JOHNSON COUNTY EMS SYSTEM

OFFICE OF THE MEDICAL DIRECTOR

EMS Skills Dictionary

2026.03.11

Change Log:

03/11/26	**Medication Access and Delivery** • Med Admin – IV Admixture Hydroxocobalamin (Cyanokit) ○ Inserted instructions and pictures for opening vent on drip set.
06/19/25	**Advanced Airway Management** • Artificial Airway Suctioning ○ Clarified measurement of Gastric Suction Catheter for Gastric Decompression with i-gel.

03/29/25	**Cardiac Management**
	• 12-Lead Placement / Acquisition / Transmission (ZOLL)
	  ○ Fixed typo regarding Alternative defib pad placement.
	• Defibrillation
	  ○ Fixed typo regarding Alternative defib pad placement.
	• Synchronized Cardioversion (ZOLL)
	  ○ Fixed typo regarding Alternative defib pad placement.
	• Transcutaneous Pacing (ZOLL)
	  ○ Fixed typo regarding Alternative defib pad placement.

03/18/2025	**Airway Management**
	• Basic Airway Clearance and Suction
	  ○ Formatting for similarity to other entries.
	• Basic Airway Maneuvers
	  ○ BVM – Updated ventilation rate wording and device pictures.
	• CPAP (Continuous Positive Airway Pressure):
	  ○ Added alternate methods of increasing FiO2 if Trio device is unavailable.
	• End Tidal CO2 (ETCO2) Detection:
	  ○ Updated pictures to current devices
	  ○ Added information regarding expectation for initialization of zeroing process during equipment set up.
	  ○ Added expectation of first breath delivered through airway have ETCO2 sampling performed.
	  ○ Added information regarding characteristics of current model ETCO2 Nasal Cannula for sampling of ETCO2 and delivery of O2.
	  ○ Added wording encouraging BLS clinicians to place waveform capnography in conjunction with use of colorimetric device.
	• Endotracheal Intubation (Adult & Peds) / (DL & VL)
	  ○ Added clarification for breathing rates for cardiac arrest patients vs patients not in cardiac arrest.
	  ○ Added information regarding expectation for initialization of zeroing process during equipment set up.
	  ○ Edited description of placing VL blade in mouth for Adult / Peds VL to be more in line with recent education.
	• Supraglottic Airway Insertion – Adult (i-gel O2 Resus):
	  ○ Added wording for expectation of placing i-gel as initial method of airway management vs starting with BVM and Mask.
	  ○ Added information regarding expectation for initialization of zeroing process during equipment set up.

	○ Added expectation of first breath delivered through airway have ETCO2 sampling performed. ○ Added information regarding characteristics of current model ETCO2 Nasal Cannula for sampling of ETCO2 and delivery of O2. ○ Added further information and pictures regarding confirmation of placement with ETCO2. ○ Added clarification for breathing rates for cardiac arrest patients vs patients not in cardiac arrest. • Supraglottic Airway Insertion – Pediatric (Anesthesia i-gel): ○ Added information regarding expectation for initialization of zeroing process during equipment set up. ○ Added expectation of first breath delivered through airway have ETCO2 sampling performed. ○ Added information regarding characteristics of current model ETCO2 Nasal Cannula for sampling of ETCO2 and delivery of O2. ○ Added further information and pictures regarding confirmation of placement with ETCO2. ○ Added clarification for breathing rates for cardiac arrest patients vs patients not in cardiac arrest. **Cardiac Management** • 12-Lead Placement / Acquisition / Transmission (ZOLL) ○ Added placement descriptions for Alternate defib pad placement to allow continuous 12-Lead monitoring. • Automated External Defibrillator (AED) (ZOLL X-Series) ○ Updated Pediatric Considerations section • Defibrillation ○ Added placement descriptions for Alternate defib pad placement to allow continuous 12-Lead monitoring. ○ Updated Pediatric Considerations section • Synchronized Cardioversion (ZOLL) ○ Added placement descriptions for Alternate defib pad placement to allow continuous 12-Lead monitoring. ○ Updated Pediatric Considerations section • Transcutaneous Pacing (ZOLL) ○ Added placement descriptions for Alternate defib pad placement to allow continuous 12-Lead monitoring. ○ Updated Pediatric Considerations section
01/01/2025	**Medication Access & Delivery** • Added Med Admin – IV Admixture Push-Dose Epinephrine
08/22/24	**Airway Management** • **Advanced Airway Management** ○ Removed Endotracheal Intubation – Adult (Bougie Assisted) ○ Removed Endotracheal Intubation – Pediatric ○ Added Endotracheal Intubation (Adult) – Direct Laryngoscopy ○ Added Endotracheal Intubation (Adult) – Video Laryngoscopy ○ Added Endotracheal Intubation (Pediatric) – Direct Laryngoscopy ○ Added Endotracheal Intubation (Pediatric) – Video Laryngoscopy

	Trauma Management • **Needle Decompression** ○ Updated with new explanation and pictures for identification and pictures of the "Safety Triangle" area

06/21/23	**Cardiac Management**
	• 12-Lead Placement / Acquisition / Transmission:
	  ○ Updated wording for removal of electrodes
	Airway Management
	• CPAP
	  ○ Updated SpO2 target
	Medication Access & Delivery
	• Med Admin-IO Analgesia
	  ○ Dose wording clarification
	  ○ Added wording cautioning against attempting to push partial vial dose
	• Med Admin – Pre-Load Assembly and Use
	  ○ Added information on administering doses that require a partial vial
	  ○ Added wording cautioning against attempting to push partial vial dose
	• Med Admin – Syringe to Syringe Transfer
	  ○ Added knowledge points to caution against attempting to push partial vial dose

08/25/22	**Skills Dictionary Format**
	• Updated format of entire document
	• Created new sections to group skills
	• Airway Management, Cardiac Management, Medication Access & Delivery, Medical Management, Trauma Management, Sunset
	Sunset Section
	• Added Sunset Section at end of document for protocols that will become obsolete at next protocol / equipment / process change
	• This will allow new entries to be added and will allow the later deletion of old skills without reformatting the entire document again
	Cardiac Management
	• 12-Lead Placement / Acquisition / Transmission
	  ○ Fixed picture covering text in Transmission section
	  ○ Added info on use of ETOH prep pad to aid in removal of electrodes
	• Cardiopulmonary Resuscitation
	  ○ Changed name of Chest Compressions entry to Cardiopulmonary Resuscitation
	  ○ Added ventilation info
	Airway Management
	• BVM 1 & 2 Person
	  ○ Combined previously separate 1-Person and 2-Person entries
	• CPAP
	  ○ Updated Contraindications to match current protocols
	  ○ Updated Use of Trio to starting at 60% FiO2 and titrating up PRN
	• Endotracheal Intubation
	  ○ Added new Endotracheal Intubation (Bougie) – Adult entry
	  ○ Added new Endotracheal Intubation – Pediatric entry
	  ○ Added Surgical Airway (Scalpel-Finger-Bougie) – Adult entry
	  ○ Moved sunsetting Endotracheal Intubation entry to Sunset section
	  ○ Moved sunsetting Percutaneous Airway Insertion – QuickTrach to Sunset section
	• End Tidal CO2 (ETCO2) Detection
	  ○ Updated information on Initializing / Zeroing

	○ Added info on issue with ETCO2 waveform display when starting CPR After ETCO2 monitoring has started **Medication Access & Delivery** • IV / IO Access & Medications ○ IO Insertion - Added image of Epinephrine extravasation ○ IO Insertion - Added Pressure Infuser Bag use directions ○ Med-Admin - Added Preload Assembly entry • Nasal Atomization ○ Nasal Atomizer – Updated format of entry **Medical Management** • Childbirth Delivery – Shoulder Dystocia ○ Updated pictures and new protocol wording **Trauma Management** • Hemorrhage Control ○ Wound Packing - Updated Wound Packing pictures and directions • Added Pelvic Binding entry
04/29/22	**Advanced Airway Placement** • Updated Adult Supraglottic Airway with revised ETCO2 info • Updated Pediatric Supraglottic Airway with revised ETCO2 info • Updated Endotracheal Intubation with revised ETCO2 info • Updated CPAP with revised ETCO2 info **End Tidal CO2** • Revised Initializing / Placement info regarding order of steps
03/15/22	**Defibrillation** • Updated information regarding the use of ONLY the Disarm button to dump unnecessary charges • Updated information on Pediatric pad use **Synchronized Cardioversion** • Updated information regarding the use of ONLY the Disarm button to dump unnecessary charges • Updated information on Pediatric pad use **Transcutaneous Pacing** Updated information on Pediatric pad use
02/01/22	**Cover Page:** • Updated department logos • Added Version date to footer **Advanced Airway Placement:** • Updated Supraglottic Airway to reflect change to i-gel Resus Pack for Adult patients • Added new Pediatric Supraglottic Airway entry • Updated Endotracheal Tube Placement information on securing and ETCO2 monitoring **End Tidal CO2 Detection:** • Updated to reflect i-gel Resus use and added images and information on troubleshooting **Suctioning:** • Updated Artificial Airway Suctioning entry to reflect i-gel Resus use **Automated External Defibrillator (AED) Use:** • Created new entry focusing on ZOLL AED 3 • Created new entry focusing on use of ZOLL X-Series in AED mode
11/18/21	**Change Log**:

	• Added Change Log **12-Lead Placement / Acquisition / Transmission**: • Added Defib Pad placement for 12-Lead monitoring. • Replaced pictures to correct locations for V1/V2
10/07/21	

EMS Skills Dictionary

Contents

This Page Left Blank

EMS Skills Dictionary

Introduction

The EMS Skills Dictionary is a living document, with the intent of demonstrating the many common and uncommon procedures and skills that are performed by EMS Providers within the Johnson County EMS System. As a living document, the Skills Dictionary will be updated periodically to refine the included techniques and add new skills as they are developed.

The steps in this dictionary are intended to show the current, best practice for the given skill demonstrated and providers should strive to perform the skills as described in this dictionary to standardize the performance of the skills, while individualizing care for each patient.

The steps for performing a given skill, verified by Credentialing, will come from this dictionary, though not all skills in this dictionary will necessarily be verified through Credentialing.

To provide feedback on this document, please email the Office of the Medical Director at jocoemsmd@gmail.com

This Page Left Blank

AIRWAY MANAGEMENT

This Page Left Blank

Basic Airway Clearance and Suction

Positioning

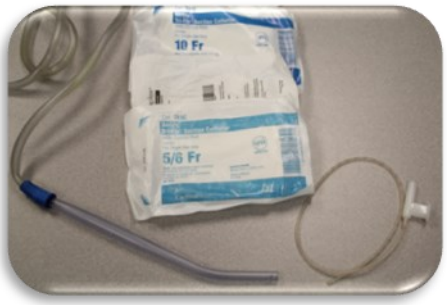
1. **Knowledge Points**
   - ∇ This entry covers the following maneuvers:
     - Opening the airway
     - Oropharyngeal suctioning
     - Nasopharyngeal suctioning
     - Stoma suctioning
   - ∇ For suctioning of Artificial Airways and gastric decompression of the i-gel, see the Suctioning – Artificial Airways entry
2. **Positioning**
   - ∇ Alert patients
     - Sitting up or position of comfort
   - ∇ Altered LOC / Unresponsive patients
     - Turn patient onto their side if able
       - Log roll technique
         - ♦ Turn the patient onto his/her side with the head down to facilitate drainage of blood, vomitus, or other secretions out of the patient's mouth rather than down the throat
         - ♦ If mechanism of injury indicates a possible spinal injury, maintain and protect spinal integrity within reason

   - ∇ Open the patient's mouth if necessary
     - Use appropriate manual airway technique
       - Crossed-Finger / Scissor technique
       - Tongue-Jaw Lift
       - Jaw Thrust

- ∇ Finger sweep if necessary
  - Use the gloved index finger of other hand to sweep the mouth
  - Facilitates clearing the airway of foreign material that may be too large to be handled by the suction equipment - never let the obtaining of equipment delay patient care
  - The airway must be cleared immediately to prevent aspiration

3. Select appropriate suction tip

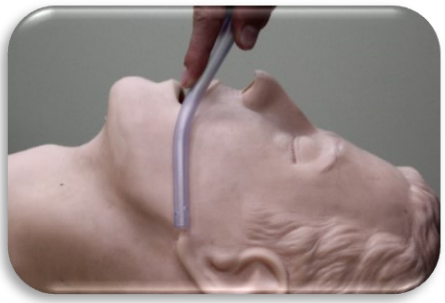
- ∇ Rigid (tonsil) tip (Yankauer)
  - This tip is preferred for suctioning the pharynx as it is less likely to become clogged and the rounded tip is less likely to be traumatic to the soft tissue
- ∇ Flexible catheters
  - A variety of sizes are available and may be tolerated better by a conscious or semi-conscious patient, patients with a stoma or suctioning the nasopharynx
  - Suctioning a patient with clenched teeth can also be accomplished easier with this type of tip because it can be placed along the teeth back into the mouth or nasally
- ∇ Suction tubing
  - At times the largest flexible catheter or the Yankauer tip will not able to suction particulate matter from the airway. The suction tubing itself without a suction tip on it can be utilized to suction thicker, particulate secretions from airway if needed



Oropharyngeal Suctioning

1. Oropharyngeal Suctioning

- ∇ Measure the tip
  - ○ Measure the Yankauer suction tip from the tip of the patient's earlobe to the corner of their mouth
    - Measuring the tip prevents the suction tip from being placed too deep into the pharynx causing soft tissue damage. In a conscious or semi-conscious patient this could stimulate vomiting.



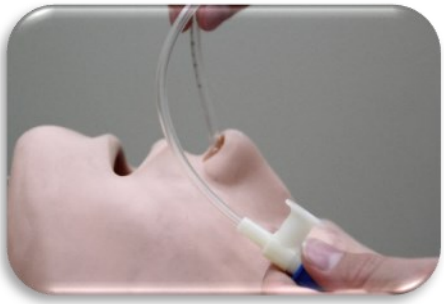
- ∇ Insert the tip with suction not applied (general rule for all suction techniques)
  - ○ Prevents suction tip from attaching to the soft tissue when inserting the tip. The tonsil tip should be inserted with its convex side along the roof of the mouth until the pharynx has been reached

- ∇ Apply oropharyngeal suctioning
  - ○ Apply suction to the pharynx and dependent buccal area
    - The suction tip must be continuously moved to prevent the catheter from attaching to the soft tissue. Try to limit suctioning to 15 sec. A complication of suctioning is hypoxia. After the airway is cleared supplemental oxygen must be administered to help prevent or counteract hypoxia

This Page Left Blank

Nasopharyngeal Suctioning

1. **Nasopharyngeal suctioning**
   - ∇ Measure the tip of the same way as for a nasopharyngeal airway
     - See nasopharyngeal airway skill entry
   - ∇ Moisten tip with water or a water-soluble lubricant
     - A flexible tip must be used for this type of suctioning. Select one small enough to fit into the nostril. A rigid tip is too large to be inserted into the nostril and would cause extensive damage to the nasal mucosa. Moistening and/or apply a water-soluble lubricant to the tip lubricates the catheter for easier insertion
   - ∇ Insert the tip gently through one of the nostrils using a slight downward slant to the back of the throat with suction not applied
     - Application of suction while inserting the tip into the pharynx increases the risk of damage to the pharyngeal mucosa. This procedure can be done with a nasal airway in place

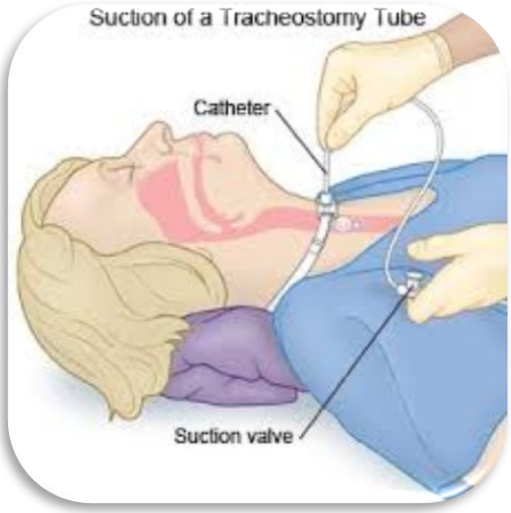


   - ∇ Apply suction intermittently
     - Suction until the airway is clear, limiting suctioning to no more than 15 seconds and administer supplemental oxygen to counteract or prevent hypoxia. Intermittent suctioning and rotating of the catheter between the thumb and forefinger prevents injury to the lining of the pharynx

Stoma / Tracheostomy Suctioning

1. **Stoma/tracheostomy suctioning**
   - ∇ Remove all coverings
     - Allows for visualization and access to stoma

   - ∇ Clear the stoma of any foreign matter
     - The airway must be cleared to prevent aspiration
   - ∇ This is a sterile procedure and every precaution should be taken to keep the suction catheter tip sterile
     - A sterile surface becomes contaminated as soon as the sterile surface comes in contact with anything, surface or object, considered not sterile. Sterile objects may touch other sterile objects and remain sterile. If you are unsure about the sterility of an object, consider it contaminated
   - ∇ Moisten tip with sterile water and/or apply a water-soluble lubricant
     - Moistening and/or application of water-soluble lubricant to the tip lubricates it for easier insertion
     - A flexible tip must also be used for this type of suctioning. Select one small enough to get through the stoma. A rigid tip is too large to be inserted and would cause extensive soft tissue damage
   - ∇ Insert tip gently, approximately 2-3 inches through the stoma
     - Suction until the airway is clear, limiting suctioning to no more than 15 seconds. Administer supplemental oxygen to counteract or prevent hypoxia. Intermittent suctioning and rotating of the tip between the thumb and forefinger prevents injury to the soft tissue of the lower airways
   - ∇ Apply intermittent suctioning as the tip is slowly withdrawn



- ∇ Flush tip and tubing with water as needed
  - Place suction tip in water with suction applied and flush the catheter and tubing as necessary
    - To prevent clogging of the tubing after suctioning is accomplished flush all emesis from tip and tubing into collection bottles. This contains the emesis for easier disposal and infection control

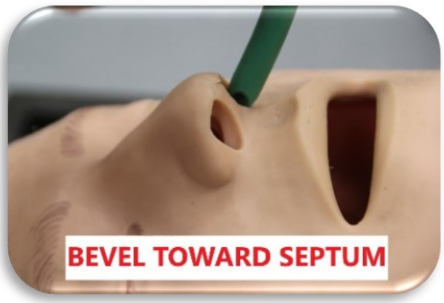
Basic Airway Maneuvers

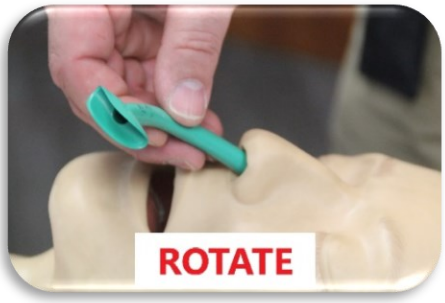
Nasopharyngeal Airway

1. **Select appropriately sized airway**
   - ∇ Measure airway from the patient's nares to angle of jaw
   - ∇ Apply lubricant as needed

2. **Insert airway**
   - ∇ Insert airway posteriorly (backwards), not superiorly (upwards)

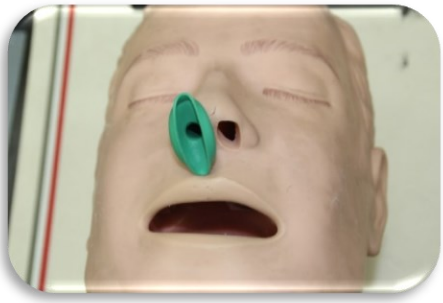
   - ∇ If for some reason, resistance is met, do not force. The airway can be placed in the other nare
     - The airway must be oriented with the bevel against the septum (the airway will not be in a position resembling the natural curvature of the nose in the beginning if placing in the left nare)
     - Once entry into the nare has been made, gently rotate the airway until it is oriented like the natural curvature of the nasal cavity and advance straight down





3. Verify position

- ∇ If properly inserted the flange of the airway should rest on the nares



Oropharyngeal Airway

1. **Select appropriately sized oropharyngeal airway**
   - ∇ Hold the airway in the position it will be oriented once inserted
   - ∇ Place against the side of the patient's face – measure the airway by placing the flange portion of the airway at the corner of the patient's mouth and the end of the curve at either the angle of jaw or the tip of the ear

2. **Insert airway**
   - ∇ Insert using one of the following methods:
     - Insert the airway with the end pointing towards the roof of the mouth until it contacts the posterior pharyngeal wall.
     - Next, rotate the airway 180° and insert until the flange rests on the patient's lips. The airway curvature should now follow the natural curvature of the patient's airway.



OR

- Insert the airway with the end pointing towards the patient's cheek.
- When in contact with the posterior pharyngeal wall rotate 90° so that the airway will now follow the natural curvature of the patient's airway.
- Advance the airway until the flange rests on the patient's lips.


OR

- Depress the patient's tongue using a tongue blade.
- Insert the airway already aligned with the curvature of the patient's airway and advance over the tongue until it rests on the patient's lips.

3. Monitor airway status

- ∇ Assess patient's airway for signs of retching or vomiting following insertion

Bag-Valve-Mask (BVM) 1-Person and 2-Person

1. **Select/assemble equipment**
   - ∇ Assemble bag, reservoir

   - ∇ Attach BVM to oxygen supply set at 15 LPM flow and fully inflate reservoir bag, if present
   - ∇ Observe for full inflation of reservoir bag, if present

   - ∇ Select proper size mask
     - A properly sized mask fits over the bridge of the nose and extends to rest on the chin

2. Apply and maintain face-to-mask seal

∇ *1-Person technique EC Technique*

- Work facing the top of patient's head when environment allows
- Position mask by placing pointed end of mask over the patient's nose until mask is sealed firmly against the bridge of nose EC technique to completely seal the mask to the face
  - EC technique: Hold mask to face with thumb and index finger and place other fingers under the mandible and bring the chin into the mask until a seal is made
- Head must be maintained in extension throughout this procedure (non-trauma patient)

∇ *2-Person Thenar Eminence Technique*

- Work facing the top of patient's head when environment allows
- Position mask by placing pointed end of mask over the patient's nose until mask is seal firmly against the bridge of nose
- Use the thenar eminence (TE) technique to completely seal the mask to the face
  - TE technique: Hold mask to face with thumbs and place other fingers under the mandible and bring the chin into the mask until a seal is made
- Head must be maintained in extension throughout this procedure. (non-trauma patient)
- The TE technique allows for jaw thrust without head extension for trauma patients

3. Ventilate

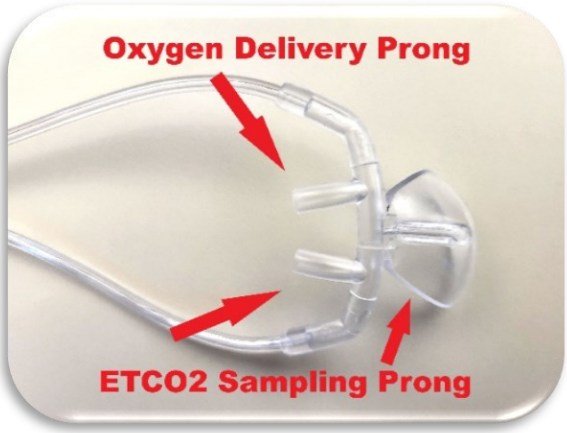
∇ While maintaining face-to-mask seal with one hand, squeeze bag slowly, delivering a ventilation (evidenced by chest rise) over 1-2 seconds (ventilation volume may vary depending on age, clinical situation, and ETC02). Completely release bag and allow for full refill between ventilations.

- During 2-Person Ventilation, 1 Rescuer will squeeze the bag to provide ventilation while the 2nd Rescuer will hold the face-to-mask seal

Use 2 fingers to ventilate

- When monitoring ETCO2 while providing ventilations using a BVM and mask, the CapnoLine nasal cannula provides the most accurate readings.
  - Especially during BVM and mask ventilation, poor mask seal can result in diluted and incorrect readings when using the FilterLine Airway Adapter. Because the CapnoLine nasal cannula samples from much closer to the mouth and nose, it provides more reliable readings when BVM mask seal is not consistent.
  - The tubing of the Capnoline nasal cannula should not create a significant enough leak, where it passes under the CPAP or BVM mask, to result in measurably diluted samples.
  - If the ETCO2 levels are below 35 mmHg (in a perfusing patient), the provider should slow ventilation rate to reach this optimum range.
  - If the ETCO2 levels are above 45 mmHg (in a perfusing patient), the provider should increase ventilation rate to reach this optimum range.

- ∇ The pictures below show use of the CapnoLine nasal cannula under BVM mask.



- ∇ Continue to ventilate (this may vary depending on age, clinical situation, and ETCO2)
- ∇ Watch for gastric distention evidenced by increasing resistance to BVM ventilation and increasing belly size (keep manometer on BVM <20 cmH20 during ventilation to minimize gastric distension).
- ∇ The ADULT Cardiac Arrest patient should be ventilated at 10 breaths per minute
- ∇ The ADULT patient With a Pulse should be ventilated at a rate / volume dependent on their ETCO2 reading:
  - Increase rate and/or volume of ventilation if ETCO2 Capnometry is >45mmHg
  - Decrease rate and/or volume of ventilation if ETCO2 Capnometry is <35mmHg

4. **Reassess patient status**
   - ∇ Continually reassess pulse oximetry, ETC02 and compliance with ventilation

*****For further information on monitoring ETCO2 during Bag Valve Mask ventilation, please see the [End Tidal Capnography Skill Dictionary]**

Advanced Airway Management

Artificial Airway Suctioning

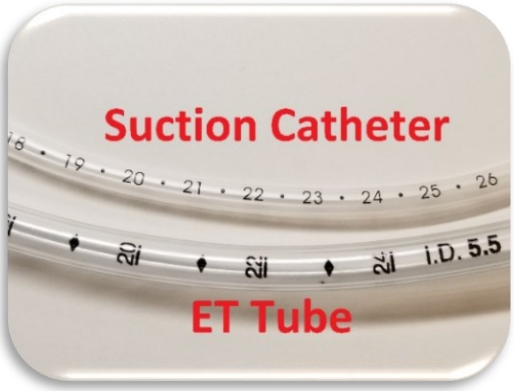
1. Selecting Suction Catheter Size

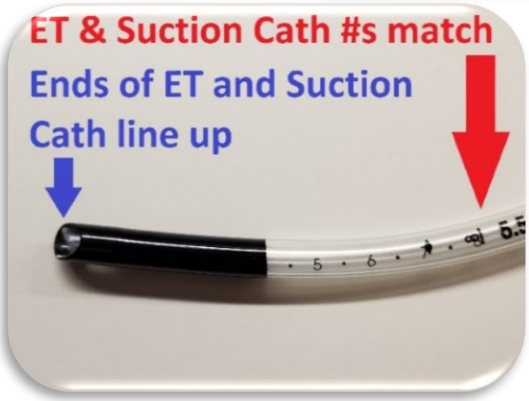
∇ Endotracheal Tube Suctioning

- Don't use a suction catheter size that takes up more than 50% of the airway.
- General rule of thumb is ET Size x2 = Suction Cath Size
  - Do Not round up.
  - See chart below for further assistance in selecting correct suction catheter size
- Determine proper suction tube insertion depth by matching top depth number on ET tube to same depth number on suction catheter during insertion (See pictures below for example)
  - This will place the tip of the catheter just at the end of the ET Tube. You may advance an additional 1-2 cm but doing so could cause trauma to the carina and bleeding in the airway.

∇ ET Suction Catheter Sizing Chart

ET Suction Cath Size Chart	
ET Size	**Suction Size**
2.5	6
3.0	6
3.5	6
4.0	8
4.5	8
5.0	10
5.5	10
6.0	10
7.0	14
7.5	14
8.0	14





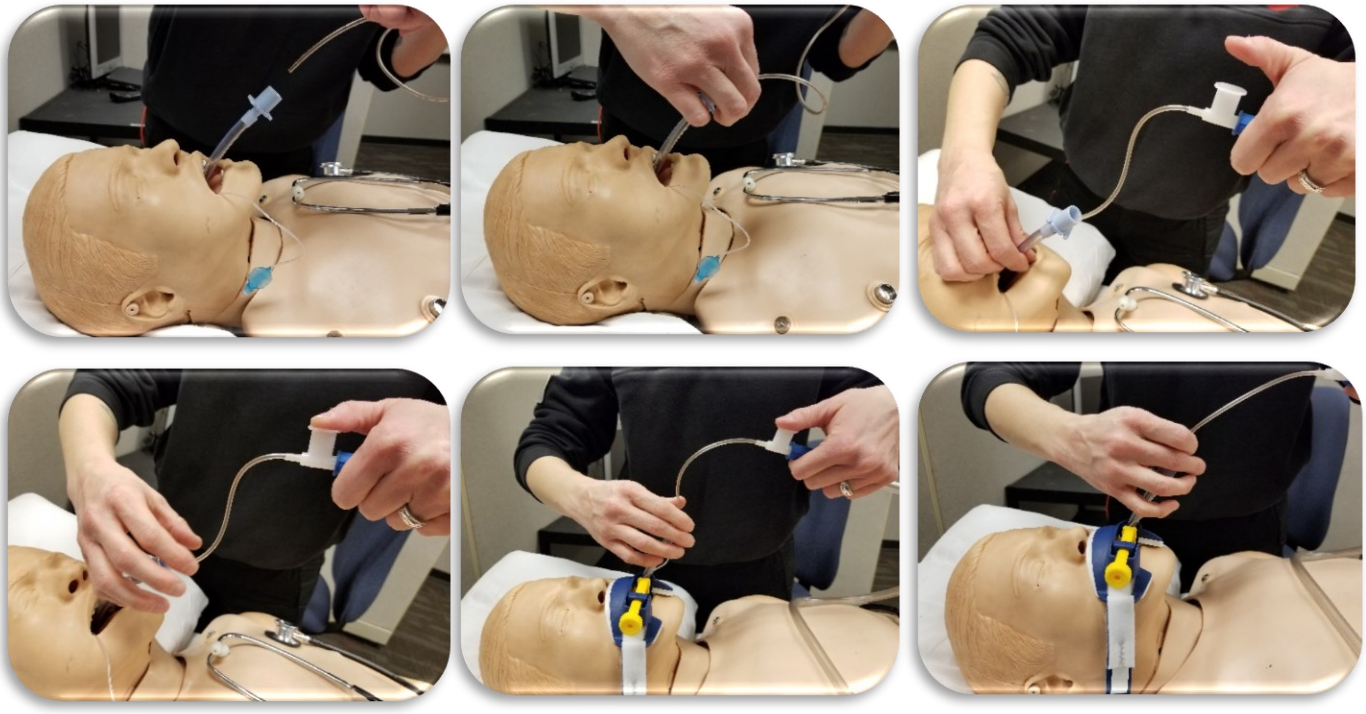
- ∇ I-gel®
  - Airway Lumen Suctioning
    - See chart below for Maximum Airway Suction Catheter size
    - Insert suction up to max depth of approximately 22-23cm on adult size (3-4-5) i-gel®
  - Gastric Suctioning
    - See chart below for Maximum Gastric Suction Catheter size
    - See below for determining insertion length
  - i-gel® Suction Catheter Sizing Chart
    -

Adult i-gel® O2 Resus Suction Cath Size Chart		
i-gel® Size	**Airway Cath Size**	**Gastric Size**
3	14fr	12fr
4	14fr	12fr
5	14fr	14fr

Pediatric i-gel® Anesthesia Suction Cath Size Chart		
i-gel® Size	**Airway Cath Size**	**Gastric Size**
1	8	N/A
1.5	10fr	10fr
2	10fr	12fr
2.5	10fr	12fr

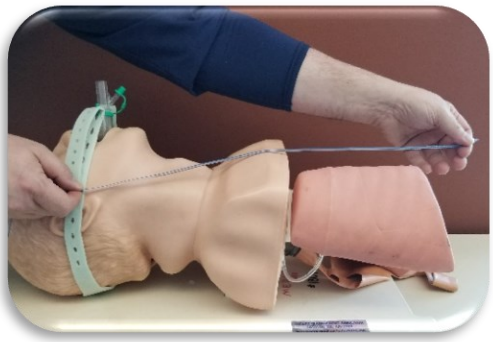
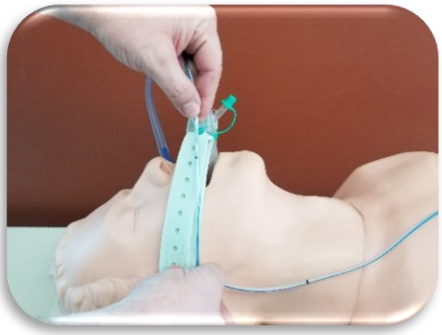
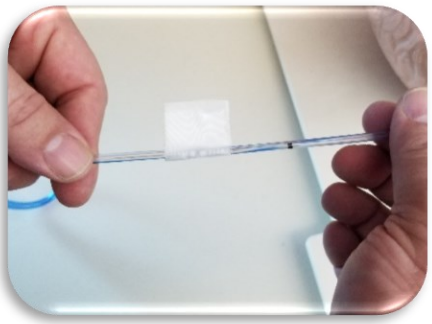
2. Performing Tracheal / Airway Lumen Suctioning (i-gel® or ET Tube)

- ∇ Pre-oxygenation may be necessary
- ∇ See chart above to select correct suction catheter size
- ∇ Select correct suction pressure
  - Adults should typically be set between 80-120 mmHg
  - Pediatrics should typically be set between 60-80 mmHg
  - Sometimes higher settings may be necessary for particularly thick / tenacious materials
  - If device only has "High" and "Low" settings, use High for adults and Low for pediatrics
- ∇ Connect suction catheter to suction device
- ∇ Insert suction catheter into airway to correct depth as described above
  - Insertion should be done without applying suction
- ∇ Occlude Chimney Port / Suction Port to apply suction and slowly remove suction catheter from airway while applying suction
  - It may be helpful to swirl the suction catheter around in the airway during removal
  - Each airway suction pass / attempt should take no more than 10-15 seconds
  - If multiple passes are required to clear airway sufficiently, re-attach BVM and provide some ventilations / oxygenation for 10-15 seconds between passes
- ∇ The pictures below demonstrate airway lumen suctioning on an Endotracheal Tube, but the procedure is the same for suctioning ET Tubes or i-gels®



3. Performing Gastric Decompression (i-gel®)

- ∇ Gastric suctioning may be done to provide gastric decompression which may improve ventilation and reduce chance of aspiration
- ∇ See chart above to select correct suction catheter size
- ∇ Nasogastric suction catheter or Nasopharyngeal suction catheter may be used
  - ○ In adult patients, using a nasopharyngeal suction catheter may not reach all the way into the stomach
- ∇ Measure insertion depth for Gastric Suction Catheter by placing distal tip at patient's xiphoid process, stretching tubing to the ear lobe, then to the airway gastric port
  - ○ Place small piece of tape at this position as insertion stop

- ∇ Lubricate gastric tube or place bolus of lube over gastric suctioning port
- ∇ Advance gastric tube into and through gastric suctioning port until reaching tape stop
  - ○ Do not turn on suction while advancing the catheter



- ∇ Once in place, gastric suctioning should not be done continuously
- ∇ If necessary, you can leave suction catheter inserted and apply suction intermittently

CPAP (Continuous Positive Airway Pressure)

1. Assess need for CPAP

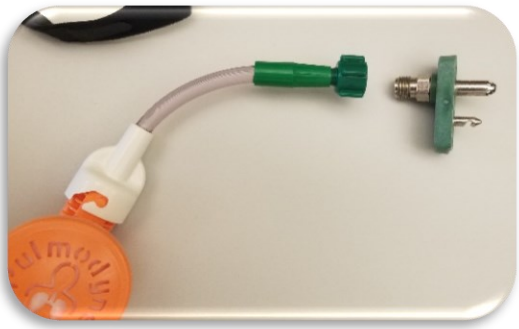
- ∇ Consider CPAP for patients with acute pulmonary edema, asthma, drowning, COPD, and/or pneumonia who show signs and symptoms of acute respiratory distress
  - Patients must meet inclusion criteria before CPAP is used
- ∇ CONTRAINDICATIONS FOR CPAP INCLUDE:
  - Pediatric patients
  - Pneumothorax
  - Nausea / Vomiting / Concern for Aspiration
  - Severely impaired LOC
  - Unable to protect / maintain own airway
  - Hypotension / Shock
  - Cardiac / Respiratory Arrest
  - Recent (<30 days) history of Basilar Skull Fx, Laryngeal / Esophageal / Facial Trauma
- ∇ Apply $ETCO_2$ nasal cannula
  - Perform continuous, non-invasive $ETCO_2$ monitoring on all patients who will be actively treated with medications.

2. Gather and Assemble equipment

- ∇ Assemble the Mask and Tubing
  - A properly fitted mask should completely cover the nose and mouth and maintain an effective seal around the cheeks and chin.
  - Mask harness should be loose but connected with the hook and loop fasteners at the forehead.
  - Connect one side of the chin harness and leave the other side undone to make placement on the patient easier.

- Connect tubing to mask port

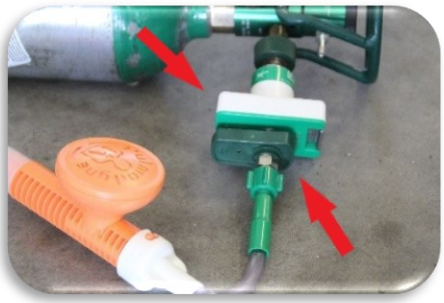
∇ Connect the other end of the CPAP tubing (Orange generator and pigtail) to the quick connect adaptor



∇ Attach female quick connect coupler to 50 psi outlet on oxygen cylinder.

∇ Connect the quick connect adaptors when ready to begin gas flow.

- There is no need to set an oxygen flow rate.



- ∇ Alternatively, if your department does not have the quick connect adapters, you and screw the CPAP pigtail directly to the threaded outlet on the oxygen regulator

3. Coach patient

- ∇ Inform patient about noise, mask, expiratory resistance, and air flow.
  - Patients are more likely to cooperate with CPAP if they are informed of what to expect. Proper coaching decreases patient anxiety and enhances patient compliance.

4. Hold mask near patient's face

- ∇ Leaving strap unsecured, hold mask under patient's chin for a few seconds to acclimate them to noise and air flow
  - Patient will likely cooperate more fully if allowed to feel the mask and air flow before the mask is secured onto their face. Properly fitting equipment is important to attain effective CPAP mask seal.

5. Secure mask to patient's face using straps provided

- ∇ Apply the mask to the patient's face and adjust the straps so that the mask fits securely across the bridge of the patient's nose and above their chin
  - Mask fit creates adequate CPAP mask seal. Apply just tight enough so that mask makes a complete seal. Do not over tighten.
  - Respiratory distress patients, especially those requiring CPAP, should have ETCO2 monitoring. Using the CapnoLine ETCO2 Nasal Cannula under the CPAP mask is the preferred method for capturing ETCO2 with CPAP.
    - The cannula tubing causes very minimal to no leak with proper mask fit.
    - The cannula captures exhaled CO2 directly from the mouth and nose, providing the most accurate reading during CPAP.
    - Using the inline FilterLine adaptor may give an incorrectly low reading due to dilution from the oxygen flow of the CPAP.

- ∇ Check for air leaks around the mask
  - If air leaks are noted, readjust mask and/or straps to insure better fit.
  - Mask can be moved aside for administration of ASA or sublingual nitroglycerine if indicated
- ∇ If an effective fit is not possible with the medium mask, switch to the larger mask for a more efficient fit

6. Reassess and monitor patient

- ∇ Assess vitals and 1-5 Respiratory Assessment every 5 minutes
  - 1-5 scale coupled with vital signs and SpO_2 form a reliable picture of patient improvement.
  - Monitoring CPAP system ensures continuous airway flow and constant evaluation of clinical parameters

How hard is it for you to breathe?

1 2 3 4 5

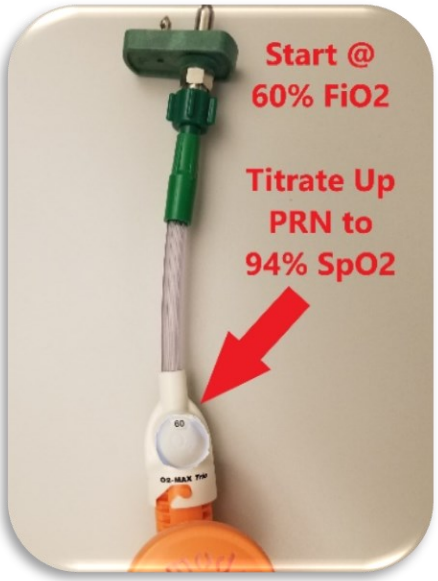
(Not bad) (Very bad)

- ∇ Monitor oxygen supply closely

7. Switch to onboard oxygen supply ASAP once in ambulance

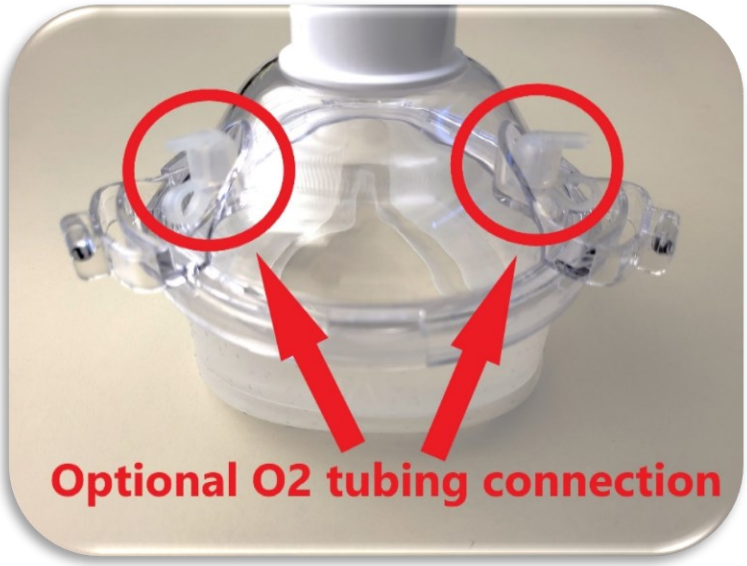
- ∇ Detach CPAP Tubing quick connect adaptor from the oxygen bottle quick connect adaptor and immediately attach the CPAP Tubing quick connect adaptor to high-pressure oxygen port in ambulance.
  - Use of onboard oxygen system minimizes chance of oxygen depletion and system failure. Ensure adequate oxygen remains in portable oxygen supply to ensure CPAP flow into the ED.

- ∇ If, at any time, gas flow is interrupted, for any reason, for more than the time it would take to unplug the quick connect from the oxygen cylinder and plug it into the wall outlet, the CPAP tubing should be disconnected from the mask, or the mask should be removed from the patient.
- ∇ If patient's SpO_2 is <94% upon arrival to ambulance, switch to Trio connector and set to 60% FiO_2.
  - Remove standard connector from orange generator and attach Trio



∇ Titrate Trio FiO_2 up to 90% or back down to 30% when able, based on need, to maintain SpO_2 94-98%

∇ If the Trio is unavailable and increasing FiO2 is still necessary, consider:
- Flowing up to 6LPM through nasal cannula under the mask.
  - Consider increasing oxygen flow rate beyond 6LPM if patient tolerates increased flow.
- Flowing 6-8LPM of oxygen through the connected nebulizer, with, or without medication.
  - See section below regarding nebulizer use.
- There is a port on the lower corners of the mask near the clips that oxygen tubing can be connected to for flows up to 15LPM.



8. Communicate patient status to ED

- ∇ Make early hospital contact.
  - Early hospital contact ensures that adequate resources are ready at the ED on patient arrival.

9. Adding a Nebulizer (when necessary)

- ∇ ***See also Medication Administration – Nebulized Delivery Skills Dictionary**
- ∇ Select medication
- ∇ Perform Medication Cross-Check
- ∇ Place medication in nebulizer cup
- ∇ Remove cap from bottom port on T-piece and attach nebulizer cup

- ∇ Connect nebulizer tubing to oxygen source and flow at 6-8 LPM
  - Same bottle can be used to run CPAP and Nebulizer if necessary, but will result in faster depletion.
  - Monitor oxygen supply closely

End Tidal CO2 (ETCO2) Detection

This Skills Dictionary entry covers the detection / measurement of End Tidal CO2 (ETCO2) using the following devices:

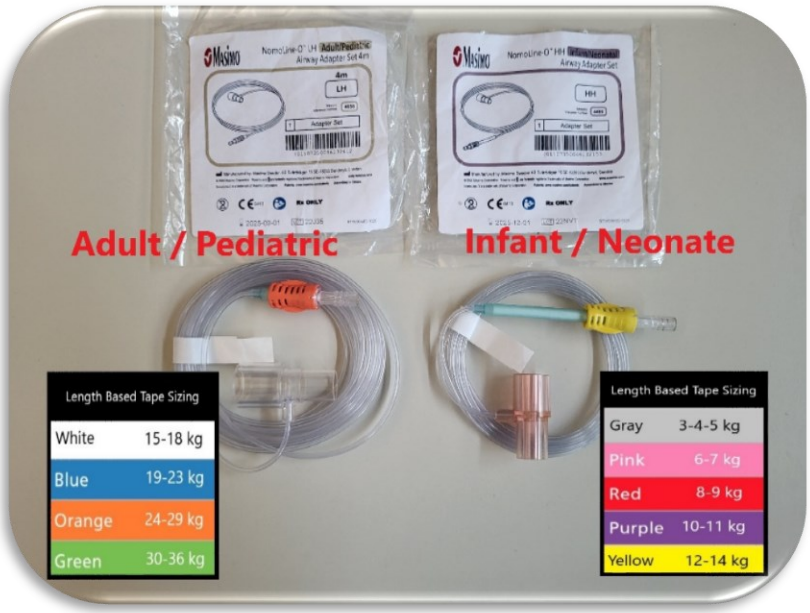
End Tidal Waveform Capnography using the Zoll X-Series Monitor
Easy Cap Colorimetric CO2 Detector

End Tidal Waveform Capnography

1. Selecting the correct sampling device

- ∇ The ETCO2 Nasal Cannula should be used to monitor the ETCO2 of any patients without an advanced airway placed
- ∇ The ETCO2 Nasal Cannula is the preferred method for ETCO2 monitoring for patients receiving CPAP or BVM/Mask ventilation

- ∇ The Filterline Airway Adapter should be used to monitor the ETCO2 of any patients with any advanced airway
  - Supraglottic Airway, Tracheostomy, Surgical / Percutaneous Airway, ET Tube
  - The Filterline Airway Adapter is available in 2 sizes
    - Adult patients use the Adult / Pediatric Filterline Adapter
    - Pediatric patients who measure *White and Larger* on a Length Based Tape also use the Adult / Pediatric FilterLine Adapter
    - Pediatric patients who measure *Yellow and Smaller* on a Length Based Tape use the Infant / Neonate FilterLine Adapter
    - Using the Adult/Pediatric Filterline on patients Yellow and smaller will result in false low readings or failure to read ETCO2 due to too much dead space in the Filterline



2. Initializing (Zeroing) the sampling device

- ∇ *The ETCO2 Filterline Adapter should be connected to the monitor and the zeroing process initiated during the Preparing Equipment phase so it is ready when applied to the airway device and the first breath delivered will include ETCO2 sampling.*
- ∇ There are 3 steps in initializing and applying the sampling device that may be done in any order
  - Plugging the sampling device into the monitor
  - Pressing the CO2 Soft Key to activate the sampling pump
  - Applying the sampling device (ETCO2 Nasal Cannula / FilterLine) to the patient
- ∇ Performing the steps in the order listed above will result in the shortest elapsed time between placing the sampling device on the patient and display of waveforms on the monitor

- ∇ Steps in detail:
  - Plug sampling device into the monitor:
    - Access the ETCO2 sampling port inside the pocket, on the side of the monitor, on the left side of the screen
    - Slide the access port cover down, insert the orange plug and twist clockwise (towards the front of the monitor) until it stops

  - Press CO2 Soft Key on Left side of screen to activate internal suction pump
    - Once the CO2 soft key has been activated, a green light will display in the box to indicate the pump is running

- Once the CO2 soft key has been activated, the Initialization (Zeroing) process will begin and the ETCO2 status will display as “Initializing”
  - ♦ During the Initializing process, no sampling results will be available if the sampling device is already applied to the patient
- When the monitor has completed the ETCO2 zeroing process, the EtCO2 box will display with a “Searching” message until it detects CO2

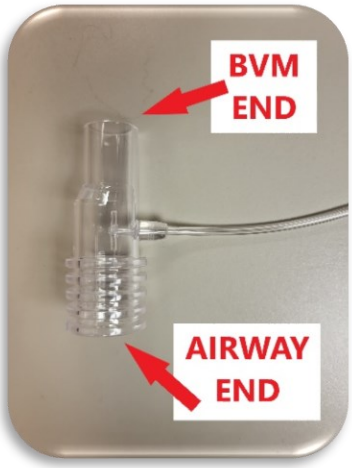
3. Apply sampling device to patient

∇ ETCO2 Nasal Cannula

- Application Steps
  - Check that both nostrils are clear
  - Position ETCO2 Nasal Cannula on the face by inserting tips into the nostrils

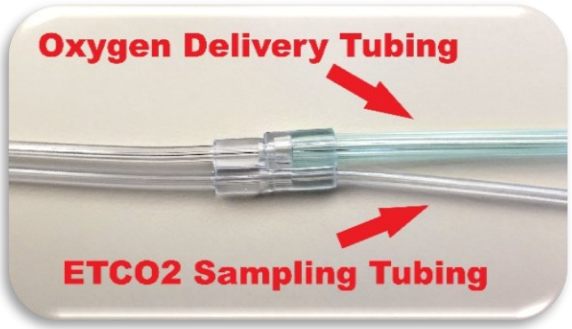
- Pass the tubing over the ears, then slide the sleeve up the tubing toward the neck to a comfortable fit under the chin
- If providing supplemental oxygen, attach green oxygen tubing to an oxygen source and set at appropriate flow rate

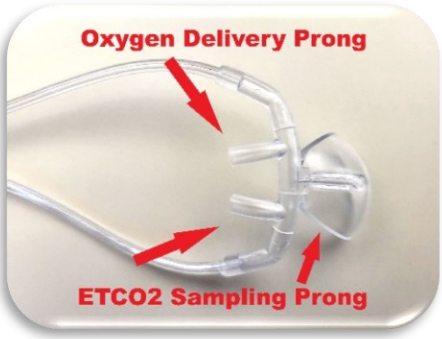
- ∇ Filterline Airway Adapter
  - The Filterline Airway Adapter fits between the advanced airway and the BVM
    - Filterline fits all emergency advanced airways
  - Application steps
    - Ensure mask has been removed from BVM
    - Place wide end of Filterline over the Airway connector
    - Place BVM connector over narrow end of Filterline



4. Sampling and Monitoring ETCO2

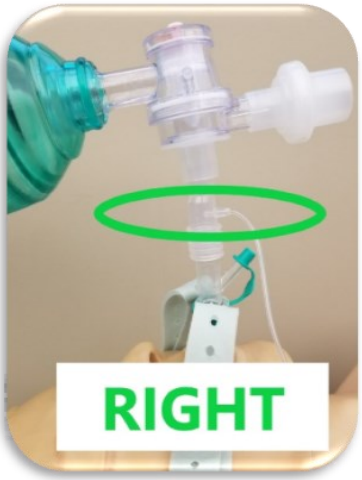
- ∇ Monitoring with ETCO2 Nasal Cannula
  - The ETCO2 nasal cannula can be used solely to monitor ETCO2, or it can be used in conjunction with oxygen flow to provide supplemental oxygen support
    - The cannula prongs are separated on the inside of the device
      - ♦ Oxygen is delivered to the prong on the patient's Left.
      - ♦ ETCO2 is sampled from the prong on the patient's Right.
        - ▪ ETCO2 sampling is also done from the small cup that hangs in front of the patient's mouth, if equipped.

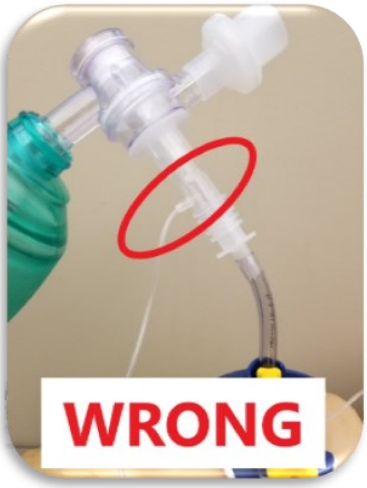




- Monitoring ETCO2 during CPAP or BVM with Mask
  - When monitoring ETCO2 while providing CPAP therapy or ventilations using a BVM and mask, the ETCO2 Nasal Cannula provides the most accurate readings
  - Especially during mask ventilation, poor mask seal can result in diluted and incorrect readings when using the FilterLine Airway Adapter.
    - Because the ETCO2 Nasal Cannula samples from much closer to the mouth and nose, it provides more reliable readings when BVM mask seal is not consistent
  - The tubing of the ETCO2 Nasal Cannula should not create a significant enough leak, where it passes under the CPAP or BVM mask, to result in measurably diluted samples
  - When monitoring ETCO2 with CPAP therapy, attempt to get a good baseline ETCO2 prior to applying CPAP
    - The flow of CPAP can dilute the ETCO2 sample, you should anticipate a possible 5-15mmHG drop in ETCO2 due to dilution when applying the CPAP. You can still evaluate trends based on the new lower, diluted reading
  - The pictures below show use of the ETCO2 Nasal Cannula nasal cannula under CPAP and BVM mask

- Monitoring with Filterline Airway Adapter
  - To minimize the risk of the sampling line becoming obstructed with airway secretions, the sampling line should never be in a dependent position





- If the sampling line becomes too heavily contaminated with airway fluids, the monitor will go through a purging cycle and a message of “Purging” will replace the ETCO2 numeric value displayed on the screen
  - If the message clears and remains clear, the Filterline tubing does not need to be replaced
  - If the purging cycle does not relieve contamination, replace the Filterline tubing
  - If you see contamination in the line but no message appears, and the wave form appears to display correctly, the Filterline tubing does not need to be changed

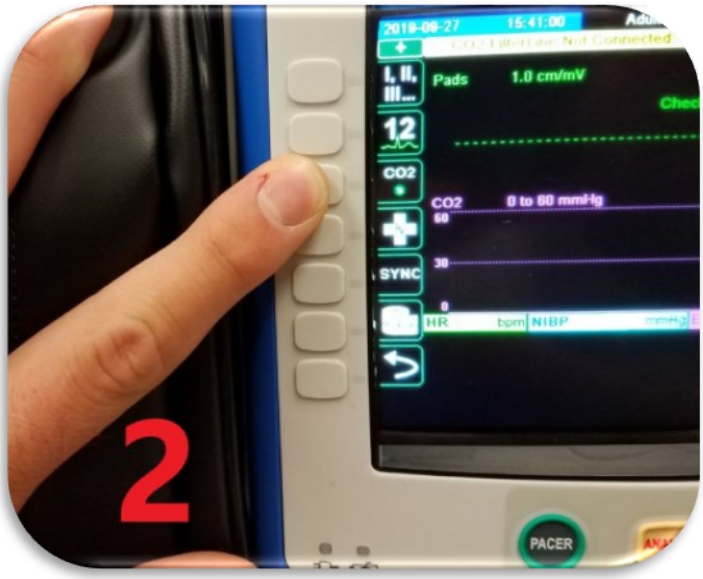
NOTE

If you have been monitoring ETCO2 on a live patient who subsequently goes into Cardiac Arrest and chest compressions are started, the CPR Feedback display will override the display of the ETCO2 waveform.

See below for information on how to resume ETCO2 waveform monitoring in addition to CPR Feedback.

