Appendix 3

Procedures Manual

The following procedures are taken out of the context of patient care. Each procedure is very specific. You may have to blend several when you treat a patient. You are expected to have the judgment and familiarity with protocol to select appropriate "sets" of procedures for each patient. For example, after the intubation procedure, we do not instruct you to continue ventilating the apneic patient or to provide emergency transportation.

The purpose of this document is to provide a brief review of standard procedures used to treat patients and is not to be a training document. The Medical Directors know you are familiar with the skills and have not explained everything in minute detail. For example IV cannulation directs the provider to "cannulate the vein" without explaining the detailed steps of the procedure. If you have questions in these areas please refer to your instructor, ALS text, or to your medical director. It is not practical, and likely not of interest to you, to include details of every procedure here.

Your assistance in identifying parts that are not clear or changes in accepted medical procedures is appreciated. Please direct any corrections to your agency administrator or medical director who will forward them to the EMS Protocol group. Thank you.

Airway Management

Direct Visual Endotracheal Intubation
Adult Care

Procedure:

1. Hyper oxygenate the apneic patient.
2. Do not interrupt ventilations for more than 30 seconds.
3. Use ITLS / PHTLS techniques for trauma patients.
4. Assemble and test the laryngoscope.
5. Attach a syringe to balloon cuff.
6. Test the cuff with appropriate amount of air.
7. Deflate it, leaving the syringe attached.
8. Insert the stylette (if you choose to use one) in the tube.
9. Prepare an agency approved securing device, CO_2 indicator, and a suction device.
10. Remove any foreign objects in the patient's airway.
11. Suction the airway PRN.
12. Grasp laryngoscope handle in left hand and engage the laryngoscope blade.
13. Grasp endotracheal tube in right hand.
14. Stop CPR for NO MORE than 30 seconds.
15. Insert the laryngoscope blade into the right side of the mouth without touching the teeth.
16. Sweep the tongue to the left and visualize the vocal cords.
17. Cricoid pressure may be applied during the insertion to minimize aspiration.
18. Insert the tube until the cuff passes the vocal cords.
19. Remove the laryngoscope blade.
20. Inflate the endotracheal cuff with appropriate amount of air.
21. Ventilate the patient with a bag valve device.
22. Rule out abdominal air sounds, auscultate for bilateral breath sounds, and observe chest rise.
23. If lung sounds are unequal, consider causes, deflate and reposition the tube, PRN.
24. If epigastric air sounds are present, extubate, hyper oxygenate, and reintubate with a new tube.
25. Secure the endotracheal tube with a securing device.
26. Resume CPR, PRN.
27. Observe and record any CO_2 readings including Capnography.
28. Observe and record the number on the tube in relation to the teeth.
29. Monitor the patient's respiratory status with available indicators.
30. If unable to establish endotracheal intubation after no more than two attempts utilize a bi-lumen or subglottic airway device
31. Consider cervical collar placement to assist in ET securing.

Direct Visual Endotracheal Intubation
Pediatric Care

Procedure:

1. Determine the correct tube size using either the appropriate methods or physical signs.
2. Have the next size tube larger and smaller available. This is especially important in smaller children.
3. Avoid cricoid pressure.
4. Apply the adult intubation procedure.
5. All pediatric patients that are intubated should be cervically immobilized for tube security.

Direct Visual Endotracheal Intubation
With Suspected Spinal Injury

Procedure:

1. Initially ventilate the patient using the jaw lift method and an oral pharyngeal airway.
2. Intubation will proceed with a 2nd rescuer maintaining cervical alignment.

Digital Endotracheal Intubation

Procedure:

1. Insert a stylet into a lubricated ETT and form the tube into an "open J" form.
2. Kneel left of the patient's head facing the feet.
3. Place a bite block or oropharyngeal airway between the patient's molars to protect your fingers.
4. "Walk" your left index and middle finger down the midline of the tongue, while pulling forward.
5. Palpate the epiglottis with your middle finger. (It feels much like the lobe of the ear.)
6. Press anteriorly on the epiglottis.
7. Slip the tube into the mouth at the left corner.
8. Use your index finger to keep the tip against your middle finger (that is pressing the epiglottis).
9. You can feel the end of the tube or the cuff to know the position of the tip.
10. Guide the tube to the epiglottis using the middle and index fingers.
11. The epiglottis is in front and your fingers behind the tube.
12. Advance the tube through the cords.
13. Press anteriorly with both left fingers to prevent the tube slipping into the esophagus.
14. Confirm tube placement and secure it.

Endotracheal Tube Introducer (BOUGIE)

PROTOCOL STATEMEMENT

The Endotracheal Tube Introducer (BOUGIE) is a firm but elastic disposable guide used to intubate the trachea. This device is used as an aid to facilitate successful orotracheal intubation

APPLICABILITY

All Virginia Beach Department of EMS (DEMS) affiliated RSI Paramedics who have been trained and authorized to use the BOUGIE by the DEMS.

INDICATIONS

1. Patient must meet clinical indications for oral intubation
2. Initial attempts at intubation have been unsuccessful
3. Patients who are predicted to be a difficult intubation.

CONTRAINDICATIONS

1. Three failed attempts at orotracheal intubation
2. Age less than eight (8) or ETT size less than 6.5mm

PROCEDURE

1. Prepare, position and oxygenate the patient with 100% oxygen;
2. Select proper ET tube without stylet, test cuff and prepare suction;
3. Lubricate the distal end cuff of the ETT and the distal ½ of the BOUGIE;
4. Using laryngoscope techniques, visualize the vocal cords, if possible, using the Sellick's maneuver, as needed;
5. Introduce the BOUGIE with curved tip anteriorly and visualize the tip passing the vocal cords or above the arytenoids if the cords cannot be visualized;
6. Once inserted, gently advance the BOUGIE until you meet resistance or "hold-up" (if you do not meet resistance you have a probable esophageal intubation and insertion should be reattempted);
7. Withdraw the BOUGIE only to a depth sufficient to allow loading of the ETT while maintaining proximal control of the BOUGIE;
8. Gently advance the BOUGIE and loaded ETT until you have "hold-up" again, thereby assuring tracheal placement and minimizing the risk of accidental displacement of the BOUGIE;

9. While maintaining a firm grasp on the proximal BOUGIE, introduce the ETT over the BOUGIE, passing the ETT to its appropriate depth;
10. If you are unable to advance the ETT into the trachea and the BOUGIE and ETT are adequately lubricated, withdraw the ETT slightly and rotate the ETT 90 degrees COUNTER clockwise to turn the bevel of the ETT posteriorly. If this technique fails to facilitate passing of the ETT you may attempt direct laryngoscopy while advancing the ETT (this will require an assistant to maintain the position of the BOUGIE and, if so desired, advance the ETT);
11. Once the ETT is correctly placed, hold the ETT securely and remove the BOUGIE;
12. Confirm tracheal placement and secure according to ETT protocols and/or training.

Capnography

Purpose:

Today, tracheal tube positioning and confirmation is accomplished using nonphysical examination techniques including the use of esophageal detector devices, qualitative end tidal CO2 indicators and capnograph or capnometry devices. The American Heart Association (AHA) recommends "secondary confirmation of proper tracheal tube placement for patients with a perfusing rhythm by capnography or exhaled CO2 detection immediately after intubation and during transport (Class II A)."

Capnography remains a non-invasive method of monitoring the level of carbon dioxide in exhaled breath (EtCO2) to assess a patient's ventilatory status. A true capnograph produces and EtCO2 value as well as a waveform or capnogram. Capnographs are useful for monitoring ventilator status, warning of airway leaks, and ventilator circuit disconnections, and ensuring proper endotracheal tube placement. Capnography may also be used to assist clinicians in diagnosing and treating another medical conditions including the efficacy of cardiac arrest efforts and in predicting outcome.

Indications:

Capnography can rapidly identify a variety of subtle pathological disturbances of metabolic, cerebral vascular, and respiratory systems making it truly the *ventilation vital sign*. Capnography is useful in the following circumstances:

1) To verify and provide evidence of the correct placement of the endotracheal tube. This is especially helpful in a noisy environment.
2) To assure continual tracheal intubation placement during transport and transfer of the patient to the emergency department staff.
3) To detect malignant hyperthermia in an intubated overdose patient ingesting hypermetabolic agents such as cocaine, amphetamines, or ecstasy.
4) To assess the effectiveness of Cardiopulmonary Resuscitation (CPR).
5) Monitor to provide adequate ventilation in the sedated intubated patient.
6) Monitor ventilation of the intubated patient suffering from a closed head injury.

