**INDICATION**

- Patient is receiving mechanical ventilation assistance (CPAP, BVM, ALS airway).
- Patient is in respiratory or cardiac arrest.
- Patients with head injuries.
- Patients with significant respiratory distress.
- Sepsis patients.

**PROCEDURE**

**ETCO₂ MONITORING OF VENTILATORY SUPPORT BY BVM OR ADVANCED AIRWAY:**

- Immediately initiate self-test, which may take up to 1 minute.
- Once self-test is complete, connect the 15 mm airway adapter of the sampling sensor to the face mask, King Tube, or endotracheal tube or ETCO₂ cannula. The goal is to capture an early baseline for ETCO₂ (First breath capnography).
- The CO₂ module will not recognize a breath when the ETCO₂ value < 8 mmHg. However, the waveform remains valid and can be used to determine the ETCO₂ measurement and the presence, if any, of respiration.
- When CO₂ is not detected, 3 factors must be quickly evaluated for possible causes:
  - Loss of airway function:
    - Airway obstruction.
    - Apnea.
  - Loss of circulatory function:
    - Massive pulmonary embolism.
    - Cardiac arrest.
    - Exsanguination.
  - Equipment malfunction:
    - Improper mask seal or tube placement.
- Assure the waveform is visible on the screen. The ETCO₂ monitoring area will display a reading from 0 to 100 mmHg.

**ETCO₂ MONITORING OF NON-VENTILATORY SUPPORT PATIENTS:**

- The CO₂ module will not recognize a breath when the ETCO₂ value < 8 mmHg. However, the waveform remains valid and can be used to determine the ETCO₂ measurement and the presence, if any, of respiration.
- 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.
- Assure the waveform is visible on the screen. The ETCO₂ monitoring area will display a reading from 0 to 100 mmHg.
- Oxygen can be given either by non-rebreather or a nasal cannula. 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.
**KEY CONCEPTS**

- Evaluate changes in the shape and character of the waveform as well as the ETCO$_2$ level.
- ETCO$_2$ readings may be unreliable if the patient is in shock or has poor perfusion.
- Normal ETCO$_2$ levels range from 32 – 36, but this may vary based on the patient’s underlying respiratory and metabolic status.
- ETCO$_2$ levels that rise from a normal baseline to or above 40 generally indicate hypoventilation is occurring.

**WAVEFORM EXAMPLES**

- The following are examples of ETCO$_2$ waveforms that should be used to establish a baseline and to track the patient over time. Proper interpretation of the waveform can signal the need for interventions before the classic signs and symptoms of distress are evident.
  - **Normal**: Square and boxlike. Same appearance as patient’s with healthy lungs.
  - **Hypoventilation**: Which can be due to sedation/analgesia, drug or alcohol intoxication, postictal states, head trauma, CVA, CHF, meningitis/encephalitis.
  - **Hyperventilation**: Anxiety, panic attack, respiratory distress (well compensated).
  - **Bronchospasm**: Diagnose the presence of bronchospasm, assess the severity of asthma and COPD and gauge the response to treatment.
  - **Esophageal Intubation**: Indicates a possible esophageal intubation.