



Regional Emergency Medical Services Authority
450 Edison Way • Reno, Nevada 89502 • 775.858.5700

PROCEDURE MANUAL

Approved August 2007

REMSA PROCEDURE MANUAL

Central Lines (Flight Nurse Only)

Femoral line Insertion

Chest Tube Placement (Flight Nurse Only)

Combitube Insertion

External Jugular Vein Cannulation

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Needle Cricothyrotomy and Jet Ventilation

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Pericardiocentesis (Flight Nurse Only)

Pre-existing Vascular Access Devices

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Surgical Cricothyrotomy

Transcutaneous Pacing

Umbilical Vein Cannulation (Flight Nurse Only)

Central Lines (Flight Nurse only)

Femoral Line Insertion

Indications:

Unable to gain peripheral venous access or IO access, or IO access is contraindicated

Contraindications:

Open book pelvic fracture

Equipment:

Arrow Emergency Infusion Device

IV tubing and bag

Tape

Betadine wipe (optional)

Suture (optional)

Technique:

- ❖ Position patient flat
- ❖ Prep insertion site with alcohol and betadine
- ❖ Palpate inguinal ligament and femoral artery
- ❖ Maintaining negative pressure, insert EID medial to the femoral artery and at the level of the inguinal ligament
- ❖ As introducer enters skin, it may be necessary to make a small incision with scalpel to allow gentle insertion of introducer
- ❖ Advance needle cephalad until blood returns into syringe
- ❖ Quickly remove metal needle and blue catheter, leaving in 8.5 Fr introducer.
- ❖ Attach IV line to introducer
- ❖ Cover site with sterile 4X4 and tape all securely. If suture available, place a purse string suture at the insertion site and pass the free ends of the suture several times around the hub of the catheter and tie.

Assessment and care:

- ❖ If bleeding or hematoma develop, apply pressure to site
- Central lines are a significant source of infection – maintain sterility and make sure receiving facility knows that line was inserted in the field

Chest Tube Placement (Flight Nurse Only)

Indications:

Greater than 25% pneumothorax with respiratory compromise, or likelihood of respiratory compromise with gain in altitude

Any pneumothorax in a patient who will be transported by air and is on positive pressure ventilation.

Hemothorax with cardiovascular compromise.

A physician's order is required to perform chest tube insertion. This order must be documented on the PCR.

Contraindications:

Normal vital signs and little potential for respiratory compromise with altitude

Known coagulopathy

Known multiple adhesions

Equipment:

Scalpel with #11 blade

1 or 2% lidocaine for awake patients (if available)

Large curved clamp

Large straight clamp

Chest tube – 32-40 French

Heimlich valve or water-seal drainage apparatus

Needle holder and 0-silk suture (if available)

4 x 4 gauze pads

Tape

Technique:

- ❖ If the patient's condition permits, place the arm of the affected side over the patient's head. Female patients should have breast tissue manually displaced to avoid advertent incision through breast tissue.
- ❖ Identify the 4th or 5th intercostals space on the affected side. This is the insertion site. The incision site is one rib below the insertion site. By incising below the insertion site, a subcutaneous tunnel is formed to aid in tract sealing.
- ❖ If time and patient condition allow, surgically prep the site with antiseptic swabs and place sterile drapes.
- ❖ If time and patient condition allow, anesthetize both the subcutaneous tissue at the site as well as the periosteum of the rib.
- ❖ With the straight clamps, clamp the proximal end of the chest tube

- ❖ Make a 2-4 cm incision along the 5th or 6th intercostals space between the lateral border of the pectoralis major and the medial border of the latissimus dorsi.
- ❖ Insert a curved clamp and tunnel upward.
- ❖ Enter the pleural cavity by puncturing through the interocostal muscles and parietal pleura over the top of the rib to avoid the neurovascular bundle below each rib. Use controlled, strong force.
- ❖ Insert a finger into the thoracic cavity.
- ❖ Using the finger as a guide, insert the clamped chest tube past the last hole into the chest cavity.
- ❖ Place the tube posteriorly and superiorly.
- ❖ Attach the chest tube to water seal suction or a Heimlich valve.
- ❖ Secure the tube to the skin. If suture available, place a purse string suture through the incision site and pass the free ends of the suture several times around the chest tube and tie.
- ❖ Cover site with sterile 4x4s, tape over all to the patient. Tape all connections.
- ❖ If available, confirm placement with chest xray.

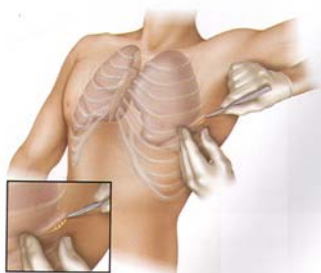
Assessment and care:

If attached to water seal drainage, set at -20 cm H₂O pressure. Observe for fluctuation in water seal chamber with respirations; watch for air leak.

If attached to Heimlich valve, watch for flutter with inspiration.

Observe patient for signs of tension pneumothorax, open chest tube to air if signs develop.

Procedural Steps

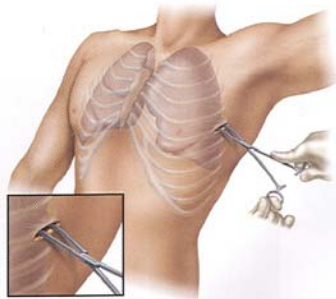


Step 1. Anesthetize the skin. Make an incision over the rib below the fourth to fifth intercostal space at the midaxillary line.

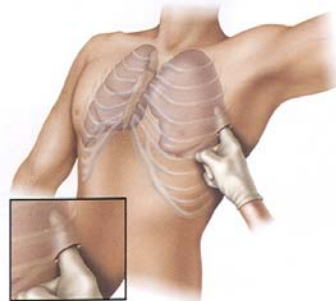


Step 2. Bluntly dissect the subcutaneous tissues overlying the intercostal muscles.

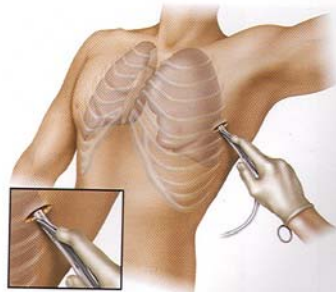




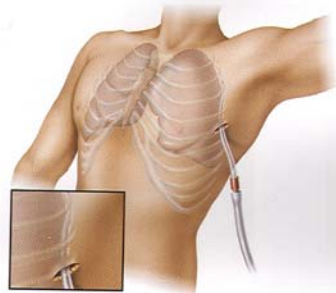
Step 3. Push through the muscles and pleura with a clamp.



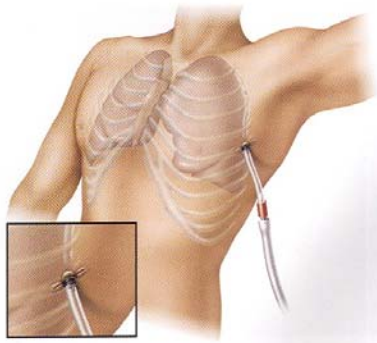
Step 4. Insert a gloved finger to check for pleural adhesions.



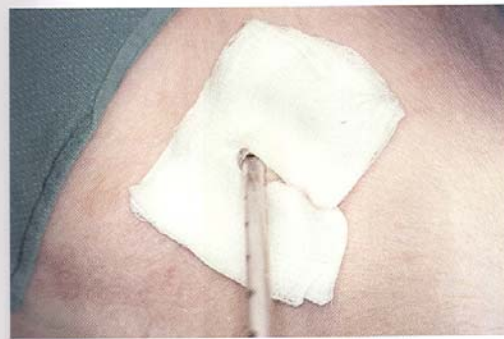
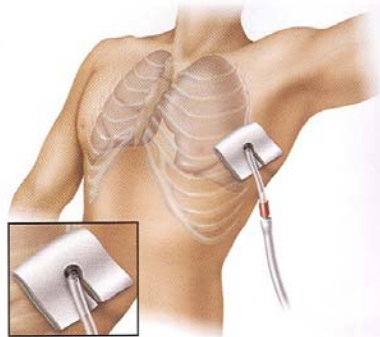
Step 5. Grasp the tube with the clamp and insert it into the pleural space.



Step 6. Guide the tube superiorly and posteriorly until all side holes are inside the chest. Attach to drainage system.



Step 7. Secure the tube with suture.



Step 8. Cover with drain sponges and a compressive bandage.

Combitube Insertion

Indications:

Unconscious patient in need of assisted ventilations who has no gag reflex and who cannot be intubated with endotracheal tube.

