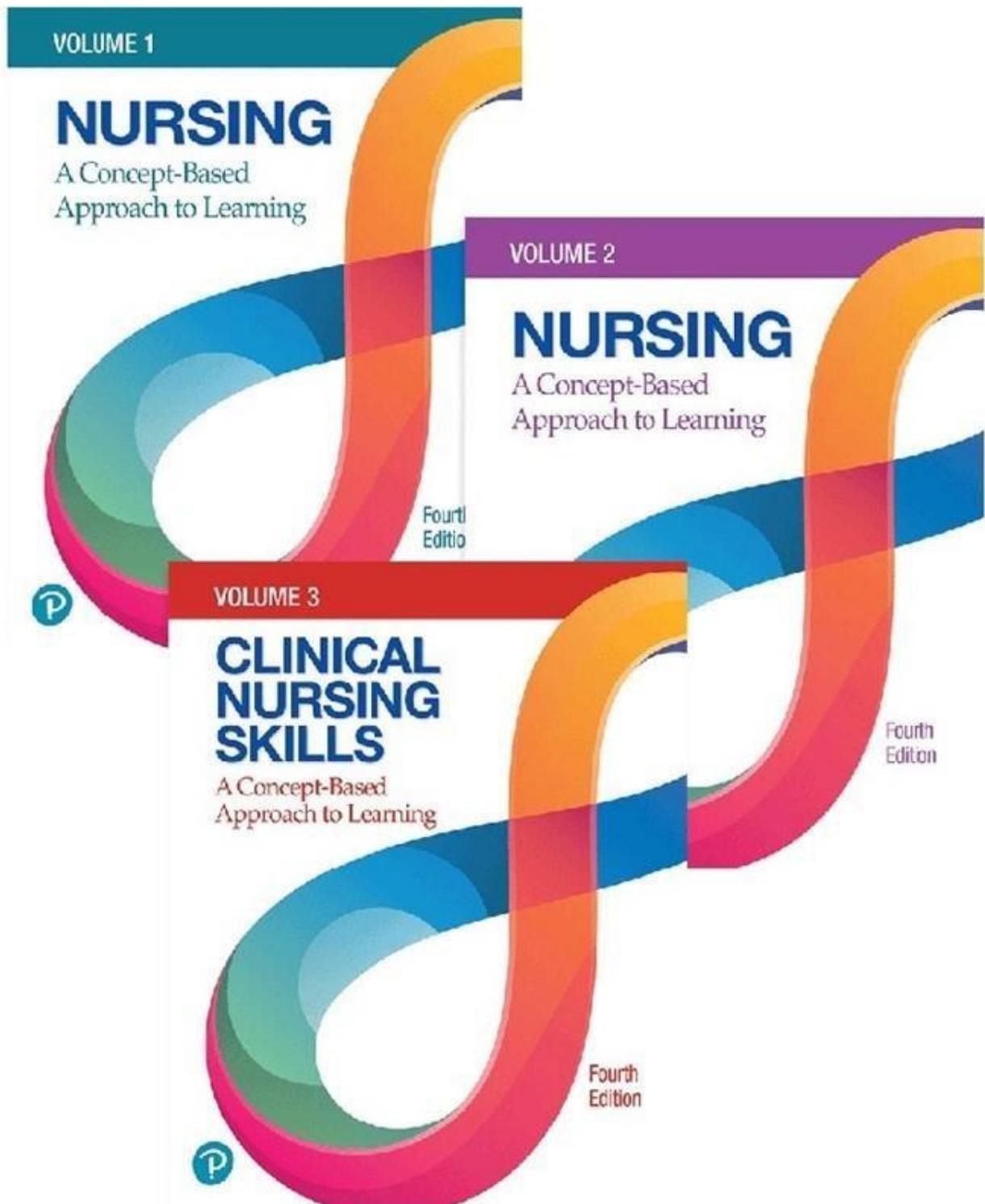


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Nursing A Concept-Based Approach to Learning, Volume I, II & III 4th Edition



Nursing: A Concept-Based Approach to Learning Vol. 1 & 2, 4e (Pearson)

Module 1 Acid-Base Balance

The Concept of Acid-Base Balance

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?