- ∇ There are 2 methods to resuming ETCO2 waveform display when overridden by CPR Feedback display
  - Option 1: Reselect display in Lead III
    - Use the Arrow Keys to highlight and select the "Lead III" Waveform which shows a dotted line and "Lead Fault"
    - A drop-down menu will open. Use the Arrow Keys to highlight and select CO2.
    - The ETCO2 waveform should now appear in the Lead III spot above the CPR Feedback

- ∇ Option 2: Turn CO2 off and back on
  - This will cause interruption in ETCO2 monitoring as it will re-initialize when it turns back on
  - Use the Soft Key Back Button to return to the previous Soft Key Menu
  - Pres the CO2 Soft Key to turn it off
  - Pres the Co2 Soft Key again to turn it back on
  - This will cause the monitor to resume displaying the ETCO2 waveform in the Lead III area but will result in a delay while the monitor re-initializes

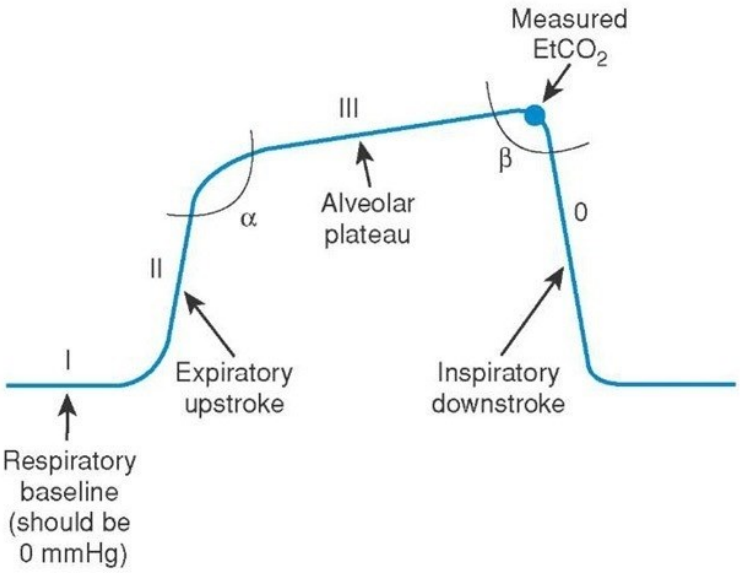


5. Measuring and interpreting ETCO2

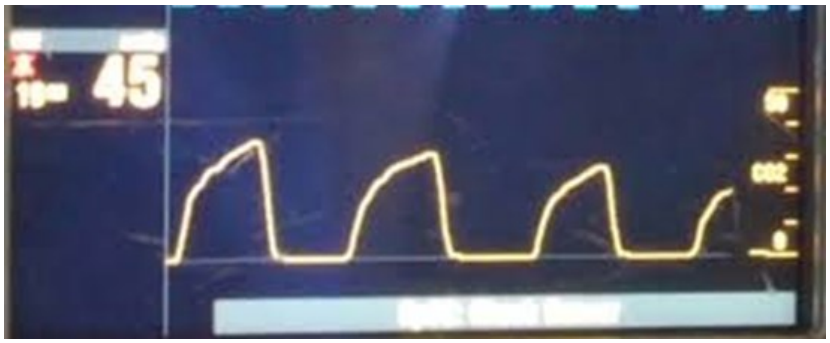
- ∇ The CO2 waveform is automatically displayed in the configured Wave Sector of the monitor when the FilterLine is connected to the CO2 Inlet port
  - A normal $EtCO_2$ waveform should resemble a top hat or a rectangle with rounded corners
    - If the bottom "0" baseline is a solid line registering Zero 30-60 seconds after completion of the initialization / zeroing process and placing the sampling line on the airway, the airway is not patent

- The measurement value (capnometry) for End-Tidal CO2 (ETCO2) is displayed on the monitor as shown below
  - ETCO2 value will be shown at the top of the box
  - Breathing Rate (BR) will be shown in smaller numbers at the bottom of the box

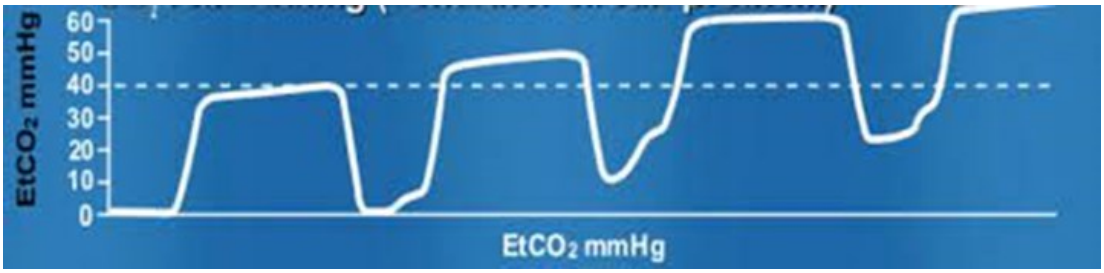
∇ A normal $ETCO_2$ level should be between 35-45 mmHg in a perfusing patient



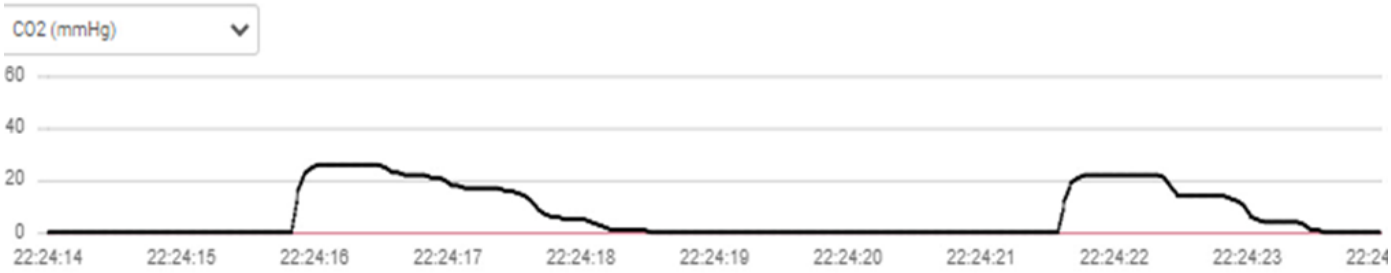
- An abnormal $EtCO_2$ wave form might look like the shapes below
  - Obstructive (Shark Fin) Pattern
    - Indicates lower airway constriction (Bronchospasm) often caused by an obstructive disease process such as COPD or Asthma



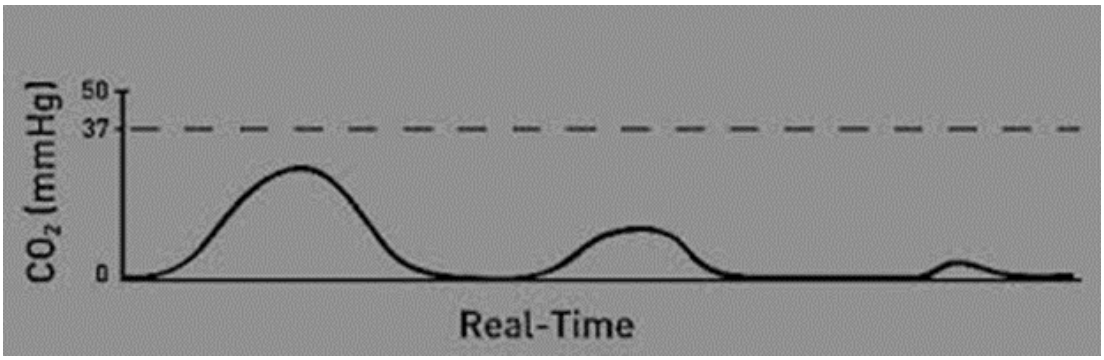
  - Breath Stacking (Rising / Elevated ETCO2 Baseline)
    - Indicates re-breathing of exhaled CO2, often caused by clinician not allowing adequate exhalation time during positive pressure ventilation



  - Downward Inspiratory Slope
    - Indicates mixing of fresh air and exhaled air during ventilation and may be caused by a leak in the glottic seal during positive pressure ventilation which causes inadequate volume being delivered



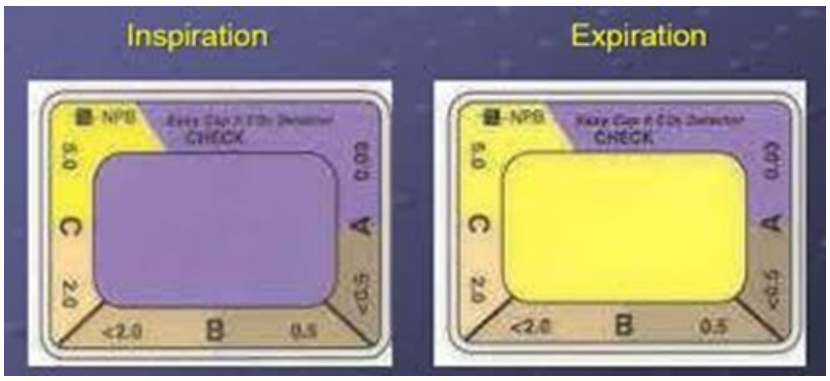
- Rounded Waveforms
  - Indicates mixing of fresh air and exhaled air during ventilation and exhalation and is caused by a leak during all phases of inhalation and exhalation with inadequate volume being



∇ The shape and speed of the waveforms is different on the screen than on the print-out
- When assessing shape of waveform to determine presence of bronchoconstriction, the print-out should be used, rather than relying on the shape of the waveform on the screen
- "The waveform on the screen usually doesn't look like the printout because most cardiac monitors' screens scroll at a rate of 25mm per second and typically display about three seconds of activity at a time. This works well for heart rates. But when a patient takes 12 breaths per minute, you wouldn't see a waveform on the scope. The screen section chosen to display the waveform is sped up about 10 times so the waveform is visible. But when the waveform is printed, it's printed real time on the paper and will be a lot wider than what you see on the scope. So I recommend that the paper capnogram be used to evaluate for airway issues, not the scrolling part on the screen. The scrolling part on the screen can be used to look at a square capnogram (for tube placement confirmation) or apnea (flat line). Everything else should be evaluated on the printout. It's the easiest and most accurate way to study the capnograph." - Bob Page

Easy Cap Colorimetric CO2 Detector

1. **Gather and assemble equipment**
   - ∇ The EasyCap colorimetric device is for use by BLS providers or for ALS providers on a response vehicle without a cardiac monitor, when placing an advanced airway
     - BLS Clinicians may initialize and place waveform capnography in conjunction with use of colorimetric device
   - ∇ The center rectangle will change color with each Inspiration / Expiration cycle. Color determination should be made by identifying the color during exhalation.



   - ∇ When using the Easy Cap colorimetric device:
     - Remove device from package
     - Attach bottom of device to advanced airway device
     - Attach BVM to the other ventilation port

2. **Measuring and interpreting EtCO2**
   - ∇ After placement, begin ventilation and watch for color change. A minimum of 6 ventilations should be provided prior to determining color change. This allows for washout of any residual CO2 in the esophagus with improper airway placement
   - ∇ *Purple – Color Range A*
     - Purple color may be the result of a non-perfusing patient or an improperly placed airway. Patient assessment and clinical judgement should be used to determine the cause
       - Possible causes include:
         - ♦ Esophageal intubation (Waveform Capnography should be used on intubated patients)
         - ♦ An improperly seated / incorrect size supraglottic airway could be allowing exhaled gas to go around airway
         - ♦ Very prolonged patient down time
       - Interventions:
         - ♦ Replace supraglottic airway with another size
         - ♦ Verify ET tube is through vocal cords (Waveform Capnography should be used on intubated patients)
         - ♦ Reassess perfusion, CPR effectiveness, patient down time

- ∇ *Tan / Brown / Grey – Color Range B*
  - Colors in this range may be the result of a poorly perfusing patient, or an improperly placed airway. Patient assessment and clinical judgement should be used to determine the cause
    - Possible causes include:
      - ♦ An improperly seated / incorrect size supraglottic airway could be allowing exhaled gas to go around airway
      - ♦ Esophageal intubation with residual CO2 (Waveform Capnography should be used on intubated patients)
      - ♦ Prolonged patient down time
    - Interventions:
      - ♦ Replace supraglottic airway with another size
      - ♦ Verify ET tube is through vocal cords (Waveform Capnography should be used on intubated patients)
      - ♦ Reassess perfusion, CPR effectiveness, patient down time
- ∇ *Yellow – Color Range C*
  - Yellow color indicates a properly placed airway in an adequately ventilated patient

Endotracheal Intubation (Adult) – Direct Laryngoscopy

1. **Knowledge Points**
   - ∇ Use of the bougie described in this section is limited to adult patients (taller than the Broselow tape).
   - ∇ For Pediatric patients who fit on the Length Based Tape, a bougie is not used.
     - See Endotracheal Intubation (Pediatric) Skills Dictionary.
2. **Tips for Success**
   - ∇ Perform the procedure as "Progressive Epiglottoscopy".
     - Start shallow.
     - Move slowly.
     - Identify structures as you approach them:
       - Base of tongue
       - Epiglottis
       - Vallecula
       - Arytenoid cartilage
       - Vocal cords
     - *Plunging the blade in too deeply in the beginning could take you past the epiglottis and increase the difficulty and duration of the attempt.*
   - ∇ Avoiding Trauma to Oropharynx / Larynx:
     - Do not watch the screen while initially inserting the blade or ET tube into the mouth.
     - Directly watch the blade enter the mouth, until you can no longer see the blade tip, then switch to watching the screen.
     - Directly watch the bougie enter the mouth, then switch to watching the screen.
   - ∇ Clearing the tongue out of the way as much as possible is important.
     - When tongue is not swept to the Left effectively, tongue can act as fulcrum for bougie, making bougie placement more difficult or impossible.
     - This will frequently direct bougie to Left posterior-lateral area of the oropharynx.
   - ∇ The Macintosh style blade is preferred with bougie assisted intubation.
     - Because the Mac blade is inserted into vallecula, it stays above the glottic opening and the wider blade is more effective at displacing the tongue.
     - Camera view is slightly farther back and will give wider view to aid in finding bougie tip in camera view.
   - ∇ Hold bougie like a pencil so you have finer control of the tip.
     - The ET tube should not be pre-loaded onto the bougie. This causes more weight and less dexterity in manipulation of the bougie.
   - ∇ Keep your bougie arm close to your body during placement (Shoulder / elbow adducted)
     - "Chicken wing" arm positioning commonly leads to bougie missing glottic space to the Left posterior-lateral area of the oropharynx.
   - ∇ Once ET tube is through the vocal cords, best practice is to maintain visualization of the glottic opening until placement is confirmed using ETCO2 to ensure there is no dislodgement up to that point.

3. Prepare Equipment

- ∇ Don appropriate PPE to cover eyes, nose and mouth
- ∇ During this period, the patient's airway should be managed, and oxygenation and ventilation provided using whatever less invasive means are appropriate and available.
- ∇ Assemble all equipment and have readily accessible

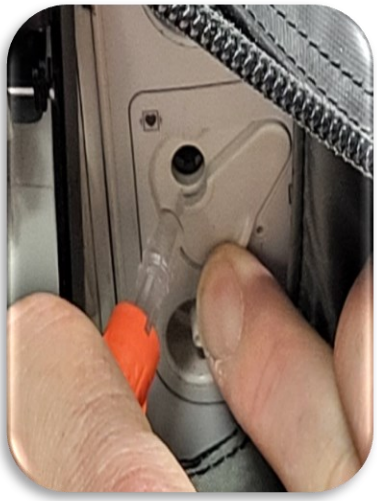
- ∇ Laryngoscope:
  - ○ Blade selection:
    - Adult:
      - ♦ Generally, Miller 3-4 or Mac 3-4
      - ♦ The Macintosh style blade is preferred with bougie assisted intubation because the wider blade is more effective at displacing the tongue.
  - ○ Connect laryngoscope blade to handle and check light / batteries are functional.

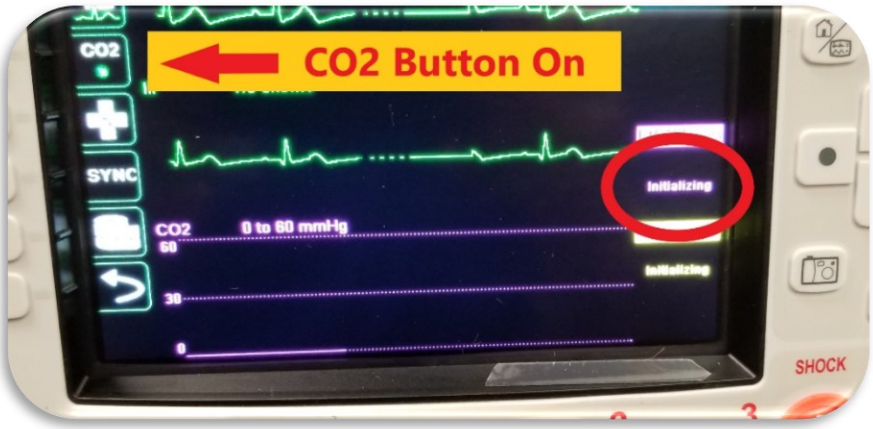
- ∇ Endotracheal Tube
  - ○ Check for cuff leak by inflating with 10mL air.
    - Attempt to minimize contamination by keeping ET Tube in packaging during check.
    - Fully deflate cuff after leak check.
    - Leave syringe attached to pilot balloon (optional).
    - Lubricate end of ET tube.

- ∇ Bougie
  - ○ Straighten the bougie as much as possible but do not straighten the Coudé tip.
    - Leaving too much of a curve near the tip can cause the bougie to get stuck just past the vocal cords, inhibiting further placement of the bougie and ET tube.
  - ○ Ensure you have another dedicated clinician ready to advance the ET tube over the bougie when the time comes.

- ∇ Suction
  - Unsure tubing and rigid suction tip are attached.
  - Check that suction is functioning.
  - *During intubation attempt, suction should be running and placed where the clinician performing the intubation can reach the catheter with their Right hand for quick access to lead with suction or perform SALAD Technique without delay.*

- ∇ ETCO2
  - The ETCO2 filterline should be connected to the monitor and the zeroing process initiated during this time so it is ready when applied to the ET tube and the first breath delivered will include ETCO2 sampling.
  - See Confirm Placement section below for details.





4. Prepare Patient

- ∇ Preoxygenate patient with a pulse
- ∇ Remove dentures which may become loose during insertion and be pushed into airway
- ∇ Place patient in sniffing position unless maintaining Spinal Motion Restriction as necessary
  - Optimal positioning is obtained by aligning the ears with the sternal notch

5. Open the Airway

- ∇ Opening the airway in a Medical Patient
  - Open the mouth widely by performing cross finger scissor maneuver

- ∇ Opening the airway in the Trauma Patient
  - 2nd rescuer establishes manual stabilization from position to the side of the torso
  - Remove anterior portion of C-collar to assure mandibular mobility
  - Open mouth widely by performing cross finger scissor maneuver as demonstrated above

6. Progressive Epiglottoscopy

- ∇ Hold laryngoscope in Left hand.
- ∇ Insert blade in the Right side of mouth and advance tip of blade until just at / past base of the tongue, then sweep the tongue to the Left until the blade is midline in the mouth.
- ∇ Position the blade to visualize cords.
  - Curved Blade
    - Preferred blade for bougie assisted intubation.
    - Advance blade observing for epiglottis.
    - Advance blade until it seats in vallecula.
    - Keeping handle in a vertical position, push laryngoscope upward and away at a 45^{o} angle, without rocking handle backward, indirectly lifting epiglottis.
    - Lift blade and identify arytnoid cartilage.
    - Continue to lift blade and identify glottic opening / vocal cords.
  - Straight Blade
    - Advance blade observing for epiglottis.
    - When visualized, place tip of blade under epiglottis.
    - Keeping handle in a vertical position, push laryngoscope upward and away at a 45^{o} angle, without rocking handle backward, directly lifting epiglottis.
    - Lift blade and identify arytnoid cartilage.
    - Continue to lift blade and identify glottic opening / vocal cords.

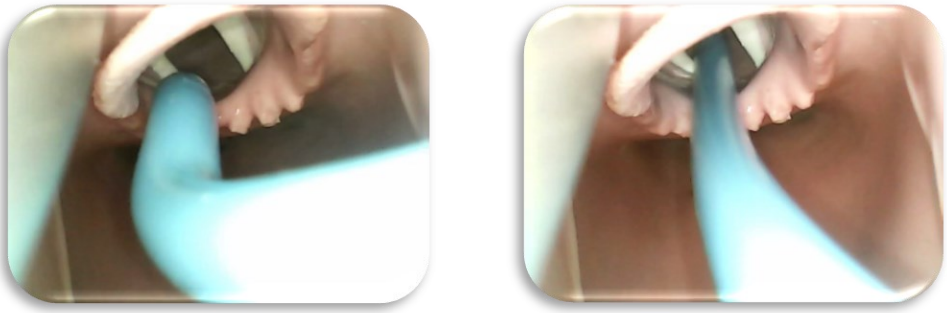
Curved Blade View

Straight Blade View

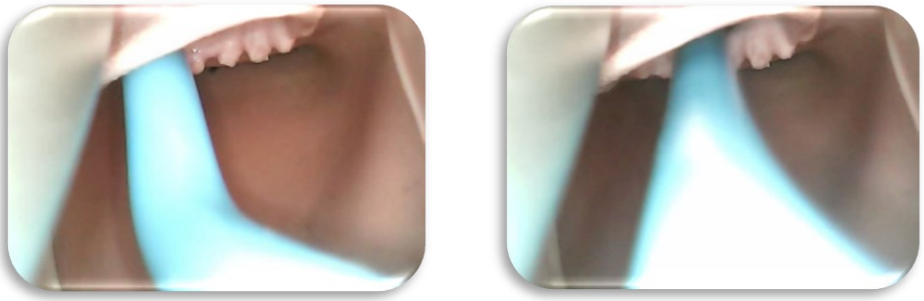
7. Insert Bougie

- ∇ Maintain position of blade and visualization of glottic opening.
- ∇ Advance bougie and continue directing bougie through glottic opening.
  - While directing bougie toward glottic opening, if bougie repeatedly deflects to the left, posterior area of the oropharynx, reposition blade to sweep more of the tongue to the left and re-attempt to insert bougie.
  - If anatomy prevents direct visualization of glottic opening during insertion, direct coudé tip (bent portion) of bougie upwards, past the epiglottis, toward the likely position of the glottic opening and advance bougie.
  - Whether or not glottic opening is able to be visualized during insertion of bougie, continue gently advancing until unable to advance further.
    - If placed in the trachea, the bougie will likely eventually lodge in the right or left mainstem bronchus and fail to advance further.
- ∇ If placed in the esophagus, the bougie will likely be able to be advanced very deeply in the esophagus with little to no resistance, which should alert the clinician the bougie is not correctly placed in the trachea and should be removed and reattempted (after reoxygenation with BVM).
- ∇ Once the bougie is positioned correctly, <u>continue to maintain view of the airway</u> with laryngoscope.
  - Do not remove laryngoscope.

Clear Glottic Opening



Hidden Glottic Opening



8. Insert Endotracheal Tube

- ∇ Have your Airway Partner slide ET Tube over free end of bougie and advance it until you are able to grasp it and continue advancing it over the bougie without taking your view away from the glottic opening

- ∇ Advance the tube through the glottic opening, stopping when the black markings pass through the cords.
  - ○ If the tube gets hung up on the arytenoid cartilages, it may be helpful to rotate the ET tube 360° to make getting through the cords easier.

Clear Glottic Opening

Hidden Glottic Opening

- ∇ While holding tube in place and maintaining visualization of ET tube through glottic opening, have Airway Partner remove bougie.
- ∇ Have Airway Partner inflate cuff with 10mL of air and remove syringe from pilot balloon.
- ∇ Have Airway Partner attach ETCO2 filterline and BVM to confirm placement.
  - See Confirmation below.
- ∇ Once confirmation of placement with ETCO2 waveform capnography occurs, intubating clinician may remove laryngoscope from airway and secure the tube.

9. Confirm Placement

- ∇ Elapsed time from steps 5-8 should be less than 30 seconds.
- ∇ Primary Confirmation is the use of ETCO2 Waveform Capnography.
  - Waveform Capnography is gold standard for confirming placement.
  - See ETCO2 Skills Dictionary for more detailed information on ETCO2 placement and monitoring.
- ∇ *The ETCO2 Filterline Adapter should be connected to the monitor and the zeroing process initiated during the Preparing Equipment phase so it is ready when applied to the ET tube and the first breath delivered will include ETCO2 sampling.*
- ∇ Initializing (Zeroing) and applying the sampling device
  - There are 3 steps in initializing and applying the sampling device that may be done in any order.
    - Plugging the sampling device into the monitor.
    - Pressing the CO2 Soft Key to activate the sampling pump.
      - ♦ *Green light is on when pump is active.*
    - Applying the sampling device (FilterLine) to the patient.

- *Note: The zeroing / initializing process may take 30-60 seconds.
- Contrary to previous teaching, applying the sampling device to the patient prior to completion of the zeroing process will not affect accuracy of readings, but ideally this will have been done prior to ET tube placement.

∇ Ventilate and observe for waveform and numerical reading.

- Due to the monitor's ETCO2 data compression for display on the screen, there is approximately a 3-4 second delay between providing a ventilation and the corresponding waveform displaying on the screen.
- If the monitor has not already been zeroed for this patient, waveforms may not appear until up to 30-60 seconds AFTER CO2 button has been activated even if the sampling device is connected to the patient.
- **If the monitor has not already been zeroed for this patient and you don't have a waveform after 30-60 seconds with ventilation, the airway is not patent.**
- **If the monitor HAS already been zeroed for this patient and you don't have waveform after 10-15 seconds with ventilation, the airway is not patent.**
- **If at any time after initial ETCO2 confirmation, there is no ETCO2 waveform with ventilation, the ET Tube is not patent.**
- **If the ET Tube is not patent, remove the ET Tube.**
  - Leave ETCO2 filterline connected to BVM, attach mask, ventilate, and assess for ETCO2 waveforms.
  - If no ETCO2 waveforms with BVM and mask, continue to troubleshoot.

∇ Once Primary ETCO2 waveform confirmation has been obtained:

- Secondary Confirmation:
  - Auscultate for absence of epigastric sounds and presence of breath sounds.
    - ♦ **Breath Sounds alone, without the presence of waveform capnography, does not indicate a patent airway.**
    - ♦ Condensation in tube is not a reliable form of confirmation.
      - ➢ Esophageal placement may still cause condensation in tube.
    - ♦ Good Bag Compliance alone, without the presence of waveform capnography, does not indicate a patent airway.

∇ Once confirmation of placement with ETCO2 waveform capnography occurs, intubating clinician may remove laryngoscope from airway and secure the tube.

10. Ventilate Patient

- ∇ Continuously monitor End-Tidal Waveforms to ensure proper seal, rate and volume
- ∇ The ADULT Cardiac Arrest patient should be ventilated at 10 breaths per minute
- ∇ The ADULT patient With a Pulse should be ventilated at a rate / volume dependent on their ETCO2 reading:
  - Increase rate and/or volume of ventilation if ETCO2 Capnometry is >45mmHg
  - Decrease rate and/or volume of ventilation if ETCO2 Capnometry is <35mmHg
- ∇ **If there is no End-Tidal waveform with ventilation, the i-gel is not patent**

11. Secure the Tube

- ∇ Continue to hold ET Tube in place, generally by pinching it against the upper teeth or gum.
- ∇ Take note of depth marking placement (Typically 19-23cm at incisors in adult patient).

- ∇ Re-secure C-Collar if Trauma Patient
- ∇ Apply commercial ET Tube securing device.

12. Re-confirm Tube Placement

- ∇ Verify tube depth remains at previous position.
  - Deflate cuff and adjust height PRN.
- ∇ Verify continuation of waveform capnography.
- ∇ Verification should be performed and documented every time the patient is moved.
- ∇ **If there is no ETCO2 waveform with ventilation, the ET Tube is not patent.**

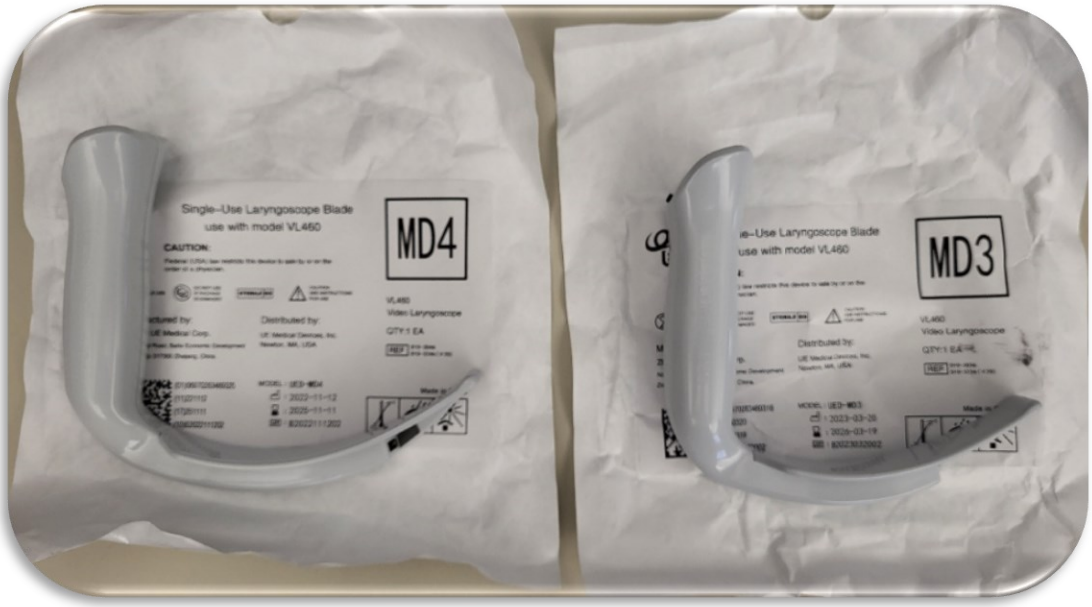
Endotracheal Intubation (Adult) – Video Laryngoscopy

1. **Knowledge Points**
   - ∇ Use of the bougie described in this section is limited to adult patients (taller than the Broselow tape).
   - ∇ For Pediatric patients who fit on the Length Based Tape, a bougie is not used.
     - See Endotracheal Intubation (Pediatric) Skills Dictionary.
2. **Tips for Success**
   - ∇ Lead with Suction
     - Best practice is to always insert the tip of the suction catheter into the oropharynx ahead of the tip of the blade even with no visible airway soiling prior to blade insertion.
     - Emesis or other fluid that is collecting at the glottic opening can then be immediately suctioned.
     - This helps prevent fouling of the camera, requiring blade removal for cleaning, increasing first pass success chance.
   - ∇ Perform the procedure as "Progressive Epiglottoscopy".
     - Start shallow.
     - Move slowly.
     - Identify structures as you approach them:
       - Base of tongue
       - Epiglottis
       - Vallecula
       - Arytenoid cartilage
       - Vocal cords
     - *Plunging the blade in too deeply in the beginning could take you past the epiglottis and increase the difficulty and duration of the attempt.*
   - ∇ Avoiding Trauma to Oropharynx / Larynx:
     - Do not watch the screen while initially inserting the blade or ET tube into the mouth.
     - Directly watch the blade enter the mouth, until you can no longer see the blade tip, then switch to watching the screen.
     - Directly watch the bougie enter the mouth, then switch to watching the screen.
   - ∇ Clearing the tongue out of the way as much as possible is important.
     - When tongue is not swept to the Left effectively, tongue can act as fulcrum for bougie, making bougie placement more difficult or impossible.
     - This will frequently direct bougie to Left posterior-lateral area of the oropharynx.
   - ∇ The Macintosh style blade is preferred with bougie assisted intubation.
     - Because the Mac blade is inserted into vallecula, it stays above the glottic opening and the wider blade is more effective at displacing the tongue.
     - Camera view is slightly farther back and will give wider view to aid in finding bougie tip in camera view.
   - ∇ Hold bougie like a pencil so you have finer control of the tip.
     - The ET tube should not be pre-loaded onto the bougie. This causes more weight and less dexterity in manipulation of the bougie.

- ∇ Keep your bougie arm close to your body during placement (Shoulder / elbow adducted)
  - "Chicken wing" arm positioning commonly leads to bougie missing glottic space to the Left posterior-lateral area of the oropharynx.
- ∇ Once ET tube is through the vocal cords, best practice is to maintain visualization of the glottic opening until placement is confirmed using ETCO2 to ensure there is no dislodgement up to that point.

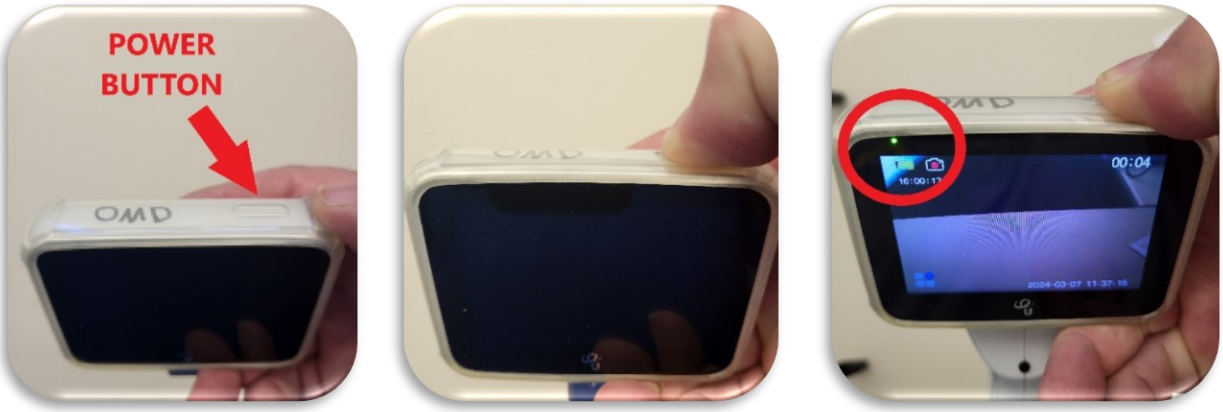
3. Prepare Equipment

- ∇ Don appropriate PPE to cover eyes, nose, and mouth.
- ∇ During this period, the patient's airway should be managed, and oxygenation and ventilation provided using whatever less invasive means are appropriate and available.
- ∇ Assemble all equipment and have readily accessible.
- ∇ UEScope:
  - Blade selection:
    - Adult:
      - ♦ Generally, Mac3 (MD3) to Mac4 (MD4) size

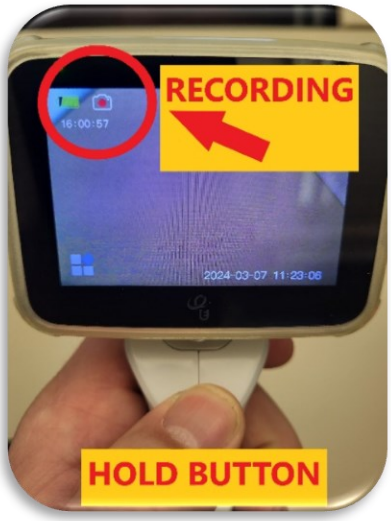


- Assembly / Preparation:
  - With screen facing you, and blade facing away from you, fully insert the monitor's connector into the connector port of the video blade.

  - Press and hold Power button on the Top-Right of the monitor housing until the green light comes on. (2-3 seconds)
  - Ensure Camera / Red Light icon is present in Top-Left corner of screen to indicate recording in progress.



- The UEScope should be programmed to begin recording when it is powered on, but if the Camera / Red Light icon is not present, press and hold the black Record button on the handle for 2-3 seconds until the Camera / Red Light icon appears.

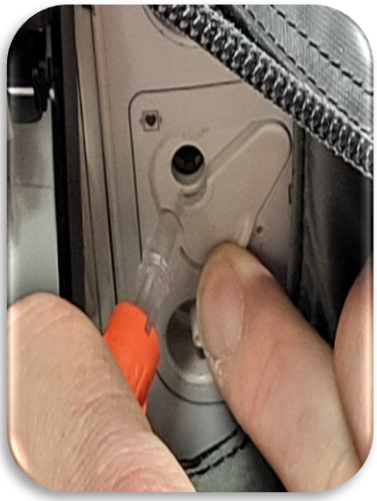


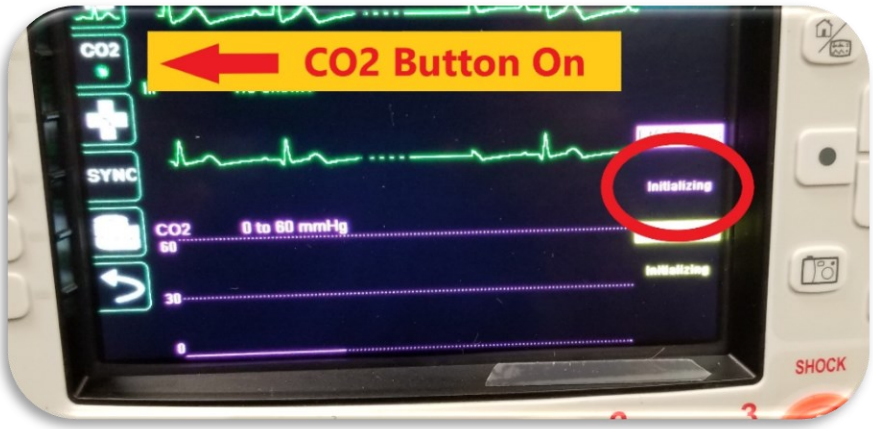
∇ Endotracheal Tube
  - Check for cuff leak by inflating with 10mL air.
    - Attempt to minimize contamination by keeping ET Tube in packaging during check.
    - Fully deflate cuff after leak check.
    - Leave syringe attached to pilot balloon (optional).
    - Lubricate end of ET tube.

∇ Bougie
  - Re-shape bougie if necessary.
  - Bougie should be generally straight along its length but do not straighten Coudé tip.
  - Ensure you have another dedicated clinician ready to advance the ET tube over the bougie when the time comes.

- ∇ Suction
  - Unsure tubing and rigid suction tip are attached.
  - Check that suction is functioning.
  - *During intubation attempt, suction should be running and placed where the clinician performing the intubation can reach the catheter with their Right hand for quick access to lead with suction or perform SALAD Technique without delay.*

- ∇ ETCO2
  - The ETCO2 filterline should be connected to the monitor and the zeroing process initiated during this time so it is ready when applied to the ET tube and the first breath delivered will include ETCO2 sampling.
  - See Confirm Placement section below for details.





4. Prepare Patient

- ∇ During this period, the patient's airway should be managed, and oxygenation and ventilation provided using whatever less invasive means are appropriate and available.
- ∇ Remove dentures which may become loose during insertion and be pushed into airway.
- ∇ Place patient in sniffing position unless maintaining Spinal Motion Restriction as necessary.
  - **Optimal positioning is obtained by aligning the ears with the sternal notch.**
  - Align the smooth area on forehead directly between eyebrows (known as the Glabella) with the point of the chin in a horizontal plane.

5. Open the Airway

- ∇ Opening the airway in a Medical Patient:
  - Open the mouth widely by performing cross finger scissor maneuver.

- ∇ Opening the airway in the Trauma Patient:
  - 2nd rescuer establishes manual stabilization from position to the side of the torso.
  - Remove anterior portion of C-collar to assure mandibular mobility.
  - Open mouth widely by performing cross finger scissor maneuver as demonstrated above.

6. Progressive Epiglottoscopy

- ∇ Hold laryngoscope in Left hand.
- ∇ Watching the tip of the blade directly, insert blade midline, or just Right of midline, keeping the tip of the blade midline, to sweep the tongue left as necessary and advance tip of blade until just at / past base of the tongue.
- ∇ Once the tip of the blade is just at the base of the tongue, shift to watching screen and continue to advance the blade slowly.

- Advance blade until you identify the epiglottis

- Advance blade into vallecula
  - Keeping handle in a vertical position, push laryngoscope upward and away at a 45^{o} angle, without rocking handle backward, indirectly lifting epiglottis.

- Lift blade and identify arytnoid cartilage.

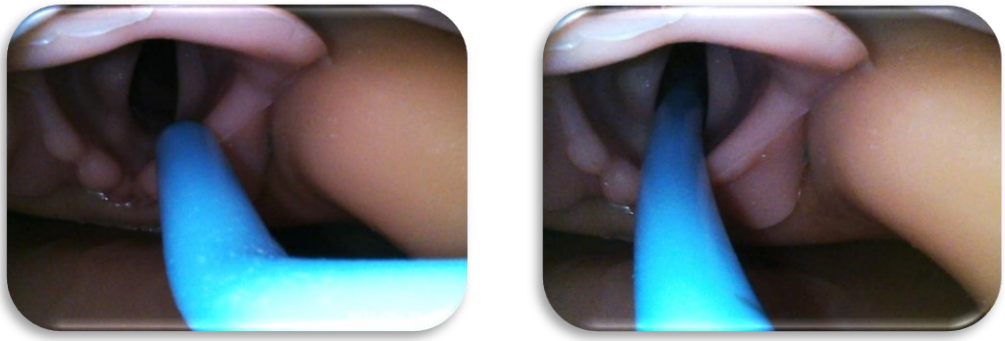
- ∇ Continue to lift blade and identify glottic opening / vocal cords.

7. Insert Bougie

- ∇ Maintain position of blade and visualization of glottic opening.
  - To minimize chance of trauma to the face, mouth, and oropharynx, directly visualize tip of bougie entering the mouth, then return to watching monitor view while advancing the bougie.
- ∇ Advance bougie until tip comes into camera view and continue directing bougie through glottic opening.
  - While directing bougie toward glottic opening, if bougie repeatedly deflects to the left, posterior area of the oropharynx, reposition blade to sweep more of the tongue to the left and re-attempt to insert bougie.
  - If anatomy prevents direct visualization of glottic opening during insertion, direct coudé tip (bent portion) of bougie upwards, past the epiglottis, toward the likely position of the glottic opening and advance bougie.
  - Whether or not glottic opening is able to be visualized during insertion of bougie, continue gently advancing until unable to advance further.
    - If placed in the trachea, the bougie will likely eventually lodge in the right or left mainstem bronchus and fail to advance further.
    - If placed in the esophagus, the bougie will likely be able to be advanced very deeply in the esophagus with little to no resistance, which should alert the clinician the bougie is not correctly placed in the trachea and should be removed and reattempted (after reoxygenation with BVM).

- Once the bougie is positioned correctly, continue to maintain view of the airway with laryngoscope.
  - Do not remove laryngoscope.

Clear Glottic Opening

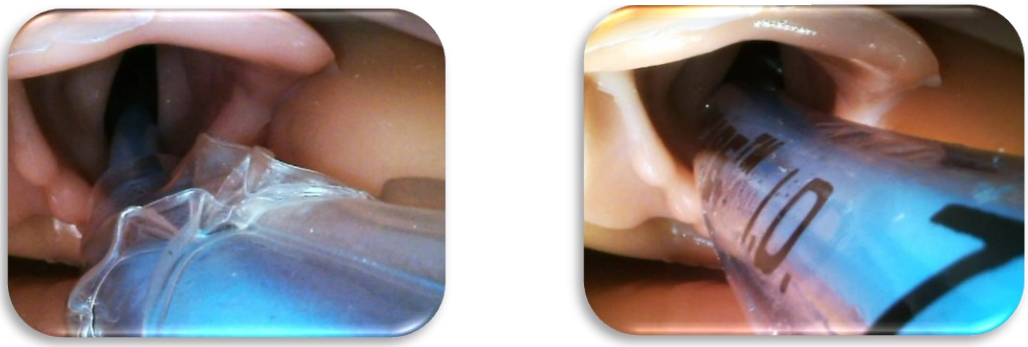


Hidden Glottic Opening

8. Insert Endotracheal Tube

- ∇ Have your airway partner slide ET Tube over free end of bougie and advance it until you are able to grasp the tube and continue advancing it over the bougie without taking your view away from the glottic opening.
- ∇ Advance the tube through the glottic opening, stopping when the black markings or the cuff are just past the cords.
  - ○ If the tube gets hung up on the arytenoid cartilages, it may be helpful to rotate the ET tube slightly either direction to make getting through the cords easier

Clear Glottic Opening



Hidden Glottic Opening

- While holding tube in place and maintaining visualization of ET tube through glottic opening, have Airway Partner remove bougie.

- Have Airway Partner inflate cuff with 10mL of air and remove syringe from pilot balloon.
- Have Airway Partner attach ETCO2 filterline and BVM to confirm placement.
  - See Confirmation below.
- Once confirmation of placement with ETCO2 waveform capnography occurs, intubating clinician may remove laryngoscope from airway and secure the tube.

9. Confirm Placement

- ∇ Elapsed time from steps 5-8 should be less than 30 seconds.
- ∇ Primary Confirmation is the use of ETCO2 Waveform Capnography.
  - Waveform Capnography is gold standard for confirming placement.
  - See ETCO2 Skills Dictionary for more detailed information on ETCO2 placement and monitoring.
- ∇ *The ETCO2 Filterline Adapter should be connected to the monitor and the zeroing process initiated during the Preparing Equipment phase so it is ready when applied to the ET tube and the first breath delivered will include ETCO2 sampling.*
- ∇ Initializing (Zeroing) and applying the sampling device
  - There are 3 steps in initializing and applying the sampling device that may be done in any order.
    - Plugging the sampling device into the monitor.
    - Pressing the CO2 Soft Key to activate the sampling pump.
      - ♦ *Green light is on when pump is active.*
    - Applying the sampling device (FilterLine) to the patient.

- *Note: The zeroing / initializing process may take 30-60 seconds.

∇ Ventilate and observe for waveform and numerical reading.
- Due to the monitor's ETCO2 data compression for display on the screen, there is approximately a 3-4 second delay between providing a ventilation and the corresponding waveform displaying on the screen.
- If the monitor has not already been zeroed for this patient, waveforms may not appear until up to 30-60 seconds AFTER CO2 button has been activated even if the sampling device is connected to the patient.
- **If the monitor has not already been zeroed for this patient and you don't have a waveform after 30-60 seconds with ventilation, the airway is not patent.**
- **If the monitor HAS already been zeroed for this patient and you don't have waveform after 10-15 seconds with ventilation, the airway is not patent.**
- **If at any time after initial ETCO2 confirmation, there is no ETCO2 waveform with ventilation, the ET Tube is not patent.**
- **If the ET Tube is not patent, remove the ET Tube.**
  - Leave ETCO2 filterline connected to BVM, attach mask, ventilate, and assess for ETCO2 waveforms.
  - If no ETCO2 waveforms with BVM and mask, continue to troubleshoot.

∇ Once Primary ETCO2 waveform confirmation has been obtained:
- Secondary Confirmation:
  - Auscultate for absence of epigastric sounds and presence of breath sounds.
    - ♦ **Breath Sounds alone, without the presence of waveform capnography, does not indicate a patent airway.**
    - ♦ Condensation in tube is not a reliable form of confirmation.
      - ➢ Esophageal placement may still cause condensation in tube.
    - ♦ Good Bag Compliance alone, without the presence of waveform capnography, does not indicate a patent airway.

∇ Once confirmation of placement with ETCO2 waveform capnography occurs, intubating clinician may remove laryngoscope from airway and secure the tube.

10. Ventilate Patient

∇ Continuously monitor End-Tidal Waveforms to ensure proper seal, rate and volume

∇ The ADULT Cardiac Arrest patient should be ventilated at 10 breaths per minute

∇ The ADULT patient With a Pulse should be ventilated at a rate / volume dependent on their ETCO2 reading:
- Increase rate and/or volume of ventilation if ETCO2 Capnometry is >45mmHg
- Decrease rate and/or volume of ventilation if ETCO2 Capnometry is <35mmHg

∇ **If there is no End-Tidal waveform with ventilation, the i-gel is not patent**

11. Secure the Tube

- ∇ Continue to hold ET Tube in place, generally by pinching it against the upper teeth or gum.
- ∇ Take note of depth marking placement (Typically 19-23cm at incisors in adult patient).

- ∇ Re-secure C-Collar if Trauma Patient.
- ∇ Apply commercial ET Tube securing device.

12. Re-confirm Tube Placement

- ∇ Verify tube depth remains at previous position.
  - o Deflate cuff and adjust height PRN.
- ∇ Verify continuation of waveform capnography.
- ∇ Verification should be performed and documented every time the patient is moved.
- ∇ **If there is no ETCO2 waveform with ventilation, the ET Tube is not patent.**

Endotracheal Intubation (Pediatric) – Direct Laryngoscopy

***Note – This entry applies to all patients that measure on the Broselow Tape. If a patient is larger than the Broselow Tape, see Endotracheal Intubation with Bougie Skills Dictionary**

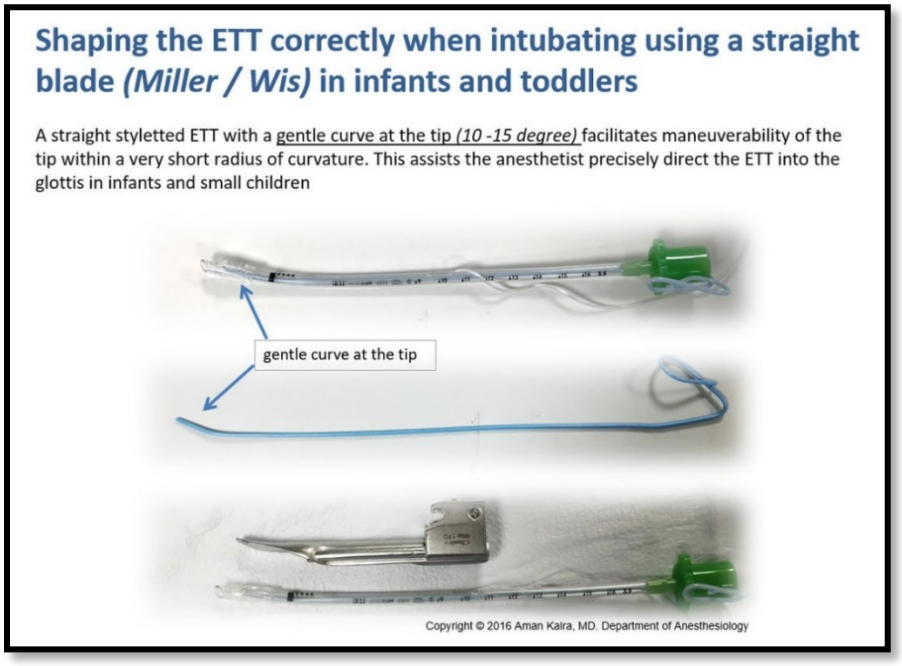
1. **Knowledge Points**
   - ∇ For Pediatric patients who fit on the Length Based Tape, a bougie is not used.
   - ∇ For patients that do not fit on the Length Based Tape, see Endotracheal Intubation (Adult) Skills Dictionary.
2. **Tips for Success**
   - ∇ Perform the procedure as "Progressive Epiglottoscopy".
     - Start shallow.
     - Move slowly.
     - Identify structures as you approach them:
       - Base of tongue
       - Epiglottis
       - Vallecula
       - Arytenoid cartilage
       - Vocal cords
     - Plunging the blade in too deeply in the beginning could take you past the epiglottis and increase the difficulty and duration of the attempt.
   - ∇ Clearing the tongue out of the way as much as possible is important.
     - The tongues of infants and toddlers are much larger relative to the mouth and jaw than an adult.
     - Failure to sweep the tongue to the left leaves no room for visualization of the cords or passage of the ET tube.
   - ∇ Whether using a Miller or Macintosh blade, first attempt to fit the tip of the blade in the vallecula to displace the epiglottis and expose the vocal cords.
     - Small children may have a very large epiglottis in relation to other anatomy or have an under-developed vallecula and may require an alternate approach.
     - If the vocal cords cannot be adequately exposed using the technique above, disengage from the vallecula and slowly advance the Miller or Macintosh blade deeper into the pharynx and directly lift the epiglottis.
   - ∇ Once ET tube is through the vocal cords, best practice is to maintain visualization of the glottic opening until placement is confirmed using ETCO2 to ensure there is no dislodgement up to that point.

3. Prepare Equipment

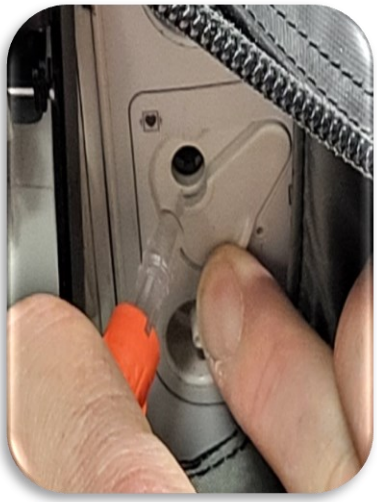
- ∇ Don appropriate PPE to cover eyes, nose and mouth.
- ∇ During this period, the patient's airway should be managed, and oxygenation and ventilation provided using whatever less invasive means are appropriate and available.
- ∇ Assemble all equipment and have readily accessible.
- ∇ Laryngoscope
  - Blade selection:
    - Chart below indicates sizing based on Length Based Tape color:

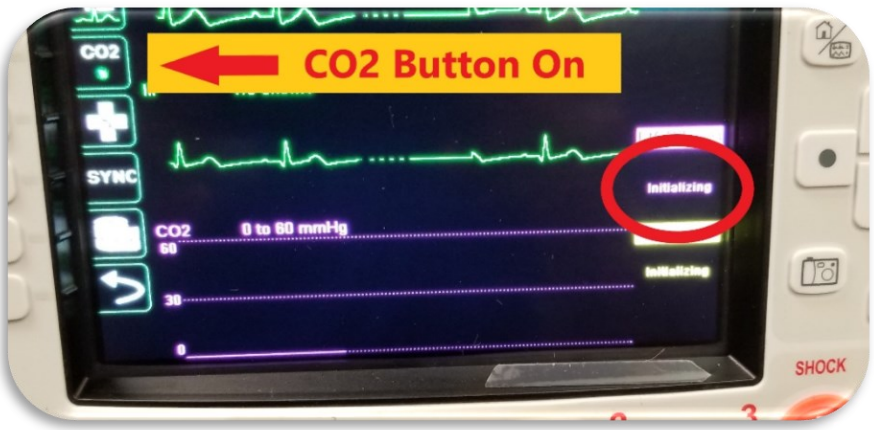
Direct Laryngoscopy Blade Size	
Gray 3-4-5 kg	0-1 Mil
Pink 6-7 kg	1 Mil
Red 8-9 kg	
Purple 10-11 kg	1-1.5 Mil
Yellow 12-14 kg	2 Mil / Mac
White 15-18 kg	
Blue 19-23 kg	
Orange 24-29 kg	
Green 30-36 kg	3 Mil / Mac

  - Connect laryngoscope blade to handle and check light / batteries are functional.
- ∇ Endotracheal Tube
  - Assure stylet is in endotracheal tube and shaped appropriately (See shaping image below).
  - *If there is a cuff:
    - Check for cuff leak by inflating with 5-10mL air.
    - Attempt to minimize contamination by keeping ET Tube in packaging during check.
    - Fully deflate cuff after leak check.
    - Leave syringe attached to pilot balloon (optional).
  - Lubricate tube.
  - Ensure you have another dedicated clinician ready to hand you the ET tube in a manner that allows you to maintain visualization of vocal cords during hand off.



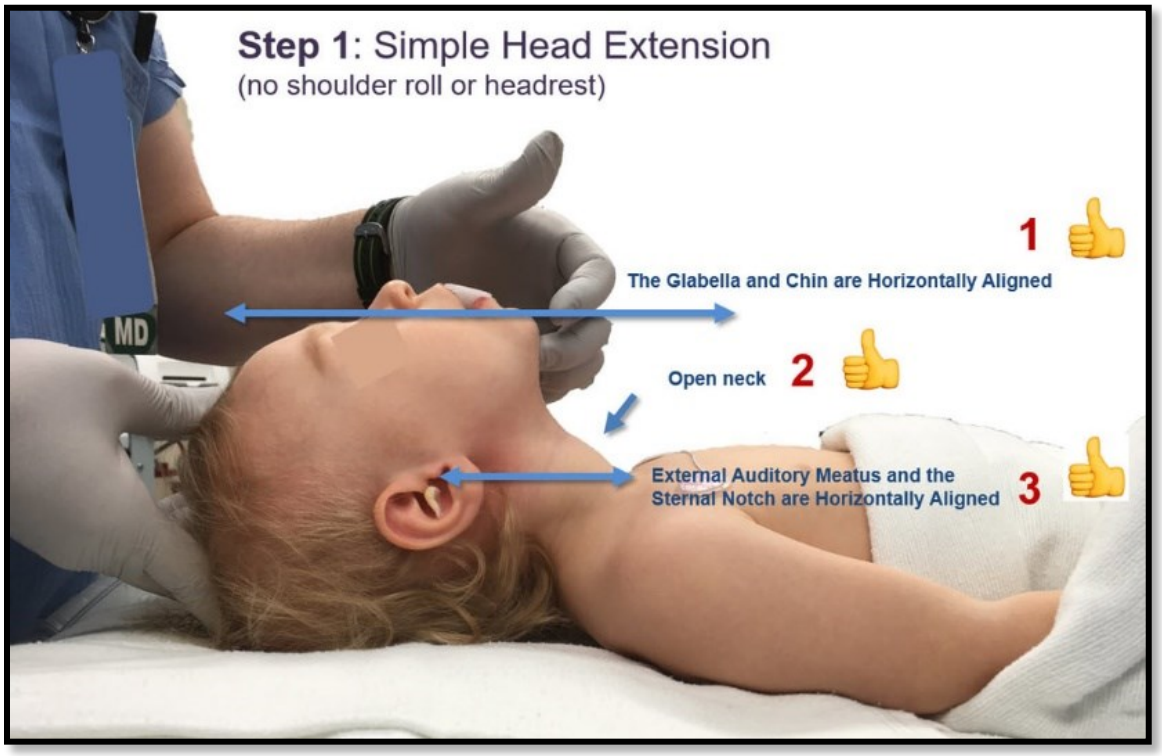
- ∇ Suction
  - Ensure tubing and rigid suction tip are attached.
  - Check that suction is functioning.
  - Ensure all tubing and rigid suction tip is connected.
  - *During intubation attempt, suction should be running and placed where the clinician performing the intubation can reach the catheter with their Right hand for quick access to decontaminate airway without delay.*
- ∇ ETCO2
  - Use FRG to determine correct size of ETCO2 filterline to use.
  - *The ETCO2 filterline should be connected to the monitor and the zeroing process initiated during this time so it is ready when applied to the ET tube and the first breath delivered will include ETCO2 sampling.*
  - See Confirm Placement section below for details.