Patients who are between four feet and 5.5 feet tall - use Small Adult (SA) model

Patients over five feet tall - use Adult model

Contraindications:

Less than four feet tall

Gag reflex present

Known bleeding esophageal disease

Suspected ingestion of a caustic substance

Equipment:

Combitube

10cc and 30cc syringes

Tube holder

Bag-valve device

Oxygen source

End tidal CO2 detector

Technique:

- ❖ Insert OPA or NPA and ventilate patient with BVM attached to oxygen source prior to insertion of Combitube
- ❖ Place patient's head in neutral position
- ❖ Estimate patient's height and chose correct size Combitube
- ❖ Coat the distal shaft of the Combitube with water soluble lubricant
- ❖ Grasp the patient's tongue and mandible between the thumb and forefinger of one hand and lift upwards.
- ❖ With the other hand, insert the Combitube into the mouth and direct it along the midline. Advance gently until the teeth (or gums) are aligned between the two black rings on the tube. DO NOT FORCE THE TUBE. IF RESISTANCE IS MET, ATTEMPT TO ROTATE, REDIRECT THE TUBE OR REMOVE AND START OVER.

- ❖ If you are using the regular adult model, first inflate the blue pilot balloon with 100 cc of air and then the white pilot balloon with 15 cc of air.
- ❖ If you are using the small adult model, first inflate the blue pilot balloon with 85 cc of air and then the white pilot balloon with 12 cc of air.
- ❖ Attempt to ventilate the patient with a BVM using the blue esophageal tube. Confirm ventilations using normal techniques.
- ❖ If unable to ventilate the patient using the blue tube, switch to the white endotracheal tube and confirm ventilations.
- ❖ Once tube placement and ventilations are confirmed per airway protocol, secure the tube.
- ❖ If neither tube produces lung sounds, deflate the blue pilot balloon and gently withdraw the tube 2-3 cm, reinflate the blue cuff, and attempt to ventilate through the blue tube.
- ❖ If lung sounds are still absent and adequate ventilations cannot be obtained, remove the Combitube, oxygenate the patient, and attempt to reinsert. If the second attempt is unsuccessful, continue ventilations using an alternate method.

Assessment and Care:

The ETCO2 monitor will work with the Combitube and should be used.

Check tube placement per airway protocol with every move of the patient.

If ventilating through the blue port, a gastric tube may be inserted through the white port and attached to suction.

External Jugular Vein Cannulation

Indications:

To establish intravenous access in critically ill or injured patients after attempts at intravenous cannulation in the upper extremities have failed. This procedure is not to be used for routine IV access. CCT RNs may use lidocaine to infiltrate the insertion site.

Contraindication:

Inability to visualize the vein due to obesity or other condition

If suspect C-spine injury, assistant must hold head in straight alignment when c-collar removed to access external jugular vein.

Equipment:

Intravenous catheter
IV tubing and bag
10cc syringe

Technique:

- ❖ Place the patient in a supine position, preferably head down, to distend the vein and help prevent air embolism.
- ❖ If c-spine injury is not suspected, turn the patient's head to the opposite side of site.
- ❖ Attach a 10cc syringe to the IV catheter to help prevent air embolism
- ❖ Clean the site with betadine/alcohol
- ❖ Press on the vein just above the clavicle with your forefinger to make the vein more prominent. Stabilize the skin over the vein with your thumb.
- ❖ Maintaining slight positive pressure on the syringe, insert IV catheter into vein. Cannulate the vein in the normal fashion once blood freely flows into the syringe.
- ❖ Maintain compression on the vein with the forefinger until IV tubing has been connected to the catheter. This will prevent air embolism from developing.
- ❖ Securely tape the catheter and tubing in place.
- ❖ If you are having trouble visualizing the external jugular, you may apply pressure on the liver (portal pressure) to engorge the external jugular.

- ❖ You may attempt this procedure only once on each side.

Assessment and Care:

There is a potential for pneumothorax. Check breath sounds, oxygen saturation, and work of breathing/compliance frequently.

If the IV catheter penetrates the opposite side of the vein (blows), apply direct pressure for two minutes and check site frequently for expanding hematoma.

Heated Oxygen Humidifier

Indications:

Clinical likelihood of hypothermia

Consider humidity in pt with burned airway (do not use heat if burned airway)

Contraindications:

Hypothermic patient intolerant of heated air

Equipment:

440 cc Aquapak

Aquatherm Aerosol Heater

Aquatherm nebulizer

Oxygen flow meter

Oxygen pigtail

Aerosol mask for pedi, adult, or trache

Long white corrugated tubing

T-piece with thermometer in it

Technique:

- ❖ Securely thread Aquatherm Aerosol Heater onto higher puncture port on Aquapak bottle and insert tubing into lower puncture port
- ❖ Securely thread Aquatherm Aerosol Heater into nebulizer
- ❖ Thread nebulizer onto flow meter
- ❖ Attach flow meter to oxygen pig tail
- ❖ Insert pigtail into wall oxygen outlet
- ❖ Plug Aquatherm Aerosol Heater into electrical outlet
- ❖ Attach white corrugated tubing to port on nebulizer

- ❖ **Non-intubated patient**
Attach other end of corrugated tubing to aerosol mask
Adjust flowmeter and nebulizer to desired oxygen flow and FiO₂

- ❖ **Intubated patient**
Disconnect oxygen tubing and corrugated reservoir from resusc bag
Attach corrugated tubing running from nebulizer to resusc bag

Assessment and care:

- ❖ To check temperature of nebulized oxygen, insert T-piece with thermometer into end of corrugated tubing.
- ❖ Follow hypothermia protocol if appropriate

Intraosseus Access with EZ-IO Device

INDICATIONS:

EZ-IO AD® (40 kg and over) & EZ-IO PD® (3 – 39 kg)

1. Immediate vascular access in emergencies.
2. Intravenous fluids or medications are urgently needed and a peripheral IV cannot be established in 2 attempts or 90 seconds

AND the patient exhibits one or more of the following:

- a. An altered mental status (GCS of 8 or less)
 - b. Respiratory compromise (SaO₂ 90% after appropriate oxygen therapy, respiratory rate < 10 or > 40 min)
 - c. Hemodynamic instability (Systolic BP of < 90).
2. EZ-IO AD® & EZ-IO PD® should be considered PRIOR to peripheral IV attempts in the following situations:
- a. Cardiac arrest (medical or traumatic)
 - b. Profound hypovolemia with alteration of mental status
 - c. Patient in extremis with immediate need for delivery of medications and or fluids.

CONTRAINDICATIONS:

- Fracture of the bone selected for IO infusion (*consider alternate site*)
- Excessive tissue at insertion site with the absence of anatomical landmarks (*consider alternate site*)(Ensure 5mm mark will be visible)
- Previous significant orthopedic procedures (*IO within 24 hours, prosthesis - consider alternate tibia*)
- Infection at the site selected for insertion (*consider alternate site*)

CONSIDERATIONS:

Flow rate: Due to the anatomy of the IO space, flow rates may appear to be slower than those achieved with an IV catheter.

- Ensure the administration of an appropriate rapid **SYRINGE BOLUS (flush)** prior to infusion **NO FLUSH = NO FLOW**
 - _ Rapid syringe bolus (flush) the EZ-IO AD® with 10 ml of normal saline
 - _ Rapid syringe bolus (flush) the EZ-IO PD® with 5 ml of normal saline
 - _ Repeat syringe bolus (flush) as needed
- To improve continuous infusion flow rates always use a syringe, pressure bag or infusion pump

Pain: Insertion of the EZ-IO AD® & EZ-IO PD® in conscious patients has been noted to cause mild to moderate discomfort (usually no more painful than a large bore IV). However, IO Infusion for conscious patients has been noted to cause severe discomfort.

□ If pain is encountered with flush or infusion of the IO, SLOWLY administer Lidocaine 2% (Preservative Free) through the EZ-IO hub. *Ensure that the patient has not allergies or sensitivity to Lidocaine.*

– EZ-IO AD® Slowly administer 20 – 40 mg Lidocaine 2% (Preservative Free)

– EZ-IO PD® Slowly administer 0.5 mg /kg Lidocaine 2% (Preservative Free)

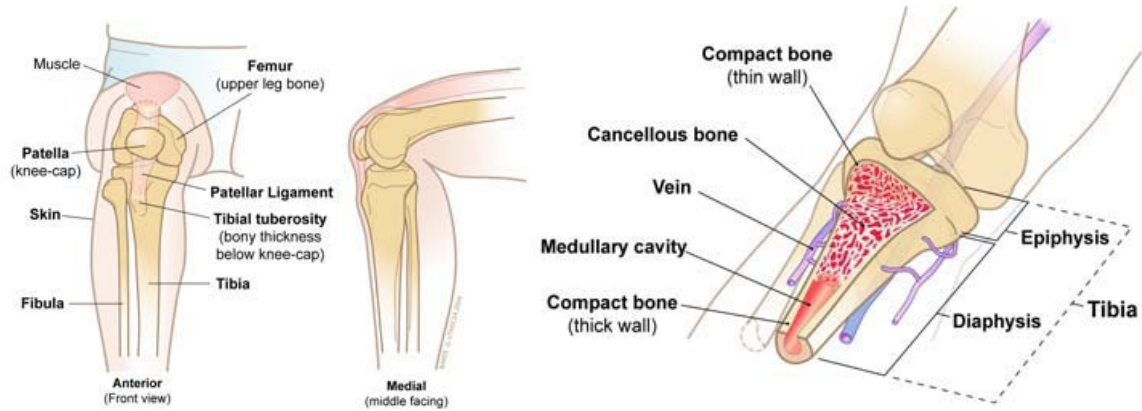
EQUIPMENT:

