnosed with respiratory acidosis. Which chronic lung illness in the 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 cystic fibrosis puts the child at risk for respiratory acidosis.
B) Aspiration is an acute lung condition.
C) Hyperthyroidism is a disorder that can cause metabolic acidosis.
D) Pneumonia is an acute lung condition.
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. | AACN Domains and Competencies: 2.3 Integrate assessment skills in practice. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment | CJMM: Analyze Cues
Learning Outcome: 1.C. 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.

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4) A client with chronic obstructive pulmonary disease is diagnosed with respiratory acidosis. For which problem will the nurse plan care?
A) Inadequate gas exchange
B) Impaired airway clearance
C) Decreased cardiac output
D) Anxiety
Answer: A
Explanation: A) Inadequate gas exchange is the priority problem for the client with respiratory acidosis. Interventions are aimed at restoring effective alveolar ventilation and gas exchange.
B) There is no evidence that the client has an impairment in clearing the airway.
C) There is no evidence that the client has a change in cardiac output.
D) Although anxiety might occur, there is no evidence that the client is experiencing it.
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. | AACN Domains and Competencies: 2.5 Develop a plan of care. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Planning | CJMM: Generate Solutions
Learning Outcome: 1.C. Analyze respiratory acidosis as it relates to acid-base balance. Provide culturally responsive 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.

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5) An older adult is 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.
B) For the client with a history of chronic lung disease and pneumonia, the nurse should instruct on the importance of frequent hand washing.
C) For the client with a history of chronic lung disease and pneumonia, the nurse should instruct on the importance of avoiding crowds.
D) For the client with a history of chronic lung disease and pneumonia, the nurse should instruct on the importance of covering the nose and mouth when coughing.
E) Fluids should be encouraged to ensure that respiratory secretions are thin.
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 Domains and Competencies: 2.2 Communicate effectively with individuals. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation | CJMM: Take Action
Learning Outcome: 1.C. Analyze respiratory acidosis as it relates to acid-base balance. Provide culturally responsive care to an individual with respiratory acidosis.
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6) The settings on mechanical ventilation for a client are: respiratory rate, 25 breaths per minute; tidal volume, 600 mL; FiO_2, 30%; humidification 30 mg H_2O/L. After being ventilated for 2 hours, arterial blood gas analysis reveals a pH of 7.20 and a $PaCO_2$ of 49 mmHg. Which change in ventilator settings should the nurse anticipate?
A) Increase in humidification of inspired air
B) Decrease of FiO_2 from 30% to 25%
C) Increased respiratory rate to 30 breaths per minute
D) Decreased tidal volume of each breath
Answer: C
Explanation: A) Humidification has no effect on the amount of CO_2 expelled.
B) Decreasing the FiO_2 would decrease the amount of CO_2 expelled.
C) This client is exhibiting respiratory acidosis that is not corrected by the current ventilator settings. This client needs to "blow off" more CO_2; therefore, the respiratory rate would be increased.
D) Decreasing the tidal volume would decrease the amount of CO_2 expelled.
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 Domains and Competencies: 2.6 Demonstrate accountability for care delivery. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Evaluation; | CJMM: Evaluate Outcomes
Learning Outcome: 1.C. Analyze respiratory acidosis as it relates to acid-base balance. Summarize diagnostic tests and therapies used by interprofessional 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.