Procedures:

The procedures contained within this protocol identify a cursory application of the device and do not purport to redefine or supplement the manufacture's recommendations and/or technical applications. Each clinician must review and fully understand the manufacturer's handbook before applying the device in actually patient care situations:

A. Capnography use for Sudden Cardiac Arrest:

1) Open the CO2 tubing connector door and connect the appropriate CO2 filter line tubing by turning the tubing clockwise. The tubing should be attached to the unit first and then to the patient.
2) Press the "on" button and adjust the contrast if necessary.
3) Verify that the ETCO2 monitor display is on.
4) The CO2 waveform will display in channel 2 or 3.
5) After auscultation and adequate chest rise, confirm ET tube placement using customary methods including the tube check device. Once confirmed place the manufacture's ET tube adaptor in place and deliver 3-6 ventilations. Levels of CO2 in the sample gas. (Capnography may be used with the Combi-tube.)
6) CO2 will not be detected if the esophagus has been intubated.
7) Confirmation of ET tube placement by Capnography is to be supplemented with pulmonary auscultation by stethoscope and the CO2 indicator on the BVM.

8) Once Capnography has been started it is to remain in place until the patient is on the ED bed. This will provide continuous monitoring of the endotracheal tube during any patient movements, loading, transport and unloading.
9) Initial CO2 levels in the cardiac arrest patient may be very low due to a decrease in metabolism and circulation. If CO2 levels do not increase during CPR, reassess for effective chest compressions, proper ventilation rate and appropriate time intervals of epinephrine administration.
10) A sudden drop in End tidal CO2 levels during cardiac arrest could be caused by a dislodged or kinked endotracheal tube, tension pneumothorax, inadequate chest compressions or inadequate ventilations.
11) In the event the patient has return of systemic circulation (ROSC) apply pulse oximetry.
12) At the completion of the call a "Code Summary" report should be attached to the patient care report for archival and quality assurance purposes.

B. Capnography use for intubated Medical and Trauma patients:

1) Follow the same procedures for device connection and tube confirmation listed in 2.A. "Capnography used for Sudden Cardiac Arrest."
2) Use in combination with pulse oximetry to confirm appropriate ventilation and oxygenation.
3) The capnography can alert the clinician to critical changes in the medical/trauma patient's condition. These would include:
    a) A rapid decrease in END tidal CO2 values could indicate the onset of cardiac arrest, sudden hypotension, pulmonary embolus, kinking or dislodgement of the ET tube, tension pneumothorax, or inadequate ventilation.
    b) An increase in CO2 production could indicate an overdose of hallucinogenic amphetamines such as ecstasy or other hypermetabolic agents such as cocaine. These drugs may lead to increase in muscle metabolism, which causes and increase in CO2 production and ultimately leading to a rise in body temperature – malignant hyperthermia.
    c) Tiring accessory respiratory muscles, changes in level of consciousness or sedation secondary to overdose or therapeutic treatment will result in respiratory depression/hypoventilation ultimately leading to an increase in CO2 levels.
    d) Can provide the clinician some indication if the current treatment is effective by showing if CO2 values are remaining in or returning to normal ranges.
    e) A decrease in CO2 readings can provide some indication of low cardiac output (CHF), hypovolemia or pulmonary embolism because the delivery of CO2 to the alveoli and measured on the capnograph depends on adequate blood flow through the pulmonary vasculature.
5) For the intubated head trauma patient that shows signs of severe increase in intracranial pressure, appropriate hyperventilation can be achieved through capnography with a goal of 25-30 mmhg (asymmetrical pupils, GCS dropping more that 5 points, extensor or flexor posturing).

A. When <u>CO2 is not detected</u>, three factors must be quickly evaluated by the field clinician for possible causes:

1) Loss of airway due to apnea or due to improper placement of the endotracheal tube.
2) Loss of circulatory function as a result of cardiac arrest, exsanguination and/or massive pulmonary embolism.
3) Equipment malfunction, extubation of the endotracheal tube, or tube obstruction.

B. Factors Affecting Accuracy:

1) Moisture and secretions entering and clogging the breathing circuit can interrupt monitoring and can cause inaccurate measurements.
2) The CO2 sensors are cross sensitive to anesthetic gases.
3) The added weight of the adapter on the endotracheal tube can cause kinking and extended extubating time.

4) Side stream capnographs are not accurate in neonatal and pediatric patients because they compete with the patient's tidal volume.
5) Mainstream capnographs cannot accommodate non-intubated patients.

C. Three Common Causes Affecting CO2 Excretion:

1) Decreased metabolic rate (sedation, hypothermia, and death) = decreased CO2 blood levels = decreased ET CO2 readings.
2) Increased metabolic rate (exercise, fever, shivering, sympathomimetic drugs) = increased CO2 blood levels = increased ET CO2 readings.
3) Decreased blood flow (inadequate chest compressions, shock, hypovolemia, tension pneumothorax, pulmonary embolism, cardiac arrest) = decreased CO2 delivery to the lungs = decreased ET CO2 readings.

Capnometry Color Change End-Tidal CO_2 Detector

Procedure:

1. Compare the initial color to the purple "CHECK" color on the product. The color should be the same or darker.
2. Do not use a detector if its color is lighter than the check color.
3. Firmly attach the detector between the inserted tube and the ventilating device.
4. Ventilate the patient 6 times. Results with less than 6 moderate ventilations will be erroneous.
5. Compare the indicated color to the chart.
6. If the indicated color is tan, ventilate six more times and monitor for changes.
7. If patient is in respiratory arrest and color indicator is purple, confirm correct intubation placement.

Combitube
(Dual Lumen Airway Device)

Procedure:

1. Hyper oxygenate the patient with 100% oxygen.
2. Prepare the combitube by lubricating distal end.
3. Maintain neck in a neutral position.
4. Perform a jaw lift and insert the combitube until the printed marks are aligned with the teeth.
5. Use caution if facial trauma has caused sharp, broken teeth or dentures.
6. DO NOT FORCE THE COMBITUBE. If it does not advance easily, redirect it or withdraw and reinsert.
7. Inflate line 1, (to the pharyngeal balloon) with 100ml.
8. Inflate line 2, (to the distal cuff) with approximately 15ml.
9. Ventilate through the longer blue (esophageal) tube and auscultate.
10. Confirm ventilation by the presence of breath sounds and chest rise and the absence of abdominal air sounds.
11. Continue ventilating if pulmonary breath sounds are present. (The second tube may be used for gastric suction.)
12. Ventilate through the second (clear) tube if pulmonary breath sounds are absent and re-auscultate.
13. Confirm ventilation by the presence of breath sounds, chest rise, and the absence of abdominal sounds.
14. Continue ventilating with oxygen by a positive pressure oxygen device or bag valve device.
15. Monitor respiration.

The patient may be intubated with the Combitube in the esophagus. Deflate line 1 and move the tube to the left of the patient's mouth and intubate. Re-inflate line 1 and ventilate if necessary.

I GEL Insertion

Procedure:

Preparation for use:

1. Choose the correct size of i-gel rescue pack for the patient.
2. Open the packaging and remove inner tray, setting the support strap and sachet of lubrication to one side and within easy reach. Remove the i-gel.
3. Open the sachet of lubricant and place a small bolus on the inner side of the main shell of the packaging.
4. Lubricate the back, sides, and front of the i-gel with a thin layer of water based lubricant.

Insertion technique:

1. Grasping the i-gel firmly along the bite block, use head tilt or jaw thrust for trauma to achieve anatomical alignment.
2. Position the device so that the i-gel cuff is facing towards the chin of the patient. Introduce the leading soft tip into the mouth of the patient in the direction of the hard palate.
3. Glide the device downwards along the hard palate with a continuous but gentle push until a definitive resistance is felt.
4. The tip of the airway should be located into the upper esophageal opening with the cuff located against the laryngeal framework. The incisors should be resting on the bite block.
5. Secure the device by sliding the strap underneath the patient's neck and attaching to the hook ring. Take care to ensure the strap is not secured too tight.
6. Alternatively the device can be secured by taping maxilla to maxilla
7. Now that the i-gel has been correctly prepared, inserted, and secured, positive pressure ventilation can commence in accordance with applicable resuscitation guidelines.

King Airway
(Dual Lumen Airway Device)

***Procedure**:*

1. Hold the KING LT(S)-D at the connector with dominant hand. With non-dominant hand, hold mouth open and apply chin lift, unless contraindicated by C-spine precautions or patient position. Using a lateral approach, introduce tip into corner of mouth.

2. Advance the tip behind the base of the tongue while rotating tube back to midline so that the blue orientation line faces the chin of the patient.

3. Without exerting excessive force, advance tube until base of connector is aligned with teeth or gums.

4. Inflate cuffs to 60 cm H2O or to "just seal" volume. Typical inflation volumes are as follows:

   KING LT-D: Size #2, 25-35 ml; Size #2.5, 30-40 ml; Size #3, 45-60 ml; Size #4, 60-80 ml; Size #5, 70-90 ml.