- EZ-IO® Driver
- EZ-IO AD® or EZ-IO PD® Needle Set
- Alcohol or Betadine Swab
- EZ-Connect® or Standard Extension Set
- 10 ml Syringe
- Normal Saline (or suitable sterile fluid)
- Pressure Bag or Infusion Pump
- EZ-IO® Yellow wristband

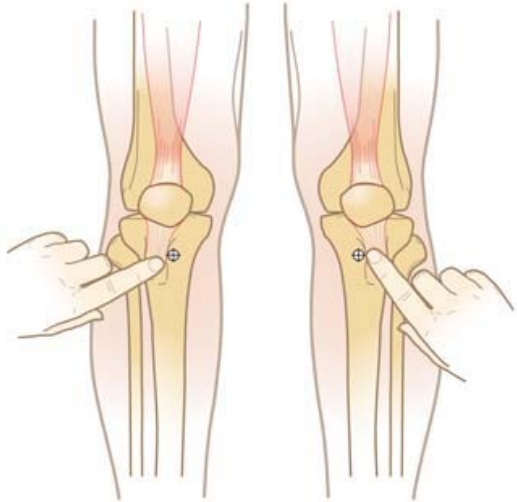
PROCEDURE: *If the patient is conscious, advise of EMERGENT NEED for this procedure*

1. Wear approved Body Substance Isolation Equipment (BSI)
2. Determine EZ-IO AD® or EZ-IO PD® Indications
3. Rule out Contraindications
4. Locate appropriate insertion site
 - a. **Ground ALS: ONLY Proximal Tibial site for both Adult and Pediatric Patients**
 - b. **Care Flight Only: Proximal / Distal Tibia and Proximal Humerus sites are approved for both Adult and Pediatric Patients**
5. Prepare insertion site using aseptic technique
6. Prepare the EZ-IO® driver and appropriate needle set
7. Stabilize site and insert appropriate needle set (Ensure 5mm mark is visible)
8. Remove EZ-IO® driver from needle set while stabilizing catheter hub
9. Remove stylet from catheter, place stylet in shuttle or approved sharps container
10. Confirm placement
11. Connect primed EZ-Connect®
12. Syringe bolus (flush) the EZ-IO® catheter with the appropriate amount of normal saline.
13. Utilize pressure (syringe bolus, pressure bag or infusion pump) for continuous infusions where applicable
14. Begin infusion
15. Dress site, secure tubing and apply wristband as directed
16. Monitor EZ-IO® site and patient condition – Remove catheter within 24 hours

Proximal Tibial Site: Adult (Ground and Care Flight)
Proximal Tibial Anatomy: Adult



Finding the Proximal Tibial Site: Adult



Note that the insertion site is one finger width medial to the tibial tuberosity.

Proximal Tibial Site: Pediatric(3-39kg)(Ground and Care Flight)



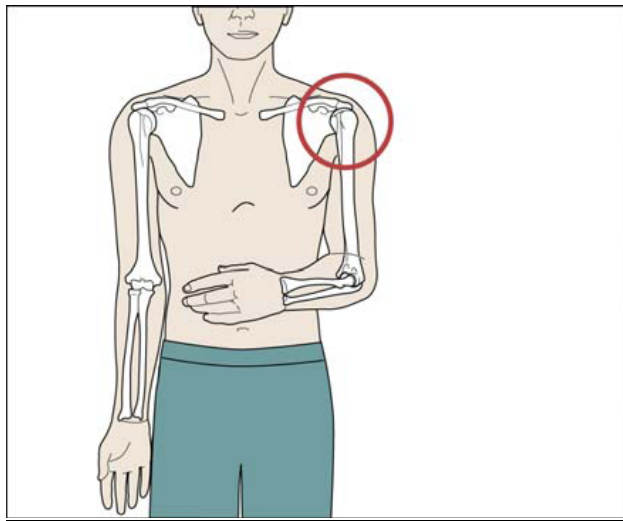
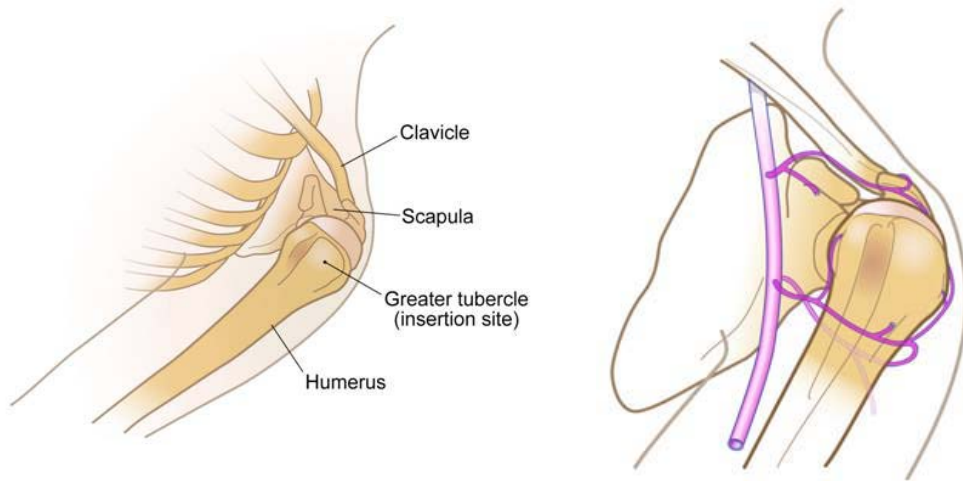
If the Tibial Tuberosity CANNOT be palpated, the Insertion site is two finger widths below the Patella (and then) medial along the flat aspect of the Tibia



If the Tibial Tuberosity CAN be palpated the Insertion site is one finger width below the Tuberosity (and then) medial along the flat aspect of the Tibia

Proximal Humerus Site: Adult (Care Flight Only)

Proximal Humerus Anatomy: Adult



Finding the Proximal Humerus Site, Adult: Preferred Method



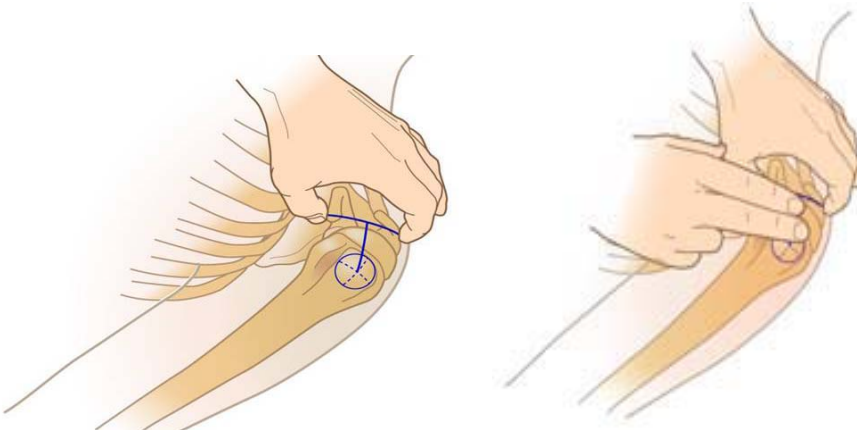
The patient should be in a supine position.

Expose shoulder and adduct humerus (place the patient's arm against the patient's body) resting the elbow on the stretcher or ground.

A Palpate and identify the mid-shaft humerus and continue palpating toward the proximal aspect or humeral head. As you near the shoulder you will note a protrusion. This is the base of the greater tubercle insertion site.

A With the opposite hand you may consider "pinching" the anterior and inferior aspects of the humeral head while confirming the identification of the greater tubercle. This will ensure that you have identified the midline of the humerus itself.

Second Option for Finding Proximal Humeral Site:



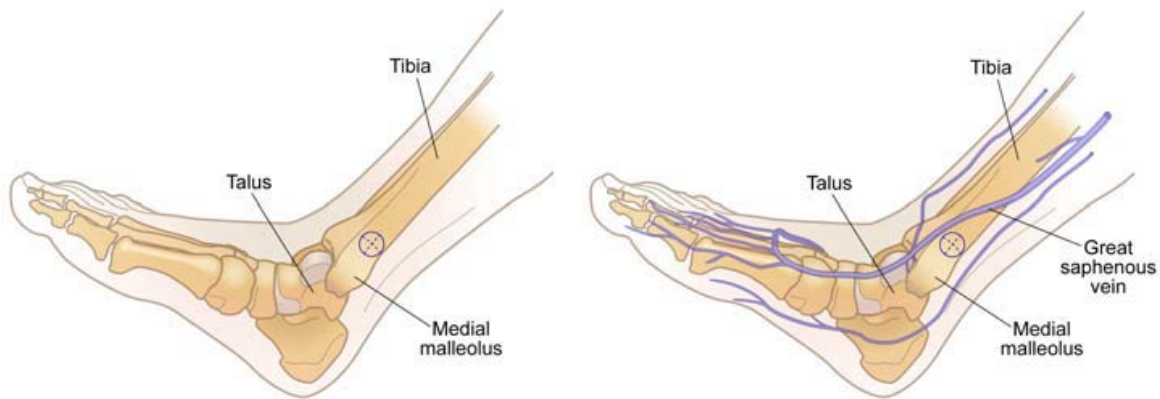
Identify the greater tubercle insertion site approximately two finger widths inferior to the coracoid process and the acromion. One can envision the location of this site by creating a "T" - the upper portion of connecting the coracoid process and the acromion while the "point" reaches inferiorly and slightly anteriorly - approximately two finger widths- on the midline of the humerus.