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7) A client with acute pneumonia is experiencing severe respiratory acidosis. Which treatments does the nurse anticipate being prescribed 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.
B) There is not enough evidence to know whether the client is experiencing heart failure as a result of the acute pneumonia.
C) The client with acute pneumonia and respiratory acidosis may increase fluid intake to thin secretions.
D) 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 frequent repositioning to preventing the pooling of respiratory secretions.
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. | AACN Domains and Competencies: 2.6 Demonstrate accountability for care delivery. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Planning | CJMM: Generate Solutions
Learning Outcome: 1.C. Analyze respiratory acidosis as it relates to acid-base balance. Provide culturally responsive care to an individual with respiratory acidosis.
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8) A client was recently extubated for treatment of aspiration pneumonia and respiratory acidosis. Which action would the nurse take to reduce the client's anxiety?
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.
B) Restraining the client will increase levels of agitation.
C) The client with respiratory failure would benefit most from the semi-Fowler or Fowler position to increase ventilation.
D) Narcotics will depress the respirations and increase respiratory acidosis. A nonnarcotic pain reliever would be considered if this client were experiencing pain.
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 Domains and Competencies: 2.1 Engage with the individual in establishing a caring relationship. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation | CJMM: Take Action
Learning Outcome: 1.C. Analyze respiratory acidosis as it relates to acid-base balance. Provide culturally responsive care to an individual with respiratory acidosis.
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9) The nurse is reviewing orders written for a client with chronic respiratory acidosis. Which order 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) Elevating the head of the bed promotes oxygenation.
B) Adequate hydration such as intravenous fluids is important to promote removal of respiratory secretions.
C) Pulmonary hygiene measures such as breathing treatments may be instituted.
D) In clients with chronic respiratory acidosis, oxygen is administered cautiously to prevent carbon dioxide narcosis.
Cognitive Level: Analyzing
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 Domains and Competencies: 2.6 Demonstrate accountability for care delivery. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Planning | CJMM: Generate Solutions
Learning Outcome: 1.C. Analyze respiratory acidosis as it relates to acid-base balance. Provide culturally responsive care to an individual with respiratory acidosis.
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10) A client with pneumonia develops respiratory acidosis. Which medications should the nurse anticipate for 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) Diuretics are not used to treat this disorder.
B) Antibiotics such as amoxicillin may be prescribed to treat respiratory infections.
C) Bronchodilator drugs such as an albuterol inhaler may be administered to open the airways.
D) Benzodiazepines such as diazepam are central nervous system depressants and would adversely affect this client's respiratory rate, adversely affecting respiratory acidosis.
E) Potassium chloride is indicated in the treatment of metabolic alkalosis.
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 Domains and Competencies: 2.6 Demonstrate accountability for care delivery. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Planning | CJMM: Generate Solutions
Learning Outcome: 1.C. Analyze respiratory acidosis as it relates to acid-base balance. Summarize diagnostic tests and therapies used by interprofessional teams in the collaborative care of an individual with respiratory acidosis.
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11) A client being treated for an overdose is in acute respiratory acidosis. Which substance found on the toxicology analysis is most likely the cause for the client's current condition?
A) Cocaine
B) Marijuana
C) Oxycodone
D) PCP
Answer: C
Explanation: A) Cocaine is a stimulant.
B) Marijuana does not depress the central nervous system or respiratory center.
C) Oxycodone is an opiate narcotic. Excessive use or overdose of narcotic substances can lead to respiratory depression and respiratory acidosis.
D) PCP is a hallucinogenic agent.
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 Domains and Competencies: 2.4 Diagnose actual or potential health problems and needs. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment | CJMM: Analyze Cues
Learning Outcome: 1.C. 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 assess in this client?
A) Warm, flushed skin
B) Daytime sleepiness
C) Irritability
D) Blurred vision
Answer: B
Explanation: A) The client with acute respiratory acidosis may demonstrate warm, flushed skin.
B) The manifestations of acute and chronic respiratory acidosis differ. The client with chronic respiratory acidosis will demonstrate daytime sleepiness.
C) The client with acute respiratory acidosis may demonstrate irritability.
D) The client with acute respiratory acidosis may demonstrate blurred vision from the acute decline in oxygenation.
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 Domains and Competencies: 2.4 Diagnose actual or potential health problems and needs. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment | CJMM: Recognize Cues
Learning Outcome: 1.C. 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.

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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) Alcohol is a central nervous system depressant, which can adversely affect respiratory status and lead to the development of respiratory acidosis.
B) The ingestion of bananas and oranges will not promote the development of respiratory acidosis.
C) 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.
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. | AACN Domains and Competencies: 2.7 Evaluate outcomes of care. | NLN Competencies: Relationship Centered Care: Effective communication. | Nursing Process: Evaluation | CJMM: Evaluate Outcomes
Learning Outcome: 1.C. Analyze respiratory acidosis as it relates to acid-base balance. Provide culturally responsive 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.

