



PROCEDURES GUIDELINES

SPEARFISH EMERGENCY AMBULANCE SERVICE, INC.

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AIRWAY & BREATHING

AIRWAY MANAGEMENT - GENERAL PRINCIPLES

The following protocols are recommended as a guide for approaching difficult medical and trauma airway problems. They assume that the responder is skilled in the various procedures, and will need to be modified according to training level. Advanced procedures should only be attempted if simpler ones fail and the technician is qualified. Individual cases may require modification of these protocols.

- * Use the simplest method of airway management appropriate to the patient.
- * Use a method with which you, as a responder, are comfortable.
- * Use meticulous suctioning to keep the airway clear of debris.
- * Monitor continuously to be sure that your treatment is still effective.

Understand the difference between various aspects of airway management. Each needs to be treated separately and requires different techniques and equipment.

Patency: how open and clear is the airway, free of foreign substances, blood, vomitus, and tongue.

Ventilation: the amount of air the patient is able to inhale and exhale in a given time.

Oxygenation: the amount of oxygen the patient is carrying to his tissues.

Medical Respiratory Arrest:

- Open airway using head tilt-chin lift or head tilt-neck lift.
- Apply Bag-Valve-Mask (BVM) with supplemental oxygen to ventilate.
- Insert nasopharyngeal airway or oropharyngeal airway if patency difficult to maintain; Suction as needed.
- Perform orotracheal intubation after initial airway management if arrest continues.

Medical Respiratory Insufficiency:

- Open the airway using most efficient method.
- Insert nasopharyngeal airway. (Suction as needed.)
- Apply supplemental O₂ by mask as needed.
- Assist respirations by BVM.
- Perform nasotracheal or orotracheal intubation if prolonged support is needed, or if airway requires continued protection from aspiration.

Traumatic Respiratory Arrest: **Open airway using jaw thrust maneuver, protecting neck.**

- Clear the airway using finger sweep; suction as needed.
- Have assistant apply in line stabilization to head and neck.
- Use hand to draw tongue and mandible forward if needed in patients with facial injuries.
- Use pocket mask (or BVM) for initial control of ventilation.
- Perform orotracheal intubation with in line stabilization. Pressure over larynx may make intubation easier. (Sellicks Maneuver)
- If intubation cannot be performed due to severe facial injury, and patient cannot be ventilated with mask: consider cricothyroid puncture only after contact with medical control.

Traumatic Respiratory Insufficiency:

- Open airway using jaw thrust maneuver, protecting neck; Apply continued in-line stabilization of head/ neck.
- Clear the airway using finger sweep; suction as needed.
- Use hand to draw tongue and mandible forward if needed with facial injuries.
- Insert nasopharyngeal airway.
- Administer high flow O₂ and assist ventilations if necessary.
- Attempt nasotracheal intubation to secure airway if needed and if no significant midface trauma.
- If patient deteriorates, and cannot be supported by less invasive means: Attempt orotracheal intubation with in line stabilization, or consider cricothyrotomy **only** if unable to intubate.

OPENING THE AIRWAY

Indications:

- Inadequate air exchange in the lungs due to jaw or facial fracture causing narrowing of air passage.
- Lax jaw or tongue muscles causing airway narrowing in the unconscious patient.
- Noisy breathing or excessive respiratory effort, which could be due to partial obstruction.
- In preparation for suctioning, assisted ventilation or other airway management maneuvers.

Precautions:

- ❖ For trauma victims, keep neck in midline and avoid flexion or hyperextension.
- ❖ For medical patients, neck extension may be difficult in elderly person with extensive arthritis and little neck motion. Do not use force, jaw thrust or chin lift without head tilt will be more successful.
- ❖ All airway maneuvers should be followed by an evaluation of their success; if breathing is still labored, a different method or more time for recovery may be needed.
- ❖ Children's airways have less supporting cartilage; overextension can kink the airway and increase the obstruction. Watch chest movement to determine the best head angle.
- ❖ Dentures should usually be left in place since they provide a framework for the lips and cheeks and allow more effective mouth-to-mouth or bag-valve-mask ventilation.

Procedure:

- To OPEN THE AIRWAY initially, choose method most suitable for patient.
- Assess ventilations.
- Relieve partial or complete obstruction, if present
- Assess oxygenation; use supplemental O₂ as needed.
- Choose method to MAINTAIN AIRWAY PATENCY during transport.
- Position patient on side (if medical problem).

Oropharyngeal airway;

- Choose size by measuring from mouth to ear margin.
- Depress tongue with tongue blade, or insert gently following the curvature of the pharynx.
- Insert gently with curve pointing upward.
- Advance to back of tongue, then turn to follow curve of airway. Move gently to be sure the tip is free in back of pharynx.
- In pediatric patients, depress tongue and insert airway with curve down to avoid injury to palate and pushing tongue posterior.

Nasopharyngeal airway;

- Lubricate tube with water-soluble lubricant
- Insert in right nostril, along floor of nose until flange is seated at nostril.
- Keep curve in line with normal airway curve.
- If you meet resistance or passage appears too narrow, try left side.
- Listen to breathing to be sure maneuver has resolved problem.
- Consider intubation.
- Resume ventilatory assistance and oxygenation as appropriate.

Above procedures:

- Listen to breathing to be sure maneuver has resolved problem
- Consider intubation to provide adequate airway.
- Consider cricothyrotomy **only** if unable to intubate.

Complications:

- Cervical spinal cord injury from neck hyperextension in trauma victim with cervical fracture.
- Neck fracture in older patients with rigid neck due to forced extension during airway maneuvers.
- Death due to inadequate ventilation or hypoxia.
- Nasal or posterior pharyngeal bleeding due to trauma from tubes.
- Increased airway obstruction from tongue following improper oropharyngeal airway placement.

- Aspiration of blood or vomitus from inadequate suctioning and continued contamination of lungs from upper airway.

Special Notes:

During transport, medical patients can be placed on their sides for effective airway control, use a flexed leg, arms, or pillows for support.

Nasopharyngeal airways are very useful for airway maintenance, and are underused. The nasal insertion provides more stability, the airway is better tolerated in partially awake patients, and it does not carry the risk of blocking the airway further like the stiff oropharyngeal airway.

Methods of opening the airway.

Head-tilt Chin Lift: From beside head, place one hand on forehead. Grasp lower edge of chin with fingers of other hand and lift chin forward. Teeth may come together.

Indications: Trauma or medical patient.

Jaw Thrust: Position yourself above patient. Place fingers of each hand under angle of jaw, just below ears, using forearms to maintain head alignment. Gently thrust angle of jaw forward.

Indications: Trauma or medical patient where neck extension is not possible.

AIRWAY OBSTRUCTION

Indications:

- Complete or partial obstruction of the airway due to a foreign body.
- Complete or partial obstruction due to airway swelling from anaphylaxis, croup or epiglottitis.
- Patient with unknown illness or injury who cannot be ventilated after **Opening the Airway** (previous protocol)

Precautions:

- ❖ Perform chest thrusts only in visibly pregnant patients and infants.
- ❖ Patients with partial airway obstruction can be very uncomfortable and vociferous. Abdominal or chest thrusts will not be effective and may injure the patient who is still breathing. Resist the temptation to attempt removal if obstruction is not complete but be ready to intervene if arrest occurs.
- ❖ Hypoxia from obstruction can cause seizures. Chest or abdominal thrusts can be ineffective until the patient becomes relaxed and the seizure ends.

Procedure:

Complete Airway Obstruction:

- Open the airway using head tilt-chin lift or jaw thrust.
- Attempt to ventilate using mouth to mask or by BVM
- If unable to ventilate, reposition and attempt again
- If airway remains obstructed, visualize with laryngoscope and remove any obvious foreign body.
- Reposition and attempt to ventilate
- If unable to ventilate, administer 5 sub-diaphragmatic abdominal thrusts.
- Reposition and attempt to ventilate
- Consider cricothyrotomy if obstruction above the cords is unrelieved.

When obstruction is relieved:

- Keep patient on side, sweeping airway to remove debris.
- Apply O2, high flow; reservoir mask.
- Assess adequacy of ventilation, and support as needed.
- Suction if needed.
- Restrain if combative

Partial Airway Obstruction:

- Place patient in position of comfort
- Apply O2, high flow by non-rebreather
- If patient is unable to move air, confused or deteriorating, visualize airway, remove foreign body or perform abdominal thrusts as noted above.

Complications:

- ❖ Brain damage and death from unrecognized or unrelieved obstruction
- ❖ Trauma from chest or abdominal thrusts
- ❖ Vomiting and aspiration after relief of obstruction

ASSISTING VENTILATION

Indications:

- Inadequate patient ventilation due to fatigue, coma, or other causes of respiratory depression.
- To apply positive pressure breathing in patients with pulmonary edema and severe fatigue.
- To ventilate patients in respiratory arrest.
- For use in conjunction with ET or Combitube to ventilate.
- To break laryngospasm.

Procedure:

- Open the airway.
- Check for ventilation.
- If patient is not breathing, perform 2 quick breaths, and check pulse. Begin CPR as needed.
- If pulse is present, but patient is not breathing, Attach O2 to BVM.
- Position yourself above patient's head, continue to hold airway position, seat mask firmly on face, and begin assisted ventilation.
- Watch chest for rise, and feel for air leak or resistance to air passage. Adjust mask fit as needed.
- If patient resumes spontaneous respirations, attach mask strap and continue to administer supplemental oxygen. Intermittent assistance with ventilation may still be needed.

Complications:

- ❖ Inadequate ventilations due to poor seal between patient's mouth and ventilatory device.
- ❖ Gastric distention, possibly causing vomiting, may require placement of a nasogastric or orogastric tube.
- ❖ Pneumothorax in children

Special Notes:

Flip the pocket mask so the narrow end is toward the chin for children and cover both nose and mouth while ventilating.

Assisted ventilation will not hurt a patient, and should be used whenever the breathing pattern seems shallow, slow, or otherwise abnormal. Do not be afraid to be aggressive about assisting ventilations, even in patients who do not require or will not tolerate intubation.

CLEARING AND SUCTIONING THE AIRWAY

Indication:

- Trauma to the upper airway, with blood, teeth, or other material causing partial obstruction.
- Vomitus, food or other foreign material in airway.
- Excess secretions or pulmonary edema fluid in upper airway or lungs (with endotracheal tube in place).
- Meconium or amniotic fluid in mouth, nose and oropharynx of newborn.

Precautions:

- Suctioning, particularly through endotracheal tubes, always risks suctioning the available oxygen as well as the fluid from the airway. Limit the suction time to a few seconds while the catheter is being withdrawn.
- This precaution should NOT be followed when vomitus or other material continues to well up and completely obstruct airway. Then suctioning must be continued until an airway is reestablished.
- Use equipment large enough for the job at hand. Large amounts of particulate matter require open-ended suction using connecting tubing.
- The catheter and-tubing will require frequent rinsing with water or saline to permit continued suction. Have a bottle of water or saline at hand before you begin. Use gauze to remove large material from the end of the catheter.

- Avoid **inserting** a suction catheter with the suction functioning. Suction only on **withdrawal** of the catheter.

Technique:

- Open airway and inspect for visible foreign material.
- Turn patient on side, if possible, to facilitate clearance.
- Remove large or obvious foreign matter with gloved hands. Sweep finger ACROSS posterior pharynx and clear material out of mouth.
- Attach suction machine.

Suction of oropharynx:

- Attach tonsil tip (or use open end for large amounts of debris).
- Ventilate and oxygenate the patient prior to the procedure as needed.
- Insert tip into oropharynx under direct vision, with sweeping motion.
- Continue intermittent suction interspersed with active oxygenation by mask. Use positive pressure ventilation if needed.
- If suction becomes clogged, dilute by suctioning water from a glass to clean tubing. If suction clogs repeatedly, use connecting tubing alone, or manually remove large debris.

Catheter suction of endotracheal tube:

- Attach suction catheter to tubing of suction device (leaving suction end in sterile container).
- Hyperventilate patient 4-5 times rapidly.
- Detach bag from endotracheal tube and insert sterile tip of suction catheter without suction.
- When catheter tip has been gently advanced as far as possible, apply suction and withdraw catheter slowly.
- Rinse catheter tip in sterile water or saline.
- Hyperventilate patient before each suction attempt.

Complications:

- ❖ Hypoxia due to excessive suctioning time without adequate ventilation between attempts.
- ❖ Persistent obstruction due to inadequate tubing size for removal of debris.
- ❖ Lung injury from aspiration of stomach contents due to inadequate suctioning.
- ❖ Asphyxia due to recurrent obstruction if airway is not monitored after initial suctioning.
- ❖ Trauma to the posterior pharynx from forced use of equipment.
- ❖ Vomiting and aspiration from stimulation of gag reflex.
- ❖ Induction of cardiorespiratory arrest from vagal simulation.

Special Notes:

Bulb suction should be used on the newborn. Consider intubation if meconium is present and a depressed newborn is delivered.

Patients with pulmonary edema may have endless frothy secretions. Be sure to oxygenate and assist ventilations even though you might be tempted to suction continuously.

You will note that complications may be caused both by inadequate and overly vigorous suctioning. Technique and choice of equipment are very important. Choose equipment with enough power to suction large amounts rapidly to allow time for ventilation. Proper airway clearance can make the difference between a patient who survives and one who dies. Airway obstruction is one of the most common treatable cause of prehospital death.