   KING LTS-D: Size #3, 40-55 ml; Size #4, 50-70 ml; Size #5, 60-80 ml.

5. Attach the breathing circuit/resuscitator bag to the KING LT(S)-D. While gently bagging the patient to assess ventilation, withdraw the KING LT(S)-D until ventilation is easy and free flowing (large tidal volume with minimal airway pressure).

6. If necessary, add additional volume to cuffs to maximize seal of the airway.

7. When utilizing the KING LTS-D's gastric access lumen: Lubricate gastric tube (up to an 18 Fr) prior to inserting into KLTSD's gastric access lumen.

Nasopharyngeal Airway – NPA

1. Determine proper size of NPA to be used (measure from the nostril to the earlobe).

2. Lubricate with water soluble gel. (Hurricane spray or Lidocaine gel optional)

3. Position the patients head in neutral position, inspect the nose and use the larger nostril.

4. (optional) Spray nostril with neo- Synephrine.

5. Insert the nasopharyngeal tube with the bevel towards the septum.

6. Gently insert the tube until the flange is resting against the nostril.

7. Ventilate as needed with positive pressure device.

- A NPA should not be used in the presence of direct head trauma.
- If resistance is met while inserting the NPA use a twisting motion.

Oropharyngeal Airway Insertion

Adult Care

Procedure:

1. Measure the device against the patient's face (mouth to ear).
2. Open the mouth with a chin lift or cross finger technique.
3. Insert the airway upside-down and rotate the airway after it passes the tongue, or depress the tongue with a tongue depressor or laryngoscope blade and insert the airway with the device directed downward and follow the contour of the tongue.
4. Ventilate the patient.

Pediatric Care

Procedure:

1. Measure the device against the patient's face (mouth to ear).
2. Depress the tongue with a tongue depressor or laryngoscope blade.
3. Insert the airway with the device directed downward and follow the contour of the tongue.
4. Ventilate the patient.

Auto Injector

Procedure:

1. Insure the auto-injector is correct medication for patient.
2. Check expiration date and for cloudiness or discoloration.
3. Remove auto-injector safety cap.
4. Select appropriate injection site in the lateral thigh or upper lateral buttocks.
5. Hold Auto Injector using thumb and forefinger (like a pencil).
6. Push auto-injector firmly against the skin until the injector activates, do not use a “stabbing” or “jabbing” motion.
7. Hold it in place until medication is fully injected (at least10 seconds).
8. Record the time.
9. Dispose of the injector in the biohazard container.
10. Reassess the patient.

Automatic External Defibrillation

Procedure:

1. Completely dry the chest area of the wet patient.
2. Be sure patient is pulseless.
3. Turn on A.E.D. and connect electrodes.
4. Push the analyze button and do not touch patient during the analysis.
5. If shock is advised then insure all rescuers are clear of the patient and press the shock button.
6. Provide Basic Life Support to the point where ventilation is completed.
7. Continue with chest compressions and follow the prompts of the A.E.D. to repeat shocks.
8. Connect cardiac monitor to the patient.
9. Continue appropriate treatment protocols.

Autopulse Automated Circumferential CPR Device

The American Heart Association recognizes that consistent and uninterrupted compressions that maintain coronary perfusion pressures (CPP) during resuscitation efforts is one of the primary keys to surviving the event. The Autopulse Circumferential CPR Device has been proven effective in the pre-hospital clinical setting in providing consistent compressions that maintain a high CPP. Because of the emphasis placed upon providing effective compressions during CPR the Autopulse should be deployed as soon as possible during the resuscitation effort.

Procedure:

1. Determine viability and potential of resuscitation.
2. Position patient in location so as to allow proper placement of the Autopulse
3. Perform manual CPR while setting up Autopulse
4. Position Autopulse board under patient using marks on board as guideline
5. Secure the velcro strap on the compression band over patient's chest
6. Turn Autopulse unit on
7. Push adjust button – Lifeband will automatically adjust to the size of the patient
8. Push the start button – Autopulse will begin providing compressions at exactly the prescribed rate of 100/min

Precautions/Contraindications:

The Autopulse **SHOULD NOT** be used on pediatric or trauma patients

The Autopulse should be deployed with caution on any patient with suspected atraumatic hemorrhage

Compressions **SHOULD NOT** be interrupted unless absolutely necessary

Continuous Positive Airway Pressure (C-PAP)

Procedure:

1. Apply C-PAP mask to face with head strap firmly in place to secure a good seal
2. Attach C-PAP device to oxygen canister
3. Turn oxygen on to appropriate level
4. C-PAP device will be fixed at 7.5 cm of water oxygen pressure
5. The C-PAP device needs to be opened up for oxygen flow to the mask
6. Reassess patient for mask seal, SAO2 saturations, and improvement or deterioration.
7. If patient's hypoxemia improves and respiratory rate decreases then mask C-PAP is likely to be successful
8. If hypoxia persists or worsens and respiratory rate increases then oral tracheal intubation may be required.
9. Patients initially may not be comfortable with mask C-PAP but with assurance generally will allow a trial of C-PAP.
10. Patient may benefit from a trial of Versed 2 mg IV or IM in an adult patient to help alleviate anxiety and improve device tolerance.

Electrical Defibrillation and Cardioversion

Electrical Cardioversion

Procedure:

1. Sedate the conscious patient if time allows.
2. Reconfirm the dysrhythmia and clinical signs.
3. Position pads or paddles on patient.
4. Enable the synchronizer.
5. Confirm marks on the ECG at the R waves indicating synchronizer mode.
6. Set the energy level.
7. Insure everyone is "ALL CLEAR," and cardiovert.
8. Reinterpret the rhythm and evaluate clinical signs.
9. Reset the synchronizer and repeat at a higher energy setting PRN.

Note:

If delays in synchronization occur, and clinical conditions are critical, deliver an immediate unsynchronized shock. Infant paddles/pads are generally used for patients < 1 year of age or < 15 kg.

Electrical Defibrillation

Procedure:

1. Confirm the dysrhythmia and clinical signs.
2. Select energy level.
3. Temporarily stop CPR.
4. Position the pads or paddles on the patient.
5. Insure everyone is "ALL CLEAR," and defibrillate.
6. Reinterpret the rhythm and evaluate clinical signs.
7. Repeat at a higher energy setting as needed.

Note:

Infant paddles/pads are generally used for patients < 1 year of age or < 15 kg.

External Pacing

Procedure:

1. Switch the pacer off and set the energy level off or to the lowest possible setting.
2. Sedate the conscious patient PRN.
3. Set the mode to demand or fixed (asynchronous) rate.
4. Set the pacing rate (usually 70).
5. Attach the electrodes and cables.
6. Record the patient's initial rhythm.
7. Turn on the pacing switch and look for pacer spikes on the monitor.
8. Treat failure to pace by checking the patient's rate (it may be fast enough to inhibit pacing) and the equipment.
9. Increase the energy level until electrical capture (a QRS responds to a pacer spike) is observed.
10. Check for a right side pulse. The pacer may cause muscle twitches so left side pulses may be misleading.
11. Treat failure to capture by checking the patient's rhythm and incrementally increasing the pacer's energy.
12. Check for a pulse with each change.
13. Treat failure to capture (at maximum) by checking the patient, electrode placement, equipment and transporting
14. Use the lowest energy setting that will produce a pulse to minimize pain.
15. Observe and record the patient's paced BP.
16. Treat hypotension by increasing the paced rate to 80 PRN.
17. Treat hypotension at a paced rate of 80 by giving a fluid challenge and/or dopamine.
18. Record the paced ECG.
19. Transport and monitor the patient frequently.

EZ-IO Insertion and Infusion

Indications

- Cardiac Arrest
- Patients where rapid, peripheral IV access is unavailable, and after 2 attempts, with any of the following:

    1. Multisystem trauma with severe hypovolemia and/or a significantly burned patient with no IV access.
    2. Severe dehydration with vascular collapse and/or loss of consciousness
    3. Respiratory failure/ Respiratory arrest with no IV access
    4. Any other immediately life-threatening, peri-arrest clinical condition in which IV access is unobtainable.

Under no circumstances should it be used for prophylactic care.

Contraindications

1. Inability to locate anatomical landmarks (blind insertion contraindicated).
2. Suspected cellulitis or burn over the insertion site.
3. Suspected acute or non-healed fracture proximal to foot in same leg (proximal tibial insertion contraindicated) or proximal to forearm in same arm (humeral head insertion contraindicated).
4. Suspected total knee arthroplasty/replacement (proximal tibial insertion contraindicated).
5. Suspected shoulder arthroplasty/replacement (proximal humerus insertion contraindicated).
6. Suspected markedly poor circulation extremity - history of amputation, gangrene, bypass (proximal tibia insertion contraindicated).