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14) The nurse is caring for an older adult client with respiratory acidosis. Which intervention should the nurse include in the 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) 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.
B) Sodium bicarbonate is indicated in the treatment of metabolic acidosis.
C) In respiratory acidosis, there is 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.
D) Reducing environmental stimuli would be appropriate for the client with respiratory alkalosis.
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. | AACN Domains and Competencies: 2.5 Develop a plan of care. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Planning | CJMM: Generate Solutions
Learning Outcome: 1.C. Analyze respiratory acidosis as it relates to acid-base balance. Provide culturally responsive 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) The nurse is caring for a client with acute respiratory acidosis. Which neurologic and cardiovascular change would the nurse anticipate from this disorder?
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.
B) Carbon dioxide narcosis occurs in chronic respiratory acidosis.
C) Hypoventilation causes respiratory acidosis; it doesn't result from respiratory acidosis.
D) Hyperventilation is related to respiratory alkalosis, not respiratory acidosis.
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 Domains and Competencies: 2.3 Integrate assessment skills in practice. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment | CJMM: Recognize Cues
Learning Outcome: 1.C. 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.

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16) A client is diagnosed with chronic respiratory acidosis. For which reason would the nurse carefully titrate the client's oxygen flow?
A) Decreased pulse rate
B) Hyperventilation
C) Respiratory depression
D) Neurotransmitter disturbances
Answer: C
Explanation: A) The pulse rate is elevated in acute respiratory acidosis, not decreased. Oxygen will not affect the pulse rate.
B) Respiratory acidosis is caused by hypoventilation, not hyperventilation.
C) Clients with chronic respiratory acidosis can tolerate $PaCO_2$ levels that are much higher than normal. In the presence of hypercapnia, oxygen can function as a respiratory depressant when the respiratory center is no longer stimulated by the lower pH and higher $PaCO_2$.
D) Neurotransmitter disturbances are unrelated to respiratory acidosis.
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 Domains and Competencies: 2.5 Develop a plan of care. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Planning | CJMM: Generate Solutions
Learning Outcome: 1.C. 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.

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Exemplar 1.D Respiratory Alkalosis

1) A client in severe pain is diagnosed with respiratory alkalosis. Which arterial blood gas value does the nurse anticipate to support this diagnosis?
A) pH is 7.33 and $PaCO_2$ is 36.

B) pH is 7.51 and HCO_3 is 30.

C) pH is 7.47 and $PaCO_2$ is 25.

D) pH is 7.35 and PaO_2 is 88.

Answer: C
Explanation: A) The pH for alkalosis and would be higher than 7.45.
B) HCO_3 would trend downward as the kidneys begin to compensate for the alkalosis by excreting HC O_3.

C) Acute pain usually causes hyperventilation, which causes the $PaCO_2$ to drop and the client to experience respiratory alkalosis. The pH would be higher than 7.45.
D) The pH would be higher than 7.45.
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 Domains and Competencies: 2.3 Integrate assessment skills in practice. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment | CJMM: Recognize Cues
Learning Outcome: 1.D. 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.