CPAP - CONTINUOUS POSITIVE AIRWAY PRESSURE

Continuous Positive Airway Pressure (CPAP) has been shown to rapidly improve vital signs, gas exchange, the work of breathing, decrease the sense of dyspnea, and decrease the need for endotracheal intubation in the patients who suffer from shortness of breath from congestive heart failure and acute cardiogenic pulmonary edema. CPAP is also shown to improve dyspnea associated with pneumonia, chronic obstructive pulmonary disease (asthma, bronchitis, emphysema). In patients with CHF, CPAP improves hemodynamics by reducing preload and afterload.

Indications: Dyspnea / Hypoxemia secondary to congestive heart failure, acute cardiogenic pulmonary edema, pneumonia, chronic obstructive pulmonary disease (asthma, bronchitis, emphysema) **and:** Any patient who is complaining of shortness of breath for reasons other than pneumothorax

- a. Is **alert and oriented**
- b. Has the ability to maintain an open airway (GCS>10)
- c. Has a respiratory rate greater than 25 breaths per minute
- d. Has a systolic blood pressure above 90 mmHg
- e. Uses accessory muscles during respirations

Contraindications: Pneumothorax, Respiratory arrest, Agonal respirations, Unconscious, Shock associated with cardiac insufficiency, Penetrating chest trauma, Persistent nausea/vomiting, Facial anomalies / stroke obtundation / facial trauma, Has active upper GI bleeding or history of recent gastric surgery, Patient with tracheostomy.

Procedure: Make sure the patient does not have a pneumothorax! Confirm bilateral breath sounds.

- Place patient in a sitting position. Assess vital signs and SpO2 q5 min. Attach heart monitor and pulse oximeter. If BP <90 systolic contact Medical Control prior to beginning CPAP. Use 5-10cmH2O.
- Explain the procedure to the patient:
 - i. Patient requires “verbal sedation” to be used effectively.
 - a. Example: “You are going to feel some pressure from the mask but this will help you breathe easier.”
 - ii. Place delivery device over mouth and nose.
 - iii. Instruct patient to breath in through their nose slowly and exhale through their mouth as long as possible (count slowly and aloud to four then instruct to inhale slowly).
 - o Check for air leaks.
 - o Treatment should be given continuously throughout transport to ED.
 - o Continue to coach patient to keep mask in place and readjust as needed.
 - o If respiratory status / level of consciousness deteriorate, remove device and consider bag valve mask ventilation and/or endotracheal intubation (see intubation protocol).

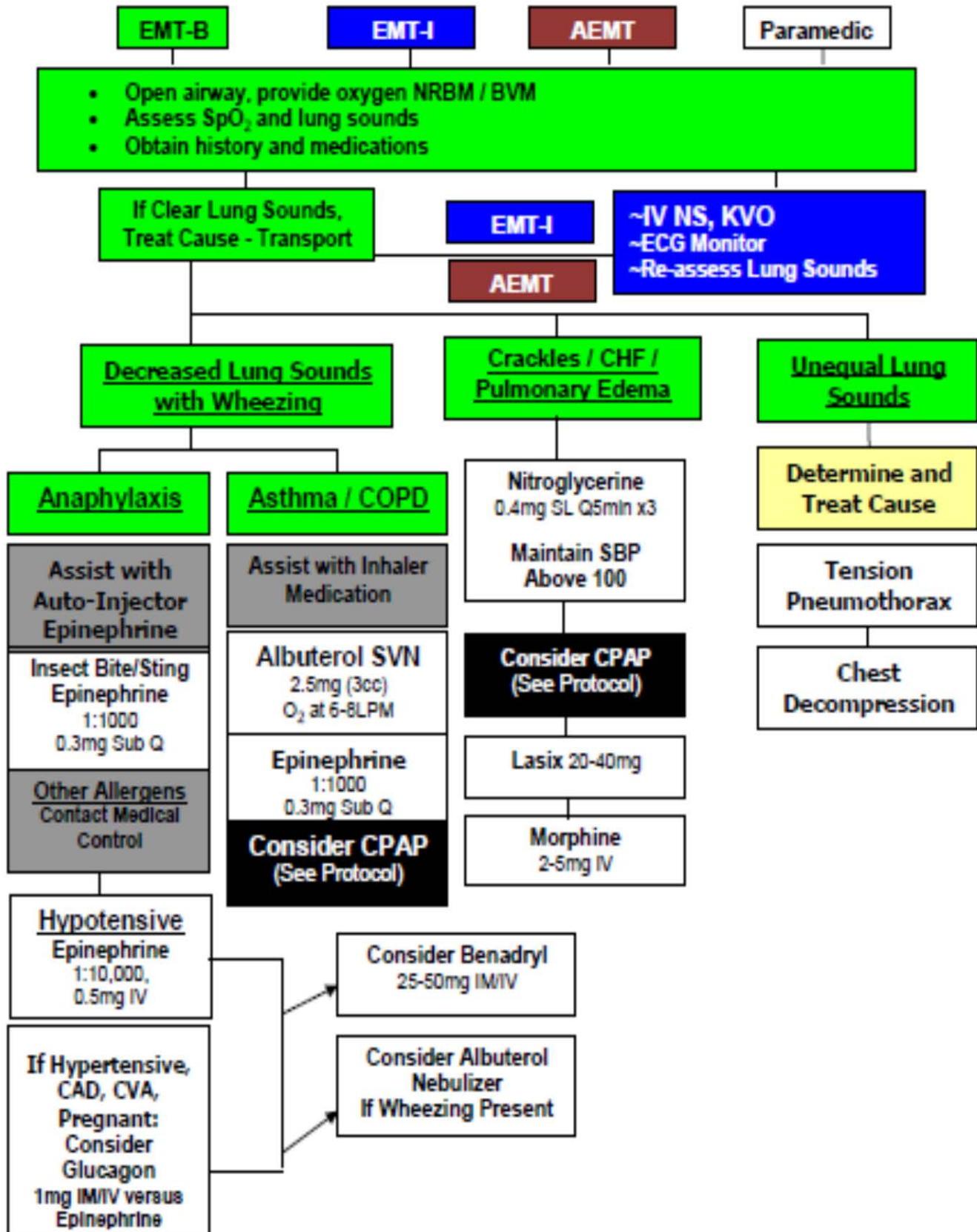
Documentation on the patient care record should include:

- | | |
|-------------------------|---------------------------|
| a. CPAP level (10cmH2O) | d. Vital Sign q 5 minutes |
| b. FiO2 (100%) | e. Response to treatment |
| c. SpO2 q 5 minutes | f. Any adverse reactions |

Special Notes: CPAP should not be used in children under 12 years of age. Advise receiving hospital as soon as possible so they can prepare for the patient’s arrival. Do not remove CPAP until hospital therapy is ready to be placed on the patient **UNLESS** the airway becomes blocked **OR** the patients’ level of consciousness deteriorates.

Monitor patient for gastric distension which may lead to vomiting.

RESPIRATORY DISTRESS - SPONTANEOUS BREATHING



BOUGIE ASSISTED SURGICAL CRICOTHYROTOMY**Introduction:**

- Surgical cricothyrotomy is a difficult and hazardous procedure that is to be used only in extraordinary circumstances as defined below. The reason for performing this procedure must be documented and submitted for review to the EMS Director within 24 hours. Surgical cricothyrotomy is to be performed only by paramedics trained in this procedure.
- An endotracheal tube introducer (“**bougie**”) facilitates this procedure and has the advantage of additional confirmation of tube position and ease of endotracheal tube placement. If no bougie is available the procedure may be performed without a bougie by introducing endotracheal tube or tracheostomy tube directly into cricothyroid membrane.
- Given the rarity and relative unfamiliarity of this procedure it may be helpful to have a medical consult on the phone during the procedure. Consider contacting base for all cricothyrotomy procedures. Individual agency policy and procedures apply and providers are responsible for knowing and following these policies.
- Remember the distance to the carina is very short. Care must be taken not to allow the tube to slip into the right mainstem bronchus if using an ET tube for passage through the cricothyroid space.

Indications:

- A life-threatening condition exists **AND** advanced airway management is indicated **AND** you are unable to establish an airway or ventilate the patient by any other means.

Contraindications:

- ❖ Surgical cricothyrotomy is contraindicated in patients less than 12 y/o for anatomic reasons.

Technique:

- Position the patient supine, with in-line spinal immobilization if indicated. If cervical spine injury not suspected, neck extension will improve anatomic view.
- Using an aseptic technique (betadine/alcohol wipes), cleanse the area.
- Stabilize the larynx with the thumb and middle finger of your left hand and identify the cricothyroid membrane, typically 4 finger-breadths below mandible.
- Using a scalpel, make a 3 cm centimeter vertical incision 0.5 cm deep through the skin and fascia, over the cricothyroid membrane. With finger, dissect the tissue and locate the cricothyroid membrane.
- Make a horizontal incision through the cricothyroid membrane with the scalpel blade oriented caudal and away from the cords.
- Insert the bougie curved-tip first through the incision and angled towards the patient’s feet. If no bougie available, Insert the hemostat with the handle directed towards the patients feet. Spread the hemostat to dilate the incision. Scalpel handle may be used to hold incision open.
- Lift caudal edge of incision to visualize and introduce the ETT directly into trachea.
- Advance the bougie into the trachea feeling for “clicks” of tracheal rings and until “hang-up” when it cannot be advanced any further. This confirms tracheal position.
- Advance a 6-0 endotracheal tube over the bougie and into the trachea. It is very easy to place tube in right mainstem bronchus, so carefully assess for symmetry of breath sounds. Remove bougie while stabilizing ETT ensuring it does not become dislodged.
- Ventilate with BVM and 100% oxygen.
- Confirm and document tracheal tube placement as with all advanced airways: ETCO₂ as well as clinical indicators e.g.: symmetry of breath sounds, rising pulse oximetry, etc.
- Secure the ET tube with ties or tape.
- Observe for subcutaneous air, which may indicate tracheal injury or extra- tracheal tube position.
- Continually reassess ventilation, oxygenation and tube placement. Apply 4X4 dressings to control bleeding around incision site.

Complications:

Respiratory arrest and patient demise due to:

- ❖ Severity of patients' airway injury
- ❖ Cricothyrotomy procedure, which takes too long.
- ❖ Bleeding into airway or soft tissue after tube insertion
- ❖ Subcutaneous air due to improper tube or catheter positioning, along with positive ventilation.
- ❖ Perforations of the esophagus from penetration by the scalpel

COMBITUBE[®] /ESOPHAGEAL TRACHEAL DOUBLE LUMEN AIRWAY

The Combitube[®]/Esophageal Tracheal Double Lumen Airway is used when the placement of an endotracheal tube cannot be accomplished. Combitube placement is a skill that can be performed by all levels of providers.

Indications:

- Adult patients in cardio/respiratory arrest
- Adult patients > 5ft.

Contraindications:

- Intact gag reflex
- Patients < 5 feet in height
- Known esophageal disease
- Caustic substance (acid or lye) ingestion
- Allergy or sensitivity to latex (The pharyngeal balloon contains latex.)

Precautions:

Take appropriate universal precautions, including facial protection, as expulsion of stomach contents can occur through the #2 tube if the initial placement is in the esophagus.

May be used in trauma, but take care to prevent neck movement.

Cardiac arrest patient needing defibrillation, initial defibrillation should not be delayed for Combitube[®] insertion.

Pulse oximetry, in states of low perfusion such as cardiac arrest, may be unreliable.

Procedure:

- Open the airway and suction mouth and oropharynx.
- Begin positive pressure ventilation with 100% oxygen and oral airway. Hyperventilate for at least 2-3 minutes prior to inserting Combitube[®]. Give ventilations slowly, over 1.5-2 seconds.

While the patient is being ventilated, assemble the Combitube[®] as follows (syringes are pre-drawn to appropriate volumes):

- Attach large syringe to the blue cuff, labeled #1 (100 cc); small syringe to the white cuff, labeled #2 (15 cc).
- Test the device by inflating both cuffs and removing syringes from check valves.
- Withdraw the air from both cuffs and leave assembled to speed insertion.
- Attach mask elbow (fluid deflector) to the shorter (#2) white tube.
- Lubricate tube tip and pharyngeal balloon well with water-soluble jelly. Move to patient's head.
- Place the head in a neutral position. Grasp the lower jaw and tongue between the thumb and fingers. Place the tip of the Combitube[®] into the mouth, aligning it along the midline of the mouth.
- Slide the tip GENTLY along the palate and posterior surface of the oropharynx. Use a curving motion to guide the tube inward and downward. Advance the tube until the upper teeth or gums are aligned between the two black rings.
- Do not force the tube. If resistance is met, withdraw the tube, reposition the head and reattempt.
- If unable to place the tube within 30 seconds, hyperventilate patient for 1-2 minutes and reattempt.
- Inflate large pharyngeal balloon (blue #1 cuff) with 100 cc of air.
- Inflate distal balloon (white #2 cuff) with 15 cc of air.
- Begin ventilating through the longer blue tube (#1).

