

Just a few benefits of non-intubated capnography

By now, waveform capnography should be considered the standard of care for intubated patients and is considered essential in monitoring respiratory and metabolic functions during anesthesia. Today, however, it is becoming increasingly popular and valuable in non-intubated patients.

This paper provides you with facts that will benefit patients and provide value for your customers as well.

Benefits:

- Early indicator of sedation effects
- Objective measure of severity of asthma attack and response to treatment
- Assessment of ventilation in patients with altered mental status
- Rapid assessment tool
- A trending tool to aid in treatment decisions
- Assess ventilatory status of actively seizing patients
- Tool for detecting metabolic acidosis in patients experiencing diabetic complications

Now lets take an in depth look at how each of the bulleted items will benefit providers.

Early indicator of sedation effects: Patients who received sedation and/or pain medications, or who are under the influence of alcohol or other drugs are at risk for hypoventilation and respiration depression. Hypoventilation is described as a decrease in the depth and rate of respirations, which increases CO₂ in the blood. EtCO₂ trends can determine the degree of hypoventilation and indicate impending respiratory depression and failure much earlier than pulse oximetry.

Asthma: Complaints of difficulty breathing can be extremely challenging to diagnose in both prehospital and hospital settings. Capnography provides more objective data in asthma exacerbation.

- **Well controlled:** normal EtCO₂ and respiratory rate (RR)
- **Mild asthma:** increased RR and drop in EtCO₂
- **Moderate:** slower RR due to tiring, EtCO₂ will begin to increase and you may notice a sharkfin appearance to the waveform
- **Severe:** Low RR. EtCO₂ continues to rise above normal or in severe cases begins to fall to low levels and sharkfin appearance to waveform very likely. Considered a medical emergency.

Response to treatment in asthma patients: EtCO₂ levels that increase from baseline indicate a worsening patient condition. Unchanged EtCO₂ levels indicate stabilization. Falling EtCO₂ levels indicate improvement.

Adequacy of ventilation in patients with altered mental status: Patients having altered mental status in connection with alcohol intoxication or other drugs, or patients experiencing a post-ictal period (confused state after seizure) are at risk for hypoventilation. Capnography can help assess how well these patients are ventilating and provide the earliest indicator of any changes in patient respiratory status.

Rapid Assessment Tool: Capnography provides accurate, reliable and objective information pertaining to patient respiratory status. Information that capnography provides supports the clinician's judgment when assessing severity and response to treatment. Common conditions detected by capnography include:

1. Not breathing
2. Upper airway obstruction
3. Laryngospasm (sudden spasm of the vocal cords and epiglottis that can result in the occlusion of the airway)
4. Bronchospasm
5. Respiratory failure

Track trends that can aid in treatment decisions: Determining the severity of a COPD or asthma patient is the initial step. By observing the trends in EtCO₂, the provider is able to determine whether the condition is improving, stabilized or worsening.

Assess the ventilatory status of actively seizing patients: Seizing patients are susceptible to periodic breathing with apneic pauses. Providers observing the EtCO₂ values in the seizing patient will be able to determine the effectiveness, ineffectiveness or absence ventilation.

Detect metabolic acidosis in patients with diabetes: Diabetic patients with uncontrolled high blood sugar may experience a decrease in serum bicarbonate levels, resulting in development of metabolic acidosis. This in turn leads to an increased respiratory rate, causing the patient to 'blow off' CO₂. The greater the acidosis, the faster and deeper the patient breathes, further decreasing their EtCO₂ value. If not treated, the cycle leads to diabetic ketoacidosis (DKA) which is a life-threatening condition. Capnography can be used to non-invasively track the severity of the patient's condition and help to determine if the patient is in DKA. EtCO₂ values less than 29 mmHG typically indicate DKA. Patients who have values greater than 36 mmHG are typically not in DKA.

In the March 2009 issue of *Trend Setters*, Orange County Fire Rescue Department (OCFRD) had this to say:

"Orange County Fire Rescue EMTs and paramedics rely on capnography as one of their most important assessment tools", states EMS Battalion Chief Jose P. Gainza Jr. "They know that the real-time, objective information that they get from capnography regarding the patient's respiratory, circulatory and metabolic status can have a big impact on their treatment decisions and ultimately impact the patient outcome in a very positive way."

Capnography provides real-time monitoring of a patient's ventilatory status and can provide an early warning signs of adverse events allowing the provider to make treatment decisions in a wide range of clinical situations objectively.

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