Respiratory Alkalosis Assessment

Respiratory alkalosis is an acid base imbalance marked by decreased levels of blood carbon dioxide with subsequent increases in pH. The direct cause is an increase in respiratory rate, which results in the excessive loss of CO2 on exhalation. Possible causes may include high altitude, aspirin toxicity, restrictive lung disease, pulmonary embolism, pregnancy, or anxiety.



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Assessment

Increased pH > 7.45
Up-arrow pH greater-than 7.45
Respiratory alkalosis is characterized by an increase in pH above 7.45 and decreased PCO2 of less than 35.

Decreased PaCO2 < 35 mmHg
Down-arrow Partial-pressure-gauge CO2 Less-than 35
Respiratory alkalosis is characterized by an increase in pH above 7.45 and decreased PCO2 of less than 35.

Hyperventilation
Hiker-vent
An increased respiratory rate causes excessive loss of carbon dioxide. This may be caused by anxiety, stress, improper mechanical ventilation, salicylate overdose, as well as hypoxemia stimulation of the respiratory centers with high altitude exposure, high fever, or shock.

Brainstem Stimulation
Brain-stem Stimulated
Brainstem stimulation can result in acid-base imbalances as the respiratory center is located in the medulla in the brainstem. The respiratory center controls the rate of excretion of CO2 by stimulating an increased rate and depth of breathing when increased amounts of CO2 or H+ are present, and vice versa. When the respiratory system loses its ability to correct a pH alteration, an acid-base imbalance occurs.

Head Injury
Head Injured
Head injury may cause damage to the brainstem, which can lead to pathologic respirations. This affects the body’s ability to correct acid-base imbalances.

Shock
Shocking
Shock states, can lead to decreased blood volume and perfusion, leading to increased respiratory drive. This translates into an increased respiratory rate, which causes CO2 to blow off rapidly, leading to respiratory alkalosis.

Lightheadedness
Light-head
Low levels of carbon dioxide in the blood can lead to feeling lightheaded or dizzy.

Tingling Lips or Fingers
Pins and Needles on Lips and Fingers
Patients may experience numbness or tingling of the lips, hands, or feet.

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Trousseau's

Truce-handshake

Because respiratory alkalosis causes a decrease in ionized calcium, Trousseau’s sign may be observed. To test for this, begin by placing a blood pressure cuff around the upper arm, inflate the cuff to greater than the patient’s systolic pressure, and keep it inflated for 1-4 minutes. Under these hypoxic conditions, a positive Trousseau’s sign occurs when the hand and fingers go into spasm in palmar flexion.

Chvostek's Sign

Chopsticks

Because respiratory alkalosis causes a decrease in ionized calcium, Chvostek’s sign may be observed. To test for this, tap directly on the facial nerve in front of the mastoid bone to trigger facial twitching of one side of the mouth, nose, and check. Twitching of the facial muscles is a positive sign of hypocalcemia.

Anxiety

Anxiety-bag

An acute anxiety attack can result in a rapid and severe hyperventilation respiratory response which can result in significant amounts of CO2 loss and quick onset of alkalosis. The patient may also begin to experience tachycardia due to the anxiety.

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