Assess placement by:

- Observing the chest rise and fall.
- Listening for bilateral lung sounds (midaxillary).
- Listening over epigastrium for air gurgling in stomach.
- If there are bilateral lung sounds, absent stomach sounds, and good chest rise, this indicates esophageal placement. Continue ventilating with 100% oxygen through the #1 tube.

If chest rise and lung sounds are absent, and/or if air is heard gurgling in the stomach, remove mask elbow and move ventilation device to the shorter tube (#2), and reassess placement as above.

If there are bilateral lung sounds, absent stomach sounds, and good chest rise while ventilating through the #2 tube, this indicates tracheal placement.

Once tube placement is confirmed, **secure tube**.

Hyperventilate patient for 2-3 minutes to correct acidosis and hypoxia.

Subsequently, ventilate once every 6-8 seconds. Each ventilation should be given over 1 second.

Additional assessment adjuncts, if available:

- Pulse oximeter: low readings may indicate APPROVED ventilations. Falling readings may indicate incorrect ventilation port.
- Direct visualization with laryngoscope.
- End-tidal CO₂ detector: lack of color change may indicate incorrect ventilation port.

If tube placement cannot be determined:

- Remove the Combitube® and ventilate patient using oral or nasal airway.
- If the device is placed in the esophagus, the #2 tube should be used to relieve gastric distention:
- Remove mask elbow and insert the stomach catheter (provided) into the #2 tube, advancing it to the first black line. If relief is not obtained, continue inserting to the second black line. The goal is to remove air from the stomach. Removal of stomach contents is not necessary.
- The stomach catheter may be connected to a suction unit placed on LOW suction (portable or installed units) for several minutes. Continuous suction should not be used.

Removal Procedure:

- The Combitube should not be removed unless:
- Tube placement cannot be determined
- The patient no longer tolerates the tube (begins to gag)
- The patient vomits past either the distal or pharyngeal balloon
- There is a palpable pulse and the patient begins breathing on own
- A Physician or Paramedic is present to place an ET tube.

Special notes:

There may be occasions following the insertion of the Combitube® where auscultation of breath sounds is negative AND gastric insufflation is negative. This may result from advancing the Combitube® too deep into the airway, causing the pharyngeal balloon to push the epiglottis over the tracheal opening. This essentially creates a partial airway obstruction, making ventilation difficult. If this occurs, deflate the No. 1 pilot (pharyngeal) balloon, pull the Combitube® approximately 2-3 cm out of the patient's mouth and re-inflate the pharyngeal balloon. This will reseat the pharyngeal balloon higher in the airway. If auscultation of breath sounds is now positive, and auscultation of gastric sounds is negative, continue ventilating. It is normal for the Combitube® to rise slightly out of the mouth as the pharyngeal balloon is being inflated. Do not attempt to prevent the Combitube® from rising while that balloon is being inflated. Remove any Combitube if you cannot determine which port is appropriate or if ventilation becomes more difficult after insertion.

The Combitube® should be stored in its original container. This assures that all necessary components are present, protects the distal and pharyngeal cuffs, and provided proper pre-filled syringe volumes.

The Combitube® may be used with an oxygen-powered resuscitator, a bag-valve-mask, or an automatic transport ventilator.

If air leaks around the pharyngeal balloon, up to 20 cc of air may be added to it (#1 pilot balloon). Do not add additional air to the distal cuff (#2 pilot balloon).

The Combitube® must be left in place when a patient is pronounced in the field.

The Combitube® is a single-use device and should be discarded after use.

Upon arrival at the medical facility, the large syringe should be brought into the ER to facilitate the decompression of the pharyngeal balloon for ET intubation.

NASOTRACHEAL INTUBATION

Purpose: To provide the method of “Blind” nasotracheal intubation to patients that may require advance airway procedures.

Indications:

- Spinal cord injury
- Mouth cannot be opened due to clenched teeth or a fractured jaw
- Anatomy that will not allow oral tracheal intubation.
- For nasotracheal intubation the patient must be breathing with severe respiratory distress.

Precautions: Nose fractures, Possible basilar skull fracture, Deviated nasal septum, People on anti-coagulants

Procedure:

Equipment needed:

Nasotracheal E.T. tube, viscous lidocaine, and 10cc. Syringe.

- Identify and verify the patients’ need for “Blind” nasotracheal intubation.
- Maintain the patient airway by either BVM or NRB with 100% oxygen.
- Place the patient head in a semi-sniffing position if no c-spine precautions are indicated.
- If C-spine precautions are indicated, maintain the head and neck in the neutral position.
- Look at the nose and nares for possible complications.
- Lube the E.T. with a generous amount of KY jelly.
- Insert the tube into the nostril with flanged end of the tube along the floor of the nostril facing the nasal septum.
- Gently guide the tube into the posterior pharynx, while listening for breaths. The louder the breath the closer to the tube is to the trachea.
- If no breaths are heard, check to see if the patient is breathing or you may be in the esophagus. Draw back on the E.T. tube and listen for breaths again.
- When the patient takes a breath, slide the E.T. tube into the trachea in a fast motion. The patient may cough or gag at this point. Assure them that they are OK.
- Slide the tube to the point past the vocal cords. Hold the E.T. tube in place.
- Inflate the cuff of the E.T. tube and check for proper placement with lung sounds and epigastric sounds.
- Ventilate the patient with BVM and 100% oxygen.
- Secure the E.T. tube in place using tape or other methods of securing an E.T. tube.

A C-collar may be placed on the patient to help keep the ET tube in place.

Contact Medical Control and notify them of that a nasal intubation was performed in the field.

OROTRACHEAL INTUBATION**Indications:**

- Patient with persistent hypoxia and hypoventilation despite initial simple airway maneuvers and adjuncts.

Patient requiring airway protection:

- To prevent aspiration of gastric contents, upper airway secretions, or bleeding.
- To suction secretions and maintain airway patency.
- To administer drugs during resuscitation for absorption through the lungs.
- To allow more effective CPR.

Precautions:

- Do not use intubation as the initial method of managing the airway in an arrest.
- Oxygenate prior to intubation (accomplish with BVM as needed).
- Nasotracheal intubation may be the preferred technique in the breathing patient. Oral intubation with in-line stabilization of the cervical spine is the best alternative in the non-breathing trauma patient. Cricothyroid puncture and trans-tracheal jet ventilation may be indicated in a traumatic respiratory arrest if intubation is not successful.
- Never lever the laryngoscope against the teeth. The jaw should be lifted with direct upward traction by the laryngoscope.
- Prepare suction beforehand. Vomiting is particularly common when the esophagus is intubated.
- Intubation should take no more than 15-20 sec to complete: do not lose track of time. If visualization is difficult, stop and re-ventilate before trying again.

Procedure:

- Assemble the equipment while continuing ventilation
- Choose tube size (see Table last page of protocol) - Introduce the stylette and be sure it stops 1/2" short of the tube's end.
- Assemble laryngoscope and check light.
- Connect and check suction.
- Lubricate tube with water-soluble lubricant.
- Position patient: neck flexed forward, head extended back. Back of head should be level with or higher than back of shoulders.
- Give a minimum of 4 good ventilations before starting procedure.
- Insert laryngoscope to right of midline. Move it to midline, pushing tongue to left and out of view.
- Apply pressure with the blade (no levering) to expose posterior pharynx.

Identity epiglottis: tip of curved blade should sit in vallecula (in front of epiglottis), straight blade should slip over epiglottis. Sellick maneuver (cricoid pressure) by assistant may improve cord visualization.

- With gentle pressure to straighten the airway, identify trachea from arytenoid cartilage's and vocal cords.
- Insert tube from right side of mouth, along blade into trachea under DIRECT VISION.
- Advance tube so cuff is 1-1.5' beyond cords. Ventilate and watch for chest rise. Listen for sounds over stomach (should not be heard) and lungs and axillae.
- Inflate cuff with 7-8 ml air.
- To avoid accidental extubation - ALWAYS maintain control of tube by hand until secured with a tube restraint.
- Before securing tube, consider a bite block to prevent patient's teeth from damaging tube.
- Re-auscultate over stomach, both sides of chest and axillae.

Procedures Guidelines

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- Note proper tube position (21 cm women, 23 cm men) and secure tube with tape or ties.

In all cases where an ET tube has been placed, **two** methods will be used to confirm tube placement;

- One method shall be direct auscultation over the stomach and bilateral chest wall.
- The second method will be the use of an end-tidal CO2 detector, Bulb tube device or Syringe tube device.

Familiarization with the end-tidal CO2 detector should be maintained reference pedi vs adult sizes, fluids down tube, length of usage, etc.

Fogging of the ET tube, while it is helpful in assessing placement, is not 100% reliable and should **not** be used as one of the primary methods of confirming tube placement.

<i>OROTRACHEAL TUBE SIZE</i>	
Age	Endotracheal Tube
Premie	2.5-3.0
Newborn	3.0-3.5
6 mos.	3.5
18 mos.	4.0
3 yrs.	4.5
5 yrs.	5.0
8 yrs.	6.0 cuffed
10-15 yrs.	6.5-7.0 cuffed
Adult	7.0-9.0 cuffed

Complications:

- ❖ **Esophageal intubation:** particularly common when tube not visualized as it passes through cords. The greatest danger is in not recognizing the error. Auscultation over stomach during trial ventilations should reveal air gurgling through gastric contents with esophageal placement. Also, make sure your patient's color improves, as it should when ventilating.
- ❖ **Intubation of right main-stem bronchus:** be sure to listen to chest bilaterally.
- ❖ **Upper airway trauma** due to excess force with laryngoscope or to traumatic tube placement.
- ❖ **Vomiting and aspiration** during traumatic intubation or intubation of patient with intact gag reflex.
- ❖ **Cervical spine fracture** in patients with arthritis and poor cervical mobility.
- ❖ **Hypoxia** due to prolonged intubation attempt.
- ❖ **Cervical cord damage** in trauma victims with unrecognized spine injury.
- ❖ **Ventricular arrhythmias** or fibrillation in hypothermia patients from stimulation of airway.
- ❖ **Induction of pneumothorax**, either from traumatic insertion, forceful bagging, or aggravation of underlying pneumothorax.

Special Notes:

Orotacheal intubation can be accomplished in trauma victims if an assistant maintains in-line stabilization of the cervical spine and keeps the neck in neutral position. Careful visualization with the laryngoscope is needed.

REMEMBER: Endotracheal intubation is **NOT** the procedure of choice in the first few minutes of a resuscitation. It is secondary procedure only. Most persons can be adequately ventilated with BVM with oropharyngeal or nasopharyngeal airway.

Difficult intubations can occasionally be made easier by continuous pressure placed over the thyroid and cricoid cartilages moving the vocal cords posteriorly into view (Sellick Maneuver).

Do not be overly aggressive and quick to intubate in trauma victims with upper airway trauma.

If you are able to manage secretions and ventilate, intubation is often not required and the complications may outweigh the advantages if your hand is not forced.

PEDIATRIC Precautions:

- Ventilate at age-appropriate rates. Do not hyperventilate
- If the intubated patient deteriorates, think "DOPE"
 - **D**islodgement
 - **P**neumothorax
 - **O**bstruction
 - **E**quipment failure (no oxygen)

Use exposure precaution techniques for all intubations.

- Reconfirm and document correct tube position after moving patient and before disconnecting from monitor in ED
- Unsuccessful intubation does not equal failed airway management. Many patients cannot be intubated without paralytics. Use King airway or BVM ventilations if 2 attempts at intubation unsuccessful.

INTUBATION & SEDATION - QUICK REFERENCE GUIDE

YES	NO	Pre-event Equipment Checklist for Intubation
		Mallampati Classification (if possible)
		AIRWAY Assessment — Mouth Opening (at least two fingers width) - Cervical mobility
		IV or IO patent
		Cardiac Monitor / Pulse Oximeter / Automatic blood pressure cuff / End-tidal CO₂ monitor
		BVM with Oxygen / Suction (confirm working)
		Endotracheal Tubes / Stylet / Laryngoscope Handle & Blades / 10 mL syringe / Tube Holder

ADULT Intubation & Sedation Guidelines

Pre-oxygenate	Pre-oxygenate with 100% oxygen by mask. Assist ventilations as needed. Apply cricoid pressure if victim is unconscious.
Pre-medicate	Pre-medicate as appropriate ; then WAIT 3 MINUTES after drug administration <ul style="list-style-type: none"> { <i>Fentanyl (Induction)</i>: 2-10 mcg/kg IV/IO/IN for analgesia in awake patient { <i>Versed (sedative)</i>: 0.5-4 mg IV/IO/IN for sedation & anti-anxiety in awake patient <i>Atropine</i>: 0.02 mg/kg IV – for child less than 5 y/o (minimum dose 0.1 mg) <i>Lidocaine</i>: 1 mg/kg IV (head injury)
Placement: Performance	Perform endotracheal intubation. If unable to intubate within 20 sec. – BVM for 30-60 sec. and Reattempt. Use O ₂ sats as a guide. Treat bradycardia with Atropine 0.5 mg IV push.
Placement: Primary confirmation	Perform <i>primary confirmation</i> of ET placement: <ul style="list-style-type: none"> By direct visualization of ET passing through vocal cords By chest rise/fall with each ventilation (bilaterally) By auscultation: epigastrium; anterior chest L and R; midaxillary line L and R.
Placement: Secondary confirmation	Perform <i>secondary confirmation</i> of ET placement: <ul style="list-style-type: none"> By ETCO₂ monitoring Esophageal detector device Monitor O₂ saturation
Prevent dislodgment	Secure ET with commercial ET holder In out-of-hospital setting – immobilize cervical spine with C-Collar
Maintain Sedation for Intubated Pt.	For ADULT patients being transferred: Maintain sedation to prevent tube dislodgment; <ul style="list-style-type: none"> Fentanyl: 2-10 mcg/kg IV/IO PRN AND Versed or Rocuronium AS NEEDED Versed: 1-4 mg IV/IO q 15 minutes PRN or as ordered by MD Rocuronium: 0.6-1.0 mg/kg q 30 minutes PRN or as MD ordered – MUST USE SEDATION Propofol: (Infusion) may increase 5-15 mcg/kg/min or as MD ordered – SEE PROTOCOL

ALL medications in the above table are further defined in the MEDICATIONS guidelines.

