Interpreting Arterial Blood Gas and the Role of Nurses in Caring for Patients with Abnormal Arterial Blood Gas

การแปลผลการตรวจก๊าซในเลือดแดง และบทบาทพยาบาลในการดูแลผู้ป่วยที่มีความผิดปกติของค่าก๊าซในเลือดแดง

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Abstract

Abnormalities in the body's acid-base balance can lead to critical complications. In certain cases, the irregularity is so severe that it poses a life-threatening risk to the patient. Nurses must be able to do arterial blood gas (ABG) analysis. The objectives of this article are to: 1) present the physiological basis for arterial blood gas evaluation; 2) present a systematic 5-step blood gas analysis method; and 3) present the role of nurses in caring for patients with abnormal arterial blood gas values. The steps in evaluating and analyzing arterial blood gases consist of determining: 1) the partial pressure of O_2 in arterial blood; 2) the concentration of hydrogen ions; 3) the respiratory and metabolic components; 4) whether the respiratory or metabolic value is consistent with the pH value; and 5) whether compensation is present. Three case scenarios are also provided to assist the reader in practicing ABG interpretation. The ability to reliably assess ABGs enables nurses to assist in restoring a patient's acid-base balance.

Keywords: Arterial blood gas; Interpretation of arterial blood gas; Acid–base balance; Role of nurses

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บทคัดย่อ

ความผิดปกติของสมดุลกรด-ด่างในร่างกาย สามารถนำไปสู่ภาวะแทรกซ้อนที่เป็นอันตรายได้ และบางครั้งความผิดปกติอาจรุนแรงจนกลายเป็นภาวะเสี่ยงที่เป็นอันตรายต่อชีวิตของผู้ป่วยได้ พยาบาลวิชาชีพ ควรมีความสามารถในการวิเคราะห์ก๊าซในเลือดแดงได้ บทความนี้มีวัตถุประสงค์เพื่อ 1) นำเสนอพื้นฐานทางสรีรวิทยาสำหรับการประเมินก๊าซในเลือดแดง 2) นำเสนอแนวทางการวิเคราะห์ก๊าซในเลือดอย่างเป็นระบบ 5 ขั้นตอน 3) นำเสนอบทบาทของพยาบาลในการดูแลผู้ป่วยที่มีความผิดปกติของค่าก๊าซในเลือดแดง โดยขั้นตอนในการประเมินและวิเคราะห์ก๊าซในเลือดแดง ประกอบด้วย 1) ออกซิเจนในเลือดแดง 2) ความเป็นกรดหรือด่างในเลือดแดง 3) ความผิดปกติของระบบทางเดินหายใจและกระบวนการเผาผลาญ 4) ค่าความผิดปกติที่สอดคล้องกับค่า pH และ 5) กลไกการปรับชดเชย นอกจากนี้ มีการนำเสนอสถานการณ์จำลอง 3 สถานการณ์ เพื่อให้ผู้อ่านได้ฝึกการประเมินก๊าซในเลือดแดง ความสามารถในการประเมินก๊าซในเลือดแดงได้อย่างแม่นยำจะช่วยให้พยาบาลสามารถให้การพยาบาลเพื่อฟื้นฟูสมดุลกรดด่างของผู้ป่วยได้อย่างเหมาะสม

คำสำคัญ: ก๊าซในเลือดแดง การแปลผลตรวจก๊าซในเลือดแดง สมดุลกรด-ด่าง บทบาทพยาบาล

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Introduction

Acid-base balance disturbance occurs when the concentration of hydrogen ions (H+) or bicarbonate ions (HCO^-_3) changes (Quade et al., 2021). This leads to changes in the acidity or alkalinity of arterial blood and affects a variety of body systems (Wagner et al., 2019). It can be severe enough to be life-threatening (Achanti & Szerlip, 2023; Hamid & Abed, 2022). To analyze and interpret ABG samples, health professionals must comprehend each component that is investigated and how it maintains the patient's normal physiological function to properly interpret ABG results (Ibrahem et al., 2021). The results of an arterial blood gas test indicate the patient's acid-base balance, which is determined by the blood's hydrogen ion (H^+) concentration, oxygen saturation (SaO_2), partial pressure of oxygen (PaO_2), partial pressure of carbon dioxide ($PaCO_2$), bicarbonate (HCO^-_3) concentration, base excess (BE), and base deficit (Chandran et al., 2021; Yee et al., 2022).

