PROCEDURES

Airway Management

Fundamental Concepts

Purpose:

Proper airway management is the first priority of the EMT/Paramedic.

Indications:

- Airway control and protection.
- Inadequate ventilation and/or oxygenation.

Oxygenation, Maintenance of Airway and Ventilation:

A. Supplemental oxygen:

1. A Nasal cannula is useful for small amounts of supplemental oxygen.
2. Partial Rebreather masks (PRB) are recommended when higher flow and concentrations of oxygen need to be delivered.
3. "Blow-by" oxygen should be used for infants and toddlers.

B. Nasopharyngeal Airway (NPA) or Oropharyngeal Airway (OPA) should be used for patients who are unable to maintain their own airway.

C. A Bag-Valve-Mask (BVM) should be used when inadequate ventilation is present.

*** Automatic Implantable Cardio-Defibrillator (AICD) Deactivation

Definition:

An AICD is an implanted defibrillator device that consists of a lead system that senses cardiac activity, logic circuitry to analyze the sensed signals, a power supply for device function and generating high voltage, and a capacitor that stores and delivers shocks when needed when brady and/or tachyarrhythmias are detected within programmed parameters. These devices may malfunction occasionally.

Indications:

For verified frequent and recurrent inappropriate AICD discharges, a magnet may be utilized to deactivate 'runaway" devices. Inhibition of AICD devices should be considered only when continuous ECG monitoring with ACLS is readily available and there is evidence of device malfunction.

Procedure:

A. Contact OLMC.

B. Monitor ECG and verify sinus rhythm AND inappropriate defibrillator discharge.

C. Locate the position of the AICD device.

D. Place doughnut magnet directly over the device.

E. After defibrillator deactivation, tape magnet firmly in place and transport.

Precautions:

A. It is very important to make the correct diagnosis before utilizing this protocol (ECG showing NSR without ectopy and indications of recurrent AICD discharges).

B. Some AICD devices will emit varying beeping or continuous tones when magnets are applied, others will not. Disregard these tones.

C. If the magnet placement is successful in overriding the pulse generation of the AICD, DO NOT REMOVE THE MAGNET. Some units will return to operational activity after removal of the magnetic field.

Special Considerations:

A. Magnets should be stored so as not to come in contact with magnetic sensitive materials, i.e., tapes, credit cards, magnetic door entry cards, and other electronic equipment.

B. A small percentage of AICDs are impervious to magnetic fields (AICD recipients who normally work around magnetic fields have these special units) and will not be deactivated with the doughnut magnet. In such cases advise OLMC and transport.

C. Consider use of the AICD magnet in deactivating cardiac pacemaker malfunctions.

D. Identification information of the AICD type, date implanted and location of implantation (usually on a wallet card) should accompany the patient to the ED.

*Use of the Combitube

Indications:

A. Use of the Esophageal Tracheal Combitube (ETC) is indicated if endotracheal intubation can not be performed and the patient needs a secure airway.

Contraindications:

A. The Combitube is contraindicated, and should not be used with patients in the following situations:

1. An intact gag reflex.

2. Airway obstruction.

3. Patients under 4 feet in height.

4. Known or suspected caustic ingestion.

5. Known esophageal disease.

Combitube Intubation:

A. Attach pulse oximeter and monitor oxygen saturation.

B. Ventilate 1-2 minutes prior to the ETC intubation attempt.

C. Estimate patient's height, place head in neutral position.

D. Utilize a water-soluble lubricant applied to the distal shaft of the ETC.

E. Insert ETC into mouth and direct it along the midline. Advance gently until the teeth (or gums) are aligned between the two black rings on the tube.

F. For patients greater than 5 feet in height, use the regular adult size ETC as follows:

1. Using a large syringe, inflate Line 1 through the pilot balloon with 100 ml of air.

2. Using the small syringe, inflate Line 2 through the pilot balloon with 15 ml of air.

G. If patient is between 4 feet and 5 feet in height, use the small adult (SA) size ETC as follows:

1. Using the large syringe, inflate Line 1 through the pilot balloon with 85 ml of air.

2. Using the small syringe, inflate line 2 through the pilot balloon with 12 ml of air.

H. Attach a bag-valve device with supplemental O_2 to Tube No. 1, and begin ventilations.

I. Listen for lung sounds in both lateral lung fields and over the epigastrium.

1. If lung sounds are present, and there are no gastric sounds continue ventilations.

2. If lung sounds are absent, and gastric sounds present, tracheal placement may have been accomplished.

a. Remove the bag-valve device from Tube No. 1 and continue ventilations through Tube No. 2.

b. Listen for lung sounds in both lateral lung fields and over the epigastrium.

3. If neither lung sounds or gastric sounds are heard, deflate the pharyngeal cuff and gently withdraw the ETC approximately 2-3 cm and attempt to ventilate through Tube Number 1.

4. If lung sounds are absent and adequate ventilation cannot be obtained then remove the ETC.

J. Attach end-tidal CO_2 monitor to the tube you are ventilating.

K. If unsuccessful after the second attempt to insert the ETC, discontinue the procedure and continue ventilations using an alternative method.

L. If esophageal intubation has occurred, consider attaching the mask elbow to Tube Number 2 to deflect the potential flow of stomach contents.

M. Periodically check for appropriate placement of the ETC and adequate ventilations.

***Endotracheal Intubation

Indications:

- Respiratory insufficiency.
- Altered mental status with airway compromise.
- Situations requiring positive pressure ventilation.

Procedure:

A. Open airway, pre-oxygenate patient while maintaining cricoid pressure.

B. Assemble equipment including cardiac monitor, suction, oximeter and alternative airway devices.

C. Intubate patient.

D. Verify placement of ET tube using the 5 point check and End-Tidal CO_2 monitor.

E. Insert an oral airway or compatible bite block device.

F. Secure the endotracheal tube and record depth.

G. **Always** recheck and document the ET tube placement after every major movement of patient or change in vital signs.

H. Administer midazolam 0.1 mg/kg (not to exceed 2.5 mg) as needed for agitation.

I. If patient continues to be agitated, administer vecuronium 0.1 mg/kg IV.

***Intubation with Paralytic Agents

[Advanced Airway Training Required]

Indications:

Patient meets criteria described above under "Endotracheal Intubation," **and** patient has any of the following:

- Trismus (clenched jaw).
- Active gag reflex.
- Uncontrollable combative behavior.
- Clinical condition requiring airway protection.

Procedure:

A. Open airway, pre-oxygenate patient and maintain cricoid pressure (if patient unconscious) when using a BVM.

B. Assemble airway equipment including suction and alternative airway devices and attach required equipment (cardiac monitor, end-tidal CO_2 detector and pulse oximeter).

C. Start IV per protocol.

D. Administer etomidate, 0.3 mg/kg IV/IO push.

E. Immediately follow with succinylcholine:

1. Adults and children 6 years or older (≥ 20kg): 1.5 mg/Kg IV/IO.
2. Children less than 6 years old (≤ 20kg): 2 mg/Kg IV/IO push.
3. If inadequate relaxation present after 60-90 seconds, repeat the same dose.
4. If succinylcholine is contrainindicated, substitute vecuronium 0.1 mg/kg/IV/IO push.