METERED DOSE INHALER ADMINISTRATION**Purpose:**

Asthma, also known as reactive airway disease, can be life threatening. Many people diagnosed with asthma have prescriptions for medications that help to dilate the respiratory passages. These medications typically come in metered-dose inhalers that are designed to deliver a pre-measured dose of medication each time the inhaler is triggered. An EMT may assist a patient in taking a dose of a meter-dose inhaler prescribed for the patient by their personal physician. Medical Control must be contacted prior to assisting the patient with the inhaler. Some of the more commonly prescribed metered-dose inhalers include: albuterol (Proventil or Ventolin), flunisolide (Aerobid), terbutaline (Brethaire), triamcinolone (Azmacort), metaproterenol (Alupent or Metaprel), beclomethasone (Vanceril or Beclovent), bitolterol (Tornalate), ipratropium bromide (Atrovent), isoproterenol (Isuprel or Medihaler-Iso)

Indications:

- For relief of acute bronchospasm (reversible airway obstruction) such as asthma, chronic bronchitis, emphysema, and smoke inhalation.

Precautions:

- ❖ Administer only to patient for whom it is prescribed.
- ❖ Use with caution in patients with heart disease, hypertension, diabetes, and those being treated with antidepressants.

Adverse Reactions/Side Effects:

- Hypertension and headache
- Arrhythmias and chest pain, palpitation, rapid heart rate.
- Nervousness and shakiness, tremors
- **Rare:** May produce immediate allergic reactions or bronchospasm

Administration:

- An EMT or Intermediate must contact Medical Control prior to assisting patient with inhaler.
- Shake inhaler to mix medication.
- Have patient exhale and then seal their lips around the end of the inhaler or spacing adapter.
- Try to spray just as the patient begins to inhale. Administer two inhalations with one minute between inhalations.
- Repeat assessment and vital signs.
- Further orders must come from Medical Control.
- Document any change in patient condition.

Actions:

- Increase Heart Rate
- Bronchial relaxation

Side Effects: Tachycardia, Dysrhythmias, Tremors, Hyperventilation, Cough

NEEDLE THORACENTESIS

Indications:

- Tension pneumothorax is rare, but when present may rapidly lead to death and must be treated promptly.
- Simple pneumothorax is relatively common, is not immediately life threatening and should not be treated in the field.
- The following signs are significant. Signs of pneumothorax **as well as** tension **must** be present before treatment is undertaken.

Simple Pneumothorax:

Respiratory distress- mild to severe.

- Chest pain

Decreased or absent breath sounds by auscultation to affected side.

- Subcutaneous crepitation

Signs of Tension:

- Progressive respiratory Distress (severe)
- “Drum-like” percussion on affected side
- Hyperexpanded chest on affected side
- Tracheal shift away from affected side
- Distended neck veins
- Shock- low BP
- Increasing difficulty bagging intubated patient

Precautions:

- ❖ Accurate diagnosis is paramount.
- ❖ This is a rare condition, but can occur with trauma and as a complication of CPR.

Procedure:

- Identify the need for decompression

There are two sites that are available for decompression:

- mid-Axillary at the fourth or fifth intercostal space
- mid-Clavicular at the second or third intercostal space
- Prepare chosen site with Betadine or alcohol
- Insert angiocath (14ga or larger in adult: 18ga in children) over the rib margin of the selected/prepped site.
- Hit the rib, then slide over it.
- The release of air or blood maybe noted and then documented.
- Attach flutter valve.
- The catheter should remain secured without further attention.
- Contact medical control of the procedure just completed.

Complications:

- ❖ Creation of a pneumothorax if none existed previously.
- ❖ Laceration of lung.
- ❖ Laceration of vessels: slide above rib (intercostal vessels run in groove under each rib)

Severe pain: if you're doing this in the field, the patient should be sick enough not to require anesthesia, but he'll let you know when you go through the pleura. Don't let this deter you - move briskly on.

Infection: clean rapidly but vigorously. Use sterile gloves if possible.

Side effects and special notes:

Sudden onset of chest pain and shortness of breath in a normal individual may also be caused by a pneumothorax (COPD and asthma). These can also progress to a tension state.

Tension pneumothorax can be precipitated by occlusion of an open chest wound with a dressing. If, after dressing an open chest wound, the patient deteriorates, remove dressing.

CARDIAC PROCEDURES

AUTOMATED EXTERNAL DEFIBRILLATORS (AED)

Indications: Patients in cardiopulmonary arrest

Contraindications:

- ❖ Stable, conscious patients who do NOT exhibit signs of cardiac or severe respiratory compromise.

Attach the AED with the Defibrillator pads to patients who show evidence of Pulselessness and Apnea.

- Ensure scene safety and apply Body Substance Isolation precautions.
- Verify cardiopulmonary arrest and initiate CPR, or if in progress, verify that it is being performed correctly.
- Ventilate with 100% oxygen. You should do CPR for as long as it takes to apply and get the AED ready to use.
- Insert oral airway and maintain open airway. Ventilate with a BVM with oxygen.
- Prepare patient for Defibrillator Pads (shave or dry chest area if necessary).
- Turn on Power to the Zoll monitor and apply pads to the patient's chest.
- Stop CPR, clear all personnel and push the **ANALYZE** button. (Do not touch the patient while analyzing). If in a moving vehicle, bring the vehicle to a complete stop.

If SHOCK INDICATED for ventricular fibrillation or ventricular tachycardia over 160 beats/minute:

- Call an **“ALL CLEAR”** and visually check head to toe for all personnel to be clear. When AED prompts to shock, press the **SHOCK** button to shock patient at 120J.
- You will have to press the analyze button after each shock.
- After two [2] minutes of CPR, press the **SHOCK** button to shock patient at 150J.
- After two [2] minutes of CPR, press the **SHOCK** button to shock patient at 200J.
- If ventricular fibrillation persists after 3 counter shocks, Continue CPR and transport.
- Additional shocks can be performed en-route.
- **CONTACT MEDICAL CONTROL FOR FURTHER INSTRUCTIONS**
- If you receive a **NO SHOCK INDICATED** message, check for a pulse, do CPR for one minute and Re-Analyze.

Transport the patient immediately if the following occurs:

- You have received 3 consecutive **NO SHOCK INDICATED** messages
- The patient regains a pulse (return of spontaneous circulation –ROSC)
- If you restore pulses in the patient and lose pulses again, press **ANALYZE** button again and repeat the shocks if indicated.
- Communicate all patient and event information to the hospital via radio/phone
- ❖ Print a **“CODE SUMMARY”** report from the AED.
- ❖ Prepare and restock AED for next use after call is complete.
- ❖ Maintain the AED and its attachments in accordance with the manufacturer's recommendations.

SPECIAL CONSIDERATIONS

- Only personnel/staff who are trained on the AED will be allowed to use them on patients.
- The use of the Zoll AED function should never be delayed by CPR. **Perform CPR until the machine is ready.**
- Do **NOT** defibrillate a patient in a moving ambulance. Bring the ambulance to a complete stop before analyzing.
- Do **NOT** defibrillate a patient who is a wet area.
- Only one team member should be responsible for the use of the AED during a Cardiac Arrest call.
- Adults (under 90 pounds)/children should be defibrillated with the AED using **PEDIATRIC PADS** (AHA guidelines).
- Be prepared to provide supportive care to patients who are successfully defibrillated.
- Watch closely for patients to Re-fibrillate once pulses have been restored.
- A **CODE SUMMARY** must be printed following every Cardiac Arrest.

DEFIBRILLATION ELECTRODES**Procedure:**

- Wipe chest dry, electrodes will adhere best when applied to a dry chest.
- Attach defibrillation cable to defibrillation electrodes.
- Place the sternum electrode with the post facing the center of the chest just below the right clavicle in the mid clavicular line.
- Place the apex electrode with the post toward the center at the left anterior axillary line over the lower ribs.
- Apply firm pressure to both electrodes to assure maximal contact.

Defibrillation

Once defibrillation electrodes are connected as described, defibrillation can be easily accomplished by following a standard procedure:

- Turn defibrillator power on
- Charge electrode pads
- Check for a pulse
- Call for and check to make sure everyone is clear
- Defibrillate
- Resume CPR immediately

Synchronized Cardioversion: Connect the Defibrillation electrodes as described.

- Turn on the defibrillation power
- Select the joules
- Push SYNC
- Observe cardioscope and adjust EKG size until sync marker appears on the “R” wave
- Press charge
- Call for and check to make sure everyone is clear
- Press defibrillator buttons (there may be a short delay in the electrical shock)

Monitoring: Defibrillation electrodes may be used to monitor patients who you believe to have a high probability of life threatening arrhythmias. To achieve a lead configuration, apply the individual 4 lead set-up to monitor rhythms.

Anterior-Posterior defibrillation/cardioversion is possible with the Defibrillation electrodes. One electrode (apex) is placed just to the left of the lower sternal border, the other (sternal) is positioned behind the heart.

Warning:

Do not discharge hard paddles on Defibrillation electrodes.

For interaction with AED, see AED protocols. AED unit should not be discontinued until ALS monitoring is attached.

PACING - EXTERNAL CARDIAC

Indications: External pacing can be used in the following settings:

- Symptomatic bradycardia with pulse unresponsive to pharmacologic therapy. In patients with symptoms (significant hypotension, altered mentation, chest pain) due to any form of bradycardia, treatment should include supplemental oxygen, ventilatory support as needed, establishment of IV access, and administration of atropine (0.5 mg to 1.0 mg every 5 minutes until desired response or total of 3.0 mg given).
- The pacer should be placed on the patient but not turned on immediately.
- Pacing should be considered if the patient does not respond to atropine, if IV access cannot be obtained, or if symptoms are so severe that waiting for a maximal response to atropine would be dangerous.
- In patients with severe bradycardia but no symptoms, the external pacer should be put in place, but not turned on unless the patient's status deteriorates.

NOTE: If bradycardia and no pulse, treat as EMD

Procedure: The following steps are needed to initiate pacing Zoll E-series:

- Attach pacing electrodes and cables. Placement of pads can be in usual position or one placed anteriorly over the heart and the other is placed posteriorly.
- Turn dial to PACER
- Select rate of 70 beats/min.
- Adjust ECG size until marker is within the QRS.
- Push start, adjust current for capture.
- Record a strip of the patient's own rhythm.

To assess the effectiveness of the pacer:

- Check for a pulse. The pacer will make chest and back muscles twitch at the same rate as the heart, so palpation of the left carotid or left femoral artery can be misleading.
- Check for a right carotid, right femoral or either brachial pulse.

12 LEAD ECG

Indications: A 12-lead ECG should be obtained whenever possible on the patient that exhibits signs and symptoms of an acute coronary syndrome (ACS). These syndromes include ST elevation, Acute Myocardial Infarction and unstable angina. This will typically be patients who are suffering from chest pain of probable cardiac origin. Patients who have a significant cardiac arrhythmia, but not the usual presentation of an acute coronary syndrome may be good candidates as well. Examples are patients with A-Fib vs. SVT, those with wide complex tachycardia of uncertain origin and those with symptoms of congestive heart failure.

Other patients with an atypical presentation of an ACS, such as a syncopal episode, unexplained diaphoresis and weakness may be candidates for a 12-lead ECG as well.

Precautions: While the acquisition of a 12-lead ECG can prove to be a valuable diagnostic tool, excessive time should not be spent in the field obtaining one if the patient is gravely ill. If necessary, try to obtain and send (if necessary) the 12-lead while the patient is being packaged for transport or en-route to the hospital.

Technique:

- Explain the procedure to the patient whenever possible.
- Preparation of the skin to remove oils and dead skin cells and the elimination of muscle tension are important in obtaining a noise-free 12-lead.
- Cleanse the skin at the electrode sites with alcohol preps and rub with a towel/ gauze. Shave excessive hair.
- Position the patients arms and legs in a comfortable position in which the extremities are resting on a supportive surface. Any self-support of the limbs by the patient may introduce fine muscle artifact even though the patient does not appear to be moving.

Any patient that is going to have a 12-lead done should have had a standard 3 or 4-lead ECG reading done first. If the Paramedic believes the patient may require a 12-lead to be obtained, the limb lead electrodes from the 4-lead reading should NOT be placed on the torso, they should be placed on the limbs (or replaced to the limbs if originally on the torso). Typical placement is on the inside of the wrists and the inner aspects of the legs near the ankles, but they may also be placed more proximally on the deltoids and upper legs. Proximal placement rather than distal placement of limb leads may result in a more noise-free ECG. Placement of limb leads on the torso may result in a non-standard 12-lead.

