

# EtCO<sub>2</sub> Monitoring (capnography)

## Indications for Nursing Interventions

**What** is EtCO<sub>2</sub> monitoring (capnography)? Capnography monitors ventilation. It tracks respiratory rate as well as a breath-by-breath trend of CO<sub>2</sub> as it is eliminated from the lungs.

**Why** do we need to know the EtCO<sub>2</sub>? The EtCO<sub>2</sub> monitor can provide an EARLY WARNING of an impending respiratory crisis. Elevations in CO<sub>2</sub> (for example: due to oversedation and subsequent hypoventilation) can be identified HOURS before changes in oxygen saturation are identified by a pulse oximeter.

**When** is EtCO<sub>2</sub> monitoring indicated? EtCO<sub>2</sub> should be monitored (in addition to pulse oximetry) whenever respiratory depression is a possibility (examples: pain management and sedation issues, history of sleep apnea).

### Normal Values:

EtCO<sub>2</sub> 35-45 mm Hg

### Abnormal Values:

EtCO<sub>2</sub> < 35 mmHg = "Hyperventilation/Hypocapnia"

EtCO<sub>2</sub> > 45 mmHg = Hypoventilation/Hypercapnia"

### Nursing Interventions:

#### If EtCO<sub>2</sub> is 45 to 50mmHg:

1. Attempt to stimulate and arouse the patient. If patient is immediately aroused and breathing normally, monitor every 15 minutes x 1 hour.
2. Assess vital signs for decompensation (O<sub>2</sub> sat, BP, HR, RR, and LOC)
3. Check patient for normal signs of ventilation and assess for hypoventilation via assessment of RR, quality and depth
4. Assess pain, level of sedation, and consider decreasing narcotic dose and/or frequency
5. Reposition the Smart CapnoLine® if necessary
6. If EtCO<sub>2</sub> remains > 45 mmHg in spite of interventions, contact physician

#### If ETCO<sub>2</sub> is >50 mmHg or greater: (In addition to the interventions above)

1. If EtCO<sub>2</sub> does not return to normal within 5 minutes, call Rapid Response Team and notify MD immediately to report patient condition
2. Consider obtaining ABG (RT or RRT can also be consulted during this process)
3. If the patient does not immediately arouse, evaluate the appropriateness of administering Narcan to partially OR completely reverse sedation
4. Patients may be referred to an intensive care unit when nursing staff has concerns about possible respiratory compromise.

#### If respiratory rate falls below 7 per minute: (whether ETCO<sub>2</sub> is normal or not)

1. Evaluate patient for sleep apnea. Sleep apnea patients are encouraged to remain non-supine.
2. Patients can potentially have a normal EtCO<sub>2</sub> and low respiratory rate. In these instances it is appropriate to monitor, contact respiratory therapy or RRT if there is any question regarding accuracy of EtCO<sub>2</sub> measurement.

## Documentation

1. During acute pain management, monitor and document ETCO<sub>2</sub> every 1 hour until satisfactory pain control is achieved.
2. Once patient comfort is achieved, monitor and document ETCO<sub>2</sub> (and displayed respiratory rate) every four (4) hours, and more frequently as patient condition warrants.
3. Some conditions may suggest a need for increased monitoring and documentation. Examples of conditions that require increased monitoring are:
  - a. Additional boluses
  - b. Continuous IV or PCA basal rate
  - c. Risk factors for complications associated with narcotic administration such as advanced age or obesity
  - d. Pre-existing conditions including allergies or sleep apnea
  - e. Current medication use
1. Document all interventions performed as a result of changes in ETCO<sub>2</sub> and respiratory rate.
2. ETCO<sub>2</sub> values should be trended, monitored and documented more frequently if values fall outside the normal range of 35 to 45mmHg.
3. All reports to physicians, respiratory therapy or RRT must be documented in the EMR.

## Discontinuation

1. ETCO<sub>2</sub> monitoring may be discontinued when:
  - a. PCA pump is discontinued
  - b. 6 hours after continuous epidural infusion is discontinued
  - c. IV narcotics discontinued
  - d. Per moderate sedation monitoring policy

## Post-Test Questions:

### Learning objective

1. Identify abnormal EtCO<sub>2</sub> measurements and related clinical interventions

### Questions and Answers:

1. A sleeping patient receiving around-the-clock opioids for pain is being monitored by continuous EtCO<sub>2</sub>. The patient's EtCO<sub>2</sub> begins to rise to 47mmHg. What would be the most appropriate nursing intervention?
  - a. Call RRT stat and obtain an order for ABGs
  - b. Partially reverse the patient with Narcan, titrating to effect until the patient's Etco2 is below 45. Assess if patient is immediately aroused, assess ventilation, assess vital signs.
  - c. Continue to monitor and consider reducing narcotic dose or frequency
  - d. Do nothing. This is a sign of normal opioid induced respiratory depression
2. A post-op patient with severe pain required multiple doses of IV pain medication in order to achieve pain control, and now the patient is asleep. The patient is receiving 4L O<sub>2</sub> via nasal cannula. The patient is arousable, but falls immediately back to sleep without stimulation. The patient's vital signs are normal, but ventilations are shallow and the EtCO<sub>2</sub> is now 60. What is the next appropriate nursing intervention? (select 2 appropriate answers)
  - a. Call Rapid Response Team and notify MD immediately to report patient condition
  - b. Prepare to administer narcan, titrating to effect while observe patient response until the respiratory depression is reversed.
  - c. Turn up the patient's oxygen until the EtCO<sub>2</sub> begins to trend down
  - d. Observe the patient. An EtCO<sub>2</sub> of 60mmHg is fine as long as the pulse oximetry is reading 95 to 100%
3. At 22:00, you note that your chronic pain patient is sleeping and has a respiratory rate of 7-8. The patient has a Fentanyl patch in place. What should you do?
  - a. Remove the fentanyl patch
  - b. Administer narcan immediately for the respiratory rate of 7.
  - c. Call a code
  - d. Assess the quality of the patient's respirations, and determine if the patient is ventilating adequately as evidenced by an EtCO<sub>2</sub> of 35-45mmHG.

### Answer Key :

1. C
2. A, B
3. D