It is imperative that healthcare professionals understand how to read ABGs and what treatments could help achieve complete homeostasis restoration (Brabrand, 2022; Ibrahem et al., 2021). An ABG test's results can reveal a wealth of information about physiological status (Duska, 2023). Arterial blood gases, in addition to pH, provide information about how well a patient is breathing and oxygenating, as well as the main cause of any disruptions to homeostasis, such as respiratory or metabolic issues (Viterbo et al., 2023). ABG findings can also show how well the patient's body is adjusting to the acid-base disruption and whether the patient has enough blood in general to carry all the nutrients needed by the body's tissues (Thangaraj et al., 2021).

Basic components of Arterial Blood Gas

Assessment of patient condition using ABG test results consists of important basic information as follows: 1) oxygen saturation (SaO_2), 2) partial pressure of oxygen (PaO_2), 3) concentration present in the blood (pH), 4) partial pressure of carbon dioxide ($PaCO_2$), and 5) bicarbonate (HCO^-_3) (Pandit & Pundpal, 2020; Wilcox et al., 2022). The normal values of arterial blood gases in adults are shown in **Table 1**

Table 1: Components of arterial blood gas test results

Measurement	Meaning	Normal Range	Critical Values
pH	Concentration of hydrogen ions (H+) in blood	7.35 to 7.45	< 7.35 = acidosis > 7.35 = alkalosis
SaO_2	Percent saturation of oxygen (O_2) in hemoglobin	80% to 100%	

Table 1: Components of arterial blood gas test results (Continue)

Measurement	Meaning	Normal Range	Critical Values
PaO_2	Partial pressure of O_2 in arterial blood	80 mm Hg to 100 mm Hg	61-80 mm Hg = mild hypoxemia 41-60 mm Hg = moderate hypoxemia < 40 mm Hg = Severe hypoxemia
$PaCO_2$	Partial pressure of carbon dioxide (CO_2) in arterial blood	35 mm Hg to 45 mm Hg	< 35 mm Hg = alkalosis > 45 mm Hg = acidosis
HCO^-_3	Concentration of bicarbonate in blood	22 mEq/L to 26 mEq/L	< 22 mEq/L = acidosis > 22 mEq/L = alkalosis
Base excess/base deficit	Excess or deficit of bicarbonate in blood	-2 mEq/L to +2 mEq/L	

Abnormalities of Arterial Blood Gas

1. Respiratory acidosis refers to a condition in which there is a buildup of carbon dioxide in the blood caused by a decrease in the patient's breathing (hypoventilation). Patients with respiratory acidosis have a low pH of less than 7.35, a high $PaCO_2$ of more than 45, and normal BE. (Tinawi, 2021). Patients will have signs and symptoms when $PaCO_2$ is high, namely fatigue, dizziness, depression, and unconsciousness. The body will adjust balance through the buffer system, which will accumulate HCO^-_3 in the blood. Later, the kidneys will reserve HCO^-_3 to store as an alkaline reserve (Mittal et al., 2021).

2. Respiratory alkalosis refers to a condition of low carbon dioxide in the blood caused by increased breathing or ventilation (hyperventilation). A patient will find a high pH value > 7.45, a low $PaCO_2$ < 35, and a normal BE. The body will adjust balance by having the buffer system bring HCO^-_3 from the blood into the cells, causing the amount of HCO^-_3 in the blood to decrease. Later, the kidneys will excrete it. HCO^-_3 is released through the urine (Mittal et al., 2021).

3. Metabolic acidosis is a condition in which there is low bicarbonate in the blood due to abnormal metabolic processes. Low pH of less than 7.35, low HCO^-_3 of less than 22, and low BE will be found from bicarbonate loss due to diarrhea or DKA with ketoacidosis from the process of fat breakdown in the liver (lipolysis) (Muneer & Akbar, 2021). Patients will have symptoms including deep breathing and regular sighing (Kussmaul breathing), a red face, and a wide pulse pressure. The body will adjust balance by using the buffer system to store HCO^-_3 in the blood, causing the amount of HCO^-_3 in the blood to increase. This can help reduce acidity. Later, the body will adjust its balance by expelling carbon dioxide through the breath with faster breathing

(Calimag et al., 2023).