F. Continue cricoid pressure, and maintain until ET tube is in place and has been verified and secured.

G. When patient is paralyzed, perform intubation (approximately 1 minute after succinylcholine, 2-3 minutes for vecuronium).

1. If patient desaturates (pulse oximetry reading of less than 90%) during the attempted intubation, ventilate with BVM and 100% oxygen.
2. If intubation attempts fail, ventilate via BVM, perform King/Combitube insertion or cricothyrotomy.

H. Treat bradycardia occurring during intubation with ventilation; continue to maintain cricoid pressure:
  1. If bradycardia persists, administer atropine:
    a. Adults, 0.5 mg IV/IO
    b. Atropine, 0.02 mg/Kg IV/IO **for children less than 2 years old.** Minimum dose is 0.1 mg. Do not exceed adult dose.

I. Verify placement of ET tube using the 5-point check and End-Tidal CO_2. Place patient on continuous End-Tidal CO_2 monitoring.

J. Insert an oral airway or compatible bite-block device.

K. Secure the endotracheal tube and record depth.

L. **Always** recheck and document the ET tube placement after every major patient movement or change in vital signs.

M. Administer midazolam, 2.5 mg IV/IO, if systolic BP > 100 mmHg. This may be repeated once (pediatric dosage 0.1 mg/kg, up to 2.5 mg).

N. If additional paralysis is needed during transport, vecuronium 0.1 mg /Kg IV/IO may be administered. A repeat dose of 0.1 mg/kg IV/IO can be administered if transport time is prolonged.

O. Contact OLMC for further sedation or paralysis orders.

Precautions:

Airway maintenance, including control of the cervical spine, is the primary concern in the treatment of all patients. If unable to establish and/or maintain and adequate airway, the patient shall be transported to the nearest hospital to obtain definitive airway control. This includes patients entered in the trauma system.

A. Check IV placement if the first dose of succinylcholine does not appear to be effective in paralyzing the patient.

B. **Do not** rely solely on pulse oximetry or End-Tidal CO_2 monitoring to determine the efficacy of intubation.

C. Succinylcholine and vecuronium do not affect the level of consciousness and should always be used with etomidate/midazolam in a conscious patient.

D. Succinylcholine is contraindicated in patients with a history of hypersensitivity to the drug.

E. Succinylcholine should be avoided in:
  1. Major burns and crush injuries between 48 hours and 6 months old.
  2. Stroke or spinal cord injury with profound residual deficits between 48 hours and 6 months old.
  3. Neuromuscular disease (muscular dystrophy, multiple sclerosis, etc)
  4. Suspected hyperkalemia such as end-stage renal disease patients who have missed dialysis.

***Emergency Cricothyrotomy

Indications:

This technique is to be used only when other attempts to establish an airway have been unsuccessful (i.e., you are unable to intubate or ventilate using a BVM or King/Combitube) and respiratory obstruction exists. Such conditions are most likely to be found with foreign-body obstruction; facial and laryngeal trauma; inhalation, thermal, or caustic injury to the upper airway; angioneurotic edema; upper airway bleeding; epiglottitis and croup.

QuickTrach®:

1. Place the patient in a supine position. Assure stable positioning of the neck region and hyperextend the neck.
2. Secure the larynx laterally between the thumb and forefinger. Find the cricothyroid membrane (in the midline between the thyroid cartilage and the cricoid cartilage). This is the puncture site.
3. Firmly hold the device and puncture the cricothyroid membrane at a 90 degree angle.

NOTES:
Because of the sharp tip and conical shape of the needle, an incision of the skin with a scalpel is not necessary. The opening of the trachea is achieved by dilating through the skin. This reduces the risk of bleeding as only the smallest necessary opening is made.

4. After puncturing the cricothyroid membrane, check the entry of the needle into the trachea by aspirating air through the syringe. If air is present, the needle is within the trachea. Now, change the angle of insertion to 60 degrees and advance the device forward into the trachea to the level of the stopper. The stopper reduces the risk of inserting the needle too deeply and causing damage to the rear wall of the trachea.
5. Remove the stopper. After the stopper is removed, be careful not to advance the device further with the needle still attached.
6. Hold the needle and syringe firmly and slide only the plastic cannula along the needle into the trachea until the flange rests on the neck. Carefully remove the needle and syringe. Next, secure the cannula with the neck tape, apply the connecting tube to the 15mm connection, and connect the other end to the resuscitation bag or ventilation circuit.

Precautions:

Should no aspiration of air be possible in Step Three because of an extremely thick neck, it is possible to remove the stopper and carefully insert the needle further until entrance into the trachea is made. Once this is verified, continue as in Step Five.

Damage to nearby structures can occur.

A. Major vessels to either side of the midline.

B. The vocal cords if the puncture is made too high.

C. Through-and-through puncture of the trachea with entry into the esophagus lying immediately behind if the puncture is made too deeply.

Pediatric Considerations: Needle Cricothyrotomy

Indications:

For pediatric patients aged 12 years and under. This technique is to be used only when other attempts to establish an airway have been unsuccessful (i.e., you are unable to intubate or ventilate using BVM) and respiratory obstruction exists. Such conditions are most likely to be found with foreign-body obstruction; facial and laryngeal trauma; inhalation, thermal, or caustic injury to the upper airway; angioneurotic edema; upper airway bleeding; epiglottitis; and severe croup.

Procedure:

1. Assemble equipment: 14 or 16 ga angiocath, 3cc syringe, 3.0 ETT adapter, oxygen, BVM.
2. Place the patient in a supine position with support under the shoulders and mild hyperextension of the neck unless C-Spine injury is suspected.
3. Palpate the neck in the midline and locate the slight depression just below the notch of the thyroid cartilage. This is the position of the cricothyroid membrane.
4. Prepare the area with Betadine wipes.
5. Stabilize the airway between thumb and forefingers.
6. Insert the needle with catheter into the cricothyroid membrane at a 30-degree angle toward the pts feet.
7. When the needle is through the membrane, stop and aspirate for air to ensure tracheal entry.
8. Advance the catheter over the needle and then remove the needle.
9. Attach the 3.0 ETT adapter to the hub of the catheter and begin ventilations with the BVM. Attach $ETCO_2$ monitor.
10. Secure the cannula with tape after confirming correct placement by auscultating for breath sounds (5 point check). Observe for kinking of cannula.

Notes & Precautions:

1. Hazards in performing this procedure are primarily those of damage to nearby structures - major vessels to either side of the midline, to the vocal cords if the puncture is made too high, or a through and through injury of the trachea if the puncture is made too deeply.
2. Palpation of the cricothyroid membrane is very difficult in the infant and young child. The key to success is immobilization of the trachea throughout the procedure.
3. Needle cricothyrotomy is only a temporizing measure and provides oxygenation, not adequate ventilation.