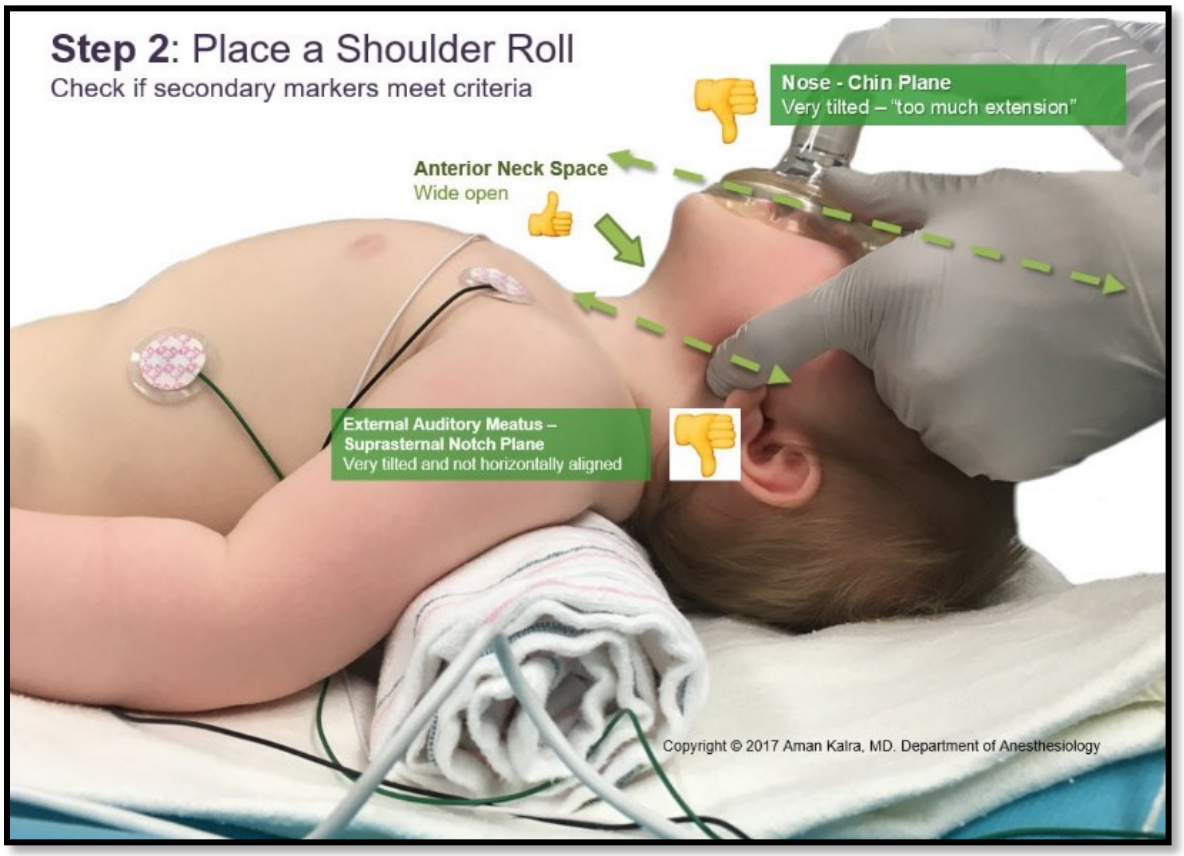


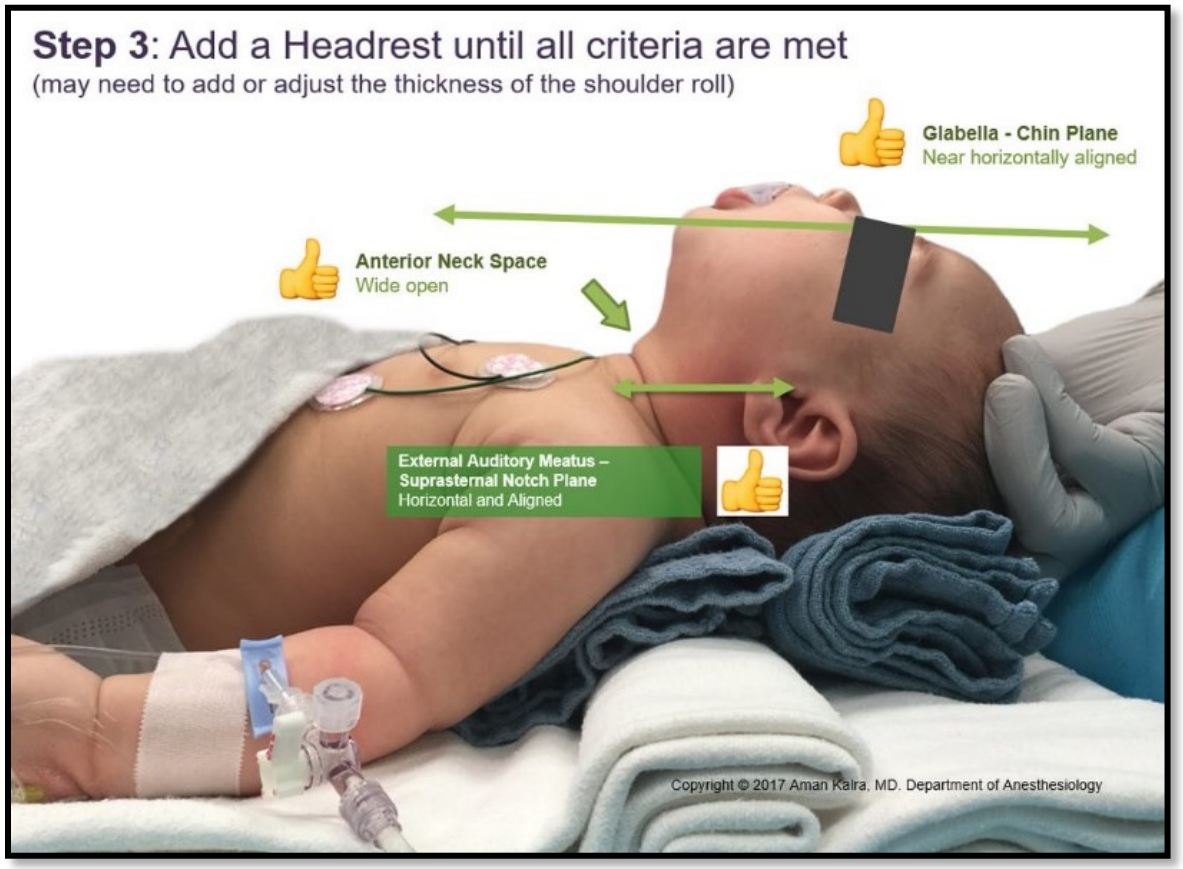


4. Prepare Patient

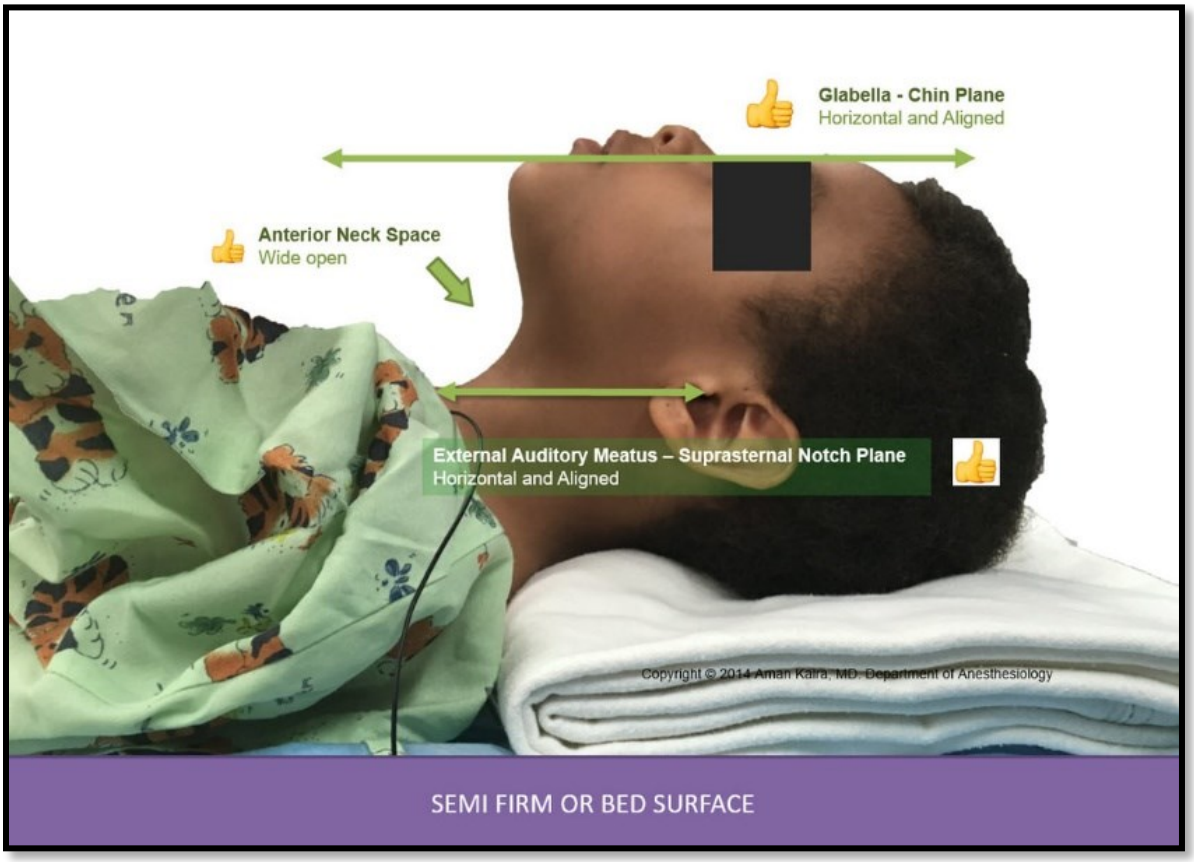
- ∇ Continue to attempt to oxygenate / ventilate with less invasive means
- ∇ Position patient
  - Generally, position all patients in the sniffing position (unless using spinal motion restriction) using padding as necessary to achieve the alignments described below.
    - **Align ear canal with sternal notch on horizontal plane.**
    - Align the smooth area on forehead directly between eyebrows (known as the Glabella) with the the point of the chin in a horizontal plane.
    - For some children, all that is needed is adjustment of the head.
    - Some children will require padding under their shoulders and head.
  - See images below for positioning of Neonates / Infants / Toddlers.

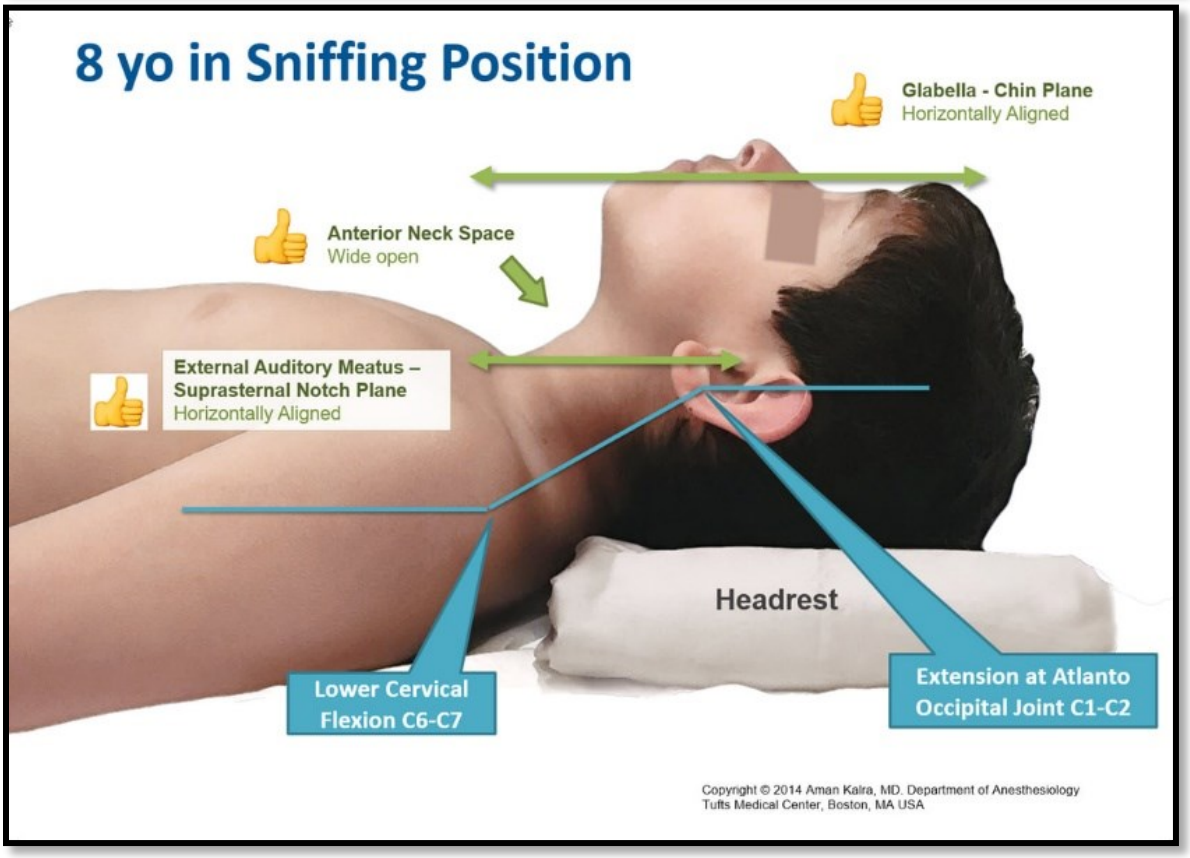



Step 2: Place a Shoulder Roll
Check if secondary markers meet criteria
Nose - Chin Plane
Very tilted – "too much extension"
Anterior Neck Space
Wide open
External Auditory Meatus –
Suprasternal Notch Plane
Very tilted and not horizontally aligned
Copyright © 2017 Aman Kalra, MD. Department of Anesthesiology


Step 3: Add a Headrest until all criteria are met
(may need to add or adjust the thickness of the shoulder roll)
Glabella - Chin Plane
Near horizontally aligned
Anterior Neck Space
Wide open
External Auditory Meatus –
Suprasternal Notch Plane
Horizontal and Aligned
Copyright © 2017 Aman Kalra, MD. Department of Anesthesiology

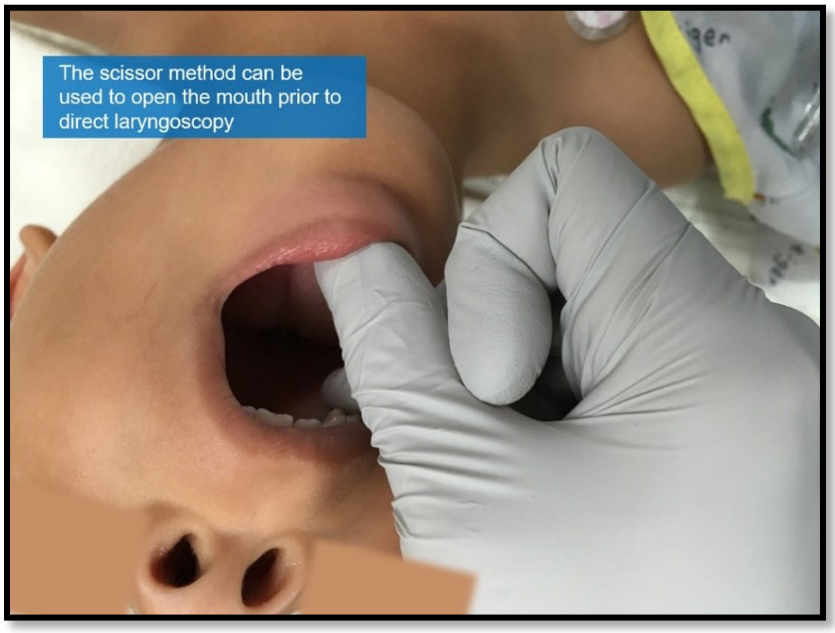
- See images below for positioning of School Age Children





5. Open the Airway

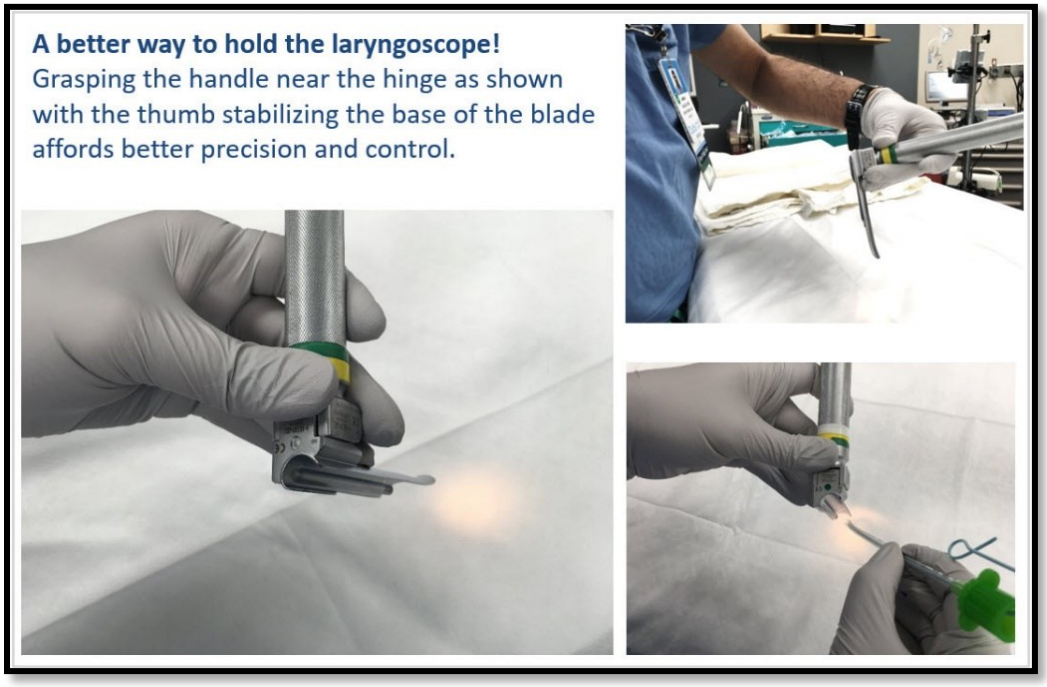
- ∇ Opening the airway in a Medical Patient
  - Open the mouth widely by performing cross finger scissor maneuver



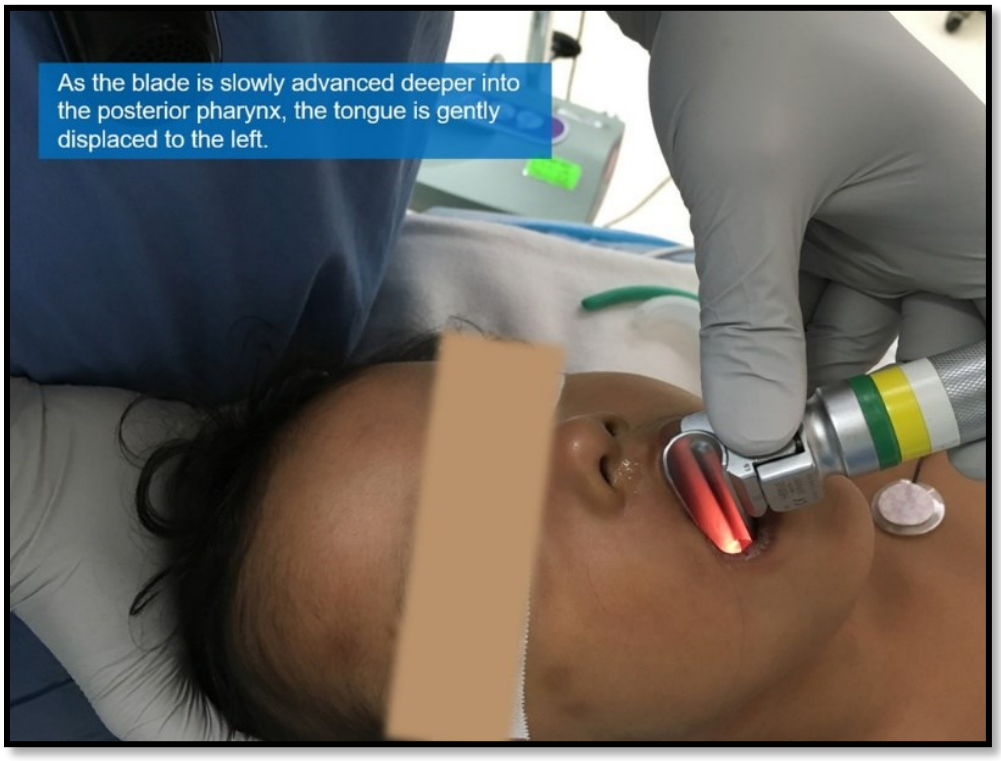
- ∇ Opening the airway in the Trauma Patient
  - 2nd rescuer establishes manual stabilization from position to the side of the torso
  - Remove anterior portion of C-collar to assure mandibular mobility
  - Open mouth widely by performing cross finger scissor maneuver as demonstrated above

6. Visualize the vocal cords / glottic opening

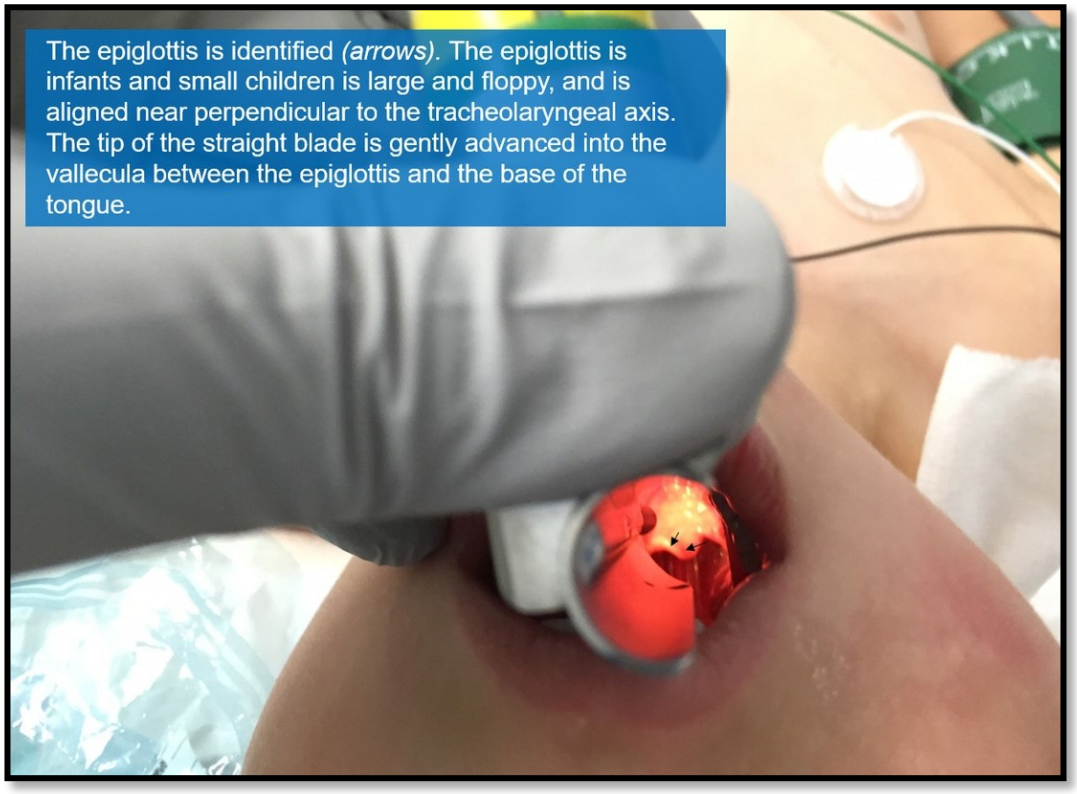
- ∇ Hold laryngoscope in Left hand

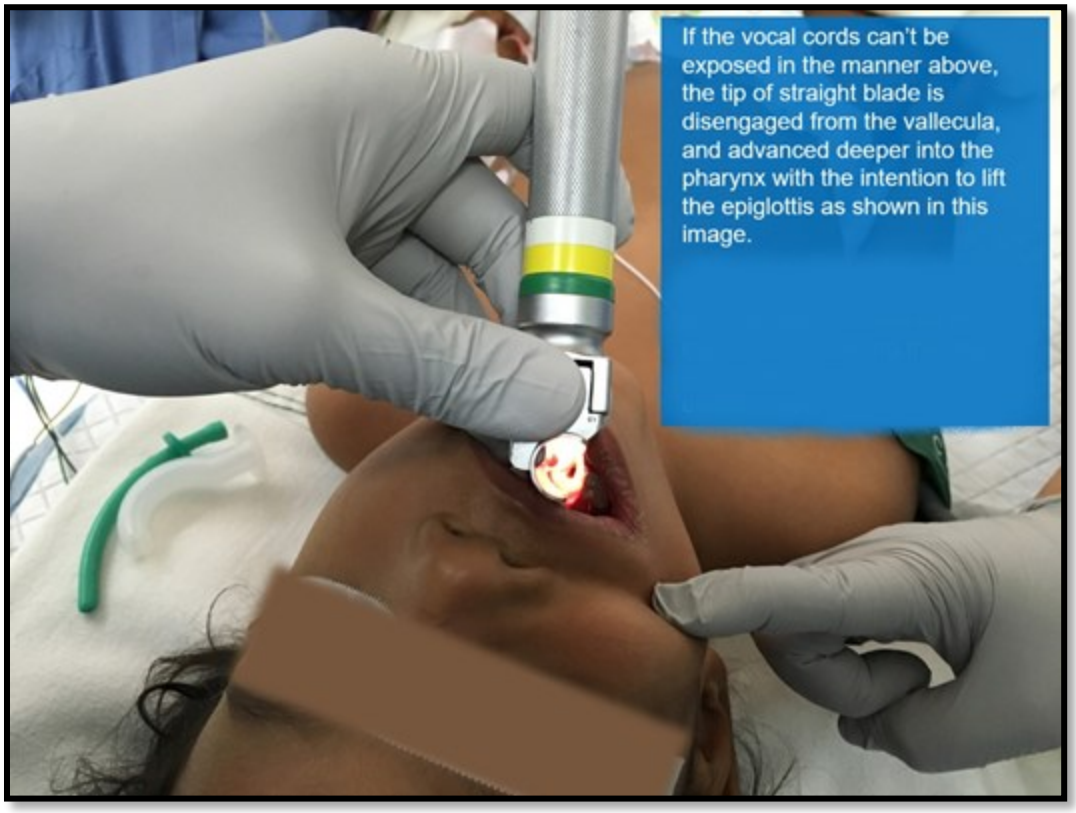


∇ Insert laryngoscope in the Right side of mouth and move to midline, sweeping tongue to left with it



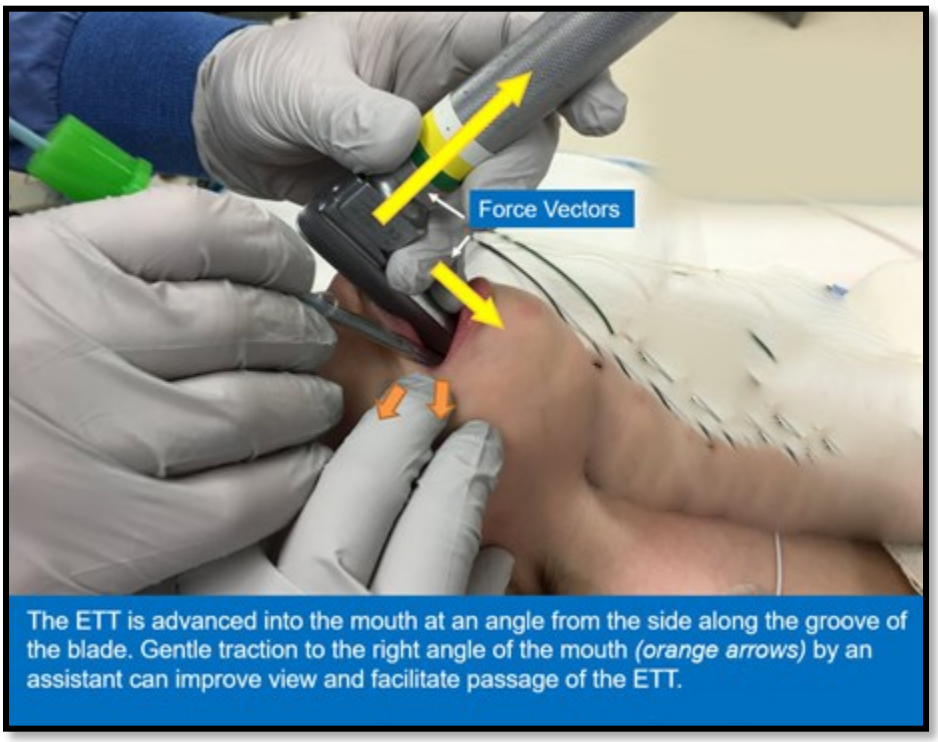
∇ Position the blade to visualize cords





7. Insert Endotracheal Tube

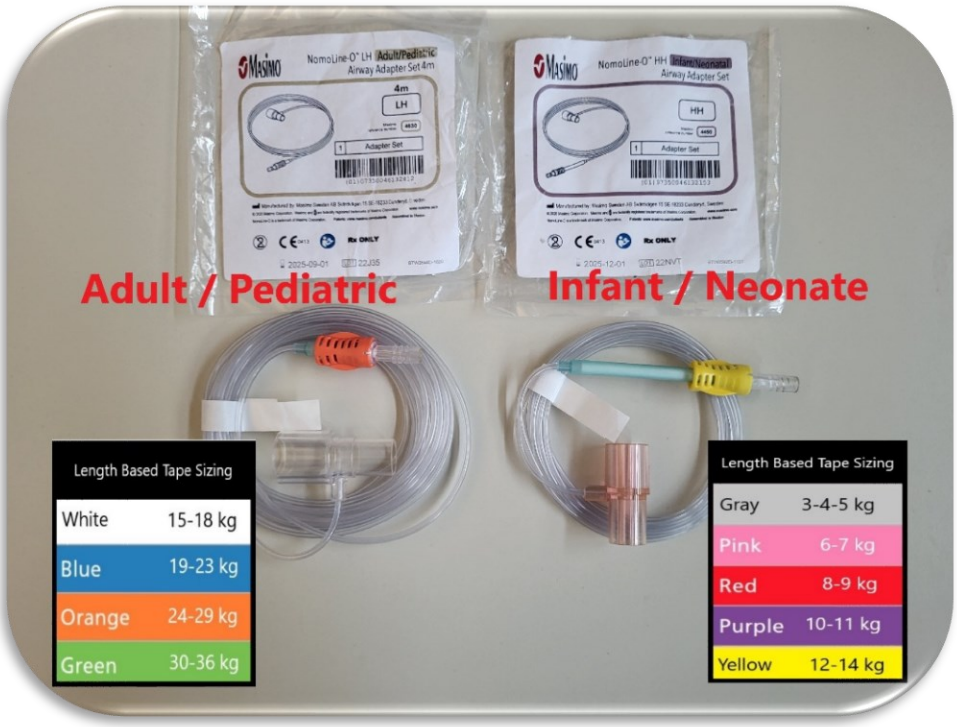
- ∇ Advance tube gently through the cords into glottic opening, stopping when cuff or black markings pass through cords.
- ∇ Take note of depth marking placement



- ∇ While holding tube in place and maintaining visualization of ET tube through glottic opening, have Airway Partner remove stylet.
- ∇ If using a cuffed tube, have Airway Partner inflate cuff with 5-10mL of air and remove syringe from pilot balloon.
- ∇ Have Airway Partner attach ETCO2 filterline and BVM to confirm placement.
  - o See Confirmation below.
- ∇ Once confirmation of placement with ETCO2 waveform capnography occurs, intubating clinician may remove laryngoscope from airway and secure the tube.

8. Confirm Placement

- ∇ Elapsed time from steps 5-7 should be less than 30 seconds.
- ∇ Primary Confirmation is the use of ETCO2 Waveform Capnography.
  - Waveform Capnography is gold standard for confirming placement.
  - **If you don't have a waveform with ventilation, the airway is not patent.**
  - See ETCO2 Skills Dictionary for more detailed information on ETCO2 placement and monitoring.
- ∇ *The ETCO2 Filterline Adapter should be connected to the monitor and the zeroing process initiated during the Preparing Equipment phase so it is ready when applied to the ET tube and the first breath delivered will include ETCO2 sampling.*
  - See below for Filterline Adapter placement.
  - See below for correct Filterline Adapter selection in Pediatric Patient based on Length Based Tape measurement.
  - See ETCO2 Skills Dictionary for more detailed information on ETCO2 placement and monitoring.



- ∇ Initializing (Zeroing) and applying the sampling device
  - There are 3 steps in initializing and applying the sampling device that may be done in any order.
    - Plugging the sampling device into the monitor.
    - Pressing the CO2 Soft Key to activate the sampling pump.
      - ♦ Green light is on when pump is active.
    - Applying the sampling device (CapnoLine / FilterLine) to the patient.
  - *Note: The zeroing / initializing process may take 30-60 seconds.

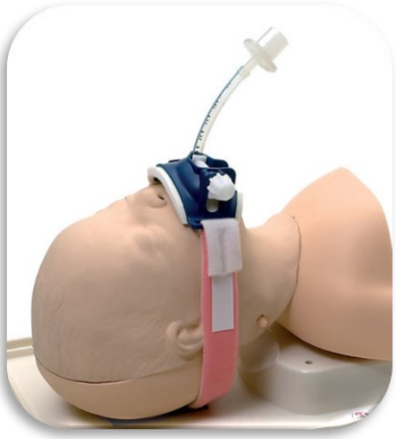
- ∇ Ventilate and observe for waveform and numerical reading.
  - Due to the monitor's ETCO2 data compression for display on the screen, there is approximately a 3-4 second delay between providing a ventilation and the corresponding waveform displaying on the screen.
  - If the monitor has not already been zeroed for this patient, waveforms may not appear until up to 30-60 seconds AFTER CO2 button has been activated even if the sampling device is connected to the patient.
  - **If the monitor has not already been zeroed for this patient and you don't have a waveform after 30-60 seconds with ventilation, the airway is not patent.**
  - **If the monitor HAS already been zeroed for this patient and you don't have waveform after 10-15 seconds with ventilation, the airway is not patent.**
  - **If at any time after initial ETCO2 confirmation, there is no ETCO2 waveform with ventilation, the ET Tube is not patent.**
  - **If the ET Tube is not patent, remove the ET Tube.**
    - Leave ETCO2 filterline connected to BVM, attach mask, ventilate, and assess for ETCO2 waveforms.
    - If no ETCO2 waveforms with BVM and mask, continue to troubleshoot.
- ∇ Once Primary ETCO2 waveform confirmation has been obtained:
  - Secondary Confirmation
    - Auscultate for absence of epigastric sounds and presence of breath sounds.
      - ♦ **Breath Sounds alone, without the presence of waveform capnography, does not indicate a patent airway.**
      - ♦ Condensation in tube is not a reliable form of confirmation.
        - ➢ Esophageal placement may still cause condensation in tube.
      - ♦ Good Bag Compliance alone, without the presence of waveform capnography, does not indicate a patent airway.

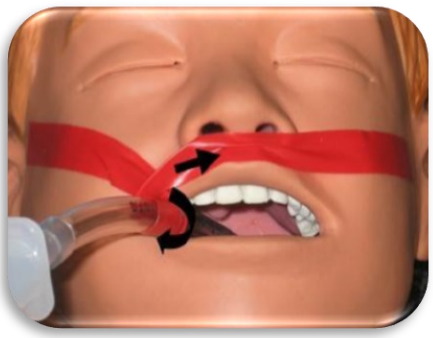
9. Ventilate patient

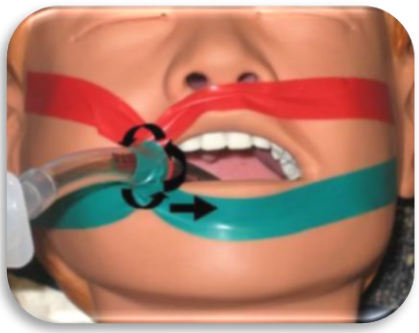
- ∇ Continuously monitor End-Tidal Waveforms to ensure proper seal, rate and volume
- ∇ The PEDIATRIC Cardiac Arrest patient should be ventilated at 12-20 breaths per minute
  - The NEONATE Cardiac Arrest patient should be ventilated at 40-60 breaths per minute
- ∇ The patient With a Pulse should be ventilated at a rate / volume dependent on their ETCO2 reading:
  - Increase rate and/or volume of ventilation if ETCO2 Capnometry is >45mmHg
  - Decrease rate and/or volume of ventilation if ETCO2 Capnometry is <35mmHg
- ∇ **If there is no End-Tidal waveform with ventilation, the i-gel® is not patent**

10. Secure the Tube

- ∇ Be sure tube is still at previously noted depth
- ∇ Re-secure C-Collar if Trauma Patient
- ∇ Secure ET Tube
  - Commercial Device
  - Tape
    - Wrap center of piece of tape around ET Tube and tape maxilla to maxilla
    - A 2nd piece of tape can be used to wrap around opposite direction and secure to lower cheeks







11. Re-confirm Tube Placement

- ∇ Verify tube depth remains at previous position
  - Deflate cuff and adjust height PRN
- ∇ Verify continuation of waveform capnography
- ∇ Verification should be performed and documented every time the patient is moved
- ∇ **If there is no ETCO2 waveform with ventilation, the ET Tube is not patent**

Endotracheal Intubation (Pediatric) – Video Laryngoscopy

***Note – This entry applies to all patients that measure on the Broselow Tape. If a patient is larger than the Broselow Tape, see Endotracheal Intubation (Adult) Skills Dictionary**

1. **Knowledge Points**
   - ∇ For Pediatric patients who fit on the Length Based Tape, a bougie is not used.
   - ∇ For patients that do not fit on the Length Based Tape, see Endotracheal Intubation (Adult) Skills Dictionary.
2. **Tips for Success**
   - ∇ Lead with Suction
     - Best practice is to always insert the tip of the suction catheter into the oropharynx ahead of the tip of the blade even with no visible airway soiling prior to blade insertion.
     - Emesis or other fluid that is collecting at the glottic opening can then be immediately suctioned.
     - This helps prevent fouling of the camera, requiring blade removal for cleaning, increasing first pass success chance.
   - ∇ Perform the procedure as "Progressive Epiglottoscopy".
     - Start shallow.
     - Move slowly.
     - Identify structures as you approach them:
       - Base of tongue
       - Epiglottis
       - Vallecula
       - Arytenoid cartilage
       - Vocal cords
     - Plunging the blade in too deeply in the beginning could take you past the epiglottis and increase the difficulty and duration of the attempt.
   - ∇ Avoiding Trauma to Oropharynx / Larynx:
     - Do not watch the screen while initially inserting the blade or ET tube into the mouth.
     - Directly watch the blade enter the mouth, until you can no longer see the blade tip, then switch to watching the screen.
     - Directly watch the ET tube enter the mouth, until you can no longer see the tube tip, then switch to watching the screen.
   - ∇ Clearing the tongue out of the way as much as possible is important.
     - The tongues of infants and toddlers are much larger relative to the mouth and jaw than an adult.
     - Failure to sweep the tongue to the left leaves no room for visualization of the cords or passage of the ET tube.
   - ∇ Whether using a Miller or Macintosh blade, first attempt to fit the tip of the blade in the vallecula to displace the epiglottis and expose the vocal cords.
     - Small children may have a very large epiglottis in relation to other anatomy or have an under-developed vallecula and may require an alternate approach.

- If the vocal cords cannot be adequately exposed using the technique above, disengage from the vallecula and slowly advance the Miller or Macintosh blade deeper into the pharynx and directly lift the epiglottis.

∇ Once ET tube is through the vocal cords, best practice is to maintain visualization of the glottic opening until placement is confirmed using ETCO2 to ensure there is no dislodgement up to that point.

3. Prepare Equipment

∇ Don appropriate PPE to cover eyes, nose, and mouth.

∇ During this period, the patient's airway should be managed, and oxygenation and ventilation provided using whatever less invasive means are appropriate and available.

∇ Assemble all equipment and have readily accessible.

∇ UEScope:

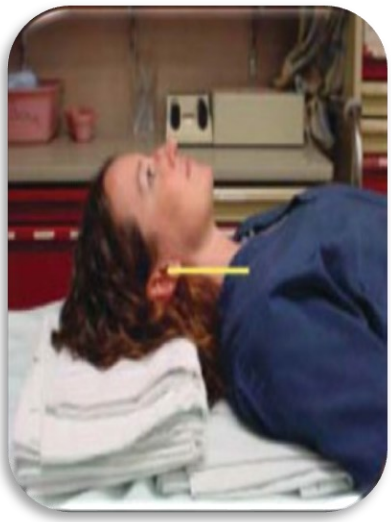
- Blade selection:
  - Chart below indicates sizing based on Length Based Tape color:

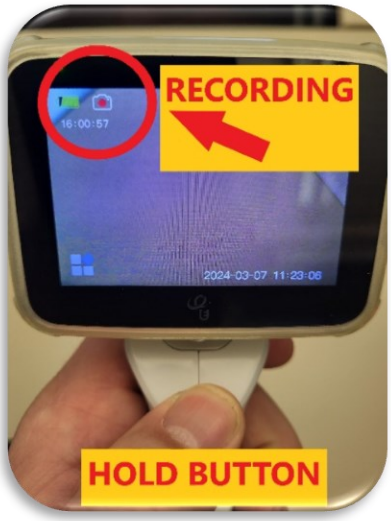
Video Laryngoscopy Blade Size	
Gray 3-4-5 kg	D0 or D1
Pink 6-7 kg	D1
Red 8-9 kg	
Purple 10-11 kg	D1 or MD3
Yellow 12-14 kg	MD3
White 15-18 kg	
Blue 19-23 kg	
Orange 24-29 kg	
Green 30-36 kg	

- With screen facing you, and blade facing away from you, fully insert the monitor's connector into the connector port of the video blade.

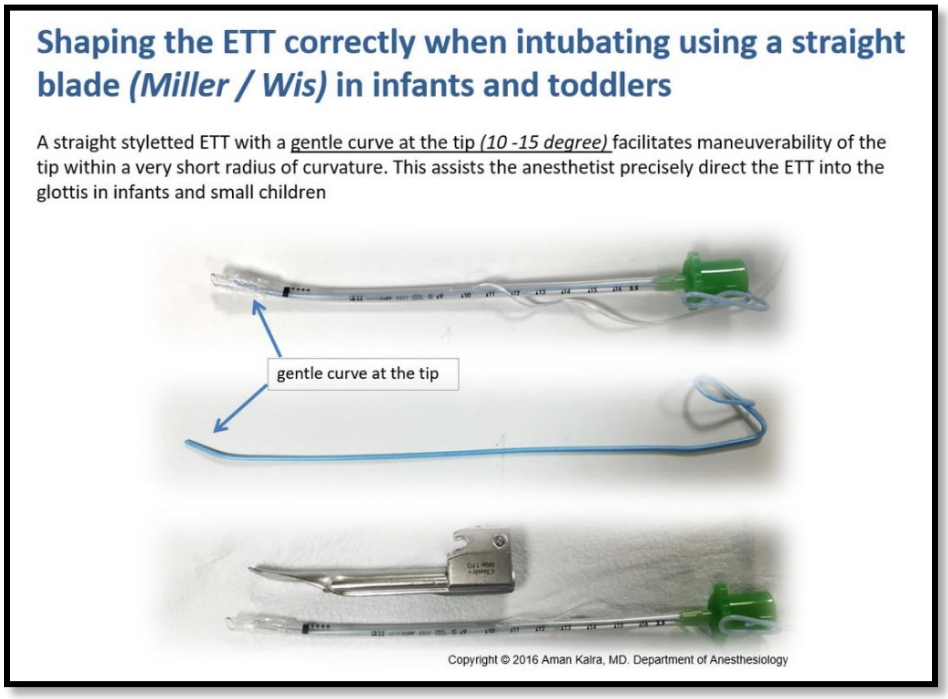
- Press and hold Power button on the Top-Right of the monitor housing until the green light comes on. (2-3 seconds)
- Ensure Camera / Red Light icon is present in Top-Left corner of screen to indicate recording in progress.

- The UEScope should be programmed to begin recording when it is powered on, but if the Camera / Red Light icon is not present, press and hold the black Record button on the handle for 2-3 seconds until the Camera / Red Light icon appears.



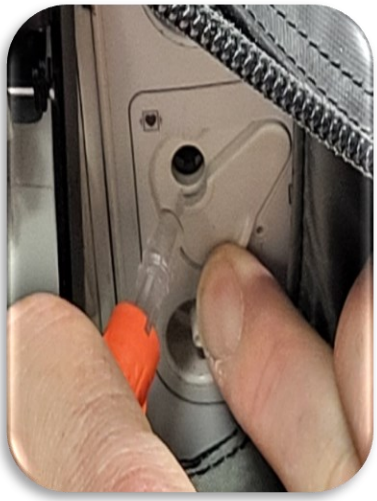


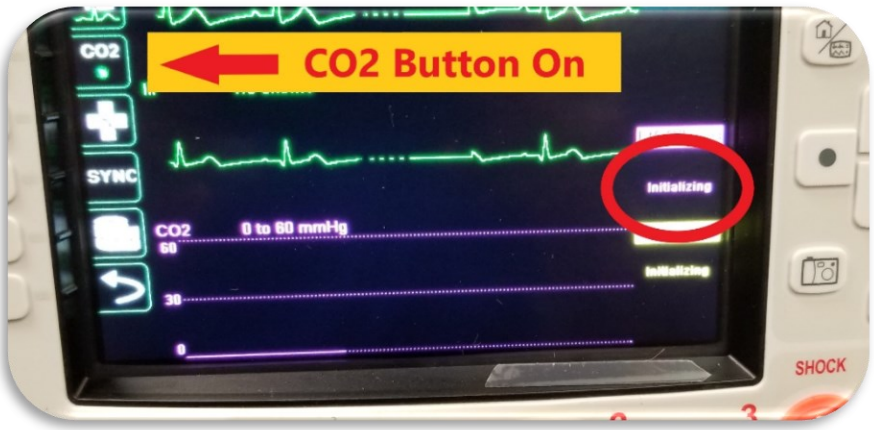
- ∇ Endotracheal Tube
  - Assure stylet is in endotracheal tube and shaped appropriately (See image below for shaping guidance).
    - Tip of stylet should not extend beyond tip of ET tube.
    - Do Not use a bougie.
    - Do Not use stylet as a bougie.
  - *If there is a cuff
    - Check for cuff leak by inflating with 5-10mL air
    - Attempt to minimize contamination by keeping ET Tube in packaging during check
    - Fully deflate cuff after leak check
    - Leave syringe attached to pilot balloon (optional)
  - Lubricate end of ET tube.
  - Ensure you have another dedicated clinician ready to hand you the ET tube in a manner that allows you to maintain visualization of vocal cords during hand off.



- ∇ Suction
  - Ensure tubing and rigid suction tip are attached.
  - Check that suction is functioning.
  - *During intubation attempt, suction should be running and rigid suction catheter placed where the clinician performing the intubation can reach it with their Right hand for quick access to lead with suction or perform SALAD Technique without delay.*

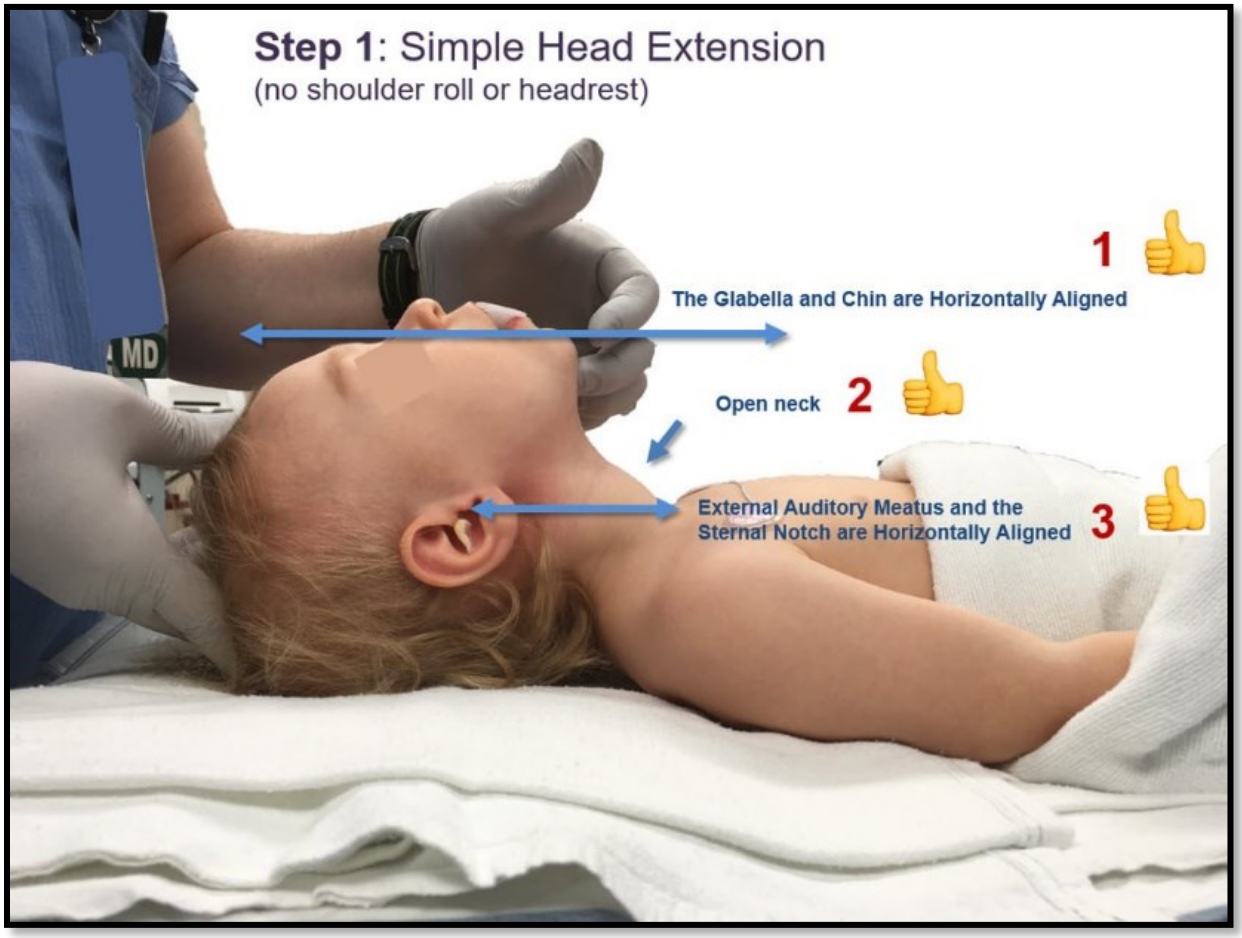
- ∇ ETCO2
  - Use FRG to determine correct size of ETCO2 filterline to use.
  - *The ETCO2 filterline should be connected to the monitor and the zeroing process initiated during this time so it is ready when applied to the ET tube and the first breath delivered will include ETCO2 sampling.*
  - See Confirm Placement section below for details.

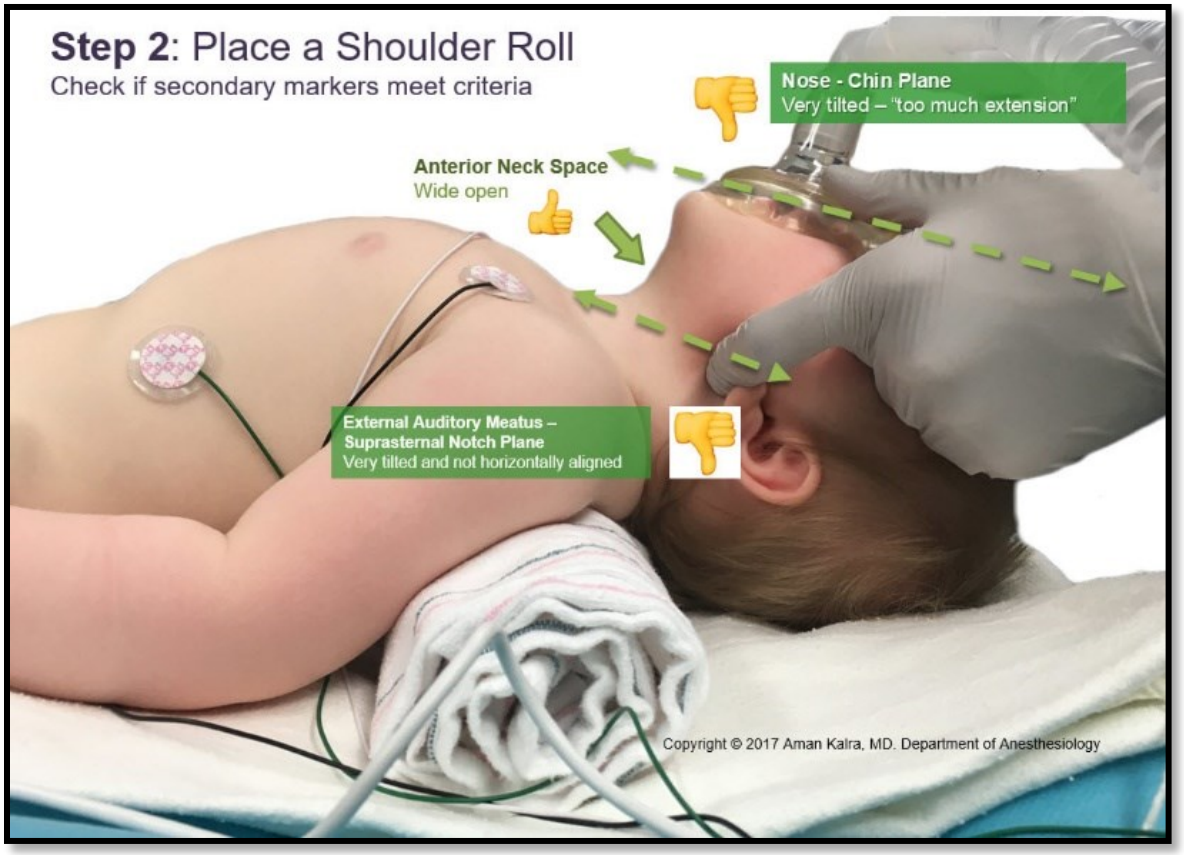


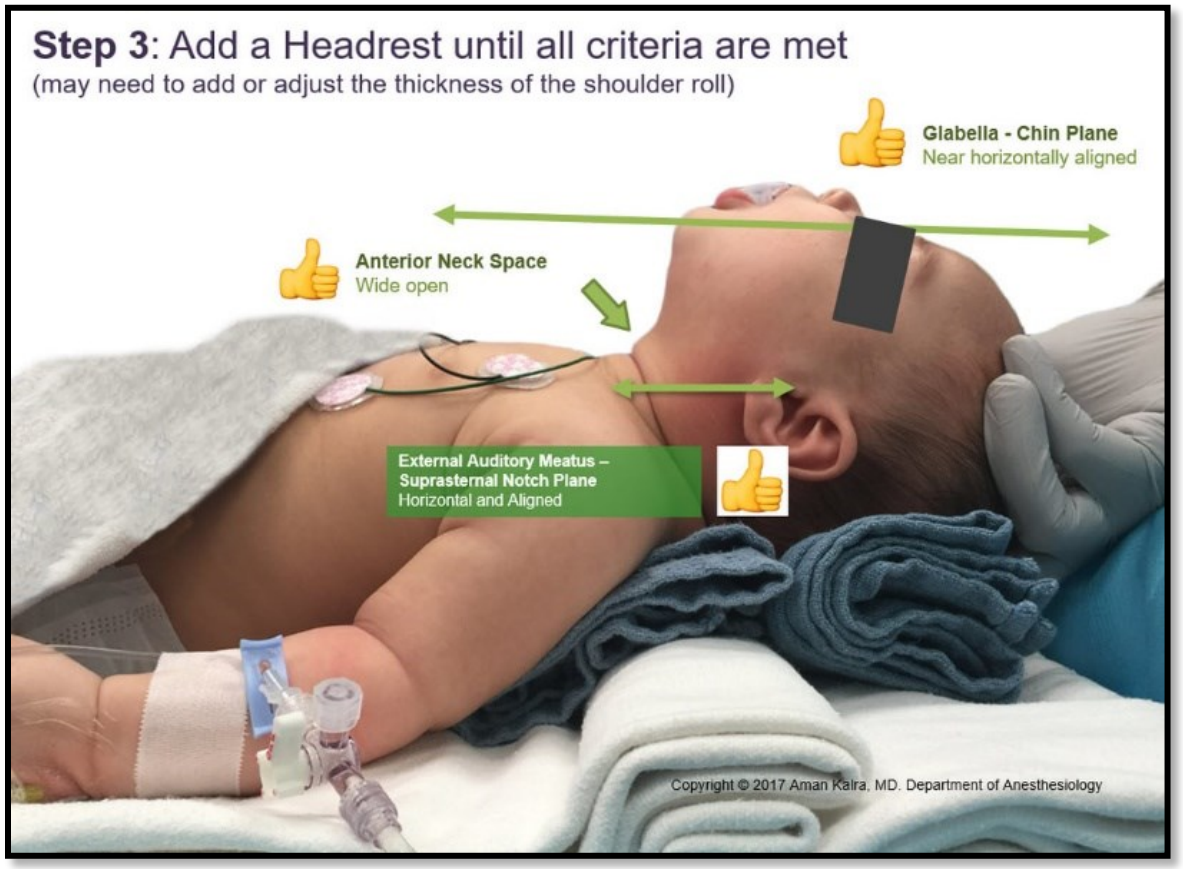


4. Prepare Patient

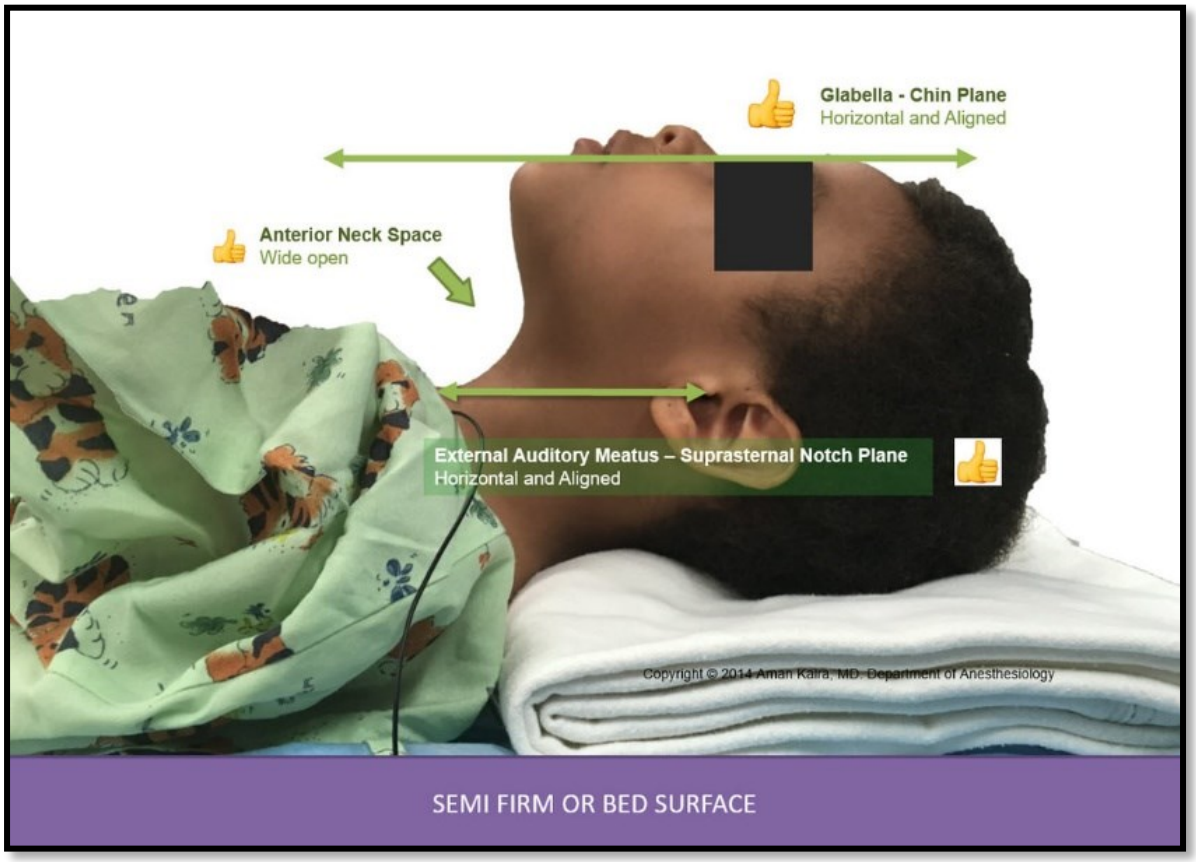
- ∇ During this period, the patient's airway should be managed, and oxygenation and ventilation provided using whatever less invasive means are appropriate and available.
- ∇ Position patient
  - Generally, position all patients in the sniffing position (unless using spinal motion restriction) using padding as necessary to achieve the alignments described below.
    - **Align ear canal with sternal notch on horizontal plane.**
    - Align the smooth area on forehead directly between eyebrows (known as the Glabella) with the point of the chin in a horizontal plane.
    - For some children, all that is needed is adjustment of the head.
    - Some children will require padding under their shoulders and head.
  - See images below for positioning of Neonates / Infants / Toddlers.

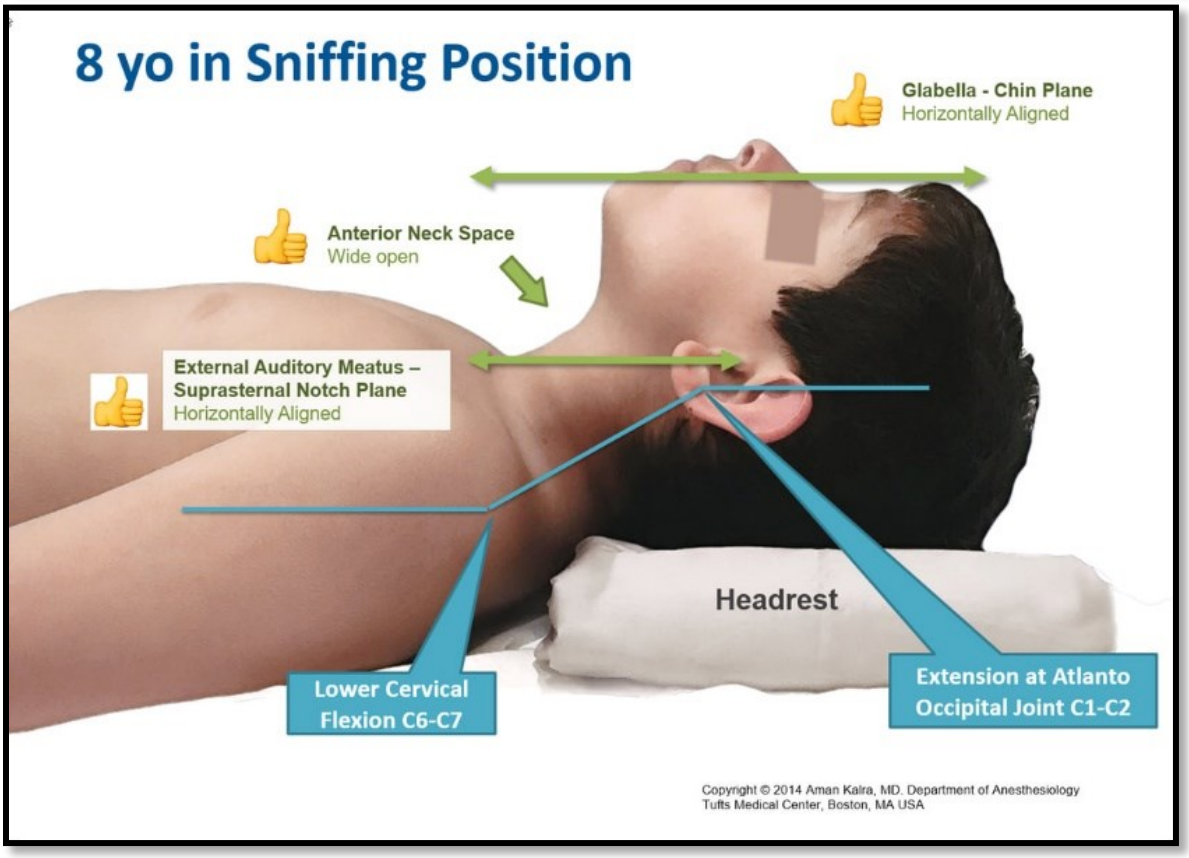



Step 2: Place a Shoulder Roll
Check if secondary markers meet criteria
Nose - Chin Plane
Very tilted – "too much extension"
Anterior Neck Space
Wide open
External Auditory Meatus –
Suprasternal Notch Plane
Very tilted and not horizontally aligned
Copyright © 2017 Aman Kalra, MD. Department of Anesthesiology


Step 3: Add a Headrest until all criteria are met
(may need to add or adjust the thickness of the shoulder roll)
Glabella - Chin Plane
Near horizontally aligned
Anterior Neck Space
Wide open
External Auditory Meatus –
Suprasternal Notch Plane
Horizontal and Aligned
Copyright © 2017 Aman Kalra, MD. Department of Anesthesiology

- See images below for positioning of School Age Children.