Pediatric Proximal Humerus Site (3-39kg)(Care Flight Only)

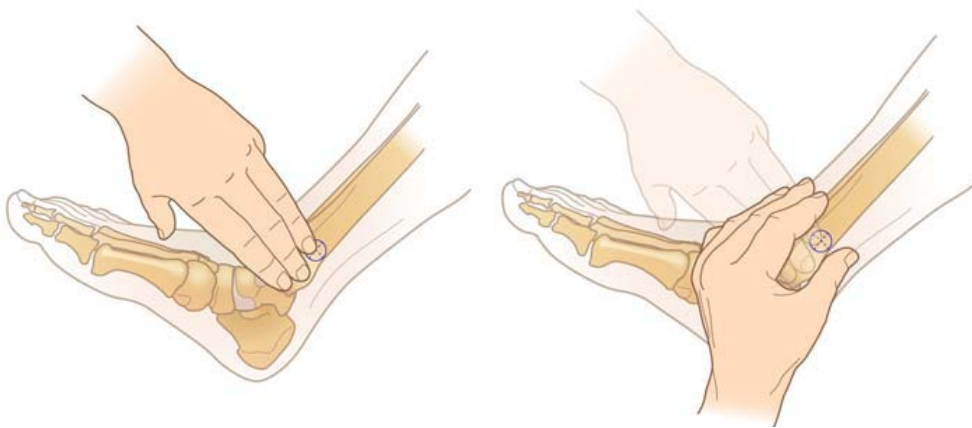
Find site in the same manner as is done with adult

Distal Tibial Site: Adult (Care Flight Only)

Distal Tibial Anatomy, Adult:

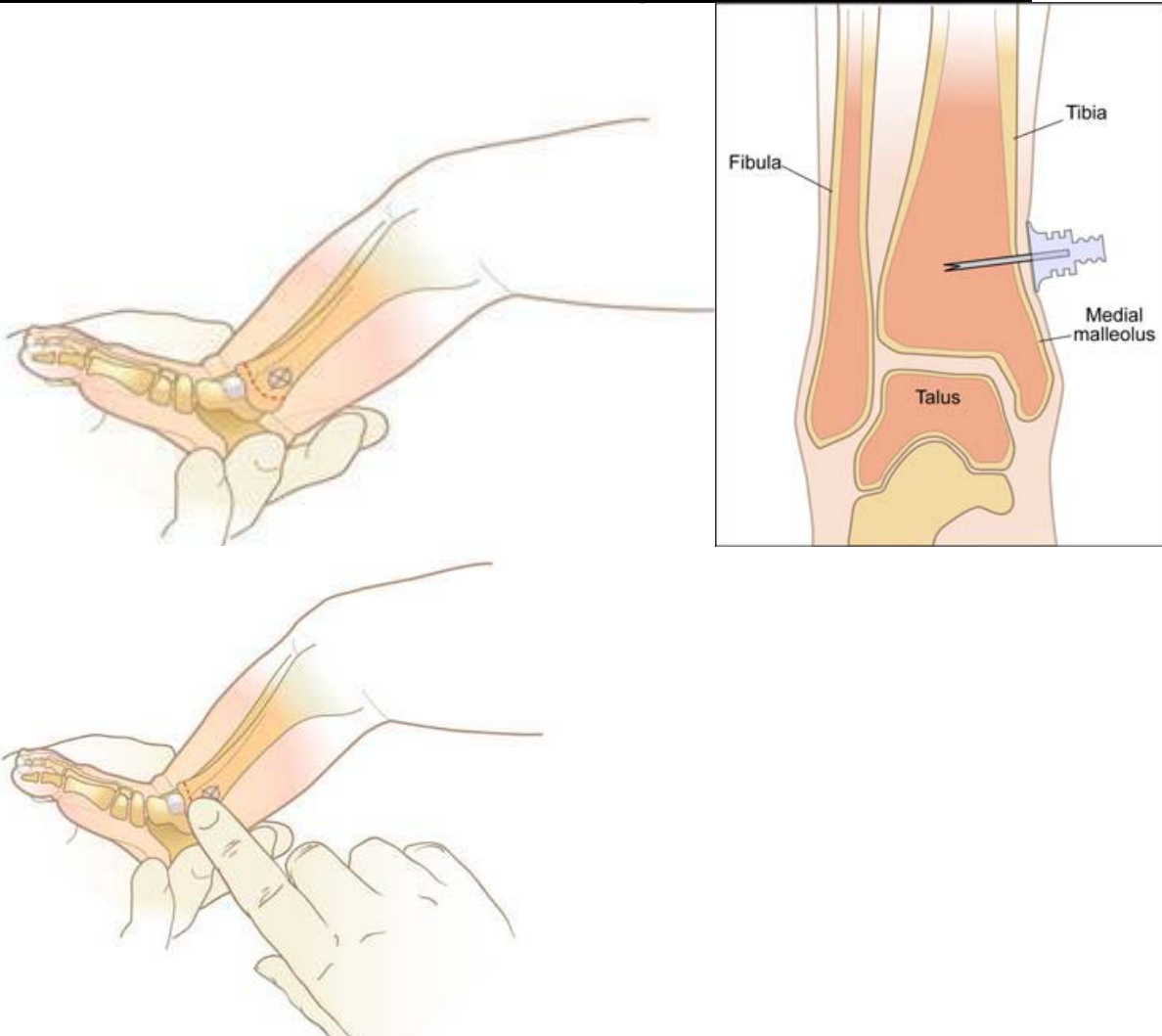


Identifying the distal tibial insertion site, adult:



Here we can identify the major structures of the lower leg as well as the **EZ-IO AD® distal tibial landmarks**, the **Distal Tibia** (anterior or most forward lower leg bone) and the **Medial Malleolus** (medial ankle bone or protrusion)
Note that the insertion site is two finger widths proximal to the Medial Malleolus and positioned midline on the medial shaft.

Pediatric Distal Tibial Site (3-39kg) (Care Flight Only)



Insertion site is one finger width proximal to the medial malleolus

Kendrick Traction Splint

Indications:

Probable fractured femur

Contraindications:

Femoral neck or pelvis fracture
Ankle fracture

Equipment:

Kendrick Traction Splint

Technique:

- ❖ Apply ankle hitch tightly around the leg, slightly above the malleoli
- ❖ Tighten stirrup by pulling green tabbed strap until snug under heel
- ❖ Apply upper thigh system by sliding male buckle under the leg, at the knee, and see-saw upward until positioned in crotch area. Engage the buckle. Cinch the strap until traction pole receptacle is positioned at the belt line or pelvic crest. (Assure that male genitalia are clear of the strap.)
- ❖ Snap out traction pole. Make sure that each joint of pole is securely seated.
- ❖ Place traction pole alongside the leg so that one section of tubing extends beyond the bottom of the foot. Adjust pole length as required. Insert pole or ends into traction pole receptacle.
- ❖ Secure elastic strap around knee.
- ❖ Place yellow tab over dart end. Apply traction by pulling red tab. As a guide, apply approximately 10% of body weight up to 15 pounds of traction. Patient comfort is the objective. Traction may be applied smoothly by grasping strap on each side of buckle and simultaneously feeding and pulling with equal pressure.
- ❖ Finish packaging by applying upper (thigh) and lower (low calf) straps.
- ❖ Strap both legs down to long board with spider straps or to sled with sled's straps.

Assessment and care:

Check distal circulation before and after applying traction and every five minutes thereafter. Loosen traction if circulation becomes compromised.

KENDRICK TRACTION DEVICE

APPLICATION INSTRUCTIONS

(A) ANKLE HITCH
(B) UPPER THIGH SYSTEM
(C) TRACTION POLE
(D) KNEE ELASTIC STRAP
(E) THIGH ELASTIC STRAP
(F) ANKLE ELASTIC STRAP
(G) STORAGE BAG

STEP 1

Apply ankle hitch tightly around the leg, slightly above the ankle bone (as pictured). Tighten stirrup by pulling green tabbed strap until snug under heel.

STEP 2

Apply upper thigh system by sliding male buckle under the leg, at the knee, and see-saw upward until positioned in crotch area (as shown). Engage the buckle. A click signals that the buckle is locked.

(By pressing together the two tabs on each side of the buckle, it instantly unlocks.) Cinch the strap until traction pole receptacle is positioned at the belt line or pelvic crest. Note: Assure that male genitals are clear of the strap.

STEP 3

Snap out traction pole. Make sure that each joint of pole is securely seated.