Attach the precordial lead attachment cable to the patient monitoring cable.

Precordial lead placement:

V1 - Fourth intercostal space to the right of the sternum.

V2 - Fourth intercostal space to the left of the sternum.

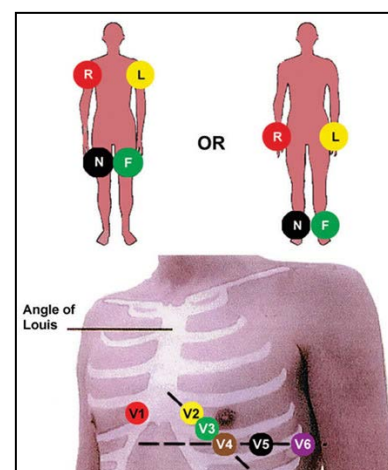
V3 - Directly between leads **V2** and **V4**.

V4 - Fifth intercostal space on midclavicular line.

V5 - Level with **V4** at the left anterior axillary line.

V6 - Level with **V5** at the mid-axillary line.

- Assure that all limb and precordial leads are firmly attached to the proper electrodes.
- Encourage the patient to remain as still as possible during the reading phase to reduce artifact.
- Turn the Zoll E-Series monitor power switch to “monitor”
- Press the far right round soft key “12 Lead”
- Press the far left round soft key “Acquire”
- Once acquired the unit will print a paper copy (total of 6 sections paper) and the transmit screen will appear
- If no transmission is required
 - press the far right round soft key “Cancel X-mit”



To retrieve past 12 Leads

- Press the right soft key “12 Lead”
- Press the soft key “Patient Record”
- Use the Arrow Keys (located to the top right of the unit) to highlight the needed record
- Press the appropriate soft key to print or fax the record “Print Record” or “Transmit”
 - *Do not press “Print All” this will print many months’ worth of old 12 Leads.

*If transmission is required:

Via Mobile Phone

Phone Side

- Ensure that BlueDUN is active on the phone (icon should be in the top bar)
- If the BlueDUN icon is not on the top bar press the BlueDUN Icon on the main screen to activate the program.
- Note: Once BlueDUN is active the screen does not have to be on to work.



Monitor Side:

- Enter Patient Name
- From Monitor Screen
 - **Press ID # Soft Key**
 - Use **Arrow Keys and Round Key** to enter patient **last name and first initial**
- **Press Return Soft Key** when complete
- From the 12-Lead Screen
 - **Press PT Info Soft Key**
 - **Press ID # Soft Key**
 - Use **Arrow Keys and Round Key** to enter patient **last name and first initial**
 - **Press Return Soft Key** when complete
 - **Press Return**
 - **Soft Key** again to exit out to the 12-Lead Screen
- **Press Acquire Soft Key** to acquire the 12-Lead
- When 12-Lead is acquired monitor will display the Transmit Screen & Contact List
- Select the desired transmit destination **using the arrow keys**
 - *SPRH*, *RCRH*, *SEAS ONLY*, *LDRH*, *STRH*, or *FTMEADE*
- **Press round key** by arrow keys. (May also press the Xmit Now Soft Key)
- Allow the unit to transmit. (This may take 30 sec. to a full 1 min)
 - When complete the monitor will read Transmission Complete

Via Land Line Phone

- Connect the phone cable to the modem card located in the data card slot, top right
 - Connect the other end of the phone cable wall plug on site
 - Use the left two soft keys (“Next Phone # & Prev Phone #) to select the appropriate fax destination.
 - Alternately the “Manual Dial” soft key may be used to manually type in the destination fax number (this may be used to include a “dial out” number such as the “9” prefix if required from the sending location)
 - With the appropriate destination number entered press the middle soft key “Dial Phone #”
 - A series of messages will appear on the screen: Preparing Fax, Fax Dialing, Fax Sending, etc.
- Once the fax has been sent a successful or unsuccessful message will appear and/or if successful the unit will return to the main screen.

Transmit Errors

- If the monitor reads any transmission errors
 - **Press PT Info Soft Key** from the 12-Lead Screen
 - **Press Patient Records Soft Key**
 - Use **Arrow Keys** to select the 12-Lead to transmit
- Press Transmit

LUCAS 2 – CPR DEVICE



Arrival at the patient

When you have confirmed a cardiac arrest, immediately start manual cardiopulmonary resuscitation (CPR). Continue with a minimum of interruptions.

Unpack LUCAS™

1. Position the bag with its top nearest to you.
2. Put your left hand on the black strap on the left side and pull the red handle so that the bag unfolds.
3. Push **ON/OFF** on the User Control Panel for 1 second to power up LUCAS in the bag and start the 'self-test'. The green LED adjacent to the **ADJUST** key illuminates when LUCAS is ready for use.

Note: LUCAS powers down automatically after 5 minutes if you let it stay in the **ADJUST** mode.

Caution - device alarm: If there is a malfunction, the red Alarm LED illuminates and a buzzer signal is heard.

Caution - keep Battery installed: The Battery must always be installed for LUCAS to be able to operate, also when powered by the external Power Supply.

Apply to patient

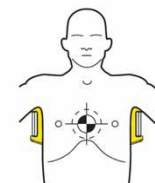
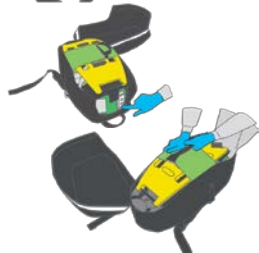
1. Remove the LUCAS Back Plate from the Carrying Bag.
2. Stop manual CPR.
3. Make sure that you support the patient's head.
4. Carefully put the LUCAS Back Plate under the patient, immediately below the arm pits. Use one of these procedures:
 - a. Hold the patient's shoulder and lift the patient's upper body a small distance,
 - b. Roll the patient from side to side.
5. Start manual CPR again.
6. Hold the handles on the support legs to remove the LUCAS Upper part from the bag. Pull the release rings once to make sure that the claw locks are open.
7. Let go of the release rings.
8. Attach the support leg that is nearest to you to the Back Plate.
9. Stop manual CPR.
10. Attach the other support leg to the Back Plate, so that the two support legs lock against the Back Plate. Listen for click.
11. Pull up once to make sure that the parts are correctly attached.

Note: If the LUCAS Upper Part does not attach to the Back Plate, make sure that the claw locks are open and that you have released the release rings.

WARNING - TOO LARGE PATIENT: If the patient is too large, the Upper Part of LUCAS cannot lock to the Back Plate without compressing the patient's chest. Continue the manual compressions.

Adjustment and operation: The compression point should be at the same spot as for manual CPR and according to guidelines. When the pressure pad in the Suction Cup is in the correct position, **the lower edge of the Suction Cup is immediately above the end of the sternum.**

1. Use your finger to make sure that the lower edge of the Suction Cup is immediately above the end of the sternum. If necessary, move the device by pulling the support legs to adjust the position.



2. Adjust the height of the Suction Cup to set the Start Position.
 - a. Make sure that LUCAS is in the **ADJUST** mode.
 - b. Push the Suction Cup down with two fingers until the pressure pad touches the patient's chest without compressing the chest.
 - c. Push **PAUSE** to lock the Start Position - then remove your fingers from the Suction Cup.
 - d. Check for proper position. If not, push **ADJUST**, pull up the Suction Cup to readjust the central and/or height position for a new Start Position. Push **PAUSE**.
 - e. Push **ACTIVE (continuous)** OR **ACTIVE (30:2)** to start the compressions.



WARNING - UNSATISFACTORY POSITION: Start manual CPR again if it is not possible to position LUCAS safely and correctly on the patient's chest.

Apply the LUCAS™ Stabilization Strap

The LUCAS Stabilization Strap helps secure the correct position during operation. Apply it while LUCAS is active to keep interruptions to a minimum.

Caution - Stabilization Strap application Delay the application of the LUCAS Stabilization Strap if this prevents or delays any medical treatment of the patient.

1. Remove the cushion strap, which is a part of the Stabilization Strap, from the Carrying Bag (the support legs strap of the Stabilization Strap should already be attached to the support legs).
2. Extend the cushion strap fully at the buckles.
3. Carefully lift the patient's head and put the cushion behind the patient's neck. Position the cushion as near the patient's shoulders as possible.
4. Connect the buckles on the support leg straps with the buckles on the cushion strap. Make sure that the straps are not twisted.
5. Hold the LUCAS support legs stable and tighten the cushion strap tightly.
6. Make sure that the position of the Suction Cup is correct on the patient's chest. If it is not, adjust the position:
 - a. Push **ADJUST**.
 - b. Release the cushion straps from the support leg straps.
 - c. Adjust the Suction Cup position (as described in the *section 5.4.2*).
 - d. When the Suction Cup is in the correct position, push **ACTIVE (continuous)** or **ACTIVE (30:2)** to start the compressions again.
 - e. Attach the cushion strap again. *Refer to the steps 2 to 5 above.*



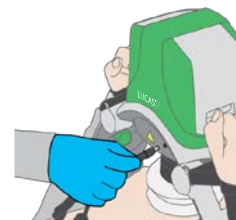
Move the patient

Secure the patient's arms

When you move the patient, you can secure the patient's arms with the Patient Straps on the LUCAS. This makes it easier to move the patient.

Caution - do not lift by the Patient Straps Do not use the Patient Straps to lift the patient. The straps are only to attach the patient's arms to LUCAS.

Caution - IV access: Make sure that IV access is not obstructed.



IV / IO ACCESS & MEDICATION PROCEDURES

BLOOD ADMINISTRATION

The establishment of IV blood administration will not be initiated in the field but rather in the ER or hospital from which the patient is being transferred. SEAS paramedics may have to start a unit of blood while transporting a patient to Rapid City Regional Hospital. Therefore, the following procedure must be followed.

Procedure:

- Inform the patient of procedure, obtain signature on blood consent form, and explain the product to be administered, length of procedure and sign/symptoms of possible reaction.
- Identify the patient and blood product.
- Set up blood product to be administered: Use blood administration set and 500cc NS, EXCEPT when administering certain products (See Chart)
- Infusion site should have a 18ga needle. (Pediatrics should have at least a 23ga)
- If however a 20 or 22ga cannula is already inserted, it does not have to be changed, especially if the patient has limited venous access.
- Obtain baseline vital signs and fill out Transfusion Record.
- Start infusion slowly, 50-75cc/h. Remain with the patient for the first 15 minutes and observe for adverse reactions and/or circulatory overload because most reactions occur within the first 15 minutes. If no adverse reaction occurs within the first 15 minutes, the rate may be increased.
- If a reaction occurs, discontinue the transfusion and notify the doctor and lab immediately. If the unit is disconnected, send the unit to the lab. Check the blood transfusion record for signs/symptoms of a reaction and check all that apply and sign your name.

Throughout the transfusion, **vital signs** should be taken in the timeframe listed below for each unit hung which the medical staff has recommended:

- At the start of the infusion
- 15 minutes apart x 2 from the start time. Then every 30 minutes until completion.

Product	BLOOD ADMINISTRATION TECHNIQUE
Packed Cells	Use standard blood filter and make sure cells cover the entire surface. Administer only with 0.9% NS Squeeze bag to mix cells every 20-30 minutes. Administer 1 unit over 2-3 hours If necessary to help cells infuse, add 50-100ml 0.9% NS from mainline through tubing.
Platelets	Administer only with 0.9% NS Administer as rapidly as tolerated, usually 4 units/hr A filter must be used- supplied by lab
Plasma	Use standard blood filter Administer as rapidly as tolerated.

Blood transfusion Tips

- ❖ Hang the blood within 30 minutes after receiving it from the Blood Bank.
- ❖ Use the blood warmer on patients with cold agglutinins and those receiving massive transfusions.
- ❖ Never administer medications via blood transfusion tubing.
- ❖ The larger the vein, the better the transfusion will infuse.
- ❖ Each unit of blood should be completely infused within 4 hours to avoid the danger of bacterial growth and red blood cell hemolysis; unless ordered by the physician.
- ❖ Blood filters may not be used for longer than 4 hours per filter.

EPINEPHRINE IN A PRE-MEASURED INJECTION DEVICE

Indications: Adult patients greater than age 12 experiencing a severe allergic reaction from stings or other allergens.

(Dose = 0.3mg) **Medical Control Order only**

Pediatric patients less than 12 years (dose =0.15 mg) Medical Control Order only

Precautions: Patients who have known allergic reactions to insect bites or other allergens will often have epinephrine prescribed in the form of an EpiPen® (or other similar device) that delivers an injection of pre-measured epinephrine.

Use with caution in patients > 40 years.

At the time when a request to deliver or assist a patient with their epinephrine is made, any suspected complication conditions, such as the following, should be reported.

Heart disease	Age > 40 years	Pulmonary Edema	Pregnancy	Glaucoma
Psychosis	COPD	Hyperthyroidism	Hypertension history	

Contraindications: There are no contraindications to the use of epinephrine in a life-threatening situation.

Side Effects: Increased heart rate, headache, nervousness, anxiety, dizziness, palpitations

Administration: EMTs may assist a patient in administering their own prescribed EpiPen® following consultation with Medical Control. Also an ALS service must be requested if one is available to respond.