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2) A client seeks medical attention for symptoms of a panic attack, including hyperventilation. For which health problem will the nurse plan care for the client?
A) Hypoventilation
B) Vomiting
C) Respiratory alkalosis
D) Memory loss
Answer: C
Explanation: A) Anxiety and panic attacks will lead to hyperventilation, not hypoventilation.
B) The client with anxiety does not necessarily have vomiting as a risk factor.
C) Anxiety disorders increase the risk for the acid-base imbalance respiratory alkalosis, due to hyperventilation that accompanies anxiety and panic attacks.
D) The client with anxiety does not necessarily have memory loss.
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 Domains and Competencies: 2.5 Develop a plan of care. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Planning | CJMM: Prioritize Hypothesis
Learning Outcome: 1.C. 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 caring for an older adult who is hyperventilating. Which statement will the nurse make when helping the client slow the breathing?
A) "What are you afraid of?"
B) "Slow down your breathing."
C) "Why are you breathing so fast?"
D) "Watch me and we can breathe together."
Answer: D
Explanation: A) Statements should be used instead of asking direct questions.
B) Telling the client to slow breathing without demonstrating it will not be effective.
C) The client may not know why the breathing is rapid.
D) Clients who are hyperventilating will be frightened and anxious. Helping them to slow down their breathing will help to resolve respiratory alkalosis. Use a calm voice and exhibit an even demeanor. Reassure clients that helping them to breathe more slowly will make them feel better. Since communication may be difficult, use statements such as "watch me and we can breathe together."
Cognitive Level: Applying
Client Need/Sub: Psychosocial Integrity
Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care. | AACN Domains and Competencies: 2.8 Promote self-care management | NLN Competencies: Relationship Centered Care: Effective communication. | Nursing Process: Implementation | CJMM: Take Action
Learning Outcome: 1.D. Analyze respiratory alkalosis as it relates to acid-base balance. Provide culturally responsive care to an individual with respiratory alkalosis.
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4) A client is diagnosed with a salicylate overdose. Which problem will the nurse prioritize for this client?
A) Ineffective breathing pattern
B) Powerlessness
C) Potential 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.
B) There is not enough evidence to determine if powerlessness is a priority for this client.
C) Potential for injury might be an issue if breathing is not addressed.
D) There is not enough information to know whether the client's mobility is impaired.
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. | AACN Domains and Competencies: 2.4 Diagnose actual or potential health problems and needs. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Planning | CJMM: Generate Solutions
Learning Outcome: 1.D. Analyze respiratory alkalosis as it relates to acid-base balance. Provide culturally responsive 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) A client with an anxiety disorder is being discharged. Which teaching will the nurse prepare for this client? **Select all that apply.**
A) Refer for counseling
B) Instruct to eat foods high in acid
C) Teach the signs of impending panic attack
D) Advise to breathe into a paper bag when feeling anxious
E) Instruct to breathe slowly
Answer: A, C, E
Explanation: A) The client with an anxiety disorder should be referred to counseling to assist with management of the disorder.
B) Eating foods high in acid will not counteract the results of hyperventilation.
C) The client with an anxiety disorder should be instructed on the signs of an impending panic attack.
D) 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.
Cognitive Level: Applying
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 Domains and Competencies: 2.8 Promote self-care management. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Planning | CJMM: Take Action
Learning Outcome: 1.D. Analyze respiratory alkalosis as it relates to acid-base balance. Provide culturally responsive care to an individual with respiratory alkalosis.
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6) The nurse instructs a client with an anxiety disorder. Which client statement indicates that 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.
B) Breathing faster will increase hyperventilation.
C) Eating bananas is more appropriate for the client at risk for metabolic alkalosis who is on diuretics.
D) Taking too many antacids is associated with metabolic alkalosis.
Cognitive Level: Analyzing
Client Need/Sub: Psychosocial Integrity
Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care. | AACN Domains and Competencies: 2.7 Evaluate outcomes of care. | NLN Competencies: Relationship Centered Care: Effective communication. | Nursing Process: Evaluation | CJMM: Evaluate Outcomes
Learning Outcome: 1.D. Analyze respiratory alkalosis as it relates to acid-base balance. Provide culturally responsive care to an individual with respiratory alkalosis.
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7) A client is diagnosed with respiratory alkalosis. Which prescriptions would the nurse anticipate for this client? **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.
B) A fluid restriction is not required in the treatment of respiratory alkalosis.
C) It is important to create a calm, quiet, low-stimulation environment to reduce the client's anxiety or panic.
D) Sodium bicarbonate is used in the treatment of respiratory and metabolic acidosis.
E) Arterial blood gases must be ordered prior to beginning medication or oxygen therapy.
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. | AACN Domains and Competencies: 2.6 Demonstrate accountability for care delivery. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Planning | CJMM: Generate Solutions
Learning Outcome: 1.D. Analyze respiratory alkalosis as it relates to acid-base balance. Summarize diagnostic tests and therapies used by interprofessional 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.