*End-Tidal CO_2 Monitoring

Purpose:

To measure the effectiveness of ventilation by measuring the amount of carbon dioxide in exhaled air.

Procedure:

A. Manage airway according to **Airway Management** procedure.

B. Apply $EtCO_2$ monitor. Maintain $ETCO_2$ output between 35-40 mmHg.

The following approximates the degree of ventilation

> 40 = Hypoventilation

35-40 = Normal ventilation

30-35 = Hyperventilation

< 30 = Aggressive hyperventilation

C. Patients with signs of increased intracranial pressure (unilateral dilated pupil, posturing, focal neurologic findings) maintain CO_2 between 30-35.

D. Document pulse oximetry and ETCO2 readings in your pre-hospital care report at regular intervals, especially following movement of the patient or change in vital signs.

Precautions:

A. Remember: pulse oximetry does not equate to ventilation. You can have a poorly ventilated patient displaying an oxygen saturation of 100%. Excessively high $PaCO_2$ levels can be detrimental to your patient's outcome.

B. A sudden drop in CO_2 output from normal (35-40 mmHg) to 15-20 mmHg and an obvious change in the waveform is indicative of tube displacement, most likely into the hypopharynx. Re-assess tube placement immediately and take corrective action.

C. Do not rely on pulse oximetry or $ETCO_2$ monitoring solely to determine the efficacy of intubation.

**Intraosseous Infusion

Definition:

An alternative technique for establishing IV access in critical adult and pediatric patients when peripheral IV access is difficult or time-sensitive.

Indications:

A. Intraosseous infusion is indicated in emergency situations when life-saving fluids or drugs should be administered and IV cannulation is difficult, impossible or too time-consuming to perform.

B. If a peripheral IV cannot be established after two attempts or within 60–90 seconds of elapsed time *and* in:

C. Adult and pediatric patients, within the proper weight range, who present with one or more of the following clinical conditions:

1. Cardiac arrest.
2. Hemodynamic instability (BP <90 mmHg and clinical signs of shock).
3. Imminent respiratory failure.
4. Status epilepticus with prolonged seizure activity greater than 10 minutes, and refractory to IM anticonvulsants.
5. Toxic conditions requiring immediate IV access for antidote.

D. IO placement may be considered prior to peripheral IV attempts in cases of cardiopulmonary or traumatic arrest, in which it may be obvious that attempts at placing an IV would likely be unsuccessful and or too time consuming, resulting in a delay of life-saving fluids or drugs.

Adult EZ-IO™ Procedure:

A. Determine patient's weight.

B. Assemble all necessary equipment.

1. The standard EZ-IO AD® needle should be utilized on patients who weigh ≥ 40 kg (approximately 88 lbs. or greater).

C. Site Selection (patients weighing ≥ 40 kg).

1. Palpate the landmarks at the proximal tibia (patella and tibial tuberosity).
2. Insertion site should be approximately one finger width to the medial side of the tibial tuberosity.
3. An alternative site may be used at the distal tibia (especially for morbid obesity patients). Insertion site should be two finger widths proximal to the medial malleolus along the midline of the tibia.

D. Needle Insertion

1. Prep the surface with Betadine and wipe dry with a sterile gauze pad.
2. Stabilize patient's leg and begin insertion from a 90-degree angle to the insertion site. Gently advance the needle set into position–do not force. Stop when you feel the "pop."
3. When needle is in proper position, remove stylet (if insertion fails, leave the needle in place and clamp the EZ-Connect; do not attempt second insertion on same leg).
4. Connect extension tubing or EZ-Connect, primed with saline, to IO hub.
5. Confirm the catheter position (catheter is stable at a 90-degree angle to the bone, able to aspirate blood, and fluids flow without evidence of extravasation).
6. Rapid bolus or "power" flush with approximately 10 ml normal saline when using the EZ-IO AD® needle.
7. Connect IV tubing and bag to extension tubing or EZ-Connect.
8. Consider additional bolus of saline if flow rates slower than expected.
9. Utilize a blood pressure cuff or pressure bag to help infuse fluids.
10. Dress site and secure tubing.

E. Pain management

1. If the procedure is performed on a conscious or semi-conscious patient, *immediately* following placement of the IO needle, administer 0.5 mg/kg 2% lidocaine (not to exceed 50 mg) *slowly* (over 30-45 seconds) through the IO site. Wait approximately 30–60 seconds before "power" flushing with normal saline.
2. In the event a patient regains consciousness and complains of severe pain secondary to the IO insertion, temporarily stop infusing the fluids, and administer lidocaine as in E.1 above. Wait approximately 30–60 seconds before continuing fluid administration.
3. If fluids do not flow freely, flush IO site with an additional 10 cc normal saline.

Pediatric EZ-IO™ Procedure (patients weighing 3-39 kg):

A. Assemble all equipment.
- **1.** The EZ-IO PD® needle should be used on patients who weigh between 3–39 kg (approximately 6–87 lbs.).

B. Site Selection
- **1.** Palpate the landmarks at the proximal tibia (patella and tibial tuberosity).
- **2.** Insertion site is one finger below the tuberosity, then medial along the flat aspect of the tibia.
- **3.** If the tibial tuberosity cannot be identified on the child, then the insertion site may be two finger widths below the distal portion of patella, then medial along the flat aspect of the tibia.

C. Needle Insertion
- **1.** Prep the surface with Betadine and wipe dry with a sterile gauze pad.
- **2.** Stabilize patient's leg and begin insertion from a 90-degree angle to the insertion site. Gently advance the needle set into position–do not force. Stop when you feel the "pop."
- **3.** When needle is in proper position, remove stylet (if insertion fails, leave the needle in place and clamp the EZ-Connect; do not attempt second insertion on same leg).
- **4.** Connect extension tubing or EZ-Connect, primed with saline, to IO hub.
- **5.** Confirm the catheter position (catheter is stable at a 90-degree angle to the bone, able to aspirate blood, and fluids flow without evidence of extravasation).
- **6.** Rapid bolus or "power" flush with approximately 5 ml normal saline when using the EZ-IO PD® needle.
- **7.** Connect IV tubing and bag to extension tubing or EZ-Connect.
- **8.** Consider additional bolus of saline if flow rates slower than expected.
- **9.** Utilize a blood pressure cuff or pressure bag to help infuse fluids.
- **10.** Dress site and secure tubing.

Pediatric Procedure with Manual IO Device

A. Equipment.
- **1.** Approved bone marrow type needles 15 and 18 gauge size
- **2.** Betadine swabs
- **3.** Two 5 cc syringes
- **4.** 60 cc Luer-lock syringe
- **5.** Three-way stopcock
- **6.** Flush solution
- **7.** Sterile gauze pads and tape

B. Site Selection: Proximal tibia.

C. Site Preparation: Palpate the landmarks and note the entry point that is the anteromedial flat surface 1–3 cm below the tibial tuberosity. Then prep the surface with Betadine and dry with a sterile gauze pad.

