

EtCO₂ MONITORING

PURPOSE

To assess tracheal intubation by detecting CO₂ in expired gas both numerically and graphically and as an indicator of the adequacy of ventilation and perfusion in endotracheally intubated patients.

It is the purpose of this policy to ensure proper application by providing optimal care to all patients utilizing waveform capnography:

For non-intubated patients, waveform capnography may also be monitored and should be considered in patients in respiratory distress or with suspected acidosis.

Monitoring with capnography will allow the providers to closely watch the patient's condition and assess treatment and is the standard of care for management of cardiac arrests and other conditions of respiratory failure.

DEFINITION

End tidal CO₂ is the peak concentration of expired CO₂ - present at end expiration.

Normal CO₂ value: 35-45 mmHg

Normal gradient EtCO₂ < PaCO₂: 2-5 mmHg

INDICATIONS

1. Confirmation of correct placement of all ALS established airways (King Tube or ETT).
2. Monitoring of effectiveness of CPR during arrest situations, from beginning of resuscitation to transfer at the hospital.
3. Before, during and after ROSC in cardiac arrest.
4. Head injured patients; to maintain ETCO₂ 30-35 mm Hg, except in patients with suspected herniation.
5. Bronchospasm, to monitor effectiveness of treatment in respiratory distress situations.
6. Measurement of the adequacy of ventilation and perfusion of patients utilizing ventilatory assist devices.
7. Assistance in the determination to terminate resuscitative efforts (patients rarely survive if ETCO₂ ≤ 10 after twenty (20) minutes of resuscitation).
8. Respiratory distress/failure or suspected acidosis in breathing patients.

PROCEDURE

ETCO₂ monitoring in intubated patients:

1. A self-test may take up to one (1) minute to assure the display is on the screen.
2. Connect the 15 mm airway adapter of the sampling sensor to the ET tube adapter or supraglottic airway. The airway adapter will allow connection of standard ventilation device.

EtCO₂ MONITORING

3. Normal exhalation moisture will not affect the sampling.
4. The CO₂ module will not recognize a breath when the ET_{CO}₂ value < 8 mmHg.

However, the waveform remains valid and can be used to determine the ET_{CO}₂ measurement and the presence, if any, of respiration. A strip shall be printed out for the intubation record.

5. When CO₂ is not detected, three (3) factors must be quickly evaluated for possible causes:

- a. Loss of airway function:

1. Improper tube placement.
2. Apnea.

- b. Loss of circulatory function:

3. Massive PE.
4. Cardiac arrest (evaluated quality/efficacy of chest compressions).
5. Exsanguination.

- c. Equipment malfunction:

6. ETT extubation.
7. ETT obstruction.

6. Assure the waveform is visible on the screen. The ET_{CO}₂ monitoring area will display a reading from 0 to 100 mm Hg.

ETCO₂ monitoring in non-intubated patients

1. Normal exhalation moisture will not affect the sampling.
2. The CO₂ module will not recognize a breath when the ET_{CO}₂ value is less than 8 mm Hg. However, the waveform remains valid and can be used to determine the ET_{CO}₂ measurement and the presence, if any, of respiration.
3. When CO₂ is not detected, possible causes such as equipment malfunction, loss of airway function, total airway obstruction, or device malfunction may have occurred and must be quickly corrected. See the causes listed under the intubated patient section.
4. Assure the waveform is visible on the screen. The ET_{CO}₂ monitoring area will display in 0 to 100 mm Hg.
5. Oxygen can be given either by non-rebreather or a nasal circuit. Oxygen is delivered from holes proximal to the nasal/oral opening, thus O₂ will be entrained, whether the patient is a mouth breather or not.
6. Evaluate changes in the shape and character of the waveform as well as the ET_{CO}₂ level.

RESPONSIBILITY

1. Place Et_{CO}₂ monitoring in line ASAP upon patient contact or intubation.
2. Record the initial (opening) Et_{CO}₂

EtCO₂ MONITORING

3. Continuous EtCO₂ values are to be recorded at a minimum of every 10 minutes
4. Document in designated column of the vital signs section of the PCR.
5. If there is strong belief that the EtCO₂ is not accurate, document findings and rationale for not making changes based on these numbers.

CONSIDERATIONS

1. In some instances, even when the ETT or other advanced airway is properly positioned in the trachea, the EtCO₂ will be very low.
2. Examples: patient undergoing CPR, profound hypotension, hypovolemia, PE, excessive PEEP (these scenarios may still display the "normal" characteristic wave form).
3. When performing CPR on intubated patients, persistently low EtCO₂ (< 10 mmHg) is highly suggestive that return of spontaneous circulation (ROSC) is unlikely. If EtCO₂ abruptly increases to a more normal value, it is reasonable to consider this as an indicator of ROSC. If the EtCO₂ is <10 during CPR, attempts should be made to improve artificial circulation.

CONTRAINDICATIONS

Do not utilize on patients <2kg as Vt (tidal volume) loss in sampling line can be significant