4. Metabolic alkalosis refers to a condition in which there is increased bicarbonate in the blood or acid loss from abnormal metabolic processes. High pH > 7.45, high HCO^-_3 > 26, and high BE will be found from loss of acid due to vomiting or utilization of a gastric tube for too long. Providing diuretics, the body will adjust its balance by using the buffer system to drive HCO^-_3 out of the blood, causing HCO^-_3 amounts in the blood to decrease, helping increase acidity. Later, the body will adjust its balance by excreting HCO^-_3 through the kidneys (Do et al., 2022; Emmett, 2020).

Maintaining acid–base balance

The acid-base balance is controlled by three systems: the kidneys (metabolic), the lungs (respiratory), and the buffer system (metabolic) (Byrne & Laske, 2022). One of the body's buffers, bicarbonate (HCO3), is regulated by the renal system and carbon dioxide (CO2) by the lungs. Thus, in an effort to make up for any deviations, the respiratory and metabolic systems cooperate to maintain a precise balance (Hopkins et al., 2022).

Buffer systems

The respiratory and renal systems are the two buffer systems in the body that work together to keep the pH level within a certain range. The procedure for interpreting the ABG (Quade et al., 2021; Wagner et al., 2019) is as follows.

1) Respiratory buffer

Carbon dioxide is a typical byproduct of biological metabolism. The blood transports extra CO_2 to the lungs, where it reacts with water to generate carbonic acid (Messina & Patrick, 2022). The blood's pH will fluctuate based on the concentration of carbonic acid. The pH level will drop (become more acidic) when there is more carbonic acid in the blood. The lungs will adjust by increasing or decreasing the depth and rate of breathing until equilibrium is reached again. This process takes 1-3 minutes in a healthy person (Pippalapalli & Lumb, 2023).

If there is too little bicarbonate (HCO^-_3 less than 22), this means that the blood is acidic due to an abnormal metabolic process (metabolic acidosis). The lungs help excrete carbonic acid which leaves the body in the form of carbon dioxide through exhaled breath. The patient will breathe faster to expel carbon dioxide by breathing. Conversely, if there is too much bicarbonate (HCO^-_3 greater than 26), the blood becomes alkaline due to metabolic alkalosis. Consequently, the body conserves carbon dioxide by reducing respiration, causing the patient to breathe more slowly. This causes the carbon to become more oxidized (Hughes et al., 2021).

2) Renal buffer

The renal system acts as a buffer because of its ability to retain or remove bicarbonate (HCO^-_3). Although it reacts a little more slowly than the respiratory system, bicarbonate is an alkaline substance and a potent buffer (Kim, 2021). As the blood pH decreases (more acidic), the kidneys will compensate by retaining HCO^-_3 and likewise, as the blood pH increases, the kidneys excrete HCO^-_3 (Rodríguez-Villar et al., 2020).

If there is increased carbon dioxide in the blood ($PaCO_2$ greater than 45), it means that the blood is acidic from the respiratory system (respiratory acidosis) (Ibrahem et al., 2021). The kidneys will reabsorb bicarbonate (HCO^-_3) to store as alkaline reserves. Conversely, if there is a decrease in carbon dioxide in the blood ($PaCO_2$ less than 35), it means that the blood is alkaline from abnormal breathing (respiratory alkalosis). The kidneys will excrete bicarbonate (HCO^-_3) through the urine (Kim, 2021).

ABG analysis and interpretation steps

This article presents the interpretation of arterial blood gas values in five steps: 1) evaluating the partial pressure of O_2 in arterial blood; 2) evaluating the concentration of hydrogen ions (H+) in blood; 3) evaluating the respiratory and metabolic components; 4) determining whether the respiratory value or metabolic value is consistent with the pH value; and 5) determining whether compensation is present (Rodríguez-Villar et al., 2020; Wongprakornkul, 2022) **(see Table 2).**

