End-Tidal CO2 Monitoring

APPROVED: _____ _____

EMS Medical Director EMS Administrator

1 Goals/Introduction:
- 1.1 End Tidal CO2 monitoring (ETCO2) via waveform capnography should be used to confirming correct placement of the endotracheal tube and/or measure the adequacy of ventilation
- 1.2 For patients in cardiac arrest, end tidal CO2 is a useful adjunct to treatment
  - 1.2.1 Note: After profound circulatory collapse, the end tidal CO2 may not be detected even if the ET tube is in the trachea.

2 Indications:
- 2.1 All patients with endotracheal intubation or an advanced alternative airway such as a King Airway

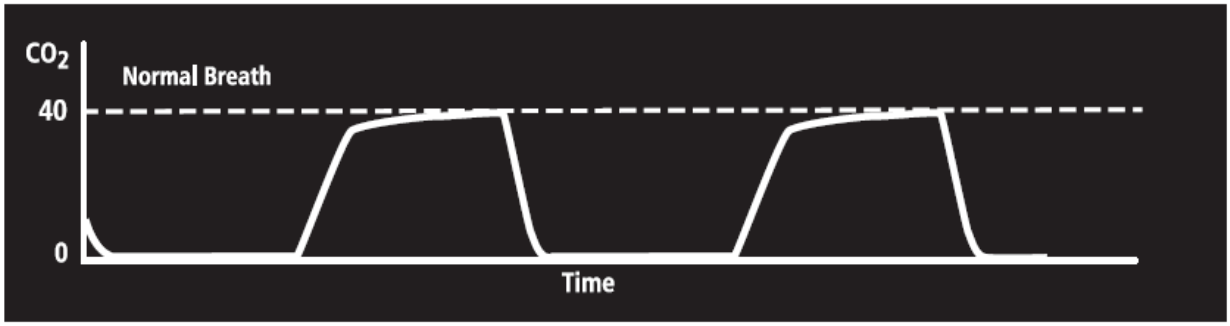
3 Absolute Contraindications:
- 3.1 None

4 Equipment
- 4.1 Appropriate monitoring equipment for waveform capnography such as integrated module on a cardiac monitor
- 4.2 Appropriate inline sampling sensor circuit for continuous monitoring

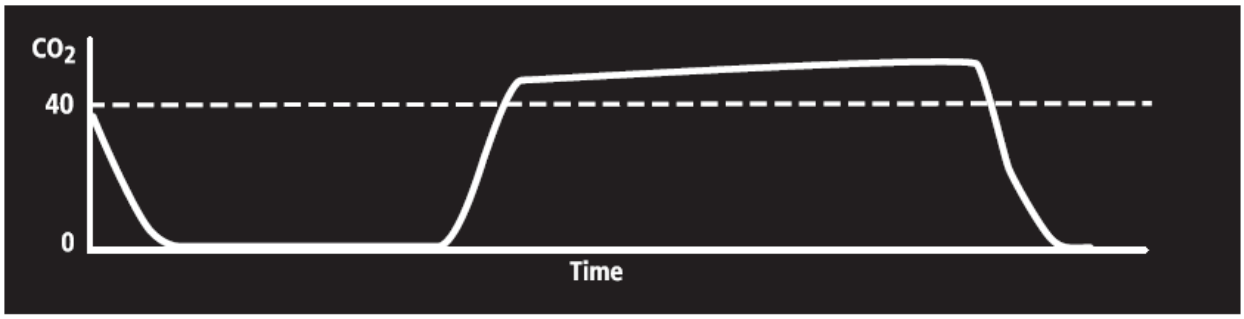
5 Procedure
- 5.1 For Intubated Patients
  - 5.1.1 A self test may take up to one minute to assure the display is on the screen
  - 5.1.2 Connect the 15 mm airway adapter of the sampling sensor to the ET adapter. The airway adapter will allow connection of a standard ventilation device
  - 5.1.3 Normal exhalation moisture will not affect the sampling. However, if bronchial secretions or vomit surrounds the sampling device, erroneous readings will occur
  - 5.1.4 A strip should be printed out for the intubation record.