D. Insert Needle: Insert at the proximal tibial site, directing the needle caudally. The needle should penetrate the skin and subcutaneous tissue and be pushed through the cortex of the bone using rotation (avoid rocking the needle!), until a "pop" or loss of resistance is felt. Placement in the marrow should then be confirmed by:

1. Firm fixation of the needle and either removal of the stylet with free aspiration of marrow/blood or:

2. Infusion of 2–3 cc of sterile solution, palpating for extravasation or noting significant resistance. If extravasation should occur, further attempts at the site and extremity should be avoided.

3. Note: it is not always possible to aspirate, but the line may be working.

E. Tape and secure the IO needle firmly in place.

F. Start Infusion:

1. Although gravity drainage may suffice, pressurized infusions (using 3-way stopcock and 60 cc syringe or infusion pump) may be needed during resuscitation.

2. When infusing medications via IO route, pressure must be applied to the fluid bag in order to maintain flow rates; the EMT must continually monitor the rate of infusion.

Contraindications (all ages):

A. Fracture of the bone selected for IO insertion (consider alternate site).

B. Previous *significant* orthopedic procedures (IO within 24 hours; prosthesis).

C. Infection at the site selected for insertion (consider alternate site).

D. Excessive tissue at insertion site, with absence of anatomical landmarks (consider alternate site).

Precautions & Possible Complications (all ages):

A. Osteomyelitis, growth plate injury (in pediatric patients), and extravasation of fluid with compression of popliteal vessels or the tibial nerve may occur.

B. Airway and breathing should be established first in accordance with other protocols.

C. Do not perform more than one attempt in each tibia.

D. Any ALS medication may be administered IO.

E. Do not use hypertonic saline through an IO.

**Management of Intravenous Lines and IV Solutions Normal Saline (NS)

Pharmacology:

These are solutions that consist of electrolytes in water. They provide water and electrolytes for replacement of acute extracellular fluid losses and do not disturb the normal electrolyte balance since the electrolyte composition and tonicity approaches that of normal plasma.

Indications;

A. Normal Saline is indicated for replacement of fluid volume losses such as in trauma, burns, dehydration or shock.

B. An IV lock may be substituted for an IV line in all situations, except where IV fluid is the therapy of choice for volume replacement.

Precautions:

NS should be used with caution in patients with renal impairment (hyperkalemia), cardiac and respiratory disorders (fluid overload), or extremes of age.

Procedure:

A. IV access:

1. Establish IV access and prepare NS.
2. Connect an extension set [(1)] between the IV hub and the solution bag and tubing.
3. All IVs will be started using regular drip sets (15 gtts/cc), unless otherwise indicated.

B. IV access with an IV lock:

1. Establish IV access.
2. Connect an extension set[1] between the IV hub and male adapter plug.
3. After placement, the line should be flushed with normal saline.
4. If the IV lock system is used for the administration of medication, the line must be flushed after each administration.

NOTE:

[(1)] An extension set should be of standard bore and be at least 5 inches long. It should contain one, or more, injection sites and a slide clamp.

**Control and Monitoring of Intravenous Solutions

Definition:

The administration of fluid or medication by continuous infusion through an intravenous line.

Purpose:

To decrease the likelihood of inadvertently administering an excess volume of medication.

Indications:

*** **A.** Any time a medication is administered as a continuous infusion.

** **B.** Any time a fluid is administered by continuous infusion in pediatric patients under the age of five.

Procedure:

A. Using a Volutrol® or Soluset® type device:

1. Establish IV access and prepare solution.
2. Connect the Volutrol® between the solution bag and the IV tubing.
3. Place one hour's solution into the Volutrol® and close the connection between the Volutrol® and the solution bag.
4. Begin infusing solution at the appropriate rate.
5. If desired, additional solution may be placed in the Volutrol®.
6. The Volutrol® should never contain more than one hour of solution.

B. Using an infusion pump:

1. Establish IV access and prepare solution.
2. Connect IV tubing to infusion pump according to manufacturer's directions.
3. Begin infusing solution at the appropriate rate.

NOTES:

A. At the time of transfer of care from one agency to another, the Prehospital Care Report should include the amount of solution currently infused, or volume "left to count."

B. All infusions and patient response should be closely monitored and documented.

*King LT-D/LTS-D Airway Device

Purpose/Definition:

The King LT-D™ and LTS-D™ airways are disposable supralaryngeal airways created as alternatives to tracheal intubation or mask ventilation. These devices offer the ability to provide positive-pressure ventilation, thus allowing maximum versatility as an airway management tool. It is easy to insert and results in minimal airway trauma.

In this protocol, unless otherwise specified, the use of the term "King Airway" will apply to either device.

Indications:

A. Use of the King Airway is indicated if endotracheal intubation cannot be performed, and the patient needs a secure airway.

B. The King Airway is an acceptable alternative primary airway device over an endotracheal tube in the setting of a cardiac arrest.

Contraindications:

A. The King Airway is contraindicated, and should not be used with patients in the following situations:

1. An intact gag reflex.
2. Airway obstruction.
3. Patients under 4 feet in height.
4. Known or suspected caustic ingestion.
5. Known esophageal disease.

Proper Selection of Tube Size

A. Selecting the proper tube size is based on the height of the patient.

B. Recommended tube size as follows:

Patient Height	Tube Size	Tube Color
4–5 feet	3	Yellow
5–6 feet	4	Red
Greater than 6 feet	5	Purple

Procedure:

A. Attach pulse oximeter, and monitor oxygen saturation.

B. If vomitus, blood or other foreign material is present in the hypopharynx, rapid and aggressive suctioning and/or manual removal must be done *prior* to attempting intubation with the King Airway.

C. Ventilate patient with bag-valve-mask (BVM) prior to insertion of King Airway.

1. Those steps as described in Sections A and C above, will not be necessary when placing the King as the primary airway in cardiopulmonary arrest.

D. Estimate patient's height, and select the proper size tube.

E. Lubricate the posterior distal end of the King Airway with a water-soluble gel.

F. Place patient's head into a "sniffing" position.

1. In cases of suspected or potential cervical spine injury, place the patient's head in a neutral position.

2. For obese patients, elevation of the shoulders and upper back may be considered.

G. Hold the King Airway device at the connector with dominant hand. With non-dominant hand, hold mouth open and apply chin-lift.

H. Using a midline approach, introduce tip of tube into mouth. The blue orientation line on tube should face the chin of the patient.

I. Advance the tip of tube behind the base of the tongue.

J. Without exerting excessive force, advance tube until the base of the connector is aligned with the teeth and/or gums.

K. Inflate tube cuffs to the appropriate volume of air using the 100 mL color-coded King Systems or other appropriate-sized syringe.

L. Note: Typical inflation volumes are as follows:

1. Size #3 45–60 mL

2. Size #4 60–80 mL

3. Size #5 70–90 mL

M. Attach bag-valve device with supplemental oxygen to connector. While gently bagging the patient to assess ventilation, simultaneously withdraw the King LT-D™ until ventilation is easy and free- flowing (large tidal volume with minimal airway pressure).