STEP 4

Place traction pole alongside the leg so that one section of tubing (8") extends beyond the bottom of the foot. Adjust pole length as required, i.e. adult, pediatric, etc. Insert pole end or ends into traction pole receptacle.

STEP 5

Secure elastic strap around knee, as shown.

STEP 6

Place yellow tab over dart end, as shown. Apply traction by pulling red tab. As a guide, apply approximately 10% of body weight to a maximum of 15 pounds tension. Patient comfort will be your primary objective. Traction may be applied smoothly by grasping strap on each side of buckle and simultaneously feeding and pulling with equal pressure.

STEP 7

Finish packaging by applying upper (thigh) and lower (ankle) elastic straps, as shown. Splint as required. Long spine board, board splint, tying legs together or any other accepted method. Note: anti-shock trousers may easily be applied over the KTD.

How to Repack KTD after use:

Ankle Hitch—Slide all straps to the original fully extended position. Open ankle hitch and fan fold the straps on the inside. Roll ankle hitch closed and seal with the Velcro® closure.

Upper Thigh System—Slide strap to fully extended position. Engage buckle, fold strap around buckle and traction pole receptacle.

Traction Pole—Disengage and fold back (accordion) at each joint. Wrap fixed elastic strap around pole.

Bag—Fold remaining two elastic straps into bottom of bag. Place traction pole in next followed by upper thigh system and ankle hitch.

medixchoice

EMERGENCY MEDICAL EQUIPMENT
938 LAYTON STREET
EL CAJON, CA 92021
619/588-4583 (619/588-4KTD)

Nasotracheal Intubation

Indications:

Patient unable to protect airway due to decreased level of consciousness, and/or unable to maintain adequate oxygen saturation. Oral intubation is always first consideration, but may not be practical or possible in several situations

ALS: Active gag reflex after sedation, trismus

ALS and Care Flight: position that would hinder intubation (i.e. large patient in helicopter, trapped in vehicle), anticipated difficult airway

Oral intubation (with RSI, for Care Flight) is the preferable intubation route for trauma patients

Contraindications:

Apnea

Pediatric patient

Significant mid-face trauma (relative)

Known use of fibrinolytics, or platelet inhibitors (except aspirin)

Equipment:

ALS:

Nasal intubation kit containing:

6.0 Endotrol ET tube

7.0 Endotrol ET tube

BAAM

Xylocaine jelly

Nasal decongestant spray

Tape for securing tube

Care Flight:

7.0 and 7.5 endotracheal tube

Xylocaine jelly

Nasal decongestant spray

Twill tape for securing tube

Bag valve device

Oxygen source

Suction

Technique:

- ❖ If appropriate, explain procedure to patient
- ❖ Ventilate and oxygenate patient while preparing equipment

- ❖ Spray nasal decongestant in selected nostril
- ❖ If available, insert NPA coated with xylocaine jelly in selected nostril

- ❖ Consider coiling selected ET tube to help obtain proper shape and coat the distal end with xylocaine jelly

- ❖ If available, place BAAM on hub of ET tube

- ❖ Remove NPA (if used) and insert the ET tube into the selected nostril. DO NOT FORCE THE TUBE.

- ❖ If resistance is met, try rotating the tube gently. If the tube will not pass, remove it and try the other nostril after oxygenating the patient.

- ❖ Apply cricoid pressure as you advance the tube and listen closely to breath sounds or (in aircraft) feel with cheek for breath transmitted through the tube as it is advanced. If breath sounds or air movement disappear or diminish, the tube should be withdrawn slowly until breath sounds are again loud or air movement returns.

- ❖ Advance the tube into the trachea on inhalation of the patient . The patient may also cough when the tube enters the larynx.

- ❖ Bulging and anterior displacement of the laryngeal prominence usually indicates correct placement.

- ❖ Inflate the cuff of the ET tube and check for proper placement as with oral intubation.

- ❖ Secure the tube with tape or twill tape

Assessment and Care:

Reevaluate the position of the tube with each patient move per airway protocol. Consider placing a cervical collar on the patient to help secure the patient's head.

Needle cricothyrotomy and percutaneous transtracheal jet ventilation

Indications:

Pediatric-sized airway that you can not intubate, can not insert Combitube, can not maintain adequate oxygenation with BVM.

Adult airway meeting above criteria that is so deformed from injury or trauma that surgical cricothyrotomy is not an option

Contraindications:

Needle cricothyrotomy does not provide adequate ventilation or airway protection. Any other form of ventilation is preferable if possible.

Equipment:

14 or 16 ga IV catheter

20cc syringe

Transtracheal ventilation set-up – high pressure oxygen tubing, stopcock, valve

Bag-valve

Gauze 4 x 4s

Technique:

- ❖ Identify landmarks
 - Head in straight alignment with body, slightly extended, if possible
 - Locate cricothyroid cartilage about 1 ½ fingerbreadths below laryngeal prominence (thyroid cartilage)
- Note: It is sometimes very difficult to identify the cricothyroid notch in children. The needle may be inserted between other tracheal rings. Stay below thyroid cartilage in order to stay below vocal cords.**
- ❖ Prepare skin with alcohol
- ❖ Have partner immobilize the larynx by placing the thumb and long finger on either side of the thyroid cartilage, placing the index finger on the cricothyroid notch
- ❖ Attach IV catheter to 20cc syringe
- ❖ Applying gentle suction, slowly insert IV catheter through cricothyroid membrane at 30 degree angle toward chest
- ❖ Stop when air is freely aspirated
- ❖ Remove syringe and advance catheter into trachea to hub
- ❖ Confirm placement by aspirating air with syringe
- ❖ **For children over 5**, attach jet ventilation device and secure catheter and device with tape. Deliver oxygen in a 1:3 ration with a one second inspiration time, three second exhalation time

- ❖ **For children under 5**, deliver oxygen with a bag, squeezing just until the chest rises, allowing exhalation time in a 1:3 ratio

Assessment and care: Watch for chest rise and fall, oxygen saturation. Position and suction to avoid aspiration.



Needle Thoracostomy

Indications:

Needle thoracostomy, or chest decompression, is indicated for treatment of possible tension pneumothorax. Tension pneumothorax may be manifested by decreased breath sounds on the affected side, increasing respiratory distress, decreased oxygen saturation, hypotension, and/or tracheal deviation. If the patient is intubated, there may be decreasing compliance. If the patient has an open chest wound, you may try massaging the wound to relieve the tension. Patients in blunt trauma arrest who show any evidence of chest trauma should have needle thoracostomy performed before pt is pronounced dead.

Contraindications:

Patients with suspected simple pneumothorax with asymmetrical breath sounds and/or subcutaneous air but no hypotension or increasing respiratory distress

Patients whose tension pneumothorax can be relieved by the removal of an occlusive dressing from an open chest wound

Equipment:

ALS:

14 gauge 2 ½ inch IV catheter
One-way valve

Care Flight:

14 gauge 2 ½ inch IV catheter
Tubing with stopcock
Heimlich valve

Technique:

- ❖ Identify the second or third intercostal space on the midclavicular line on the affected side
- ❖ Clean the site with Betadine and alcohol.
- ❖ After removing the end cap of the 14 ga IV catheter or spinal needle, insert needle over the superior margin of the third or fourth rib along the midclavicular line on the affected side.
- ❖ Advance the needle until a rush of air is heard.
- ❖ Remove the needle, leaving the catheter in place. ALS: Place the one way valve on the end of the catheter, pointed end up. Care Flight: attach tubing, three way stopcock, and Heimlich Valve.
- ❖ Stabilize the catheter (and tubing) with tape and bandage material to ensure it is not dislodged.

- ❖ Evaluate lung sounds, oxygen saturation, and vital signs for improvement.

Assessment and Care:

Continue to monitor patient for return of tension or other respiratory complications.

Second decompression may be needed if return of tension, catheter occlusion, or dislocation is evident.

OROTRACHEAL INTUBATION

INDICATIONS:

To establish an emergency airway for patients who can not provide or protect their own airway or maintain adequate gas exchange.

Care Flight only: RSI is usually indicated for patients not in cardiac arrest, who require orotracheal intubation.

CONTRAINDICATIONS:

Able to protect airway and maintain adequate gas exchange

EQUIPMENT:

BVM with appropriately sized OPA or NPA

Suction unit

Appropriately sized ET tube with stylet and 10 cc syringe

ET tube holder

End tidal capnography device or quantitative capnometry

Laryngoscope with appropriate sized blade

TECHNIQUE:

Initially oxygenate patient with BVM and OPA/NPA

Hyperoxygenate patient with BVM and 100% O₂ for approximately one minute prior to intubation attempt

Open the patient's airway and, holding the laryngoscope in the left hand, insert the blade into the right side of the mouth and sweep the tongue to the left

Using proper technique for the type of blade, lift the tongue and epiglottis and visualize the vocal cords. Have assistant apply cricoid pressure to prevent regurgitation.

If necessary, have an assistant apply backward, upward, rightward pressure(BURP) on the thyroid cartilage to help visualize the cords

Slip the ET tube through the vocal cords until the cuff is past the cords

Remove the stylet and inflate the ET cuff with 5-10 cc of air, until balloon is taunt. Note the depth of the ET tube at the teeth. A good general rule of thumb is three times the diameter of the tube.