Equipment

- EZ-IO™ driver
- EZ-IO™ needle set
- Alcohol or povidone-iodine swab
- Extension set or EZ-Connect
- 10 mL syringe
- Normal saline
- Tape or gauze

Procedure:

1. Locate proper site for EZ-IO insertion.

    a. **Adult Tibial:** The first landmark is the patella or kneecap to locate it, feel the front surface of the leg just below the femur or thigh bone for a "floating" bony structure. The second landmark is approximately 2 finger widths below the patella. It is the tibial tuberosity, a round oval elevation or "bump" on the front surface of the tibia or lower leg. Now, 1 finger width medial (toward the inside) of the tibial tuberosity is the final landmark. This is the insertion site for the EZ-IO.

    b. **Adult Proximal Humerus**: The proximal humerus insertion site is located directly on the most prominent aspect of the greater tubercle. Ensure that the patient's hand is resting on the abdomen and that the elbow is adducted (close to the body). The hand may be pronated on the side of the body if unable to bend or move the arm. Slide thumb up the anterior shaft of the humerus until you feel the greater tubercle, this is the surgical neck. Approximately 1 cm (depending on patient anatomy) above the surgical neck is the insertion site. This is the preferred site for patients who are responsive to

pain. Once the insertion is completed secure the arm in place to prevent movement and accidental dislodgement of the IO catheter.

c. **Pediatric Tibial:** 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.

d. **Pediatric Distal Femur:** (Special Insertion Subsection) *EZ-IO distal femur insertion site identification (infant/child)*

- Secure the selected leg in the outstretched position to ensure the knee does not bend.
- Identify the patella by palpation.
- The insertion site is just proximal to the patella (maximum 1 cm) and approximately 1-2 cm medial to the midline.

EZ-IO distal femur insertion technique (infant/child)

- Prepare the site with the selected antiseptic (clinician's choice)
- Use a clean, "no touch" technique.
- Remove the EZ-IO needle set cap.
- (Stabilize the extremity.) Aim the needle set toward the center of the bone at a 90º angle.
- Push the needle set tip through the skin until the tip rests against the bone.
- The 5-mm mark must be visible above the skin for confirmation of adequate needle set length.
- Gently drill, *immediately* release the trigger when the "pop" or "give" is felt as the needle set enters the medullary space. *Avoid recoil—do NOT pull back on the driver when releasing the trigger.*
- Hold the hub in place, and pull the driver straight off.
- Continue to hold the hub while twisting the stylet off the hub with counterclockwise rotations. The catheter should feel firmly seated in the bone (first confirmation of placement).
- Place the stylet in a sharps container. Always dispose of all sharps and biohazard materials from IO lines using standard biohazard practices and disposal containers. If using the Needle VISE 1-port sharps block, place it on stable surface and use a one-handed technique to dispose of the sharps.
- Place the EZ-Stabilizer dressing over the hub.
- Attach a *primed* EZ-Connect extension set to the hub; firmly secure it by twisting it clockwise.
- Pull the tabs off the EZ-Stabilizer dressing to expose the adhesive; apply to the skin.
- Aspirate for blood/bone marrow (second confirmation of placement). Inability to withdraw/aspirate blood from the catheter hub does not mean the insertion was unsuccessful. Consider attempting to aspirate after the flush. Site placement can also be confirmed by the ability to administer pressurized fluids, and noting the pharmacologic effects of medication administration after flow is established.
- Continue per the instructions below: patients responsive or unresponsive to pain.

NOTE: The leg should remain immobilized until the IO catheter is removed.
NOTE: In the unlikely event that the battery on the driver fails, clinicians may manually insert the needle set by penetrating the bone cortex with steady, firm pressure. Do NOT use excessive force, do NOT rock or bend the needle set during insertion.

Recommended anesthetic

Infant/child responsive to pain

- Observe the recommended cautions/contraindications to using 2% preservative- and epinephrine-free lidocaine (intravenous [IV] lidocaine)
- Confirm the appropriate lidocaine dose per institutional protocol. The usual initial dose is 0.5 mg/kg, not to exceed 40 mg.
- Prime the EZ-Connect extension set with lidocaine. (*Note that the priming volume of the EZ-Connect is approximately 1.0 mL.)* For small lidocaine doses, consider administering by carefully attaching the syringe directly to the needle hub (prime the extension set with normal saline).
- Slowly infuse the lidocaine over 120 seconds. Allow the lidocaine to dwell in the IO space for 60 seconds.
- Flush with 2-5 mL of normal saline.
- Slowly administer the subsequent lidocaine dose (half the initial dose) IO over 60 seconds. Repeat as needed (PRN).

- Consider systemic pain control for patients not responding to IO lidocaine.

Infant/child unresponsive to pain

- Prime the EZ-Connect extension set with normal saline.
- Flush the IO catheter with 2-5 mL of normal saline.
- Connect fluids if ordered; the infusion may need to be pressurized to achieve the desired rate.
- Assess for any signs of extravasation/complications.
- If the patient develops signs that indicate responsiveness to pain, refer back to the section above for "Infant/child responsive to pain."

2. **Adult Insertion Technique**: Clean the insertion site (use aseptic technique). Use providone-iodine swab and/or alcohol to clean the site prior to powering the EZ-IO into position.

3. Prepare the EZ-IO driver and needle set:
   a. Open the EZ-IO case.
   b. Remove the driver and one EZ-IO cartridge.
   c. Open the EZ-IO cartridge and attach the needle set to the driver (you should feel a "snap" as the small magnet connects).
   d. Remove the needle set from the cartridge.
   e. Remove the safety cap from the needle set. One way to remove the cap from the needle set (with the needle facing you) is to grasp the cap tightly and rotate clockwise to loosen and remove. Attempting to "pull" the cap off may remove the entire needle set from the driver – rotating counterclockwise will cause the catheter and stylet to separate.

4. Begin insertion of the EZ-IO Needle Set
   a. Holding the EZ-IO driver in one hand, stabilize the leg near the insertion site with the opposite hand. Make sure your hands and fingers are a safe distance from the path of insertion.
   b. Position the driver at the insertion site with the needle at a 90-degree angle to the surface of the bone. Power the needle set through the skin at the insertion site until you feel the needle set tip encounter the bone itself.
   c. At this point if there is any doubt that the needle set is not long enough, verify that you can see the 5 mm marking on the catheter itself (this is the mark closest to the flange). If this mark is not visible, you should abandon the procedure as the needle set may not be long enough to penetrate the IO space.

5. Continue to insert the EZ-IO.
   a. Apply firm and steady pressure on the driver and power through the cortex (hard, outer surface) of the bone, ensuring the driver is maintained at a 90-degree angle at all times.
   b. Stop when the needle flange touches the skin or a sudden decrease in resistance is felt. This indicates entry into the bone marrow cavity (intramedullary space).

6. Remove driver from the needle set.
   a. While supporting the needle set in one hand, gently pull straight up on the driver and lift away.
   b. Return the driver to its case.

7. Remove the stylet from the catheter. While grasping the hub firmly with one hand, rotate the stylet counterclockwise (unscrew the stylet from the catheter). Pull the stylet out of the catheter and consider placing it into the empty cartridge, now called the stylet shuttle. The stylet shuttle must then be placed in an FDA–approved biohazard container as soon as possible. Do not replace or attempt to "recap" the stylet.

8. Confirm proper EZ-IO catheter tip position. Proper placement of the IO catheter tip can be confirmed through any of the following:

   a. The IO catheter stands straight up at a 90–degree angle and is firmly seated in the tibial bone.

b. Blood at tip of the stylet (sometimes visible).
c. Aspiration of a small amount of bone marrow with a syringe.
(Extravasation) underneath the skin.

9. Attach the primed EZ-Connect or any standard luer lock extension set to the EZ-IO hub and then SYRINGE FLUSH the IO space with 10 mL of normal saline. Prior to any drug or fluid administration be certain to flush the EZ-IO catheter with 10 mL of fluid. A rapid syringe flush will "clear the pathway" allowing for an acceptable infusion rate.

10. You may administer 10 to 20 mg (1 to 2 cc) of 2% Lidocaine in adult patients who experience infusion-related pain. This may be repeated prn to a maximum of 60 mg (6 cc).

11. Following the administration of any IO medications, flush the IO line with 10 cc of IV fluid.

12. Initiate the infusion. A pressure infuser may be necessary to maintain adequate flow rates.

13. Document the procedure, time, and result (success) on/with the patient care report (PCR).

14. Notify ED staff of the EZ-IO insertion, since timely removal of trocar is important. The EZ-IO catheter must be secured in place with a standard dressing.

Removal of EZ-IO

1. The EZ-IO® catheter should be removed within 24 hours.
2. Either grasp the hub directly or attach a sterile syringe. The syringe will serve as a larger handle for the catheter hub and is preferred. Support the patient's extremity while rotating the catheter clockwise and gently pulling. Rotating the hub during removal reduces catheter to bone friction and will allow for an easier removal process. Once the catheter has been removed immediately place it in an approved biohazard sharps container.
4. Cover wound site with sterile dressing.

Note: Removal of the extension or fluid administration set, without proper protection of the EZ-IO hub (in the form of a sterile cap, port or extension set), could cause bleeding or infection.

Note: Maintaining a 90-degree angle while rotating the catheter will insure proper removal without complications.

Note: Be certain that you DO NOT ROCK the catheter while removing. Rocking or bending the catheter with a syringe may cause the catheter to separate from the hub.

Note: If hub-catheter separation occurs use an appropriate hemostat to grasp and gently remove the catheter in the same manner as suggested above (rotating while gently pulling).

Infusaport (Central Catheter)

Procedure:

1. Prepare infusion set.
2. Identify the Infusaport septum by palpating its outer perimeter.
3. Wear sterile gloves.
4. Observing aseptic technique, use iodine swab sticks to disinfect the skin in a circular fashion.
5. Attach a 10-ml. syringe filled with 5 ml of saline and a non-coring 90-degree (Huber) needle.
6. Flush the needle to remove any air.
7. Insert the needle into the Infusaport septum at a perpendicular angle.
8. Confirm needle placement by aspirating blood.
9. Inject the contents of the syringe to flush the port and catheter.
10. Draw back 8-10 ml of blood and discard the syringe.
11. Draw needed blood samples with a new syringe.
12. Discard needle, and connect infusion set.
13. Use an additional iodine swab to again disinfect around the injection site and needle.
14. Apply a bulky sterile dressing to stabilize the needle and secure it with adhesive tape.
15. Loop the infusion tubing and secure it to the chest with another piece of tape.

Interfacility Monitoring IV Pumps

Procedure:

1. The flow-rate will be ordered by the physician.
2. Request the facility to document the pump is leaving with the patient.
3. Insure the pump will work on battery when unplugged.
4. If the battery will not run the pump, replace the pump before transporting.
5. Insure the medical facility staff has explained the use and trouble shooting of the pump.
6. Plug the pump into the vehicle AC outlet and with the engine running, turn on the inverter.
7. The "battery in use" light on the pump should go out.
8. A yellow light in the center of the outlet will indicate the power is working properly.
9. An inverter that does not work, normally has a circuit breaker in line or on the inverter that is off.
10. An audible alarm will sound if a problem occurs. The flow will cease until the problem is corrected.
11. The following are common problems and solutions:

    - Air in the line (indicated on the screen):
        a. Place the pump on "hold" by pressing the HOLD/STOP/OFF button.
        b. Close the IV line and open the IV pump and look for air in the line.
        c. If the bubble is small, open the IV line and allow the bubble to move beyond the pump.
        d. If the bubble is large, insert a syringe into a hub along the IV line. Open the IV line and draw the bubble into the syringe as it passes.
        e. Close the pump door and press the START button.
        f. When all else fails, use a Dial-a-Flo® IV line extension or manually adjust the drip rate.

    - Line occlusion (indicated on the screen):
        a. This normally indicates a pinched IV line between the IV bag and the pump.
        b. Straighten the IV line and remove the occlusion.
        c. The patient's IV site may have become interrupted. Attempt to clear the line with a saline flush or insert a new catheter into another vein.
        d. Press the START button to resume flow.
        e. When all else fails, use a Dial-a-Flo® IV line extension or manually adjust the drip rate.

    - Low/dead battery (indicated on the screen):
        a. Plug the pump's power cord into the vehicle outlet and turn on the inverter.
        a. Get the patient to his/her destination and plug the cord into an AC outlet.
        b. When all else fails, use a Dial-a-Flo® IV extension or manually adjust the drip rate.

12. Monitor and record the flow-rate of the IV pump on the EMS report.
13. Do not change the flow rate setting on the pump without a physician's order.
14. Document any problems with the pump.
15. If the patient becomes unstable or shows signs of overdose, request orders to change the infusion rate.
16. If the patient becomes unstable, Divert to the nearest appropriate facility.
17. Calculate, prior to transport, the drip rate equivalent to the flow rate on the pump. If the pump fails, you can quickly disconnect the pump and hang a normal bag drip.

Interfacility Monitoring IV Pumps

Procedure: (Continued Page 2 of 2)

The following is a list of medications you may encounter being transferred with the patient via an IV pump.

dilitiazem (cardizem)	15 mg/hour	dopamine (intropin)	5 µg/kg/minute
Dobutamine HCl (dobutrex)	20 µg/kg/minute	Lidocaine HCl	4 mg/minute
esmolol hydrochloride (brevibloc)	200 µg/kg/min	magnesium sulfate	3 ml/minute
heparin	1600 units/hr	norepinephrine bitartrate (levophed)	4 µg/min
eptifibatide (integrillin)	2 µg/kg/min	phenylephrine (neo-synephrine)	180 µg/min
Nitroglycerin (tridil)			

Interfacility Monitoring of Non-Medicated IVs

Setting up an IV:

1. Prepare an IV solution with tubing.
2. Assist the provider performing the venipuncture by providing supplies such as dressing, tape, etc.

Monitoring of Non-Medicated IVs:

1. The EMT will be responsible for monitoring drip rates required to keep the vein from collapsing or clotting:
   - Microdrips should be set to 30 gtts/min.
   - Macrodrips should be set to 7-8 gtts/min.
   - Dial-A-Flo® extension sets are preset and should not be altered by the EMT.
   - IV pumps are preset and should not be altered by the EMT.
2. An EMT transporting a patient who has an IV complication will contact the emergency department, county EMS, or Coastal Communications.
3. Blood transfusion is an advanced life support outside the Paramedic scope of practice. Paramedics will transport patients receiving blood only when mandated by a physician and instruction is given prior to departure.
4. Potassium chloride (KCL) does not require cardiac monitoring for concentrations < 30 mEq/1000 ml IV bag (15 mEq/500 ml). Flow rates in excess of 30 mEq/hour or concentrations in excess of 30 mEq/1000 ml will require cardiac monitoring and will be considered ALS. All patients on KCL will be transported in an ALS ambulance.

IV Saline Lock

Procedure:

1. Flush a male IV adapter.
2. Attach the adapter to the catheter and flush the combination.
3. Initiate and secure an IV access.
4. Flush the lock with at least 3 ml of Sodium Chloride before and after administration of any medication.
5. The lock may be converted to a regular IV replacing the adapter with IV tubing or adding IV tubing with a needle.

Managing Amputated Parts

Procedure:

2. Gently remove gross contaminants by irrigating amputated parts with sterile saline or a moist, sterile sponge.
3. Do not attempt a thorough cleansing of the amputated part.
4. Place moistened, sterile 4 x 4s into a waterproof container.
5. Wrap the amputated part with moist 4 x 4s and place it into the waterproof container.
6. Place the sealed container into ice water or cold packs.
7. Transport the amputated part with the patient but out of the patient's sight.

MAST (military anti-shock trousers)

MAST trousers are a medical device that was initially designed to provide auto transfusion by compression of the abdomen and lower extremities.
Since it development there has been little evidence to support claims that this device actually auto transfused or improved mortality in patients suffering from hypovalemia.
Improvement in blood pressure is thought to be secondary to increased peripheral vascular resistance.
Evidence based medicine does demonstrate two areas of benefit:

1. The control of internal and external bleeding in areas which are covered by the garment.
2. To support and stabilize fractures of the pelvic girdle and lower extremities

Indication for use
a. Stabilization of the pelvis
b. Stabilization of lower extremity fractures
c. Compression of external bleeding
d. Intra-abdominal bleeding
e. Ruptured AAA
f. Spinal shock

Contraindications
a. CHF or Pulmonary edema
b. Cardiogenic shocks
c. Pregnancy
d. Head trauma

Complications
a. Lower extremity compartment syndrome
b. Diaphragmatic hernia
c. Pulmonary edema
Method of application

1. Assess patient thoroughly to identify all wounds and rule out PULMONARY EDEMA

2. Remove or cutaway clothing

3. Apply and size trousers to fit the patient
ensuring the waist section is inferior to the 12th rib
.
4. Attach the tubing to the male connectors on the trousers and
begin inflation.

5. Inflate the leg sections first followed by the abdominal section

6. Inflate all section until the Velcro cracks and air exhaust from the pop off valves.

7. Close all valves keeping the foot pump attached

8. Reassess vital signs and lung sounds

Mechanical Ventilator

Procedure:

1. Intubate patient.
2. Verify tube placement.
3. Attach the ventilator to an oxygen source.
4. Occlude the opening of the patient connector to insure the pop-off valve is working.
5. Set the ventilator to manufacturer's recommendations.
6. Attach the ventilator to the tube.
7. Auscultate for adequate breath sounds, and visualize for adequate chest rise. If inadequate, adjust tidal volume.

Use the trigger mechanism to hyperventilate or assist with spontaneous respiration,. Use caution when hyperventilating as this may cause gastric distention.

Medication Administration

Rationale:

This procedure has been established in an attempt to reduce medication administration errors. The following procedure is required for ***ALL*** medication administrations.

Assessment Checklist:

- Right drug
- Right dose
- Right time (and interval time)
- Right route
- Right patient
- Right documentation
- Contraindications

Procedure:

All medications are to be verified by another provider prior to administration. This shall be performed by the administrating paramedic verbalizing the name, dose, route, rate, and reason for administration. The 2nd provider, if a paramedic, is to confirm all information provided is correct. Both providers are to visualize the drug container. If any issues or concerns by provider #2 exits this must be addressed prior to administration. An EMT may perform the task of the 2nd provider, but shall only need to verify proper name and concentration of the medication to be administered. However, a paramedic should be used when available.

Nasogastric Tube Insertion

Procedure:

1. Contact Medical Control for physician orders, except cardiac arrest
2. This procedure is contraindicated with frontal head or facial trauma where the cribriform plate may be fractured.
3. Ready the proper size tube (adult 16 french/pediatric as per the Broselow Tape (6 - 16 french)), 60 ml syringe, water soluble lubricant, and tape.
4. Measure the tube from the stomach to the ear and then to the nose. (Note the mark on the tube.)
5. Lubricate the end of the tube with lidocaine gel.
6. It may also be advisable to spray the mouth and nose (of the conscious patient) with Cetacaine.
7. Insert the tube into the largest naris.
8. If resistance is felt, withdraw slightly and gently reinsert using a twisting motion to avoid the turbinate.
9. Do NOT FORCE the NG tube.
10. Advance until the mark noted above is at the naris opening.
11. The patient can assist by swallowing during insertion.
12. Verify tube placement by auscultating epigastric sounds while injecting 20-30ml's of air.
13. Tape the tube in place and note depth of tube on the run report.
14. Aspirate stomach contents and irrigate concomitantly, as ordered.

Nasal Atomizers

Purpose:

For delivery of medications intranasally when IV access is not available.

Medications to be used with Atomizer:

- Narcan
- Versed

Procedure:

- Apply medication to atomizer devices.
- Place atomizer approx. 1.5 cm into nostril.
- Briskly compress syringe to administer ½ of the total volume as atomized spray.
- Remove and repeat in the other nostril, so that all of the medication has been administered.
- Continue to attempt IV access for additional drug delivery.

Precautions:

- Damage to mucosa either from trauma or chronic cocaine use will reduce effectiveness of drug delivery.
- Patients with active Upper Respiratory Infections that have large amounts of mucous secretions, a bloody nose, or severe hypotension are *contraindicated* for this route of medication administration.

Nebulizer

Procedure:

1. Assemble a nebulizer, oxygen tubing, and mouthpiece (or face mask), mist chamber, and drug reservoir.
2. Add medicine to the reservoir and connect it with the mouthpiece or face mask.
3. Connect the oxygen supply and the set flow at 6-8 liters/minute.
4. Place the patient in a position of comfort and have the patient place the mouthpiece in their mouth.
5. Encourage the patient to breathe calmly, deeply and evenly until no more mist is formed in the nebulizer.
6. You may need to slowly increase the flow to the nebulizer to insure all medication is nebulized.
7. The treatment will be finished in 5 to 15 minutes.
8. Reassess respiratory status.
9. Discontinue the treatment if there is any adverse reaction such as light-headedness, a 20% increase in heart rate, extreme tremor, bronchospasm, or an increase in P.V.C.s.

Needle Cricothyrotomy

Procedure:

1. Identify the cricothyroid membrane, located anteriorly, between the thyroid cartilage and cricoid cartilage.
2. Clean the area well with Betadine solution or a providone-iodine swab stick.
3. Attach appropriate size IV catheter-over-the needle to a 6-12 ml syringe.
4. Insert IV catheter through the skin and cricothyroid membrane into the trachea.
5. Direct the needle at a 45-degree angle caudal (toward the feet) until a "pop" is felt.
6. Aspirate with the syringe. If air is easily returned, the needle is in the trachea.
7. Withdraw the needle while gently advancing the catheter downward into the position.
8. Attach the 15 mm adapter (from a 3.0 ET tube) to the needle hub.
9. Oxygenate the patient with 100% oxygen.
10. Secure the apparatus to the patient's neck.
11. Transport in emergency status as soon as possible. Adequate oxygenation can be maintained for 30-45 minutes. Ventilation cannot be adequately accomplished.

Neonatal Resuscitation

Procedure:

1. The APGAR score will be assessed at both 1 and 5 minutes after birth.
2. Resuscitate any infant with an APGAR < 7.
3. Clear the airway. Gently suction the mouth, then the nose with a bulb syringe.
4. If meconium is present, it should then be quickly aspirated by direct suctioning through an endotracheal tube. Suction pressure should not exceed 100 mmHg.
5. Suctioning is rapidly repeated until no more meconium is present.
6. If the endotracheal tube was used for meconium suctioning, reintubate with a new tube each time.
7. Do not ventilate the patient until all meconium is cleared.
8. The infant may then be ventilated with positive pressure.
9. Initiate breathing if the infant is apneic or the respiratory rate is slow and irregular.
10. Ventilate the infant with a bag valve mask using 100% oxygen at 40 breaths per minute with pressure applied to gently move the chest wall.
11. In an infant who has not yet taken a breath, over 40 cm H_2O pressure may be necessary to expand the lungs. In mildly asphyxiated infants this may produce a prompt increase in heart rate and the onset of regular, respiration.
12. Intubate and assist respiration if the heart rate and respiration have not reached normal within 2 minutes.
13. Maintain body temperature.

Peak Flow Meter

Procedure:

1. Place a disposable mouthpiece on the meter.
2. Set the indicator to the bottom of the scale.
3. Have the patient hold the meter and inhale deeply.
4. Have the patient make a tight seal on the mouthpiece and blow out as hard and fast as possible.
5. Document the peak flow indicated on the meter.
6. Provide any appropriate medical treatment.
7. Repeat the process and document any change.

Pediatric Resuscitation Tapes

Procedure:

1. Place the patient in a supine position.
2. Remove tape from package and unfold.
3. Place tape (face up) next to patient.
4. Place end of tape at the top of the patient's head.
5. Place the edge of one hand on the end of the tape.
6. Run the edge of your free hand down the tape.
7. Stop when your free hand is even with the heel of the patient's foot.
8. If patient is longer than the tape, stop here and use child or adult protocols.
9. Verbalize the color block (or letter) and weight range at which your hand has stopped.
10. If patient falls at a border, go to the greater marker.

Peripheral Venipuncture for Intravenous Infusion

Preparing the IV:

1. Prepare an IV solution, IV tubing, an appropriate size catheter, constricting band, disinfectant swab, gauze, band aid, tape or veniguard (optional), and arm board.
2. Open IV envelope at the edge where it is notched.
3. Check the IV bag for cloudiness and squeeze it for leaks.
4. Read the name of the solution.
5. Open IV tubing and connect all pieces of tubing.
6. Close control valve below the drip chamber.
7. Insert IV tubing into the IV solution bag portal.
8. Squeeze the drip chamber until it is half full of solution.
9. Uncap distal end of tubing and prevent contamination of the cap.
10. Open the IV tubing valve to allow the solution to flow through until all air bubbles are out of the tube.
11. Close the tubing valve and recap the distal end of tube.

Inserting the IV:

1. Use personal protective equipment including gloves and glasses (or face shield).
2. Carefully explain the procedure to the patient.
3. Locate a suitable venipuncture site.
4. Place the constricting band to halt venous return without obstructing arterial flow.
5. Palpate the veins for resilience and select a site.
6. Cleanse the site with increasing concentric circles.
7. Stabilize the vein distally with the rescuer's thumb.
8. Cannulate the vein.
9. Remove the needle and dispose it properly while compressing the vein proximal to the tip of the catheter to minimize bleeding.
10. Draw blood for the hospital.
11. Label the tubes appropriately.
12. Connect IV tubing to the catheter.
13. Remove the constricting band.
14. Open the IV clamp to assure free flow.
15. Set the IV drip rate for the medication or fluid use.

Securing the IV:

1. Cover the insertion site.
2. Secure the IV catheter with a loop of tape or the veniguard.
3. Loop the tubing back and secure it with another piece of tape or strip from the veniguard package.
4. Do not cover IV portals.
5. Recheck IV drip rate to insure it is flowing at the correct rate.