Metabolic acidosis

Respiratory alkalosis

Metabolic alkalosis

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.

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

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Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN 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

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.

The nurse is caring for a client in the emergency department. Which factors will the nurse identify that increase the client's risk for metabolic acidosis? **Select all that apply.**

Abdominal fistulas

Chronic obstructive pulmonary disease

Pneumonia

Chronic renal failure

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.

Chronic obstructive pulmonary disease places the client at risk for respiratory acidosis with the increased retention of carbon dioxide in the blood.

Pneumonia places the client at risk for respiratory acidosis with the increased retention of carbon dioxide in the blood.

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.

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.

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Cognitive Level: Applying

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN 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

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.

A client with acute asthma has a PaCO₂ of 48 mmHg, a pH of 7.31, and a normal HCO₃ arterial blood gas value. Which condition will the nurse associate with these values?

Metabolic acidosis

Respiratory alkalosis

Respiratory acidosis

Metabolic alkalosis

Answer: C

Explanation: A) Uncompensated metabolic acidosis has a decreased pH, normal PaCO₂, and decreased HCO₃.

Uncompensated respiratory alkalosis has an increased pH, decreased PaCO₂, and normal HCO₃.

If the pH is decreased and the PaCO₂ is increased with a normal HCO₃, it is uncompensated respiratory acidosis.

Uncompensated metabolic alkalosis has an increased pH, normal PaCO₂, and increased HCO₃.

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Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Domains and Essential 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
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.

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?

pH 7.32

PaCO₂ 18 mmHg

HCO₃ 8 mEq/L

PaCO₂ 48 mmHg

Answer: D

Explanation: A) A normal pH level is 7.35-7.45. A pH of less than 7.35 is acidosis.

A PaCO₂ level of 18 mmHg is low and is seen in respiratory alkalosis.

A HCO₃ level of 8 mEq/L is low and is most likely associated with metabolic acidosis.

In metabolic alkalosis, there is an excess of bicarbonate. To compensate for this imbalance, the rate and depth of respirations decrease, leading to retention of carbon dioxide. The PaCO₂ will be elevated.

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Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Domains and Essential 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

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.

A client is diagnosed with chronic obstructive pulmonary disease. Which test provides the most accurate indicator of the client's acid-base balance?

Arterial blood gases (ABGs)

Pulse oximetry

Sputum studies

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.

Pulse oximetry is a noninvasive test that evaluates the oxygen saturation level of blood.

Sputum studies can provide specific information about bacterial organisms.

A bronchoscopy provides visualization of internal respiratory structures.

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Cognitive Level: Applying

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

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN 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

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.

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?

"I should contact the doctor if I have any gastric discomfort with chest pain."

"I need to purchase antacids without salt."

"I should use the antacid for at least 2 months."

"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.

The client should be instructed to use non-sodium antacids to prevent the absorption of excess sodium or bicarbonate into systemic circulation.

The client should be instructed to not use any bicarbonate antacid for longer than 2 weeks.

The client should be instructed to immediately contact the primary healthcare provider if dyspnea or diaphoresis occurs.

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Cognitive Level: Analyzing

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

Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care: patient/family/community preferences, values; coordination and integration of care; information, communication, and education; physical comfort and emotional support; involvement of family and friends; Transition and continuity. | AACN 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

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

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

A client is receiving sodium bicarbonate intravenously (IV) for correction of acidosis secondary to diabetic coma. The nurse assesses the client to be lethargic, confused, and breathing rapidly. Which action will the nurse take?

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

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

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

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.

The client receiving sodium bicarbonate is prone to alkalosis; monitor for cyanosis, slow respirations, and irregular pulse.

The client continues to exhibit signs of acidosis; symptoms of acidosis include lethargy, confusion, CNS depression leading to coma, and a deep, rapid respiration rate that indicates an attempt by the lungs to rid the body of excess acid, and the physician should be notified.

The infusion should not be increased or decreased without a practitioner order.

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Cognitive Level: Analyzing

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

Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care: Patient/family/community preferences, values; Coordination and integration of care; Information, communication, and education; Physical comfort and emotional support; Involvement of family and friends; Transition and continuity. | AACN 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

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

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

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?

Look at the PaCO₂.

Look at the pH.