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8) A client with a history of anxiety is experiencing chest pain, palpitations, and dyspnea. Which intervention would be a priority for this client?
A) Providing educational material for the medical diagnosis
B) Ordering a regular diet
C) Reassuring that symptoms will resolve
D) Asking Respiratory Therapy to set up a mechanical ventilator
Answer: C
Explanation: A) Providing teaching for the client becomes a priority when the client is recovering from the illness.
B) Ordering the diet is done by the healthcare provider.
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.
D) Instructing the respiratory therapist is done by the healthcare provider.
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 Domains and Competencies: 2.2 Communicate effectively with individuals. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation | CJMM: Take Action
Learning Outcome: 1.D. Analyze respiratory alkalosis as it relates to acid-base balance. Provide culturally responsive care to an individual with respiratory alkalosis.
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9) A client with metabolic alkalosis is experiencing numbness around the mouth and tingling of the fingers. Which information will the nurse provide 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) Rapid breathing is not reducing the amount of oxygen reaching the nerve endings.
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.
C) Excessive carbon dioxide would lead to acidosis.
D) Respiratory alkalosis is not caused by an imbalance of serum potassium.
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 Domains and Competencies: 2.2 Communicate effectively with individuals. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation | CJMM: Take Action
Learning Outcome: 1.D. Analyze respiratory alkalosis as it relates to acid-base balance. Identify the clinical manifestations of respiratory alkalosis.
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10) A client who is intubated is fighting the ventilator and attempting to pull out the endotracheal tube. Which action will the nurse take 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.
B) Applying wrist restraints to a client who is demonstrating anxiety with an endotracheal tube might increase the client's anxiety.
C) 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.
D) The reason for the endotracheal tube is to maintain the client's airway. Removing the tube could lead to a collapse of the airway and a life-threatening situation.
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 Domains and Competencies: 2.6 Demonstrate accountability for care delivery. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation | CJMM: Take Action
Learning Outcome: 1.D. Analyze respiratory alkalosis as it relates to acid-base balance. Summarize diagnostic tests and therapies used by interprofessional teams in the collaborative care of an individual with respiratory alkalosis.
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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.
B) Ability to sleep through the night would indicate a reduction in anxiety, which is a risk factor for the development of respiratory alkalosis.
C) Appropriate outcomes for the care of a client with respiratory alkalosis include no episodes of injuries.
D) Appropriate outcomes for the care of a client with respiratory alkalosis include maintenance of fluid balance.
E) Bronchodilators are not used to treat this acid-base imbalance.
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. | AACN Domains and Competencies: 2.7 Evaluate outcomes of care. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Evaluation | CJMM: Evaluate Outcomes
Learning Outcome: 1.D. Analyze respiratory alkalosis as it relates to acid-base balance. Provide culturally responsive care to an individual with respiratory alkalosis.
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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. Which action will the nurse complete 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) Once the environment is controlled, the nurse can begin to implement interventions to help the client slow the breathing rate.
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.
C) A sedative may be prescribed; however, this would not be the first intervention.
D) 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.
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 Domains and Competencies: 2.6 Demonstrate accountability for care delivery. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation | CJMM: Take Action
Learning Outcome: 1.D. Analyze respiratory alkalosis as it relates to acid-base balance. Provide culturally responsive care to an individual with respiratory alkalosis.
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13) A client hyperventilates after learning that a breast biopsy was positive for cancer and loses consciousness. Which action should the nurse take?
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 client does not need cardiopulmonary resuscitation.
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.
C) The physician may need to be notified; however, the client's safety is a priority.
D) The client is not critically ill, and an intravenous access device is not indicated at this time.
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 Domains and Competencies: 5.2 Contribute to a culture of patient safety. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation | CJMM: Take Action
Learning Outcome: 1.D. Analyze respiratory alkalosis as it relates to acid-base balance. Provide culturally responsive 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 nurse is preparing a teaching tool about respiratory alkalosis. Which disorder will the nurse identify that increases the risk for this acid-base imbalance?
A) Respiratory
B) Anxiety
C) Cardiovascular
D) Congenital
Answer: B
Explanation: A) Respiratory disorders are more likely to lead to respiratory acidosis.
B) Anxiety with hyperventilation is a common cause of respiratory alkalosis. Therefore, anxiety disorders increase the risk for respiratory alkalosis.
C) Cardiovascular disorders do not usually lead to respiratory alkalosis.
D) Congenital disorders do not usually lead to respiratory alkalosis.
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 Domains and Competencies: 2.2 Communicate effectively with individuals. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation | CJMM: Generate Solutions
Learning Outcome: 1.D. 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.

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15) A 2-month-old infant with pneumonia with respiratory alkalosis is believed to be experiencing paresthesias of the hands and feet, because the infant pulls away and cries when the extremities are touched. Which technique will the nurse recommend to address the paresthesias?
A) Postural drainage
B) Massage
C) Breastfeeding
D) Swaddling
Answer: D
Explanation: A) Postural drainage techniques are used to clear the airway, not comfort the infant.
B) Massage techniques will likely cause additional discomfort for the infant; calming touch is needed instead.
C) A mother of a 2-month-old infant likely already understands breastfeeding techniques.
D) Comfort measures that may be successful for infants experiencing paresthesias include swaddling, calming touch, and speaking with a quiet voice.
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 Domains and Competencies: 2.8 Promote self-care management. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation | CJMM: Take Action
Learning Outcome: 1.D. Analyze respiratory alkalosis as it relates to acid-base balance. Differentiate care of patients 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.

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