If a stinger present, remove it: Scrape stinger out; e.g., with edge of card. Avoid using tweezers or forceps as these can squeeze venom from the venom sac into the wound. Take pulse and respiratory rate and contact medical control with history. If Epi-Pen ordered, administer as listed below.

Follow these steps if the EMT-B is assisting the patient with their own prescribed Epi Auto Injector. The EMT-B must **contact Medical Control** prior to administration.

Refer to specific manufacturer instructions, but generally: EpiPen® administration is as follows:

- Check expiration of EpiPen®.
- Pull off safety cap.
- Wipe injection site with alcohol.
- Place tip of EpiPen® on exposed thigh (anterior/lateral) at right angle to the leg. Apply in this area regardless of what area of the body has been stung.
- Press hard into thigh until auto-injector mechanism triggers, and hold in place for several seconds. Remove EpiPen® and discard into sharps container.
- Massage injection site for 10 seconds to enhance absorption.
- Dispose of needle and syringe in sharps container.
- With persistent severe anaphylaxis, additional injections may be necessary. Dispose of needle and syringe in sharps container. Consult with medical control if a second dose is indicated.
- Repeat patient assessment and vital signs.
- Apply cold packs to site of sting.
- Document any changes in patient condition.

Pediatric Considerations: The EpiPen® comes in two available dosing options: EpiPen® delivers 0.3 mg (in 0.3 cc) of 1:1,000 epinephrine IM. EpiPen Jr. delivers 0.15 mg. (in 0.3 cc) of 1:1,000 epinephrine IM and is intended for use in patients < 60 lbs.

Special Notes: Do not apply a tourniquet (may apply constriction band as approved by medical direction) that may be provided in patient's epinephrine kit. Consult with Medical Control if patient has applied them prior to arrival.

Actions: Sympathomimetic drug, acts on alpha & beta receptors; Dilates bronchioles, Constricts blood vessels.

Side Effects: Increases heart rate, Headache, Nausea & vomiting, Nervousness & anxiety, Palpitations.
Can cause chest pain, pallor and dizziness.

GLUCOMETER

Indications: Patients with altered mental status where hypoglycemia is suspected. Glucose determination should precede the administration of Dextrose.

Procedure:

- Assemble items needed for testing: Glucometer, strip, finger puncturing device and alcohol prep.
- Ensure the code on strips matches the code number displayed on meter. If needed, change meter code.
- Use universal precautions.
- Clean the puncture site. If alcohol prep used, ensure site is dry prior to puncture
- Prick the side of a fingertip using a sterile lancing device.
- Apply one large drop of blood on the test strip completely covering the test site.
- Glucometer will give reading in 10-15 seconds.
- Treat patient according to protocol.
- Refer to glucometer handbook for further operational and cleaning procedures.

INTRAOSSIOUS INFUSION-ADULT (EZ-IO)

The rationale for the use of the EZ-IO is the same as the rationale for the use of the Jamshidi style bone marrow needle. The primary difference is the EZ-IO may be used on both the adult and the pediatric patient.

The EZ-IO placement is much less painful than the Jamshidi, so it may be placed in the patient that is still awake, as opposed to the Jamshidi requiring a patient that is either in cardiac arrest or fully unconscious.

Indications:

- EZ-IO AD (adult) patient weight 40 kg and over.
- EZ-IO PD (pediatric) patient weight 3-39 kg.

IV fluids or medications are needed and a peripheral IV cannot be established after 3 attempts AND the patient exhibits one or more of the following:

- Significantly altered mental status (GCS of 8 or less)
- Respiratory compromise (O₂ saturation 80% or less after oxygen therapy, respiratory rate <10 or >40)
- Hemodynamic instability (systolic BP of <90 mmHg)

Contraindications: Fractures or crush injuries of the limb selected for IO infusion (consider alternative site). Excessive tissue at the insertion site with the absence of anatomical landmarks. Obvious, previous significant orthopedic procedures on the bone selected for IO infusion. Obvious infection at the insertion site. Insertion of an IO line should NOT delay transport in an emergent situation.

Complications: The complications with the EZ-IO intraosseous placement and infusion are the same as the Jamshidi placement noted above and in IO Protocol - Pediatric.

Considerations: If the insertion site fails the tests, appears obstructed and cannot be flushed, extravasates (leaks) or the needle set bends or breaks, the needle set must be removed and disposed of in a sharps container.

If the procedure must be repeated, do it in another limb with a new needle set, DO NOT attempt a second placement on the same limb.

To remove the EZ-IO catheter, support the patients arm or leg with one hand, grasp the hub itself firmly (or attach a sterile syringe to the hub for a larger “handle”) and rotate the catheter clockwise while applying gentle upward traction. The site may be dressed with a band-aid.

The EZ-IO catheter must be removed within 24 hours of placement.

Assemble the following materials:

EZ-IO driver	60 drop IV set and NS IV solution
EZ-IO needle set, AD for adults, PD for pediatric	Pressure bag or infusion pump
Alcohol or Betadine swabs	2% lidocaine (preservative free)
EZ-Connect extension set	EZ-IO yellow wristband
10ml syringe containing 10ml of NS flush solution	

Technique

- Record neurovascular status of the limb before and after the procedure
- Locate landmarks and identify insertion site
- Prepare driver and needle set, using AD needle for adult, PD needle set for pediatric patients. Assure that the needle set is securely seated on the driver. Prime the extension set with NS.
- Clean the insertion site with alcohol or Betadine and stabilize the limb.
- Position the driver at the insertion site with the needle set at a 90-degree angle to the bone. Gently power the needle set until the needle set tip touches the bone.
- Check to ensure that at least 5mm of the needle set is visible as indicated by the black 5mm line on the shaft, if the black 5mm line is not visible, the patient has too much soft tissue at the insertion site and that site will not be able to be used. Consider an alternative location or abort the procedure completely.
- Penetrate the bone cortex by squeezing the trigger and applying gentle, steady, downward pressure, **DO NOT FORCE**, allow the driver to do the work. When performing the procedure on a pediatric patient, the weight of the driver alone should provide enough force for successful insertion.
- Release the trigger and stop when the needle flange touches the patients skin or a sudden give or “pop” is felt upon entry into the medullary space. A properly placed catheter will stand up straight at a 90-degree angle and will be firmly seated in the tibial bone.
- While supporting the needle set with one hand, remove the driver by pulling straight up and away.
- Remove the stylet from the catheter by grasping the hub firmly with one hand and unscrewing the stylet from the catheter by turning it counter clockwise. Place the stylet in a sharps container, do not attempt to re-cap it.
- Connect the primed connection set to the catheter hub’s Luer lock and rapidly flush with 10ml NS in an adult and 5ml in a pediatric patient. **No Flush = No Flow**. Failure to appropriately flush the catheter may result in a limited or no flow situation. You may attempt to aspirate a very small amount of blood or marrow. Do not use a syringe directly on the catheter hub, use the extension set at all times.

Note: In the conscious patient, slowly administer (20-50mg – adult. 0.5mg/kg – pediatric) 2% lidocaine into the port (through the extension set) prior to the initial flush. This may cause transient pain but will make subsequent infusions much less painful. While the insertion procedure itself is known to be only minimally to moderately painful, infusion of fluid (which causes intramedullary pressure) can be quite painful in the conscious patient without the Lidocaine.

Initiate infusions or medications as needed. A pressure infuser bag or pump will typically have to be used to maintain adequate flow rates.

Apply a yellow EZ-IO wristband to the patient (the wristband is necessary as a reminder of EZ-IO placement and the need for timely removal) and dress and secure the catheter and tubing as needed to protect it. Assure that any dressings do not interfere with your ability to observe the site for problems.

Consider splinting the extremity to limit movement and protect against dislodgment.

LOCATE – CLEAN – INSERT (Power or Manual) – OPEN – FLUSH – TREAT

Sites for Insertion:

1 Proximal Tibia:

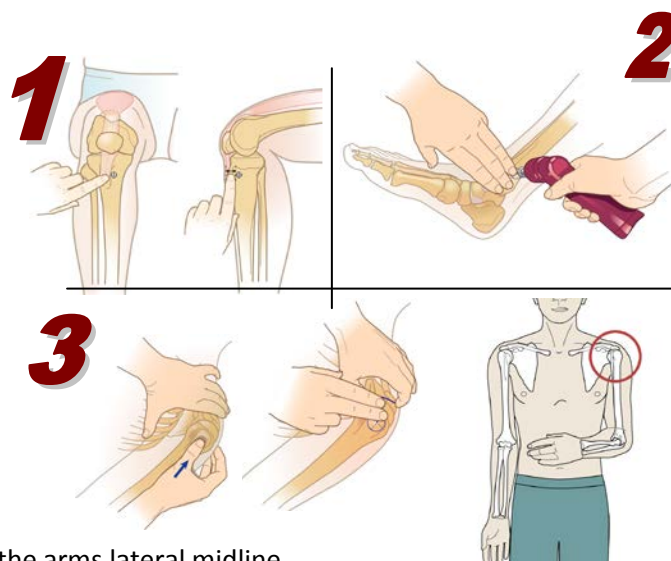
Anterior medial surface of the tibia
1 cm (1 finger width) medial to the
tibial tuberosity on the flat, broad
portion of the tibia.

2 Distal Tibia:

Measure up about three finger breadths
superior to the end of the medial malleolus (AD).

3 Proximal Humeral head:

The greater tubercle site is located slightly anterior to the arms lateral midline.



INTRAOSSEROUS CANNULATION (IO) PEDIATRICS

Indications:

Intraosseous infusion used to obtain vascular access in children under seven years that are in critical condition and where IV cannulation may take more than 90 seconds or has been unsuccessful. This is the primary vascular method of access for pediatric arrests.

Precautions:

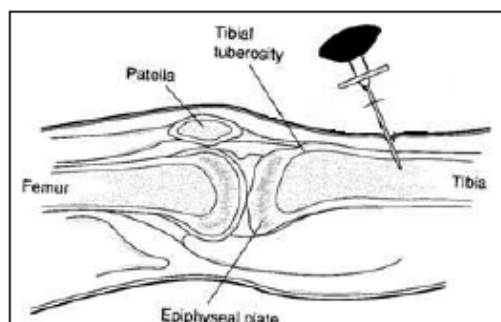
In a child that is conscious local anesthesia should be used.
Do not perform on known or suspected fractured bones.

Complications:

Subperiosteal or subcutaneous infusion
Leaking around the puncture site.
Bone growth plate injury
Osteomyelitis and or fat embolism

Considerations:

Flow rates of up to 1200cc/hr can be achieved with pressure infusion.
If initial site fails, utilize other tibia, using new needle for each site.
Medications and fluids used in peripheral lines may be given IO.



Procedure:

Locate the site of cannulation. The tibial tuberosity is identified by palpation, and the site of intraosseous cannulation is approximately 1 to 3 cm below this tuberosity. At this site the tibial plateau is just under the skin surface.

- Cleanse the skin over the insertion site with an antiseptic solution.
- Check the needle and ensure that the bevels of the outer needle and internal stylet are properly aligned.
- Grasp the thigh and knee above the insertion site with the palm of the non-dominant hand. Wrap the fingers and thumb around the knee to stabilize the proximal tibia. Do not allow any portion of your hand to rest behind the insertion site. The leg should be supported on a firm surface.
- Palpate the landmarks and again identify the flat surface of the tibia just below and medial to the tibial tuberosity.
- Insert the needle through the skin over the flat anteromedial surface of the tibia already identified.
- Advance the needle through the bony cortex of the proximal tibia, direct the needle perpendicular (90 degrees) to the long axis of the bones or slightly caudad (toward the toes) to avoid the epiphyseal plate, using a gentle but firm twisting or drilling motion.

- Stop advancing the needle when a sudden decrease in resistance to forward motion of the needle is felt. This decrease in resistance usually indicates entrance into the bone marrow cavity. It is possible to aspirate bone marrow at this point. Any aspiration of bone marrow must be followed by irrigation to prevent obstruction of the needle with marrow.
- Unscrew the cap and remove the stylet from the needle.
- Stabilize the intraosseous needle and slowly inject 10 ml of normal saline through the needle. Check for any signs of increased resistance to injection, increased circumference of the soft tissues of the calf, or increased firmness of the tissue.

If the test injection is successful:

- Disconnect the syringe, evacuate any air remaining in the connection tubing, and join an infusion set to the needle. Secure the needle and tubing with tape and support it with bulky dressing.
- If the test injection is unsuccessful (i.e., infiltration of normal saline into the leg tissue is observed), remove the needle and attempt the procedure on the other leg.

Insertion is successful and the needle is clearly in the marrow cavity if the following conditions are present:

- A sudden decrease in resistance to insertion occurs as the needle passes through the cortex into marrow.
- The needle can remain upright without support.
- Marrow can be aspirated into a syringe joined to the needle, although this is not consistently achieved.
- Fluid flows freely through the needle without evidence of subcutaneous infiltration.
- Contact Medical Control of the IO being placed and or if complications with the IO have happened.

INTRAVENOUS THERAPY

Indications:

- Patients experiencing signs and symptoms of shock, or hypovolemic state needing fluid replacement.
- Patients requiring IV medication administration when ALS care is available.