Ventilate the patient and auscultate over the epigastrium first for absence of sounds, and then over the lung fields for bilaterally equal breath sounds

Attach the ETCO₂ capnography sensor to the tube and secure the tube with a commercial tube holder or tape. EZCap may be used to determine tube placement as a backup to capnography

USE OF THE FLEX-GUIDE™ ET TUBE INTRODUCER (BOUGIE)

This device can be used when there is difficulty visualizing a patient's vocal cords due to the patient's anatomy, edema, or a need to limit neck motion. It is best to use this device early in your intubation attempt. Prolonged scene times related to multiple intubation attempts should be avoided.

CONTRAINDICATIONS:

Nasal intubation
Patient needs an ET tube smaller than 6.0

TECHNIQUE:

Standard orotracheal intubation preparation and procedures should be used.

When the laryngoscope blade is in place and exposing some or all of the laryngeal opening, advance the ET Tube Introducer, tip up, into the trachea until the black line on the introducer is at the patient's lips. Frequently, you will feel the introducer bounce along the tracheal rings as it is advanced. This is a good indication you are in the trachea.

Lubricate an appropriately sized ET tube (minimum of 6.0mm) and pass it over the introducer and into the trachea. If resistance is felt, rotate the ET tube 90 degrees counterclockwise. This allows the bevel of the ET tube to spread the arytenoids so that minimum force is used.

If resistance is still felt, back up the ET tube slightly and try again.

Advance the ET tube to an appropriate depth and remove the introducer.

DIGITAL INTUBATION:

INDICATIONS:

Can be used with patients with an absent gag reflex with a suspected neck injury, patients positioned without adequate access behind their head for normal techniques, or as a second line technique when conventional visualization is unsuccessful.

TECHNIQUE:

Insert a bite stick, OPA, or similar device between the patient's teeth to prevent the patient from biting down on your fingers.

"Walk" the middle and index finger of one hand down the patient's tongue until the epiglottis is felt.

Lift the epiglottis and tongue anteriorly.

Insert the ET tube using your middle and index fingers into the trachea.

You can also use the ET Tube Introducer in the same manner and then insert the ET tube over the introducer.

Once the tube is in place, use the same procedures to secure and confirm tube placement as with any other intubation.

ASSESSMENT AND CARE:

Obtain quantitative ETCO₂ to confirm tube placement as soon as possible

Tube placement must be checked with every patient move per airway protocol.

A cervical collar can help prevent tube dislodgement.

Use of the portable ventilator is strongly encouraged as it will provide a consistent rate and volume of respirations. Begin at a rate of 12/min and increase only if patient clearly needs an increased rate to improve oxygenation.

Each attempt at intubation should be limited to 30 seconds with BVM ventilations between each attempt.

PALM ActiveECG

Indications:

For use by the bike team and other ALS standbys that use an AED only.

Equipment:

Palm Pilot
ActiveECG device
Connecting cable.

Technique:

- ❖ Attach the cable from the ActiveECG device to the Palm. Make sure the connection is firm and that no contacts are broken in the connector.
- ❖ Below the screen on the Palm are six buttons. Two are located one above the other. Push the upper button of these two to turn on the Palm. Press the “OK” button when the clock screen comes up. Go to the Home screen and select the ActiveECG program. You can use your finger or the stylus. If the program doesn’t show up, select ALL or MAIN from the category menu.
- ❖ Attach the three leads from the ActiveECG device to the patient.
- ❖ If everything is connected correctly, there will be a “check” mark in the upper right corner of the screen.
- ❖ The “Patients” Tab should be on the screen when you activate the program. You must name a patient before it will allow you to monitor. The simplest way is to tap the “new” entry and then tap the “male” or “female” entry and then a number to identify the patient. You can tap the keyboard symbol in the lower right corner and type in a name if you wish. Once a patient has an ID, you can rename them at any time, which will be explained later.
- ❖ The next step is to tap on the “Monitor” tab. A screen with the patient’s rhythm should appear. A numerical heart rate will appear over the EKG screen. The lower left will display the horizontal and vertical scale. The “□” symbol below the EKG strip is a calibration pulse.
- ❖ The “Record Strip” tab in the lower right is touched when you wish to record a strip into the memory of the device. To stop recording, tap the “End Strip” tab, which will appear after you start recording a strip. A maximum time of 30 seconds is allowed per recording. A maximum of 20 strips can be recorded for each patient.

- ❖ If the device detects a cardiac pacemaker, an indicator will appear next to the numeric heart rate readout. It will either be a text “Pace” or a heart icon that blinks.
- ❖ If you wish a larger view of the EKG rhythm, touch the “Monitor” tab again and the bottom row of controls will be eliminated and a larger view of the rhythm will appear. Tap the “Monitor” again to return to the normal view.
- ❖ If you wish to review a strip you recorded (maybe to show it to the transport crew), tap on the “Strips” tab at the top of the display to the right of “Monitor”. Touch the review button to see the highlighted strip. Tap on the “OK” button in the lower right to return to the “Strips” folder.
- ❖ To rename a patient, tap on the “Patients” tab in the upper left corner. Touch the patient’s ID, then the “Rename” button and enter the patient’s real name.
- ❖ The Palm will turn off automatically after two minutes if no interaction with the handheld is performed. You can prevent this by occasionally tapping on the EKG display which resets the auto timer. If the device shuts down while you are monitoring, restart it and it will immediately go back to monitor.

Assessment and Care:

The Palm Active ECG must be turned in to Clinical Services for downloading and inclusion in the patient’s chart.

Pericardiocentesis (Flight Nurse Only)

Indications:

Clinical indications of cardiac tamponade
Trauma arrest with possibility of chest injuries

Contraindications:

Normal vital signs
Consider and treat tension pneumothorax first

Equipment:

20 or 30cc syringe
18 ga spinal needle

Technique:

- ❖ If time and patient condition allows, prepare site with alcohol prep
- ❖ Attach needle to syringe
- ❖ If there is cardiac activity an ECG monitor positive lead may be attached to the chest in a V1 position
- ❖ Manually locate the xyphoid process and move your finger left to the lower costal margin. This is where the needle is inserted.
- ❖ While maintaining negative pressure, insert the needle at a 45 degree angle, advancing it slowly toward the tip of the left scapula.
- ❖ If attached to a cardiac monitor, watch for a change in the S-T segment or ventricular ectopy when the needle touches the myocardium
- ❖ When the needle tip enters the blood-filled pericardial sac, withdraw as much blood as possible
- ❖ If syringe is full, leave needle in place, remove syringe and eject blood, then reattach syringe and withdraw blood again. Air will not enter the pericardial sac if patient does not have spontaneous respirations. If the patient may have spontaneous respirations, attach 3-way stopcock, then turn it off before detaching full syringe.

Assessment and care:

If patient is transported, monitor for signs of returning tamponade and treat accordingly.

PRE-EXISTING VASCULAR ACCESS DEVICES

Overview

To provide rapid intravenous utilization for a patient in extremis.

Definition

1. **Pre-existing Vascular Access Device (PVAD)**: A PVAD is an indwelling catheter/device placed into the lower 1/3 to 1/2 of the superior vena cava to provide vascular access for those patients requiring long-term intravenous therapy or hemodialysis.
 - a. **Central Chest Lines**: Catheters that are tunneled subcutaneously into the subclavian vein from a point on the anterior chest wall that terminates into the lower Superior Vena Cava.
 - *Open Ended Catheters - Triple Lumen, Broviac and Hickman (White in color).*
 - *Closed Ended Catheter - Groshong (BLUE in color).*
 - b. **PICC Line**: Peripherally Inserted Central Catheter usually inserted into the lower Superior Vena Cava via the Anticubital Vein, Basilic Vein or Cephalic Vein.
 - *Open Ended Catheters - L-caths, V-caths.*
 - *Closed Ended Catheter - Groshong (Blue in color), PASV (white in color)*
2. **Open Ended Catheters**: Tip of catheter is open and blood flows in when fluid is not infusing. Risk of air embolism and/or hemorrhage if catheter becomes disconnected. Requires Heparinization to keep catheter patent.
3. **Closed Ended Catheters**: Tip of catheter is closed, no blood enters catheter in neutral state. Requires positive or negative pressure to open the valves. No risk of air embolism or hemorrhage if catheter becomes disconnected. Does not require Heparin flush to remain patent.
4. **Implantable Venous Access Device (Port-a-Cath)**: Are long-term, surgically implanted infusion systems that contain a self-sealing injection port connected to a catheter, which is placed into the subclavian vein or internal jugular and terminates in the lower one-third of the SVC. The entire system is implanted. Nothing is exposed outside the body.

PROCEDURE

Central Chest and PICC lines:

1. Never use a syringe with less than a 10 cc barrel for flushing or administering medications through PVADs.
2. Prepare medication and NS flush, or IV solution and tubing and purge all air from lines and syringe.
3. Wash hands thoroughly and/or cleanse with alcohol.
4. Don clean gloves. Identify and discontinue any current IV solution the patient may be receiving. Use extreme caution when discontinuing an IV infusion containing chemotherapy to minimize exposure. Some medications (Dobutamine, narcotics, etc) may cause a serious adverse reaction if flushed into the patient line, resulting in an unwanted bolus.

