pulse oximetry measurements. Consider usage of ETCO₂ monitoring.

l. If patient’s anxiety level prevents patient from tolerating the device, consider contacting online medical control for sedation.

m. Monitor and document the patient’s respiratory response to the treatment.

n. Continue to coach patient to keep mask in place and readjust as needed.

o. For patients requiring nebulized medication, utilize the T-Piece to administer nebulized medicine concurrently with CPAP.

J. Needle Thoracostomy [ALS]

1. Indication
   a. Emergent treatment of a clinically unstable patient with a tension pneumothorax.
   b. A tension pneumothorax is the progressive collection of air in the pleural space with subsequent increasing pleural pressures and respiratory compromise.
   c. Treatment of a tension pneumothorax should begin as soon as it is clinically recognized.

2. Contraindications
   a. Absolute: insertion of needles through an area of infection. Select alternative insertion site.
   b. Relative: In patients being manually ventilated, use extreme caution. If the presumption of tension pneumothorax is incorrect, insertion of the needle may create a pneumothorax which, with positive pressure ventilation, can convert into a tension pneumothorax.

3. Insertion Site
   a. Primary site: Anterior approach, patient in a supine position with the head of the stretcher elevated 30°. Insertion site is the second intercostal space in the midclavicular line.
   b. Alternative site (if primary site obstructed, infected or excess musculature or obesity): Lateral approach, patient in a supine position with the head of the stretcher elevated 30°. Insertion site is the fourth/fifth intercostal space in the midaxillary line.

4. Technique
   a. Prepare needle insertion site with antiseptic solution or alcohol.
   b. Attach 10 cc syringe filled with 5 ml saline to a 14 gauge intravascular catheter.
   c. Palpate the third rib at the mid-clavicular line (or alternatively the sixth rib in the midaxillary line for the lateral approach. This is generally at the nipple line.).
   d. Insert the needle perpendicularly just over the upper edge (towards the head) of the rib. Ensure the needle passes over the upper edge of the rib as opposed to lower edge where the intercostal vessels lie.
   e. Gently aspirate the syringe as you advance the needle. A ‘pop’ may be felt as the pleural space is entered and air is encountered.
   f. Advance the catheter into the chest and then withdraw the needle and syringe.
   g. Secure the catheter in place with tape, being sure not to block or kink the catheter.
   h. Continue to reassess patient. If no improvement, consider persistent tension pneumothorax requiring no more than one additional catheter placement.

K. Waveform Capnography - End Tidal CO₂ Monitoring [ALS]
1. Capnography is a noninvasive method for monitoring the level of carbon dioxide in exhaled breath, to assess a patient’s ventilatory status. Capnography is also an indirect measure of circulatory status/cardiac output of the patient. End Tidal CO₂ Monitoring on the LifePak 15 provides both a numeric ETCO₂ value and a waveform. Normal ETCO₂ is 35 - 45. End Tidal CO₂ monitoring can be performed with either the nasal cannula or ET Tube connector devices.

2. There is a good concordance with the partial pressure of CO₂ in the blood and the ETCO₂. This can help provide a quicker detection of acute respiratory events than pulse oximetry would otherwise indicate.

3. Indications : Optional
   a. Respiratory assessment - By physical exam alone, it is not always clear if a patient is having an exacerbation of asthma/COPD, CHF or a cardiac presentation. In obstructive respiratory diseases (asthma/COPD), the ETCO₂ waveform will have a sloping upward plateau similar to a shark’s fin appearance. In cardiac disease (“cardiac wheezing”), there will be a normal plateau along with a likely increased ETCO₂ value.

   ![Graph showing ETCO₂ values](image)

   b. CPAP adjustment - ETCO₂ can assist in determining the most effective level of PEEP for a patient requiring CPAP. As PEEP increases, oxygenation increases and the ETCO₂ value will decrease. Too much PEEP can be detrimental however, worsening oxygenation. As this point is reached, the ETCO₂ value will increase and the pulse oximetry will decrease.

   c. To measure quality of chest compressions - ETCO₂ is reflective of the cardiac output achieved while a patient is receiving chest compressions. While no specific value can be obtained in any specific patient, a decrease in ETCO₂ over a period of chest compressions should draw concern to proper chest compression technique, specifically rate and depth.

4. Indications : Mandatory
   a. Airway Maintenance Confirmation - All patients having their airway and breathing maintained by ALS with either a BVM, Supraglottic airway, or Endotracheal Intubation shall have ETCO₂ monitored to ensure successful airway control, both initially and throughout the duration of care of that patient.

   b. Assessment of Sedation - In patients sedated by drugs or alcohol, or those sedated by HFD narcotic or benzodiazepine therapy, ETCO₂ monitoring provides a gauge of their ventilatory status. With an ETCO₂ within normal values, the patient is in less respiratory compromise than the patient whose ETCO₂ is elevated or becoming progressively elevated indicating hypoventilation. This information can be used as a guide to therapy of a patient with regard to both nalaxone administration as well as potential repeat dosages of narcotics or benzodiaepines.

L. Neonatal / “Newly Born” [BLS/ALS]
   1. Bulb suctioning is indicated immediately following birth for those neonates who have obvious obstruction to spontaneous breathing or who require BVM ventilations.

   2. Deep suctioning of the airway with an endotracheal tube is no longer recommended. Standard bulb suctioning alone is recommended to remove any secretions present.