Table 2: Steps of ABG analysis and interpretation

Step 1: Analyze PaO_2 To assess whether your patient has hypoxemia or not. (If PaO_2 61-80 = mild hypoxemia, PaO_2 41-60 = moderate hypoxemia, PaO_2 < 40 = severe hypoxemia) To make matters worse, when PaO_2 is less than 50, your patient may develop hypoxia and cyanosis.
Step 2: Analyze pH value Does the pH indicate acidosis or alkalosis? (pH < 7.35 = acidosis, pH > 7.45 = alkalosis) If pH value is normal range, you need to indicate that it approaches acidosis or alkalosis, using 7.40 as absolute normal. (pH 7.35–7.40 = normal acidosis, pH 7.41–7.45 = normal alkalosis)
Step 3: Analyze the respiratory/metabolic status or condition as appropriate Evaluate $PaCO_2$ and HCO_3^- to see if the patient is acidotic or alkalotic.
Step 4: If the pH is abnormal, determine whether the respiratory value ($PaCO_2$) or metabolic value (HCO_3^-) is consistent with the pH value If $PaCO_2$ < 35 mmHg (base) and pH > 7.45 (base) = Respiratory alkalosis If $PaCO_2$ > 45 mmHg (acid) and pH < 7.35 (acid) = Respiratory acidosis If HCO_3^- < 22 mEq/liter (acid) and pH < 7.35 (acid) = Metabolic acidosis if HCO_3^- > 26 mEq/liter (base) and pH > 7.35 (base) = Metabolic alkalosis

Table 2: Steps of ABG analysis and interpretation (Continue)

Step 5: Determine the compensation is present
No compensation, Uncompensation = the ABG value that is not consistent with the acid-base status of pH is normal
Partial compensation = the ABG value that is not consistent with the acid-base status of the pH and the pH itself are above or below normal
Complete compensation, full compensation = the ABG value that is not consistent with the acid-base status of the pH is above or below normal, but the pH is normal
* Note that a pH between 7.35 and 7.40 is considered normal acidic; and a pH between 7.41 and 7.45 is considered normal alkalotic. Therefore, acidosis is the main imbalance if the pH is less than 7.40. If the pH is higher than 7.40, primary alkalosis is present. Abnormal $PaCO_2$ and HCO_3^- parameters indicate the adjustment, which involves respiratory and metabolic processes going in the opposite direction.

Putting steps into practice based on a scenario

A scenario constitutes the situation of a real patient, and this will allow those who practice interpreting ABG results to understand the steps more clearly. The purpose of this scenario is to allow trainees to interpret ABG results following the steps mentioned above. The following outlines the five-step approach to interpreting your patient's ABGs. 1) Is the patient hypoxemic? Look at the PaO_2; 2) What is the acid-base balance? Check the pH; 3) How is pulmonary ventilation? Look at the $PaCO_2$; 4) What is the metabolic status? Review the HCO_3^-; and 5) Is there any compensation or other abnormality? What is the primary cause of acid-base imbalance, and which derangement is the result of secondary (compensatory) change? After that, we must match the PaO_2 and HCO_3^- parameters with the pH. Using the above five-step approach, we can easily interpret ABGs in a systematic and logical way without confusion.

Scenario 1 A patient arrives at the emergency department of a hospital with symptoms of lethargy and unconsciousness 30 minutes previously. The patient has a pH of 7.20, $PaCO_2$ of 60 mmHg, PaO_2 of 48 mm Hg, and HCO_3^- of 24 mEq/L.

In step 1, the PaO_2 is determined which, in this scenario, represents moderate hypoxemia.

In step 2, the pH level is examined and is below the low end of normal (i. e., 7.20), indicating acidosis.

In step 3, the $PaCO_2$ and HCO_3^- levels are evaluated. In this case, the $PaCO_2$ value is higher than the baseline, indicating acidosis, and the HCO_3^- is normal.

In step 4, the value consistent with the pH results is evaluated which, in this scenario, is $PaCO_2$, indicating a respiratory cause. **(see Figure 1)**

PH 7.20	$PaCO_2$ 60	HCO_3^- 24	PaO_2 48
acidosis	respiratory acidosis	normal	moderate hypoxemia

Interpretation: respiratory acidosis, uncompensated, moderate hypoxemia

Figure 1: Example value consistent with the pH results, respiratory acidosis, uncompensated, moderate hypoxemia

In step 5, evaluation is done of the evidence for compensation by searching for a value that is not consistent with the pH. In this scenario, this would be HCO_3^-, which is within the normal range, indicating that there is no compensation occurring. After this analysis, the healthcare professional determines that this patient is in respiratory acidosis with no compensation. This can explain the patient's lethargy and unconsciousness, which causes the patient to breathe more slowly (hypoventilation), in turn, causing carbon dioxide to build up in the blood stream (hypercapnia). This disorder is caused by the respiratory system, resulting in ABG being respiratory acidosis. Normally, if the renal system is to be balanced, a lot of HCO_3^- must be stored in the blood. To help reduce acidity, the HCO_3^- value must be high. But in this case, the HCO_3^- value was normal, indicating that it did not help adjust the acid-base balance.