When indicated, Aspirate the contents of the line and discard before flushing.

5. Cleanse cap with three (3) Betadine swabs; allow 90 seconds drying if time allows. Follow with three (3) alcohol swabs and allow drying if time allows.
6. Flush with 5 ml normal saline. If resistance is met when trying to inject, reclamp catheter and do not use.

Implantable Venous Access Devices (Port-a-Caths):

1. Never use a syringe with less than a 10 cc barrel for flushing or administering medications.
2. Prepare medication and saline flush, or IV solution and purge all air from lines, and syringe.
3. Wash hands thoroughly and/or cleanse with alcohol. Don **clean** gloves.
4. Identify and discontinue any current IV solution the patient may be receiving. Use extreme caution when discontinuing an IV infusion containing chemotherapy to minimize exposure. Some medications (Dobutamine, narcotics, etc) may cause a serious adverse reaction if flushed into the patient line, resulting in an unwanted bolus dose. When indicated, aspirate the contents of the line and discard before flushing.
5. When Port-a-cath is not currently accessed, use the following sterile procedure - Don sterile or clean gloves:
 - a. Locate the reservoir on the chest wall.
 - b. Cleanse site with three (3) alcohol swabs; start at the center of the septum and swab outward until an area of approximately six (6) inches in diameter is cleansed. Do this three (3) times. Repeat the above step with Iodine swabs, if possible allow to dry.
 - c. Palpate port to locate center of septum.
 - d. Insert noncoring (Huber) needle into center of port (Use an 18g. needle if not available). Push until the needle hits back of port and stops. The needle will not be fully inserted into the port.
 - e. Aspirate a small amount of blood to check for patency and flush with 10cc NS. *Note: Upon arrival to the ED, report that central line was not flushed with Heparin.*
 - f. Secure needle and infusion set, hold in place.
 - g. Cover with transparent membrane.

Administering Medications:

1. Flush with 10ml NS, if medication is being administered to pt.
2. Administer IV medication. All Central Catheter Lines shall be connected via a luer lock configuration to prevent inadvertent disconnection.
3. Avoid using excessive pressure when injecting medication into the line to avoid rupturing the line.
4. Flush well with 10 cc NS following each medication administered.
Remember, speed of flush will determine speed of medication bolus; flush slowly if you want the medication to infuse slowly, flush rapidly if you want the medication to infuse rapidly or it is not contraindicated.

Sterile Dressing Change:

The Central IV Line requires a sterile dressing. Some physicians may allow a clean dressing (or no dressing) once tissue has grown into the cuff, which usually occurs several weeks after insertion. If dressing becomes contaminated or is inadvertently detached, perform the following:

1. Wash hands or cleanse with alcohol swabs.
2. Don clean gloves, remove existing dressing and discard appropriately.
3. Inspect site for redness, swelling or drainage.
4. Don sterile gloves.
5. Using alcohol swabs, cleanse exit site rotating in a circular method from inside outward approximately four (4) to six (6) inches. Do this three (3) times.
6. Repeat the above step with iodine swabs. Allow to dry.
7. Cover site with transparent membrane or sterile gauze.

POTENTIAL COMPLICATIONS AND PVAD MAINTENANCE AND CARE

Symptoms	Preventative Measures	Interventions
Phlebitis:		
<ul style="list-style-type: none"> • Chemical Phlebitis: 	<ul style="list-style-type: none"> • Use of recommended solutions or diluents when mixing medications. • Dilution of known irritating medications to the greatest extent possible. • Administration of medications or solutions at the minimal rate recommended. 	<ul style="list-style-type: none"> • Immediate cessation of the infusate. • Heat, rest, and elevation of the affected extremity. • Notify physician.
<ul style="list-style-type: none"> • Bacterial Phlebitis: 	<ul style="list-style-type: none"> • Hand washing is the single, most important procedure. • All equipment must be checked for expiration date, package integrity, particulate matter, cloudiness or any signs to indicate the presence of contamination. • Sterile technique is essential for catheter insertion and all dressing changes. 	<ul style="list-style-type: none"> • Notify physician.
Infection:		
<ul style="list-style-type: none"> • Pain, inflammation, or redness at entrance or exit sites. • Fever/chills/shaking/rigors; diaphoresis; weakness, fatigue; muscle aches; signs of shock; or purulent drainage. 	<ul style="list-style-type: none"> • Strict adherence to aseptic techniques is crucial when handling any PVAD. Obtain new supplies if equipment or gloves become contaminated. • Use clean gloves at all times. • Use sterile gloves for dressing changes. • Prep injection port with alcohol and Betadine swabs prior to accessing line. Allow drying if time permits. • Keep the sterile dressing clean, dry, and occlusive. 	<ul style="list-style-type: none"> • Notify physician.

Symptoms	Preventative Measures	Interventions
Infiltration/Extravasation:		
<ul style="list-style-type: none"> • Pain/stinging at or near the insertion site. • Swelling proximal to or distal to the insertion site. • Puffiness of the dependent part of the limb/body. • Taut, rigid, skin around the insertion site. • Blanching/coolness of the skin around the insertion site. • Damp or wet dressing. • Slowed infusion rate, or infusion stops running. 	<ul style="list-style-type: none"> • Dilute all medications as indicated in their literature. • Secure the catheter so that the site is visible. • Avoid the use of high pressure infusion pumps, especially when infusing highly irritating or vesicant drugs. • Educate the pt. to report any feelings of burning or pain. 	<ul style="list-style-type: none"> • Stop the infusion. • Elevate the arm • Notify physician.
Dislodgment of Catheter:		
<ul style="list-style-type: none"> • Leakage from PVAD or exit site. • Increase or decrease in external catheter length. 	<ul style="list-style-type: none"> • Protect PVAD during transport. • Secure loose ends with tape, so PVAD does not get caught and pulled during loading and unloading. 	<ul style="list-style-type: none"> • Secure catheter and extension tubing with tape. • Notify physician.
Hemorrhage:		
<ul style="list-style-type: none"> • Needle/catheter is dislodged. • PVAD is damaged. 	<ul style="list-style-type: none"> • See preventative measures under "Damaged Catheter" below. 	<ul style="list-style-type: none"> • Maintain direct pressure over site for 10 min. (as for arterial bleed).
Damaged Catheter:		
<ul style="list-style-type: none"> • Leakage from external catheter. • Broken hub • Broken bifurcation • Pockets of swelling along catheter path. 	<ul style="list-style-type: none"> • Always use a minimum of a 10 ml syringe to prevent catheter damage from excess infusion pressure. • Administer medications and flushes without force, regardless of syringe size. • Do not clamp the catheter. • Keep scissors and all sharp objects away from catheter. • Access the injection ports with a needleless system or use only small bore needles with a length of one (1) inch or less to access the injection port. 	<ul style="list-style-type: none"> • Closed ended catheters (Groshong) will not bleed or cause air embolism if damaged; open ended catheters must be clamped immediately between the skin exit site and the damaged area to prevent air embolism or blood loss. • Cover broken part with sterile gauze, tape securely. • Use pt. clamp or (nonserrated) padded hemostats if line needs to be clamped. • Do not use the catheter until it has been repaired or replaced. • Notify physician.

Symptoms	Preventative Measures	Interventions
Catheter Occlusion/Thrombus or Chemical:		
<ul style="list-style-type: none"> • Unable to administer fluids. • No flow. • Unable to aspirate. • Persistent high pressure alarms on infusion pumps. • Visible precipitate/blood in external segment or leaking of fluid from the insertion site. • Sudden onset of resistance or occlusion following incompatible agents. • Tenderness and edema of neck, shoulder, and/or arm on catheter side. Impaired movement of neck and jaw. • Engorged peripheral veins in arm or chest wall. 	<ul style="list-style-type: none"> • Comply with established P & P for the handling & maintenance of the PVAD. • Flush PVAD line after each use. • After blood draw, flush with 20 ml NS, using positive pressure, pulsating technique. • Use infusion pumps, prn. • Do not inject medications or fluids if resistance is met. • When establishing patency, attempt to aspirate 5 ml first, then push 5 ml and if resistance is met, reclamp catheter and do not use. Dislodging a clot can cause a pulmonary embolus or vascular damage. • Mix medications with the appropriate diluent and compatible medication or solutions. • Follow medications with 5 ml normal saline. If open ended catheter, report to ED that PVAD was not flushed with Heparin. 	<ul style="list-style-type: none"> • Stop use of PVAD. • Rule out mechanical obstruction • Kinked tubing • Empty IV bag • Closed clamp • Occluded injection cap • Occluded IV filter • Do not flush or use force to clear the catheter. • Attempt peripheral IV, prn. • Notify physician.
Air Embolus:		
<ul style="list-style-type: none"> • Chest pain. • Cyanosis. • Increased blood pressure and/or pulse rate. 	<ul style="list-style-type: none"> • Do not remove injection cap. • Make sure the catheter is capped if used for intermittent therapy or when not in use. • Do not allow IV fluids to run dry. • Always expel air from preload syringe prior to administration. 	<ul style="list-style-type: none"> • Clamp line. • Place pt. on left side with head ↓. • Notify physician. • Monitor VS, high flow oxygen. • Attempt peripheral IV, prn.
Catheter Embolus:		
<ul style="list-style-type: none"> • Shortness of breath or tachypnea. • Confusion or other change in mental status. Anxiety. • Signs of shock. • Sudden severe pain at insertion site. 	<ul style="list-style-type: none"> • Avoid using forceful flushing or forceful drug push 	<ul style="list-style-type: none"> • STAT tourniquet proximal to the insertion site to retain the fragment in the arm and prevent migration. Obstruct venous flow but not arterial flow. Frequently assess CSM's distal to the tourniquet; Only a physician should remove the tourniquet. • Do not allow pt. to move. • Notify physician STAT. • High flow O₂. • Monitor vital signs & SaO₂. • Start peripheral IV immediately.