5.2 For Non-Intubated Patients (when available)
- 5.2.1 Normal exhalation moisture will not affect the sampling
- 5.2.2 Attach the nasal cannula ETCO2 prongs to the patient

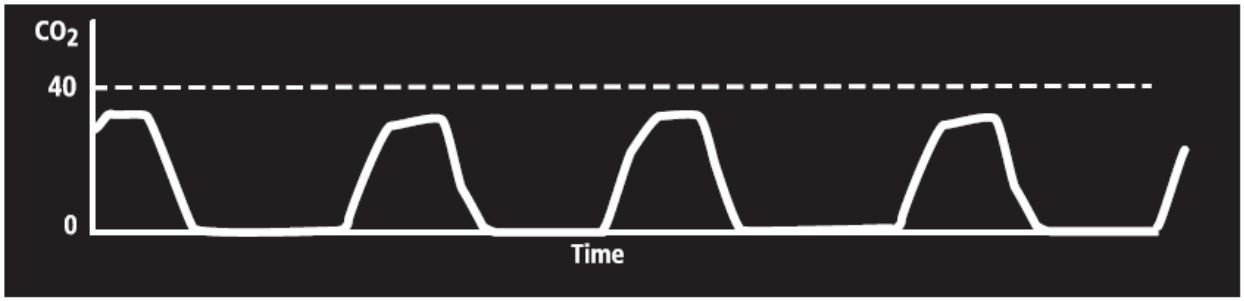
6 Special Information and Complications
- 6.1 When CO2 is not detected, three factors must be quickly evaluated for possible causes
  - 6.1.1 Loss of Airway Function
    - 6.1.1.1 Improper tube placement
    - 6.1.1.2 Apnea
  - 6.1.2 Loss of circulatory function
    - 6.1.2.1 Massive PE
    - 6.1.2.2 Cardiac Arrest
    - 6.1.2.3 Exsanguination
  - 6.1.3 Equipment Malfunction
    - 6.1.3.1 ETT extubation
  - 6.1.4 Obstruction
- 6.2 The CO2 module will not recognize a breath where the ETCO2 value is less than 8 mm Hg.
  - 6.2.1 Note: waveform remains valid and can be used to determine the ETCO2 measurement and the presence, if any, of respiration.
  - 6.2.2
- 6.3 Waveform examples: The following are examples of ETCO2 waveforms that should be used to establish a baseline and to track the patient over time.
  - 6.3.1 Normal: square and boxlike



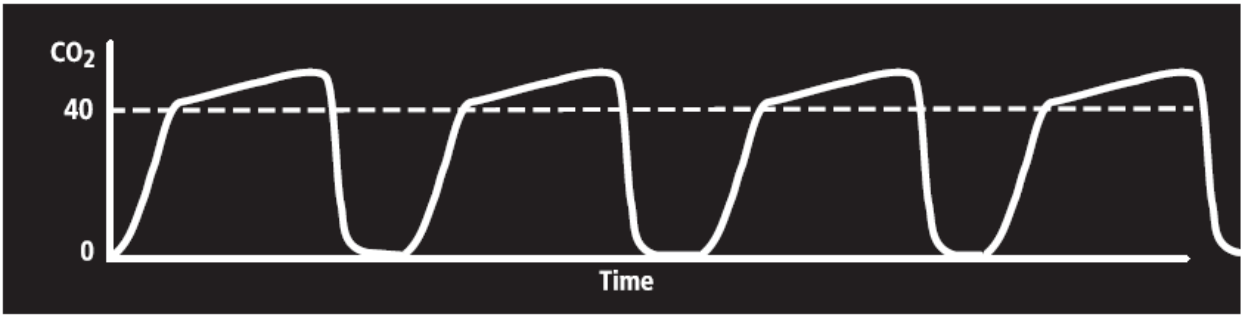
  - 6.3.2 Hypoventilation: can be due to sedation/analgesia, drug or alcohol intoxication, postictal states, head trauma, CVA, CHF, meningitis/encephalitls



6.3.3 Hyperventilation: anxiety, panic attack, respiratory distress (well compensated)



6.3.4 Bronchospasm: diagnose the presence of bronchospasm, assess the severity of asthma and COPD and gauge the response to treatment



6.4 ETCO2 goals
- 6.4.1 Head injury: 34-38
- 6.4.2 All others: 35-45

6.5 Use of Nasal Cannula
- 6.5.1 If available, a special nasal cannula can monitor end-tidal CO2 for non-intubated patients to evaluate ventilatory status in respiratory and cardiac emergency situations

7 Complications
- 7.1 Missed esophageal intubation due to inaccurate assessment of waveform

8 Documentation
- 8.1 The use of ETCO2 as well as the measured readings
- 8.2 A printed strip of the end tidal CO2 recording for all intubated patients to be included in the patient's chart.

9 Transport Considerations
- 9.1 ETCO2 should be evaluated after every patient move and at transfer of care to the receiving facility
- 9.2 Notify the receiving facility of the prehospital ETCO2 readings during patient turnover report