N. Listen for lung sounds in both lateral lung fields and over the epigastrium.

O. Attach end-tidal CO_2 monitor.

P. As soon as feasible, secure the King Airway with an endotracheal tube holder. Do *not* use tape.

Q. If ventilation is *not* sufficient, gently withdraw the device approximately 1 cm in order to achieve optimal ventilation.

Suctioning through the King LTS-D:

A. Use of the gastric access lumen for suctioning and removal of stomach contents will be at the discretion of the user.

B. Attach a maximum size 18 Fr suction catheter to a portable suction unit.

C. If necessary, lubricate the catheter with a water-soluble gel.

D. Insert suction catheter into the opening of the gastric access lumen, and advance to the maximum depth.

E. Turn on suction unit and maintain continuous suction until there is no further return of stomach contents.

F. After detaching the suction unit, the suction catheter may be left in place to prevent any additional stomach contents from being expelled from the gastric access lumen.

G. If active suctioning is not performed, a suction catheter may be placed in the gastric access lumen to act as a passive vent, and to prevent stomach contents from being expelled from the lumen.

Precautions:

A. The King Airway is intended for airway management in patients over 4 feet in height.

B. It is extremely important to properly open the airway and ensure that the tip of the King Airway advances past the base of the tongue.

Non-transport Procedure

Purpose:

To describe the process of interaction and documentation for individuals who are not transported.

Philosophy:

1. Every person will be assessed to determine whether or not he/she meets the criteria of an identified patient.
2. All identified patients for whom 911 is called are offered transport but we recognize
   a. Some patients may not need ambulance transport
   b. Patients with decision-making capacity have the right to refuse treatment and/or transport

Definitions:

A. No Patient Identified:
   1. No significant mechanism of injury.
   2. No signs of trauma.
   3. No acute medical condition.
   4. Individual is 18 years of age, or older.
   5. Individual did not request medical assistance

B. Decision-making capacity: The ability to make an informed decision about the need for medical care based on:
   1. The person is given accurate information about possible medical problems and the risks of refusing treatment and/or transport.
   2. The person understands and verbalizes these risks and benefits.
   3. The person is able to make a decision that is consistent with his/her values.

C. Impaired Decision-making Capacity: The inability to understand the nature of the illness or injury, or the risk and consequences of refusing care.

D. Emergency Rule: EMTs may treat and/or transport a person whose condition is immediately life/limb-threatening but who has impaired decision-making.

Refusal and Informed Consent Flow Chart

Assess Person's Medical Need

Refusal and Informed Consent Flow Chart

Assess Patient's Medical Need

No Identified Patient

- No significant mechanism
- No visible signs of traumatic injury
- No known acute medical condition
- No identifiable behavior problems and normal mental status
- NOT less than 18 years old
- DID NOT request medical assistance

Action:
No Information Form required

Identified Patient

Assess Ability to Make Decisions:

- Head injury
- Drug or alcohol intoxication
- Medical conditions (e.g., hypoglycemia)
- Toxic exposure
- Psychiatric problems
- Language barriers

Able to make Decisions
Ambulance transport needed, but refused

- **Explain risks of refusal**
- If serious medical need exists, contact OLMC
- Enlist family, friends, police to help convince patient
- Complete Information Form, follow documentation guidelines.

Able to make Decisions With no apparent need for Ambulance transport

- **PIC must agree with patient's course of action.**
- Fully document physical findings
- Fully document advice given to patient
- Follow documentation guidelines.

Unable to Make Decisions (Impaired capacity)

- Treat and transport if medical emergency exists. Use restraint protocol if needed.
- Make all reasonable efforts to assure patient gets medical care.
- **Consult OLMC**
- **DO NOT** have patient sign an Information Form.

Minimum Documentation:
(For all identified patients)

- General appearance and level of consciousness
- History, vital signs, and physical exam
- Presence of any intoxicants
- Assessment of patients decision making capacity
- Any risks that were explained to the patient
- Communications with family, police, and/or OLMC

Required OLMC Contact:

- Impaired decision making capacity
- Suspected serious medical condition
- Suspected abuse, child or elderly
- First-time seizures
- Scene conflict regarding medical care
- Minor without guardian refusing care

Information Form

Name: _____ Date of Birth: _____

Run Number:_____ Date: _____

Please Read And Keep This Form!

This form has been given to you because you do not want treatment and/or transport by Emergency Medical Services. Your health and safety concern us. Please remember the following:

1. Your condition may not seem as bad as it actually is. Without treatment your condition could become worse.
2. Our help cannot replace treatment by a doctor. You should obtain treatment by going to an Emergency Department, or by calling your doctor. You may be seen at an Emergency Department without an appointment.
3. If you change your mind or your condition becomes worse call 9-1-1. Don't wait.
4. ❑ If the box has been checked, you have been advised to go by ambulance to a hospital for treatment.
5. ❑ If the box has been checked, we have discussed your condition with a doctor who approved this advice.
6. Other: _____

I have received a copy of this information sheet.

Patient/Guardian Signature: _____ Date: _____

I. Patient or Guardian Assessment

1. Oriented to: **Person?** ❑ **Yes** ❑ **No** ____**Place?** ❑ **Yes** ❑ **No**
   ____**Time?** ❑ **Yes** ❑ **No** **Event?** ❑ **Yes** ❑ **No**
2. Altered level of consciousness? ❑ **Yes** ❑ **No**
3. Head injury? ❑**Unknown** ❑ **Yes** ❑ **No**
4. Alcohol, drug ingestion, or psychiatric impairment? ❑**Unknown** ❑ **Yes** ❑ **No**
5. In EMTs judgement, patient understands advice given and risks of refusal? ❑**Yes** ❑ **No**

II. On-Line Medical Control

❑ Not indicated.
❑ Contacted OLMC.
❑ Unable to contact. Explain: _____

Patient Advice (check each advice given)

❑ Self-care Instructions:
- ❑ Abrasions ❑ Burns ❑ Diabetic Reaction
- ❑ Lacerations ❑ Seizure ❑ Sprains/Strains

❑ Ambulance transport needed. ❑ Further harm could result without medical treatment.

III. Disposition

❑ Patient would not accept Information Form.
❑ Refused all EMS services. ❑ Refused field treatment. ❑ Refused transport.
❑ In care or custody of other agency. Agency: _____

❑ In care or custody of relative or friend. Name: _____ Relation: _____

EMT Signature: _____ **Date:** _____

ATTACH TO PATIENT CARE REPORT

Self-Care Instructions

Self-care instructions are to be used only as a guide until you can see your health care provider.

❑ Muscle Sprains and Strains

Apply ice packs to painful areas for 20 minutes out of each hour for the first 24 hours while awake only.

Elevate injured extremity above the level of your heart when possible.

Avoid long periods of standing.

Remove rings if your hand is bruised or swollen.

If the injured area is bruised or swollen, do not lie

❑ Laceration

Seek medical attention to determine if you need stitches.

Cleanse the wound with warm water and mild soap.

Dress with a sterile bandage.

Seek medical attention immediately if you develop any signs of infection such as fever, increasing pain, increasing redness or discharge from the wound.