Precautions: In trauma patients or patients in acute distress, extreme care must be taken to ensure that the initiation of the IV on scene does not delay transport to definitive care.

Patients with latex sensitivity.

Complications:

- ❖ **Air embolism** - due to improper clearing of air from IV tubing
- ❖ **Infiltration** – when IV catheter is not in vein and fluid leaks into surrounding tissue
- ❖ **Hematoma** – when IV needle goes through vein and bleeds into surrounding tissue
- ❖ **Pyrogenic Reaction** – reaction from foreign proteins or particles entering the vein
- ❖ **Catheter Shear** – piece of catheter shears off, may cause embolism
- ❖ **Thrombophlebitis** – inflammation around the vein with redness and swelling
- ❖ **Arterial Puncture** – IV needle and catheter entering an artery

Procedure: Fluid Preparation

- Choose correct IV solution. Inspect fluid for clearness and check for expiration date.
- Pull the plastic stopper from the port end of IV bag and keep area sterile
- Open the correct IV administration set (10 drop set for trauma, 60 drop set for medication administration)
- Close off the roller clamp on the tubing. Insert the spike end into the prepared IV bag using aseptic technique
- Prime the tubing by squeezing the clear chamber until approximately ½ full.
- Open the roller clamp and allow fluid to run through the tubing to remove all air.
- Keep the end of tubing sterile by recapping.
- Remember to close off roller clamp once air is removed from tubing.

IV Site Preparation:

- Start by telling the patient what you are doing and why.
- Select an IV site on the patient's hand or forearm. Apply the tourniquet just below the elbow.

Note: Trauma or cardiac arrest patients, apply tourniquet above elbow for access to the antecubital fossa IV site. Let patient’s hand fall below level of cot to let gravity aid in the process.

- Select the appropriate IV catheter size needed (18ga for medical, 16ga or larger for trauma).
- Open the package in preparation for IV start.
- Tear off 3 or 4 four inch pieces of medical tape and place in easy reach of patient’s side
- If difficulty finding vein site, tap the area of the vein gently. This may help raise a vein at the site.
- Prep the IV site area with an alcohol wipe. Start by wiping in the middle, and in a circular motion, cleanse the area moving outward from the site.
- Put on gloves if you have not already done so. Pull back on skin to keep area tight.
- Insert IV catheter at a 30-45 degree angle, with the bevel of the needle facing up, until you feel a “pop”. Blood should soon fill the flash chamber located at the end of the IV needle.
- Advance the catheter completely into the vein and remove needle while applying pressure on the vein. Release tourniquet and dispose of needle immediately in a “sharps” container.
- Attach the IV tubing luer lock cap to the IV catheter. Secure the site with tegaderm or tape. Continue to secure the IV site and tubing to ensure the IV site remains intact.
- Turn on the fluid by opening the roller clamp. Watch the drip chamber to see if fluid is dripping into the chamber. Watch the IV site for fluid infiltration into the surrounding tissues. Set fluid at appropriate rate.
- If you meet resistance, do not advance or force the catheter. Apply pressure to the site and release the tourniquet. Pull out the needle and attach the IV tubing to the IV catheter hub. Try turning the fluid on and floating the catheter by the vein valve. If IV fails to run, you may need to try another site. Turn off the fluid by closing off the roller clamp. Remove tubing from catheter and select another IV site.

Note: Do not attempt more than 3 IV sticks on any patient. If IV cannot be initiated, go back and ensure good BLS care is still being delivered to the patient. Basic Life Support skills should be maintained prior to IV initiation. IV initiation should not delay transport of critical patients. In these patients, IV should be attempted en-route to the hospital.

IV FLUID RATES IN DROPS / MINUTE					
Drip Set	10	12	15	20	60
30 cc/hr	5	6	8	10	30
60 cc/hr	10	12	15	20	60
100 cc/hr	17	20	25	33	100
200 cc/hr	33	40	50	67	200
300 cc/hr	50	60	75	100	300
400 cc/hr	67	80	100	133	400
500 cc/hr	83	100	125	167	500
1000 cc/hr	167	200	250	333	1000

IV THERAPY - SALINE LOCK/PIGTAIL INSERTION

Indications: Administer medications. Precautionary IV access.

Precautions: Do not start IV distal to fracture site or through skin damaged with more than erythema or superficial abrasion. If trauma patient or hypotensive patient that will probably require fluid replacement, establish a regular peripheral IV.

Technique:

- Use universal precautions
- Explain procedure to the patient.
- Prepare injection cap by flushing with normal saline.
- Perform venipuncture as stated in peripheral IV line insertion protocol.
- Flush pigtail or saline lock with normal saline.

- Attach injection site cap to IV catheter.
- Flush with 2-5cc normal saline. As the plunger is still moving forward and the last 1/2 cc is being injected, withdraw the syringe from the injection cap. Maintaining a positive pressure in the catheter will prevent backflow of blood.
- Tape in place.

Contraindications: Any patient who is in need of fluid or who is hypotensive. Cardiac Arrest.

Administering medications:

- Wipe injection cap with alcohol.
- Flush with saline.
- Administer medication.
- Flush with 2cc saline.

Note for EMT-Basic Monitoring:

Although EMT-Basics cannot establish saline-locks in the field, they are allowed to transport patients with one established, providing the site is securely covered.

EXTERNAL JUGULAR VENOUS ACCESS

Indications: Inability to secure extremity IV

Precautions: Patients with latex sensitivity

Complications:

- ❖ *Air embolism* - due to improper clearing of air from IV tubing
- ❖ *Infiltration* – when IV catheter is not in vein and fluid leaks into surrounding tissue
- ❖ *Hematoma* – when IV needle goes through vein and bleeds into surrounding tissue
- ❖ *Pyrogenic Reaction* – reaction from foreign proteins or particles entering the vein
- ❖ *Catheter Shear* – piece of catheter shears off, may cause embolism
- ❖ *Thrombophlebitis* – inflammation around the vein with redness and swelling
- ❖ *Arterial Puncture* – IV needle and catheter entering an artery

Fluid Preparation: Prepare the same for extremity IV

Site Preparation:

- Explain the procedure to the patient when possible.
- Position the patient: supine, head down (this may not be necessary or desirable if congestive heart failure or respiratory distress present). Turn patient's head to opposite side from procedure. Maintain C-Spine immobilization in trauma patient.
- If not contraindicated, expose vein by having patient bear down if possible, and "tourniquet" vein with finger pressure just above clavicle.
- Scrub insertion site (betadine or alcohol).
- Align the cannula in the direction of the vein, with the point aimed toward the shoulder on the same side.
- Puncture skin then puncture vein. Use other hand to traction vein near clavicle to prevent rolling.
- Note flash and advance cannula well into vein once it is penetrated.
- Block open end of catheter to prevent air entry into the Jugular Vein
- Attach IV tubing and open clamp completely to check flow and placement, then set rate or TKO.
- Secure tubing with tape, making sure of at least one 180 degree turn in the taped tubing to be sure any traction on the tubing is not transmitted to the cannula itself.
- Recheck to be sure IV rate is as desired and monitor.

MEDICATION ADMINISTRATION

Indications: Illness or injury, which requires medication to improve or maintain patients condition.

Precautions: Wear gloves

- ❖ Certain medications can be administered via one route only, others several. If you are uncertain about a certain drug, contact medical control.
- ❖ Always double check medication and dose before administration.
- ❖ Medications given IM and SQ can be absorbed erratically or not at all if the patient is seriously ill or severely vasoconstricted. The IV route should be used if possible. If one isn't established then endotracheal or sublingual are the best alternatives.

Procedure:

- Use syringe just large enough to hold appropriate amount of medication
- Attach large needle to syringe.
- Break ampule or cleanse multi-dose vial with alcohol
- Using sterile technique, draw medication into syringe.
- Change needle to small gauge for IM or SQ.

Endotracheal:

- Prepare medication to be given and set next to patient being ventilated.
- Ventilate 4-5 times prior to disconnecting the bag from the endotracheal tube.
- Check medication in hand. Confirm medication, dose, amount and expiration date.
- Administer 2 times the recommended IV dose.
- Flush with 10ml NS
- Connect the bag and ventilate rapidly 4-5 times before resuming the recommended ventilatory rate according to age and patient condition
- Record medication given, dose, amount and time.

Intraosseous:

- Prepare medication to be administered
- Check medication in hand. Confirm medication, dose, amount and exp. date.
- Inject into port on intraosseous line or
- Remove needle from syringe and inject directly into IO needle.
- Record medication given, dose, amount and time.

Intravenous:

- Use needle appropriate for viscosity of fluid injected. Glucose requires larger gauge needle.
- Cleanse IV tubing injection site with alcohol.
- Check medication in hand. Confirm medication, dose, amount and exp. date.
- Eject air from syringe. Insert needle into injection site.
- Pinch IV tubing closed and inject at a rate appropriate for medication.
- Withdraw needle and release tubing to restore flow.
- Record medication given, dose, amount, and time.

Nebulization:

- Use hand held nebulizer with mouthpiece or mask for patient unable to hold nebulizer
- Check medication in hand. Confirm medication, dose amount and exp. date.
- Draw up dose of medication in syringe or dropper; inject into nebulizer.
- Attach O2 Tubing and set 6-8 L/min
- Administer for approximately 5 minutes, until solution is gone from chamber.
- Record medication given, dose, amount and time.

Subcutaneous injection:

- Use 25ga needle, 5/8" length for most subcutaneous injections
- Check medication in hand. Confirm medication, dose amount and expiration date.
- Select injection site. (Usually just distal and posterior to deltoid)
- Cleanse site.
- Eject air from syringe
- Pinch skin. Insert needle at a 45 degree angle.
- Aspirate, and if there is no blood return, inject medication.
- Remove needle and put pressure over site with sterile swab.
- Record medication given, dose, amount and time.

Complications:

- ❖ Local extravasation during IV medication injection, particularly dopamine or dextrose, may cause tissue necrosis. Watch carefully and be ready to stop injection immediately.
- ❖ Allergic and anaphylactic reactions occur more rapidly with IV injections, but may occur with medication administered by any route.
- ❖ Too rapid IV injection can cause untoward side effects (except adenosine); for example, diazepam can cause apnea, and epinephrine can cause asystole or hypertension.
- ❖ IM or SQ injection causes uncertain medication levels over time. Later treatment may be jeopardized because of slow release and late effects of medication given hours before.

Side effects and special notes:

- Several medications are carried in different concentrations in an ALS medication bag. Be sure you are using the correct concentration.
- Endotracheal medication administration provides onset of drug effect almost as rapidly as with IV administration

BANDAGING, RESTRAINTS & SPLINTING

BANDAGING

Indications:

- To stop external bleeding by application of direct and continuous pressure to wounds.
- To protect patient from contamination to lacerations, abrasions and burns.

Precautions:

- ❖ Use gloves.
- ❖ External wounds may appear dramatic but they are rarely high priority in trauma situations.
- ❖ Do not use circumferential dressing around neck. Continued swelling may block airway.

Procedure:

- Gather bandage and dressing supplies
- Control hemorrhage and treat injuries by priority once assessment is complete.
- Remove excessive dirt & contaminants from wound: clothing (if easily removed), gasoline, acids or alkalis.
- Irrigate with saline or tap water for chemical contamination
- Evaluate wound for depth, presence of fracture, foreign body or evidence of injury to deep structures.
- Note distal motor sensory and circulatory function prior to applying dressing.
- Apply sterile dressing to wound surface. Touch outer surface of dressing only.
- Wrap dressing with clean gauze or cloth bandages applied just tight enough to hold dressing securely
- Assess wound for evidence of continued bleeding.
- Check distal pulses, color, capillary refill and sensory after bandage applied.
- Continue to apply direct hand pressure over dressing or use air splint if bleeding continues.

Complications:

- ❖ Loss of distal circulation from bandage applied too tightly around extremity.
- ❖ Airway obstruction due to tight neck bandages.
- ❖ Restriction of breathing from circumferential chest wound splinting.
- ❖ Continued bleeding no longer visible under dressings.
- ❖ Inadequate hemostasis: some wounds require continuous direct pressure manual pressure to stop bleeding.

PNEUMATIC ANTI SHOCK GARMENT (PASG-FORMERLY MAST)

Indications:

- *Unstable pelvic fractures with:* Systolic blood pressure less than 90 mmHg. Signs and symptoms of shock.
- *Suspected ruptured abdominal aneurysm:* Systolic BP less than 90 mmHg. Signs and symptoms of shock.
- Bilateral femur Fractures.
- Trauma Arrest (consider).

Precautions: (See Special Notes)

- ❖ Only absolute contraindications to inflation are pulmonary edema and chest trauma.
- ❖ Except in the presence of pulmonary edema, DO NOT DEFLATE IN THE FIELD.
- ❖ Never inflate the abdominal section alone.
- ❖ In visibly pregnant patients (third trimester), eviscerations, and impaled objects, avoid abdominal inflation if possible.
- ❖ Carefully note presence of wounds, which the suit will cover once inflated.
- ❖ Do not apply too low: remember that the inflated chambers will shorten. The most common error is to apply so that only the lower abdomen is covered.
- ❖ Jobst brand PASG pre-1982 have air bladder post abdominal compartment. When spinal injury is suspected, avoid inflating abdominal compartment, which may deform spine.