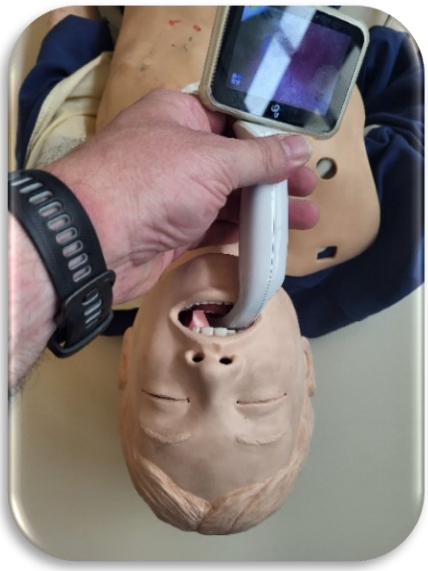
5. Open the Airway

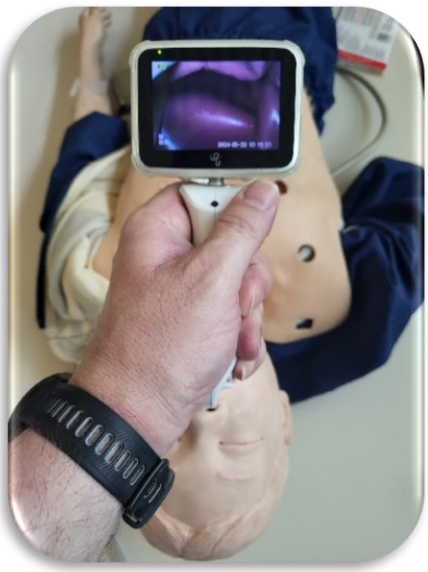
- ∇ Opening the airway in a Medical Patient:
  - Open the mouth widely by performing cross finger scissor maneuver**.**

- ∇ Opening the airway in the Trauma Patient:
  - 2nd rescuer establishes manual stabilization from position to the side of the torso.
  - Remove anterior portion of C-collar to assure mandibular mobility
  - Open mouth widely by performing cross finger scissor maneuver as demonstrated above.

6. Visualize the vocal cords / glottic opening (Perform / Begin Progressive Epiglottoscopy)

- ∇ Hold laryngoscope in Left hand.
- ∇ Watching the tip of the blade directly, insert blade midline, or just Right of midline, keeping the tip of the blade midline, to sweep the tongue left as necessary and advance tip of blade until just at / past base of the tongue.





- ∇ Once the tip of the blade is just at the base of the tongue, shift to watching screen, continue to advance the blade slowly.

- ∇ Advance the blade until you identify the epiglottis.

- ∇ Advance blade until it seats in vallecula.
  - ○ Whether using a Miller or Macintosh blade, first attempt to fit the tip of the blade in the vallecula to displace the epiglottis and expose the vocal cords.
    - Small children may have a very large epiglottis in relation to other anatomy or have an under-developed vallecula and may require an alternate approach.
    - If the vocal cords cannot be adequately exposed using the technique above, disengage from the vallecula and slowly advance the Miller or Macintosh blade deeper into the pharynx and directly lift the epiglottis.
- ∇ Keeping handle in a vertical position, push laryngoscope upward and away at a 45^{o} angle, without rocking handle backward, indirectly lifting epiglottis.

∇ Lift blade and identify arytnoid cartilage.

∇ Continue to lift blade and identify glottic opening / vocal cords.

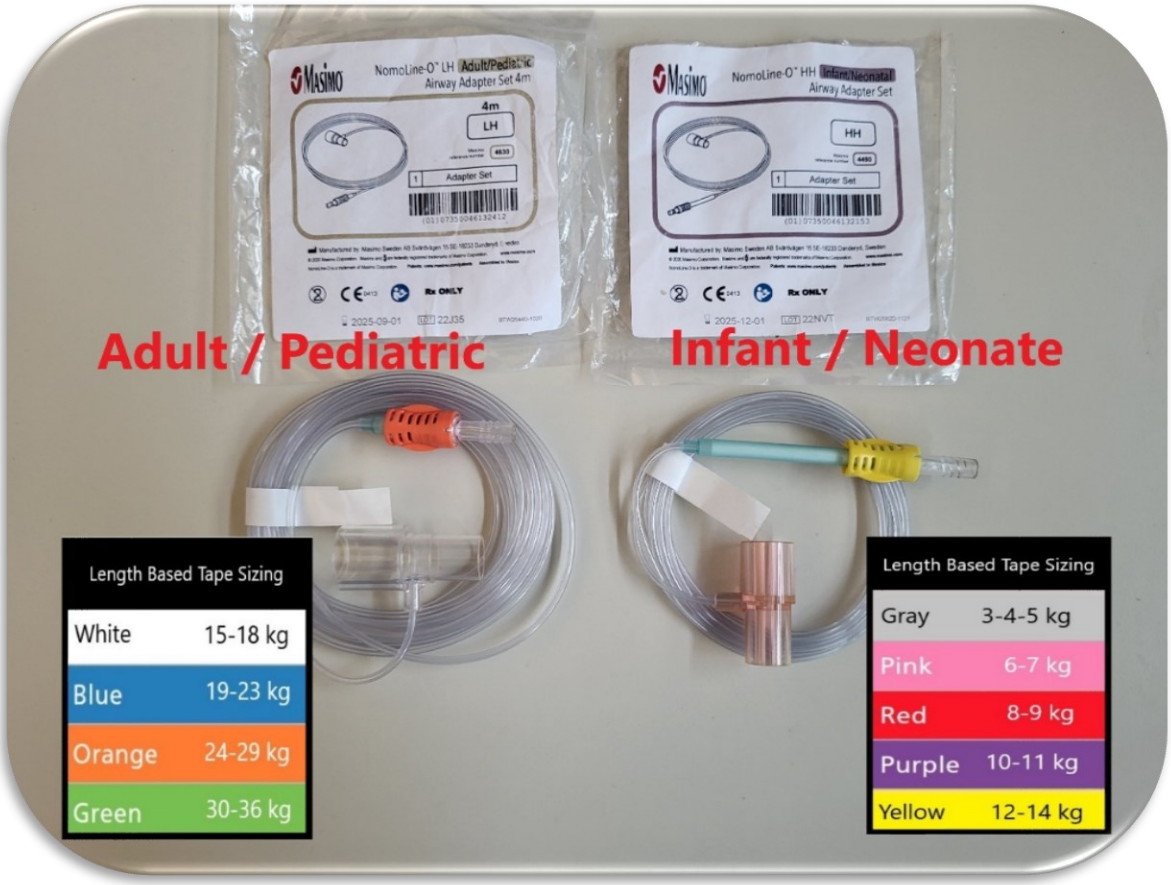
7. Insert Endotracheal Tube

- ∇ Advance tube gently through the cords into glottic opening, stopping when black markings or the cuff pass through cords.
- ∇ Take note of depth marking placement.
- ∇ While holding tube in place and maintaining visualization of ET tube through glottic opening, have Airway Partner remove stylet.

- ∇ If using a cuffed tube, have Airway Partner inflate cuff with 5-10mL of air and remove syringe from pilot balloon.
- ∇ Have Airway Partner attach ETCO2 filterline and BVM to confirm placement.
  - See Confirmation below.
- ∇ Once confirmation of placement with ETCO2 waveform capnography occurs, intubating clinician may remove laryngoscope from airway and secure the tube.

8. Confirm Placement

- ∇ Elapsed time from steps 5-7 should be less than 30 seconds.
- ∇ Primary Confirmation is the use of ETCO2 Waveform Capnography.
  - Waveform Capnography is gold standard for confirming placement.
  - **If you don't have a waveform with ventilation, the airway is not patent.**
  - See ETCO2 Skills Dictionary for more detailed information on ETCO2 placement and monitoring.
- ∇ *The ETCO2 Filterline Adapter should be connected to the monitor and the zeroing process initiated during the Preparing Equipment phase so it is ready when applied to the ET tube and the first breath delivered will include ETCO2 sampling.*
  - See below for Filterline Adapter placement.
  - See below for correct Filterline Adapter selection in Pediatric Patient based on Length Based Tape measurement.
  - See ETCO2 Skills Dictionary for more detailed information on ETCO2 placement and monitoring.



- ∇ Initializing (Zeroing) and applying the sampling device
  - There are 3 steps in initializing and applying the sampling device that may be done in any order.
    - Plugging the sampling device into the monitor.
    - Pressing the CO2 Soft Key to activate the sampling pump.
      - ♦ Green light is on when pump is active.
    - Applying the sampling device (CapnoLine / FilterLine) to the patient.
  - *Note: The zeroing / initializing process may take 30-60 seconds.

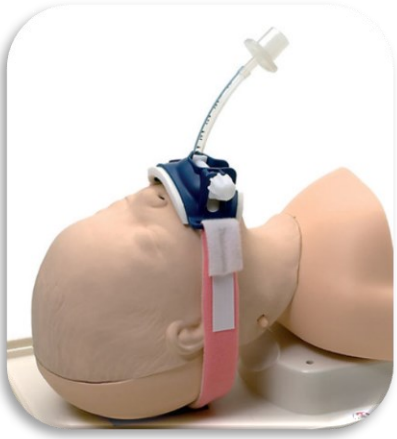
- ∇ Ventilate and observe for waveform and numerical reading.
  - Due to the monitor's ETCO2 data compression for display on the screen, there is approximately a 3-4 second delay between providing a ventilation and the corresponding waveform displaying on the screen.
  - If the monitor has not already been zeroed for this patient, waveforms may not appear until up to 30-60 seconds AFTER CO2 button has been activated even if the sampling device is connected to the patient.
  - **If the monitor has not already been zeroed for this patient and you don't have a waveform after 30-60 seconds with ventilation, the airway is not patent.**
  - **If the monitor HAS already been zeroed for this patient and you don't have waveform after 10-15 seconds with ventilation, the airway is not patent.**
  - **If at any time after initial ETCO2 confirmation, there is no ETCO2 waveform with ventilation, the ET Tube is not patent.**
  - **If the ET Tube is not patent, remove the ET Tube.**
    - Leave ETCO2 filterline connected to BVM, attach mask, ventilate, and assess for ETCO2 waveforms.
    - If no ETCO2 waveforms with BVM and mask, continue to troubleshoot.
- ∇ Once Primary ETCO2 waveform confirmation has been obtained:
  - Secondary Confirmation
    - Auscultate for absence of epigastric sounds and presence of breath sounds.
      - ♦ **Breath Sounds alone, without the presence of waveform capnography, does not indicate a patent airway.**
      - ♦ Condensation in tube is not a reliable form of confirmation.
        - ➢ Esophageal placement may still cause condensation in tube.
      - ♦ Good Bag Compliance alone, without the presence of waveform capnography, does not indicate a patent airway.

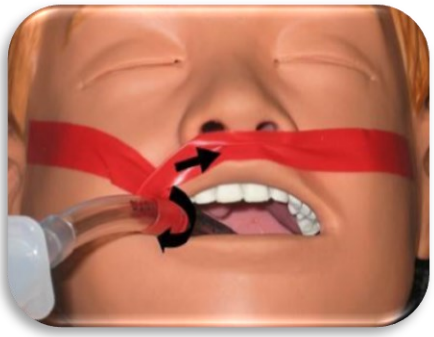
9. Ventilate patient

- ∇ Continuously monitor End-Tidal Waveforms to ensure proper seal, rate and volume
- ∇ The PEDIATRIC Cardiac Arrest patient should be ventilated at 12-20 breaths per minute
  - The NEONATE Cardiac Arrest patient should be ventilated at 40-60 breaths per minute
- ∇ The patient With a Pulse should be ventilated at a rate / volume dependent on their ETCO2 reading:
  - Increase rate and/or volume of ventilation if ETCO2 Capnometry is >45mmHg
  - Decrease rate and/or volume of ventilation if ETCO2 Capnometry is <35mmHg
- ∇ **If there is no End-Tidal waveform with ventilation, the i-gel® is not patent**

10. Secure the Tube

- ∇ Be sure tube is still at previously noted depth.
- ∇ Re-secure C-Collar if Trauma Patient
- ∇ Secure ET Tube
  - Commercial Device
  - Tape
    - Wrap center of piece of tape around ET Tube and tape maxilla to maxilla
    - A 2nd piece of tape can be used to wrap around opposite direction and secure to lower cheeks.





11. Re-confirm Tube Placement

- ∇ Verify tube depth remains at previous position.
  - Deflate cuff and adjust height PRN.
- ∇ Verify continuation of waveform capnography
- ∇ Verification should be performed and documented every time the patient is moved.
- ∇ **If there is no ETCO2 waveform with ventilation, the ET Tube is not patent.**

Magills Forceps Use

1. **Assemble equipment**
   - ∇ Gather laryngoscope blade and handle, check light
   - ∇ Select appropriate size Magills forceps
   - ∇ Check suction and have standing by

2. **Position patient**
   - ∇ Remove dentures which may become loose during insertion and be pushed into airway
   - ∇ Place patient in sniffing position unless maintaining Spinal Motion Restriction as necessary
     - Optimal positioning is obtained by aligning the ears with the sternal notch

3. **Insert laryngoscope***
   - ∇ **EMT and AEMT Providers are not authorized to perform direct laryngoscopy during the FBAO removal procedure. These providers are authorized to use the Magill Forceps to remove ONLY foreign bodies that are visible with opening the mouth and positioning the airway. Rather than inserting the laryngoscope, the EMT and AEMT Providers will skip to Step 3, below*
   - ∇ Insert blade on right side of mouth and sweep tongue to left

4. **Visualize and remove obstruction**
   - ∇ Hold Magills forceps with right hand as demonstrated in picture below

- ∇ Insert Magills forceps and grasp obstruction
- ∇ Remove obstruction

5. Assess patient's condition

- ∇ Visualize to confirm entire obstruction removed
- ∇ Check for breathing
- ∇ Auscultate breath sounds
- ∇ Assess vital signs
- ∇ Provide BVM ventilation if necessary
- ∇ Follow progressive airway management model as necessary

Supraglottic Airway Insertion – Adult (i-gel O2 Resus)

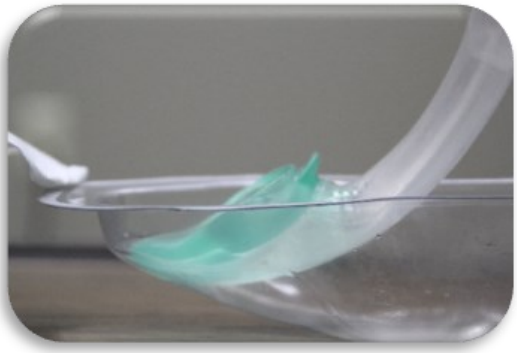
1. **Knowledge Points**
   - ∇ This entry demonstrates use of the Adult i-gel O2 Resus Pack.
   - ∇ For Pediatric use, see Supraglottic Airway Insertion – PEDIATRIC (Anesthesia i-gel)
   - ∇ In cardiac arrest, it is usually preferred to place an i-gel as the first airway management intervention vs starting airway management with BVM and Mask.
     - The minimal time difference between starting with BVM and Mask or placing an i-gel prior to delivering the first breath is not clinically significant.

2. **Prepare Equipment**
   - ∇ Assure oxygenation and ventilation is maintained during equipment preparation.
   - ∇ Prepare i-gel
     - Select correct size – See chart below
       - Colors **do not** correlate with any Length Based Tape sizes.

	Description	Weight	Height
●	i-gel O_2 Resus Pack, large adult – includes a size 5 i-gel O_2 with orange hook ring, sachet of lubricant, airway support strap and a 12FG suction tube	90+kg	>6 ft
●	i-gel O_2 Resus Pack, medium adult – includes a size 4 i-gel O_2 with green hook ring, sachet of lubricant, airway support strap and a 12FG suction tube	50–90kg	5-6 ft
●	i-gel O_2 Resus Pack, small adult – includes a size 3 i-gel O_2 with yellow hook ring, sachet of lubricant, airway support strap and a 12FG suction tube	30–60kg	<5 ft

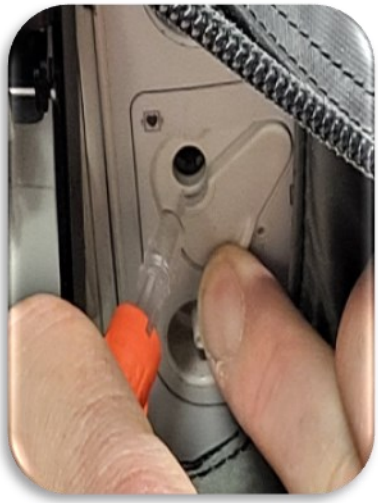
       - I-gel packaging is marked with a weight-based sizing range. The height-based rule of thumb measuring can also be used.
         - ♦ Orange Size 5 – Height >6 ft
         - ♦ Green Size 4 – Height 5-6 ft
         - ♦ Yellow Size 3 – Height <5 ft
       - If first attempted size does not fit, attempt a size up or down.

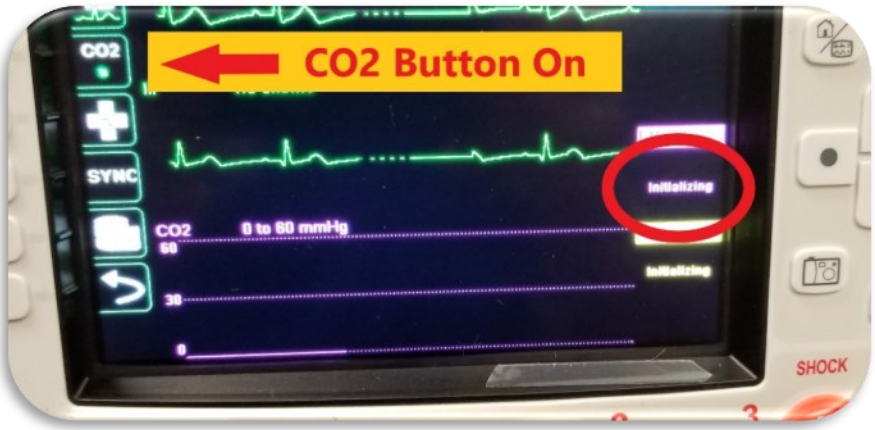
- Lubricate back, sides and front of cuff and place back in cradle
  - Generous lubrication is critical to prevent friction in the airway which can lead to bleeding
  - Do not allow a large bolus of lube to collect in the lumen of the i-gel or occlude the distal suction port

∇ Prepare Suction
- Vomiting and fluids in the pharynx are possible when placing an airway and may present challenges to the airway seal and ventilation


- ∇ Prepare ETCO2
  - *The ETCO2 filterline should be connected to the monitor and the zeroing process initiated during this time so it is ready when applied to the i-gel and the first breath delivered will include ETCO2 sampling.*
  - If only BLS Clinicians are on scene, initial confirmation will be done with a colorimetric device.
    - Waveform capnography should be implemented as soon as possible.
    - BLS Clinicians may initialize and place waveform capnography in conjunction with use of colorimetric device
  - See Confirm Placement section below for details.



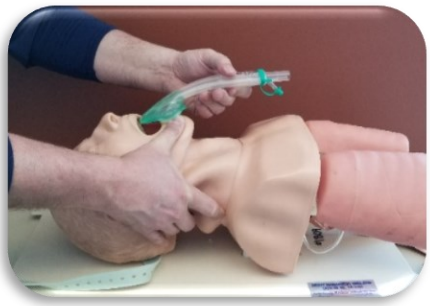


3. Prepare Patient

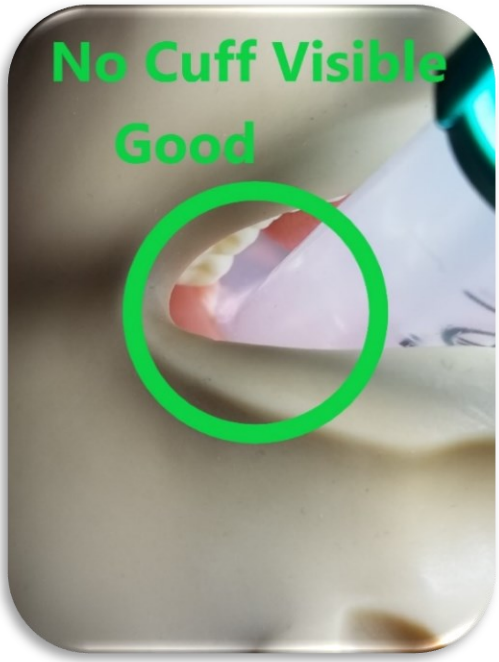
- ∇ Remove Dentures which may become loose during insertion and be pushed into airway
- ∇ Place patient in sniffing position unless maintaining Spinal Motion Restriction is necessary
  - Optimal positioning is obtained by aligning the ears with the sternal notch

4. Insert Airway

- ∇ Grasp integral bite-block at midshaft, cuff facing patient's chin
  - Integral bite block and shaft are sturdy and can successfully guide airway. No fingers need enter mouth or between teeth
- ∇ With your other hand, open mouth by pushing chin down
  - Opening mouth facilitates passage of cuff through oropharynx
- ∇ Insert leading soft tip, gently advancing at midline toward hard palate
  - Some resistance may be felt as cuff passes tonsillar area of pharynx, but continue insertion
  - Stop when definitive resistance is felt
    - Tip of cuff should rest in upper esophageal opening



  - No portion of the cuff should be visible when looking in the mouth



5. Confirm Placement

- ∇ Elapsed time from steps 2-4 should be less than 30 seconds.
- ∇ Primary Confirmation is the use of ETCO2 Waveform Capnography.
  - Waveform Capnography is gold standard for confirming placement.
  - See below for use of colorimetric device
  - See ETCO2 Skills Dictionary for more detailed information on ETCO2 placement and monitoring.
- ∇ *The ETCO2 Filterline Adapter should be connected to the monitor and the zeroing process initiated during the Preparing Equipment phase so it is ready when applied to the i-gel and the first breath delivered will include ETCO2 sampling*.
- ∇ Initializing (Zeroing) and applying the sampling device
  - There are 3 steps in initializing and applying the sampling device that may be done in any order.
    - Plugging the sampling device into the monitor.
    - Pressing the CO2 Soft Key to activate the sampling pump.
      - ♦ *Green light is on when pump is active.*
    - Applying the sampling device (FilterLine) to the patient.

- *Note: The zeroing / initializing process may take 30-60 seconds.

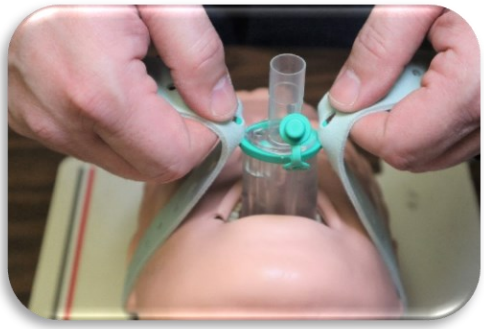
∇ Ventilate and observe for waveform and numerical reading.
- Due to the monitor's ETCO2 data compression for display on the screen, there is approximately a 3-4 second delay between providing a ventilation and the corresponding waveform displaying on the screen.
- If the monitor has not already been zeroed for this patient, waveforms may not appear until up to 30-60 seconds AFTER CO2 button has been activated even if the sampling device is connected to the patient.
- **If the monitor has not already been zeroed for this patient and you don't have a waveform after 30-60 seconds with ventilation, the airway is not patent.**
- **If the monitor HAS already been zeroed for this patient and you don't have waveform after 10-15 seconds with ventilation, the airway is not patent.**
- **If at any time after initial ETCO2 confirmation, there is no ETCO2 waveform with ventilation, the airway is not patent.**
- **If the airway is not patent, remove the airway.**
  - Leave ETCO2 filterline connected to BVM, attach mask, ventilate, and assess for ETCO2 waveforms.
  - If no ETCO2 waveforms with BVM and mask, continue to troubleshoot.

∇ Once Primary ETCO2 waveform confirmation has been obtained:
- Secondary Confirmation:
  - Auscultate for absence of epigastric sounds and presence of breath sounds.
    - ♦ **Breath Sounds alone, without the presence of waveform capnography, does not indicate a patent airway.**
    - ♦ Condensation in airway is not a reliable form of confirmation.
    - ♦ Good Bag Compliance alone, without the presence of waveform capnography, does not indicate a patent airway.

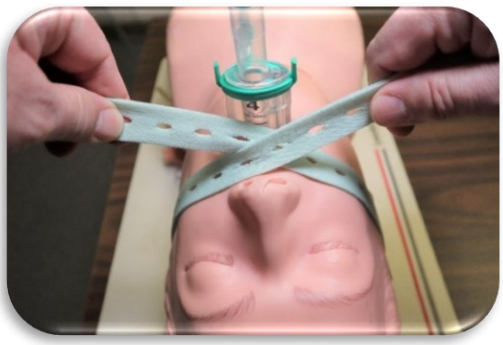
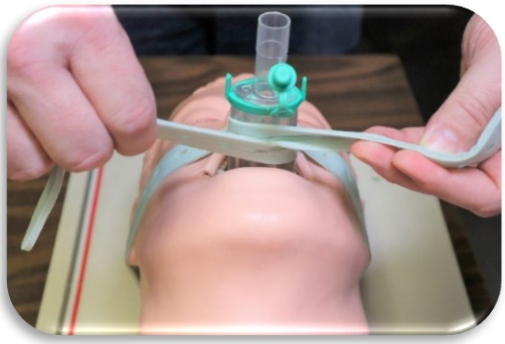
∇ BLS Clinicians will use the colorimetric confirmation device if no ALS clinicians are on scene.
- Waveform capnography should be implemented as soon as possible.
- BLS Clinicians may place and initialize waveform capnography in conjunction with use of colorimetric device.

6. Secure airway

- ∇ Secure the i-gel using the included elastic strap
  - Use of the Thomas Tube Holder to secure the i-gel is NOT approved
  - See Pediatric Section for information on securing pediatric i-gels
  - Straight Securing Method
    - Place the wide, center part of the strap behind the patient's head at the occiput.
    - Stretch each end of the strap up and insert a strap hole over the securing horn on each side of the device


  - Cross Securing Method
    - If using the straight securing method allows too much side to side movement in the situation you may attempt the Cross Securing Method to maintain a better seal
    - Place the wide, center part of the strap behind the patient's head at the occiput
    - Stretch each end of the strap up and cross them across the i-gel either on the nose or chin side
    - Wrap each side <u>once</u>, around the opposite side of the i-gel and insert a strap hole over the securing horn on each side of the device


*****NOTE*****

- ∇ **To perform the Cross Securing Method correctly, you must cross both ends of the strap at either the side closest to the top of the patient's head or the side closest to the patient's chin**
  - When completed correctly, both tails should point either towards the top of the patient's head or the patient's chin
  - If tails point in opposite directions when complete, it is likely the wrap was done incorrectly and a rotational force could be applied to the i-gel that will prevent it from sealing adequately against the glottis

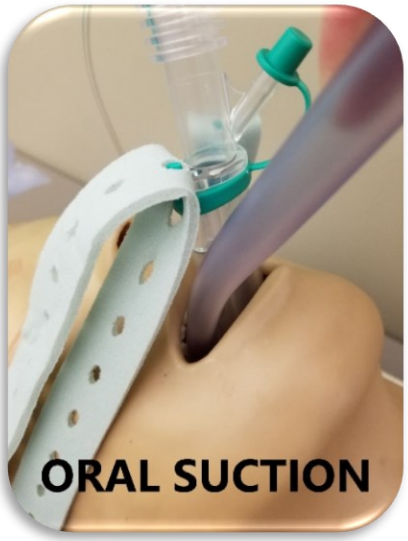
7. Ventilate Patient

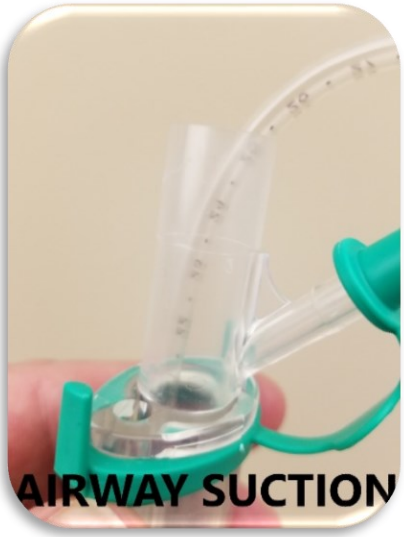
- ∇ Continuously monitor End-Tidal Waveforms to ensure proper seal, rate and volume
- ∇ The ADULT Cardiac Arrest patient should be ventilated at 10 breaths per minute
- ∇ The ADULT patient With a Pulse should be ventilated at a rate / volume dependent on their ETCO2 reading:
  - Increase rate and/or volume of ventilation if ETCO2 Capnometry is >45mmHg
  - Decrease rate and/or volume of ventilation if ETCO2 Capnometry is <35mmHg
- ∇ **If there is no End-Tidal waveform with ventilation, the i-gel is not patent**

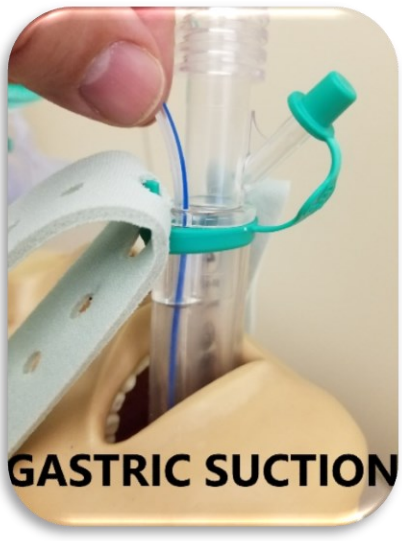
8. Suction PRN

- ∇ Oral Suctioning
  - Oral suctioning can be done around the i-gel for excessive secretions / emesis
- ∇ Airway Lumen Suctioning
  - Direct airway suctioning through the airway lumen of the i-gel may also be performed PRN.
  - Insert Suction cath up to max depth of approximately 22-23 cm on size 3-4-5
  - Disconnect the ETCO2 Filterline from the i-gel during airway lumen suctioning to make suctioning easier and avoid fouling the Filterline
- ∇ Gastric Suctioning
  - Gastric suctioning may be done to provide gastric decompression which may improve ventilation and reduce chance of aspiration
  - See i-gel® Gastric Suctioning section in Artificial Airway Suctioning for specific info on measuring and placing gastric suctioning catheters
  - Gastric suctioning should not be done continuously
    - If necessary, you can leave suction catheter inserted and apply suction intermittently
- ∇ See chart below for maximum suction catheter sizes

Adult i-gel® O2 Resus Suction Cath Size Chart		
i-gel® Size	**Airway Cath Size**	**Gastric Size**
3	14fr	12fr
4	14fr	12fr
5	14fr	14fr







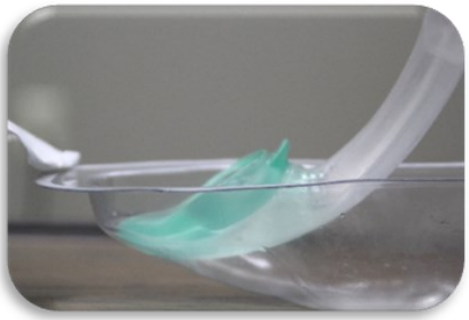
Supraglottic Airway Insertion – Pediatric (Anesthesia i-gel)

1. **Knowledge Points**
   - ∇ This entry demonstrates use of the Pediatric i-gel® (Anesthesia model)
   - ∇ For Adult use, see Supraglottic Airway Insertion - Adult (i-gel® Resus)

2. **Prepare Equipment**
   - ∇ Assure oxygenation and ventilation is maintained during equipment preparation
   - ∇ Pediatric Sizing
     - Pediatric i-gels® are the anesthesia model, not the O2 Resus mode
     - Pediatric i-gel® colors DO NOT correlate with Length Based Tape sizing colors. Use Length Based Tape and Field Reference Guide to determine correct size of Pediatric i-gel®
     - If first attempted size does not fit, attempt a size up or down

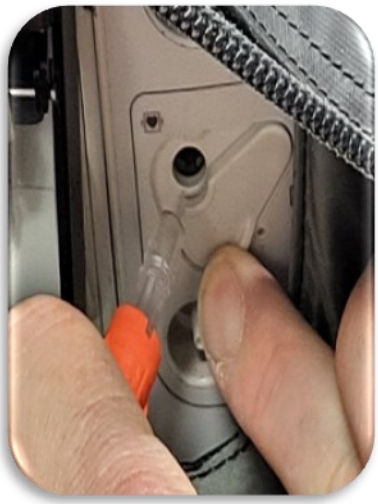
	Description	Size	Weight
○	i-gel, large paediatric, supraglottic airway	2.5	25-35kg
●	i-gel, small paediatric, supraglottic airway	2	10-25kg
●	i-gel, infant, supraglottic airway	1.5	5-12kg
●	i-gel, neonate, supraglottic airway	1	2-5kg

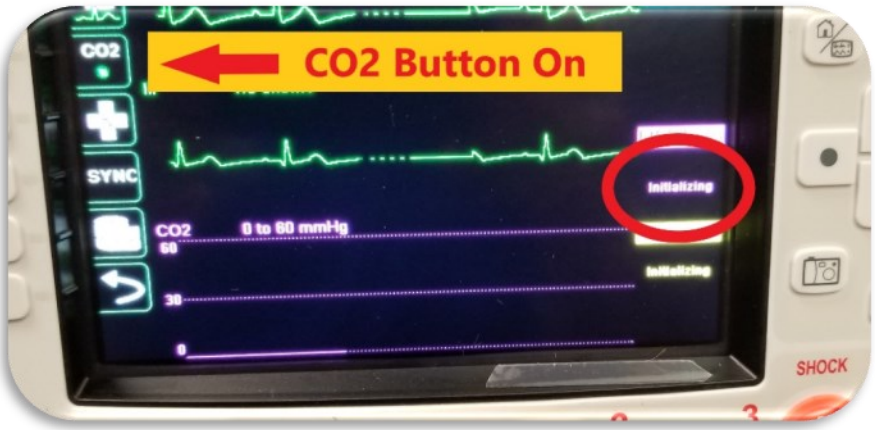
   - ∇ Lubricate back, sides and front of cuff and place back in cradle
     - Generous lubrication is critical to prevent friction in the airway which can lead to bleeding
     - Do not allow a large bolus of lube to collect in the lumen of the i-gel or occlude the distal suction port

- ∇ Prepare Suction
  - Vomiting and fluids in the pharynx are possible when placing an airway and may present challenges to the airway seal and ventilation

- ∇ Prepare ETCO2
  - Use the Length Based Tape / FRG to determine correct ETCO2 Filterline size
  - *The ETCO2 Filterline should be connected to the monitor and the zeroing process initiated during this time so it is ready when applied to the i-gel and the first breath delivered will include ETCO2 sampling.*
  - If only BLS Clinicians are on scene, initial confirmation will be done with a colorimetric device.
    - Waveform capnography should be implemented as soon as possible.
    - BLS Clinicians may initialize and place waveform capnography in conjunction with use of colorimetric device
  - See Confirm Placement section below for details.





3. Prepare Patient

- ∇ For pediatric patients with larger occiput, pad under the shoulder blades to place head in sniffing position

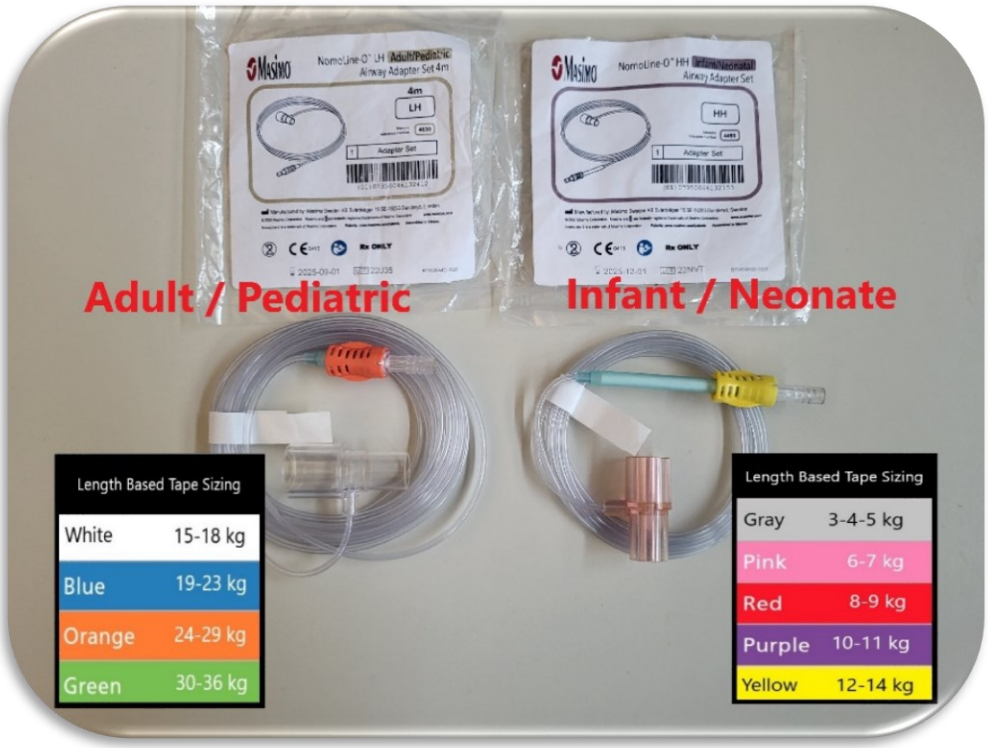
4. Insert Airway

- ∇ Grasp integral bite-block at midshaft, cuff facing patient's chin
  - Integral bite block and shaft are sturdy and can successfully guide airway. No fingers need enter mouth or between teeth
- ∇ With your other hand, open mouth by pushing chin down
  - Opening mouth facilitates passage of cuff through oropharynx

- ∇ Insert leading soft tip, gently advancing at midline toward hard palate
  - Some resistance may be felt as cuff passes tonsillar area of pharynx, but continue insertion
  - Stop when definitive resistance is felt
    - Tip of cuff should rest in upper esophageal opening
  - No portion of the cuff should be visible when looking in the mouth

5. Confirm Placement

- ∇ Elapsed time from steps 2-4 should be less than 30 seconds.
- ∇ Primary Confirmation is the use of ETCO2 Waveform Capnography.
  - Waveform Capnography is gold standard for confirming placement.
  - See below for use of colorimetric device
  - See ETCO2 Skills Dictionary for more detailed information on ETCO2 placement and monitoring.
- ∇ *The ETCO2 Filterline Adapter should be connected to the monitor and the zeroing process initiated during the Preparing Equipment phase so it is ready when applied to the i-gel and the first breath delivered will include ETCO2 sampling*.
- ∇ Selecting the correct Filterline size for your patient using the Length Based Tape / FRG:
  - The Filterline Airway Adapter is available in 2 sizes
    - Pediatric patients who measure *White and Larger* on a Length Based Tape use the Adult / Pediatric FilterLine Adapter
    - Pediatric patients who measure *Yellow and Smaller* on a Length Based Tape use the Infant / Neonate FilterLine Adapter
    - Using the Adult/Pediatric Filterline on patients Yellow and smaller will result in false low readings or failure to read ETCO2 due to too much dead space in the adapter



- ∇ Initializing (Zeroing) and applying the sampling device
  - There are 3 steps in initializing and applying the sampling device that may be done in any order.
    - Plugging the sampling device into the monitor.
    - Pressing the CO2 Soft Key to activate the sampling pump.
      - ♦ *Green light is on when pump is active.*
    - Applying the sampling device (FilterLine) to the patient.

- *Note: The zeroing / initializing process may take 30-60 seconds.

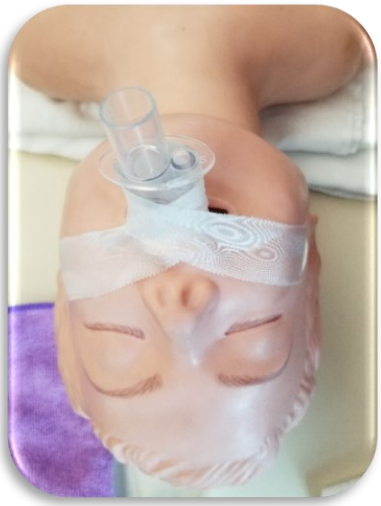
∇ Ventilate and observe for waveform and numerical reading.
- Due to the monitor's ETCO2 data compression for display on the screen, there is approximately a 3-4 second delay between providing a ventilation and the corresponding waveform displaying on the screen.
- If the monitor has not already been zeroed for this patient, waveforms may not appear until up to 30-60 seconds AFTER CO2 button has been activated even if the sampling device is connected to the patient.
- **If the monitor has not already been zeroed for this patient and you don't have a waveform after 30-60 seconds with ventilation, the airway is not patent.**
- **If the monitor HAS already been zeroed for this patient and you don't have waveform after 10-15 seconds with ventilation, the airway is not patent.**
- **If at any time after initial ETCO2 confirmation, there is no ETCO2 waveform with ventilation, the airway is not patent.**
- **If the airway is not patent, remove the airway.**
  - Leave ETCO2 filterline connected to BVM, attach mask, ventilate, and assess for ETCO2 waveforms.
  - If no ETCO2 waveforms with BVM and mask, continue to troubleshoot.

∇ Once Primary ETCO2 waveform confirmation has been obtained:
- Secondary Confirmation:
  - Auscultate for absence of epigastric sounds and presence of breath sounds.
    - ♦ **Breath Sounds alone, without the presence of waveform capnography, does not indicate a patent airway.**
    - ♦ Condensation in airway is not a reliable form of confirmation.
    - ♦ Good Bag Compliance alone, without the presence of waveform capnography, does not indicate a patent airway.

∇ BLS Clinicians will use the colorimetric confirmation device if no ALS clinicians are on scene.
- Waveform capnography should be implemented as soon as possible.
- BLS Clinicians may initialize and place waveform capnography in conjunction with use of colorimetric device.

6. Secure Airway

- ∇ Use tape to wrap once around i-gel and adhere maxilla to maxilla
  - Place center of length of tape with sticky side adhering to side of i-gel closest to feet
  - Wrap one side around i-gel and adhere to opposite maxilla
  - Wrap other side around i-gel and adhere to opposite maxilla



7. Ventilate patient

- ∇ Continuously monitor End-Tidal Waveforms to ensure proper seal, rate and volume
- ∇ The PEDIATRIC Cardiac Arrest patient should be ventilated at 12-20 breaths per minute
  - The NEONATE Cardiac Arrest patient should be ventilated at 40-60 breaths per minute
- ∇ The patient With a Pulse should be ventilated at a rate / volume dependent on their ETCO2 reading:
  - Increase rate and/or volume of ventilation if ETCO2 Capnometry is >45mmHg
  - Decrease rate and/or volume of ventilation if ETCO2 Capnometry is <35mmHg
- ∇ **If there is no End-Tidal waveform with ventilation, the i-gel® is not patent**

8. Suction PRN

- ∇ Oral Suctioning
  - Oral suctioning can be done around the i-gel for excessive secretions / emesis
- ∇ Airway Lumen Suctioning
  - Direct airway suctioning through the airway lumen of the i-gel may also be performed PRN.
  - Disconnect the ETCO2 Filterline from the i-gel during airway lumen suctioning to make suctioning easier and avoid fouling the Filterline.
- ∇ Gastric Suctioning
  - Gastric suctioning may be done to provide gastric decompression which may improve ventilation and reduce chance of aspiration
  - See i-gel® Gastric Suctioning section in Artificial Airway Suctioning for specific info on measuring and placing gastric suctioning catheters
  - Gastric suctioning should not be done continuously
    - If necessary, you can leave suction catheter inserted and apply suction intermittently.
- ∇ See chart below for maximum suction catheter sizes

Pediatric i-gel® Anesthesia Suction Cath Size Chart		
i-gel® Size	**Airway Cath Size**	**Gastric Size**
1	8	N/A
1.5	10fr	10fr
2	10fr	12fr
2.5	10fr	12fr

Surgical Airway – Adult (Scalpel-Finger-Bougie)

1. **Knowledge Points**
   - ∇ This airway procedure is for ADULT patients only (Any patient taller than the Broselow tape)
   - ∇ This procedure is not to be used on pediatric patients
2. **Prepare Equipment**
   - ∇ Open and position surgical airway kit
     - ∇ The Surgical Airway kit is a preassembled unit with a 10-ml syringe, shortened 6.0 ET Tube with pre-attached depth-stop and tie, Scalpel and Bougie that allows access for ventilation in the presence of acute respiratory distress with upper airway obstruction when less invasive airway procedures are unsuccessful
     - ∇ Check ET cuff with syringe
   - ∇ Have an assistant ready with suction, this will be a bloody procedure
   - ∇ Personal Protective Equipment should include face mask and eye protection, as aerosolization of blood and airway secretions from the incision is possible

3. **Position the patient and yourself**
   - ∇ Place the patient supine
   - ∇ Position yourself at the patient's shoulder
     - If you are Right Hand Dominant, position yourself at the patient's Right Shoulder
     - If you are Left Hand Dominant, position yourself at the patient's Left Shoulder
   - ∇ Hyperextend the patient's head and neck
     - Hyperextension of the head stretches the skin of the neck and facilitates locating landmarks for the laryngeal structures and puncture site.
     - *If there is suspected cervical spine injury, do not hyperextend neck, maintain spinal motion restriction*

4. Locate the Cricothyroid Membrane

- ∇ Method 1
  - Clean the area from the top of the Thyroid Cartilage to the Sternal Notch with ETOH wipe or betadine swab
  - Perform Laryngeal Handshake to locate the body of the Thyroid Cartilage (Larynx)
    - Stabilize your Non-Dominant Hand by resting the palm / wrist on the patient's chin, then using it to grasp and stabilize the body of the thyroid cartilage between your Thumb and Middle Finger
  - Use your Non-Dominant Index Finger to palpate the thyroid cartilage, sliding down the firm structure until the tip of your finger locates the "dip" of the Crico-Thyroid Membrane (CTM) between the bottom of the thyroid cartilage and the top of the cricoid cartilage
  - Stretch the skin taut between your fingers and thumb
  - Keep the tip of your finger on the CTM until ready to incise



- ∇ Method 2
  - Clean the area from the top of the Thyroid Cartilage to the Sternal Notch with ETOH wipe or betadine swab
  - Perform Laryngeal Handshake to locate the body of the Thyroid Cartilage (Larynx)
    - Stabilize your Non-Dominant Hand by resting the palm / wrist on the patient's chin, then using it to grasp and stabilize the body of the thyroid cartilage between your Thumb and Middle Finger
  - Use your Non-Dominant Index Finger to palpate the Sternal Notch
  - Slide index finger up the cricoid cartilage and to locate the "dip" of the CTM between the top of the cricoid cartilage and the bottom of the thyroid cartilage
  - Stretch the skin taut between your fingers and thumb
  - Keep the tip of your finger on the CTM until ready to incise



5. Make the incision

- ∇ *This will be a bloody procedure*
  - Have an assistant ready with suction and gauze to assist with clearing of blood to improve visibility when needed
  - Keep incision at the midline to minimize potential for contact with arteries and veins that supply the thyroid from either side
- ∇ Maintain laryngeal handshake to stabilize thyroid cartilage during incision
- ∇ With the scalpel in your dominant hand, make a vertical incision from the Thyroid Cartilage downward to bottom of Cricoid Cartilage
  - This incision should be approximately 2-3 inches in length
  - You may have to dissect down through a layer of fatty tissue
  - Expose Cricothyroid Membrane

- ∇ Use Index Finger of non-dominant hand to palpate and confirm location of CTM through vertical incision if difficult to visualize due to bleeding
- ∇ Turn blade of scalpel horizontally and puncture lower border of CTM at the midline, then cut laterally to one edge of CTM
- ∇ Without removing blade, twist blade 180 degrees and cut laterally to opposite edge of CTM
  - Be careful not to insert the scalpel deep enough to cause trauma to rear wall of trachea, which could allow placing bougie and ET Tube into a false passage
- ∇ Remove blade and insert index finger into incision until touching the back of the trachea (which is back of cricoid cartilage)

6. Insert Bougie

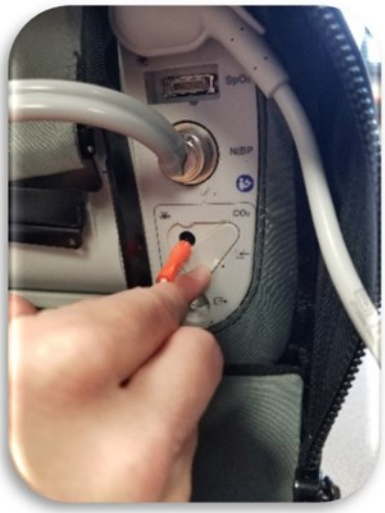
- ∇ Keep your non-dominant index finger inserted in the incision, touching the back of the trachea
- ∇ Using your dominant hand, insert tip of bougie into trachea next to your finger
- ∇ Once the tip of the bougie is past the opening of the CTM, you may remove your finger
- ∇ Continue to advance bougie until it stops
  - If placed in the trachea, the bougie will likely eventually lodge in the right or left mainstem bronchus and fail to advance further
  - If placed in the esophagus, the bougie will likely be able to be advanced very deeply in the esophagus with little to no resistance, which should alert the clinician the bougie is not correctly placed in the trachea and should be removed and reattempted
  - If placed in a false passage, the bougie will likely be difficult to advance and will not advance very deeply
  - When fully advanced, there may not be enough bougie outside the trachea to allow you to grasp and stabilize it during ET insertion, so you may have to back the bougie out slightly prior to placing ET tube over it

7. Insert ET Tube

- ∇ Have another clinician slide ET Tube over free end of bougie and advance it until you are able to grasp it
- ∇ slide down through incision until ET cuff is no longer visible
  - It may be helpful to rotate the ET Tube during insertion to prevent it from being held up at the incision
- ∇ Remove bougie while maintaining position of ET tube
- ∇ Inflate Cuff

8. Confirm Placement

- ∇ Elapsed time from steps 2-7 should be less than 30 seconds
- ∇ Primary Confirmation is the use of ETCO2 Waveform Capnography
- ∇ Patient must be ventilated with BVM to assess proper placement
  - Observe for chest rise
- ∇ Attach BVM, ETCO2 Filterline Adapter and ventilate



  - Waveform Capnography is gold standard for confirming placement
  - See ETCO2 Skills Dictionary for more detailed information on ETCO2 placement and monitoring

- ∇ Initializing (Zeroing) and applying the sampling device
  - There are 3 steps in initializing and applying the sampling device that may be done in any order
    - Plugging the sampling device into the monitor
    - Pressing the CO2 Soft Key to activate the sampling pump
    - Applying the sampling device (FilterLine) to the patient
  - Ventilate and observe for waveform and numerical reading
    - ***Note: The zeroing / initializing process may take 30-60 seconds.**
    - **If the monitor has not already been zeroed for this patient, waveforms may not appear until up to 30-60 seconds AFTER CO2 button has been activated even if the sampling device is connected to the patient**
  - **If you don't have a waveform after 30-60 seconds with ventilation, the airway is not patent**
    - If the bottom "0" baseline is a solid line registering Zero 30-60 seconds after completion of the initialization / zeroing process and placing the sampling line on the airway, the airway is not patent
  - **If there is no ETCO2 waveform with ventilation, the ET Tube is not patent**
- ∇ Secondary Confirmation
  - Auscultate for absence of epigastric sounds and presence of breath sounds
    - **Breath Sounds alone, without the presence of waveform capnography, does not indicate a patent airway**
    - Condensation in tube is not a reliable form of confirmation
      - ♦ Esophageal placement may still cause condensation in tube

9. Secure ET Tube

- ∇ Secure ET Tube with attached device
  - Depending on the size of the patient, the ET may be inserted until the attached securing device is flush with the incision
  - On smaller patients, there may be space between the securing device and the incision.
    - With one hand holding ET Tube in place, use other hand to twist attached securing device back and forth to work it down the tube to be flush with incision
- ∇ Tie securing device in place
  - *Be sure not to tie so tightly that you are compressing carotid arteries and other vascular structures in neck*
  - *You should be able to slip 2 fingers between the patient's neck and the securing strap*

10. Ventilating the patient

- ∇ It is best practice to maintain a hand on the ET Tube, stabilized on the patient's neck at the incision during ventilation
- ∇ Never allow BVM to hang from the ET Tube

- ∇ Watch for chest rise and fall
  - There is much less dead space with this technique vs an orally placed ET Tube or i-gel, be careful not to over inflate the lungs
  - Frequently check for ventilation of both lungs by auscultating the chest and observing for chest movement
- ∇ The "Feel" of providing ventilations
  - The size 6.0 ET Tube may feel slightly more difficult to ventilate than a larger ET or i-gel
  - Be cautious and reassess breath sounds if there is an increase in the difficulty at any point. This could be an indicator of pneumothorax caused by inadequate exhalation time, or migration of the ET tube into a false passage
- ∇ Prolonged exhalation time may need to be allowed due to the small lumen
  - Timing alone can be unreliable and chest rise may not easily be detected
  - Using ETCO2 is the most reliable indicator of adequate ventilation.
    - If the ETCO2 levels are below 35 mm Hg, the provider should slow ventilation rate to reach this optimum range but do not ventilate slower than 8-10 breaths per minute
    - If the ETCO2 levels are above 45 mm Hg, the provider should increase ventilation rate to reach this optimum range but be cautious to continue to allow adequate exhalation time.

CARDIAC MANAGEMENT

This Page Left Blank

12-Lead Placement / Acquisition / Transmission (ZOLL)

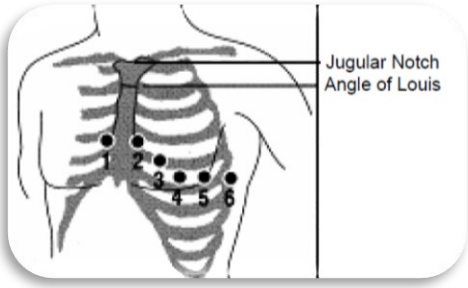
*This entry assumes the monitor is powered on.

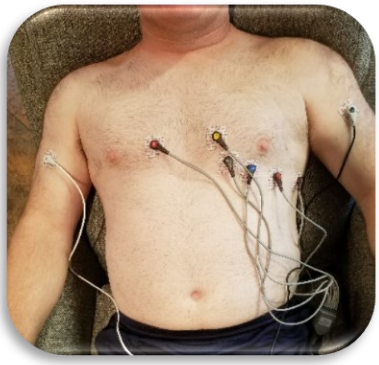
1. **Prepare the patient**
   - ∇ Explain the procedure to the patient
   - ∇ Prepare the patient's skin
     - Slight abrasion to the area where the electrodes are to be placed will significantly improve tracing quality and decrease artifact.
       - Use a small piece of abrasive material such as skin prep tape or scrape the area with the edge of the plastic sheet that holds the electrodes.
     - Clean oily skin with an alcohol prep.
     - Rub wet or sweaty skin briskly to dry.
     - Apply benzoin to improve adhesion if necessary.

2. **Attach 4-Lead electrodes and cables**
   - ∇ Connecting the lead wire to the electrode prior to placing the electrode on the patient is best practice as it is easier for the provider, more comfortable for the patient, and minimizes risk of displacing the conductive gel.
     - Patients with fragile skin may experience skin tears by attempting to apply the lead wire to an electrode already attached to the patient
   - ∇ To obtain a 12-Lead with diagnostic value, the limb leads MUST be placed on the limbs.
     - Limb Leads may be placed anywhere beyond the Shoulder joint and Hip joint.
       - Limb Leads may be placed generally anywhere along the length of the limb but should be placed in the same general location of each arm and each leg.
       - Large bony prominences and large muscle groups should be avoided

3. Attach the Precordial Leads (V-Leads / Chest Leads) and cables

- ∇ Locating the V1 position (4th intercostal space) is critically important because it is the reference point for locating the placement of the remaining V-Leads.
  - Place your finger on top of the jugular Notch
  - Move your finger slowly downward about 1.5 inches until you feel a slight horizontal ridge or elevation. This is the "Angle of Louis", where the manubrium joins the body of the sternum.
  - Locate the 2nd intercostal space on the patient's right side, lateral to and just below the Angle of Louis.
  - Move your finger down two more intercostal spaces to the 4th intercostal space which is the V1 position.
- ∇ Attach V1 electrode at the position described above.
- ∇ Attach V2 electrode to the Left of the sternum, across from V1, at the 4th intercostal space.
- ∇ Attach V4 electrode in the 5th intercostal space at the Left midclavicular line.
- ∇ Attach V3 electrode midway between V2 and V4.
- ∇ Attach V5 electrode at the Left anterior axillary line, at the same horizontal level as V4.
- ∇ Attach V6 electrode at the Left midaxillary line, at the same horizontal level as V4 and V5.
- ∇ When placing electrodes on patients with pendulous breast tissue, always place leads V3-V6 under the breast rather than on the breast.
- ∇ Attach the V-Lead connector to the 4-Lead cable.





NOTE

ALL STEMI PATIENTS SHOULD HAVE DEFIB PADS APPLIED AS SOON AS POSSIBLE AFTER RECOGNITION.

USE THE FOLLOWING PLACEMENT LOCATIONS FOR DEFIB PATCHES TO ALLOW FOR CONTINUED 12-LEAD MONITORING:

Anterior / Lateral Placement:

Anterior Pad: Below Right clavicle, just to the Right of the sternum.

Lateral Pad: Left lower rib margin, centered below V6 location.

Anterior / Posterior Placement:

Anterior Pad: Below Left clavicle, just to the Left of the sternum.

Posterior Pad: To the Left of the spine, just below the Left scapula.