Symptoms	Preventative Measures	Interventions
Post Insertion Migration (of catheter tip)		
<ul style="list-style-type: none"> • Inability to inject fluids. • Cardiac dysrhythmias/SOB. • Pt. C/O of "gurgling" sound in ear (if PVAD has migrated to the Internal Jugular Vein). • Local pain/swelling of the ipsilateral extremity. • Difficulty swallowing. 	<ul style="list-style-type: none"> • History: Gradual or rapid onset?; difficult or forceful flush of catheter?; recent medications given that may have required a forceful flush? 	<ul style="list-style-type: none"> • STOP all infusions. <ul style="list-style-type: none"> ❖ Notify physician.
Pinch-off syndrome:		
<ul style="list-style-type: none"> • Resistance to flush. • Inability to withdraw blood. • Flow restored when patient's position is changed. 	<ul style="list-style-type: none"> • Attempt position change in order to draw blood and administer medications. • Rotate and reposition the arm in case lumen opening is against the vessel wall (Statue of Liberty pose, arm circles, arm over head, etc.). 	<ul style="list-style-type: none"> ❖ Notify physician.

Sager Traction Splint

Indications:

Suspected femur fracture

Contraindications:

Suspected pelvic or hip fracture
Suspected fracture of ankle, tib-fib, or knee

Equipment:

Sager splint and all straps

Technique:

- ❖ Position the Sager splint between the patient's legs, resting the padded saddle against the ischial tuberosity, with the traction handle on the upper side. Be sure the patient's genitalia is protected. With a unilateral fracture place the splint on the side of the injury. With a bilateral fracture, place the splint on the side with the greatest degree of injury.
- ❖ Apply the thigh strap around the upper thigh of the fractured limb and tighten snugly.
- ❖ Lift the spring loaded clip on the inner shaft of the splint and adjust the length so that the crossbar is level to the patient's heels.
- ❖ Position the ankle harness beneath the heel and just above the ankle. Fold down cushions on the ankle harness so that it fits snugly around the ankle. Pull the slack out of the strap connecting the ankle harness to the splint crossbar until it is tight.
- ❖ Grasp the padded shaft of the splint with one hand and the traction handle with the other and gently extend the inner shaft until the desired amount of traction is pulled on the traction scale. Use 10% of the patient's weight per fractured femur up to 7kg (15 lbs.) per leg. For bilateral fractures are present the max would be 14 kg (30 lbs.)
- ❖ Readjust the thigh strap to make sure it is snug and apply the elastic leg cravats to minimize limb movement.

Assessment and Care:

Check pulse/capillary refill in foot on affected side during transport. If patient loses pulse or signs of perfusion, readjust splint immediately

Surgical Cricothyrotomy

Indications:

Can not intubate, can not insert Combitube, can not maintain adequate oxygenation with BVM.

Contraindications:

Pediatric – sized airway

Equipment:

Scalpel with #11 blade
Trousseau dilator (trache spreaders)
Tracheal hook
#6 Endotracheal tube
Tape or ties to secure tube
Bag-valve and oxygen source
Suction
Gauze 4 x 4s

Technique:

- ❖ Identify landmarks
Position head in straight alignment with body, slightly extended, if possible
Locate cricothyroid cartilage about 1 ½ fingerbreadths below laryngeal prominence (thyroid cartilage)
Prepare skin with betadine and alcohol
Immobilize the larynx by placing the thumb and long finger on either side of the thyroid cartilage, placing the index finger on the cricothyroid notch
- ❖ Make a midline or transverse (vertical or horizontal) incision over the cricothyroid membrane, about 2 cm long, carefully going through skin, subcutaneous tissue, and anterior cervical fascia, but not through any cartilage. Assistant uses gauze to control bleeding.
- ❖ Palpate with index finger through incision to identify the crichthyroid membrane
- ❖ Make a horizontal incision about 1 cm long into the cricothyroid membrane. Hold the scalpel in the incision.
- ❖ Assistant inserts tracheal hook from above into the trachea through the incision in the cricothyroid membrane and gently pulls toward head to open incision
- ❖ Insert Trousseau dilator and squeeze together so that incision is opened from above and below (not side to side)
- ❖ Insert #6 ET tube until cuff is just inside trachea.
- ❖ Inflate cuff of ET tube and check tube placement per airway protocol.

- ❖ Secure ET tube with tape or trache ties, ensuring that it is not so tight that venous return from head is impeded
- ❖ You may shorten ET tube (be careful not to go below balloon port)

Assessment and care: Check for tube placement, ventilation, and oxygenation in usual fashion. Watch for and control bleeding at surgical site.

Transcutaneous Pacing (TCP)

Indications:

Adult patient with:

2nd degree heart block Type II or 3rd degree heart block with SBP<80 or SBP 80-100 with signs or symptoms of shock

Sinus bradycardia with SBP<80 or SBP 80-100 with signs or symptoms of shock unresponsive to atropine

Consider TCP early in cardiac arrest with asystole

Consider TCP when treating PEA if rate <60 and unresponsive to atropine

Contraindications:

Any rhythm that provides adequate perfusion

Severe hypothermia

Equipment:

Monitor/defibrillator

Midazolam for sedation

IV access

Technique:

- ❖ If patient is awake, consider sedation with Midazolam (see Pain/Sedation Management protocol)
- ❖ Make sure cardiac monitor leads are applied to patient and monitor is displaying a rhythm. This is needed for monitor to sense when to apply pacing energy.
- ❖ Attach pacing electrodes to anterior and posterior chest just to the left of the sternum and spinal column.
- ❖ Begin pacing at a heart rate of 70 bpm and “zero” current output.
- ❖ Slowly increase current while observing cardiac monitor for evidence of electrical capture (a QRS complex after each pacing spike).

- ❖ After electrical capture has been confirmed, check for mechanical capture by checking for pulses and BP. Add 10% to the milliamp current output to get above the patient's threshold. Be aware that electrical stimulation causes muscular jerking that may mimic a carotid pulse.
- ❖ For asystole, begin at maximum current. If mechanical capture occurs, slowly decrease output until capture is lost, then add current until mechanical capture reoccurs.
- ❖ Use the 4:1 button to periodically check the underlying rhythm for any changes.

Umbilical Vessel Cannulation

Indications:

Unable to gain venous access in a newborn

Contraindications:

None

Equipment:

Umbilical clamps/Tape
Scalpel
5 or 8 Fr feeding tube
10 cc syringe
IV bag
IV tubing
3 way stopcock

Technique:

- ❖ Clamp cord at least 3-4 inches from neonate's abdomen
- ❖ Tie umbilical tape around base of cord and gently snug it to control bleeding
- ❖ Make as clean a cut as possible through cord about 1 inch from neonate's abdomen
- ❖ Wipe cut end of cord with alcohol
- ❖ Measure for depth of insertion by measuring the distance of the cord plus 1-4cm (2cm) to that measurement and mark with a piece of tape.
- ❖ Identify umbilical vein (in most neonates, there are two small arteries and one larger, more floppy vein)
- ❖ Flush catheter with NS
- ❖ Insert feeding tube in a cephalad direction (towards the patient's head)(8 Fr in normal gestation, 5 Fr in premature neonate) to approximately one inch beyond abdominal surface. (To the tape marking insertion depth). It may be helpful to stabilize the cord by holding it at the base and applying gentle traction
- ❖ Gently apply negative pressure on end of feeding tube with syringe, watching for blood return (do not apply negative pressure until about one inch beyond the skin)
- ❖ Tape distal portion of catheter to abdomen
- ❖ Disconnect syringe and connect 3 way stopcock, IV bag, and flushed tubing.
- ❖ Administer fluid and medications in a bolus fashion

Assessment and care:

Once feeding tube has touched skin of abdomen, it can't be advanced – it is unsterile; it can be withdrawn.

Ensure that feeding tube is not advanced under skin more than 1 ½ inches – it will enter liver.

Maintain strict aseptic technique.

Any medications or fluids that can be given IV can be given through UVC

If feeding tube has been inadvertently inserted into an umbilical artery, rescue medications and fluid may still be given through it.