Procedure:

- PASG application should be incorporated with initial patient packaging, i.e., immobilization and stabilization, and should not increase scene time.
- Obtain baseline vital signs and lung sounds. Remove clothing.
- Inflate the legs first, and then abdominal section. Be sure abdominal section is positioned properly, up to the xiphoid, covering main abdominal surfaces.
- Inflate until Velcro crackles or air exhaust through relief valves.
- Close stopcock valves.
- Remove pump.
- Record time of inflation.
- Listen to lungs and check for adequacy of ventilation.
- Recheck and record vital signs. (Preferably every 5 minutes).
- Monitor suit pressure and patient blood pressure en-route and regulate inflation as needed.

Complications:

- ❖ Pulmonary edema (potential).
- ❖ Inability to examine patient under MAST, inability to monitor skin color, temperature, circulation in feet.
- ❖ Vomiting, urination or defecation due to abdominal pressure at time of inflation.
- ❖ Acidosis and circulatory compromise with long-term inflation and in setting of diaphragmatic herniation.
- ❖ Compartment Syndrome

Special Notes:

Application of the PASG should not significantly increase scene time.

Monitor the patient's pressure, NOT the suit pressure.

Be familiar with deflation procedures and be willing to assist hospital personnel, if needed.

Monitor inflation carefully. Leaks occur, and adjustment is also needed during changes in altitude or temperature.

RESTRAINTS

Restraints are only to be applied in limited circumstances. Contact medical control if there is uncertainty as to whether or not the use of restraints is warranted in transporting the unwilling or uncooperative patient.

Indications:

- A patient who needs to be transported for medical care, which is refusing transport/ care, & who is incompetent to refuse.
- A person who appears to be an imminent danger to others or to himself.
- Physician direction/Law Enforcement concurrence.

Precautions: Any attempt at restraint involves risk to patient and EMT or Paramedic.

- ❖ Do not attempt to restrain patient without adequate assistance.
- ❖ Physical restraints are a last resort. All possible means of verbal persuasion should be attempted first.
- ❖ A patient who is alert, oriented, aware of his condition, and capable of understanding the consequences of his refusal is entitled to refuse treatment. He may not be restrained and treated against his will.
- ❖ If there is a significant chance of the patient vomiting (e.g., intoxicants, withdrawal states), do not restrain in supine position, but rather in lateral position to decrease risk of aspiration.

Techniques:

- Obtain adequate manpower for assistance.
- Utilize police assistance if necessary.
- Treat the patient with respect.
- Tell him he is being restrained because he might injure himself or someone else.
- Organize your help in advance. Assign at least one person to each limb. A fifth person can coordinate the procedure.
- Have all equipment ready.
- Utilize Kerlix, sheets or other soft restraints.
- Consider the patients' range of motion in the need for and method used to restrain.
- Explain the procedure to the patient.
- Restrain arms and legs. Avoid body restraints as they may result in strangulation.
- Reassure patient; remind him that you are there to assist him in getting care.
- Check restraints as soon as applied and every 10 minutes thereafter to ensure no injury to extremities.
- Pad restraints as necessary.
- Once in restraints - do not leave the patient at any time.
- Remove restraints only with sufficient personnel available to control patient generally only in the hospital.

Complications:

- ❖ Radial nerve palsy (sensory loss on hand) can result from pinching of the nerve in handcuffs or other hand restraints over the wrist prominences.
- ❖ Aspiration can occur if patient is restrained on his back and cannot protect his own airway.
- ❖ Medical causes for combativeness may result in further injury to patient or inappropriate placement.
- ❖ Do not forget the medical differential of altered mental states: hypoglycemia, hypoxia, stroke, hyperthermia, hypothermia, or drug ingestion.
- ❖ Deterioration may cause your patient to "calm down", be sure you are not falsely reassured.

Special Notes:

Use with caution in patients with extremity injuries.

Written and verbal reports must completely document the necessity for the use of physical restraints.

Record condition of limbs before applying restraints and recheck and record neurovascular status on arrival at hospital.

SPINAL IMMOBILIZATION

Indications:

- Spinal tenderness, pain on palpation, pain with movement, or neurological deficit (associated distal weakness, numbness, tingling, or paralysis).
- Swelling or deformity of the spine, which may be due to fracture, dislocation, or ligamentous instability.
- All trauma patients who are unconscious or present with an altered level of consciousness due to traumatic head injury or drug and/or alcohol ingestion.
- Patients with significant head trauma or who have experienced a significant mechanism of injury that cannot be ruled out by an accurate exam or history that present with the potential for unrecognized coexistent spinal trauma.

Precautions:

- ❖ Perform and document a complete neurologic exam prior to and after movement of the patient. Re-document a complete exam after splinting and upon delivery to the hospital.

Cervical Splinting Procedure:

- Use assistant to apply neutral in-line stabilization while completing primary survey.
- Advise the patient of the procedure and purpose before and during application.
- Use a rigid cervical collar to immobilize the cervical spine.
- Prepare to move the patient to a long spine board or to apply a KED as the situation dictates.

Football Helmets: Leave football helmets in place if the patient is also wearing shoulder pads that will provide in-line immobilization. Removal of the facemask portion of the helmet will in most cases allow for airway control. If required, complete removal of the helmet will also necessitate removal of shoulder pads and other auxiliary spinal protective equipment.

Motorcycle/and other Sporting Helmets: In most cases these helmets will need to be removed to provide for airway control and in-line immobilization unless other auxiliary protective equipment is in place or appropriate padding can be applied to ensure a neutral in-line position.

When removing a helmet use an approved **BTLS/PHTLS** technique.

Note: Application of a cervical collar by itself does not constitute adequate spinal immobilization. Cervical collars are to be used in conjunction with long spine boards and cervical immobilization devices; with the addition of the KED when appropriate.

Spinal Immobilization: Assess and document neurologic findings.

- Immobilize the cervical spine.
- Use the KED for seated patients provided that they are stable and rapid extrication is not required.
- Slide the KED behind the patient and position chest panels up into the armpits.
- Apply chest straps.
- Apply leg straps.
- Secure the head using padding when necessary to ensure a neutral in-line position.
- Prepare to move the patient to a long spine board ensuring that adequate manpower, straps and a cervical immobilization devices are readily available.
- When appropriate apply the **PASG** suit to the board before moving the patient.
- Logroll or lift the patient to the board as a unit.
- Release the leg straps if a KED was used.
- Use appropriate padding behind the neck, back, or knees in order to ensure proper in-line immobilization.
- Apply straps to secure the chest, thighs and lower legs to the board
- Secure the head using a cervical immobilization device.
- Assess and re-document neurologic findings.

SPINAL IMMOBILIZATION EXCLUSION CRITERIA

INDICATION

Spinal immobilization is indicated for any trauma patient who sustains an injury with a mechanism having the potential for causing spinal injury and who has any one of the following clinical criteria:

ASSOCIATED CLINICAL CRITERIA	YES	NO
Penetrating trauma to the head, spine or thoracic region	<input type="checkbox"/>	<input type="checkbox"/>
Inability to communicate (e.g., child/infant, language, other)	<input type="checkbox"/>	<input type="checkbox"/>
Altered mental status or loss of consciousness	<input type="checkbox"/>	<input type="checkbox"/>
Significant mechanism of injury such as:	<input type="checkbox"/>	<input type="checkbox"/>
high speed motor vehicle crash		
axial loading		
rollover motor vehicle crash		
fall from greater than twice the patient’s standing height		
Evidence of mental impairment (e.g., intoxication, drugs, dementia, etc.)	<input type="checkbox"/>	<input type="checkbox"/>
Distracting injury, such as significant fracture or laceration	<input type="checkbox"/>	<input type="checkbox"/>
Neurologic deficit	<input type="checkbox"/>	<input type="checkbox"/>
Midline spine pain (subjective)	<input type="checkbox"/>	<input type="checkbox"/>
Midline spine tenderness (objective)	<input type="checkbox"/>	<input type="checkbox"/>
Suspected spinal cord injury based on MOI, history or exam findings.....	<input type="checkbox"/>	<input type="checkbox"/>

IF ALL ABOVE ARE “NO”

Have the patient actively rotate his/her neck left and right then flex up and down while palpating the c-spine. Coach the patient to stop movement if there is pain, crepitus, limited movement or other concerns.

ASSESS FOR:

Pain with active neck rotation & flexion	<input type="checkbox"/>	<input type="checkbox"/>
Range of motion neck rotation limited to, 45° or less.....	<input type="checkbox"/>	<input type="checkbox"/>

If any answer is “YES” spinal immobilization is indicated.

If ALL answers are “NO” immobilization is not indicated.

WHEN IN DOUBT IMMOBILIZE

SPLINTING: EXTREMITY

Indications: Pain, swelling or deformity in extremity, which may be due to fracture or dislocation.

- In an unstable extremity injury: to reduce pain, limit bleeding at the site of injury, and prevent further injury to soft tissues, blood vessels or nerves.

Precautions:

- ❖ Critically injured trauma victims should not be delayed in transport by lengthy evaluation of possible non-critical extremity injuries.
- ❖ Prevention of further damage may be accomplished by securing the patient to a spine board when other injuries demand prompt hospital treatment.
- ❖ The patient with altered level of consciousness from head injury or drug influences should be carefully examined and conservatively treated, because his ability to recognize pain and injury is impaired.
- ❖ Make sure the obvious injury is also the only one. It is easy to miss fractures proximal to the visible one.
- ❖ In a stable patient, when no environmental hazard exists, splinting should be done prior to moving them.
- ❖ Never deliberately test for crepitus or instability.
- ❖ Air splints are useful to control bleeding, but avoid over inflation and circulatory compromise. Temperature and altitude changes during transport will alter splint pressure.

Extremity Splinting Procedure:

- *Check pulse, movement, and sensation distally prior to splinting or movement.*
- Remove bracelets, watches, or other constricting bands prior to splint application.
- Identify and dress open wounds. Note wounds that contain exposed bone or lie near fracture sites.
- Avoid sudden or unnecessary movement of fracture site to minimize pain and soft tissue damage.
- Choose splint to immobilize joint above and below injury. Pad rigid splints to prevent injury to extremity.
- Apply gentle continuous traction to extremity and support to fracture site during splinting operation.
- Check distal pulses, movement and sensation after splinting.

Traction Splinting Technique (for suspected femur fractures):

- Use two persons for splint application procedure.
- Immobilize the affected extremity. Remove sock and shoe and check for distal pulse and sensation (unless you cannot protect exposed foot from weather; then just ask patient about sensation / movement).
- Identify and dress open wounds, and note exposed bone or wounds overlying fractures.
- Measure splint length prior to application for the Hare. Make sure the Sager is not too long for the child.
- Apply ankle hitch and pull gentle traction, reducing angulations or open fractures. Support calf and thigh throughout application of the Hare.
- Position ischial pad under buttocks, up against bony prominence (ischial tuberosity) for the Hare.
- Empty pockets if needed. Position the ischial pad into the groin avoiding the genitals for the Sager.
- Secure groin strap.
- Apply the ankle hitch for the Sager.
- Maintain continuous traction for the Hare, stabilization for the Sager, and support the fracture site throughout procedure.
- Apply traction to the Hare pulling the ankle hitch out of the EMTs hands without losing traction until the patient experiences an improvement in comfort (movement at the fracture site will cause some pain, but if traction continues to cause increased pain, do not proceed).
- Splint and support leg in position of most comfort). Apply traction by extending the Sager to achieve a force of 10% of body weight utilizing the same principles above for comfort.
- Adjust support straps to appropriate positions under leg.
- Secure support straps after traction properly adjusted.
- Check distal pulses and sensation after splinting.
- Do not apply Hare/Sager traction devices if pelvic, knee or lower extremity fractures exist or are suspected.

TOURNIQUET USE

Indications

- A tourniquet may be used to control potentially fatal hemorrhage only after other means of hemorrhage control have failed.

Precautions

- ❖ A tourniquet applied incorrectly can increase blood loss.
- ❖ Applying a tourniquet can cause nerve and tissue damage whether applied correctly or not.
- ❖ Proper patient selection is of utmost importance.
- ❖ Injury due to tourniquet is unlikely if the tourniquet is removed within 1 hour. In cases of life-threatening bleeding benefit outweighs theoretical risk.
- ❖ A commercially made tourniquet is the preferred tourniquet. If none is available, a blood pressure cuff inflated to a pressure sufficient to stop bleeding is an acceptable alternative. Other improvised tourniquets are not allowed.

Technique

- First attempt to control hemorrhage by using direct pressure over bleeding area.
- If a discrete bleeding vessel can be identified, point pressure over bleeding vessel is more effective than a large bandage and diffuse pressure.
- If unable to control hemorrhage using direct pressure, apply tourniquet according to manufacturer specifications and using the steps below:
 - Cut away any clothing so that the tourniquet will be clearly visible. NEVER obscure a tourniquet with clothing or bandages.
 - Apply tourniquet proximal to the wound and not across any joints.
 - Tighten tourniquet until bleeding stops. Applying tourniquet too loosely will only increase blood loss by inhibiting venous return.
 - Mark the time and date of application on the patient's skin next to the tourniquet.
 - Keep tourniquet on throughout hospital transport – a correctly applied tourniquet should only be removed by the receiving hospital.