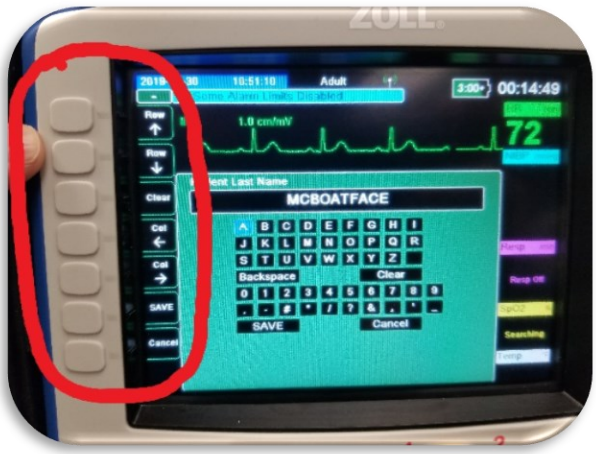
4. Position the patient

- ∇ The patient needs to be as still as possible to produce a 12-Lead with minimal artifact and consistent baseline.
  - Ensure they are still from just prior to acquisition and until the acquisition process is complete.
- ∇ Instruct the patient to "relax and breathe normally"
  - Instructing the patient to "Hold still" may cause the patient to grab arm rests or cot rails or tense skeletal muscles, which contributes to artifact.
- ∇ If serial 12-Leads are obtained, the patient should be in similar positions for all 12-Leads, if possible, for the greatest comparative value.

5. Navigate to 12-Lead View and Menu

- ∇ Press 12-Lead quick access key
- ∇ Press Patient Info quick access key

- ∇ Use arrow and select buttons to enter patient's age, gender and name.
  - You can also use quick access navigation keys on Left of screen.



- ∇ It is important to enter each patient's age and gender prior to performing ECG analysis using the 12-Lead Interpretive Algorithm. Providing age and gender will ensure the highest accuracy of analysis.
- ∇ If age is not entered, default of 45yo is used. If gender is not entered, default of male is used.

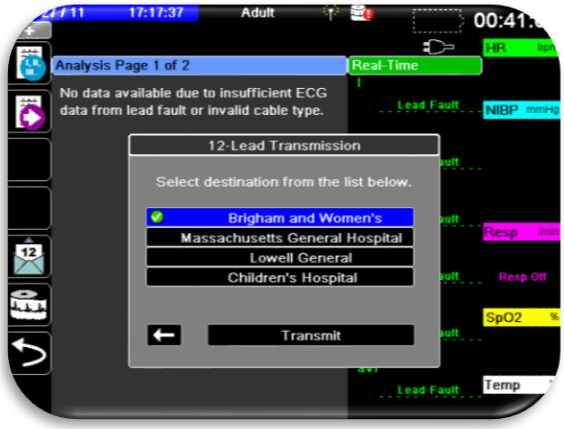
6. Acquire 12-Lead

- ∇ Once all patient information has been entered, view the leads display to ensure all leads are connected and displaying correctly, acquire the 12-Lead
- ∇ Push the Acquire quick access key.
  - A message and status bar will display showing “Acquiring 12-Lead” and then “Saving 12-Lead”
  - If you need to stop either process, you can use the Stop quick access key.

- ∇ Once the 12-Lead is acquired and saved, a 12-Lead Interpretive Analysis is displayed.
  - The 12-Lead Interpretive Analysis is intended for Adult patients only.
  - The 12-Lead Interpretive algorithm’s interpretive statements are designed to enhance the diagnostic process. They are no substitute for the qualified judgement of a properly trained clinician. Always give consideration to patient symptoms, history and other relative factors.

7. Transmit the 12-Lead Snapshot

- ∇ Press the 12-Lead Review Next quick access key to display a list of acquired 12-Leads
- ∇ Use the arrow navigation and select buttons to select the desired 12-Lead
- ∇ Press the 12-Lead Send quick access key to bring up a list of preconfigured distribution list.
- ∇ Use the arrow navigation and select buttons to select the desired receiving facility
- ∇ Select Transmit to initiate 12-Lead transmission to selected facility.



8. Removal

- ∇ *****CAUTION*** Best practice is to leave electrodes on the patient to prevent skin tears**
- ∇ ***When removing lead wires from electrodes, do not grasp the cable and forcefully pull off wire from the electrode as this may cause injury, skin tears, discomfort to the patient and damage to the cables***
  - Unclip each wire from electrodes individually to minimize chance of injuring patient or damaging cables
- ∇ Leave electrodes attached to patient unless there is a therapeutic need to remove them
- ∇ Electrodes can even be left in place with patient refusals
- ∇ If removing electrodes from patient, stabilize skin around electrode and pull gently
  - On patients with delicate skin, stabilize skin around electrode during removal to minimize shearing force and risk of skin tear and use alcohol prep pad to deactivate adhesive during removal
    - Pull up electrode slightly to tent skin, then use alcohol prep pad to slide under edge of electrode, rubbing the alcohol pad back and forth under electrode as it peels away.

PEDIATRIC 12-LEADS

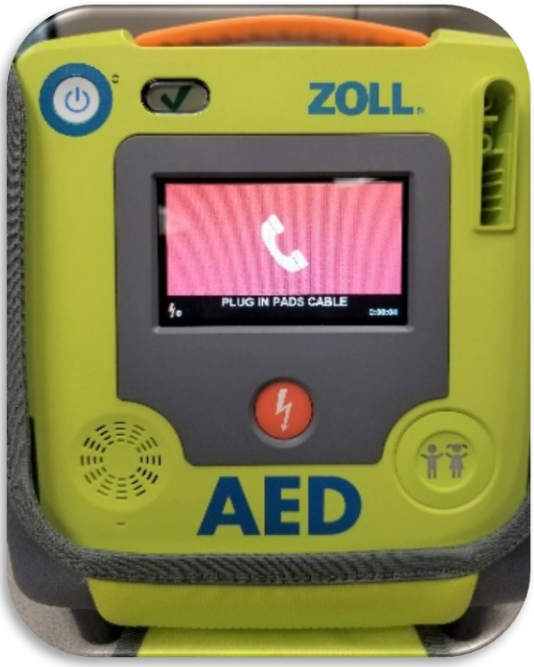
1. **Pediatric 12-Lead Placement / Acquisition / Transmission**
   - ∇ The processes for Lead placement, acquisition, and transmission of 12-leads for children is identical to adult patients.
   - ∇ Landmarks for lead placement are the same, though the size of electrodes may make placement difficult. 12-Lead accuracy and quality should not be affected by overlapping the adhesive portions of the electrodes, but do not overlap the conductive portions of the electrodes.
   - ∇ The displayed / printed analysis text is not to be considered accurate for pediatric patients. The provider's own interpretation, along with a solid clinical assessment and online medical direction, if necessary, should guide treatment.

Automated External Defibrillator (ZOLL AED 3) Use

1. **Knowledge Points**
   - ∇ This Dictionary focuses on the use of the ZOLL AED 3. Other AEDs will have typically similar functions
   - ∇ For use of the ZOLL X-Series Monitor/Defibrillator as an AED, see Automated External Defibrillator (ZOLL X-Series)
2. **Open case / expose AED**
   - ∇ Depending on the manufacturer, some AEDs power on automatically when case is opened
   - ∇ If AED does not power on automatically, proceed to next step.
   - ∇ Once AED powers on, follow the auditory directions and directions on screen

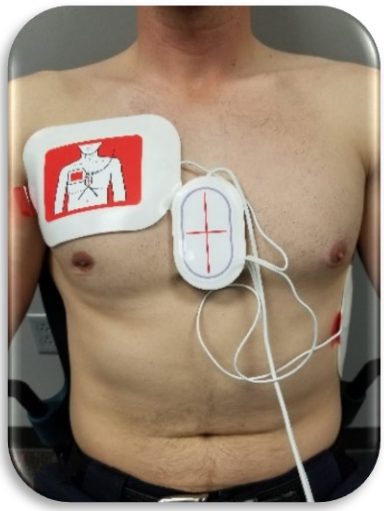
3. **Power on AED – Press Power Button**
   - ∇ AEDs go through brief self-check when powered on and will display results prior to beginning directions
   - ∇ Once AED powers on, follow the auditory directions and directions on screen
   - ∇ Those directions are detailed in the following steps

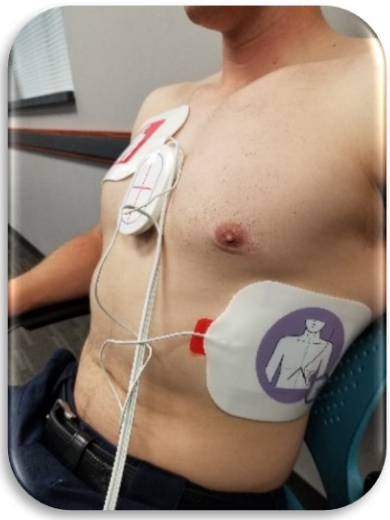
4. **Plug in Pads Cable**
   - ∇ If your department stores the AED with pads already plugged in, the AED will skip this step
   - ∇ If Pediatric pads are plugged in, the Child Selector Button will illuminate, and the AED will automatically attenuate the doses delivered for pediatric patients
     - If you are using Universal pads or Adult pads on a pediatric patient, you will need to manually press the Child Selector Button.



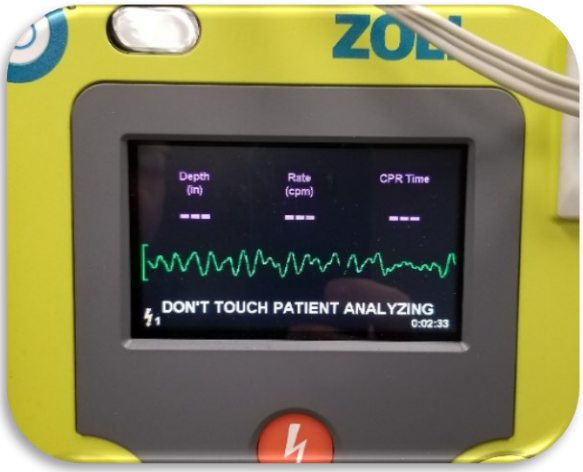
5. **Expose Bare Chest**
   - ∇ Prepare skin as necessary
   - ∇ Not all patients will require skin preparation prior to application of therapy patches
   - ∇ Dry the chest if wet or diaphoretic
   - ∇ Clip or shave hair as needed to allow proper pad contact with skin
     - ○ If razor/clippers are not available, but there are more than one set of pads available, you may remove hair by applying a set of pads to the patient's chest and then rapidly pulling them off. Discard this set of pads and apply a new set to begin therapy.

6. **Attach Pads**
   - ∇ The AED will remind you to open the pad package
   - ∇ The Anterior-Lateral pad position is the preferred placement for Defibrillation
     - A-L position is preferred because it causes the least interference with other lifesaving interventions such as CPR.
     - Place the Anterior pad by adhering the CPR sensor on the bottom half of the sternum, aligned with the sternal notch and applying the anterior pad on the patient's upper right torso.
     - Place the Lateral pad so the center of the conduction area is at the V6 position.
   - ∇ Once pads are placed, the AED will automatically proceed to analyzing the rhythm
   - ∇ Once pads are placed you will be able to see rhythm on screen



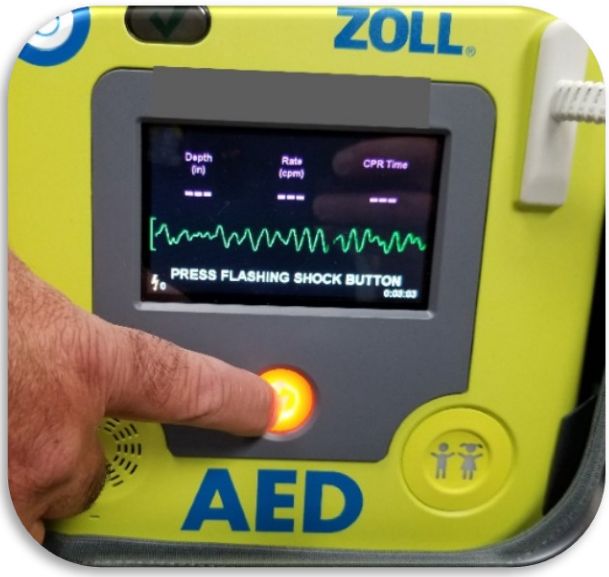


7. **Analyze Rhythm**
   - ∇ The AED will automatically begin analyzing the rhythm when the pads are placed on the patient
   - ∇ The AED will give auditory and on-screen directions to not touch the patient while analyzing
   - ∇ You will be able to see the rhythm on screen during AED analysis
   - ∇ The AED operator should also announce and visually ensure that no other providers are touching the patient during analysis



8. **Shock or No-Shock Determination**
   - ∇ Following analysis, the AED will determine if a defibrillation shock is advised or not advised.
   - ∇ SHOCK ADVISED
     - o If the AED determines the rhythm is shockable, it will give auditory and on-screen directions of "Shock Advised" and begin to charge the defibrillator to the preset amount of 200 Joules.
     - o The AED will also give auditory and on-screen directions of "Stand Clear" or "Do Not Touch Patient".
     - o While CPR may be performed during charging, it is imperative the operator of the AED announce and visually ensure that no other providers are touching the patient when delivering the defibrillation shock.
     - o Once fully charged, shock button will light up and/or flash and the AED will give auditory and on-screen directions to "Press Shock" to deliver the defibrillation shock.
     - o Once defibrillation has been delivered, the AED will give auditory and on-screen directions to "Begin CPR" and the metronome will begin at 105 beats per minute.


ZOLL
Depth (in)
Rate (cpm)
CPR Time
SHOCK ADVISED
AED


ZOLL
Depth (in)
Rate (cpm)
CPR Time
PRESS FLASHING SHOCK BUTTON
AED


ZOLL
Depth (in)
Rate (cpm)
CPR Time
SHOCK DELIVERED
AED


ZOLL
Depth (in)
Rate (cpm)
CPR Time
1:59
START CPR
AED

- NO SHOCK ADVISED
  - If the AED determines the rhythm is non-shockable, it will give auditory and on-screen directions of "No Shock Advised" and to "Begin CPR". The metronome will begin at 105 beats per minute.

- Performing CPR and CPR Feedback
  - The AED will continue with the metronome at 105 beats per minute
  - The AED will display the following information on screen during CPR
    - Cardiac rhythm
    - Number of shocks delivered
    - CPR countdown timer to keep track of 2-minute intervals
    - Elapsed time of event
    - CPR Feedback information
      - CPR Feedback information may include auditory and on-screen prompts regarding rate and depth of compressions depending on device and type of defibrillation patches used.
  - At the end of every 2-minute cycle, the AED will provide auditory and on-screen instructions to "Stop CPR" and the AED will cycle back through the process of analyzing the rhythm.
    - If the AED detects a shockable rhythm, it will repeat the instructions to charge and shock the patient.
    - If the AED detects a non-shockable rhythm, it will provide auditory and on-screen instructions to "Check Pulse" before continuing prompts to continue CPR.

Automated External Defibrillator (AED) (ZOLL®X-Series)

1. **Knowledge Points**
   - ∇ *****CAUTION*****
   - ∇ The ZOLL X-Series monitors in use by the JOCO EMS System power on in Manual Mode.
     - ○ *This requires great attention and care from the BLS Provider to operate the monitor correctly, safely and within their scope of practice.*

2. **Power on ZOLL X-Series Monitor – Press Power Button**
   - ∇ The monitor will go through brief self-check when powered on and will display results prior to beginning directions

3. Patient Preparation

- ∇ These steps may be done before or after pushing the Analyze button for AED use. If done after pushing Analyze, the AED will guide you through these steps.
- ∇ ***CAUTION*** the monitor will remain in Manual Mode until the Analyze Button is pushed. It is recommended that BLS Clinicians push the Analyze Button immediately after the monitor self-check is completed.
- ∇ CPR Should be performed while simultaneously performing the following steps.
  - **Push Analyze Button**
    - Pushing the Analyze Button places the X-Series monitor in AED Mode.
    - Once in AED Mode, the monitor will prompt you through attaching the pads, defibrillation when necessary, and CPR.

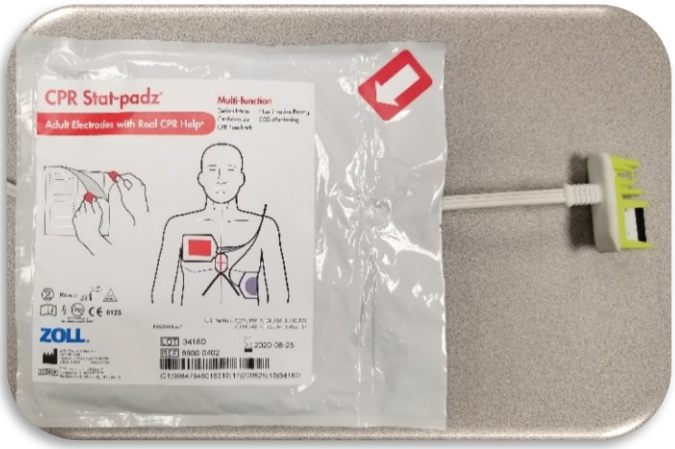
- **Expose Bare Chest**
  - Prepare skin as necessary
  - Not all patients will require skin preparation prior to application of therapy patches
  - Dry the chest if wet or diaphoretic
  - Clip or shave hair as needed to allow proper pad contact with skin
    - If razor/clippers are not available, but there are more than one set of pads available, you may remove hair by applying a set of pads to the patient's chest and then rapidly pulling them off. Discard this set of pads and apply a new set to begin therapy.

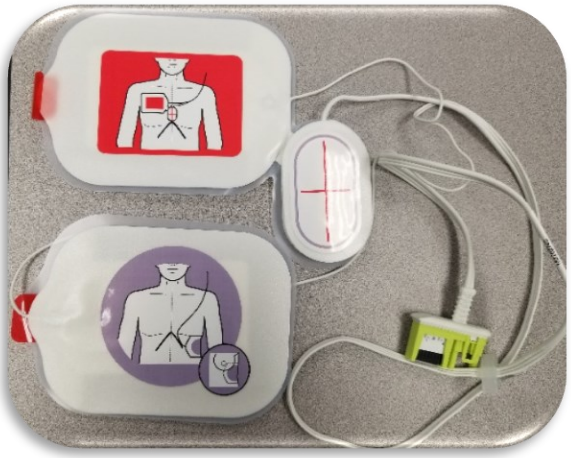
- **Attach Pads**
  - Using the ZOLL X-Series, it's likely always kept ready for use with the Adult pads kept plugged in
  - If your department stores the X-Series with pads already plugged in, skip this step
  - If your department does not store the X-Series with pads already plugged in, the monitor will display "ATTACH PADS". See picture below.
  - If your department does not store the X-Series with pads already plugged in, see pictures below for steps to plug in pads.
  - Adult pads require an adaptor that is typically left connected to the One-Step (defibrillator) cable
  - Pediatric pads require the removal of the Adult adapter. See Pediatric Considerations Section at end of this entry.

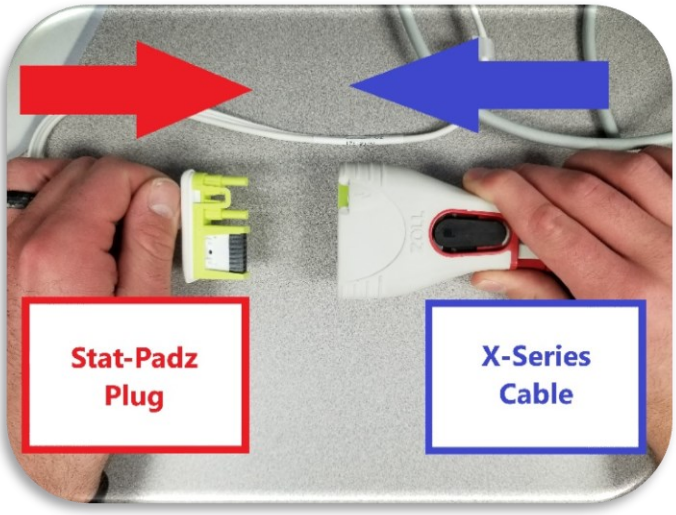
EMS Skills Dictionary

ATTACH PADS MESSAGE

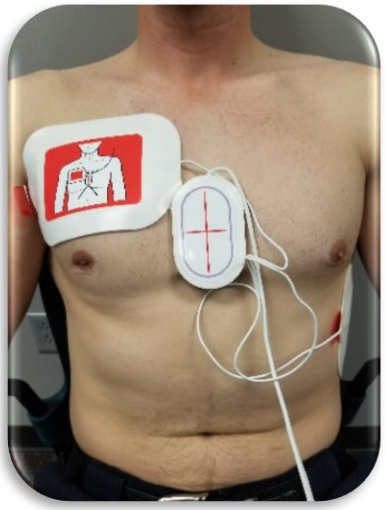
ADULT PADS CONNECTION

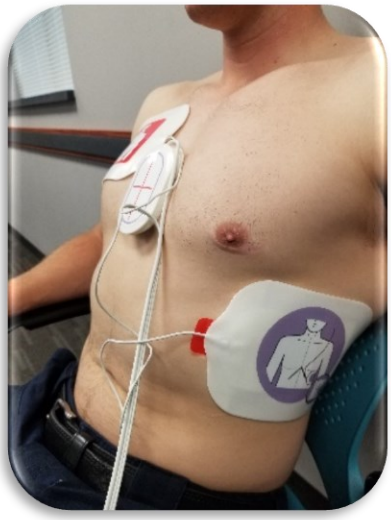






4. **Place Pads on Patient**
   - ∇ The Anterior-Lateral pad position is the preferred placement for Adult Defibrillation
     - A-L position is preferred because it causes the least interference with other lifesaving interventions such as CPR.
     - Place the Anterior pad by adhering the CPR sensor on the bottom half of the sternum, aligned with the sternal notch and applying the anterior pad on the patient's upper right torso.
     - Place the Lateral pad so the center of the conduction area is at the V6 position.
     - For Pediatric Pad placement, see Pediatric Considerations section.
   - ∇ If the Analyze Button has been pushed, once pads are placed, the monitor will automatically proceed to analyzing the rhythm (See next step)
   - ∇ Once pads are placed you will be able to see rhythm on screen





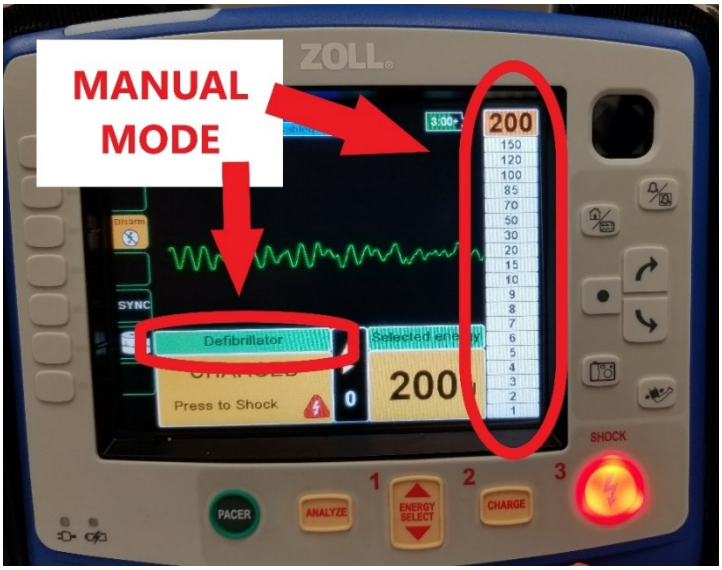
(Pictures are for placement reference only. Patients should be placed supine for CPR and Defibrillation)

5. **Analyze Rhythm**
   - ∇ If you have not already pushed the Analyze Button, do so now.
   - ∇ ***BLS Clinicians – you must push the Analyze Button to enter AED Mode
   - ∇ In AED Mode (after pushing the Analyze Button), the monitor will automatically begin analyzing the rhythm when the pads are placed on the patient.
   - ∇ The AED will give auditory and on-screen directions to not touch the patient while analyzing
   - ∇ You will be able to see the rhythm on screen during AED analysis
   - ∇ The AED operator should also announce and visually ensure that no other providers are touching the patient during analysis

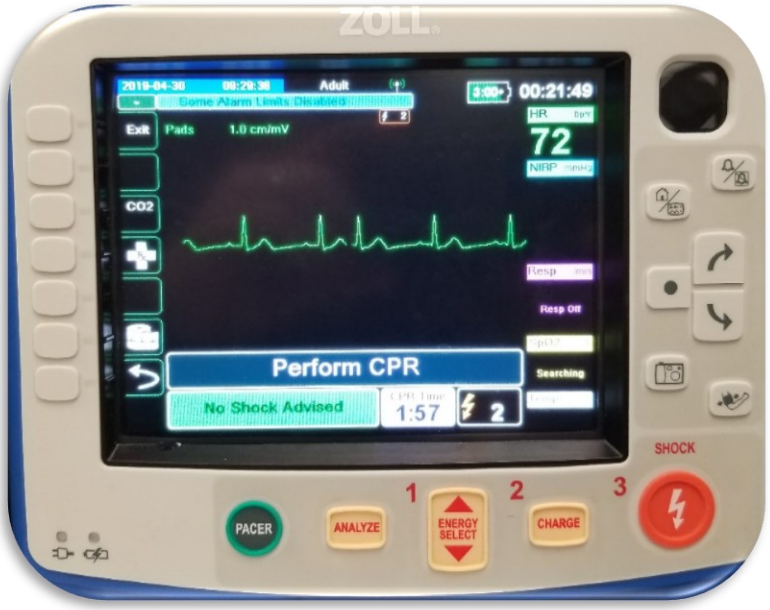
6. **Shock or No-Shock Determination**
   - ∇ Following analysis, the AED will determine if a defibrillation shock is advised or not advised.
   - ∇ SHOCK ADVISED
     - If the AED determines the rhythm is shockable, it will give auditory and on-screen directions of "Shock Advised" and begin to charge the defibrillator to the preset amount of 200 Joules.
     - The AED will also give auditory and on-screen directions of "Stand Clear" or "Do Not Touch Patient".
     - ***Note: The monitor does NOT make a noise when charging in AED Mode.
     - *** If you hear a charging noise when charging YOU ARE NOT IN AED MODE and must PUSH ANALYZE BUTTON TO ENTER AED MODE
     - While CPR may be performed during charging, it is imperative the operator of the AED announce and visually ensure that no other providers are touching the patient when delivering the defibrillation shock.
     - Once fully charged, shock button will light up and/or flash and the AED will give auditory and on-screen directions to "Press Shock" to deliver the defibrillation shock.
     - Once defibrillation has been delivered, the AED will give auditory and on-screen directions to "Perform CPR" and the metronome will begin at 105 beats per minute once several compressions have been detected by the monitor.
       - If internal metronome has been deactivated, activate external metronome at 105 beats per minute

WARNING

- When in AED Mode, you DO NOT need to push the Charge button. Ever.
  - If you have to push the "Charge" button to get the machine to charge, you are NOT IN AED MODE. Push the ANALYZE BUTTON to enter AED Mode.
- When in Manual Mode, the monitor displays a Charging Bar on the Right side of the screen and says "Defibrillator" in a Green and Yellow block on the Lower Left of the screen when charged.
- When operating in AED Mode, the monitor DOES NOT display the Charging Bar and DOES NOT say "Defibrillator".
- If you see these things, YOU ARE IN MANUAL MODE
- BLS CLINCIANS – DO NOT PUSH THE SHOCK BUTTON IN MANUAL MODE
  - Push the ANALYZE BUTTON to enter AED Mode



- ∇ NO SHOCK ADVISED
  - If the AED determines the rhythm is non-shockable, it will give auditory and on-screen directions of "No Shock Advised" and to "Perform CPR". The metronome will begin at 105 beats per minute once several compressions have been detected by the monitor.
    - If internal metronome has been deactivated, activate external metronome at 105 beats per minute



7. Performing CPR and CPR Feedback

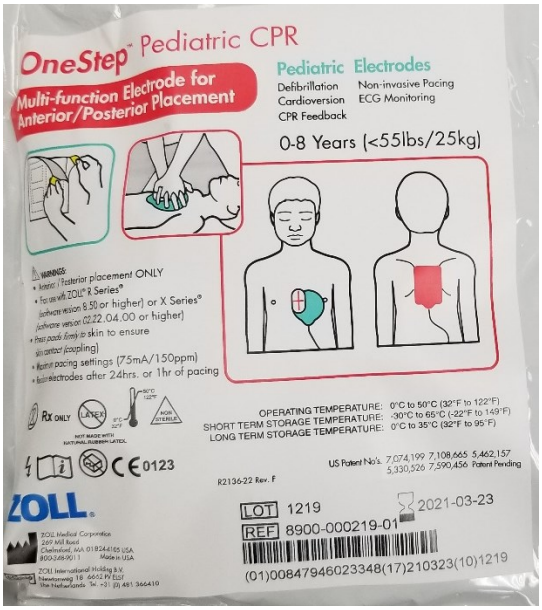
- ∇ The AED will continue with the metronome at 105 beats per minute
  - If internal metronome has been deactivated, activate external metronome at 105 beats per minute
- ∇ The AED will display the following information on screen during CPR
  - Cardiac rhythm
  - Number of shocks delivered
  - CPR countdown timer to keep track of 2 minute intervals
  - Elapsed time of event
  - CPR Feedback information
    - CPR Feedback information may include auditory and on-screen prompts regarding rate and depth of compressions depending on device and type of defibrillation patches used.
- ∇ At the end of every 2 minute cycle, the AED will provide auditory and on-screen instructions to "Stop CPR, Stand Clear" and the AED will cycle back through the process of analyzing the rhythm.
  - If the AED detects a shockable rhythm, it will repeat the instructions to charge and shock the patient.
  - If the AED detects a non-shockable rhythm, it will provide auditory and on-screen instructions to "Check Pulse" before continuing prompts to continue CPR.

ALS PROVIDERS ONLY

- To exit AED Mode and enter Manual Mode, press any of the buttons listed below
  - Energy Select Button
    - ♦ Dumps any existing charge, Exits AED Mode and opens screen to select an energy level and charge for a Manual Defibrillation
  - Charge Button
    - ♦ Dumps any existing charge, Exits AED Mode and opens screen to select an energy level and charge for a Manual Defibrillation
  - EXIT Soft Key
    - ♦ Dumps any existing charge, Exits AED Mode and opens basic monitoring screen

Pediatric Considerations

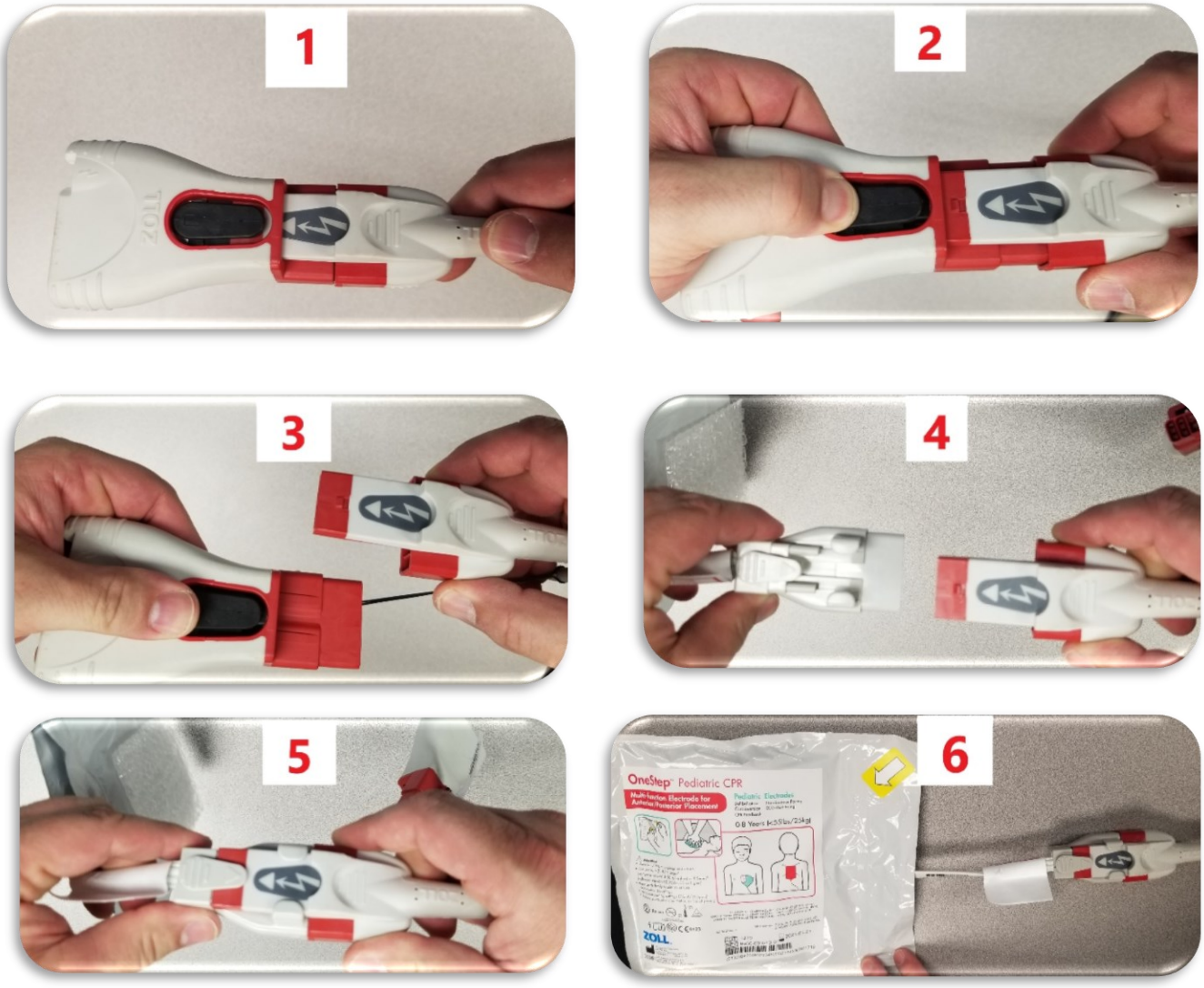
1. **Use of Pediatric Defibrillation Pads**
   - ∇ Connecting Pediatric pads automatically places the monitor in Pediatric Mode
   - ∇ Defibrillation steps for pediatric patients is identical to adult patients
   - ∇ The Pediatric One Step Patches are only to be used with children younger than 8 years old or weigh less than 55lbs / 24kg (Blue and under on Length Based Tape / Field Reference Guide)
   - ∇ See appropriate Weight Based color section of Johnson County EMS Field Reference Guide for appropriate defibrillation joule settings
   - ∇ Use caution when separating pads from backing: See Below



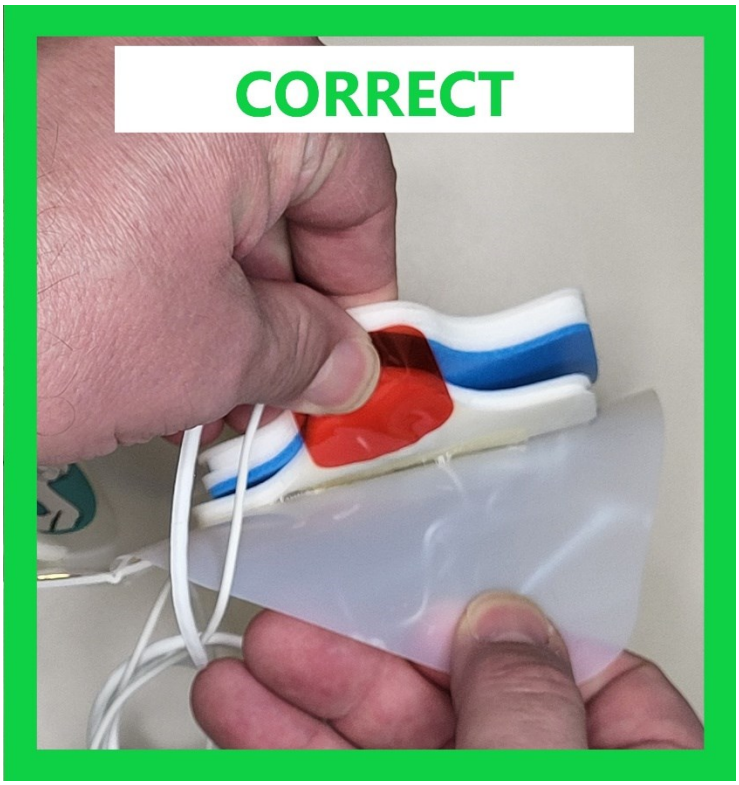
Length Based Tape Sizing
Grey 3-5 kg
Pink 6-7kg
Red 8-9 kg
Purple 10-11 kg
Yellow 12-14 kg
White 15-18 kg
Blue 19-23 kg

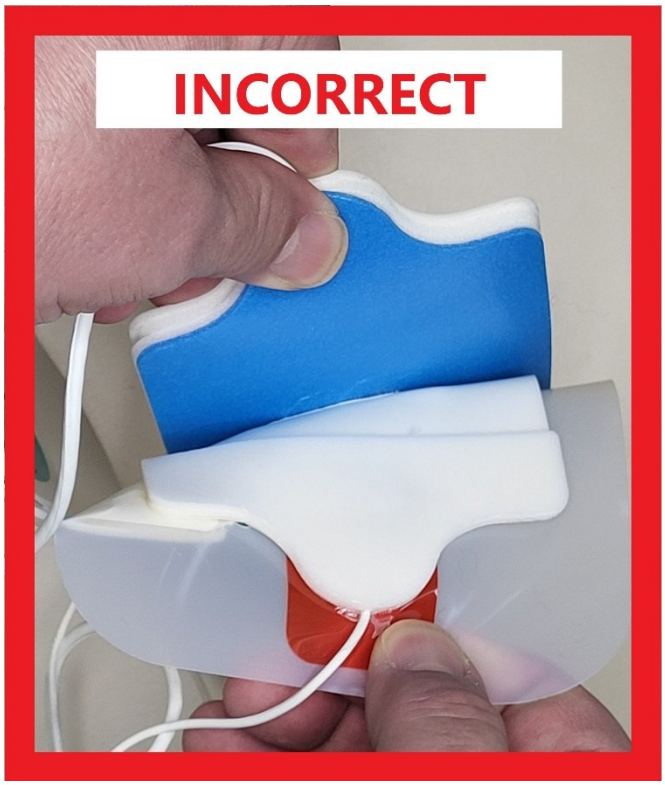
Length Based Tape Sizing
Orange 24-29 kg
Green 30-36 kg

∇ Attaching the Pediatric One Step pads to the One Step Cable will require the removal of the Adult Stat-Padz Adaptor if it is attached. See steps below for removal of adaptor and connection of pads



- **Use Caution when separating Pediatric Pads from backing**
  - **Use the Red Tab to pull the pad off of the backing**
  - **Do Not attempt to keep Red Tab with the backing or pad will separate and become inoperable**

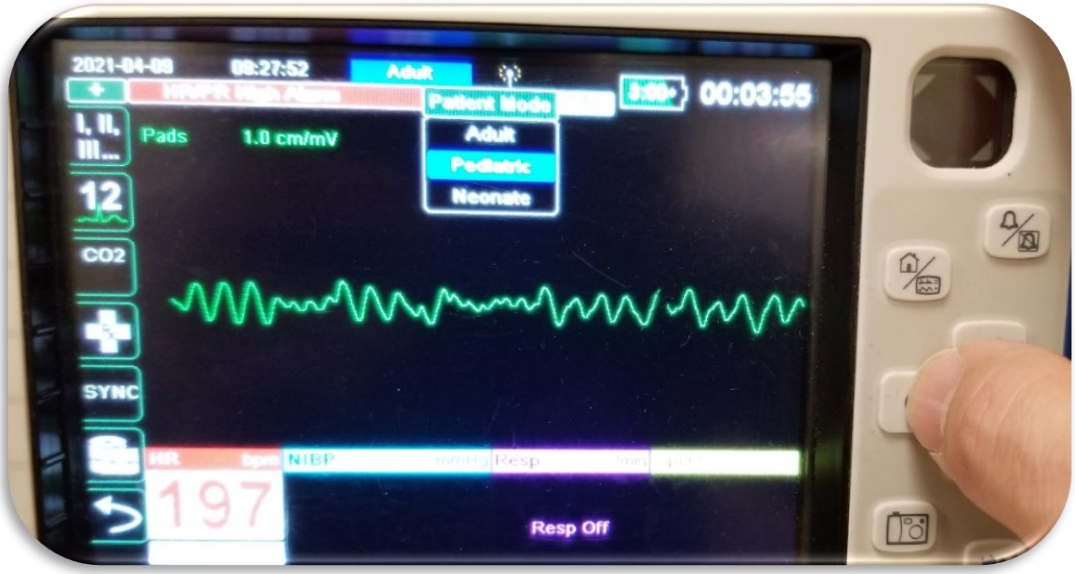




- ∇ The Anterior – Posterior placement is the only acceptable placement when using Pediatric One Step patches

- ○ If you are using Adult Stat-Padz Defibrillation patches, see directions below for manually placing the ZOLL X-Series in Pediatric Mode.
  - The Patient Age Mode setting is located in the top, center of the screen. Available selections are “Adult”, “Pediatric” and “Neonate”.

- Use the Navigation Keys to the Right of the screen to scroll through the display to highlight and select the Patient Mode.
- Use the Navigation Keys to select Pediatric.



Cardiopulmonary Resuscitation

Adult CPR

1. **Determine correct hand position**
   - ∇ Hand placement should include both hands (one on top of the other) being placed the lower ½ of the sternum
     - Hands can also be placed two fingers above the xiphoid process

2. **Begin Compressions**
   - ∇ Compression rate should be at least 100 compressions/min
     - Use of a metronome is required when available (105/minute)
     - Care should be taken to ensure the metronome is activated and any CPR Feedback from the Monitor / AED is followed
   - ∇ Compression depth should be at least two inches in depth
     - Larger adult chests may require a depth of more than two inches
   - ∇ Allow for complete recoil with each compression
     - Do not lean on the patient's chest between compressions as this does not allow for complete filling of the heart.

3. **Ventilation**
   - ∇ Immediate placement of Supraglottic Airway in adults with BVM ventilation at 10 breaths per minute (1 breath every 10 compressions)
   - ∇ Ventilation should be provided on the upstroke of compressions
   - ∇ See Basic Airway Maneuvers Dictionary for full information on providing ventilations

Child CPR

1. **Determine correct hand position**
   - ∇ Hand placement should include one or both hands (one on top of the other) being placed the lower ½ of the sternum (dependent on patient and rescuer size)


2. **Begin Compressions**
   - ∇ Compression rate should be at least 100-120 compressions/min
     - Use of a metronome is required when available (105/minute)
     - Care should be taken to ensure the metronome is activated and any CPR Feedback from the Monitor / AED is followed
     - If there is one rescuer available, 30 compressions : 2 ventilations should be performed
     - If there are multiple rescuers available, 15 compressions : 2 ventilations should be performed
     - Once an advanced airway is in place, a ventilation should be provided every 10th compression
   - ∇ Compression depth should be about two inches in depth or 1/3 the depth of the chest
   - ∇ Allow for complete recoil with each compression
     - Do not lean on the patient's chest between compressions as this does not allow for complete filling of the heart

3. **Ventilation**
   - ∇ BVM with OPA is the preferred method of airway management in pediatric patients for cardiac arrest
     - If BVM is unsuccessful a Supraglottic Airway may be placed
     - Endotracheal Intubation should only be attempted when BVM and SGA have failed to adequately secure the airway
   - ∇ With BVM, ventilations should be provided as follows
     - If there is one rescuer available, 30 compressions : 2 ventilations should be performed
     - If there are multiple rescuers available, 15 compressions : 2 ventilations should be performed
   - ∇ With SGA or ET Tube, ventilations should be provided as follows
     - 1 breath every 3-5 seconds (12-20 breaths per minute)
   - ∇ Ventilation should be provided on the upstroke of compressions
   - ∇ See Basic Airway Maneuvers Dictionary for full information on providing ventilations

Infant CPR

1. **Determine correct hand position**
   - ∇ 1-Rescuer – Place 2 fingers on the sternum just below the nipple line
   - ∇ 2-Rescuer - Place both thumbs on the sternum below the nipple line and encircle the hands around the back of the patient for support during compressions

2. **Begin compressions**
   - ∇ Compression rate should be at least 100-120 compressions/min
     - Use of a metronome is required when available (105/minute)
     - Care should be taken to ensure the metronome is activated and any CPR Feedback from the Monitor / AED is followed
     - If there is one rescuer available, 30 compressions : 2 ventilations should be performed
     - If there are multiple rescuers available, 15 compressions : 2 ventilations should be performed
     - Once an advanced airway is in place, a ventilation should be provided every 10th compression
   - ∇ Compression depth should be at least 1 ½ inches in depth or 1/3 the depth of the chest
   - ∇ Allow for complete recoil with each compression
     - Do not lean on the patient's chest between compressions as this does not allow for complete filling of the heart

3. **Ventilation**
   - ∇ BVM with OPA is the preferred method of airway management in pediatric patients for cardiac arrest
     - If BVM is unsuccessful a Supraglottic Airway may be placed
     - Endotracheal Intubation should only be attempted when BVM and SGA have failed to adequately secure the airway
   - ∇ With BVM, ventilations should be provided as follows
     - If there is one rescuer available, 30 compressions : 2 ventilations should be performed
     - If there are multiple rescuers available, 15 compressions : 2 ventilations should be performed
   - ∇ With SGA or ET Tube, ventilations should be provided as follows
     - 1 breath every 3-5 seconds (12-20 breaths per minute)
   - ∇ Ventilation should be provided on the upstroke of compressions
   - ∇ See Basic Airway Maneuvers Dictionary for full information on providing ventilations

Newly Born or Neonate CPR

1. **Determine correct hand position**
   - ∇ 1-Rescuer – Place 2 fingers on the sternum just below the nipple line
   - ∇ 2-Rescuer - Place both thumbs on the sternum below the nipple line and encircle the hands around the back of the patient for support during compressions

2. **Begin compressions**
   - ∇ Compression rate should be at least 100-120 compressions/min
     - Use of a metronome is required when available (105/minute)
     - Care should be taken to ensure the metronome is activated and any CPR Feedback from the Monitor / AED is followed
     - Rescuers should perform 3 compressions : 1 ventilation
     - Once an advanced airway is in place, a ventilation should be provided every 3-5 seconds
   - ∇ Compression depth should be at least 1 ½ inches in depth or 1/3 the depth of the chest
   - ∇ Allow for complete recoil with each compression
     - Do not lean on the patient's chest between compressions as this does not allow for complete filling of the heart

3. **Ventilation**
   - ∇ BVM with OPA is the preferred method of airway management in pediatric patients for cardiac arrest
     - If BVM is unsuccessful a Supraglottic Airway may be placed
     - Endotracheal Intubation should only be attempted when BVM and SGA have failed to adequately secure the airway
   - ∇ With BVM, ventilations should be provided as follows
     - Rescuers should perform 3 compressions : 1 ventilation
   - ∇ With SGA or ET Tube, ventilations should be provided as follows
     - 1 breath every 3-5 seconds (12-20 breaths per minute)
   - ∇ Ventilation should be provided on the upstroke of compressions
   - ∇ See Basic Airway Maneuvers Dictionary for full information on providing ventilations

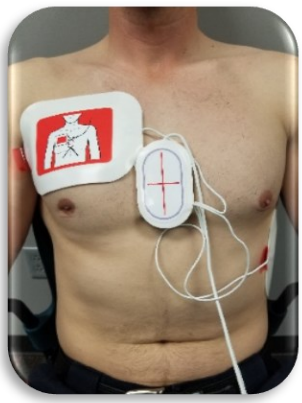
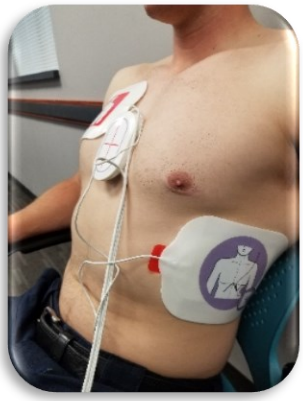
Defibrillation

Standard / Single Defibrillation

*This entry assumes the monitor is powered on.

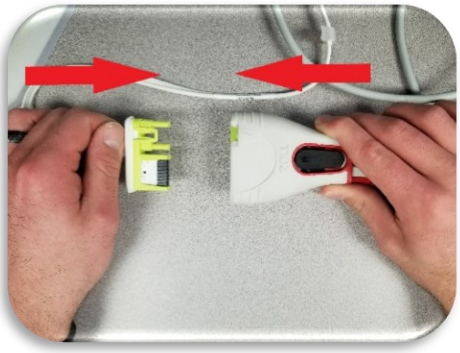
1. **Prepare the patient for Defibrillation**
   - ∇ Remove all clothing covering the patient's chest
   - ∇ Wipe and dry the areas where pads will be placed
   - ∇ Clip or shave chest hair if it will interfere with adherence of the pads to the chest

2. **Apply the Hands-Free therapy electrodes**
   - ∇ The Anterior-Lateral pad position is the preferred placement for Defibrillation
     - o A-L position is preferred because it causes the least interference with other lifesaving interventions such as CPR.
       - If the patient has already had the therapy electrodes placed in the Anterior-Posterior configuration prior to developing cardiac arrest and the need for defibrillation, there is no need to change the configuration of the electrodes to the Anterior-Lateral position.
       - The Anterior-Posterior position is more effective in Transcutaneous Pacing and Synchronized Cardioversion. If the patient experiences ROSC followed by indications for either of those therapies, consider changing the pad position.
     - o Place the Anterior pad by adhering the CPR sensor on the bottom half of the sternum, aligned with the sternal notch and applying the anterior pad on the patient's upper right torso.
     - o Place the Lateral pad so the center of the conduction area is at the V6 position.

- For A-L placement, it is not necessary to separate the CPR device from the Anterior pad, but separating them may make it easier to reposition the pads as necessary, and minimize artifact in the See-Thru CPR function.

∇ Connect therapy electrodes to therapy cable if not already done.



NOTE

WHEN CONCURRENT USE OF THERAPY ELECTRODES AND 12-LEAD ELECTRODES IS NECESSARY, THE FOLLOWING ALTERNATE THERAPY ELETRODE PLACEMENT IS ACCEPTABLE:

Anterior / Lateral Placement:

Anterior Pad: Below Right clavicle, just to the Right of the sternum.

Lateral Pad: Left lower rib margin, centered below V6 location.

Anterior / Posterior Placement:

Anterior Pad: Below Left clavicle, just to the Left of the sternum.

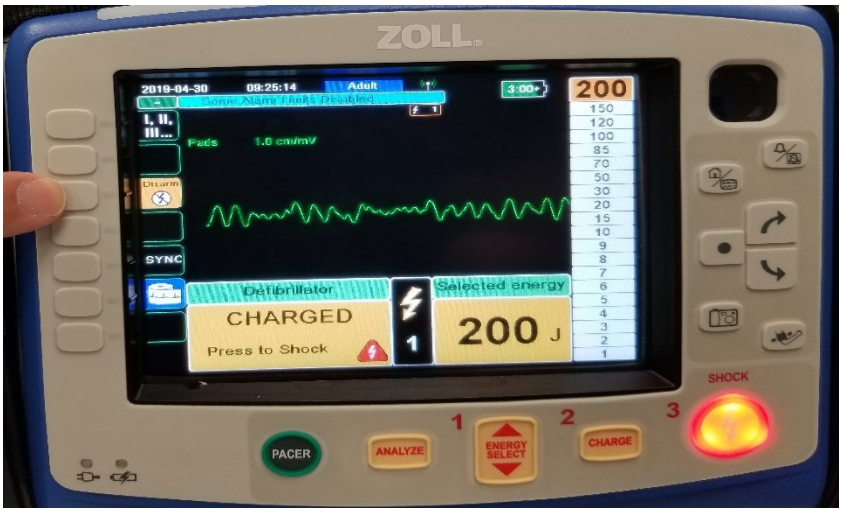
Posterior Pad: To the Left of the spine, just below the Left scapula.

3. Charge the Defibrillator

- ∇ *During CPR, the defibrillator should be charged near the end of the CPR cycle to minimize the peri-shock pause.*
- ∇ Push the Charge button.
  - An energy bar will appear on the right of the screen to show charging progress.
  - The defibrillator will charge to the preset energy level of 200 Joules.
    - Ensure the preset level is the desired level. For pediatric patients who require a lower energy level, prior to charging, you may use the Energy Select button to change dosage if necessary. Changing the energy level after charging will dump the energy and the Charge button will need to be pushed again to charge to the new desired energy level.

4. Verify presence of shockable rhythm

- ∇ After charging, if the patient's condition no longer warrants defibrillation, or you need to dump the charge for any reason, use ONLY the "Disarm" quick access key illustrated below.
  - *NOTE* using the "Energy Select" key to disarm the charge will cause subsequent charges to charge to a lower level and if not noticed, will result in defibrillations delivered at a lower level.
  - If the defibrillator is not discharged within 60 seconds after reaching selected energy level, the unit automatically disarms itself.

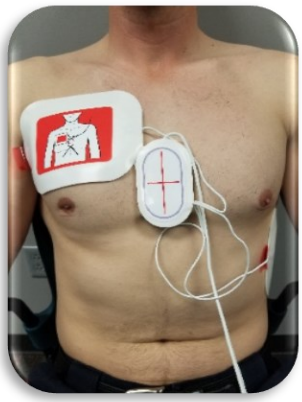
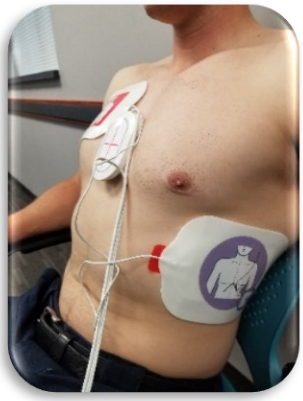


5. Deliver Shock

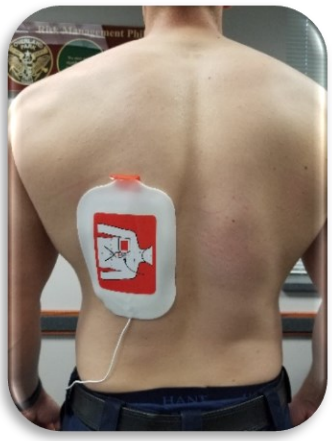
- ∇ ***Warn all persons in attendance of the patient to STAND CLEAR prior to discharge***
- ∇ Press and hold the "SHOCK" button until energy is delivered.

Double Sequential Defibrillation

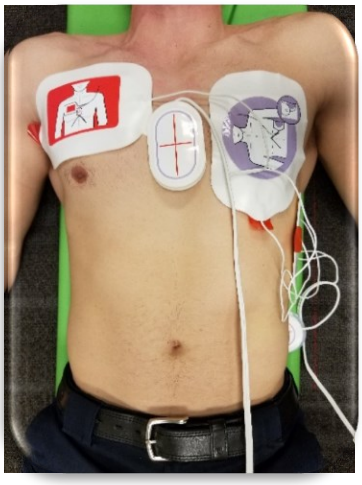
***This entry assumes the patient is already connected to one defibrillator with the therapy patches applied in the Anterior – Lateral (A-L) Position and a minimum of 5 single defibrillations have been performed with refractory VF/VT.**

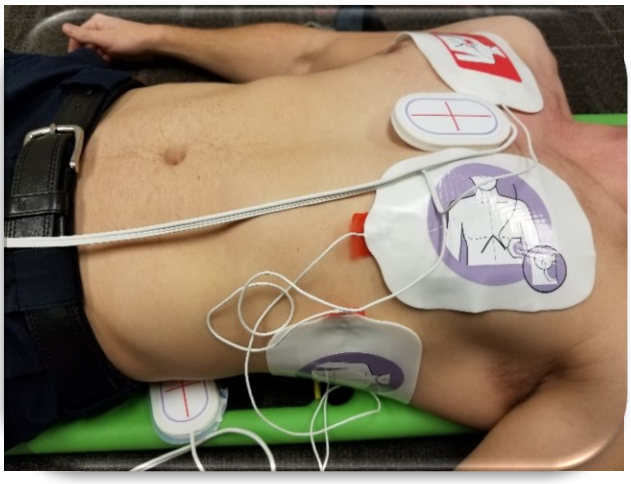



1. **Apply 2nd set of therapy patches in the Anterior – Posterior (A-P) Position**
   - ∇ Begin removing the CPR feedback device from the new anterior pad.
     - This is done by tearing the foam and plastic backing. Leave the plastic backing attached to the foam pad.
     - The 2nd CPR feedback device will not be used, and should be placed somewhere beside the patient where it will not be able to detect vertical movement.
     - If the unused CPR feedback device detects vertical movement, it may trigger the 2nd monitor to begin giving audible CPR feedback cues.
   - ∇ *Place 2nd Anterior Pad
     - For the A-P application, the 2nd Anterior pad will be placed on the patients back, Left of the spine, just below the scapula, at the heart level.
     - Recalling the phrase “Red to Bed” may be helpful in remembering to place the 2nd Anterior pad in the correct position for DSD.

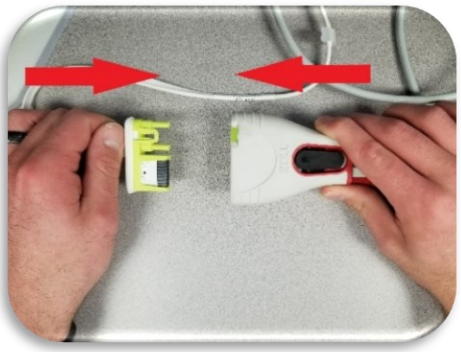



- ∇ Place 2nd Lateral Pad
  - The 2nd Lateral Pad will need to be placed on the Left Anterior chest, over the heart.
  - It may need to be placed vertically so as not to overlap with 1st Lateral Pad.
    - Overlap of the adhesive edges is allowable but do not allow any of the conductive area of a pad to overlap any of the adhesive or conductive area of another pad.
  - Avoid placing the conductive area of the pad over the patient's nipple when possible.





2. Connect 2nd set of therapy electrodes to 2nd therapy cable of 2nd defibrillator if not already done.



3. Position defibrillators so they can be read and used by a single provider

4. Charge BOTH defibrillators

- ∇ *During CPR, the defibrillator should be charged near the end of the CPR cycle to minimize the peri-shock pause.*
- ∇ Push the Charge button.
  - An energy bar will appear on the right of the screen to show charging progress.
  - The defibrillator will charge to the preset energy level of 200 Joules.
    - Ensure the preset level is the desired level. For pediatric patients who require a lower energy level, prior to charging, you may use the Energy Select button to change dosage if necessary. Changing the energy level after charging will dump the energy and the Charge button will need to be pushed again to charge to the new desired energy level.

5. Verify presence of shockable rhythm

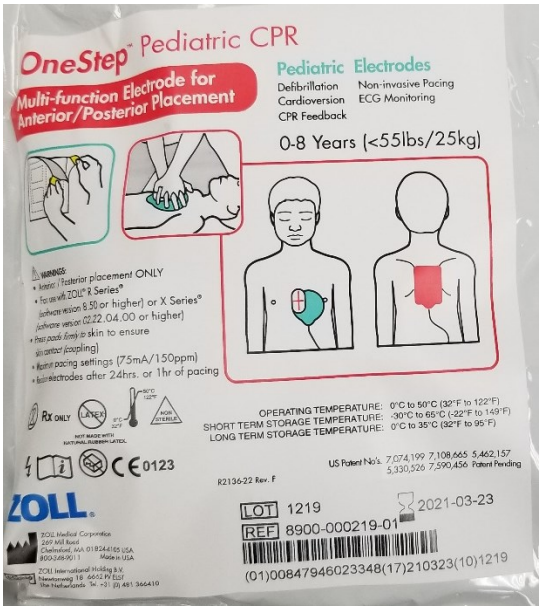
- ∇ After charging, if the patient's condition no longer warrants defibrillation, or you need to dump the charge for any reason, use ONLY the "Disarm" quick access key illustrated below.
  - *NOTE* using the "Energy Select" key to disarm the charge will cause subsequent charges to charge to a lower level and if not noticed, will result in defibrillations delivered at a lower level.
  - If the defibrillator is not discharged within 60 seconds after reaching selected energy level, the unit automatically disarms itself.

