



# Endotracheal Intubation

ALS PROCEDURE AP-01

INDICATION	<ul style="list-style-type: none"> <li>• Patients that are <math>\geq 15</math> years old with respiratory compromise or in cardiac and/or respiratory arrest or where the airway cannot be adequately maintained by BLS techniques.</li> </ul>
PROCEDURE	<ul style="list-style-type: none"> <li>• Prepare, position, and oxygenate the patient with 100% Oxygen.</li> <li>• Consider use of Video Laryngoscopy device when available.</li> <li>• Select proper ET tube and stylet; have suction ready.</li> <li>• When performing direct laryngoscopy, use of an endotracheal tube introducer (Bougie) device is required for all attempts.</li> <li>• Using laryngoscope, visualize vocal cords.</li> <li>• Limit each intubation attempt to 30 seconds with BVM between attempts. For patients in cardiac arrest this is not necessary as long as chest compressions are continuous.</li> <li>• Visualize tube passing through vocal cords.</li> <li>• Inflate the cuff with 3 – 10 mL of air.</li> <li>• Apply <a href="#">Waveform Capnography AP-12</a>.</li> <li>• Auscultate for bilaterally equal breath sounds and absence of sounds over the epigastrium. If you are unsure of placement, remove tube and ventilate patient with a BVM.</li> <li>• If ET intubation efforts are unsuccessful after 2<sup>nd</sup> attempt, return to <a href="#">Airway/Respiratory Management BP-01</a> or consider <a href="#">King Tube Intubation AP-02</a>.</li> <li>• Patients who have an advanced airway established should be secured with tape or a commercial device. Devices and tape should be applied in a manner that avoids compression of the front and sides of the neck, which may impair venous return from the brain.</li> </ul>
KEY CONCEPTS	<ul style="list-style-type: none"> <li>• If the patient regains consciousness while intubated, do not extubate. Use restraints as necessary to prevent uncontrolled extubation. Consider <a href="#">Sedation AP-14</a> if patient becomes awake and aware.</li> <li>• If the patient has a suspected spinal injury:             <ul style="list-style-type: none"> <li>• Open the airway using a jaw-thrust without head extension.</li> <li>• If airway cannot be maintained with jaw thrust, use a head-tilt/chin-lift maneuver.                 <ul style="list-style-type: none"> <li>• Manually stabilize the head and neck rather than using an immobilization device during CPR.</li> </ul> </li> </ul> </li> </ul>



# King Tube Intubation

ALS PROCEDURE AP-02

INDICATION	<ul style="list-style-type: none"> <li>• Patients who meet indications for <a href="#">Endotracheal Intubation AP-01</a>; and             <ul style="list-style-type: none"> <li>• Patients, who after two (2) attempts with an ETT, have not been successfully intubated.</li> </ul> </li> </ul>
CONTRAINDICATION	<ul style="list-style-type: none"> <li>• Gag reflex.</li> <li>• Caustic ingestion.</li> <li>• Known esophageal disease (e.g. cancer, varices or stricture).</li> <li>• Height &lt; 4 feet.</li> </ul>
PROCEDURE	<ul style="list-style-type: none"> <li>• Use <a href="#">Waveform Capnography AP-12</a> throughout.</li> <li>• Select the proper tube size.</li> <li>• While preparing tube, have assistive personnel open the airway, and clear of any foreign objects. Pre-oxygenate with 100% oxygen.</li> <li>• Test cuff inflation system by injecting the maximum recommended volume of air into the cuffs. Remove all air from both cuffs prior to insertion.</li> <li>• Apply water soluble lubricant to the distal tip and posterior aspect (only) of the tube, taking care to avoid introduction of the lubricant into or near the ventilatory openings.</li> <li>• Position patient into “sniffing position” if possible, otherwise head may be in a neutral position.</li> <li>• Hold the tube at the colored connector with the dominant hand. With the non-dominant hand, hold open the patient’s mouth and apply a tongue-jaw lift (thumb into oral cavity, index finger under chin).</li> <li>• Rotate the tube 90° laterally, so that the blue orientation/x-ray line on the inside curve of the airway is touching the outer corner of the mouth, with the tube curving out.</li> <li>• While advancing the tip of the tube across the tongue to its base, rotate the tube an additional 90° back to midline, so that the blue orientation line now faces the chin.</li> <li>• Advance the tube until the base of the connector is aligned with the teeth or gums. Be sure to maintain the tip of the tube midline so as to advance it into the upper esophagus and not into the piriform fossa (blind pocket).</li> <li>• Using a syringe, inflate the cuffs with the minimum volume necessary to seal the airway at the peak ventilatory pressure employed (“just seal” volume). Typical inflation volumes are as follows:             <ul style="list-style-type: none"> <li>• Size 3: 45-60 mL</li> <li>• Size 4: 60-80 mL</li> <li>• Size 5: 70-90 mL</li> </ul> </li> </ul>

PROCEDURE CONT.	<ul style="list-style-type: none"><li>• Attach a BVM. While gently bagging the patient to assess ventilation, carefully withdraw the airway until ventilation is easy and free flowing (large tidal volume with minimal airway pressure).</li><li>• Confirm proper position by auscultation, chest movement and verification of ET<sub>CO</sub><sub>2</sub> by waveform capnography.</li><li>• If necessary, readjust cuff inflation to “just seal” volume as needed.</li><li>• Patients who have an advanced airway established should be secured with tape or a commercial device. Devices and tape should be applied in a manner that avoids compression of the front and sides of the neck, which may impair venous return from the brain.</li></ul>
KEY CONCEPTS	<ul style="list-style-type: none"><li>• If placement is unsuccessful, remove tube, ventilate via BVM and repeat sequence of steps.</li><li>• If unsuccessful on second attempt, BLS airway management should be resumed.</li><li>• If BLS airway management is unsuccessful, perform <a href="#">Needle Cricothyrotomy AP-03</a>.</li><li>• Most unsuccessful placements relate to failure to keep tube in midline during placement.</li><li>• Cuffs can be lacerated by broken teeth or dentures. Remove dentures before placing tube.</li><li>• Do not force tube, as airway trauma may occur.</li></ul>



# Needle Cricothyrotomy

ALS PROCEDURE AP-03

INDICATION	<ul style="list-style-type: none"><li>• Adult patients where life threatening upper airway obstruction where BLS/ALS airway procedures have failed.</li></ul>
PROCEDURE	<ul style="list-style-type: none"><li>• Place the patient in a supine position. If spinal precautions are indicated, maintain the neck in a neutral position.</li><li>• Locate the cricothyroid membrane.</li><li>• Prep the skin of the anterior neck.</li><li>• Stabilize the cricoid cartilage and palpate the cricothyroid membrane.</li><li>• Place the needle of the QuickTrach® Cricothyrotomy unit in the midline and perforate the soft tissues of the neck at a right angle.</li><li>• Keep aspirating while advancing the unit into the trachea.</li><li>• Once air is easily aspirated, incline the unit at a 45° angle, pointing the distal end of the needle toward the feet.</li><li>• Advance it further into the trachea until the stopper meets the skin.</li><li>• Remove the stopper</li><li>• Hold the steel needle and advance only the plastic cannula.</li><li>• Withdraw the steel needle and advance the plastic cannula until the fixation flange rests on the skin.</li><li>• Secure fixation flange with the padded strap.</li><li>• Attach connecting tube to the 15 mm connector on the plastic cannula.</li><li>• Connect other end to BVM and ventilate.</li><li>• Auscultate the lungs to ensure ventilations are effective.</li></ul>
KEY CONCEPTS	<ul style="list-style-type: none"><li>• Use <a href="#">Waveform Capnography AP-12</a> throughout.</li><li>• Be aware of possible complications associated with procedure:<ul style="list-style-type: none"><li>• Localized bleeding.</li><li>• Esophageal perforation.</li><li>• Subcutaneous emphysema.</li><li>• Pneumothorax.</li><li>• Obstruction or kinking of the catheter.</li></ul></li></ul>



# Continuous Positive Airway Pressure (CPAP)

ALS PROCEDURE AP-04

<b>INDICATION</b>	<ul style="list-style-type: none"> <li>• Patients age <math>\geq</math> 8 years of age in moderate to severe respiratory distress or respiratory failure.</li> </ul>
<b>CONTRAINDICATION</b>	<ul style="list-style-type: none"> <li>• Respiratory or cardiac arrest.</li> <li>• Tracheostomy.</li> <li>• Agonal respirations.</li> <li>• Signs and symptoms of pneumothorax.</li> <li>• Inability to maintain airway patency.</li> <li>• Vomiting.</li> <li>• Systolic blood pressure <math>&lt;</math> 80 mmHg.</li> </ul>
<b>PROCEDURE</b>	<ul style="list-style-type: none"> <li>• Place patient in seated position.</li> <li>• Monitor <math>SP_{O_2}</math> and <math>ETCO_2</math> throughout procedure.</li> <li>• Set up CPAP system (per manufacturer's recommendation) with pressure set at 7.5 cm <math>H_2O</math>.</li> <li>• Explain procedure to patient.</li> <li>• Place the delivery mask over the mouth and nose. Oxygen should be flowing through the device at this point.</li> <li>• Secure the mask with provided straps starting with the lower straps until minimal air leak occurs.</li> <li>• Encourage patient to breathe normally. Patients may have a tendency to hyperventilate.</li> <li>• Re-evaluate the patient every 5 minutes. Normally, the patient will improve in the first 5 minutes with CPAP, as evidenced by:             <ul style="list-style-type: none"> <li>• Decreased heart rate, respiratory rate, and blood pressure.</li> <li>• Increased <math>SP_{O_2}</math>.</li> </ul> </li> <li>• <a href="#">Airway/Respiratory Management BP-01</a>, should be considered if the patient fails to show improvement.</li> </ul>
<b>KEY CONCEPTS</b>	<ul style="list-style-type: none"> <li>• Be aware of possible complications associated with this procedure that include, hypotension, pneumothorax, corneal drying, and gastric distention.</li> </ul>



# Needle Thoracostomy

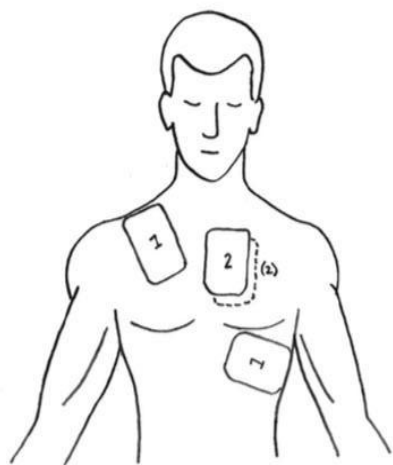
ALS PROCEDURE AP-05

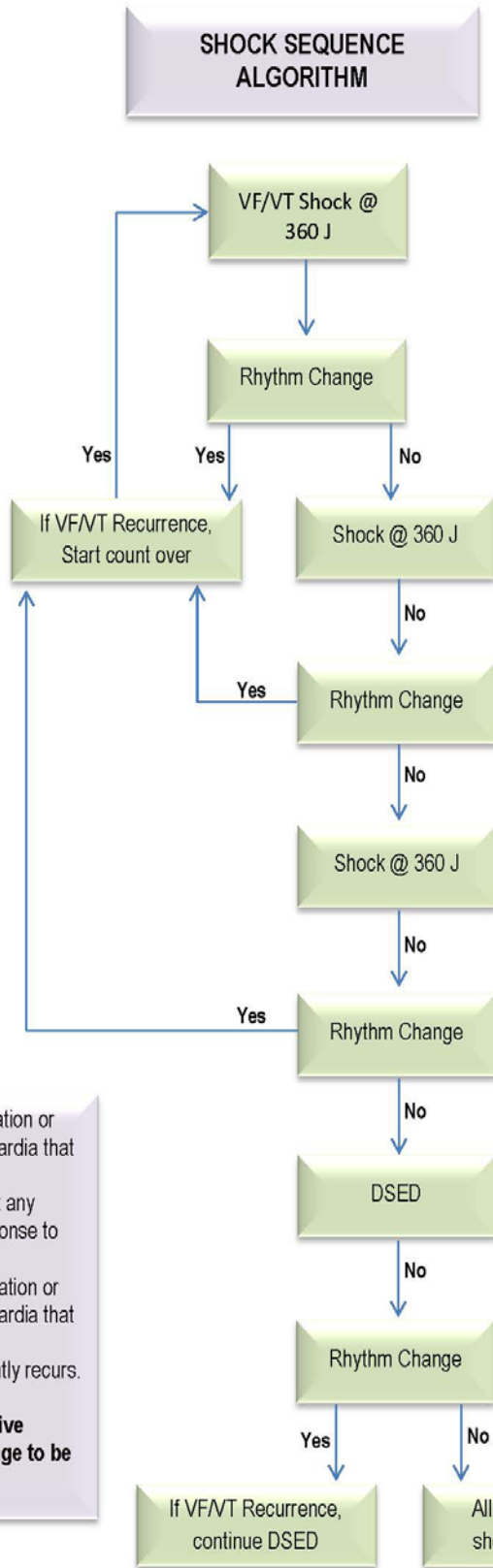
<b>INDICATION</b>	<ul style="list-style-type: none"><li>• Tension pneumothorax, characterized by an air leak into pleural space through a hole in the lung, acting as a one-way valve.</li><li>• Assessment confirmed by hypotension, tachycardia, and by at least one of the following:<ul style="list-style-type: none"><li>• Decreased breath sounds, unilaterally or bilaterally.</li><li>• Extreme dyspnea associated with low SPO<sub>2</sub>.</li><li>• Neck vein distension.</li><li>• Agitation.</li><li>• Possible cyanosis.</li><li>• Tracheal shift away from affected side (Late sign, can be difficult to detect).</li></ul></li><li>• Traumatic arrest with thoracic injury.</li></ul>
<b>PROCEDURE</b>	<ul style="list-style-type: none"><li>• Locate and clean the insertion site with chlorhexidine swabs.</li><li>• Insert the angiocatheter into 1 of 2 sites:<ul style="list-style-type: none"><li>• The 2<sup>nd</sup> intercostal space on the mid-clavicular line, penetrating over the 3<sup>rd</sup> rib at a 90° angle to the chest wall on the affected side; or</li><li>• The 4<sup>th</sup> or 5<sup>th</sup> intercostal space in the mid-axillary line, penetrating over the 5<sup>th</sup> or the 6<sup>th</sup> rib at a 90° angle to the chest wall on the affected side (pull the pectoralis muscle forward and insert needle adjacent to your middle finger).</li></ul></li><li>• Advance the needle until lack of resistance or “pop” as needle enters pleural space, followed by a possible hiss of air.</li><li>• While holding the angiocatheter, advance the catheter all the way to the hub and remove the needle.</li><li>• Secure catheter with needle guard or tape.</li><li>• Attach connecting tubing.</li><li>• Attach one-way valve device.</li></ul>
<b>KEY CONCEPTS</b>	<ul style="list-style-type: none"><li>• In patients where cannulation into the pleural space is not probable / possible (e.g. bariatric patients), contact the base hospital for on-line medical control regarding a possible procedure site variation.</li></ul>



# Double Simultaneous External Defibrillation

ALS PROCEDURE AP-06

<b>INDICATION</b>	<ul style="list-style-type: none"><li>In cases where an adult cardiac arrest patient in ventricular fibrillation or pulseless ventricular tachycardia is <u>resistant</u> to conventional methods of defibrillation and ventricular fibrillation or pulseless ventricular tachycardia persists after 3 consecutive shocks (including from AED), without a rhythm change.</li></ul>
<b>PROCEDURE</b>	<ul style="list-style-type: none"><li>Ensure continuous uninterrupted chest compressions.</li><li>Confirm presence of cardiac arrest with resistant ventricular fibrillation or pulseless ventricular tachycardia.</li><li>Apply pads to patient's chest in anterior-lateral and anterior-posterior positions and connect to two separate defibrillators.</li><li>Charge both defibrillators to 360 J. If using AED, activate AED for rhythm analysis.</li><li>Defibrillate by pressing shock button on both defibrillators simultaneously.</li><li>Immediately resume CPR for two (2) minutes.</li><li>If indicated by response and rhythm, repeat.</li><li>Any subsequent shocks for resistant ventricular fibrillation or pulseless ventricular tachycardia are administered as DSED shocks.</li><li>If a non-shockable rhythm presents, resume resuscitative efforts according to the appropriate protocol.</li><li>If ventricular fibrillation or pulseless ventricular tachycardia persists after first DSED, transport to the closest STEMI receiving facility for further treatment.</li></ul> 
<b>KEY CONCEPTS</b>	<ul style="list-style-type: none"><li>Prior to DSED, providers should verify that the pads are well-adhered and not touching.</li><li>Definitions:<ul style="list-style-type: none"><li><u>Resistant</u>: Ventricular fibrillation or pulseless ventricular tachycardia that is persistent, after three (3) consecutive shocks, without any transient conversion in response to conventional defibrillation.</li><li><u>Recurrent</u>: Ventricular fibrillation or pulseless ventricular tachycardia that is temporarily converted by defibrillation and subsequently recurs.</li></ul></li></ul>



- This is a sequence of shocks **ONLY**.
- **DO NOT STACK SHOCK**
- For cases of recurrent ventricular fibrillation/pulseless ventricular tachycardia, consider the previous threshold at which there was a rhythm change.

- **Resistant** ventricular fibrillation or pulseless ventricular tachycardia that is persistent, after three (3) consecutive shocks, without any transient conversion in response to conventional defibrillation.
- **Recurrent** ventricular fibrillation or pulseless ventricular tachycardia that is temporarily converted by defibrillation and subsequently recurs.

**There must be three consecutive shocks without a rhythm change to be considered resistant.**





# External Cardiac Pacing

ALS PROCEDURE AP-07

INDICATION	<ul style="list-style-type: none"> <li>• Patients experiencing severe symptomatic bradycardia with signs and symptoms of inadequate cerebral or cardiac perfusion. Symptoms will include:             <ul style="list-style-type: none"> <li>• Chest pain.</li> <li>• Hypotension.</li> <li>• Acute onset of pulmonary edema.</li> <li>• Altered mental status.</li> <li>• Seizure.</li> </ul> </li> </ul>
PROCEDURE	<p><b>ADULT</b></p> <ul style="list-style-type: none"> <li>• Place pads on the patient’s chest according to manufacturer’s recommendations.</li> <li>• Set initial pacing rate at 80 pulses per minute (ppm).</li> <li>• Begin output at 10 milliamps (mA). Increase slowly by 10 mA until capture / pulses are noted. Once capture is confirmed, increase mA by 10%.</li> <li>• If capture is maintained but the patient remains symptomatic of inadequate cerebral or cardiac perfusion (systolic blood pressure &lt;100, ALOC) consider increasing the rate by 10 ppm. <u>Do not exceed 100 ppm.</u></li> </ul> <p><b>PEDIATRIC</b></p> <ul style="list-style-type: none"> <li>• Use pediatric patches, place pads on the patient’s chest according to manufacturer’s recommendations.</li> <li>• Set initial pacing rate at 100 ppm.</li> <li>• Begin output at 5 mA. Increase slowly by 5 mA until capture / pulses are noted.             <ul style="list-style-type: none"> <li>• The smaller the child, the lower the required energy for capture.</li> </ul> </li> </ul>
KEY CONCEPTS	<ul style="list-style-type: none"> <li>• Any discomfort associated with pacing, administer fentanyl according to <a href="#">Pain Management AP-13</a>.</li> <li>• For agitation associated with pacing, administer midazolam according to <a href="#">Sedation AP-14</a>.</li> <li>• Any movement of patient may increase capture threshold response. Output may have to be slightly increased to compensate. Monitor pulse, blood pressure and level of consciousness closely.</li> </ul>



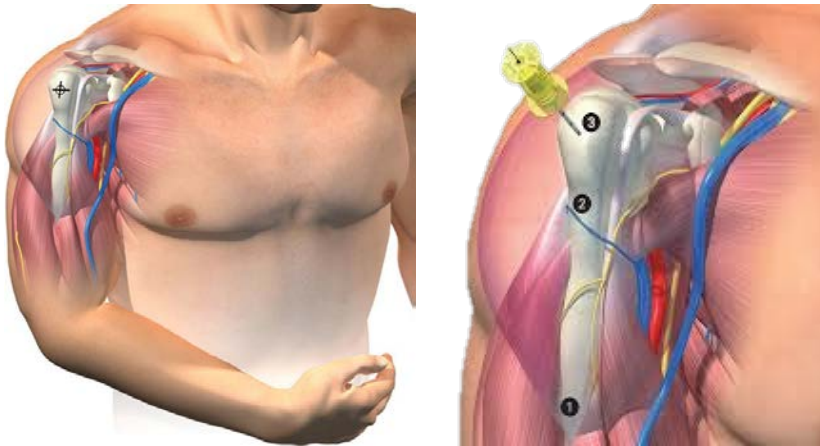
# Intraosseous Infusion

ALS PROCEDURE AP-08

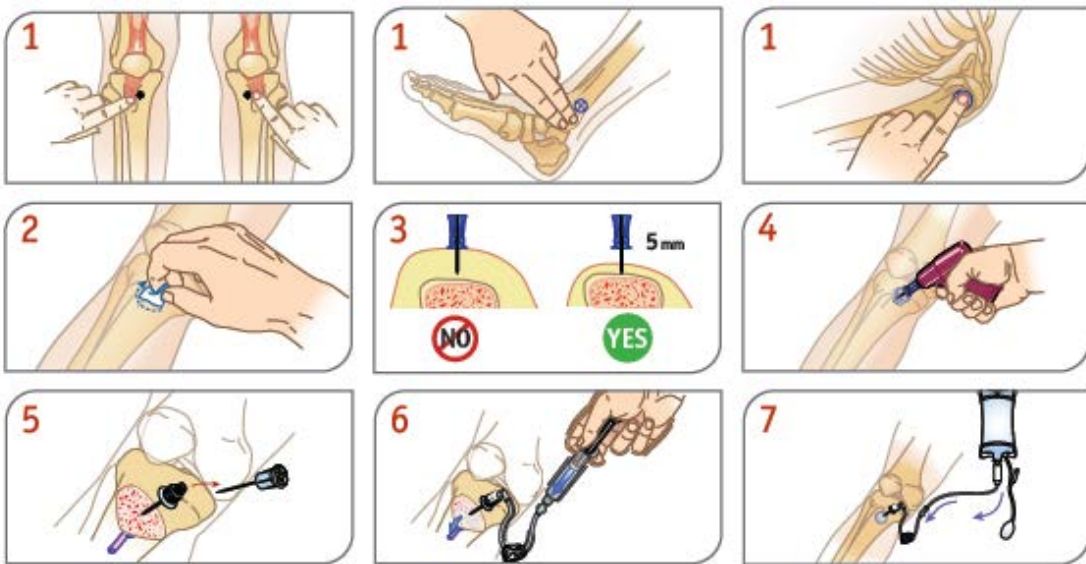
<b>INDICATION</b>	<ul style="list-style-type: none"> <li>• Patients that require rapid circulatory access.</li> <li>• Should be used as an alternative technique for establishing IV access when peripheral IV access is difficult or time sensitive, especially in pediatric patients.</li> <li>• IO placement should be considered prior to peripheral IV attempts in cases of cardiopulmonary or traumatic arrest.</li> </ul>
<b>CONTRAINDICATION</b>	<ul style="list-style-type: none"> <li>• Fracture of the bone selected for IO infusion.</li> <li>• Excessive tissue at the insertion site with the absence of anatomical landmarks.</li> <li>• Previous significant orthopedic procedure (IO within last 24 hours).</li> <li>• Infection at the site selected for insertion.</li> <li>• Conscious patient with stable vital signs and peripheral vascular access readily available.</li> </ul>
<b>PROCEDURE</b>	<ul style="list-style-type: none"> <li>• Choose appropriate intraosseous site and assemble equipment per the manufacturer's recommendations:             <ul style="list-style-type: none"> <li>• EZ-IO 15mm (pink):                 <ul style="list-style-type: none"> <li>▪ Proximal Tibia: If the tibial tuberosity is present, the insertion site is located approximately 2 cm medial to the tibial tuberosity along the flat aspect of the tibia. If the tibial tuberosity is not present, the insertion site is located approximately 4 cm below the patella and then medial, along the flat aspect of the tibia.</li> <li>▪ Distal Tibia: Place one finger directly over the medial malleolus; move approximately 2 cm (depending on patient anatomy) proximal and palpate the anterior and posterior borders of the tibia to assure that the insertion site is on the flat center aspect of the bone.</li> </ul> </li> <li>• EZ-IO 25mm (blue) or EZ-IO 45mm (yellow)                 <ul style="list-style-type: none"> <li>▪ Proximal Humerus (preferred site): Insertion site is located directly on the most prominent aspect of the greater tubercle. Place patient's hand over the umbilicus. Slide thumb up the anterior shaft of the humerus until you feel the greater tubercle, this is the surgical neck. Approximately 1 cm (depending on patient anatomy) above the surgical neck is the insertion site.</li> <li>▪ Proximal Tibia: See insertion site description above.</li> <li>▪ Distal Tibia: See insertion site description above.</li> </ul> </li> </ul> </li> <li>• Prepare intraosseous site using aseptic technique with chlorhexidine.</li> <li>• Insert EZ-IO needle into the selected site per the manufacturer's recommendations.</li> <li>• After removing Power Driver from needle set, stabilize the catheter hub.</li> <li>• Remove stylet from catheter and dispose in sharps container.</li> <li>• Secure site.</li> <li>• Connect primed EZ-Connect tubing to the catheter and confirm placement by flushing the catheter with:</li> </ul>

- Lidocaine:** *Adult:* 40 mg slow IO over 2 minutes. May repeat once at a half dose (20 mg.) for pain control. Max total dose of 60 mg.  
  
*Pediatric:* IO; push over 2 minutes. May repeat once at a half dose for pain control. Administer according to PediaTape weight calculation and [Pediatric Medication Reference Cards](#).
- Flush with 10 mL of normal saline.
- Assess the IO infusion site for signs of extravasation.
- If clinically indicated, begin infusion of fluids utilizing a pressurized delivery system.
- Place the EZ-IO armband on patient and document date/time of procedure.

- Use caution in patients with severe osteoporosis or other bone disorder/abnormalities.
- Use caution in patients with prosthetic joints near the insertion site (consider alternate site).
- Images of proximal humerus placement:



- Image of tuberal tuberosity placement:





# Fluid Challenge

ALS PROCEDURE AP-09

INDICATION	<ul style="list-style-type: none"> <li>Patients exhibiting signs and symptoms consistent with shock or who are hemodynamically compromised, or have the potential to become hemodynamically compromised.</li> </ul>
CONTRAINDICATION	<ul style="list-style-type: none"> <li>Respiratory distress secondary to pulmonary edema.</li> <li>Presence of rales during assessment of lung sounds.</li> </ul>
PROCEDURE	<ul style="list-style-type: none"> <li>Establish IV/IO access. Large bore access is preferred.</li> <li>Evaluate need for fluid challenge per appropriate field treatment guideline.</li> <li>Assess vital signs and lung sounds prior to administration and every 250 mL increments of fluid challenge.</li> <li><i>Adults:</i> IV/IO; Administer 500 mL of normal saline. May repeat once.             <ul style="list-style-type: none"> <li>Septic patients may receive rapid infusion, 30 mL/kg without base contact to maintain a systolic blood pressure of &gt; 90 mmHg.</li> </ul> </li> <li><i>Pediatrics:</i> IV/IO; administer according to PediaTape weight calculation and <a href="#">Pediatric Medication Reference Cards</a>.</li> </ul> <p style="text-align: center;"><b>***Base hospital contact required for additional dosing***</b></p>
KEY CONCEPTS	<ul style="list-style-type: none"> <li>Continuous ET<sub>CO</sub><sub>2</sub> monitoring should be used.</li> </ul>



# Targeted Temperature Management

ALS PROCEDURE AP-10

<b>INDICATION</b>	<ul style="list-style-type: none"> <li>• Adult cardiac arrest patients with 5 minutes of sustained return of spontaneous circulation (ROSC) who remains unconscious.</li> </ul>
<b>CONTRAINDICATION</b>	<ul style="list-style-type: none"> <li>• Traumatic Cardiac Arrest.</li> <li>• Responsive post arrest with GCS <math>\geq</math> 8, and/or rapidly improving GCS.</li> </ul>
<b>PROCEDURE</b>	<ul style="list-style-type: none"> <li>• Begin targeted temperature management procedure if patient is unconscious and has no other obvious underlying causes for this comatose state.</li> <li>• Expose patient and apply 8 cold packs:             <ul style="list-style-type: none"> <li>• 2 on head.</li> <li>• 2 on the neck over the carotid arteries.</li> <li>• 1 in each axilla.</li> <li>• 1 on each femoral artery at groin.</li> </ul> </li> <li>• Consider other passive cooling measures (removal of patient's clothes, air-conditioning in the patient compartment directed over the patient).</li> <li>• Continue with standard of care and monitor patient for shivering and/or improved GCS.</li> <li>• Transport patients whom cooling procedures have been initiated to the nearest STEMI receiving center.</li> <li>• Advise the emergency department personnel in advance and upon arrival that targeted temperature management was initiated.</li> <li>• Discontinue targeted temperature management if patient becomes responsive.</li> </ul>
<b>KEY CONCEPTS</b>	<ul style="list-style-type: none"> <li>• Consider causes for comatose state such as hypoglycemia or hypoxemia.</li> </ul>



# Mechanical Circulatory Support

ALS PROCEDURE AP-11

<b>INDICATION</b>	<ul style="list-style-type: none"> <li>Patients with mechanical circulatory support that present with any complaint.</li> </ul>		
<b>CONTRAINDICATION</b>	<ul style="list-style-type: none"> <li>Do not give aspirin and/or nitroglycerin to mechanical circulatory support patients.</li> </ul>		
<b>PROCEDURE</b>	<ul style="list-style-type: none"> <li>Identify type of mechanical circulatory support: <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top;"> <p><b>Ventricular Assist Device (VAD)</b></p> <ul style="list-style-type: none"> <li>Usually pulseless.</li> <li>ECG shows native heart rhythm.</li> <li>Only perform chest compressions with Base Hospital direction.</li> <li>You may provide synchronized cardioversion, external cardiac pacing, or defibrillation.</li> <li>Must auscultate the left upper quadrant of the patient’s abdomen for the “hum” of the VAD.</li> <li>Usually have an internal cardiac defibrillator.</li> <li>You will not be able to obtain a blood pressure.</li> </ul> </td> <td style="width: 50%; vertical-align: top;"> <p><b>Total Artificial Heart (TAH)</b></p> <ul style="list-style-type: none"> <li>Pulsatile.</li> <li>ECG is meaningless since there is no heart.</li> <li>No compressions.</li> <li>Do not provide synchronized cardioversion, external cardiac pacing, or defibrillation.</li> <li>The TAH’s Freedom Driver is audible without a stethoscope, making a “galloping” type of sound.</li> <li>Do not have an internal cardiac defibrillator.</li> <li>Blood Pressure is obtainable utilizing a normal sphygmomanometer.</li> </ul> </td> </tr> </table> </li> <li>Contact Base Hospital and request assistance with coordinating care and destination decision for mechanical circulatory support patient.</li> <li>Mechanical Circulatory support patients should go to the closest receiving facility unless directed otherwise by Base Hospital.</li> </ul>	<p><b>Ventricular Assist Device (VAD)</b></p> <ul style="list-style-type: none"> <li>Usually pulseless.</li> <li>ECG shows native heart rhythm.</li> <li>Only perform chest compressions with Base Hospital direction.</li> <li>You may provide synchronized cardioversion, external cardiac pacing, or defibrillation.</li> <li>Must auscultate the left upper quadrant of the patient’s abdomen for the “hum” of the VAD.</li> <li>Usually have an internal cardiac defibrillator.</li> <li>You will not be able to obtain a blood pressure.</li> </ul>	<p><b>Total Artificial Heart (TAH)</b></p> <ul style="list-style-type: none"> <li>Pulsatile.</li> <li>ECG is meaningless since there is no heart.</li> <li>No compressions.</li> <li>Do not provide synchronized cardioversion, external cardiac pacing, or defibrillation.</li> <li>The TAH’s Freedom Driver is audible without a stethoscope, making a “galloping” type of sound.</li> <li>Do not have an internal cardiac defibrillator.</li> <li>Blood Pressure is obtainable utilizing a normal sphygmomanometer.</li> </ul>
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PROCEDURE CONT.	<ul style="list-style-type: none"><li>• Assist family and/or caregiver to troubleshoot mechanical circulatory support due to disconnection, power or mechanical failures.</li><li>• Provide patient care as clinically indicated per field treatment guidelines.</li><li>• <a href="#">Fluid Challenge AP-09</a>: Should be considered as a first line therapy for VAD patients.</li><li>• Collect all mechanical circulatory support equipment/information for transport with the patient.</li></ul>
KEY CONCEPTS	<ul style="list-style-type: none"><li>• Patient's family/caregiver should have direct 24/7 contact information for VAD/TAH program. VAD/TAH program should be contacted through Base Hospital to coordinate care and destination for the patient.</li><li>• When transporting patient with mechanical circulatory support device, ensure that extra batteries and charging device are brought with the patient.</li></ul>



# Waveform Capnography

ALS PROCEDURE AP-12

<b>INDICATION</b>	<ul style="list-style-type: none"><li>• Patient is receiving mechanical ventilation assistance (CPAP, BVM, ALS airway).</li><li>• Patient is in respiratory or cardiac arrest.</li><li>• Patients with head injuries.</li><li>• Patients with significant respiratory distress.</li><li>• Sepsis patients.</li></ul>
<b>PROCEDURE</b>	<p><b>ETCO<sub>2</sub> MONITORING OF VENTILATORY SUPPORT BY BVM OR ADVANCED AIRWAY:</b></p> <ul style="list-style-type: none"><li>• Immediately initiate self-test, which may take up to 1 minute.</li><li>• 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 ETCO<sub>2</sub> cannula. The goal is to capture an early baseline for ETCO<sub>2</sub> (First breath capnography).</li><li>• The CO<sub>2</sub> module will not recognize a breath when the ETCO<sub>2</sub> value &lt; 8 mmHg. However, the waveform remains valid and can be used to determine the ETCO<sub>2</sub> measurement and the presence, if any, of respiration.</li><li>• When CO<sub>2</sub> is not detected, 3 factors must be quickly evaluated for possible causes:<ul style="list-style-type: none"><li>• Loss of airway function:<ul style="list-style-type: none"><li>▪ Airway obstruction.</li><li>▪ Apnea.</li></ul></li><li>• Loss of circulatory function:<ul style="list-style-type: none"><li>▪ Massive pulmonary embolism.</li><li>▪ Cardiac arrest.</li><li>▪ Exsanguination.</li></ul></li><li>• Equipment malfunction:<ul style="list-style-type: none"><li>▪ Improper mask seal or tube placement.</li></ul></li></ul></li><li>• Assure the waveform is visible on the screen. The ETCO<sub>2</sub> monitoring area will display a reading from 0 to 100 mmHg.</li></ul> <p><b>ETCO<sub>2</sub> MONITORING OF NON-VENTILATORY SUPPORT PATIENTS:</b></p> <ul style="list-style-type: none"><li>• The CO<sub>2</sub> module <u>will not</u> recognize a breath when the ETCO<sub>2</sub> value &lt; 8 mmHg. However, the waveform remains valid and can be used to determine the ETCO<sub>2</sub> measurement and the presence, if any, of respiration.</li><li>• When CO<sub>2</sub> 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.</li><li>• Assure the waveform is visible on the screen. The ETCO<sub>2</sub> monitoring area will display a reading from 0 to 100 mmHg.</li><li>• Oxygen can be given either by non-rebreather or a nasal cannula. Oxygen is delivered from holes proximal to the nasal/oral opening, thus O<sub>2</sub> will be entrained, whether the patient is a mouth breather or not.</li></ul>



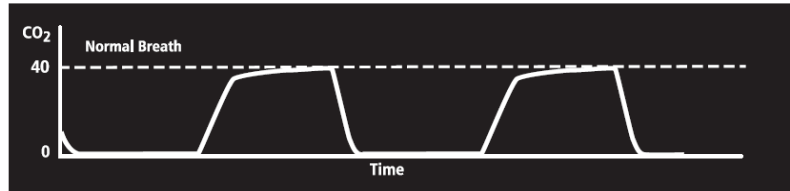
KEY CONCEPTS

- Evaluate changes in the shape and character of the waveform as well as the ETCO<sub>2</sub> level.
- ETCO<sub>2</sub> readings may be unreliable if the patient is in shock or has poor perfusion.
- Normal ETCO<sub>2</sub> levels range from 32 – 36, but this may vary based on the patient’s underlying respiratory and metabolic status.
- ETCO<sub>2</sub> levels that rise from a normal baseline to or above 40 generally indicate hypoventilation is occurring.

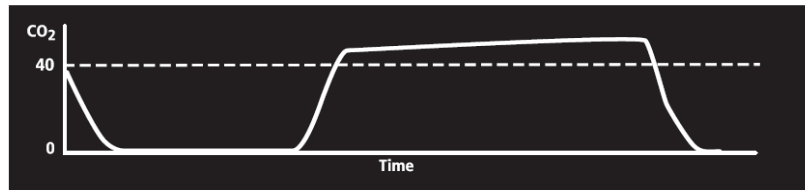
WAVEFORM EXAMPLES

- The following are examples of ETCO<sub>2</sub> 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.

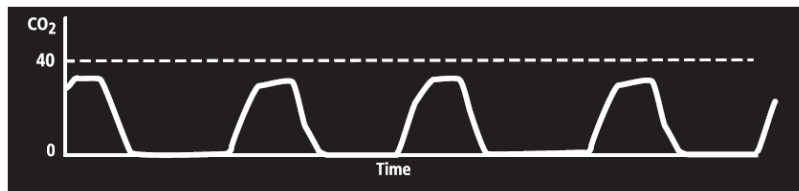
- **Normal:** Square and boxlike. Same appearance as patient’s with healthy lungs.



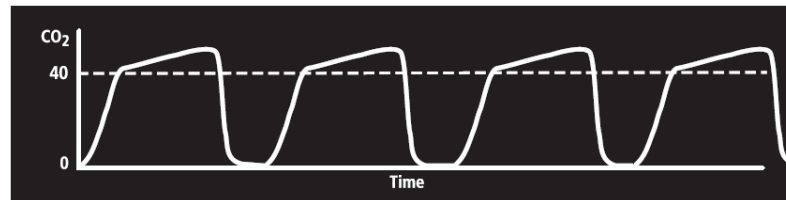
- **Hypoventilation:** Which can be due to sedation/analgesia, drug or alcohol intoxication, postictal states, head trauma, CVA, CHF, meningitis/encephalitis.



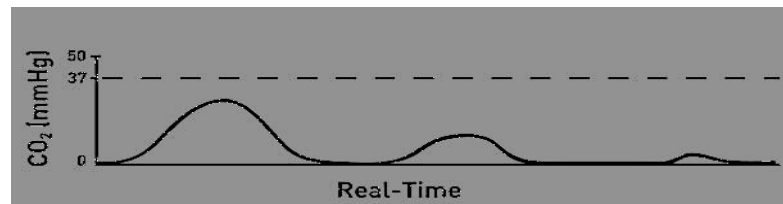
- **Hyperventilation:** Anxiety, panic attack, respiratory distress (well compensated).



- **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.





# Pain Management

ALS PROCEDURE AP-13

INDICATION	<ul style="list-style-type: none"> <li>Pain in the presence of adequate vital signs and level of consciousness.</li> <li>Extrication, movement, or transportation is required which will cause considerable pain to the patient AND there are no known contraindications to administering analgesia.</li> <li>Examples of patient complaints:             <ul style="list-style-type: none"> <li>Significant extremity injuries</li> <li>Burn patients</li> <li>Crush injury patients</li> <li>Severe back and spinal pain</li> <li>Immobilized patients</li> <li>Abdominal pain</li> </ul> </li> </ul>
PROCEDURE	<p>If BLS measures (see below) are unsuccessful at relieving pain, consider pharmacological therapy.</p> <ul style="list-style-type: none"> <li><b>Acetaminophen</b> <i>Adults</i> For adults &gt; 50 kg, IV: 1000 mg drip infused over 20 minutes</li> <li><b>Fentanyl:</b> <i>Adult:</i> IV/IO: 1 mcg/kg, MAX single dose of 100 mcg; may repeat q 5-10 minutes, titrated to pain, to MAX total dose of 200 mcg.              IN: 1 mcg/kg divided into each nare with a MAX single dose of 100 mcg; may repeat once in 15 minutes, to a MAX total dose of 200 mcg.              IM: 1 mcg/kg to a MAX single dose of 50 mcg; may repeat 3 times in 15 minute increments; to a MAX total dose of 200 mcg.</li> </ul> <p><b>***Use extreme care and give half-dose increments to patients &gt; 65 years of age***</b></p> <ul style="list-style-type: none"> <li><i>Pediatric:</i> IV/IO/IN; May repeat every 5 minutes, as needed, up to 200 mcg. Administer according to PediaTape weight calculation and <a href="#">Pediatric Medication Reference Cards</a>.</li> <li><b>Ondansetron:</b> <i>Adult:</i> 4 mg IV/IM/PO. May repeat every 10 minutes, MAX total dose of 12 mg.  <i>Pediatric:</i> IV/IO/IM; Base order required for repeat dosing. Administer according to PediaTape weight calculation and <a href="#">Pediatric Medication Reference Cards</a>.</li> <li><b>BASE HOSPITAL ORDERS</b> <ul style="list-style-type: none"> <li>The use of <b>Midazolam</b> in conjunction with fentanyl requires base hospital consultation. Refer to <a href="#">Sedation AP-14</a> for dosing.</li> </ul> </li> <li>Patients exhibiting the following required Base Hospital consult:             <ul style="list-style-type: none"> <li>Respiratory depression</li> <li>Altered mental status</li> <li>Women in labor</li> <li>BP &lt; 90mmHg systolic</li> <li>Patients with pain not covered above</li> </ul> </li> </ul>
KEY CONCEPTS	<ul style="list-style-type: none"> <li>To monitor the physiologic response to pain management continuous pulse oximetry is mandatory.</li> <li>Have naloxone readily available to reverse any respiratory depression that may occur.</li> <li>Use psychological and BLS measures, such as cold packs, repositioning, splinting, elevation, and/or traction splints as appropriate, to reduce the need for pain medication.</li> <li>Rapid administration of large quantities of fentanyl has been associated with chest wall rigidity syndrome.</li> </ul>





# Sedation

<b>INDICATION</b>	<ul style="list-style-type: none"><li>• Anxiety communicated by patient not relieved with other calming measures.</li><li>• Combative behavior that endangers patient or caregivers. This is considered to be chemical restraint; careful detailed documentation is required when using sedation for this purpose.</li><li>• Sedation prior to ALS treatment that may cause anxiety.<ul style="list-style-type: none"><li>• Anticipated cardioversion (in the conscious patient).</li><li>• Anticipated cardiac pacing (in the conscious patient).</li></ul></li><li>• Signs of excited delirium; a condition that manifests as a combination of delirium, psychomotor agitation, anxiety, hallucinations, speech disturbances, disorientation, violent and bizarre behavior, insensitivity to pain, elevated body temperature, and superhuman strength.</li></ul>
<b>PROCEDURE</b>	<ul style="list-style-type: none"><li>• If BLS measures are unsuccessful at calming patient, consider:</li><li>• <b>Midazolam:</b> <i>Adult:</i> IV/IO: 2 mg initial dose; may repeat twice to a MAX total dose of 6 mg. IM: 5 mg; may repeat once in 15 min. IN: 5 mg ½ in each nostril; may repeat once in 15 min.<ul style="list-style-type: none"><li>• <b>Use extreme care and give half-dose increments to patients &gt; 65 years of age.</b></li><li>• <b>Base contact required for additional dosing.</b><ul style="list-style-type: none"><li>• <i>Pediatric:</i> IM/IN ONLY; <b>Not locally indicated in patients &lt; 5 kg. Base contact required for additional dosing.</b> Administer according to PediaTape weight calculation and <a href="#">Pediatric Medication Reference Cards</a>.</li></ul></li><li>• Patients receiving midazolam frequently experience decreased respirations and hypotension. Midazolam must be administered slowly if given intravenously IV.</li><li>• Administer supplemental oxygen and consider a 1 time 250 mL bolus of IV saline prior to midazolam administration.</li><li>• Be prepared to manage patient's airway.</li></ul></li><li>• <b>BASE HOSPITAL ORDERS</b><ul style="list-style-type: none"><li>• The use of midazolam in conjunction with fentanyl requires base hospital consultation.</li></ul></li></ul>
<b>KEY CONCEPTS</b>	<ul style="list-style-type: none"><li>• Airway management in the sedated patient does not necessarily mandate advanced airway management; assess the patient's ability to protect his / her own airway.</li></ul>



# Field Blood Collection

ALS PROCEDURE AP-15

<b>INDICATION</b>	<ul style="list-style-type: none"><li>• Collection of blood at the request of law enforcement personnel for evidentiary purposes.</li></ul>
<b>PROCEDURE</b>	<ul style="list-style-type: none"><li>• A law enforcement representative must request the blood sample be collected and must be present to witness the collection.</li><li>• There must be the appropriate collection equipment immediately available.</li><li>• The paramedic will obtain the collection sample only if the following conditions are met:<ul style="list-style-type: none"><li>• The paramedic provider agency has a written agreement with the local law enforcement agency to provide blood collection services;</li><li>• The paramedic is capable of obtaining the collection sample;</li><li>• If the individual that the blood sample is being drawn from is a patient, treatment may not be delayed, compromised, or interfered with as a result of the blood collection;</li><li>• The paramedic ensures appropriate chain of custody of the blood sample.</li></ul></li></ul>
<b>KEY CONCEPTS</b>	<ul style="list-style-type: none"><li>• Blood collection must not interfere with emergency medical care.</li><li>• It will be the provider agency's right to determine if their personnel shall participate in this program.</li></ul>