Troubleshooting the IV (if the IV is not working well):

1. Make sure the constricting band is off.
2. Check the IV insertion site for swelling and infiltration.
3. Check the IV tubing clamp to make sure it is open.
4. Check the drip chamber to insure it is half full.
5. Lower the IV bag below IV site and look for blood to return into the tubing.

Pleural Decompression

Procedure:

1. Assess the patient to insure the condition is a tension pneumothorax.
2. Continue to give the patient high-flow oxygen and ventilatory assistance.
3. Identify the second intercostal space midclavicular line.
4. Quickly prepare the area with a providone-iodine swabstick.
5. Make a one-way valve on a 14 gauge 2 1/2 inch IV catheter. Do not delay the procedure for this step.
6. Insert the catheter into the skin over the third rib and direct it just over the top of the rib into the interspace.
7. Insert the catheter to the hub or until air escapes.
8. Remove the needle and leave the catheter in place.
9. Secure the catheter.
10. Reassess lung sounds and patient's condition.

Pulse Oximetry

Procedure:

1. The pulse oximeter is used by turning the unit on and applying the monitoring clip to the patient's finger.
2. False readings may result if patients have carbon monoxide inhalation, false fingernails or are hypotensive.
3. The paramedic should assess the clinical condition of the patient and correlate it with the pulse oximeter readings.

Rapid Sequence Induction (RSI) for Intubation

Procedure:

1. Prepare for intubation, suctioning, and emergency cricothyrotomy.
2. Maintain cervical stabilization of the trauma patient.
3. Connect the patient to the cardiac monitor and oximeter.
4. Oxygenate with high flow oxygen. Manual ventilation may cause gastric distention, vomiting and aspiration.
5. Administer Versed, Etomidate, Succinylcholine, Atropine, or Fentanyl per drug manual.
6. Apply cricoid pressure.
7. Intubate the patient when the jaw becomes relaxed.
8. Stop intubation and ventilate by BVM if the intubation effort requires more than 30 seconds.
9. Ventilate patient by BVM until spontaneous respiration returns (usually 3 to 5 minutes) if unable to intubate.
10. Place bi-lumen or subglottic airway device if endotracheal intubation is unsuccessful and ventilation is inadequate.
11. Perform a cricothyrotomy if bi-lumen or subglottic airway device is unsuccessful and ventilation remains inadequate.
12. Treat bradycardia during intubation by temporarily halting intubation and hyperventilating the patient.
13. Apply the cervical collar and complete spinal precautions for transport as needed.
14. Perform spinal immobilization on all pediatric patients requiring intubation (for tube security).
15. If Etomidate was used for intubation Versed should be used for sedation.

Res-Q-Pod Device

The Res-Q-Pod is a device designed to be inserted between the mask and the bag or between the ET tube and the bag. The concept of Res-Q-Pod is to decrease passive flow of air from the mouth through the trachea to the lungs. That occurs after a chest compression. By eliminating this passive refilling of the lungs, negative intrathoracic pressure develops improving filling of the heart with blood and therefore coronary perfusion pressure with each subsequent chest compression. The American Heart Association has rated this device as IA intervention, meaning probably helpful, benefits outweigh the risks. This device also has a flashing light once activated that reminds the EMT/paramedic to compress the bag only every six seconds (10/minute).

Procedure:

1. Determine viability and potential of resuscitation.
2. Position the Res-Q-Pod between the mask and the bag.
3. Pull the adhesive off the red button at the top of the Res-Q-Pod and press the button to initiate the red light that times ventilations
4. Detach the Res-Q-Pod once return of spontaneous circulation has been clearly re-established.

Precautions/Contraindications:

Compressions **SHOULD NOT** be interrupted unless absolutely necessary

Spinal Immobilization

Assessment:

*Patients involved in any of the following mechanisms of injury **MUST** undergo immobilization immediately:*

- **Mechanism of Injury**

Axial load (diving), blunt trauma to the head or neck, high speed motor vehicle collision > 40 mph with or w/o rollover or ejection, recreational motor vehicle or bicycle accident, fall >3

*Patients displaying any of the following signs & symptoms related to any injury **MUST** undergo immobilization immediately: Complaints of Pain or Examination Tenderness of cervical spine & spinous process, Altered Patient Reliability (Mentation) due to trauma or intoxication, Significant Distracting Injury, Neurologic Deficiency Consistent with CSI, Age Factor =>65 & <8 years of age, Inability to rotate neck actively 45 degrees left & right*

- **Midline Cervical Pain or Tenderness**

Mid-line posterior cervical spine tenderness is present if the patient reports pain on palpation of the posterior midline neck from the nuchal ridge to the prominence of the first thoracic vertebra, or if the patient expresses pain with direct palpation of any cervical spinous process.

- **Evidence of Intoxication**

Patients should be considered intoxicated if they have a recent history provided by the patient or an observer of intoxicating ingestion to include ETOH or controlled or illicit substances, with evidence of intoxication on physical exam such as an odor of ETOH, slurred speech, ataxia, or behavior indicative of intoxication.

- **Altered Level of Alertness and Consciousness**

An altered level of alertness can include any of the following: a GCS score of 14 or less; disorientation to place, time or event; inability to recall three objects at five minutes; a delayed or inappropriate response to external stimuli; or alternative findings consistent with altered mentation.

- **Significant Distracting Injury**

A distracting injury is any condition that, in the examiner's judgment, could be producing enough pain so as to distract the patient from another, particularly cervical, injury. Such injuries may include a long bone fracture; a visceral injury; a significant laceration, degloving injury, or crush injury; large burns; gunshot wound to head, torso, pelvis or upper legs; concussive or explosive injury; or any other injury causing acute functional impairment

- **Neurological Deficit Consistent with CSI (Cervical Spine Injury)**

If the patient is reliable and without distracting injury, prehospital providers should proceed to a careful and complete neurological examination. This examination should include commonly accepted assessment means for consideration of motor or sensory deficits from spine injury. Any abnormal neurological examination finding(s), including loss of urethral or rectal sphincter control, should direct providers to proceed with spinal immobilization

- **Age Factors**

=> 65 years & < 8 years of age

- **Inability to rotate neck actively 45 degrees left & right**

Access the patient's ability to actively rotate their neck, both left & right, at a 45 degree angle. If, the patient is unable to perform this request, then c-spine precautions must be administered.

*Paramedic judgment may be utilized any time he/she feels the need to provide cervical protection and immobilization, even if the patient does not meet any of the above mentioned criteria

Immobilization of the Supine/Prone Patient:

Procedure:

1. Begin with manual immobilization of the head in a neutral, in-line position. Manual immobilization should be provided without interruption until complete patient immobilization is accomplished.
2. Contraindications to placement in an in-line position:
   a) Neck muscle spasm that prohibits neutral alignment
   b) Increased pain
   c) Onset of or increase of a neurological deficit such as numbness, tingling, or loss of motor ability
   d) Compromise of the airway or ventilation
   e) If the patient's injuries are so severe that the head presents with such misalignment that it no longer appears to extend from the midline of the shoulders
3. Size and apply the appropriate cervical collar. To size the collar, measure the distance, using your fingers, between the bottom of the jaw to the top of the trapezius muscle or according to manufacturer's recommendations. In the rare instance an appropriately sized cervical collar is not available, maintain manual immobilization and complete the immobilization process without a cervical collar.

4 While maintaining manual stabilization with a cervical collar in place:
   a) Position the backboard next to the patient so that the head of the backboard is approximately 1-2 feet above the patient's head.
   b) Log roll the patient onto the backboard in a supine position.
   c) Reposition patient, in order to center on backboard, by sliding patient in an upward motion (axial) on the board. Do not slide patient in a direct lateral position, as this may manipulate the spine.

5 Place cervical immobilization device in place.

6 Pad the space, as needed, between the back of the head and the backboard to prevent hyperextension of the cervical vertebrae.

7 Secure the patient's body to the board with straps.
   a) Immobilize the upper torso to prevent upward sliding of patient's body during movement and transportation. This is accomplished by bringing straps over the shoulders and across the chest to make an X.
   b) Additional straps must be placed to prevent side to side movement of the body on the board. This can be accomplished by placing straps across the iliac crests and mid-to-distal thigh or at the pelvis with groin loops.
   c) Arms should be placed at the patient's side to prevent movement of the shoulder girdle.
   d) Secure both feet together to prevent rotary movement of the legs.

e) Apply 1 or 2 inch tape directly across the forehead and secure the head while extending the tape under the backboard. DO NOT apply tape directly under the chin as this may create an airway obstruction. Tape may be placed across the surface of the semi rigid cervical collar.