6. **Deliver the Dual Sequential Shock**
   - ∇ ***Warn all persons in attendance of the patient to STAND CLEAR prior to discharge***
   - ∇ Position hands so you ONE provider has a finger on each shock button.
   - ∇ Press and hold the "SHOCK" button on Defibrillator #1 until energy is delivered.
   - ∇ Count "One – One Thousand"
   - ∇ Press and hold the "SHOCK" button on Defibrillator #2 until energy is delivered.

7. **Transport Considerations**
   - ∇ If ROSC is achieved using DSD, consider transporting the patient with both defibrillators.
   - ∇ For ePCR recordkeeping, further therapies following ROSC such as pacing, should be done using the Transport Agency's monitor / defibrillator.
     - o If the Transport Agency's defibrillator was used as Defibrillator #1, with therapy electrodes placed in the Anterior – Lateral position, consider unplugging the A-L electrodes and plugging the Anterior –Posterior electrodes into the Transport Agency defibrillator.

Pediatric Considerations

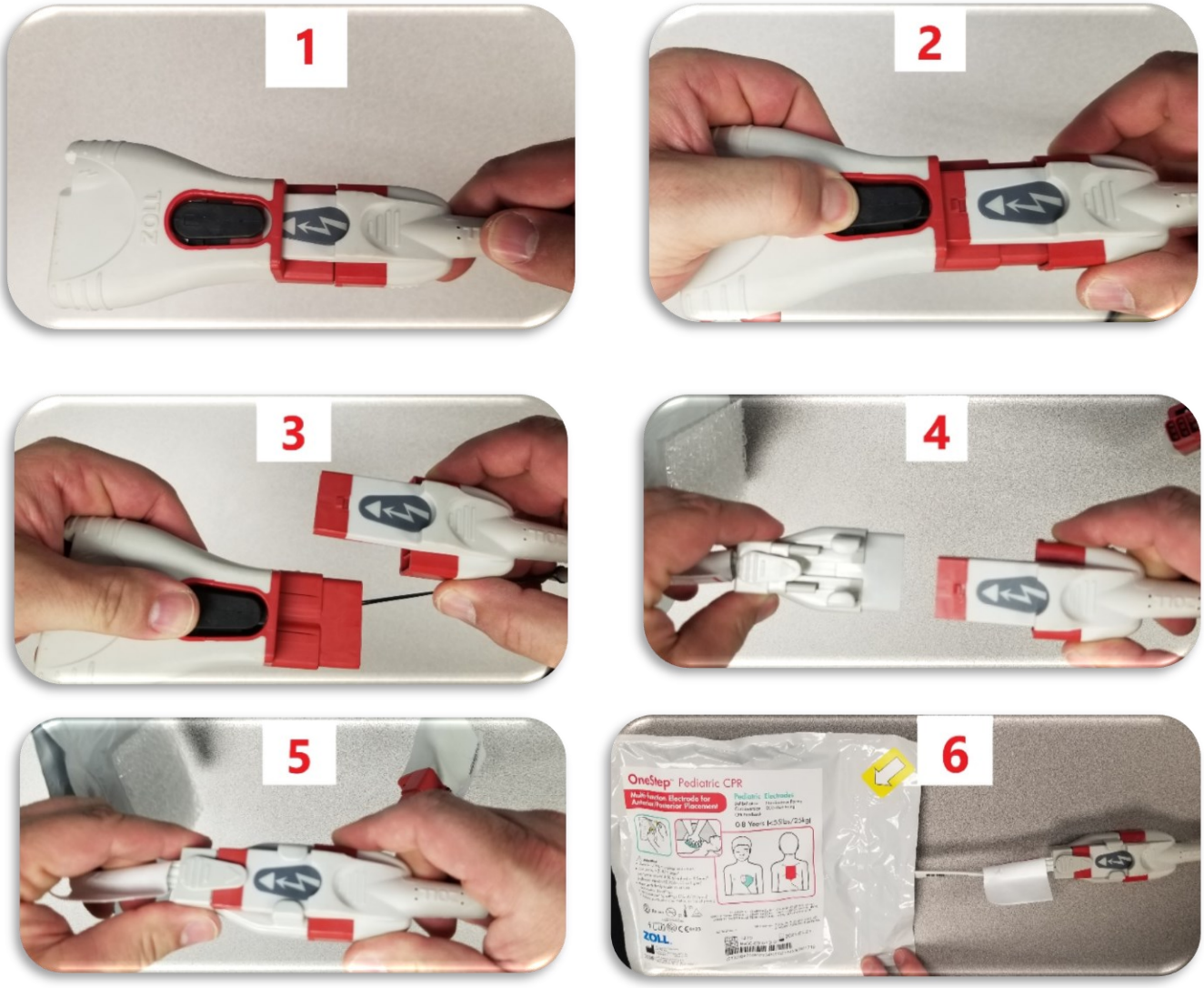
1. **Pediatric Defibrillation**
   - ∇ Connecting Pediatric pads automatically places the monitor in Pediatric Mode
   - ∇ Defibrillation steps for pediatric patients is identical to adult patients
   - ∇ The Pediatric One Step Patches are only to be used with children younger than 8 years old or weigh less than 55lbs / 24kg (Blue and under on Length Based Tape / Field Reference Guide)
   - ∇ See appropriate Weight Based color section of Johnson County EMS Field Reference Guide for appropriate defibrillation joule settings
   - ∇ Use caution when separating pads from backing: See Below



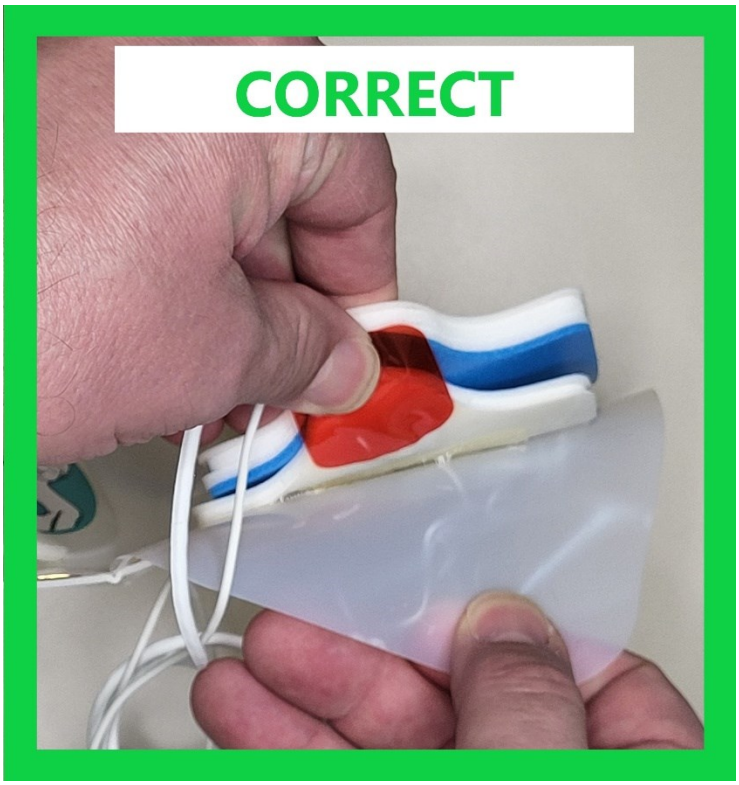
Length Based Tape Sizing
Grey 3-5 kg
Pink 6-7kg
Red 8-9 kg
Purple 10-11 kg
Yellow 12-14 kg
White 15-18 kg
Blue 19-23 kg

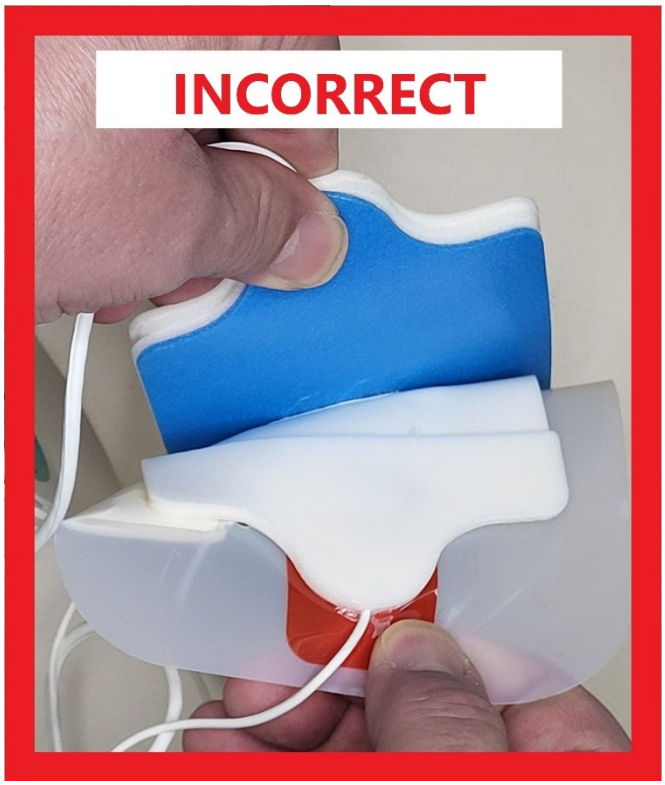
Length Based Tape Sizing
Orange 24-29 kg
Green 30-36 kg

∇ Attaching the Pediatric One Step pads to the One Step Cable will require the removal of the Adult Stat-Padz Adaptor if it is attached. See steps below for removal of adaptor and connection of pads



- **Use Caution when separating Pediatric Pads from backing**
  - **Use the Red Tab to pull the pad off of the backing**
  - **Do Not attempt to keep Red Tab with the backing or pad will separate and become inoperable**

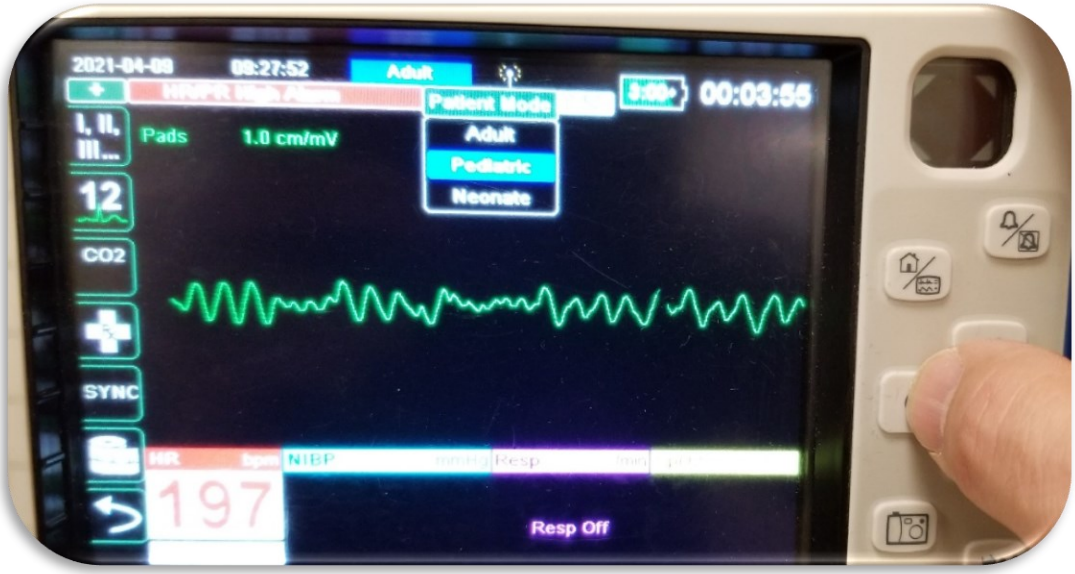




- ∇ The Anterior – Posterior placement is the only acceptable placement when using Pediatric One Step patches

- ○ If you are using Adult Stat-Padz Defibrillation patches, see directions below for manually placing the ZOLL X-Series in Pediatric Mode.
  - The Patient Age Mode setting is located in the top, center of the screen. Available selections are “Adult”, “Pediatric” and “Neonate”.

- Use the Navigation Keys to the Right of the screen to scroll through the display to highlight and select the Patient Mode.
- Use the Navigation Keys to select Pediatric.

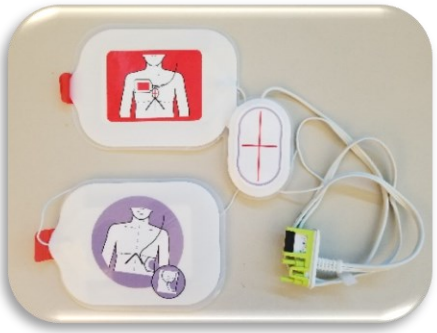


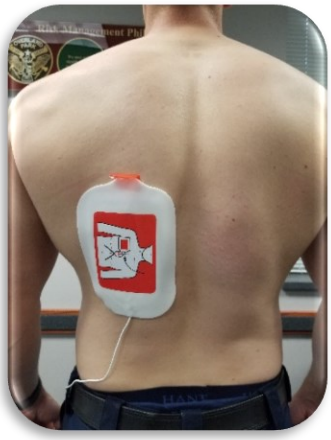
Synchronized Cardioversion (ZOLL X-Series)

*This entry assumes the 4-Lead ECG Monitoring Electrodes are already attached and the monitor is powered on.

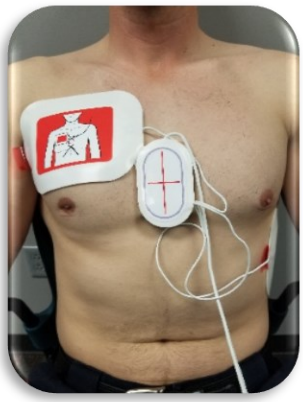
1. **Prepare the patient for cardioversion**
   - ∇ Explain the process to the patient
   - ∇ Consider Sedation
   - ∇ Remove all clothing covering the patient's chest
   - ∇ Wipe and dry the areas where pads will be placed
   - ∇ Clip or shave chest hair if it will interfere with adherence of the pads to the chest

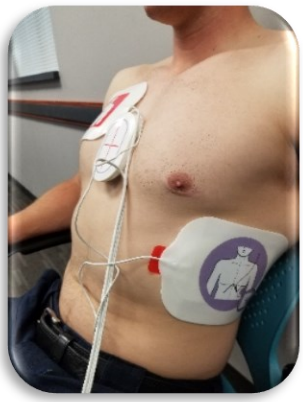
2. **Apply the Hands-Free therapy electrodes**
   - ∇ *The Anterior-Posterior pad position is the PREFERRED placement for Synchronized Cardioversion*
     - o A-P position is preferred because it decreases capture thresholds and as a result may increase patient tolerance
     - o Zoll Brand (and Zoll compatible) defibrillation electrodes come from the package with the CPR device attached to the Anterior pad. Separate the CPR device from the pad and *place the Anterior pad on the BACK of the patient,* Left of the spine, just below the scapula, at the heart level
       - Recalling the phrase "Red to Bed" may be helpful in remembering correct placement
     - o Place the Lateral pad over the cardiac apex with the center of the pad at the V4 position, 4th intercostal space at the mid-clavicular line
       - On a male patient, the nipple may be placed under the adhesive area of the pad. Try to avoid placing nipple under conduction area
       - On a female patient, place the pad UNDER the breast
     - o Place the CPR device on the bottom half of the sternum, aligned with the sternal notch



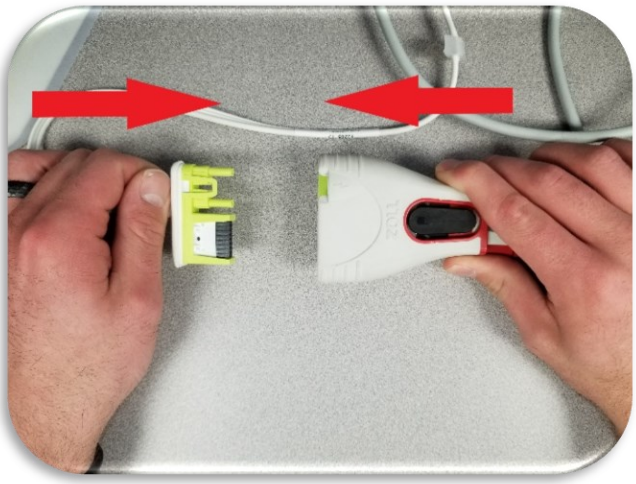


- ∇ The Anterior-Lateral placement of electrodes is not recommended for Synchronized Cardioversion due to increased capture thresholds and decreased patient tolerance
  - If patient anatomy or circumstances of the call prevent placement of pads in the preferred Anterior-Posterior configuration, you may use the Anterior-Lateral configuration
    - For A-L placement, it is not necessary to separate the CPR device from the Anterior pad, but separating them may make it easier to reposition the pads as necessary, and minimize artifact in the See-Thru CPR function
  - Place the Anterior pad by adhering the CPR sensor on the bottom half of the sternum, aligned with the sternal notch and applying the anterior pad on the patient's upper right torso
  - Place the Lateral pad so the center of the conduction area is at the V6 position





- ∇ Connect electrodes to therapy cable if not already done



NOTE

WHEN CONCURRENT USE OF THERAPY ELECTRODES AND 12-LEAD ELECTRODES IS NECESSARY, THE FOLLOWING ALTERNATE THERAPY ELETRODE PLACEMENT IS ACCEPTABLE:

Anterior / Lateral Placement:

Anterior Pad: Below Right clavicle, just to the Right of the sternum.

Lateral Pad: Left lower rib margin, centered below V6 location.

Anterior / Posterior Placement:

Anterior Pad: Below Left clavicle, just to the Left of the sternum.

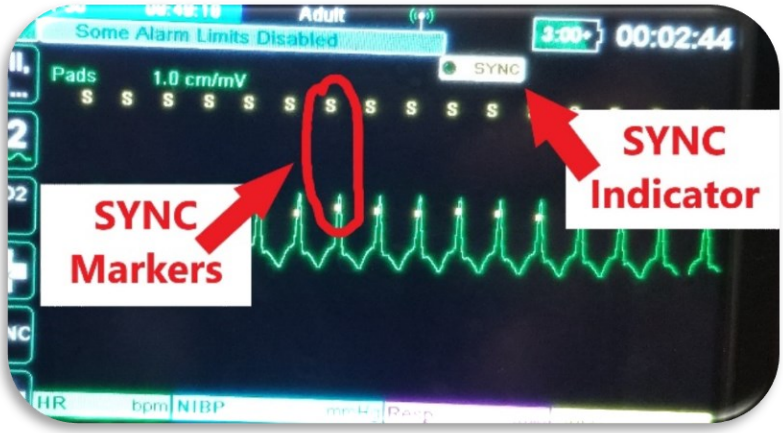
Posterior Pad: To the Left of the spine, just below the Left scapula.

3. Activate SYNC Mode

- ∇ Press the Sync quick access key on the front panel. The system will now be in SYNC mode

4. Ensure sensing of the QRS

- ∇ A sync marker (S) appears on the monitor above each detected R-wave to indicate where discharge will occur, and a Sync Indicator appears at the top of the display screen
  - o If the marker does not appear over the R wave, select a different ECG lead. If the sync marker doesn't display, the defibrillator will not charge

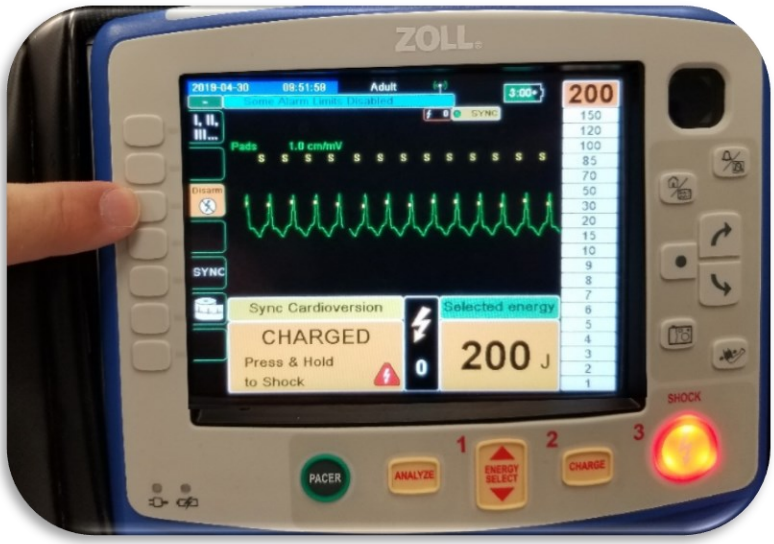


5. Charge the defibrillator

- ∇ Push the Charge button
  - An energy bar will appear on the right of the screen to show charging progress
  - The defibrillator will charge to the preset energy level of 200 Joules
    - Ensure the preset level is the desired level. For pediatric patients who require a lower energy level, prior to charging, you may use the Energy Select button to change dosage if necessary. Changing the energy level after charging will dump the energy and the Charge button will need to be pushed again to charge to the new desired energy level

6. Re-verify presence of shockable rhythm

- ∇ After charging, if the patient's condition no longer warrants defibrillation, or you need to dump the charge for any reason, use ONLY the "Disarm" quick access key illustrated below
  - *NOTE* using the "Energy Select" key to disarm the charge will cause subsequent charges to charge to a lower level and if not noticed, will result in defibrillations delivered at a lower level
  - If the defibrillator is not discharged within 60 seconds after reaching selected energy level, the unit automatically disarms itself



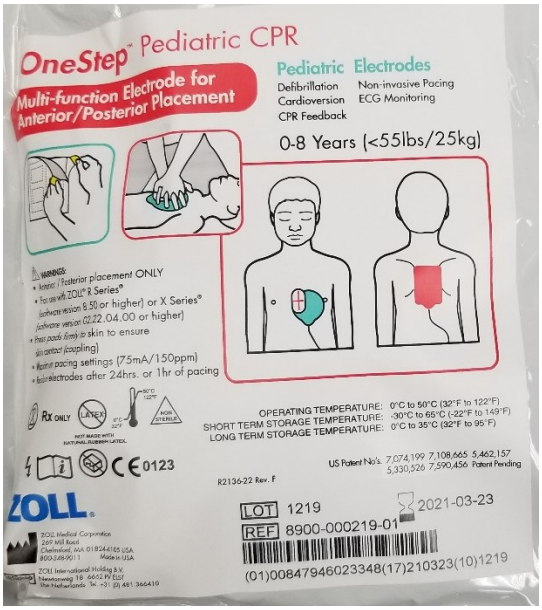
7. Deliver Shock

- ∇ ***Warn all persons in attendance of the patient to STAND CLEAR prior to discharge***
- ∇ Press and HOLD the Shock button until the energy is delivered
- ∇ Once energy is delivered, the machine will automatically exit Sync mode and the Sync button will need to be pressed again to deliver another Synchronized Cardioversion

Pediatric Considerations

2. Pediatric Synchronized Cardioversion

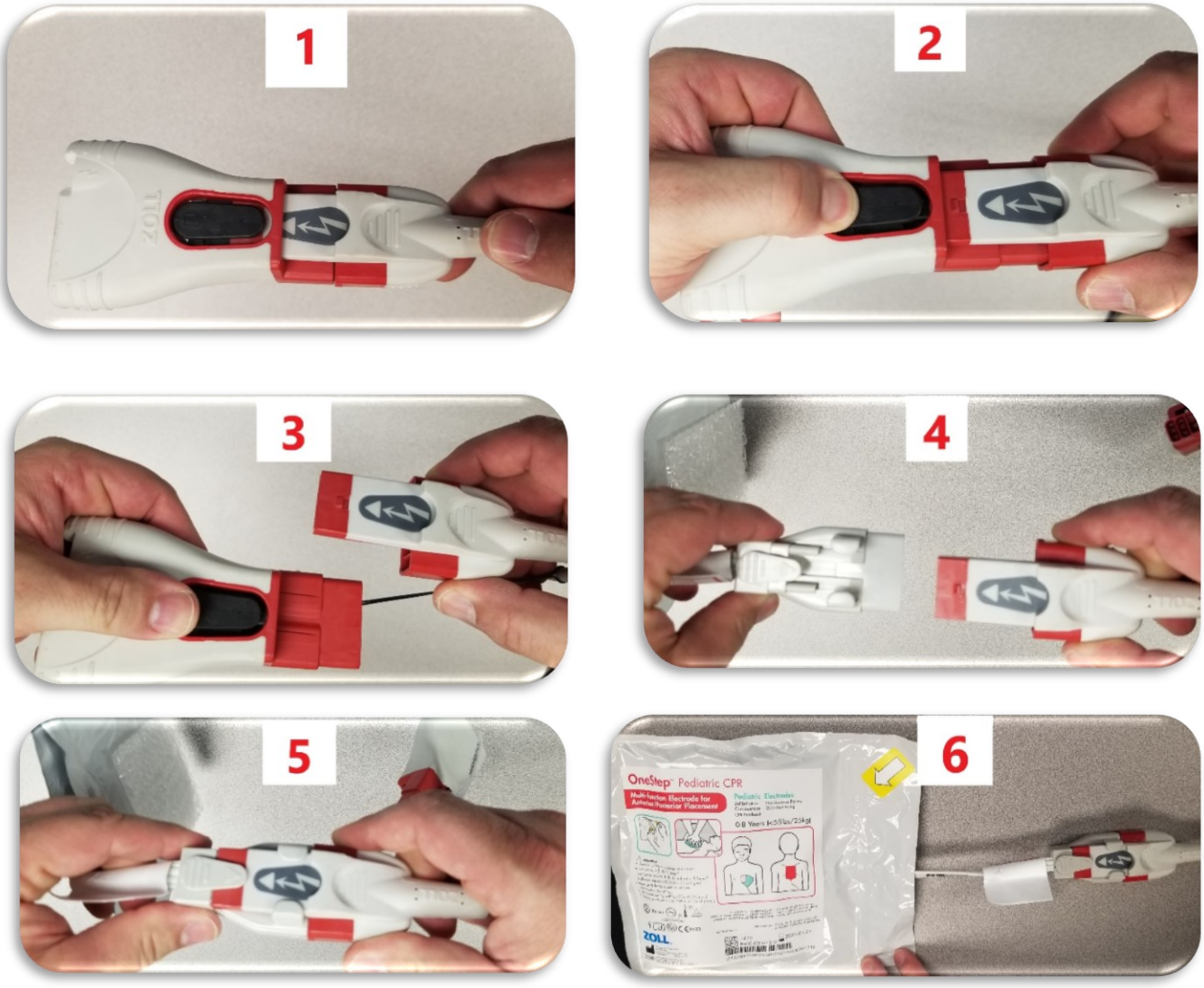
- ∇ Connecting Pediatric pads automatically places the monitor in Pediatric Mode
- ∇ Synchronized Cardioversion steps for pediatric patients is identical to adult patients
- ∇ The Pediatric One Step Patches are only to be used with children younger than 8 years old or weigh less than 55lbs / 24kg (Blue and under on Length Based Tape / Field Reference Guide)
- ∇ See appropriate Weight Based color section of Johnson County EMS Field Reference Guide for appropriate Synchronized Cardioversion joule settings
- ∇ Use caution when separating pads from backing: See Below



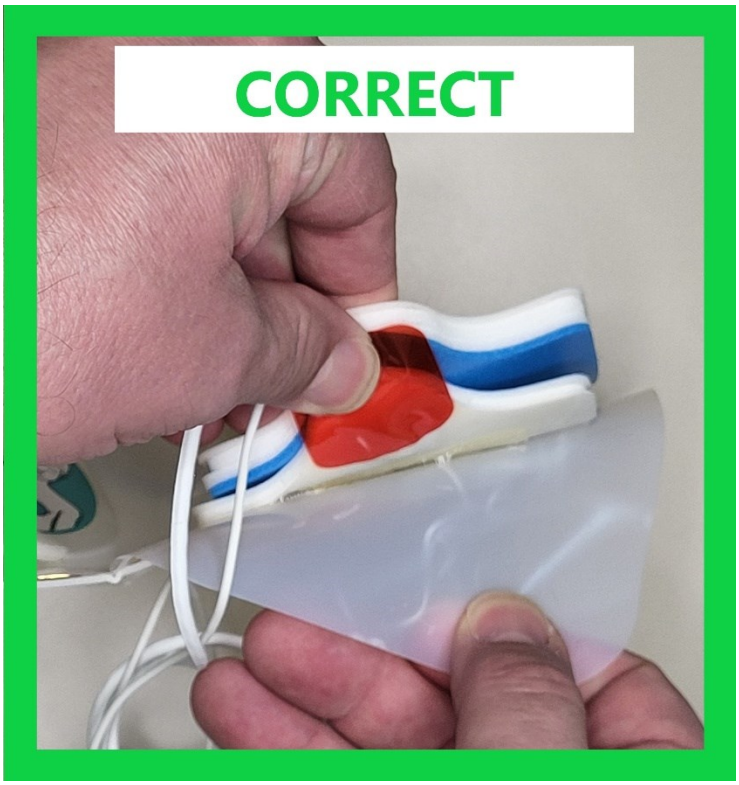
Length Based Tape Sizing
Grey 3-5 kg
Pink 6-7kg
Red 8-9 kg
Purple 10-11 kg
Yellow 12-14 kg
White 15-18 kg
Blue 19-23 kg

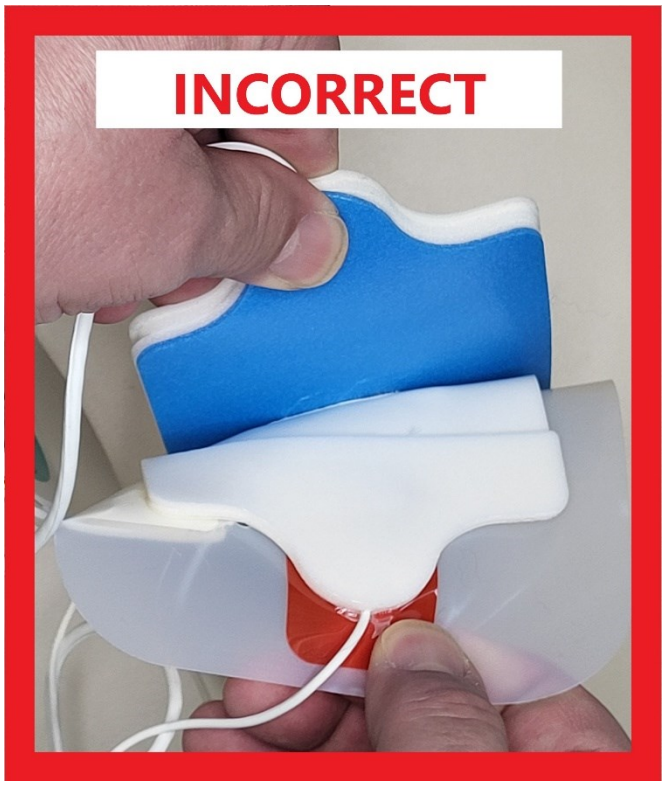
Length Based Tape Sizing
Orange 24-29 kg
Green 30-36 kg

∇ Attaching the Pediatric One Step pads to the One Step Cable will require the removal of the Adult Stat-Padz Adaptor if it is attached. See steps below for removal of adaptor and connection of pads



- **Use Caution when separating Pediatric Pads from backing**
  - **Use the Red Tab to pull the pad off of the backing**
  - **Do Not attempt to keep Red Tab with the backing or pad will separate and become inoperable**

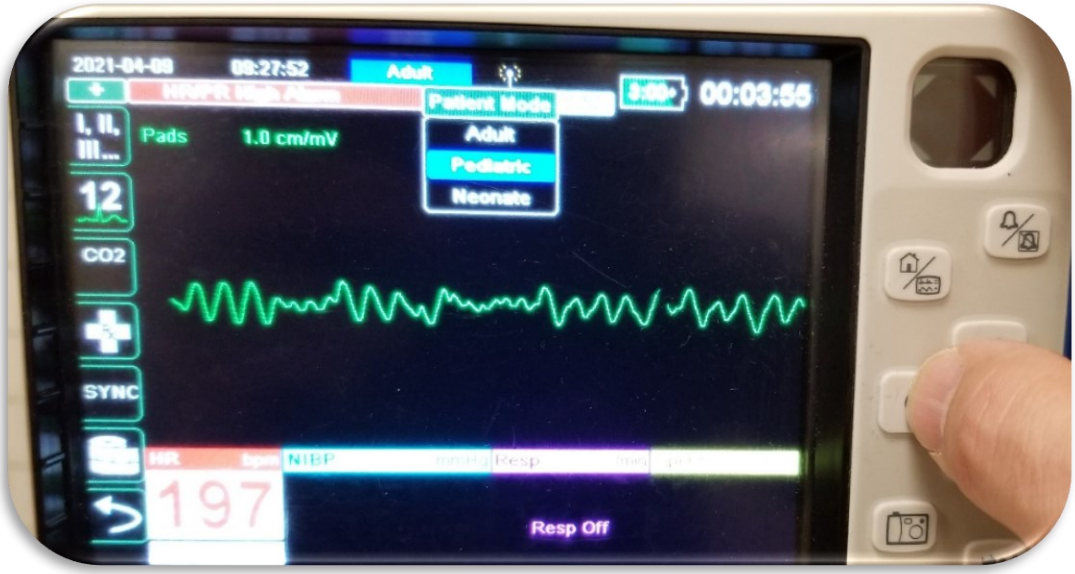




- ∇ The Anterior – Posterior placement is the only acceptable placement when using Pediatric One Step patches

- ○ If you are using Adult Stat-Padz Defibrillation patches, see directions below for manually placing the ZOLL X-Series in Pediatric Mode.
  - The Patient Age Mode setting is located in the top, center of the screen. Available selections are “Adult”, “Pediatric” and “Neonate”.

- Use the Navigation Keys to the Right of the screen to scroll through the display to highlight and select the Patient Mode.
- Use the Navigation Keys to select Pediatric.

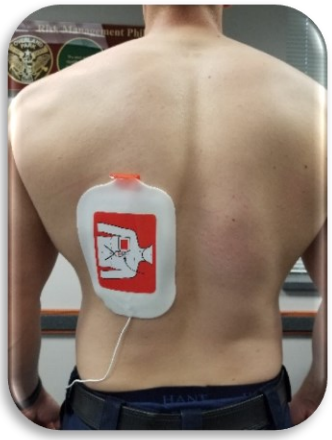


Transcutaneous Pacing (ZOLL X-Series)

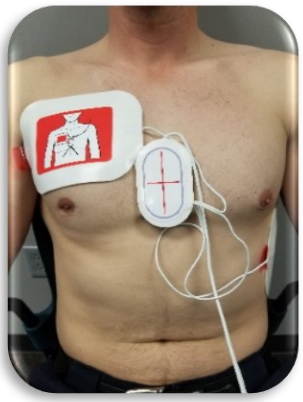
*This entry assumes the 4-Lead ECG Monitoring Electrodes are already attached and the monitor is powered on.

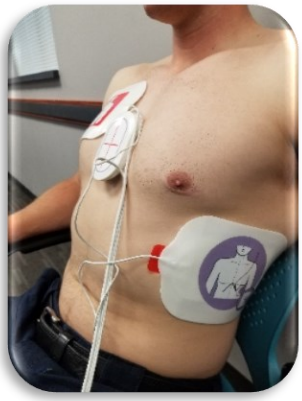
1. **Prepare the patient for Transcutaneous Pacing**
   - ∇ Explain the process to the patient
   - ∇ Consider sedation
   - ∇ Remove all clothing covering the patient's chest
   - ∇ Wipe and dry the areas where pads will be placed
   - ∇ Clip or shave chest hair if it will interfere with adherence of the pads to the chest

2. **Apply the Hands-Free therapy electrodes**
   - ∇ *The Anterior-Posterior pad position is the PREFERRED placement for Synchronized Cardioversion*
     - A-P position is preferred because it decreases capture thresholds and as a result may increase patient tolerance
     - Zoll Brand (and Zoll compatible) defibrillation electrodes come from the package with the CPR device attached to the Anterior pad. Separate the CPR device from the pad and *place the Anterior pad on the BACK of the patient,* Left of the spine, just below the scapula, at the heart level
       - Recalling the phrase "Red to Bed" may be helpful in remembering correct placement
     - Place the Lateral pad over the cardiac apex with the center of the pad at the V4 position, 4th intercostal space at the mid-clavicular line
       - On a male patient, the nipple may be placed under the adhesive area of the pad. Try to avoid placing nipple under conduction area
       - On a female patient, place the pad UNDER the breast
     - Place the CPR device on the bottom half of the sternum, aligned with the sternal notch

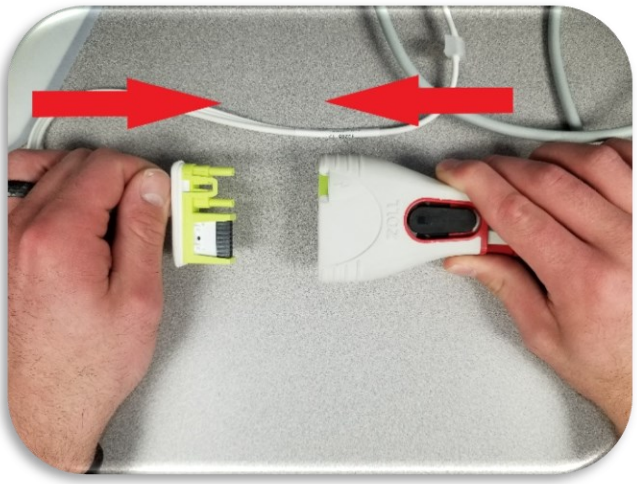


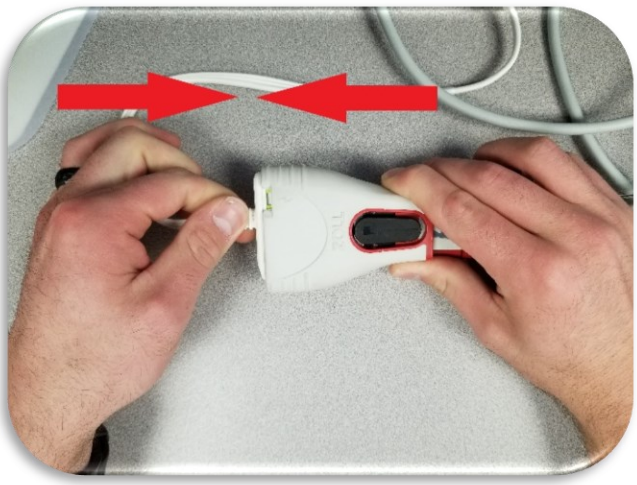
- ∇ The Anterior-Lateral placement of electrodes is not recommended for Synchronized Cardioversion due to increased capture thresholds and decreased patient tolerance
  - If patient anatomy or circumstances of the call prevent placement of pads in the preferred Anterior-Posterior configuration, you may use the Anterior-Lateral configuration
    - For A-L placement, it is not necessary to separate the CPR device from the Anterior pad, but separating them may make it easier to reposition the pads as necessary, and minimize artifact in the See-Thru CPR function
  - Place the Anterior pad by adhering the CPR sensor on the bottom half of the sternum, aligned with the sternal notch and applying the anterior pad on the patient's upper right torso
  - Place the Lateral pad so the center of the conduction area is at the V6 position





- ∇ Connect electrodes to therapy cable if not already done





NOTE

WHEN CONCURRENT USE OF THERAPY ELECTRODES AND 12-LEAD ELECTRODES IS NECESSARY, THE FOLLOWING ALTERNATE THERAPY ELETRODE PLACEMENT IS ACCEPTABLE:

Anterior / Lateral Placement:

Anterior Pad: Below Right clavicle, just to the Right of the sternum.

Lateral Pad: Left lower rib margin, centered below V6 location.

Anterior / Posterior Placement:

Anterior Pad: Below Left clavicle, just to the Left of the sternum.

Posterior Pad: To the Left of the spine, just below the Left scapula.

3. Select display lead

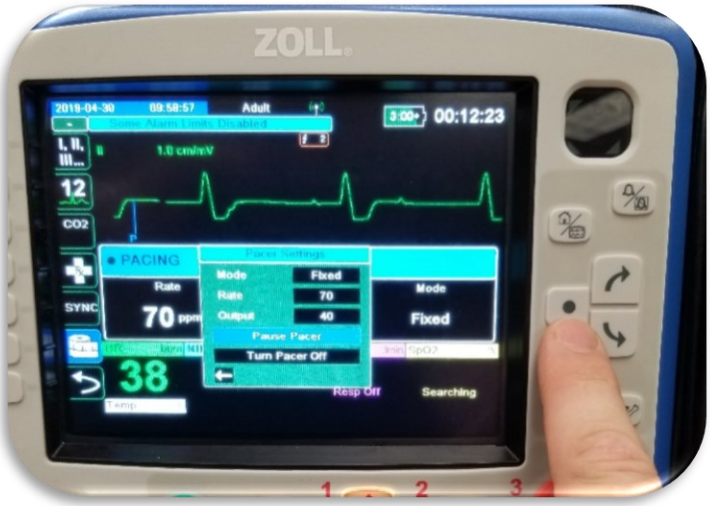
- ∇ To provide the most reliable electrical sensing and capture, the 4-Lead ECG electrodes should be used in conjunction with the hands-free therapy electrodes
- ∇ Press the Lead Select quick access key to select either Lead I, II or III to display the view with the highest QRS amplitude

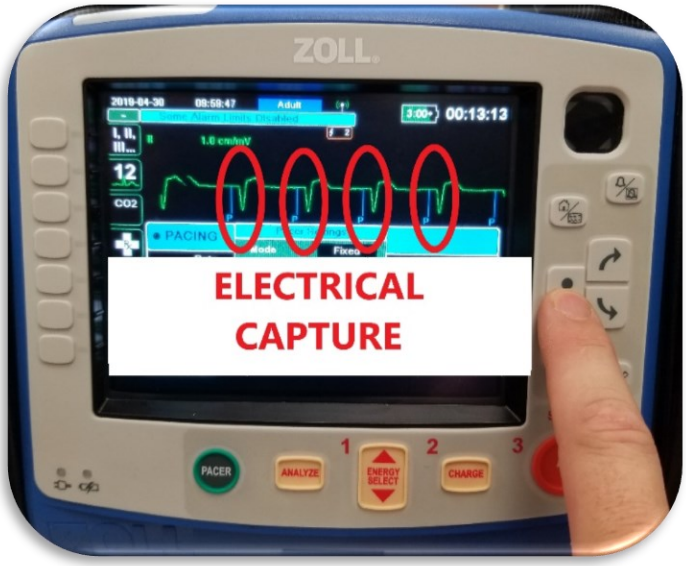
4. Press Pacer button to open Pacer menu

- ∇ Pacer should default to Demand Pacing Mode at a Rate of 70 and 30 mA
- ∇ If adjustments need to be made to Mode, Rate, or mA, use the Arrow Navigation buttons
  - o If there is a circumstance that prevents using the 4-Lead ECG electrodes or interferes with sensing, pacing may be done in Fixed Mode if there is no alternative available
  - o The steps for performing Fixed Mode Pacing are the same

5. Start Pacing

- ∇ Use the Arrow Navigation buttons and select “Start Pacer”
- ∇ Observe for presence of Pacer Spikes and Electrical Capture





6. Adjust Pacer Output

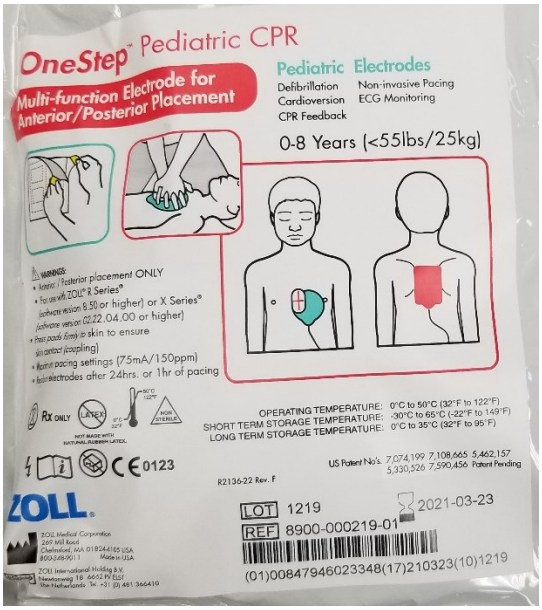
- ∇ Use the Arrow Navigation buttons to increase pacer output until electrical capture is obtained
  - The amount of energy in takes to obtain capture is called the Capture Threshold
  - The amount of energy in takes to obtain capture is called the Capture Threshold
  - Energy adjustment is done in 10mA increases and 5mA decreases
  - Electrical Capture results in a Pacer Spike immediately producing a QRS
  - Electrical Capture results in a Pacer Spike immediately producing a QRS.
    - Electrical Capture typically produces a widened QRS complex and suppression of the intrinsic QRS complex shape
  - Once Capture Threshold is achieved, increase energy output by 10%

7. Verify Mechanical Capture

- ∇ Mechanical Capture is assessed by palpation of the peripheral pulse
  - To avoid mistaking muscular response to pacing stimuli for arterial pulsations, use ONLY the following locations for palpating pulse during pacing
    - Femoral Artery (Left or Right)
    - Right Brachial Artery
    - Right Radial Artery

Pediatric Considerations

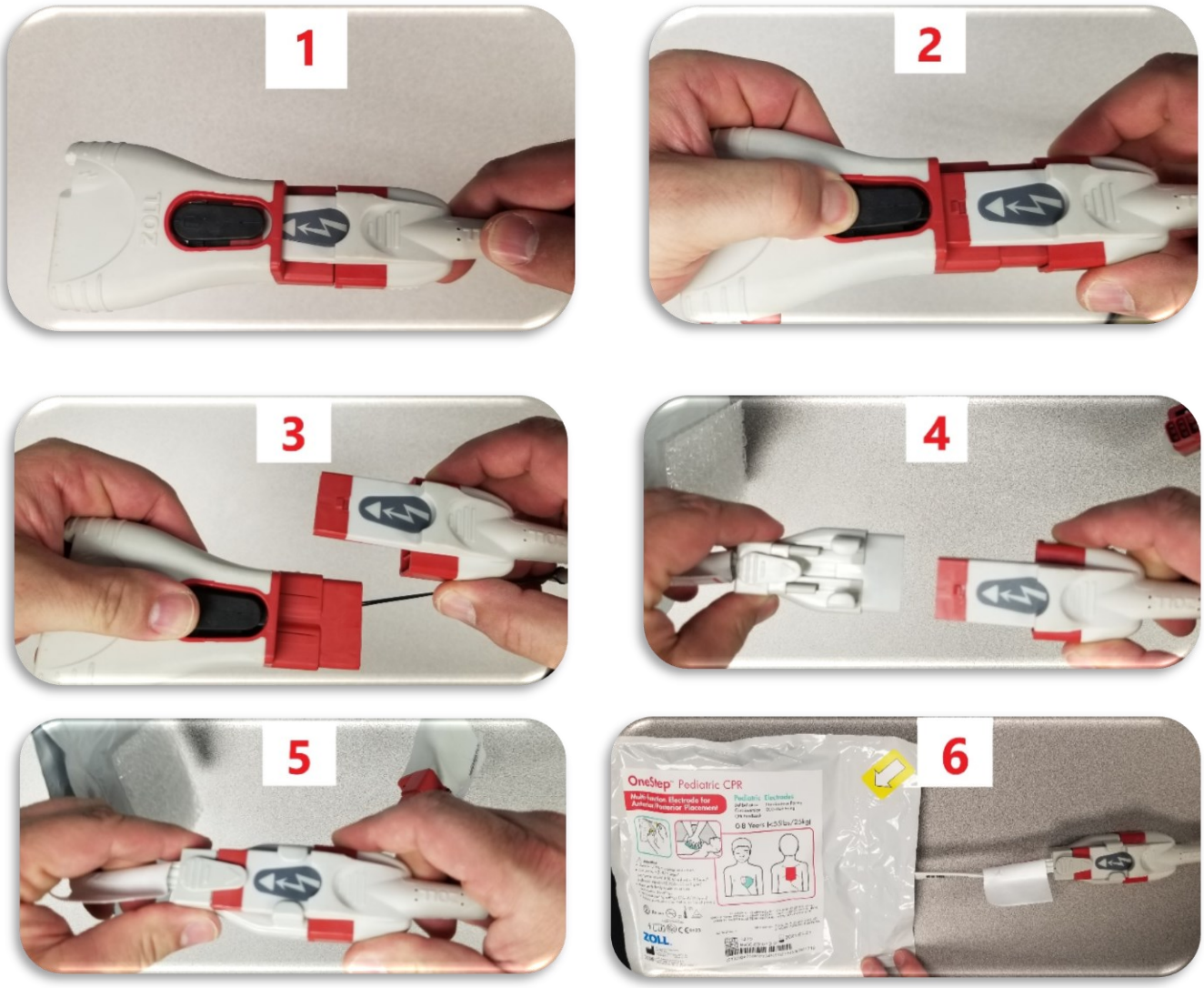
1. **Pediatric Transcutaneous Pacing**
   - ∇ Connecting Pediatric pads automatically places the monitor in Pediatric Mode
   - ∇ Transcutaneous Pacing steps for pediatric patients is identical to adult patients
   - ∇ The Pediatric One Step Patches are only to be used with children younger than 8 years old or weigh less than 55lbs / 24kg (Blue and under on Length Based Tape / Field Reference Guide)
   - ∇ See “Pacing Chart” in Johnson County EMS Field Reference Guide for starting Rate and mA levels
   - ∇ Use caution when separating pads from backing: See Below



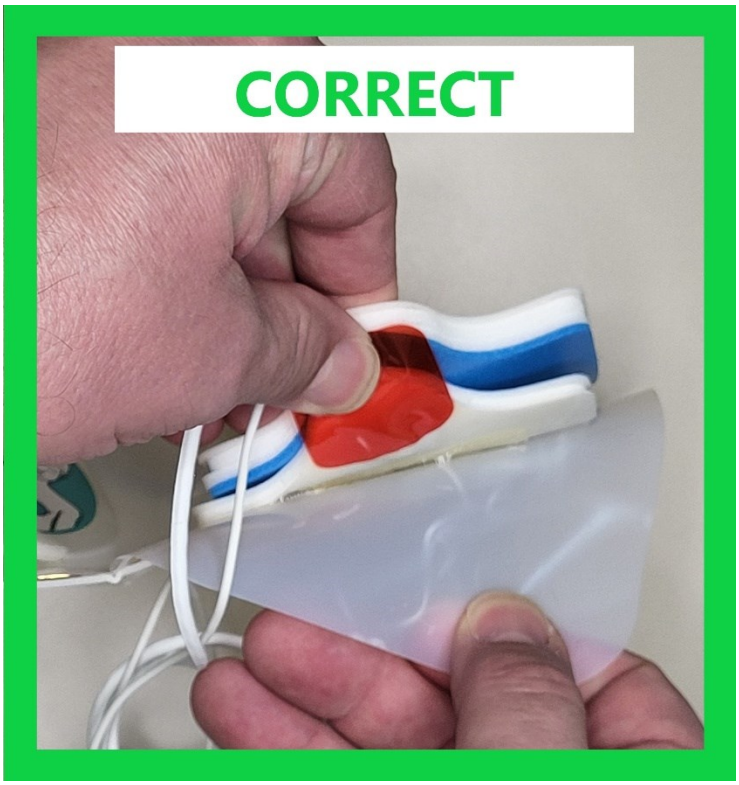
Length Based Tape Sizing
Grey 3-5 kg
Pink 6-7kg
Red 8-9 kg
Purple 10-11 kg
Yellow 12-14 kg
White 15-18 kg
Blue 19-23 kg

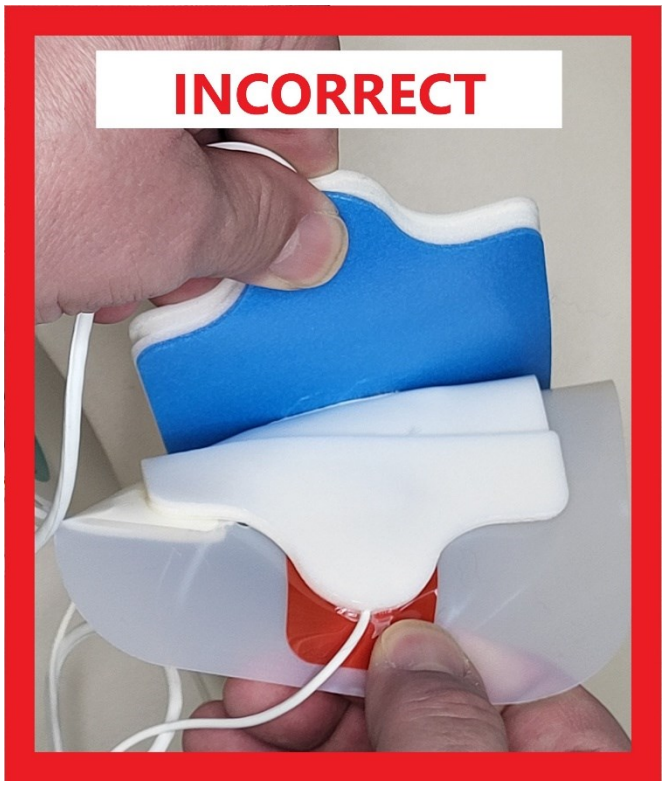
Length Based Tape Sizing
Orange 24-29 kg
Green 30-36 kg

∇ Attaching the Pediatric One Step pads to the One Step Cable will require the removal of the Adult Stat-Padz Adaptor if it is attached. See steps below for removal of adaptor and connection of pads



- **Use Caution when separating Pediatric Pads from backing**
  - **Use the Red Tab to pull the pad off of the backing**
  - **Do Not attempt to keep Red Tab with the backing or pad will separate and become inoperable**

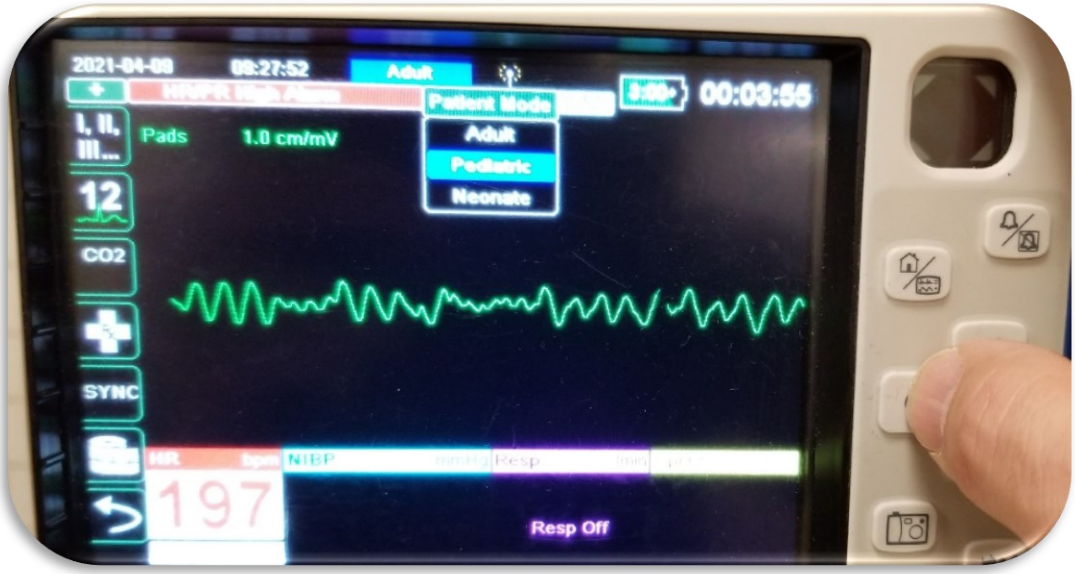




- ∇ The Anterior – Posterior placement is the only acceptable placement when using Pediatric One Step patches

- ○ If you are using Adult Stat-Padz Defibrillation patches, see directions below for manually placing the ZOLL X-Series in Pediatric Mode.
  - The Patient Age Mode setting is located in the top, center of the screen. Available selections are “Adult”, “Pediatric” and “Neonate”.

- Use the Navigation Keys to the Right of the screen to scroll through the display to highlight and select the Patient Mode.
- Use the Navigation Keys to select Pediatric.



MEDICATION ACCESS & DELIVERY

IM (Intramuscular)

Medication Administration – Auto-Injector

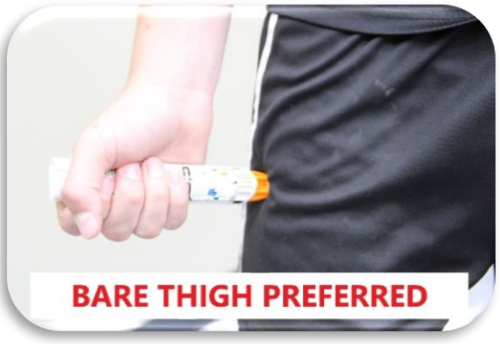
1. **Assemble equipment**
   - ∇ Obtain appropriate auto-injector and medication and follow manufacturer's guidelines

2. **Medication Verification / Cross Check**
   - ∇ Verify right patient
   - ∇ Verify the medication name and concentration
   - ∇ Verify the right indication for administering med
   - ∇ Are there any contraindications for administering this medication?
     - Confirm patient is not allergic to medication to be administered
     - Are the patient's vital signs appropriate?
     - Is the medication in date?
   - ∇ What is the appropriate route for administering this medication?
   - ∇ What is the right dose and volume of medication to be administered?

3. **Prepare patient and medication**
   - ∇ Advise patient of procedure
   - ∇ Remove safety cap from the auto-injector
     - Assure that fingers are kept away from the needle end of the auto-injector (follow manufacturer's guidelines)

4. Administer medication

- ∇ Locate site for injection
- ∇ Injection site should be the lateral thigh between the hip and knee
  - Can be administered over single layer of clothing (thin material) if unable to bare thigh
- ∇ Place the auto-injector against the outer thigh (one layer of clothing only) and firmly push the injector until a click is heard
- ∇ Hold in place for 5 sec



- ∇ Dispose of auto-injector into a sharps box
- ∇ Rub injection site for 5 sec

5. Reassess patient

- ∇ Reassess patient status after the medication has been administered for improvement and document

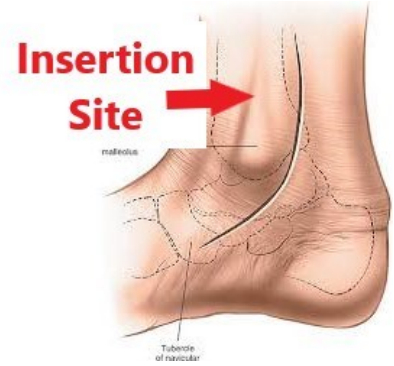
IV / IO (Intravenous / Intraosseous) Access and Medications

Intraosseous Insertion – EZ IO

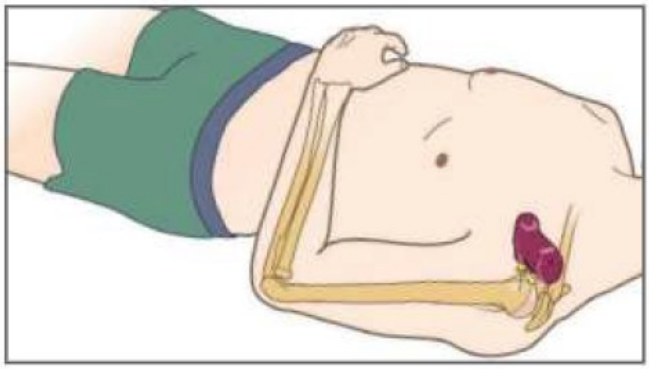
1. **Gather equipment**
   - ∇ Needle
     - See below for size selection info
   - ∇ Drill
   - ∇ Extension set
   - ∇ 10mL syringe
   - ∇ 10mL Flush syringe
   - ∇ 2% Lidocaine
   - ∇ ETOH preps
   - ∇ Tape
   - ∇ Flush extension set

2. **Site Selection**
   - ∇ Acceptable sites
     - Proximal Tibia
     - Distal Tibia
     - Proximal Humerus
   - ∇ Contraindications for IO Placement
     - Fracture in target bone
     - Infection at site
     - Burn at site
     - Inability to identify landmarks
     - Osteogenesis Imperfecta
     - Osteopenia / Osteopetrosis
     - Previous attempt in target bone in 48 hours
     - Prosthesis or orthopedic procedure near target site
   - ∇ Site Identification:
     - Proximal Tibia
       - Locate tibial tuberosity
       - Move 1-2 finger widths below tibial tuberosity
       - Move medially to flat tibial plateau

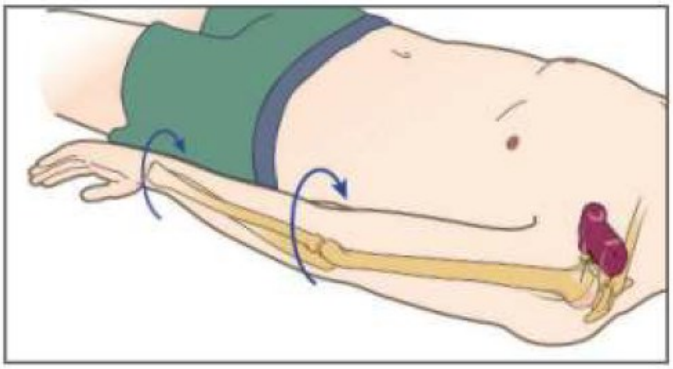
- Distal Tibia
  - Locate the medial malleolus and the insertion site is one finger width proximal to malleolus



- Proximal Humerus:
  - Arm Positioning
    - Arm / Elbow adduction
    - Internal rotation

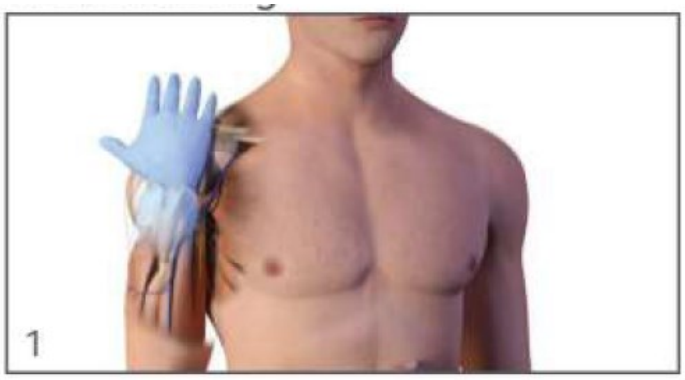


Place the patient's hand over the abdomen with arm tight to the body.



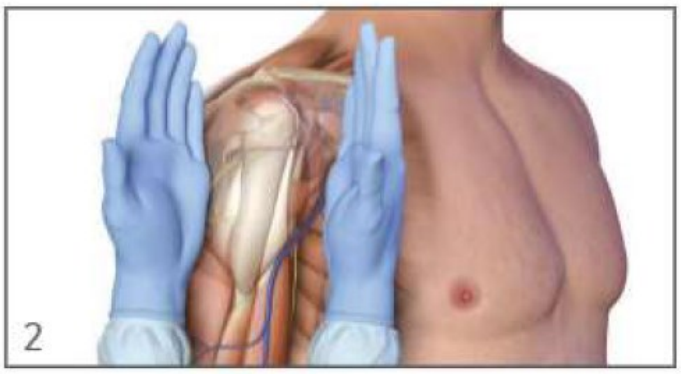
Place the arm tight against the body, rotate the hand so the palm is facing outward, thumb pointing down.

- Landmarking

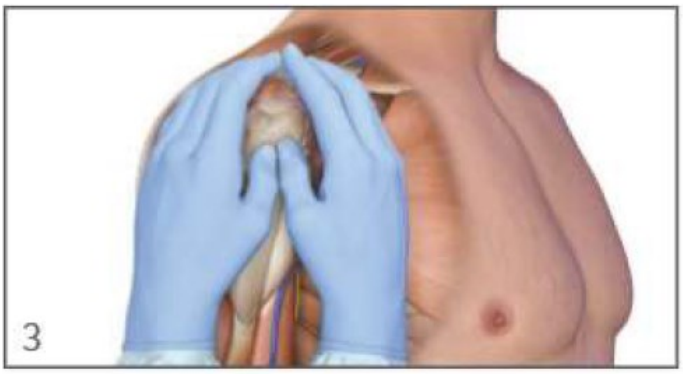


Place your palm on the patient's shoulder anteriorly.

- The area that feels like a "ball" under your palm is the general target area
- You should be able to feel this ball, even on obese patients, by pushing deeply

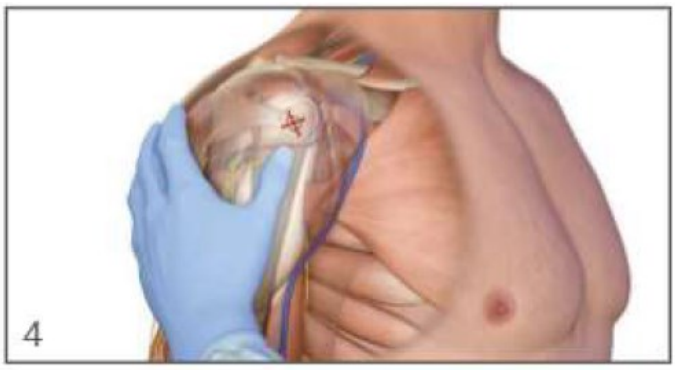


Place the ulnar aspect of one hand vertically over the axilla. Place the ulnar aspect of the opposite hand along the midline of the upper arm laterally.



Place your thumbs together over the arm.

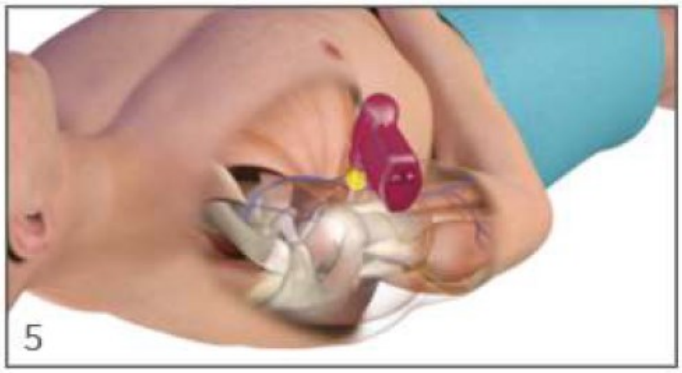
- This identifies the vertical line of insertion on the proximal humerus

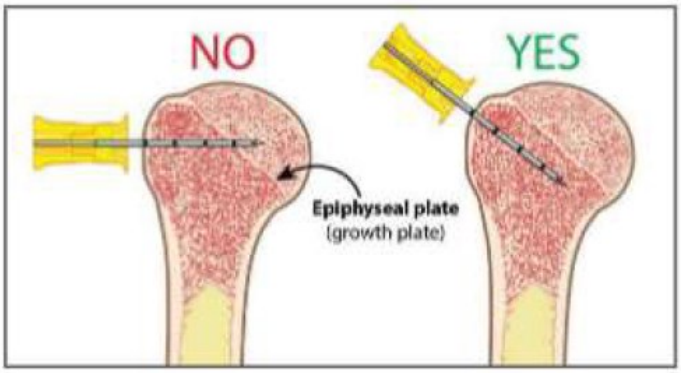


Palpate deeply as you climb up the humerus to the surgical neck.

- It will feel like a golf ball on a tee – the spot where the "ball" meets the "tee" is the surgical neck

The insertion site is on the most prominent aspect of the greater tubercle, 1 to 2 cm above the surgical neck.





Point the needle tip at a 45-degree angle to the anterior plane and posteromedial.

3. Needle Selection

- ∇ The needles do not have "Adult" or "Pediatric" sizes
- ∇ Clinical judgement should be used to determine appropriate needle selection based on patient weight, anatomy and tissue depth overlying the insertion site
  - Red 15ga 15mm for 3 - 39kg (Green and below on length-based tape)
  - Blue 15ga 25mm > 3kg
  - Yellow 15ga 45mm >40kg and / or excessive tissue depth
    - Always consider 45mm needle for proximal humerus in patients >40kg
- ∇ With the needle inserted through the soft tissue and touching the bone, the 5mm mark (most proximal black line to needle head) must be visible outside the skin for confirmation of adequate needle length prior to drilling
- ∇ On Blue 25mm and Yellow 45mm, if most distal black line is still visible when inserted in tissue and touching bone, needle is too large

4. Insertion

- ∇ Assemble IV solution / drip set
- ∇ Flush extension set
- ∇ Secure selected needle to drill head
- ∇ Stabilize extremity at selected insertion site
- ∇ Confirm landmarks at selected insertion site
- ∇ Position drill at insertion site at 90^{o} angle to bone
- ∇ Push needle through overlying tissue until it rests on bone
- ∇ Verify that at least 5mm of needle is still visible above skin (Most proximal black line)

- ∇ Penetrate bone cortex by squeezing drill trigger and applying gentle, steady downward pressure
- ∇ Release trigger and stop insertion when sudden give or pop is felt on entry into marrow space
  - In the event of drill failure, remove drill from needle, grasp needle hub by hand and advance into marrow space while twisting
- ∇ Stabilize hub, remove drill and needle stylet

5. Confirm patency and flush

- ∇ Observe that the needle will stand and is firm in position without support
- ∇ Attempt to aspirate blood or marrow
- ∇ Place EZ-Stabilizer Dressing over catheter hub

- ∇ For all Unconscious patients
  - Attach pre-flushed extension set
  - Flush with 5-10mL for adults or 2-5mL for infants/children
- ∇ For Conscious Adults Only
  - Consider pain management prior to flush
  - See IO Analgesia (Lidocaine Administration) Skills Dictionary for procedure for administering IO Infusion Pain Management
- ∇ Attach pre-flushed extension set

6. IV Fluid administration

- ∇ Attach IV tubing to IO extension set
- ∇ Open flow clamp
- ∇ Observe drip chamber for IV flow
  - If acceptable flow rate is observed, titrate drip rate and monitor
  - If no or low flow consider:
    - Extravasation / Infiltration
    - Pressure Infusion or syringe for fluid bolus
- ∇ Secure tubing

7. Pressure Infuser Use

∇ To infuse fluids, a pressure infuser bag will likely be necessary

- Insert IV bag with flushed administration tubing through the bottom of the pressure infuser bag
  - Insert your hand into the top of the pressure infuser bag to pull the IV bag to the top
- Insert loop sewn into top of infuser bag through hole in top of IV bag

Hang bag from IV pole or hold to elevate



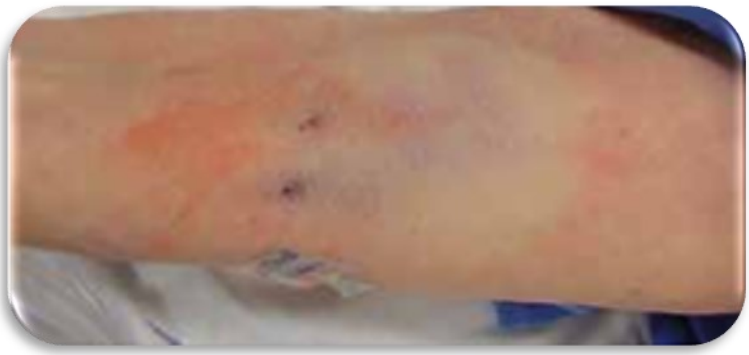
- Place the stopcock attached to the inflation bulb so the "OFF" handle points towards the open Leur port
  - This allows the inflation bladder to be filled with air
- Squeeze the inflation bulb until the attached pressure gauge displays the Green ring (300 mmHg)
  - Overinflating will display the Red (CAUTION) ring and activate the pressure relief valve which will allow air to escape until a pressure of 300 mmHg is achieved
- Once proper pressure is achieved, rotate stopcock so the "OFF" handle points straight up the inflation tubing towards the IV bag.
  - This will help prevent any leak from the inflation bulb
- As the IV fluid is infused, you may need to periodically add air to keep the pressure gauge in the Green (300 mmHg) ring




- To deflate the pressure infuser bag, rotate the stopcock "OFF" handle to point 180^{o} opposite the Leur port
  - This will allow air to escape out the Leur port

8. Ongoing Monitoring

∇ Check surrounding tissue and tissue opposite insertion site for signs of infiltration / extravasation
- This image shows extravasation of Epinephrine from an IV, but the skin blanching surrounding an IO site will be similar



∇ Adjust drip rate as necessary

∇ If using pressure infuser:
- Adjust pressure as necessary

Med Admin – IO Analgesia (Lidocaine Administration)

***This dictionary entry assumes a patent intraosseous infusion device has already been appropriately placed. For instructions on inserting an intraosseous infusion device, see Skills Dictionary "Intraosseous Insertion EZ-IO"**

***Prior to administration of any medication, confirm your dose in the Field Reference Guide and complete the Medication Cross-Check with another provider**

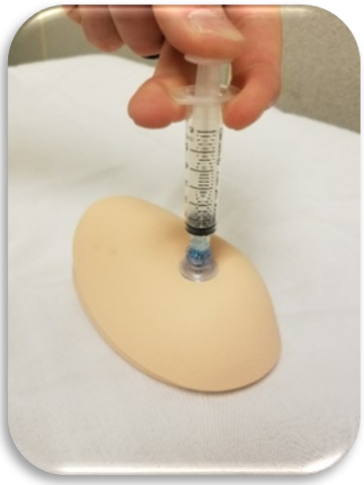
*Medications in this skills dictionary entry are simulated with colored fluids for easier visualization

1. **Gather equipment**
   - ∇ Lidocaine 2% Pre-Load
   - ∇ Syringe (3 to 10mL)
   - ∇ Stopcock

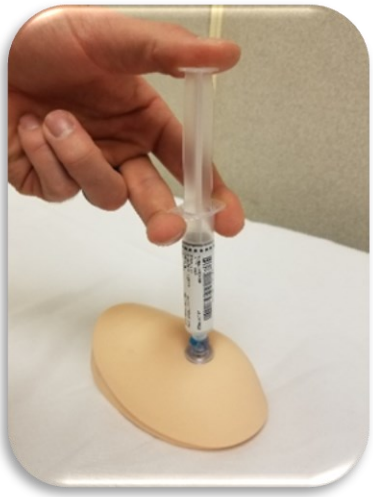
2. **Draw up Lidocaine**
   - ∇ Assemble stopcock, Lidocaine syringe and empty receiving syringe
   - ∇ Transfer 2mL (40mg) of Lidocaine to receiving syringe
   - ∇ Do Not attempt to administer a partial dose from a full syringe or full pre-load
   - ∇ For complete instructions on performing syringe to syringe transfer, see Skills Dictionary Medication Administration – Syringe to Syringe Transfer

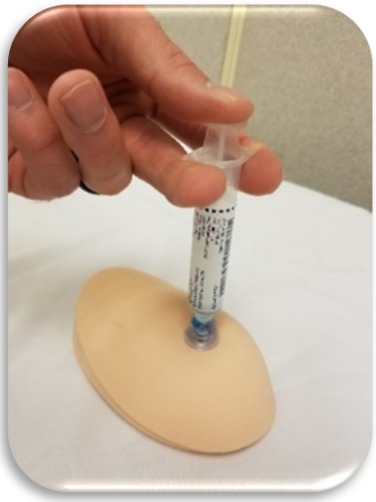
3. Administer Lidocaine

- ∇ For the following examples, colored water is used to easier visualize the doses
- ∇ Connect receiving syringe to IO hub and slow push 2mL Lidocaine over 2 minutes

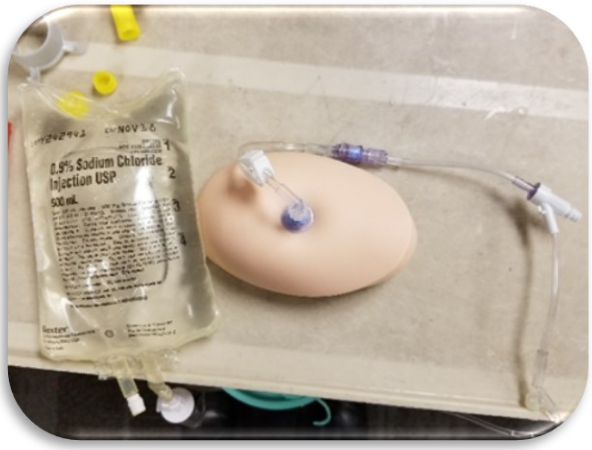


- ∇ Best anesthetic results are achieved if the initial Lidocaine dose is allowed to dwell in the marrow space for approximately 30-60 seconds before administering the flush
- ∇ Attach 10mL flush and push rapidly





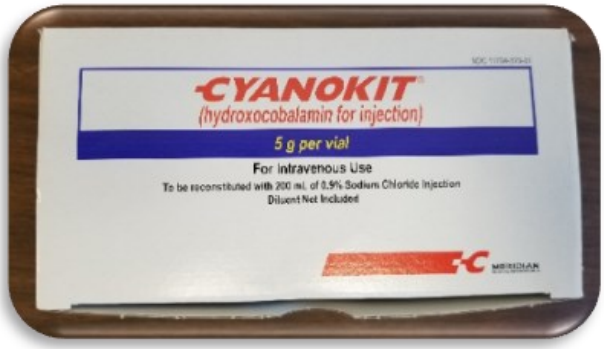
- ∇ Reassess pain and administer 1mL (20mg) Lidocaine over 1 minute, once and flush as necessary
  - Follow the steps above to transfer 1mL of Lidocaine from pre-load to syringe for administration
- ∇ Connect appropriately flushed extension tubing and/or IV administration set and continue fluid administration as indicated
  - See Skills Dictionary "Intraosseous Infusion – EZ IO" for information on intraosseous fluid administration



Med Admin – IV Admixture Hydroxocobalamin (Cyanokit)

1. **Knowledge Points**
   - ∇ Admixtures such as Hydroxocobalamin should not be hung as a "piggy-back" on another infusion of fluid or medication. Admixtures should have their own dedicated IV access point
   - ∇ Use only the included vented, 10gtt/mL administration line
     - The gtts/min doses listed in the JoCo EMS Field Guide will only be correct if using a 10gtt drip set
   - ∇ Do not administer other medications through the Hydroxocobalamin admixture IV line
     - Dopamine and Fentanyl have a known physical incompatibility with Hydroxocobalamin resulting in particulate formation when mixed. Other medications may result in similar particulate formation
     - Physical and chemical incompatibility has also been noted with Sodium Nitrite and Sodium Thiosulfate
   - ∇ Hypertension reported greater than 180/110 is common after administration of Hydroxocobalamin
   - ∇ Refer to JOCO EMS System Field Reference Guide for mixing and dosing information of specific medications for all admixture delivery
     - Drip rates are calculated using a 10gtt set. Prior to administration, ensure you are using a 10gtt set
     - Adult (and Pediatrics > 36kg) dosing is 1 full vial (200mL) over 15 minutes @ 133 gtts/min
     - Pediatrics 19-36kg dosing is ½ vial (100mL) over 15 minutes @ 67 gtts/min
     - Pediatrics up to 18kg dosing is ¼ vial (50mL) over 15 minutes @ 33 gtts/min
     - *Drip rate is gravity dependent and may change if the bag or the patient is raised or lowered after the drip rate is set. Frequently evaluate for rate change and recalibrate with metronome if needed*

2. **Gather Equipment**
   - ∇ Gather all necessary equipment (medication, needles, syringes, fluid bags, drip sets, alcohol pads, medication labels, etc)



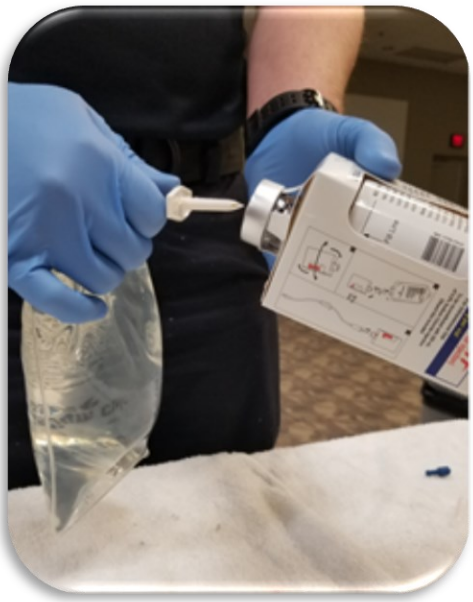
3. Perform Medication Verification / Cross Check

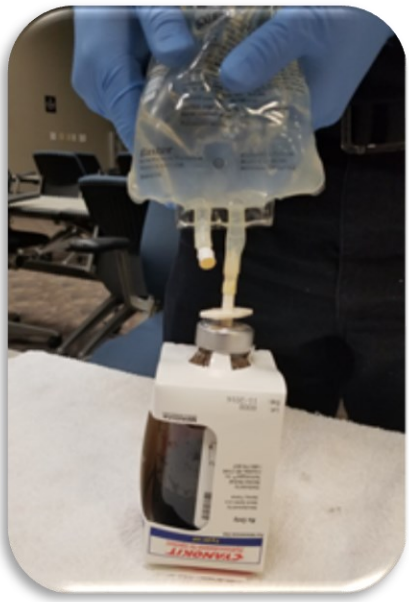
- ∇ Verify right patient
- ∇ Verify the medication name and concentration
- ∇ Verify the right indication for administering med
- ∇ Are there any contraindications for administering this medication?
  - o Confirm patient is not allergic to medication to be administered
  - o Are the patient's vital signs appropriate?
  - o Is the medication in date?
- ∇ What is the appropriate route for administering this medication?
- ∇ What is the right dose and volume of medication to be administered?

4. Admixture Set-up

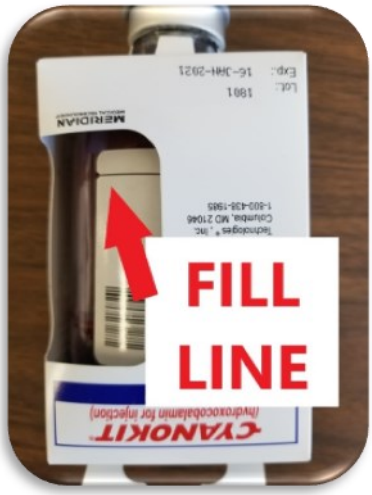
- ∇ Using sterile technique, reconstitute the Hydroxocobalamin by filling the vial with 200mL of 0.9% Sodium Chloride
  - o Filling the vial can be done either with two (2) 100mL bags or by using a portion of a larger volume such as a 500mL bag
- ∇ Filling with two (2) 100mL bags method:
  - o Using the Transfer Spike, connect first 100mL fluid bag to medication vial and squeeze in the contents
  - o Disconnect the first bag from the transfer spike, attach the 2nd 100mL bag to the spike and squeeze in the contents

- ∇ Filling with single (≥ 500mL) bag method:
  - Using the Transfer Spike, connect the fluid bag to the medication vial and squeeze in 200mL of fluid





- ∇ With the vial sitting vertically, on a level surface, with the injection port pointing up, the 200mL of fluid should come to the level of the "Fill Line" printed on the vial label

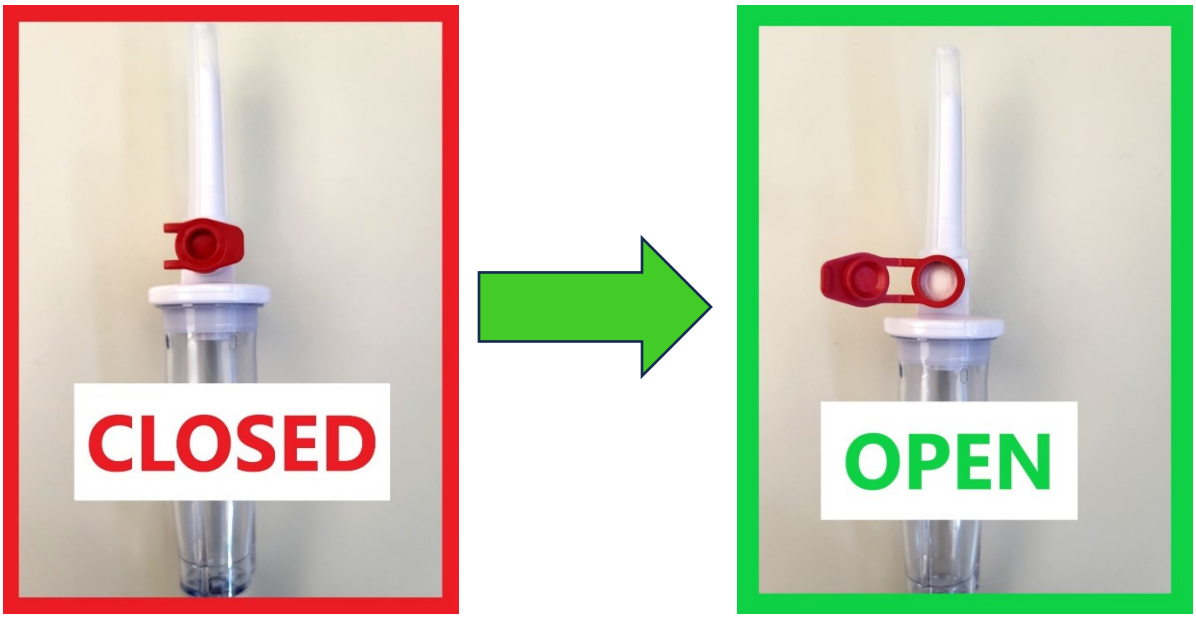


- ∇ Mix bag well by rocking bag back and forth or swirling in a circular motion
  - DO NOT SHAKE! Shaking will result in the formation of bubbles in the medication that will result in it being unusable

5. Infusion

- ∇ Connect appropriate drip set to bag, fill drip chamber ½ way and flush tubing with infusion mixture
  - Note for pediatric patient prior to connecting drip set:
    - In pediatric patients 19-36kg (Blue – Green on length based tape) withdraw and discard 100mL of mixed solution to prevent over-administration
    - In pediatric patients under 19kg (Gray – White on length-based tape) withdraw and discard 150mL of mixed solution to prevent over-administration

- ∇ ****You MUST open the vent cover on the drip set to allow medication to flow****
  - Vent cap color may differ depending on stock / manufacturer



- ∇ Begin infusion
  - Use metronome to set drip rate:
    - Adult (and Pediatrics > 36kg / taller than length-based tape)
      - ♦ 1 full vial (200mL) over 15 minutes @ 133 gtts/min
    - Pediatrics 19-36kg (Blue – Green on length based tape)
      - ♦ ½ vial (100mL) over 15 minutes @ 67 gtts/min
    - Pediatrics under 19kg (Gray – White on length-based tape)
      - ♦ ¼ vial (50mL) over 15 minutes @ 33 gtts/min
    - Always use supplied vented 10gtt set

6. Reassess patient

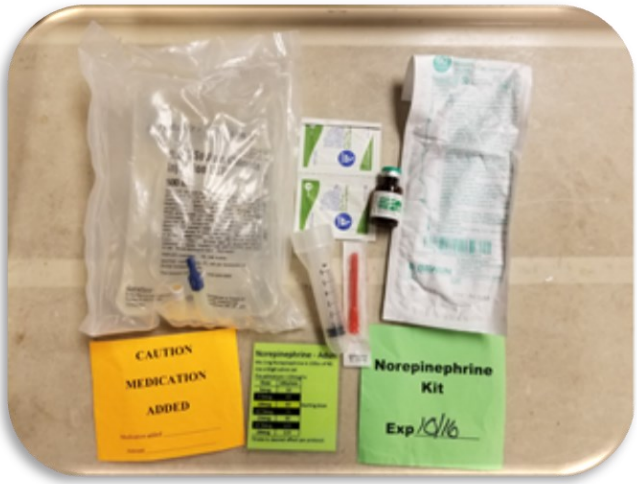
- ∇ Observe for both desired and adverse effects
- ∇ Document any change in patient status post infusion

This Page Left Blank

Med Admin – IV Admixture Norepinephrine

1. **Knowledge Points**
   - ∇ Admixture examples include Norepinephrine and Hydroxocobalamin
     - See IV Admixture Infusion – Hydroxocobalamin Skills Dictionary for specific information on Hydroxocobalamin
   - ∇ Admixtures should not be hung as a "piggy-back" on another infusion of fluid or medication. Admixtures should have their own dedicated IV access point
   - ∇ The following example is pictured using Norepinephrine but the process should be followed for any admixture medication
   - ∇ Refer to JOCO EMS System Field Reference Guide for mixing and dosing information of specific medications for all admixture delivery
   - ∇ *Drip rate is gravity dependent and may change if the bag or the patient is raised or lowered after the drip rate is set. Frequently evaluate for rate change and recalibrate with metronome if needed*

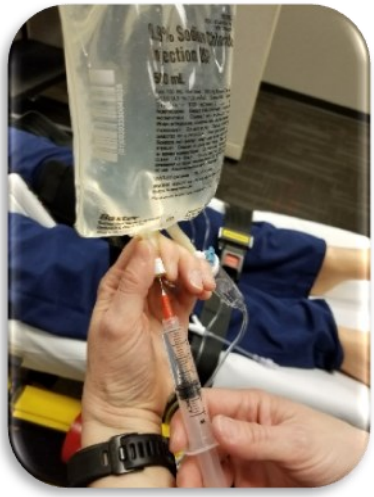
2. **Gather Equipment**
   - ∇ Gather all necessary equipment (medication, needles, syringes, fluid bags, drip sets, alcohol pads, medication labels, etc)



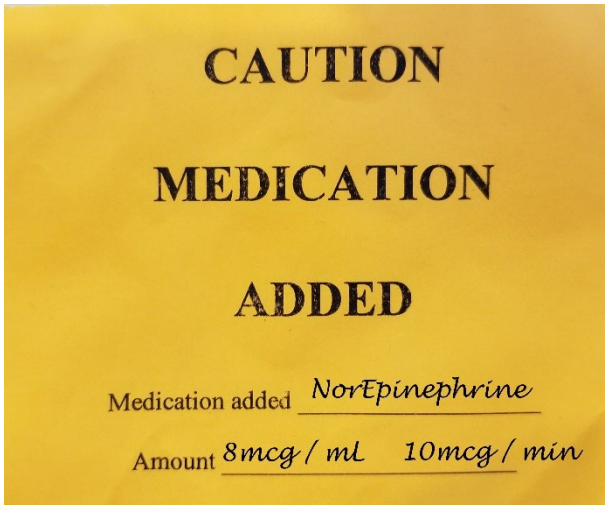
3. **Medication verification / Cross Check**
   - ∇ Verify right patient
   - ∇ Verify the medication name and concentration
   - ∇ Verify the right indication for administering med
   - ∇ Are there any contraindications for administering this medication?
     - Confirm patient is not allergic to medication to be administered
     - Are the patient's vital signs appropriate?
     - Is the medication in date?
   - ∇ What is the appropriate route for administering this medication?
   - ∇ What is the right dose and volume of medication to be administered?

4. Admixture Set-Up

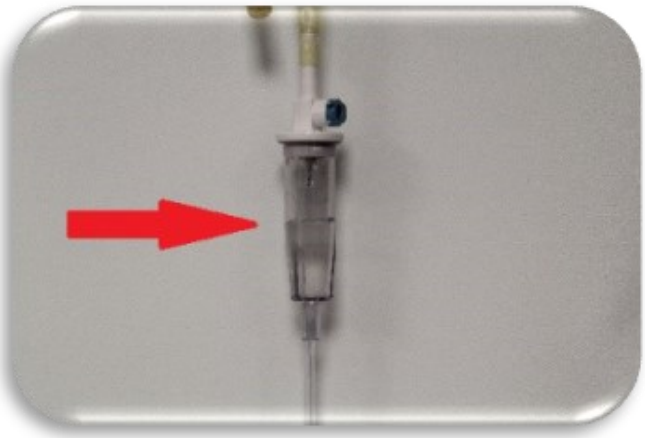
- ∇ Using sterile technique, draw up medication from vial
- ∇ Using sterile technique, inject medication into Normal Saline 0.9% bag

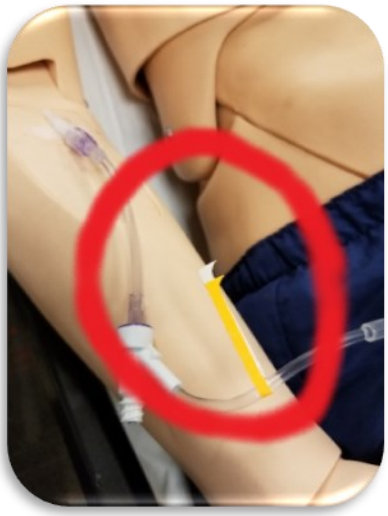


- ∇ Mix bag well by rocking back and forth
- ∇ Fill out and apply medication label to bag
  - Best Practice is to include Concentration (8mcg/mL) and Administered Dose (10mcg/min – starting dose as example)



- ∇ Connect appropriate drip set to bag, fill drip chamber ½ way and flush tubing with infusion mixture
- ∇ Using sterile technique, connect tubing to saline lock / extension set on patient
- ∇ Since there is a chance you may have more than one active IV line on a patient, it is a good practice to consider using the remaining edge of the medication label to "flag" the IV tubing, near the hub, that contains the medication





5. Infusion

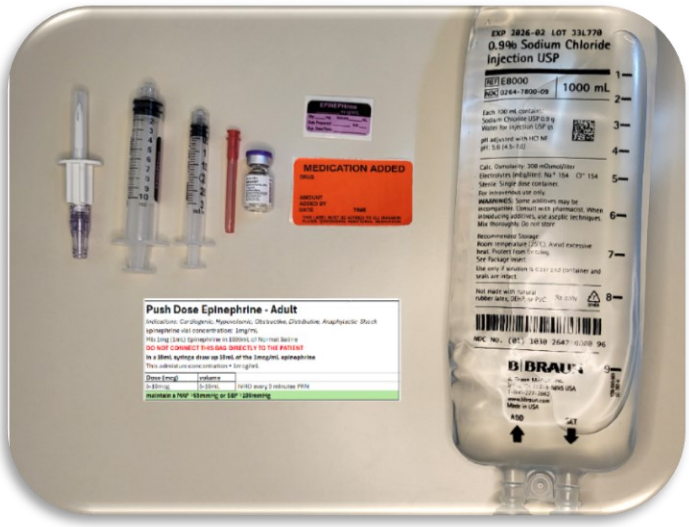
- ∇ Begin infusion and set drip rate to applicable rate based on JOCO EMS System Field Resource Guide
  - Use Metronome to set drip rate

6. Reassess patient

- ∇ Observe for both desired and adverse effects
- ∇ Document any change in patient status post infusion

Med Admin – IV Admixture Push-Dose Epinephrine

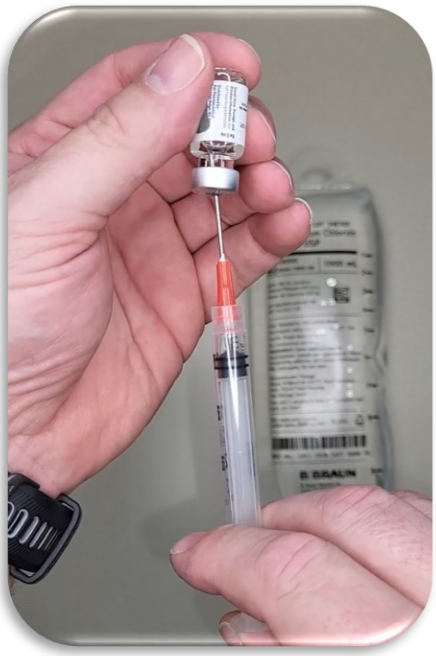
1. **Gather Equipment**
   - ∇ Gather all necessary equipment (medication, needles, syringes, fluid bags, drip sets, alcohol pads, medication labels, etc.).
   - ∇ Push-Dose Epi equipment is packaged as a kit that includes:
     - 1000mL bag Normal Saline
     - 1mL vial Epinephrine (1mg/mL)
     - IV bag access spike
     - 10mL syringe
     - 3mL syringe
     - Blunt tip needle
     - IV bag label
     - Syringe label
     - Mixing instructions

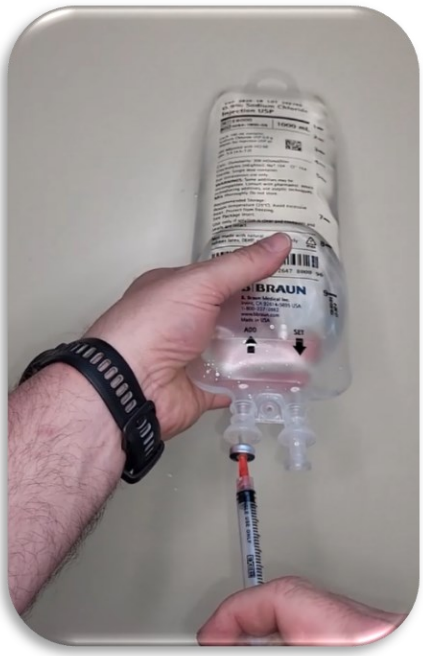


2. **Medication Verification / Cross Check**
   - ∇ 2 clinicians will verify Medication, Dose and Concentration of Epinephrine vial against FRG or Mixing Instructions from kit.
   - ∇ When Epinephrine is drawn from vial, 2 clinicians will verify volume of epinephrine in syringe prior to injection into 1000mL IV bag.
   - ∇ 2 clinicians will verify Indications for Push-Dose Epi administration against FRG or Mixing Instructions from kit.
     - Cardiogenic Shock
     - Hypovolemic Shock
     - Obstructive Shock
     - Distributive Shock
   - ∇ 2 clinicians will verify Contraindications from Formulary.
     - Hypersensitivity to Epinephrine.
     - Discuss Vital Signs, Expiration Date of Vial and Bag, PMH, etc.
   - ∇ 2 clinicians will verify correct Route against FRG or Mixing Instructions from kit.
     - IV/IO Push – Bolus Dosing Only - DO NOT HANG THIS MIXTURE AS A DRIP.

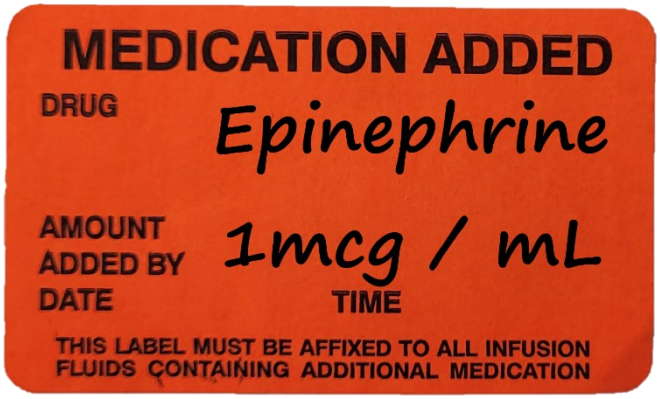
3. Admixture Set-Up

- ∇ Use sterile technique for accessing all vials, ports and injection sites.
- ∇ Draw up epinephrine from vial.
- ∇ Inject epinephrine into 1000mL Normal Saline 0.9% bag via the injection port.





- ∇ Mix bag well by rocking back and forth.
- ∇ Apply medication label to bag.
  - If label is not pre-printed with the information below, print the following information on label:
    - Name of medication (Epinephrine / Push-Dose Epi).
    - Concentration (1mcg/mL).

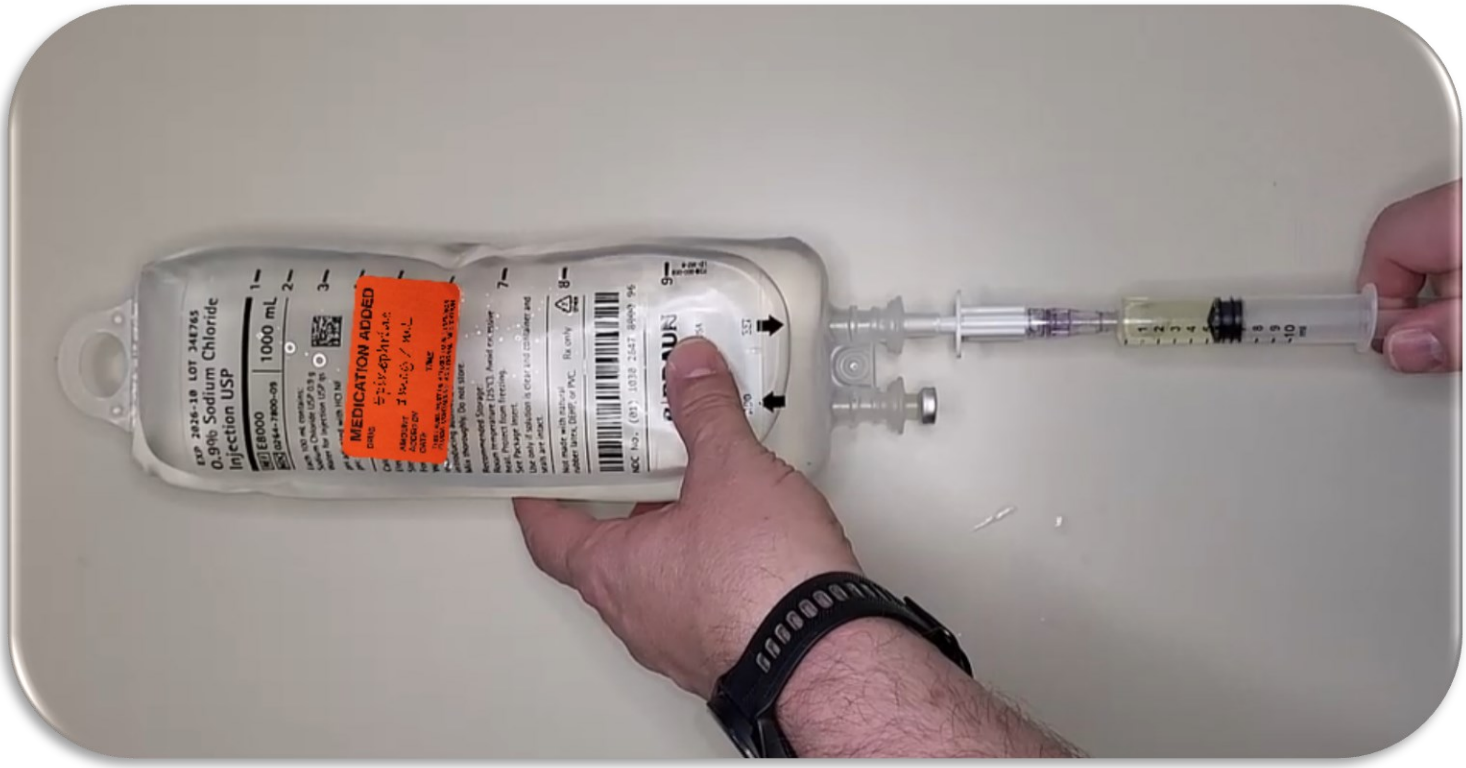


∇ Spike IV bag with leur-lock access spike.

∇ Apply medication label to syringe.
- ○ If label is not pre-printed with the information below, print the following information on label:
  - Name of medication (Epinephrine / Push-Dose Epi).
  - Concentration (1mcg/mL).
- ○ Do Not cover volume indicator lines with label.

4. Administration

- ∇ Using sterile technique, draw up 5-10mL (5-10mcg) in labeled 10mL syringe.
- ∇ Using sterile technique, connect syringe to access port on patient's IV line.
- ∇ Administer 5-10mL (5-10mcg) IV/IO Push and repeat every 3-5 minutes to maintain MAP >65mmHg or SBP >100mmHg.
- ∇ Flush after medication administration
- ∇ DO NOT CONNECT THIS BAG TO THE PATIENT.



5. Reassess patient

- ∇ Observe for both desired and adverse effects.
- ∇ Document any change in patient status post administration.

Med Admin – Pre-Load Assembly & Use

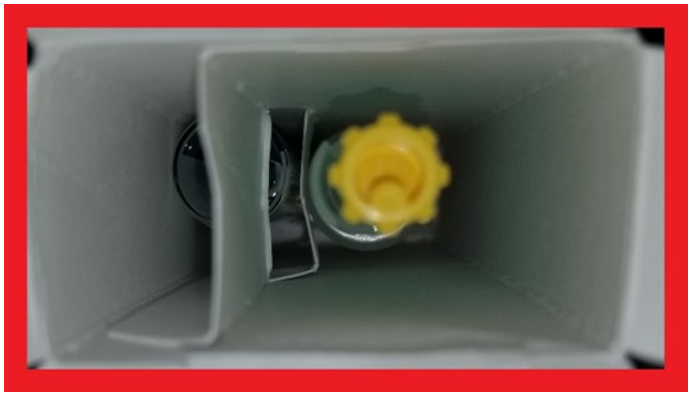
***Prior to administration of any medication, confirm your dose in the Field Reference Guide and complete the Medication Cross-Check with another provider**

*Medications in this skills dictionary entry may be simulated with colored fluids for easier visualization

1. **Identify correct medication for assembly**
   - ∇ Note – Some Pre-Load Medications come in pre-assembled plastic syringes and do not need assembly
   - ∇ Different manufacturers may have different box designs that pictured below but the colors are fairly standard, so the same drug from a different manufacturer will still be a similar shade of the colors depicted below
   - ∇ The most common medications that will require this assembly procedure include:
     - Atropine
     - Calcium Chloride
     - Epinephrine
     - Lidocaine
     - Naloxone
     - Sodium Bicarbonate

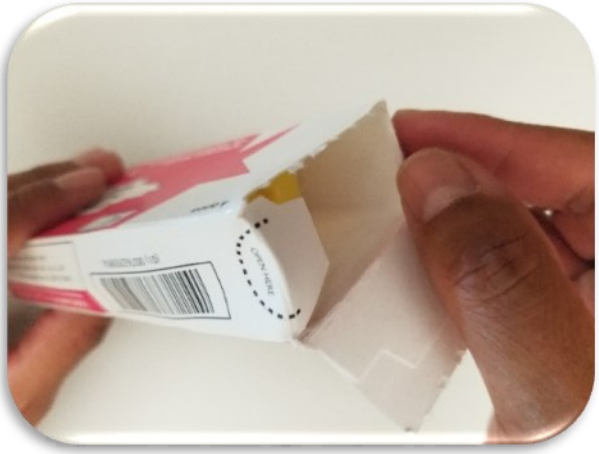
2. Open the box

- ∇ The box will have a printed identifier for which end to open
- ∇ Built in package dividers will prevent medication from coming out of the box if the incorrect end is opened first
  - This will require extra effort to remove the inserts or open the correct end



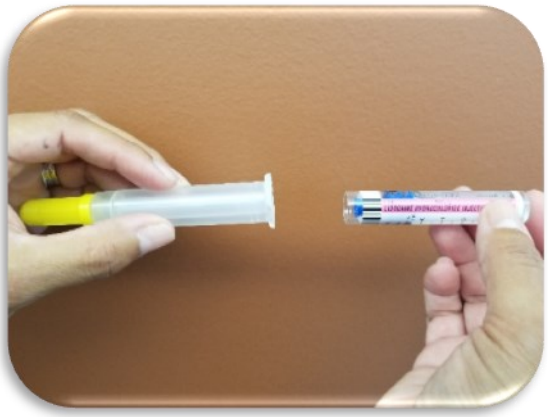
3. Carefully remove vial and syringe from box

- ∇ The medication is stored in a fragile glass vial that may break from rough storage or handling



4. **Remove end caps from injector and vial**
   - ∇ This is most commonly done by grasping each piece in separate fists with caps up and pushing the caps up and off with your thumbs
     - Additional EMS style points will be awarded to those who achieve greater height and distance on cap removal
   - ∇ Maintain sterile technique

5. **Join vial and injector**
   - ∇ insert the end of the vial with the threaded stopper into the injector
   - ∇ Screw the pieces together until you meet resistance, or the stopper spins inside the glass vial
     - Be careful when handling that you are applying neither an inward force that might unintentionally expel medication, or an outward force that could pull the stopper out of the vial and pour out the medication
   - ∇ Maintain sterile technique



6. Purge Air from vial

- ∇ Hold the assembled unit vertically, with the glass vial at the bottom so the air migrates to the top of the vial
- ∇ Gently loosen or remove the small cap on the Luer-lock end of the injector
  - If you remove cap, be sure not to touch inside of cap or end of injector
- ∇ Gently push the vial upward into the injector until all the air is expelled
  - A small drop of medication may come out the end of the injector
- ∇ Recap injector
- ∇ Maintain sterile technique

7. Setting the dose

- ∇ After purging the air from the vial, there may still be excess medication so that the stopper is not even with the "0" line on the syringe.
  - If you are administering the entire volume of the pre-load, expel the excess medication by pressing the vial into the injector until the stopper is even with the "0" marker on the vial
- ∇ Some medications such as Lidocaine or Sodium Bicarbonate have doses that might require you to use a partial vial.
  - If you are administering a volume less than the full contents of the vial, expel the amount of excess medication so that the contents left in the pre-load are equal to the amount needed to administer
  - As an example, Lidocaine is packaged with a concentration of 100mg in 5mL. Per the Johnson County EMS Field Reference Guide, if you were administering a dose of Lidocaine to a 220 lb patient in cardiac arrest, you would need to administer a total of 7mL of medication.
  - To administer a full dose of Lidocaine, you would need to administer the entire 5mL volume of one pre-load and then administer 2mL of volume from a second pre-load.
  - The correct method of administration would be to expel 3mL of medication from the 2nd pre-load, leaving only the remaining 2mL of intended volume remaining in the vial to be administered to the patient. This removes the possibility of an inadvertent over dose of medication.
  - Alternatively, you may use the Syringe to Syringe transfer method to remove 2ml of Lidocaine to another syringe and then administer the medication you have just drawn up into the syringe.

This Page Left Blank

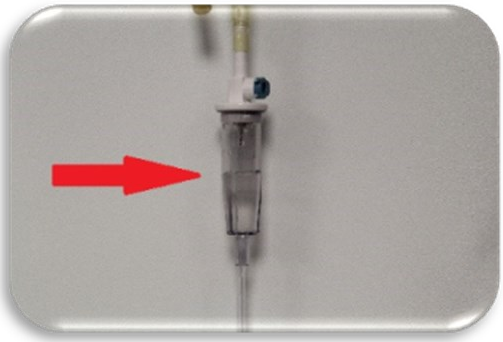
Med Admin – IV Pre-Mixed Dextrose 10% (D10)

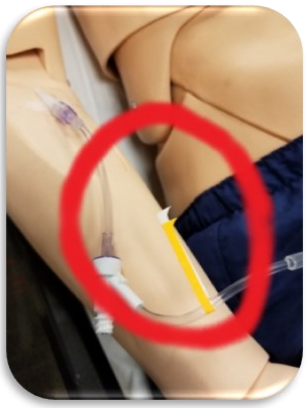
1. **Knowledge Points**
   - ∇ Pre-Mixed medication infusion examples include D10
   - ∇ Pre-Mixed medication infusions should not be hung as a "piggy-back" on another infusion of fluid or medication. Pre-Mixed medications should have their own dedicated IV access point
   - ∇ The following example is pictured using D10 but the process should be followed for any pre-mixed medication
   - ∇ Refer to JOCO EMS System Field Reference Guide for dosing information of all pre-mixed medication infusions

2. **Gather Equipment**
   - ∇ Gather all necessary equipment (medication, needles, syringes, fluid bags, drip sets, alcohol pads, medication labels, etc)

3. **Medication verification / Cross Check**
   - ∇ Verify right patient
   - ∇ Verify the medication name and concentration
   - ∇ Verify the right indication for administering med
   - ∇ Are there any contraindications for administering this medication?
     - Confirm patient is not allergic to medication to be administered
     - Are the patient's vital signs appropriate?
     - Is the medication in date?
   - ∇ What is the appropriate route for administering this medication?
   - ∇ What is the right dose and volume of medication to be administered?

4. **Pre-Mixture Set-Up**
   - ∇ Fill out and apply medication label to bag
     - While you are not actually adding anything to the bag of fluid, using a medication label is a good practice to remind other providers that there is a medication in that bag that is flowed at a prescribed rate
   - ∇ Connect appropriate drip set to bag, fill drip chamber ½ way and flush tubing with infusion mixture
   - ∇ Using sterile technique, connect tubing to saline lock / extension set on patient
   - ∇ Since there is a chance you may have more than one active IV line on a patient, it is a good practice to consider using the remaining edge of the medication label to "flag" the IV tubing, near the hub, that contains the medication





5. **Infusion**
   - ∇ Begin infusion and set drip rate to applicable rate based on JOCO EMS System Field Resource Guide
   - ∇ Use Metronome to set drip rate

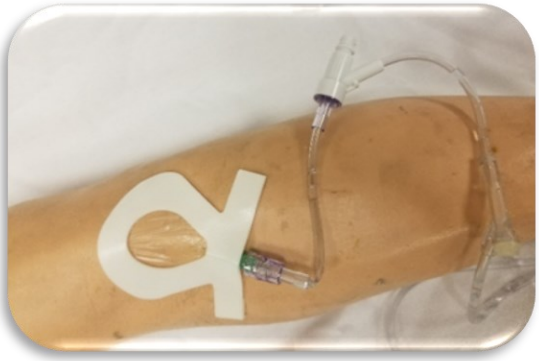
6. **Reassess patient**
   - ∇ Recheck Blood Glucose
   - ∇ Observe for both desired and adverse effects
   - ∇ Document any change in patient status post infusion

Med Admin – Rapid Push IV (Adenosine)

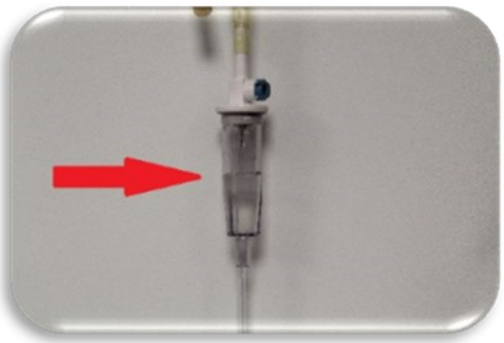
***Prior to administration of any medication, confirm your dose in the Field Reference Guide and complete the Medication Cross-Check with another provider**

*Medications in this skills dictionary entry are simulated with colored fluids for easier visualization

1. **Establish patent IV line**
   - ∇ Placement should be as close to heart as possible
   - ∇ Use of at least 18ga IV catheter recommended

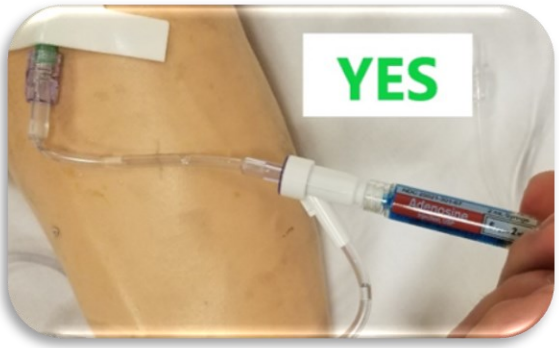


2. **Set up Crystalloid IV solution and drip set**
   - ∇ If not already done
   - ∇ Connect appropriate drip set to bag, fill drip chamber ½ way and flush tubing with fluid
   - ∇ Using sterile technique, connect tubing to saline lock / extension set on patient



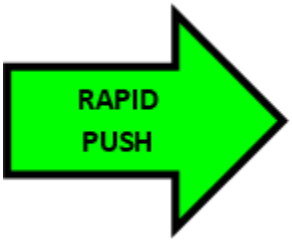
3. Connect Adenosine to IV

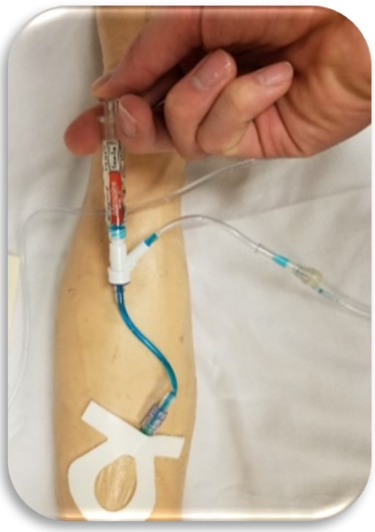
- ∇ Remove air from Adenosine syringe
- ∇ Using sterile technique, connect syringe to IV tubing port most proximal to patient
- ∇ Do Not use stopcock

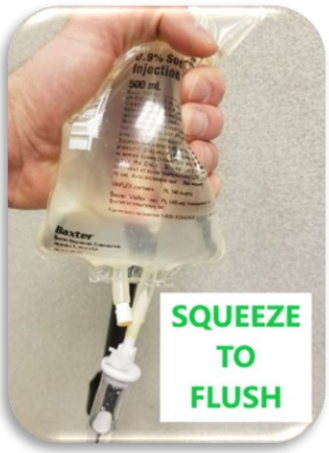


4. Rapid Push Adenosine

- ∇ With IV fluid running Wide Open, rapidly inject Adenosine over 1-2 seconds or less
- ∇ Do not pinch tubing during administration of Adenosine
- ∇ After pushing Adenosine, it is recommended to squeeze IV bag for up to 10 seconds to flush / assist with delivery of medication
  - o There is no need to use any other flush







5. **Slow drip rate to TKO**

6. **Reassess patient**
   - ∇ Observe for both desired and adverse effects
   - ∇ Document any change in patient status post infusion

This Page Left Blank

Med Admin – Syringe to Syringe Transfer

***Prior to administration of any medication, confirm your dose in the Field Reference Guide and complete the Medication Cross-Check with another provider**

*Medications in this skills dictionary entry are simulated with colored fluids for easier visualization

1. **Knowledge Points**
   - ∇ Never attempt to administer a partial volume from a syringe or pre-load vial.
   - ∇ Attempting to administer a partial volume from a syringe or pre-load vial creates a high likelihood of medication over-dose.
   - ∇ Muscle memory, patient movement, provider movement, or ambulance movement can all contribute to pushing more than the intended volume when trying to administer a partial volume from a syringe or pre-load vial.
   - ∇ Use of the Syringe to Syringe Transfer technique prevents the possibility of inadvertent over-dose in trying to administer partial volumes and maintains access to the remaining medication for subsequent dosing when necessary.