Scenario 2 A 20-year-old man is brought to the emergency department with abdominal pain, nausea, and vomiting with increasing polyuria, polydipsia, and drowsiness since the previous day. He was diagnosed with type 1 diabetes two years prior. He mentions that he ran out of insulin two days ago. Upon a mental status examination, he presents drowsiness. Physical examination reveals Kussmaul breathing (deep and rapid respiration due to ketoacidosis) with an acetone odor and mild generalized abdominal tenderness without guarding and rebound tenderness. The patient has a pH of 7.30, $PaCO_2$ of 26 mmHg, PaO_2 of 76 mm Hg, and HCO_3^- of 12 mEq/L.

In step 1, the PaO_2 is determined, which in this scenario, represents mild hypoxemia.

In step 2, the pH level is examined and is below the low end of normal (ie, 7.30), indicating acidosis.

In step 3, the results for respiratory or metabolic components are evaluated. In this scenario, the $PaCO_2$ indicates alkalosis and the HCO_3^- indicates acidosis, which is consistent with the pH value.

In step 4, the value consistent with the pH results is evaluated. The value that is consistent with the pH in this scenario is the HCO_3^-, indicating a metabolic cause. **(see Figure 2)**

PH 7.30	$PaCO_2$ 26	HCO_3^- 12	PaO_2 76
acidosis	respiratory alkalosis	metabolic acidosis	mild hypoxemia

Interpreting: metabolic acidosis, partial compensation, mild hypoxemia

Figure 2: Example value consistent with the pH results, metabolic acidosis, partial compensation, mild hypoxemia

In step 5, evaluation is done of the evidence of compensation. To do this, he or she would search for a value that is not consistent with the pH. In this scenario, that is the $PaCO_2$. It can be explained that this patient came to the hospital with DKA, which includes a buildup of ketones. This results in the patient's blood being acidic from the buildup of ketones. This abnormality is caused by metabolic ABG and is, therefore, metabolic acidosis, when the blood has more acidity. This will cause the acid-base balance to be adjusted by the respiratory system by stimulating the patient to breathe faster to help expel CO_2, leading to a reduction of acid in the bloodstream. Therefore, the $PaCO_2$ value in this case is low which helps balance the alkalinity with partial compensation. However, if it can help balance until the pH is within the normal range (7.35-7.45), this will be complete compensation.

Scenario 3 A patient with chronic obstructive pulmonary disease comes to the hospital with symptoms of shortness of breath and rapid breathing. Upon arriving at the hospital, he begins breathing slowly and immediately falls into a coma. The patient has a pH of 7.38, $PaCO_2$ of 60 mmHg, PaO_2 of 30 mm Hg, and HCO_3^- of 36 mEq/L.

In step 1, the PaO_2 is determined, representing severe hypoxemia.

In step 2, the pH level is examined, and in this case, is in the normal range, using 7.4 as an absolute value to determine the presence of acidosis or alkalosis; 7.38 is lower than 7.4, so the patient is experiencing acidosis.

In step 3, the patient's $PaCO_2$ is evaluated as higher than normal, indicating acidosis, and the HCO_3^- is in the alkalotic range.

Finding a consistent value (step 4), that $PaCO_2$ is evaluated to ensure it fits the acidotic state, suggesting that respiratory issues are the source of the acidosis.

To determine if compensation is occurring (step 5), the patient's significantly high HCO_3^- shows a metabolic effort to make up for it, which the nurse notices. Since the pH has returned to the normal range, the nurse concludes from the examination that the patient is in respiratory acidosis with complete metabolic compensation. **(see Figure 3)**

PH 7.38	$PaCO_2$ 60	HCO_3^- 36	PaO_2 30
acidosis normal	respiratory acidosis	metabolic alkalosis	severe hypoxemia

Interpreting: respiratory acidosis, complete compensation, severe hypoxemia

Figure 3: Example value consistent with the pH results, respiratory acidosis, complete compensation, severe hypoxemia

Role of nurses in caring for patients with abnormal arterial blood gas

1. Respiratory acidosis management

In clinical practice, the management of respiratory acidosis requires the combined roles of nurses and doctors. In order for patients to receive safe care and treatment, management must proceed as follows: (Tinawi, 2021, Adrogue & Madias, 2020).