Immobilization of the Standing Patient

Procedure:

1. Initiate manual immobilization of the head in a neutral in-line position. Approach the patient from the front to eliminate lateral movements.
2. Apply the appropriate cervical collar.
3. Position backboard behind standing patient.
4. Have rescuer holding manual stabilization of the head front the front of the patient pass off the stabilization to a second rescuer that will hold manual stabilization of the head from behind the patient, with arms on either side of the standing backboard. The third rescuer can hold the backboard in place during this switch.
5. Have two rescuers face the patient on either side of the backboard and grasp the board just under each of the patient's arms.
6. With one rescuer at each side of the backboard and the third holding the head, slowly lay the board down. A stop approximately half-way down will be needed to allow the rescuer holding the head to reposition hands.
7. When the patient is supine on the backboard, follow steps in previous section to secure patient to the backboard.

Immobilization with a Vest-type Extrication Device (KED)

Procedure:

1. Initiate manual in-line stabilization of the head.
2. Apply appropriate cervical collar.
3. Insert device behind the patient. Try to limit movement while positioning the device.
4. Position the device so it fits securely under the axils of the patient. Open the side flaps and place them around the patient's torso. Make sure the device is centered on the patient.
5. Position, connect and adjust the torso straps. Leave the uppermost strap loose until the head is immobilized.
6. Position and fasten each groin loop. Adjust one side at a time to prevent excess movement of the patient.
7. Place the pad behind the patient's head, filling the void to prevent hyperextension.
8. Position the head flaps. Fasten the forehead strap and apply the chin strap over the cervical collar.

Caution: The handles of the KED should not be used to lift, carry or move the patient.

Pediatric Immobilization

Procedure:

1. Begin with manual immobilization of the head in a neutral, in-line position, unless contraindicated. Manual immobilization should be provided without interruption until complete patient immobilization is accomplished.
2. Size and apply the appropriate cervical collar.
3. While maintaining manual stabilization with a cervical collar in place:
   a) Position the Pediatric immobilizer next to the patient so that the head of the immobilizer is approximately 6-12 inches above the patient's head.
   b) Log roll the patient onto the backboard in a supine position.
   c) Reposition patient, in order to center on immobilizer, by sliding patient in an upward motion (axial) on the immobilizer. Do not slide patient in a direct lateral position, as this may manipulate the spine.
4. Pad the space, as needed, between the back of the head and the immobilizer to prevent hyperextension of the cervical vertebrae.
5 Secure the patient's body to the immobilizer with the attached straps.
   a) Immobilize the upper torso to prevent upward sliding of patient's body during movement and transportation. This is accomplished by bringing straps over the shoulders and across the chest to make an X. The cross straps velcro into the strap that crosses the abdomen.
   b) Apply the attached straps across the chest, abdomen and legs. Take care not to leave any space between the straps and the sides of the patient. If the patient is so small that there is a space left between straps and sides of patient, take up space with pads (e.g. blanket, towel, etc.).
   c) Arms should be placed at the patient's side to prevent movement of the shoulder girdle.
6 Place cervical immobilization device in place.
7 Adjust the head piece to snugly fit around the patient's head. Fasten the forehead strap and apply the chin strap over the cervical collar.

Note:

If a pediatric immobilizer is not available, care should be taken to fill all voids between the patient and the straps with padding.

Surgical Cricothyrotomy
(10 years or greater)

Procedure:

1. Hyperextend the patient's neck (unless cervical spine injury is suspected).
2. Locate the cricothyroid membrane between the cricoid and thyroid cartilage.
3. Clean the area well with betadine solution or a providone-iodine swabstick.
4. Using a scalpel, make a vertical incision through the skin and expose the cricothyroid membrane.
5. Direct the scalpel posterior at a 90 degree angle to the cricothyroid membrane.
6. Make a horizontal incision through the cricothyroid membrane.
7. Careful hold the scalpel to limit the depth it can penetrate to prevent esophageal perforation.
8. Insert a hemostat or a needle cap through the opening to widen and maintain the pathway.
9. Do not remove the scalpel until another instrument is in the tract.
10. It is important to not aim the knife cephalad (toward the head), since injury to the vocal cords may occur.
11. Insert an appropriate sized endotracheal tube through the incision.
12. Insert the tube not more than 1-2 cm past the superior border of the cuff to avoid right mainstem intubation.
13. Ventilate the patient with a bag valve device at the highest available oxygen concentration.
14. Inflate the properly placed tube cuff with the appropriate amount of air.
15. Ensure proper tube placement.
16. Secure the tube.
17. Evaluate the neck for complications.

Tourniquet

Use of a tourniquet is appropriate when upper or applying direct pressure to the site of bleeding cannot control lower extremity hemorrhage. A tourniquet will be applied to any life threatening extremity hemorrhage

Procedure:

1. Utilize a Medical-Director approved tourniquet device designated for use in the management of hemorrhage

2. Use Personal Protective Equipment (PPE) appropriate for potential blood exposure

3. Visually inspect injured extremity and avoid placement of a tourniquet over joint, angulated or open fracture, stab or gun shot wound sites

4. Assess and document circulation, motor and sensation distal to injury site

5. Apply approved tourniquet device proximal to wound (usually 2-4 inches)

6. Tighten tourniquet incrementally to the least amount of pressure required to stop bleeding

7. Cover wound with an appropriate sterile dressing and/or bandage

8. Do not cover tourniquet (keep tourniquet visible)

9. Re-assess and document circulation, motor and sensation distal to tourniquet

10. Ensure receiving facility staffs are aware of tourniquet placement and time tourniquet placed

13. Document Estimated blood loss and time tourniquet applied

Twelve Lead E.C.G. Monitor

Placement of Electrodes:

1. RA - right arm, upper arm or upper chest near the shoulder
2. LA - left arm, upper arm or upper chest near the shoulder
3. RL - right leg or lower abdominal quadrant near the hip
4. LL - upper leg or lower abdominal quadrant near the hip
5. V1 - 4th intercostal space, immediately to the right of the sternum
6. V2 - 4th intercostal space, immediately to the left of the sternum
7. V4 - 5th intercostal space in the midclavicular line (Note: V4 must be placed prior to V3)
8. V3 - Placed between V2 and V4
9. V5 - 5th intercostal space in the anterior axillary line.
10. V6 - 5th intercostal space in the mid axillary line.

Vaginal Delivery of Child (Childbirth)

Procedure:

1. Use sterile technique.
2. Guide and control the birth, but do not retard or hurry delivery.
3. Check the neck for a circumferential umbilical cord as soon as the head delivers.
4. Suction the mouth and then the nose with a bulb syringe.
5. Suction again after delivery.
6. Stimulate the neonate by drying it and provide supplemental oxygen
7. Keep the neonate warm (98 degrees).
8. Perform an APGAR assessment.
9. If the APGAR < 7, begin neonatal resuscitation.
10. If the APGAR is 7-10, dry completely, wrap in sterile or clean blanket, and place on mother to conserve heat.
11. Clamp the cord in two places approximately 4-6 inches from the infant.
12. Cut the cord between the two clamps.
13. If the mother has excessive postpartum bleeding, gently massage the lower abdomen.
14. Do not delay transport for or attempt to deliver placenta.
15. If placenta delivers spontaneously, take it to the hospital.

Complications:

Prolapsed Cord Presentation:

1. Place the mother in Trendelenburg position.
2. Insert your gloved hand to apply counter-pressure against the head to allow blood flow through cord.
3. Elevate the mother's buttocks to alleviate pressure on the cord.
4. Provide emergency transportation to the nearest appropriate facility.

Breach Presentation:

1. If the presenting part of the fetus is not the head, place the patient in the Trendelenburg position.
2. Support presenting parts as they deliver, and coach the mother through a controlled delivery.
3. Provide emergency transportation to the nearest appropriate facility.

Circumferential (around the neck) Umbilical Cord:

1. Try to slip the cord gently over the head.
2. If you are unable to slip the cord over the head, clamp it 2 inches apart then cut.
3. Provide emergency transportation to the nearest appropriate facility.

Venipuncture for Blood Draw

Procedure

1. Obtain venous access using appropriate procedures
2. Prior to the administration of fluids or medications attach department approves devices for the evacuation of blood.
3. Evacuate a maximum of 10cc-12cc of blood.
4. Place blood in the blood tubes in the following order
5. Red Top
6. Purple Top
7. Blue Top (wrapped in cold pack)
   Note: Gently invert each blood tube once to allow for proper mixing of anti-coagulants.
8. Blood tubes must be properly labeled for hospital use:
9. Patients Name (last name first)
10. DOB
11. Date/time blood draw
12. Paramedic that had drawn the bloods initials
13. Blood specimen must be placed into a properly labeled bag.
14. Blood must be provided to patient care provider at local hospital.