You may need a tetanus booster if it has been longer than 5 years since your last tetanus shot.

❑ Diabetic Reaction

Stay with someone who will read these instructions and be able to assist you until you can follow-up with your health care provider.

Drink more water. **Avoid alcohol and caffeine**.

Follow your recommended diet.

Check your urine or blood sugar according to the recommendations of your health care provider.

Notify your health care provider if you are unable to keep fluids, food or medications down.

❑ Burns

Do not break any blisters that may be present.

Cover with sterile dressing.

Seek medical attention.

Ease pain with cool compresses for 20 minutes out of each hour for up to 24 hours while awake only.

Watch for signs of infection such as fever, discharge, increasing pain or redness.

You may need a tetanus booster if it has been longer than 5 years since your last tetanus shot.

❑ Seizure (previous history of seizures)

Warm baths or a heating pad may help muscle soreness.

Do not take part in activities that may harm you or others such as swimming, driving a motor vehicle or operating machinery. You should see your health care provider before returning to normal daily activity.

Stay with someone who can help you until you are able to care for yourself.

Call your health care provider as needed.

❑ Abrasions

Using warm water and mild soap, cleanse the wound twice a day for 6-8 days.

Dress the wound with a topical antibacterial ointment such as Neosporin or Bacitracin and a bandage.

Change the bandage without delay if it becomes wet or dirty.

Seek medical attention immediately if you develop any signs of infection such as fever, increasing pain, increasing redness or discharge from the wound.

You may need a tetanus booster if it has been longer than 5 years since your last tetanus shot.

Seek Medical Attention Immediately If Your Illness Or Injury Worsens!

Patient Restraint Procedure

Purpose:

Physical or chemical restraints should be utilized only if the patient is potentially a danger to self and/or others. It is not to be used on patients specifically refusing treatment unless they are placed under a police hold or being treated under implied consent.

Procedure:

A. Physical Restraint Guidelines

1. Use the least restrictive method required to accomplish necessary patient care and ensure safe transportation:
   - **a.** Do not endanger yourself or your crew.
   - **b.** If law enforcement or additional personnel are likely to be needed, call for assistance prior to attempting restraint procedures.
   - **c.** Soft restraints are usually sufficient to secure extremities; plastic ties or other hard restraints should ONLY be used when all other alternatives are inadequate to ensure safety.
2. Avoid restraining a patient in a prone position, applying any pressure to or obstructing the airway, or affixing limb restraints that inhibit distal circulation.
3. Explain to the patient why he/she is being restrained.
4. If a patient's degree of agitation changes, reassess the most appropriate level of restraint and adjust as required.
5. Whenever locked devices are used, by anyone, keys must be immediately available at all times.

B. Maximal Physical Restraint Procedure (consider using soft restraints)

1. Ensure sufficient personnel are present; USE LAW ENFORCEMENT ASSISTANCE WHEN AVAILABLE.
2. Place patient face up on a long backboard.
3. If necessary, use spinal precautions to control violent head or body movements.
4. Secure ALL extremities to backboard.
   - **a.** Try to restrain lower extremities around the ankles first.
   - **b.** Next, restrain the patient's arms along the side of the board.
5. Place padding under patient's head and wherever else needed to protect the patient from restricted circulation or other harm.

6. Secure the backboard onto gurney for transport using additional straps; avoid restricting the wheeled carriage.

NOTES:
Physical restraint of all extremities MUST be used any time a potentially violent or agitated (e.g. altered mental status, head injured, intoxicated) patient is transported by AIR ambulance.

C. REQUIRED DOCUMENTATION for every patient being physically or chemically restrained:

1. Reason restraints were required

2 Method of restraint used

3. Rationale for level of restraint used

4. Nature and extent of any and all known preexisting injuries

5. Reassessment of vital signs and distal circulation at least every 10 minutes

D. Chemical Restraint Guidelines:

1. Sedative agents may be used to provide a safe method of restraining the violently combative patient who presents a danger to themselves or others and to prevent the violently combative patient from further injury while secured by physical restraints.

2. These patients may include but are not limited to the following:

a. Alcohol and/or drug-intoxicated patients.

b. Restless, combative head-injury patients.

***E. Chemical Restraint Procedure:**

1. Assess the possibility of using physical restraints first. Evaluate the personnel needed to safely attempt restraining the patient.

2. Assess the need for sedation carefully.

a. The violently combative patient stands a lesser chance of injury when sedated.

b. A patient who is physically restrained and aggressively fighting his/her restraints, or compromising his/her airway or C-spine may be a candidate for sedation.

3. Administer droperidol 2.5 mg. IM or IV. If initial dose has no effect, after 10 minutes, give an additional dose of 2.5 mg. Maximum dose is 5 mg.

a. Vital signs should be assessed within the first five minutes and thereafter as appropriate. Prepare for possible hypotensive side effects. Apply cardiac monitor and start IV as soon as possible.

F. Chemical Restraint Precautions:

Side effects of droperidol may include hypotension, tachycardia, and acute dystonic reactions.

Pediatric Field Initial Survey

Initial Survey:

A. Establish level of consciousness.

B. Evaluate airway and protective airway reflexes.

C. Basic airway skills, and spinal immobilization, as needed.

D. Start O_2, follow **Airway Management** procedure.

E. Assist ventilation as needed.

F. Stop hemorrhage. Evaluate and support circulation.

G. Perform environmental assessment, including consideration of intentional injury.

H. Determine appropriate treatment protocol.

Treatment: See specific protocol for pediatric considerations.

Special Considerations:

A. Identify sign of airway obstruction and respiratory distress, including:

1. Cyanosis
2. Stridor
3. Drooling
4. Nasal flaring
5. Choking
6. Grunting
7. Intercostal retraction
8. Absent breath sounds
9. Bradycardia, tachycardia
10. Apnea, bradypnea or tachypnea

B. Open airway, using jaw thrust and chin-lift (and/or head tilt if no suspected spinal trauma), and if indicated, use suction. Consider placement of OPA if child is unconscious.

C. If cervical spine trauma is suspected, immobilize spine with cervical immobilization device and backboard. Infants and young children may require under-shoulder support to achieve neutral spine position.

D. Use OPA, (NPA's are not recommended), partial rebreather mask, or O_2 blow-by, as tolerated, with child in position of comfort.

E. Use chest rise as indicator of adequacy of ventilation. If chest rise is inadequate, consider:

1. Repositioning the airway
2. Foreign body in the airway
3. Inadequate bag volume or activated pop-off valve

F. Rescue breathing

1. 2 initial breaths (approx. 1.3 seconds)

2. Then rate of 20 breaths per minute for infant or child.

G. Assess perfusion using:

1. Heart rate

2. Skin signs

3. Capillary refill

4. Mental status

5. Quality of pulse

6. Blood pressure

H. Compression rate

1. 120 per minute for neonates with 5:1 compression ventilation ratio.

2. 100 per minute and ½ to 1" for infants with 5:1 compression ventilation ratio.

