

RESPIRATORY ACIDOSIS

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IMMEDIATE CONSIDERATIONS

FINDINGS

- **Signs & Symptoms**

- Symptoms may develop acutely or slowly depending on the degree of hypercapnia and whether the condition is acute or chronic
- Patients are usually:
 - Anxious
 - Dyspneic
 - Develop symptoms of carbon dioxide narcosis like:
 - Delirium
 - Somnolence
 - Confusion
 - Obtundation
 - Look for:
 - Mental status changes
 - Possible digital clubbing
 - Cyanosis
 - Diffuse wheeze
 - Hyper inflated chest

- **Lab Findings**

- Decreased pH (< 7.35) on ABG analysis
- The presence of an increased partial pressure of arterial carbon dioxide (PaCO₂) (>45 mm Hg)

- **Formulae for calculating compensation:**

- Acute

- pH drops by 0.08 units, and HCO₃ increases by 1 mEq/L per 10 mmHg increase in PaCO₂

- Chronic

- pH drops by 0.03 units, and HCO₃ increases by 3-4 mEq/L per 10 mmHg increase in PaCO₂

- **Predisposing Conditions**

- COPD

- Neuromuscular diseases

- Chest wall disorders

- Obesity hypoventilation syndrome

- Obstructive sleep apnea

- CNS depression

- Including opioid overdose and alcohol intoxication

- Head trauma

- Intracranial hemorrhage

- Cerebral edema

- Increased intracranial pressure

- Tracheal stenosis

- Lung protective mechanical ventilation

- **Differential Diagnoses**

- Identify specific etiology amongst the conditions listed above

DIAGNOSTIC INTERVENTIONS

- **Severity Score**

- May require ICU admission if patient has:
 - Patient confusion
 - Lethargy
 - Respiratory muscle fatigue
 - Low pH (< 7.25)
- All patients who require tracheal intubation and mechanical ventilation must be admitted to the ICU

- **Labs**

- ABG
- Electrolytes
- Drug and toxicology screen

- **Monitoring**

- Mental status
- Blood gases

- **Imaging**

- Chest x-ray or CT based on suspected underlying condition
 - CT head if suspect intracranial pathology

THERAPEUTIC INTERVENTIONS

- Oxygen supplemental

- **Medications**

- Beta₂ agonists
 - Albuterol
- Inhaled short-acting anticholinergic medication ipratropium

- Inhaled glucocorticoids
 - Budesonide
 - Fluticasone
 - Mometasone
- Systemic glucocorticoids
 - Methylprednisolone
 - Prednisone
 - Prednisolone
- Flumazenil
 - In iatrogenic benzodiazepine overdose
- Naloxone
 - In opioid overdose
- **Procedures**
 - May require non-invasive ventilation or tracheal intubation and mechanical ventilation
- **Contact/Consult**
 - Pulmonologist
- **Anxiolysis & Sedation**
 - For patients on mechanical ventilation, may need to consider sedation

MANAGEMENT AFTER STABILIZATION

- **Further Treatment**
 - Treat underlying etiology
- **Manage Complications**
 - If the patient is intubated, use lung protective ventilation strategies

CAUTIONS

- **Complications**

- Rapid correction of the hypercapnia by the application of external noninvasive positive-pressure ventilation or invasive mechanical ventilation can result in alkalemia
- Oxygen therapy should be used with caution because it may worsen hypercapnia in some situations due to ventilation perfusion mismatch and the Haldane effect
- Hypercapnia is best avoided by titrating Fio₂ to maintain oxygen saturation approximately 88-92 percent

REFERENCES & ACKNOWLEDGMENTS

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