Evaluate the relationship between pH and PaCO₂.

Look at the bicarbonate in relation to the pH.

Answer: 2, 1, 3, 4

Explanation: 1. The second step is to look at the PaCO₂. If the PaCO₂ is <40, then more carbon dioxide is being exhaled. If the PaCO₂ is >40, then more carbon dioxide is being retained.

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.

The third step is to evaluate the relationship between the pH and the PaCO₂. 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.

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.

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Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Physiological Adaptation

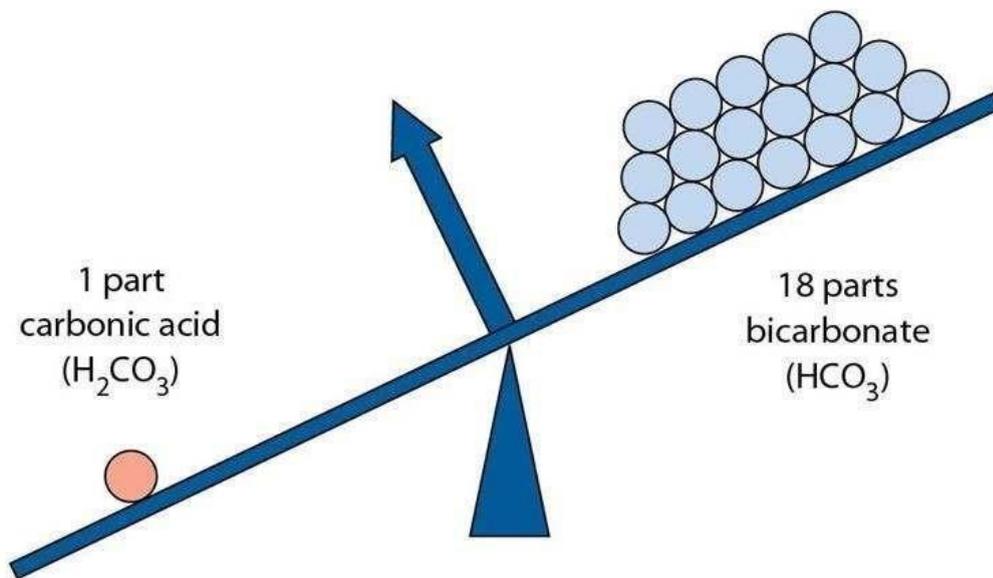
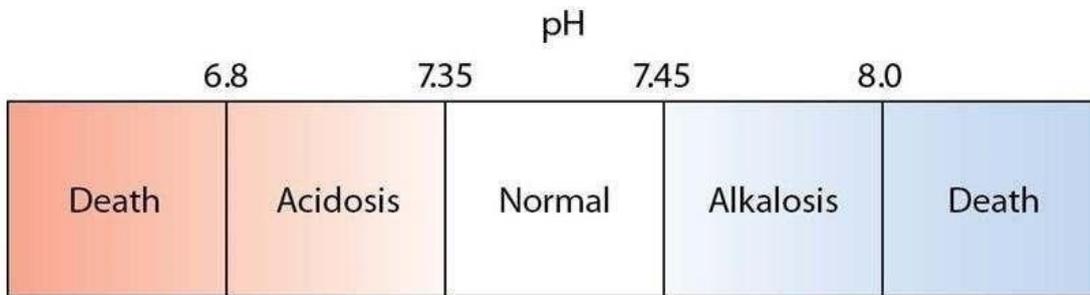
Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Domains and Competencies: 2.3 Integrate assessment skills in practice. |

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

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.

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



- Metabolic acidosis
- Metabolic alkalosis
- Respiratory acidosis
- Respiratory alkalosis

Answer: A

Explanation: A) In metabolic acidosis, the amount of bicarbonate decreases in relation to the amount of acid in the body.

In metabolic alkalosis, there is an excess of bicarbonate in relation to the amount of hydrogen ions.

Respiratory acidosis occurs when carbon dioxide is retained, increasing the amount of carbonic acid in the body.

Respiratory alkalosis can occur when too much carbon dioxide is lost and carbonic acid levels fall.

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Cognitive Level: Understanding

Client Need/Sub: Physiological Integrity: Physiological Adaptation