3. 80 to 100 per minute and 1½" for children with 5:1 compression ventilation ratio.

Pelvic Wrap

Purpose:

The initial reduction of an unstable pelvic fracture (to lessen ongoing internal bleeding and to ease the pain by splinting the fracture) using either a specifically applied sheet or another approved device.

Indications:

A. To be applied in all significant trauma patients with either pelvic pain or pelvic instability.

B. Consider the risk of pelvic instability in all blunt trauma patients with appropriate mechanism of injury.

C. Consider pelvic wrap in trauma patients with pelvic pain that is not associated with pelvic or hemodynamic instability.

Procedure:

A. For high-energy mechanisms, consider advanced placement of a pelvic sheet wrap on the backboard in case it is needed.

B. Fold the sheet smoothly several times lengthwise (do not roll it) until it is about 9 inches wide, and apply underneath the pelvis, centered on the greater trochanters of the femurs. The greater trochanter of each femur is the bony prominence on the lateral upper thigh; it is typically found to be even with the level from the patient's distal wrist to the base of the thumb, in the supine patient with arms down at the side.

C. Before tightening the sheet around the pelvis, ensure all the objects are removed from pockets so the pressure of the sheet doesn't press on items causing additional pain.

D. Tighten the sheet around the pelvis, adjusting the tension to try to return the pelvis to the normal anatomic position based on the initial assessment of instability. Cross the sheet in the middle, twist it, and then secure it laterally with a knot or clamp. The sheet should feel tightly wrapped around the pelvis allowing for two fingers to be inserted between sheet and pelvis.

Precautions:

A. Always re-check the position of the sheet (in terms of up and down). You should still be able to feel the anterior superior iliac spines after placement. If not, the sheet may be too high on the pelvis and must be repositioned.

B. If the pelvis is unstable on initial exam, do not repeat the exam.

C. The pelvic wrap is not indicated for suspected isolated hip fractures, i.e., ground level falls.

Selective Spinal Immobilization

A. Spinal immobilization is indicated in patients with a mechanism having the potential for causing spinal injury and who have ANY one of these clinical criteria:

1. Altered Mental Status
2. Evidence of intoxication
3. Distracting pain/injury or situation (e.g., extremity fracture, drowning, etc.)
4. Neurological deficit (numbness, tingling, paralysis)
5. Spinal pain
6. Spinal tenderness
7. Distracting situation (e.g., communication barrier, emotional distress, etc.)

B. If indicated, immobilize patient per current trauma life support guidelines.

Key Considerations:

1. Document clinical criteria on patient care form.
2. Consider leaving helmet (and shoulder pads if pertinent) in place.
3. If immobilization causes pain or neurological deficit, immobilize in position found.
4. If third trimester of pregnancy, elevate right side of back board 6".
5. Loosen straps if necessary to avoid respiratory compromise.
6. Complete secondary neurological assessment after immobilization.
7. Comorbid age factor (<12 or >60) may impact the EMT's ability to assess the patient's perception and communication of pain. A conservative approach to immobilizing these patients is recommended.

Procedure:

A. Temporarily immobilize the cervical spine with rigid extrication collar and continuous manual in-line support. Immobilize thoracic and lumbosacral spine to long spine board, when possible, and/or other appropriate device as patient condition allows (KED, OSS, orthopedic, etc.). In the severely traumatized patient requiring rapid transport, use a rigid C-collar with continuous manual in-line support during rapid extrication onto a long spine board.

B. After immobilizing patient's body from the neck down, secure head and cervical spine to long spine board using dense, soft support material on both sides of the head, and tape. Use 4 straps (or equivalent) and head padding to maintain neutral anatomic position. Secure the patient diagonally across the shoulders, chest, and straight across the hips and thighs. During this procedure, the patient should be moved as little as possible, and always as a unit.

C. Chin straps, which could compromise the airway, should be removed as the patient is immobilized to the long board. Leg straps, which were placed on the patient while in a sitting position prior to extrication, should also be removed if they compromise C-spine immobilization.

D. Patient should be securely strapped to long board to enable board and patient to be turned as a unit because of possibility of vomiting. Additional help may be necessary during transport to turn patient and manage the airway while maintaining C-spine integrity.

Pediatric Considerations:

A. Children require extra padding behind the T-spine and shoulders and are best immobilized in a device made especially for their small size.

B. Where this is not practical, and the child must be immobilized on an adult long backboard, the EMT must take special precautions during immobilization of the patient's body.

C. Since the pediatric patient is at risk of sliding from side to side on a backboard, it is recommended that the EMT place rolled up blankets or other dense, soft support material on both sides of the pediatric patient prior to securing the chest and hip straps.

D. The location of the straps on the backboard may have to be adjusted so they securely hold the pediatric patient in place and do not compress the abdomen.

Sports Equipment Removal

Purpose:

To provide direction on the safe removal of protective sports equipment that includes helmet and shoulder pads. This procedure page uses football gear as an example, but these guidelines can be used with other sports equipment as well.

Procedure:

A. **Initial Evaluation**

1. The initial evaluation should begin by assessing level of consciousness, breathing, and circulation. If the athlete is breathing and stable, but a neck injury is suspected-quick sensory and motor nerve exam should be initiated.
2. After the quick neurological exam on a stable athlete, the facemask should always be removed.

B. Face Mask Removal

1. Stabilize head.
2. Cut side and top attachments at loop to remove face mask.

C. Guidelines for Helmet Removal on the Field

1. If athlete has neck pain, numbness or tingling, extremity weakness or is unconscious, the helmet should not be removed on the playing field.
2. If access to airway is compromised, removal of helmet and shoulder pads as a unit may be initiated.

While backboard and straps are being prepared:

D. Chest Access

1. Cut jersey and front laces of shoulder pads
2. Flip out shoulder pads
3. Place hands on shoulders with thumbs grasping the clavicle and fingers surrounding the upper trapezius muscles.
4. Secure the athlete's head between the EMT's forearms.

E. Back Board Utilization

1. Person at head initiates commands and oversees proper placement and techniques
2. Three on each side of body: one at shoulders, one at hips, and one at legs.
3. One other person is in charge of backboard and slides it into place
4. Person at head gives command to lift athlete and slide backboard into place from feet. If helmet is not resting on board, padding can be added to fill space
5. Fasten straps and tape helmet to board
6. Chinstrap remains in place unless it interferes with airway
7. Recheck sensory and motor nerve vitals for changes and document

F. If Removal of Helmet and/or Shoulder Pads are necessary, remove as a unit

1. Cut chin straps
2. Release cheek pad snaps with 3 tongue depressors
3. Cut shoulder pad straps
4. Cut both the jersey and shirt up sleeves towards midline of body
5. Person at head stabilizes maxilla and occiput and gives commands
6. Three people on each side, with one stabilizing head. Another person removes the equipment. Person tilts helmet slightly forward and slides off head. **CAUTION: DO NOT SPREAD APART SIDES OF HELMET.** Shoulder pads, jersey, and shirt are then slid off with great care as a unit.

NOTE:
If athlete is face down, person at head crosses arms and a log roll technique is used to initiate evaluation.