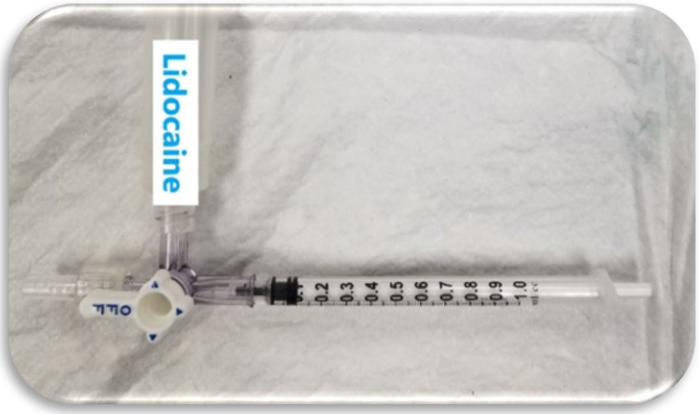
2. **Assemble equipment**
   - ∇ Stopcock
   - ∇ Desired medication pre-load syringe
   - ∇ Appropriate size receiving syringe
     - i.e. 1mL syringe for pediatric dosing

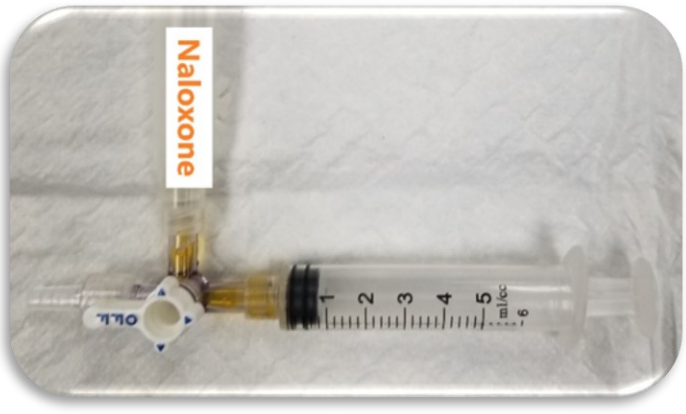
3. **Set Stopcock**
   - ∇ Make sure stopcock lever is pointed to the “male” port to turn shut off that port

4. **Assemble and flush pre-load medication syringe**
   - ∇ See Medication Administration – Pre-Load Medication Assembly Skills Dictionary for more complete directions

5. **Attach medication syringe to one of the "female" ports on the stopcock and flush stopcock**
   - ∇ For the following examples, colored water is used to easier visualize the doses
   - ∇ Child weight / volume examples shown are:
     - Naloxone 2mL (Orange on length-based tape 19-23kg)
     - Lidocaine 0.25mL (Grey on length-based tape 5kg)

6. **Attach empty receiving syringe to other "female" port of stopcock**





7. **Slowly push medication from medication syringe into the receiving syringe until proper dose is achieved**

8. **Remove receiving syringe and administer to patient**

9. **Special Notes**
   - ∇ Use separate stopcocks for separate medications
     - i.e. during a code, use one stopcock for epinephrine and a different stopcock for lidocaine
   - ∇ When multiple medications are being drawn up, LABEL THE SYRINGES
   - ∇ Never place the stopcock in the patient's IV line to do the transfer
     - There's too much risk of having the stopcock turned the wrong way and injecting an overdose
   - ∇ Care should be taken to not contaminate any of the hubs of the stopcock and syringes. Clean with isopropyl alcohol pads prn

This Page Left Blank

Nasal Atomization

Med Admin – Nasal Atomizer

Nasal Atomization of medication can be done in varying ways, depending on the level of the Credentialed Provider:

Pre-Packaged Nasal Atomizer (All Credential levels)
Mucosal Atomization Device (MAD) (Paramedic Credential only)

1. **Gather and Prepare Equipment**
   - ∇ Pre-Packaged Nasal Atomizer
     - Obtain Pre-Packaged Nasal Atomizer
   - ∇ MAD / Syringe
     - Gather MAD device, syringe, aspiration needle, ETOH wipes
     - Using sterile technique, draw up appropriate dose of medication from vial
     - Remove aspiration needle from syringe and affix MAD device to syringe
       - Ensure MAD device is securely affixed to syringe to prevent air leaks and maximize atomization

2. **Medication Verification / Cross Check**
   - ∇ Verify right patient
   - ∇ Verify the medication name and concentration
   - ∇ Verify the right indication for administering med
   - ∇ Are there any contraindications for administering this medication?
     - Confirm patient is not allergic to medication to be administered
     - Are the patient's vital signs appropriate?
     - Is the medication in date?
   - ∇ What is the appropriate route for administering this medication?
   - ∇ What is the right dose and volume of medication to be administered?

3. **Position / Prepare Patient**
   - ∇ Works best with patient in supine position
   - ∇ Make sure nare to be utilized is clear
   - ∇ If patient is alert:
     - Have patient blow nose if possible
     - Explain procedure
   - ∇ Put finger against opposite nare and ensure air movement in chosen nare

4. Administer Medication

∇ Pre-Packaged Nasal Atomizer

- Insert device tip firmly into nare until your fingers touch the bottom of the patient's nose
- Push the plunger briskly
  - Try to administer during inhalation if possible

∇ MAD / Syringe

- Insert tip of MAD snugly against nare
  - Aim slightly upward and outward toward top of the ear
- Briskly compress syringe plunger to deliver medication
  - Depending on volume of medication, you may need to split dose between nares, delivering half in each nare
  - Maximum volume to be administered:
    - ♦ Adult patient – 1mL per nare max
    - ♦ Pediatric patient – 0.5mL per nare max

5. Reassess Patient

∇ Observe for both desired and adverse effects

∇ Document any change in patient status post administration

Nebulized Medication Delivery

This Skills Dictionary entry covers Nebulized Medication Delivery via the following adjuncts:

Mouthpiece and Aerosol Mask
BVM and Advanced Airways
CPAP

Mouthpiece and Aerosol Mask

1. **Gather equipment**
   - ∇ Medication
   - ∇ Nebulizer kit
   - ∇ Oxygen source
   - ∇ Aerosol mask

2. **Medication verification / Cross Check**
   - ∇ Verify right patient
   - ∇ Verify the medication name and concentration
   - ∇ Verify the right indication for administering med
   - ∇ Are there any contraindications for administering this medication?
     - Confirm patient is not allergic to medication to be administered
     - Are the patient's vital signs appropriate?
     - Is the medication in date?
   - ∇ What is the appropriate route for administering this medication?
   - ∇ What is the right dose and volume of medication to be administered?

3. **Prepare Medication and Assemble Equipment**
   - ∇ <u>All Devices:</u>
     - Pour medicine to be administered into the nebulizer reservoir
     - Medicine can be placed with cap removed or through the top of cap
     - Reattach reservoir cap if removed

- ∇ Mouthpiece
  - Assemble T-piece with mouthpiece on one end and corrugated tubing to other end
  - Apply bottom port of T-piece to reservoir cap
- ∇ Aerosol Mask
  - Attach aerosol mask to reservoir cap

- ∇ All Devices
  - Connect oxygen tubing to oxygen source and bottom of the nebulizer reservoir and set flow meter to 6 – 8 LPM

4. **Prepare Patient**
   - ∇ <u>All Devices</u>
     - Place patient in sitting position or position of comfort
   - ∇ <u>Mouthpiece</u>
     - Instruct patient on how to hold nebulizer
   - ∇ <u>Aerosol Mask</u>
     - Instruct patient to place mouthpiece in mouth and breathe in and out through mouth or breath normally if using the facemask
5. **Administer Medication**
   - ∇ <u>Mouthpiece</u>
     - Instruct patient to place mouthpiece in their mouth and begin breathing through it
   - ∇ <u>Aerosol Mask</u>
     - Place Aerosol Mask strap over patient's head and position mask over their nose and mouth
     - Some patients may feel more comfortable manually holding the mask to their face rather than using head strap
   - ∇ <u>All Devices</u>
     - Administration is complete when reservoir cup is empty or "sputtering" occurs

6. **Reassess Patient**
   - ∇ Assess breath sounds and work of breathing / subjective breathing scale about halfway through administration (@5-7 minutes) and again at end of treatment
   - ∇ Observe for both desired and adverse effects
   - ∇ Document any change in patient status post administration

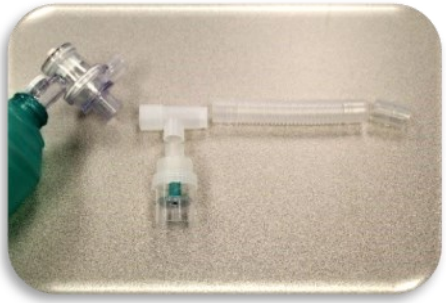
This Page Left Blank

BVM Mask / Advanced Airways

1. **Gather Equipment**
   - ∇ Medication
   - ∇ Nebulizer kit
   - ∇ Oxygen source
   - ∇ 15mm to 15mm adapter
   - ∇ BVM

2. **Medication verification / Cross Check**
   - ∇ Verify right patient
   - ∇ Verify the medication name and concentration
   - ∇ Verify the right indication for administering med
   - ∇ Are there any contraindications for administering this medication?
     - Confirm patient is not allergic to medication to be administered
     - Are the patient's vital signs appropriate?
     - Is the medication in date?
   - ∇ What is the appropriate route for administering this medication?
   - ∇ What is the right dose and volume of medication to be administered?

3. **Prepare Medication and Assemble Equipment**
   - ∇ <u>All Devices</u>
     - Pour medicine to be administered into the nebulizer reservoir
     - Medicine can be placed with cap removed or through the top of cap
     - Reattach reservoir cap if removed
     - Assemble 15mm adapter and "T" piece to opposite ends of corrugated tubing
       - The T-Piece and Corrugated Tubing are assembled in the same manner as if delivering via the mouthpiece, but the mouthpiece is not attached
       - The 15mm adapter is attached to the end of the corrugated tubing opposite of the T-piece
       - Attach T-piece to reservoir cap
       - Attach BVM to end of T-piece



- Connect oxygen tubing to oxygen source and bottom of the nebulizer reservoir and set flow meter to 6 – 8 LPM
- Separate oxygen sources will be necessary when delivering via BVM/Advanced Airway

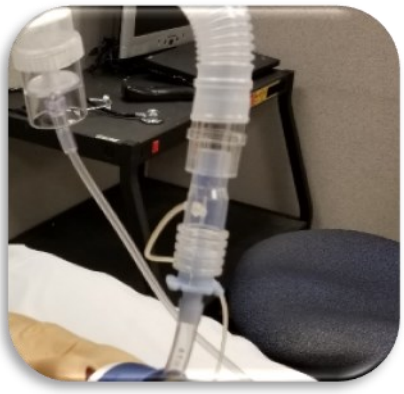
4. Prepare Patient

∇ If alert
- Place patient in sitting position or position of comfort
- Comfort coaching for BVM assistance will likely be required

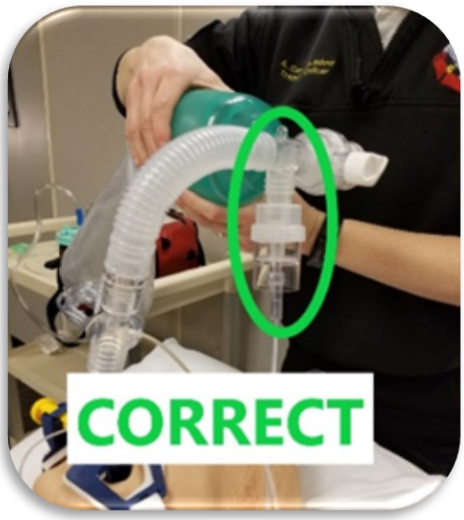
∇ If unresponsive
- Place patient supine

5. Administer Medication

∇ Attach 15mm adapter to BVM Mask or Advanced Airway
- The same 15mm to 15mm adapter will attach to either a BVM Mask, ET Tube, Tracheostomy Tube, or iGEL, and will also attach to the FilterLine ETCO2 adapter
  - Delivering nebulized medication through the Filterline ETCO2 adapter may result in increased fluid in the Filterline and cause ETCO2 purging



- ∇ The nebulizer reservoir cup must remain vertical for effective medication delivery
- ∇ Ventilate patient
- ∇ Administration is complete when reservoir cup is empty or “sputtering” occurs



6. Reassess Patient

- ∇ Assess breath sounds and work of breathing / subjective breathing scale about halfway through administration (@5-7 minutes) and again at end of treatment
- ∇ Observe for both desired and adverse effects
- ∇ Document any change in patient status post administration

This Page Left Blank

CPAP Device

1. **Gather Equipment**
   - ∇ Medication
   - ∇ Nebulizer kit
   - ∇ Oxygen source
   - ∇ CPAP

2. **Medication verification / Cross Check**
   - ∇ Verify right patient
   - ∇ Verify the medication name and concentration
   - ∇ Verify the right indication for administering med
   - ∇ Are there any contraindications for administering this medication?
     - Confirm patient is not allergic to medication to be administered
     - Are the patient's vital signs appropriate?
     - Is the medication in date?
   - ∇ What is the appropriate route for administering this medication?
   - ∇ What is the right dose and volume of medication to be administered?

3. **Prepare Medication and Assemble Equipment**
   - ∇ Pour medicine to be administered into the nebulizer reservoir
   - ∇ Medicine can be placed with cap removed or through the top of cap
   - ∇ Reattach reservoir cap if removed


   - ∇ Connect oxygen tubing to oxygen source and bottom of the nebulizer reservoir and set flow meter to 6 – 8 LPM
     - Same bottle may be used to run CPAP and nebulizer if necessary but will result in much faster oxygen depletion


4. **Prepare Patient**
    - Place patient in sitting position or position of comfort
    - Comfort coaching for CPAP will likely be required
    - Instruct patient to breathe in and out through mouth
    - See CPAP Skills Dictionary for more information

5. **Administer Medication**
    - ∇ Remove cap inline CPAP nebulizer attachment
    - ∇ Insert top of reservoir cap into port
    - ∇ See CPAP Skills Dictionary for more information
    - ∇ Administration is complete when reservoir cup is empty or “sputtering” occurs

6. **Reassess Patient**
    - ∇ Assess breath sounds and work of breathing / subjective breathing scale about halfway through administration (@5-7 minutes) and again at end of treatment
    - ∇ Observe for both desired and adverse effects
    - ∇ Document any change in patient status post administration

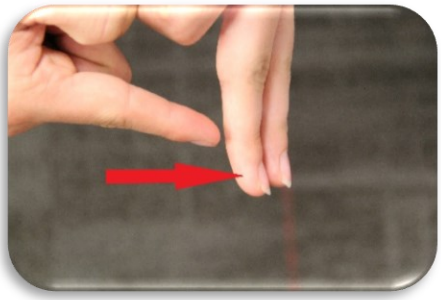
MEDICAL MANAGEMENT

This Page Left Blank

Blood Glucose Analysis

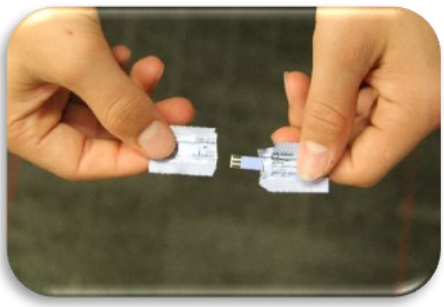
1. **Assemble equipment**
   - ∇ Gather glucometer, test strip, lancet device, cleansing prep, and bandage or 4x4's

2. **Ready Fingerstick site**
   - ∇ Choose medial or lateral aspect of distal ring or middle finger
     - Less callused area, more comfortable for the patient

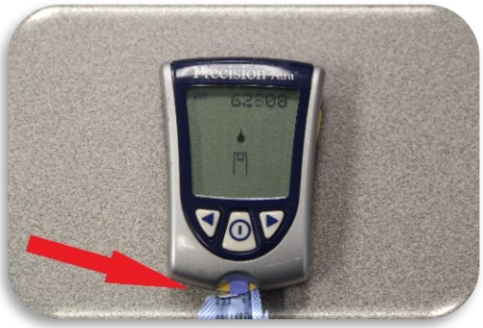


   - ∇ Cleanse site thoroughly with alcohol prep
     - Decreases chance of infection and inaccurate readings from other sources (i.e. candy, food, etc.)
   - ∇ Allow site to dry thoroughly before finger stick
     - Alcohol left wet on the skin will mix with the specimen and can cause inaccurate high readings

3. **Ready glucometer and testing strip**
   - ∇ Place glucometer on flat surface
   - ∇ Open testing strip sheath by tearing at arrows and removing short end of sheath to expose "bar codes"
   - ∇ Grasp sides of electrode and pull strip half out of foil packet
     - Leaving foil on test site area precludes contamination of test strip. Do not use if bar code area is bent, scratched or damaged in any way



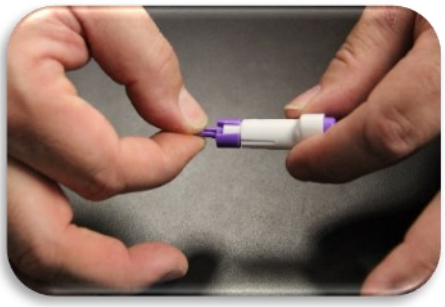
- ∇ With test strip still in foil packet insert bar code end face up into the glucometer. Gently push until it stops

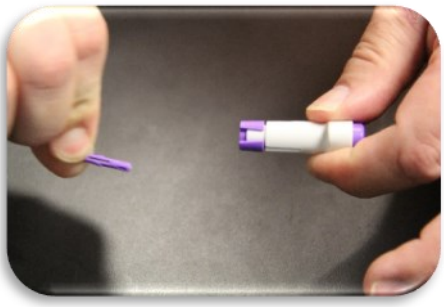


4. Obtain specimen

- ∇ Twist the plastic purple collar of lancet to dial needle depth (length marks on stem of lancet)

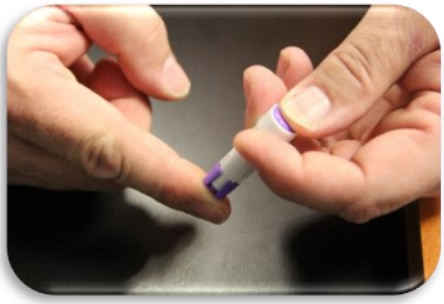
- ∇ Remove guard off end of lancet device, assuring to keep fingers away from lancet end



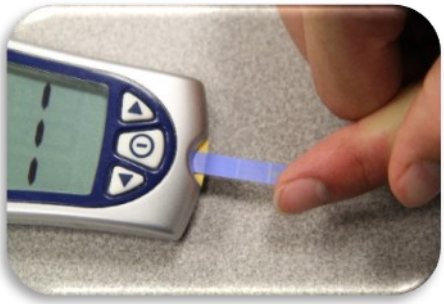


- ∇ Place the lancet device firmly against the cleansed and dried site
  - The lancet device should be held against the site firmly so that all of the force of the device is directed into the site
  - Supporting the finger assure stability for the stick and helps to keep the digit firmly against the lancet when it springs out

- Depress lancet device button on opposite end
  - This action advances the lancet to cause puncture. Lancet is then drawn back into the sheath.



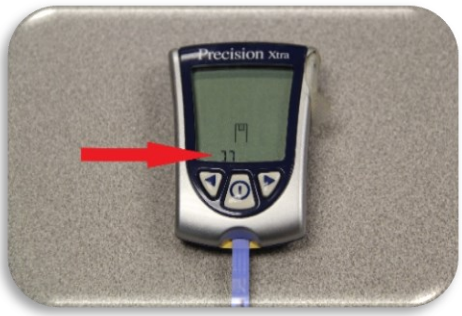
- With hand remaining dependent, gently milk the finger in downward strokes. Do not squeeze site
  - Squeezing site can cause an increase in serous fluid and cause inaccurate readings
- Obtain a large drop for sample purposes
- Remove foil cover over electrode to expose test site
- Firmly press the drop of blood on finger into the oval test site area
  - The device is designed to measure glucose in a predictable volume of blood. This is the volume normally found in a hanging drop. Enough blood must be infused into the white area for the unit to begin testing



- If this action fails, remove the strip and insert a new one and try again
- Clean puncture site with 4x4's. May need to apply Band-Aid to stop any continued hemorrhage

5. Read results

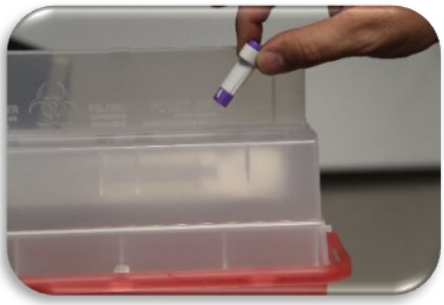
- ∇ Wait for the glucometer to countdown 20 seconds, which is visible on screen, following placement of the specimen on the test strip



- ∇ Observe the reading that appears
- ∇ If display does not appear, discard strip and use a new strip and a new puncture site
- ∇ Compare test readings to patient's presentation
  - ○ If reading is low, does this coincide with the patient's condition? And the same with high readings. Administration of glucose agents should not be determined on the basis of a glucometer reading only

6. Dispose of sharps and strips

- ∇ Dispose of lancet in approved sharps containers only. Dispose of test strip and placing in waste bin



Childbirth

Delivery – Shoulder Dystocia

1. Knowledge Points

- ∇ Shoulder dystocia occurs during childbirth. After delivery of the infant's head, the anterior shoulder gets caught on the mother's pubic bone. This may result in the baby's head "turtling" or pulling back into the vagina. Shoulder dystocia is an obstetric emergency that occurs in about 1% of vaginal deliveries. If the body of the infant does not deliver within 1 minute of head presentation, Shoulder Dystocia is the likely cause.
- ∇ Relieving shoulder dystocia requires multiple providers. Call for additional units if necessary but if unable to be resolved after 2-3 contraction cycles, do not delay transport.
- ∇ Risk factors for Shoulder Dystocia include:
  - Maternal Age > 35
  - Short in stature
  - Small or abnormal pelvis
  - > 42 weeks gestation
  - Estimated fetal weight ≥ 10 lbs
  - Maternal diabetes (2-4x increased risk)
- ∇ There are two primary techniques to alleviate Shoulder Dystocia and *they are to be applied simultaneously* for maximum results:
  - McRoberts' Maneuver
  - Suprapubic Pressure
- ∇ Supplemental oxygen via Non-Rebreather Mask should be applied to mother during these procedures regardless of SpO2 readings.
- ∇ ***Shoulder Dystocia is a Time Critical Medical Emergency*** **- No more than 2 minutes should be spent attempting the McRoberts' Maneuver and Suprapubic Pressure before transporting to the hospital for definitive care.**

2. McRoberts' Manuever

- ∇ Hyperflex mother's hips to severe supine knee-chest position
  - The mother's legs should be bent at the knees and pulled as far apart as possible
  - The mother's knees should be pressed as far as possible into her chest / pulled back toward her shoulders.
  - This may be done by having a provider on each leg (preferred) or by having the mother perform the maneuver
- ∇ This position causes the pubic bone to rotate towards the mother's head and position it slightly higher and more horizontal, to allow passage of the baby.
- ∇ DO NOT pull on the baby's head. Excessive downward traction of the baby's head could cause injury to the brachial plexus, causing weakness / paralysis of the baby's arm.

Severe Knee-Chest Position

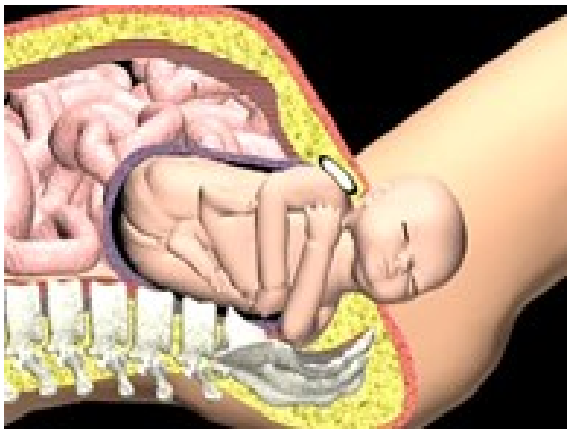


Fig. 1 Shows legs in standard position with knees bent and feet on flat surface. In this position, the pubic bone is pointed downward, covering the baby's shoulder.

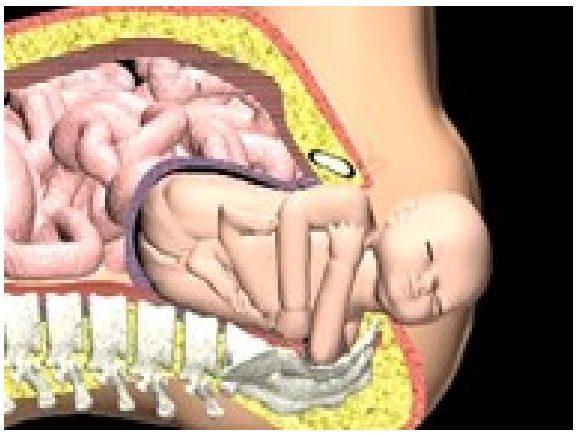
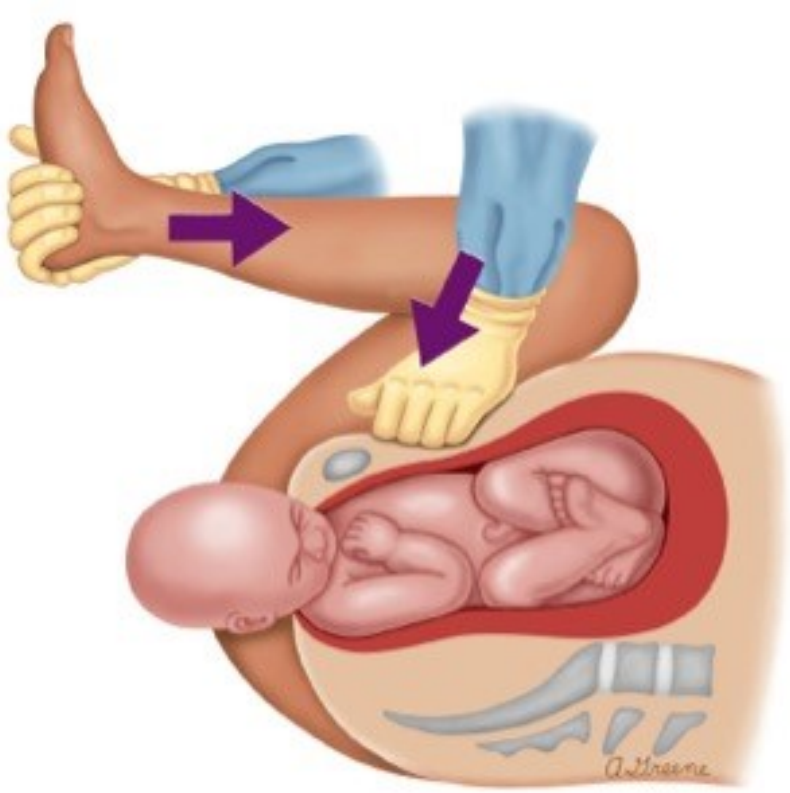


Fig. 2 Shows legs in Severe Knee-Chest Position. In this position, the spine flattens, increasing pelvic space and helps rotate the pubic bone backward, above the shoulder.

3. Suprapubic Pressure

- ∇ While initiating the McRoberts's Maneuver, another provider should position themselves to the side of the mother and palpate immediately superior to the symphysis pubis, to locate the anterior shoulder of the infant.
- ∇ Once locating the anterior shoulder, the provider will place the heel of their hand over the infant's anterior shoulder and apply pressure downward and laterally, at a 45° angle towards the baby's face.
  - Pressure from this angle pushes the shoulders together towards the front of the baby, causing the width of the baby's shoulders to decrease. If successful, the baby will rotate face down and be delivered.
  - Initially the pressure is applied continuously downward and towards the baby's face, causing the shoulder to adduct and pass under the symphysis.
  - Repeat these maneuvers 2-3 (2-3 contraction cycles) times by releasing pressure and relaxing leg position between contractions, then resetting the legs to the severe knee-chest position and applying pressure to the baby's shoulder just prior to the next compression
    - DO NOT apply fundal pressure as this only worsens the impaction and potentially cause injury to the infant or mother.
  - **If the combined efforts have been unsuccessful after attempting for 2 – 3 contraction cycles, immediately transport to the hospital for definitive care and continue to repeat maneuvers during transport.**



This Page Left Blank

Modified Valsalva Maneuver

1. **Attach 4-Lead electrodes and cables**
   - ∇ Attaching 12-Lead electrodes and cables is also suggested and may be beneficial in diagnosing Supraventricular Tachycardia prior to performing the Modified Valsalva Maneuver
   - ∇ See 12-Lead Placement / Acquisition / Transmission Skills Dictionary for instructions on placing 12-Lead

2. **Place patient in Semi-Fowlers position**

3. **Have patient blow into 10mL syringe for 15 seconds**
   - ∇ It is suggested to move the plunger slightly back and forth to loosen the seal prior to performing maneuver
   - ∇ Instruct the patient to hold the syringe with the tip in their mouth and blow hard enough to attempt to move the plunger
   - ∇ Instruct the patient to blow for 15 seconds while the provider times them or counts out loud "one-one thousand, two-one thousand, etc"

4. **Lay patient supine and perform passive leg raise for 15 seconds**
   - ∇ Lean the patient's head and torso into the supine position
   - ∇ The provider should then lift the patient's legs to a 45 degree angle
     - o Do not bed the patient's legs at the knees
     - o The provider should bear the weight of the legs
     - o Elevating the foot of the cot does not provide enough elevation alone

5. **Lower patient's legs and elevate head back to semi-fowlers position for 30 seconds**
   - ∇ Continue to monitor patient and ECG for 30 seconds after returning to Semi-Fowlers position, before attempting again or providing further therapy (unless the patient becomes unstable)

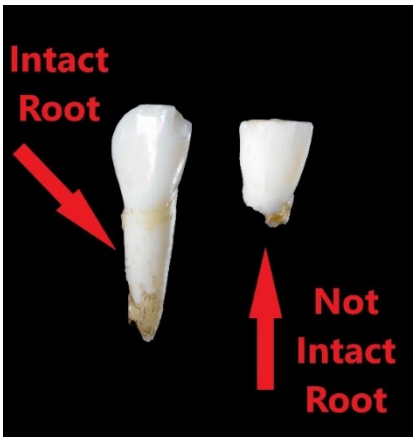
6. **Re-evaluate patient after 30 seconds**
   - ∇ Evaluate ECG rhythm and re-assess patient to determine efficacy of Modified Valsalva Maneuver and / or need for further therapy for continued tachycardia

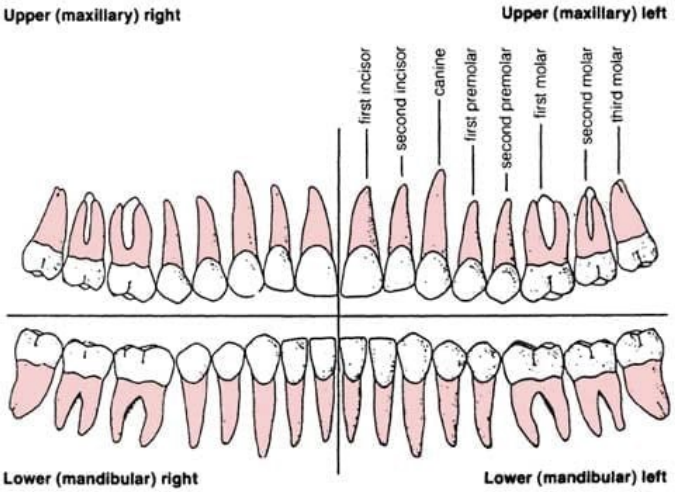
TRAUMA MANAGEMENT

This Page Left Blank

Avulsed Tooth Management

1. **Determine duration of time tooth has been out of mouth and if patient would like you to attempt re-insertion**
   - ∇ Re-insertion can only be done on tooth that has intact root connected
   - ∇ For best results, elapsed time should be no more than 30 minutes





2. **Tooth Handling**
   - ∇ Rinse tooth gently with tap water or Normal Saline
     - Do not scrub or rub root area with gauze
     - Handle the tooth only by the crown area

   - ∇ If patient does not want EMS provider to attempt re-insertion but would like attempt by provider in ED or dentist office, place tooth in media listed below in preferred order:
     - Container of cold white milk
       - Do not use flavored milk
       - Do not use alternative milk (i.e. soy, almond, etc)
     - Container of patient's saliva
     - Container of normal saline
     - Container of tap water
   - ∇ If patient would like provider to attempt re-insertion, continue to next steps

3. **Position patient**
   - ∇ High Fowler's is best to minimize possibility of swallowing tooth or causing airway obstruction if tooth is dropped during re-insertion attempt
4. **Orient tooth**
   - ∇ Crown in proper direction
   - ∇ Front facing out
   - ∇ Do not handle tooth by the roots
5. **Replace tooth into socket**
   - ∇ Attempt to approximate level to height of surrounding teeth
   - ∇ Anesthesia is typically not necessary as pain-carrying nerve fibers are often displaced and damaged when tooth is knocked out
   - ∇ Use gentle pressure only, if resistance is met, place tooth in storage media and transport

6. **Stabilize tooth**
   - ∇ Place folded gauze pad over tooth and have patient bite down gently to stabilize tooth during transport

7. **Monitor closely for airway obstruction**

Hemorrhage Control

Basic Wound Care

1. **Apply direct pressure immediately to wound**
   - ∇ Use firm, even pressure with hand to control bleeding
     - Direct pressure is effective at controlling minor to moderate bleeding

2. **Apply dressing to wound**
   - ∇ Use sterile dressings when possible
     - Sterile dressings can help prevent infection
   - ∇ If dressing becomes saturated, apply additional dressings and maintain pressure
     - Do not remove dressing. Place additional dressings on and maintain pressure
     - Removal of dressing interferes with the body's ability to clot, crucial to bleeding control

This Page Left Blank

Tourniquet Application

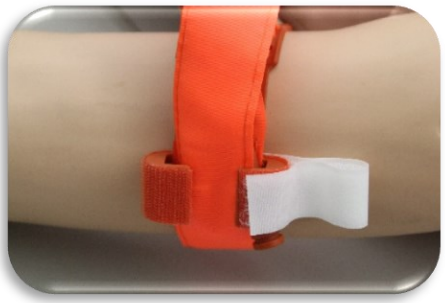
1. **Prepare tourniquet**
   - ∇ Prepare tourniquet for application
     - Tourniquet components:

2. **Apply tourniquet to injured limb 1-2" or 3 fingers above injury site**
   - ∇ Avoid Joints
   - ∇ If tourniquet strap is still already threaded through buckle, pass injured limb through tourniquet loop
   - ∇ If tourniquet strap is not threaded through buckle, place around limb and thread tip of strap through buckle
   - ∇ Place tourniquet proximal to bleeding site

3. **Pull tourniquet band very tight and securely fasten back on itself**
   - ∇ Tourniquets are designed to cut off blood flow and must, therefore, be very tight
   - ∇ Tourniquets should be applied to bare skin, not over clothing
   - ∇ Should be tight enough that you cannot fit fingers between TQ and limb <u>prior to</u> turning windlass
   - ∇ If one tourniquet is not sufficient to stop the blood loss, then a second tourniquet can be applied


4. **Twist the windlass until bleeding has stopped and distal pulse is occluded**
   - ∇ Monitor bleeding and palpate distal pulse to ensure effectiveness
   - ∇ Distal pulses (radial, pedal) should not be palpable after application

5. **Secure windlass into clip**
   - ∇ Place windlass into clip
   - ∇ Feed remainder of tourniquet strap into clip with windlass
   - ∇ Secure Velcro strap over opening




6. **Reassess bleeding and pulse**
   - ∇ Monitor bleeding and palpate for absence of distal pulse to ensure continued effectiveness
   - ∇ It is okay to reposition if necessary to ensure effective application
   - ∇ Monitor for signs / symptoms of shock and treat as needed

7. **Document time of tourniquet application on windlass clip securing strap**

Wound Packing

1. **Expose the wound**
   - ∇ Expose the injury by opening or cutting away the clothing
   - ∇ If possible, remove excess blood and or debris from the wound while preserving any clots in the wound that may have formed
   - ∇ Locate the source of the most active bleeding

2. **Apply Direct pressure**
   - ∇ Use any available gauze or dressing initially
   - ∇ Consider using fingers of gloved hand to locate and apply direct manual pressure on the artery or vein that is the source of the worst bleeding

3. **Tightly pack wound with gauze**
   - ∇ Hemostatic gauze is best
   - ∇ Use finger over finger technique while unrolling gauze and pressing into wound
   - ∇ Use one finger to hold pressure on area of worst bleeding, using other finger to press next piece of gauze into wound, alternating fingers to maintain constant pressure
   - ∇ Target artery or vein causing worst bleeding
   - ∇ Pack as deeply as possible
   - ∇ Fill wound as completely as possible to apply as much compression as possible

4. **Apply firm pressure**
   - ∇ Once wound is fully packed, apply firm, direct pressure to packing for 3-8 minutes to aid in clotting

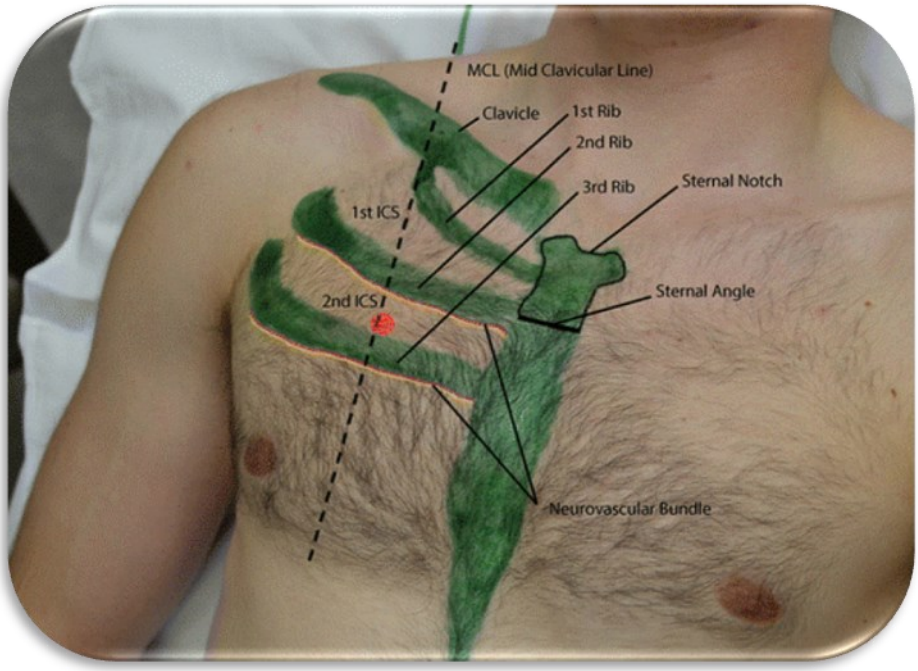
5. **Secure packing with dressing**
   - ∇ After applying pressure to packing for 3-8 minutes apply a snug pressure dressing over packing using gauze, Coban or ace wrap.
   - ∇ Consider immobilizing area of injury to prevent packing from dislodging during transport

6. **Reassess**
   - ∇ If heavy bleeding continues following packing with hemostatic gauze, applying direct pressure for 3-8 minutes and applying snug dressing, consider repacking with fresh hemostatic gauze or applying tourniquet if possible
   - ∇ Monitor for signs / symptoms of shock and treat as needed
7. **Document**
   - ∇ Description of injury
   - ∇ Description of materials and quantity used for packing
   - ∇ Time of tourniquet application if placed

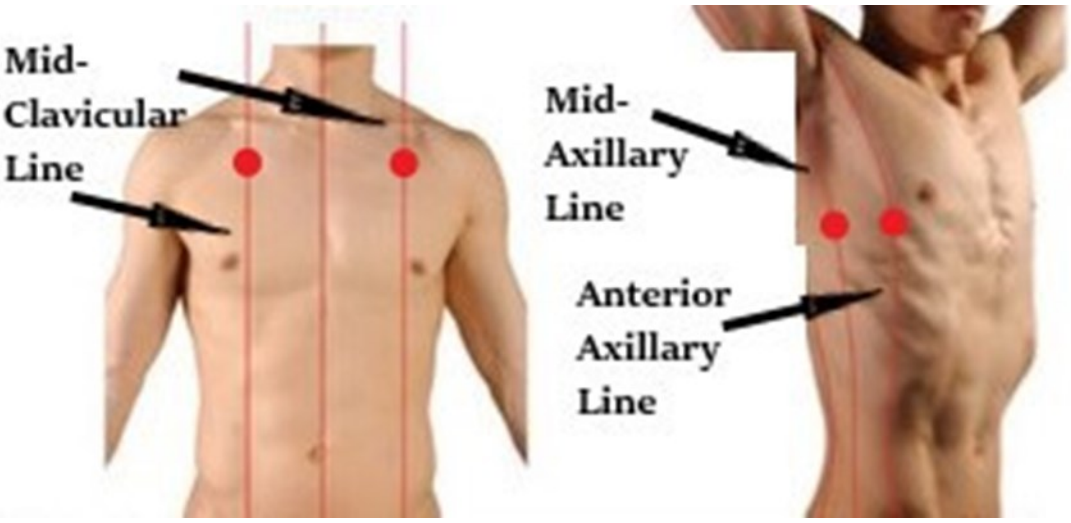
Needle Decompression

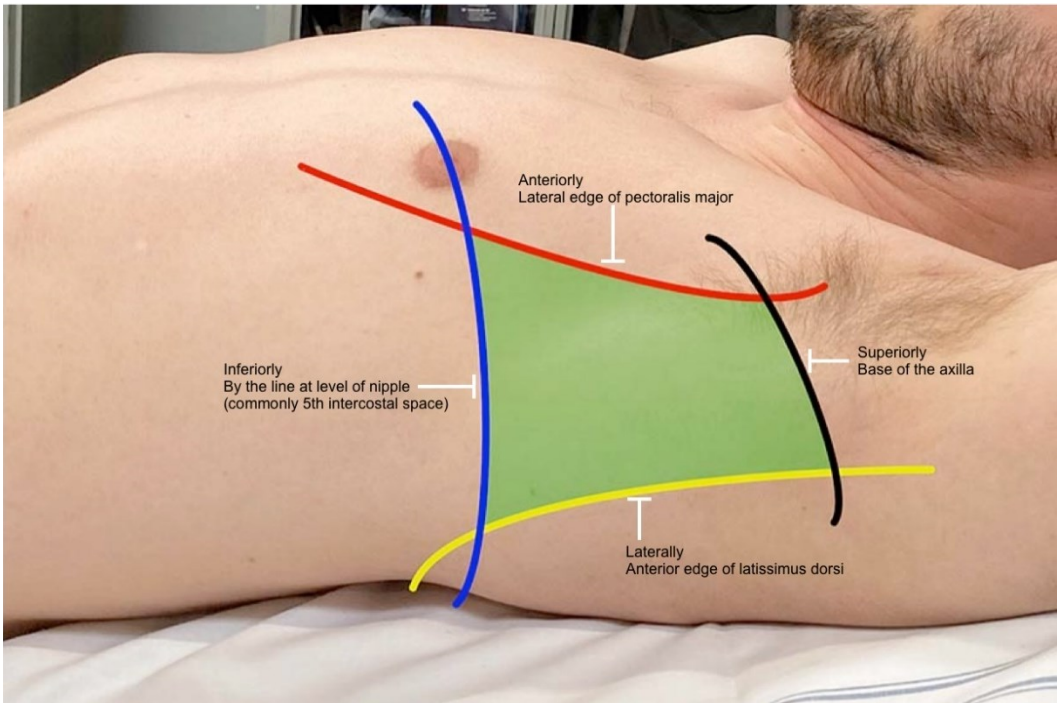
1. **Assemble Equipment**
   - ∇ 10ga, 3.25in chest decompression needle, ETOH prep

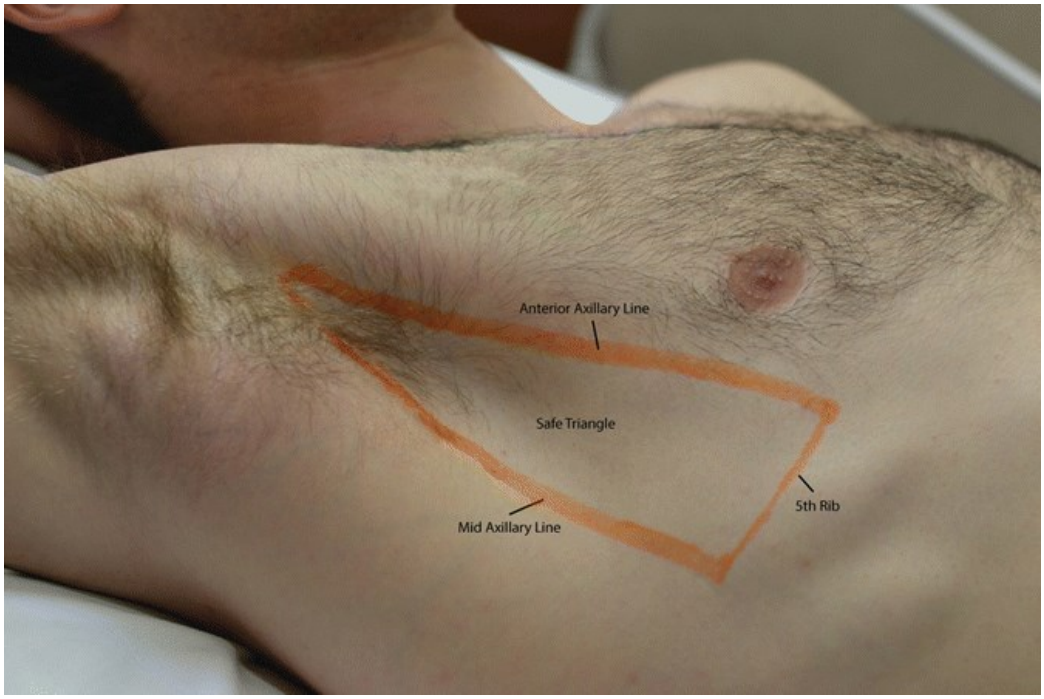
2. **Locate and prepare appropriate puncture site**
   - ∇ <u>2nd Intercostal Space at the Mid-Clavicular Line (2ICS-MCL)</u>
     - To locate the site, begin by palpating the sternal notch then sliding your finger down to the first dip you feel. This is the Sternal Angle or Angle of Louis
       - The Sternal Angle is located at the Top of the 2nd Intercostal Space (ICS)
       - The 1st ICS cannot be externally palpated as it is covered by the clavicle
       - Palpate toward the affected side, slightly down from the Sternal Angle to locate the 2nd ICS
     - Move finger laterally on the affected side in the 2nd ICS to the Mid-Clavicular Line (MCL)
       - The MCL is commonly mistaken to be more medial that it actually is
       - Note in the picture below how far lateral the clavicle extends toward the shoulder
       - Placing the needle too medially risks injury to the great vessels
     - Care should be taken to assess for presence of indwelling catheters or implanted pacemakers, defibrillators or nerve stimulation devices in this area that would require use of alternate site



- ∇ 4th or 5th Intercostal Space at the Anterior-Axillary or Mid-Axillary Lines
  - To locate the site, begin by palpating the sternal notch then sliding your finger down to the first dip you feel. This is the Sternal Angle or Angle of Louis
    - The Sternal Angle is located at the Top of the 2nd Intercostal Space (ICS)
    - The 1st ICS cannot be externally palpated as it is covered by the clavicle
  - Palpate toward the affected side, slightly down from the Sternal Angle to locate the 2nd ICS (2ICS)
  - Follow identified ICS laterally to the Anterior-Axillary or Mid-Axillary line
  - Alternate identification of this location can be made by recognizing the boarders created by the landmarks identified as the "Safety Triangle".
    - ♦ Superiorly, the base of the axilla (lower border of the arm pit)
    - ♦ Anteriorly, the edge of the pectoralis major muscle, or also approximately the Anterior Axillary Line
    - ♦ Laterally, Anterior edge of latissimus dorsi muscle, or also approximately the Mid Axillary line
    - ♦ Inferiorly, the 5th intercostal space, or also approximately the level of the nipple.
    - See picture below for identifying landmarks
    - Placement anywhere within the boarders of the Safety Triangle is acceptable.
    - Use caution in these sites on the Left side as injury to the Left Ventricle is possible
    - Use caution in these sites as injury to the Liver, Spleen, and Stomach may occur if incorrectly placed below the Diaphragm
    - Use caution when abducting the arm to locate these sites. Placing the arm over the head gives excellent access to the space, but after puncture, adducting the arm back to natural position may cause significant shifting of skin and underlying tissue, resulting in dislodgement or kinking of decompression catheter



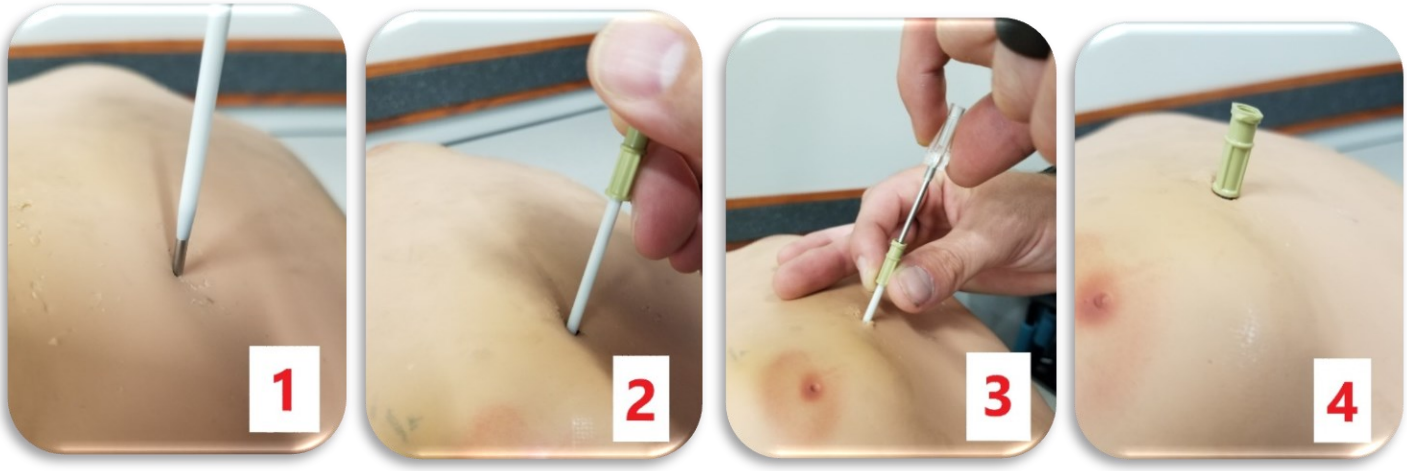




- ∇ Vasculature and nerves run along the bottom of each rib, therefore when identifying your insertion site withing the chosen ICS, needle insertion should be done by guiding over the top of the rib making the inferior border of the chosen ICS
- ∇ Prepare the skin with alcohol or betadine

3. Insert Catheter

- ∇ Position needle at the top of the inferior rib for the chosen ICS, perpendicularly to the chest wall
- ∇ Advance the needle over the top of the rib into the intercostal space
  - A "pop" should be felt when the pleural space is accessed
- ∇ Once in the pleural space, advance the catheter while holding the needle stationary
- ∇ Once the catheter is seated against the chest wall, remove the needle, leaving the catheter in place
- ∇ Listen for a "hiss" of trapped air which verifies existence of pneumothorax
  - This does not always occur



4. Consider stabilizing the catheter

- ∇ You may place gauze on either side of the catheter and tape in place
- ∇ This is not necessary and may interfere with placement of subsequent decompression needles if indicated

5. **Assess patient and check for relief of tension pneumothorax**
   - ∇ Auscultate lungs
     - Breath sounds should improve on affected side with decompression but are unlikely to return to equal with the unaffected side
     - Breath sounds on the unaffected side may also improve if this side was compressed by the tension pneumothorax
   - ∇ Check vital signs
     - Circulation should improve with relief of tension pneumothorax
   - ∇ If S/S of tension pneumothorax recur, place perform additional decompressions next to previous needle or consider alternative site on affected side

Pelvic Binding

1. **Knowledge Points**
   - ∇ Binding the pelvis reduces pelvic volume (creating a tamponade effect), stabilizes fracture fragments (which reduces hemorrhage from fracture sites) and improves patient comfort
   - ∇ Pelvic "Open Book" fractures have a high potential for lethality due to associated injuries of the structures withing the pelvic ring and massive pelvic hemorrhage.
   - ∇ Open Book fractures result from anterior-posterior compression of the pelvis
   - ∇ Open Book fractures are often seen in falls from height, MVCs and other high energy blunt trauma
   - ∇ Pelvic instability should be detected by lateral compression/anterior-posterior compression on the iliac crests and by detection of disruption of the symphysis pubis on palpation
   - ∇ *Pelvic Binding should only be done on patients with unstable pelvis fractures who are hemodynamically unstable*
   - ∇ *Trochanter / Proximal Femur Fractures are Contraindications for Pelvic Binding*

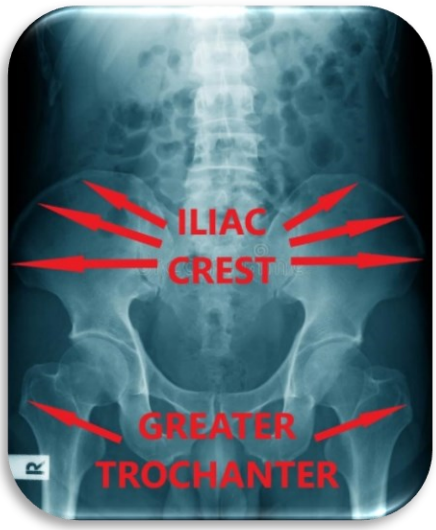
2. **Prepare Equipment**
   - ∇ Begin by folding linen sheet or linen blanket in Fourths on the long axis, so it ends up approximately 10-12 inches wide
     - Fold the sheet in half lengthwise, then again in half lengthwise
   - ∇ Have heavy duty zip ties ready
   - ∇ Have rolled gauze / ace wrap / tape ready for wrapping feet

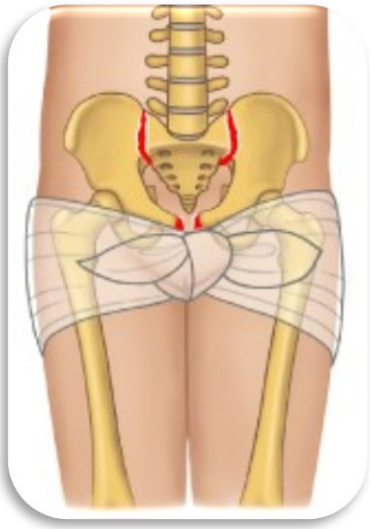
3. **Position Patient**
   - ∇ If patient needs to be extricated from place of injury / entrapment, it is best to have sheet already prepared and positioned so patient can be moved from position and placed directly on the sheet
   - ∇ *If pants are not removed, be sure all items are removed from pockets*
     - Leaving items in pockets WILL cause further injury to the patient
   - ∇ Log Roll Technique
     - Begin with patient supine
     - Roll one end of folded sheet from one end to the midline
     - Log roll patient to one side and place sheet roll under patient so the sheet is centered over the *Greater Trochanters* (Do not center on iliac crests)
     - Roll patient to the other side and unroll sheet so it is now centered underneath them



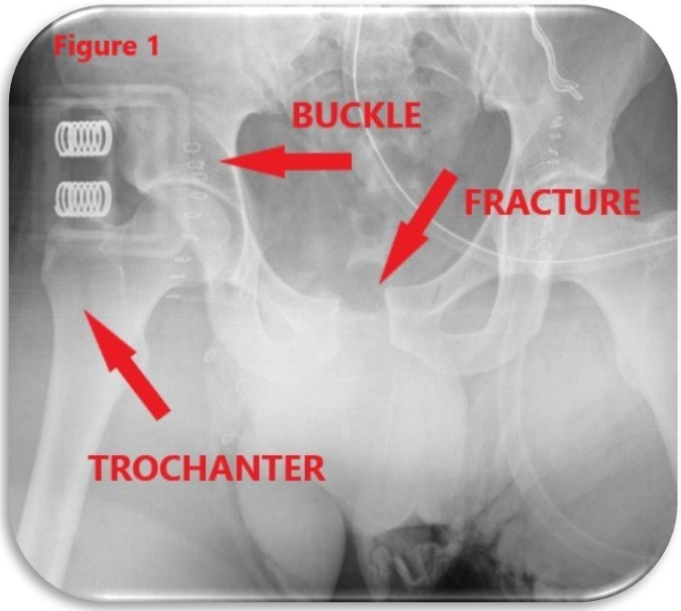
   - ∇ Sheet Slide Technique
     - Begin with patient supine
     - Insert and center sheet under patient's knees
     - Slide sheet up, under patient's pelvis, centered on Greater Trochanters
       - Gentle lifting of patient's hips may facilitate positioning of sheet

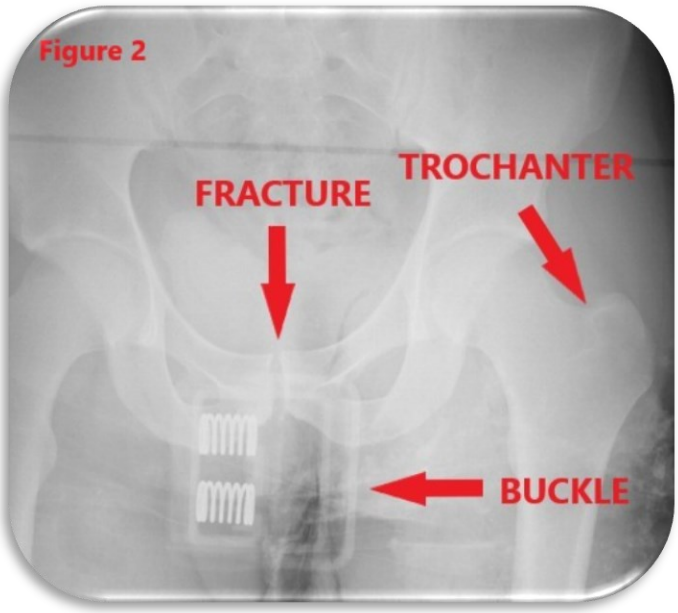
4. **Binder Positioning Information**
   - ∇ Correct positioning of the binder involves centering the sheet on the greater trochanters
   - ∇ NOTE * *This might seem too low, but when correctly centered on the trochanters, it will also be centered at or close to the patient's groin, NOT their waistline*
     - This often falls in the area where the openings for front pockets on jeans are, NOT at the belt line
     - Placing sheet too high, centered on iliac crests, can have opposite effect of widening the pelvis and increasing injury
     - See pictures below for positioning of knot in relation to groin





- Radiographs below show commercial pelvic device use. Note position of buckle indicating centering level of device
  - Figure 1 device is placed too high, failing to reduce pelvic fracture and possibly widening the injury
  - Figure 2 device is placed properly (or slightly low) and shows almost complete reduction of fracture





5. **Apply Binding**
   - ∇ These steps are best performed by having a clinician positioned at each side of the patient, centered on the patient's greater trochanters
   - ∇ The point of this maneuver is not to splint in place, but to provide significant and appropriate traction to the separated pelvic girdle in order to bring it back to anatomic position
   - ∇ From both sides, pull sheet taught underneath patient to ensure there is no slack in the sheet
   - ∇ Cross the sheet ends over the patient
     - Each clinician will take the opposite sheet end from their partner, pulling tightly to bring the pelvis back together
   - ∇ Continue to pull tightly and twist the sheet around itself, each provider will again pass their end of the sheet to their partner 1-2 more times to tighten the sheet
   - ∇ Once sufficient tension has been pulled, position zip ties between the sheet and the patient, on both sides of, and close to the knot and secure the zip tie as tightly as possible, capturing the bottom of the sheet and the tail of the twisted end on each side
     - This may best be accomplished by a third clinician, if available, while the other 2 clinicians continue to pull tension
   - ∇ Finish by securing patient's feet together to help maintain overall anatomic position of legs / pelvis
     - Pad between ankles if necessary

EMS Skills Dictionary

SECTION BREAK
THIS PAGE LEFT BLANK

SUNSET

This section contains dictionary entries that will become obsolete with the next protocol release.

If there is a replacement, the new entry has been placed in its appropriate section to begin familiarization.

Unused