1) The nurse should assess the patient's dyspnea to see if they have difficulty breathing including the assessment of hypoxemia, which can be seen from an O_2 saturation that is lower than normal and from the PaO_2 from the ABG value (if it is less than 80 = mild hypoxemia, if it is less than 60 = moderate hypoxemia, and if it is less than 40 = severe hypoxemia). Nurses must assess whether they have dyspnea and hypoxemia, as this can cause the patient to develop hypoxia and lead to cardiac arrest if not properly managed.

2) The nurse should position the patient with their head elevated at 35–45 degrees so that the patient's lungs can expand well. They will be better able to ventilate to expel carbon dioxide from their bodies.

3) The nurse should provide the patient with appropriate ventilation equipment. If the patient has mild hypoxemia, they should be treated with an oxygen cannula or an oxygen mask with a bag. If the patient has moderate to severe hypoxemia, they should be treated with a high-flow nasal cannula, and if the patient's symptoms do not improve, the nurse should report to the physician to consider intubation and mechanical ventilation. This is to prevent them from developing hypoxia and cardiac arrest. In addition, after intubation and use of a ventilator, nurses should report to the doctor to adjust the mode and setting of the patient's ventilator and ensure that the ventilator works efficiently.

2. Respiratory alkalosis management

Respiratory alkalosis is often caused by patients breathing too quickly. This could be due to them being extremely short of breath or anxiety-induced hyperventilation (hyperventilation syndrome). The nurse should teach the patient to breathe through a paper bag to increase carbon dioxide in the blood. This corrects the alkalosis. However, some patients are intubated.

The nurse should notify the doctor to adjust the ventilator appropriately by setting the setting to slow the patient's breathing. But if the patient is still breathing quickly, the nurse should notify the physician that he or she considers giving sedatives such as fentanyl or midazolam to put the patient to sleep. This will help solve the patient's rapid breathing problem. It is important that when a patient receives sedatives, the nurse administers the medication appropriately via the infusion pump to control the appropriate drug flow rate. In addition, the nurse must assess the patient's vital signs, level of consciousness, and side effects of medicines that may cause patients to have low blood pressure (Palmer & Clegg, 2023).

3. Metabolic acidosis management

Metabolic acidosis often occurs in patients with diabetic ketoacidosis, which results in a buildup of ketones, making the blood acidic. Nurses should, therefore, provide nursing care in conjunction with medical treatment as follows:

1) The nurse should give the patient intravenous fluids according to the doctor's treatment plan, which is a 0.9% NaCl 1500 mL IV load in 1 hour. After that, consider the electrolyte test results by considering the sodium level in the blood. If the sodium level is normal or low (hypernatremia), the nurse should give a 0.9% NaCl IV drip rate of 200–250 ml/hr., but if the sodium is high (hypernatremia), the nurse should give a 0.45% NaCl IV drip rate of 200–250 ml/hr according to the treatment plan. To correct dehydration shock, giving fluids also helps reduction of blood sugar levels and excretion of carbon dioxide.

2) The nurse should have the patient receive regular insulin (RI) according to the treatment plan and only give it through a controlled intravenous solution (an infusion pump). Also, the infusion set that gives insulin should be changed every 24 hours. However, patients receiving intravenous insulin will have a side effect, namely hypokalemia. Potassium values should be monitored strictly, and if the patient has hypokalemia, they should immediately notify the doctor to consider giving potassium as a replacement. In addition, nurses must monitor capillary plasma glucose every hour and monitor ABG results to ensure that patients are safe from metabolic acidosis (Yagi & Fujii, 2021).

4. Metabolic alkalosis management

Regarding the nurse's role in managing metabolic alkalosis, it is crucial to administer isotonic saline (0.9% NaCl) and replenish potassium with potassium chloride intravenously (IV), orally (PO), or both, in patients with metabolic alkalosis linked to volume contraction. Sodium bicarbonate diuresis and the recovery of the acid-base balance will result from this tactic (Tinawi, 2021).

Conclusion

A patient's condition might change drastically and quickly in a critical care situation. Nurses can quickly and reliably determine whether someone has an acid-base problem and take the

necessary action by using the five-step approach to ABG interpretation. Expertise in interpreting ABG can enable nurses to plan appropriate care for patients with ABG abnormalities.

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