Removal of Taser Barbs

Indication:

To remove the remaining barb after use of a Taser by Law Enforcement agencies

Procedure:

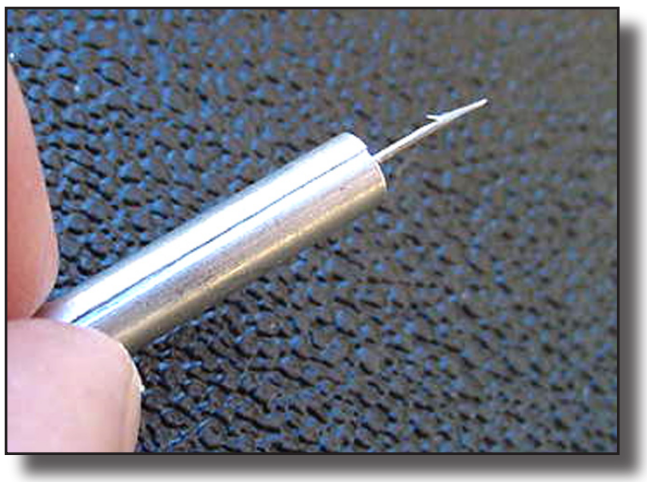
1. Perform patient assessment. Always wear PPE.
2. Monitor vitals and LOC. Insure that vitals are in the normal limits for the situation.
3. Contact OLMC if unsure whether to transport.
4. Expose the area where Taser barb has implanted under the skin.
5. Cut wires from the barb if they are still attached.
6. Make an "L" with your non-dominant hand and stabilize the extremity (or area) in the general proximity of the Probe. Keep your hand several inches away from the probe itself, and do not attempt to stretch the skin immediately around the probe.
7. Holding tension, use a needle-nose pliers (or similar tool) with gripping strength and grasp the end of the barb protruding out of the skin near the wire lead and firmly pull out the barb with one quick jerking motion.
8. Assess the skin where the barb was removed. Control any bleeding and dress the wound.

Precautions:

Patients should be in police custody and monitored by Police for the safety of medical personnel.

Do not remove Taser Barbs from the face, neck or groin area, or imbedded in bone. These patients must be seen at the Emergency Department.

Tasers emit two barbs. Make sure both are removed. Treat all barbs as a bio-hazard and dispose as you would any other sharps. Some law enforcement agencies may direct you to place the probe back into the cartridge as evidence.



Caution:

Where both implanted barbs and wires are still connected to the Taser Gun, shock can still be delivered.

Do not forget the potential trauma that may have occurred before or after the patient was hit by the Taser (i.e. falls, bean bagged, mace etc).

Remember that the process of removing a Taser probe is not a time-critical emergency. Calm and decisive actions by the EMS provider will deliver the best patient care and help prevent biohazard exposure.

Documentation:

Fully document your assessment and care on a patient care report.

***Tension Pneumothorax Decompression (Thoracentesis)

Definition:

The emergency decompression of tension pneumothorax using an over-the-needle catheter and a Heimlich® type valve.

Indications:

Some of the signs of simple pneumothorax as well as some of the signs of tension pneumothorax **must** be present before decompression is undertaken:

A. Tension Pneumothorax:

1. Consistent history, (i.e., chest trauma, COPD, patient on positive pressure ventilation).
2. Shock symptoms, with low or rapidly decreasing BP.
3. Progressive respiratory distress.
4. Tracheal shift away from affected side.
5. Distended neck veins.
6. Asymmetrical movement on inspiration.
7. Hyperexpanded chest on affected side.
8. Drum like percussion on affected side.
9. Increased resistance to positive pressure ventilation, especially if intubated.

B. Simple or non-tension pneumothorax is relatively common, is not immediately life threatening, and should not be decompressed in the field.

1. Respiratory distress, mild to severe.
2. Chest pain.
3. Decreased or absent breath sounds on affected side.
4. Subcutaneous crepitation.

Procedures:

Needle Decompression:

A. Expose the entire chest.

B. Clean chest vigorously with alcohol, Betadine® or soap.

C. On affected side, locate the mid-clavicular line and insert a large gauge over-the needle catheter (10 to 14 Ga.) with syringe attached **over** the superior margin of the third rib.

D. Hit the rib, then slide over it.

E. If the air is under tension, the barrel will pull easily and "pop" out of the syringe.

F. Remove syringe, and advance the catheter, then remove needle.

G. Attach a Heimlich®-type valve, and be sure closed end is pointing away from the patient.

F. Tape tension outlet securely to the patient's chest.

Specific Precautions:

A. Exact diagnosis is paramount — note that simple pneumothorax has one set of signs and symptoms and tension pneumothorax has another set in addition.

B. Patient's chest should be auscultated often for return of tension or other respiratory complications.

C. Patients should be well oxygenated at all times, with assistance if needed.

D. Tension pneumothorax is a rare condition, but can occur both with trauma and spontaneously.

1. It can also occur as a complication of CPR.
2. Tension takes time to develop, but forceful ventilation during CPR may increase the rate of development.

NOTES:

A. Possible Complications:

1. Creation of pneumothorax if none existed previously.
2. Laceration of lung.
3. Laceration of blood vessels (slide needle above rib, intercostal vessels run in groove under each rib).
4. Infection: Clean rapidly but vigorously; use sterile gloves if possible.

B. This procedure is extremely painful, especially when piercing the pleura. The procedure should be done as promptly as possible.

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

***Transcutaneous Pacing

Definition:

Transcutaneous pacing is the technique of electronic cardiac pacing accomplished by using skin electrodes to pass repetitive electrical impulses through the thorax.

Indications:

Transcutaneous pacing should be considered in bradycardia (heart rate less than 60 bpm) and evidence of inadequate perfusion (e.g., hypotension (BP less than 90 mm/Hg) altered mental status).

Procedure:

A. Ensure that the pacemaker leads are attached and the monitor is displaying a cardiac rhythm.

B. Attach pacing electrodes to anterior and posterior chest just to the left of the sternum and spinal column, respectively.

C. Begin pacing at a heart rate of 80 bpm and "zero" current output.

D. Increase current by increments of 20 mAs while observing cardiac monitor for evidence of electrical capture*, then confirm mechanical capture by checking pulses and BP.

E. If the patient is comfortable at this point, continue pacing. If the patient is uncomfortable at this point, decrease current output by increments of 5 mA to a point just above electrical and mechanical capture.

F. If the patient still complains of pain during pacing despite reduced current output, contact OLMC for sedation and /or analgesia orders.

G. If the patient remains unconscious during pacing, assess capture by observing the monitor and evaluating pulse or blood pressure changes. In case of electrical capture and no pulses, follow **Cardiac Arrest — PEA** protocol.

H. If there is no response to pacing **and** ACLS drugs, consult OLMC.

Precautions:

Transcutaneous should not be used in the following settings:

A. Asystole

B. Patients meeting death in the field criteria.

C. Patients with signs of penetrating or blunt trauma.

* Example of electrical capture: