Airway Management

Fundamental Concepts

Purpose:
Proper airway management is the first priority of the EMS Provider/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.
   4. Attempt to maintain oxygen saturation >94%.

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.

D. CPAP should be considered for MEDICAL patients complaining of moderate to severe respiratory distress meeting ALL the criteria described in Continuous Positive Airway Pressure (CPAP) procedure.

E. PEEP valve should be considered when ventilating a patient with COPD or emphysema to maintain alveolar inflation during exhalation.
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.
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.

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.

Consider use of the AICD magnet in deactivating cardiac pacemaker malfunctions.
Identification information of the AICD type, date implanted and location of implantation
(usually on a wallet card) should accompany the patient to the ED.
Behavioral Health Emergencies

Purpose:
To establish criteria for EMS assessment, triage and treatment of patients with potential behavioral/mental health emergencies and direct transport to the Unity Center for Behavioral Health (UCBH).

Definition:
Behavioral health encompasses behavioral factors in chronic illness care, care of physical symptoms associated with stress rather than diseases, and health behaviors, as well as mental health and substance abuse conditions and diagnoses.

Inclusion:
A. Voluntary patient or patient on police or mental health director hold.
B. Primary 911 call or police request.
C. Age between 18-70 years.
D. Mental health complaint (depression, psychosis, suicide or homicidal ideation), substance abuse or behavioral disorder with no acute medical or traumatic condition requiring treatment.
E. Alert and oriented to person, place, and time.
F. No evidence of trauma other than minor abrasions.
G. Able to perform activities of daily living (ambulate, bathe, toileting, eat and drink) independently.
H. If CBG is obtained, between 60 and 300 mg/dl.

Vital Signs:
A. HR 60-130.
B. \( O_2 \) sat > 90%.
C. Systolic BP 90-200 mmHg.
D. Diastolic BP <110 mmHg.
E. Temperature between 96.0 F and 100.4 F (38 C) if taken.

Exclusion:
A. Possible drug overdose or acute intoxication impairing ability to ambulate or perform activities of daily living.
B. Acute medical or traumatic condition including altered level of consciousness, chest or abdominal pain, significant bleeding, respiratory distress, or other acute illness or injury.
C. Patients with abnormal vital signs or physical findings.
D. Patients who require chemical restraint (olanzapine ODT or IM Geodon \textbf{ALONE} is NOT an exclusion).
E. Signs/symptoms of acute drug/alcohol withdrawal (tachycardia, hypertension, tremor, visual hallucinations).
Procedure:

A. Assess and assure scene safety.

B. If police or Crisis Intervention Team (CIT) is on scene, EMS assessment and intervention should not be delayed, however, police or the CIT may need to diffuse the situation in order to allow for EMS to safely assess the patient. EMS crews should get an initial report from the officer before approaching the patient. If EMS is first on scene, give an initial report to officer.

C. Approach the patient in a calm, slow, reassuring and honest manner. Multiple people attempting to intervene may increase the patient’s confusion and agitation.

D. Consider offering olanzapine ODT 10 mg for severe agitation or anxiety.

E. Protect the patient, bystanders and rescuers from injury. Consider restraint and follow Patient Restraint protocol, if indicated.

F. Obtain history, physical and mental status examination.

G. Assess and treat any medical conditions per EMS protocol and then determine if patient is eligible for transport to UBHH.

H. All patients will be assessed and evaluated by EMS regardless of transport status.

Specific Precautions:

A. Red Flags that this might not be a psychiatric condition:
   1. Waxing and waning level of consciousness.
   2. Abnormal vital signs.
   3. Dilated or pinpoint pupils.
   4. First psychotic episode over the age of 30.
   5. Acute onset over hours/days (consider substance abuse).

B. Psychiatric signs/symptoms.
   1. Mood disorder: depression, mania, suicide ideation, anxiety.
   2. Thought disorder: hallucinations, pressured speech, racing thoughts, grandiose or paranoid ideation, delusions.

C. Medical illnesses including hypoglycemia, hypoxia, stroke, head injury, CNS infection may mimic psychiatric illness. Do not assume the patient’s condition is purely psychiatric.
Continuous Positive Airway Pressure (CPAP)

Continuous Positive Airway Pressure has been shown to rapidly improve vital signs, gas exchange, and to decrease the work of breathing, the sense of dyspnea and the need for endotracheal intubation in patients who suffer from shortness of breath secondary to CHF/pulmonary edema or COPD.

Indications:
MEDICAL patients complaining of moderate to severe respiratory distress meeting ALL the following criteria:
A. Is awake and oriented and has the ability to maintain an open airway
B. Has signs and symptoms consistent with either CHF/pulmonary edema or COPD
C. Has a systolic blood pressure above 90 mmHg (MAP of 65 mmHg)
D. Is over 12 years old and is able to fit the CPAP mask

Contraindications:
A. Respiratory arrest
B. Non-cooperative patient
C. Suspected pneumothorax
D. Hemodynamically unstable
E. Presence of tracheostomy
F. Inability to maintain mask seal
G. Active vomiting

Procedure:
A. EXPLAIN and COACH THE PATIENT ON THE PROCEDURE.
B. Ensure adequate oxygen supply to ventilate device.
C. Place the patient on continuous pulse oximetry and end-tidal CO₂.
D. For the CPAP device: start with oxygen flow at the manufacturer’s recommended rate and adjust as needed and adjust as needed. Look at manometer for correct pressure.
E. Place the CPAP over the mouth and nose.
F. Secure the mask with the provided straps.
G. Check for air leaks.
I. Continue to coach patient to keep mask in place and readjust as needed.
J. IF RESPIRATORY STATUS DETERIORATES, REMOVE DEVICE AND CONSIDER BAG VALVE MASK VENTILATION AND/OR ENDOTRACHEAL INTUBATION.
Removal Procedure:
CPAP therapy needs to be continuous and should not be removed unless the patient cannot tolerate the mask or experiences continued or worsening respiratory failure.

Special Notes:
A. If unable to maintain oxygen saturation > 90%, administer positive airway pressure via BVM and PEEP valve.
B. Reassessment of the patient’s status is critical and documentation should be performed every 5-10 minutes until patient is stable.
C. Remove CPAP mask temporarily to administer nitroglycerin.
D. Suctioning of secretions may be required on some patients.
E. Watch for gastric distention and/or nausea.
F. Estimated CPAP pressure delivered by CPAP:

<table>
<thead>
<tr>
<th>Oxygen Flow Rate (liters / min)</th>
<th>Estimated CPAP Pressure (cm H₂O)</th>
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</thead>
<tbody>
<tr>
<td>Flow-Safe II</td>
<td>Rescuer II</td>
</tr>
<tr>
<td>8 - 9</td>
<td>5</td>
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<td>10 - 12</td>
<td>7</td>
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<td>13 - 14</td>
<td>8</td>
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</tbody>
</table>
Endotracheal Intubation

Indications:
- Hypoventilation.
- Severe hypoxemia (hypoxemia despite supplemental oxygen).
- Clinical condition requiring airway protection.
- Airway obstruction.
- Head injury with GCS ≤ 8 secondary to trauma.

Procedure:

A. Open airway, pre-oxygenate patient.
   1. If patient is breathing, administer oxygen via NRB mask.
   2. If patient is not breathing, use a BVM with OPA/NPA.
   3. Place nasal cannula in the patient’s nares. If patient tolerates, administer oxygen at 15 L/minute (passive oxygenation).
   4. If unable to maintain oxygen saturation > 90%, consider addition of PEEP valve to BVM and continue passive oxygenation.

B. Assemble airway equipment including two $\text{O}_2$ tanks w/ regulators, nasal cannula, mask or BVM, intubation equipment, suction, and alternative airway devices (Bougie, rescue airway) and attach required equipment (cardiac monitor, EtCO$_2$ monitor and pulse oximeter). Optimize patient position for mask ventilation, laryngoscopy, and intubation by aligning the ear with the sternal notch for nontrauma patients.

C. If feasible, consider positioning of the patient in semi-sitting position or head up ~20-30 degrees.

D. Open airway/Oxygenate.

E. Intubate patient with bougie (strongly recommended).

F. Verify placement of ET tube using the EtCO$_2$.

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

H. Secure the ET tube and record depth.

I. Verify placement of ET tube using the EtCO$_2$. Place patient on continuous EtCO$_2$ monitoring. In situations where EtCO$_2$ does not have a consistent waveform, the ET tube should be removed and ventilation be performed by alternative methods (BVM, supraglottic airway, or repeat intubation) OR perform direct visualization of ET tube inserted through vocal cords.

J. Always recheck and document the ET tube placement with EtCO$_2$ after every major movement of patient or change in vital signs.
# Intubation with Paralytic Agents

**[Advanced Airway Training Required]**

## Procedure:

A. Start IV per protocol.

B. Administer etomidate 0.3 mg/kg IV/IO push. If etomidate unavailable, administer ketamine 1 mg/kg IV/IO.

   All patients who received ketamine should receive one dose of midazolam.

C. Follow with succinylcholine:
   1. Adults and children 6 years or older (≥ 20 kg): 1.5 mg/kg IV/IO.
   2. Children less than 6 years old (< 20 kg): 2 mg/kg IV/IO push.
   3. If inadequate relaxation present after 60-90 seconds, check IV line patency and repeat the same dose.
   4. If succinylcholine is contraindicated, substitute vecuronium 0.1 mg/kg IV/IO push or rocuronium at 1 mg/kg.

D. Continue or initiate passive oxygenation via nasal cannula at 15 L/minute during the intubation process.

E. When patient is paralyzed, perform intubation with bougie (strongly recommended), 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 before next attempt.
   2. If intubation attempts fail, ventilate via BVM and proceed to rescue airway i.e., King or i-gel airway.
   3. If unable to ventilate with BVM or rescue airway, proceed to cricothyrotomy.

F. Treat bradycardia occurring during intubation with ventilation;
   1. If bradycardia persists, administer atropine:
      a. Adults: 0.5 mg IV/IO.
      b. Pediatrics: 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.

G. Verify placement of ET tube using the EtCO₂. Place patient on continuous end-tidal CO₂ monitoring. **In situations where EtCO₂ does not have a consistent waveform, the ET tube should be removed and ventilation be performed by alternative methods (BVM, supraglottic airway, or repeat intubation) OR perform direct visualization of ET tube inserted through vocal cords.** Consider insertion of OG tube to decompress the stomach and facilitate ventilation.

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

I. Secure the endotracheal tube and record depth.

J. **Always** recheck and document the ET tube placement with EtCO₂ after every major patient movement or change in vital signs.

K. Administer midazolam, 2.5 - 5 mg IV/IO if systolic BP > 100 mmHg. This may be repeated every 15 minutes to maintain sedation as needed. (Pediatric dosage 0.1 mg/kg, up to 2.5 mg). If agitation or combativeness continues, consider fentanyl 50 to 100 micrograms (adult).
L. If additional paralysis is needed during transport, vecuronium 0.1 mg/kg IV/IO or rocuronium may be administered. A repeat dose of vecuronium 0.1 mg/kg IV/IO (or rocuronium 1 mg/kg IV/IO) can be administered if transport time is prolonged.

M. Contact OLMC for further sedation or paralysis orders.

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**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 an 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. Continuously monitor the patient’s overall condition, including vital signs, cardiac rhythm, perfusion, and ease of bagging post-intubation.

C. Succinylcholine and vecuronium/rocuronium do not affect the level of consciousness and should always be used with etomidate or ketamine and 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.

F. Vecuronium and rocuronium should be avoided in patients suspected of having status epilepticus who require intubation.

G. If ketamine is administered, monitor closely for laryngospasm.

H. If ketamine is administered to an adult, always administer midazolam to avoid negative emergence reaction.
Emergency Surgical Cricothyrotomy

**Indications:**
A. When a patient’s airway cannot be secured using nonsurgical methods (e.g. oral intubation and when rescue devices do not work).
B. When an airway is required immediately in a patient who is not a candidate for orotracheal intubation (i.e. in the case of severe facial trauma).

**Contraindications:**
A. Relatively contraindicated in children less than 10 years of age (needle cricothyrotomy preferred).

**Equipment needed:**
A. Scalpel
B. Bougie
C. Size 5.5 or 6.0 ETT
D. Trach hook (highly recommended)
E. Combat gauze

**Procedure:**
A. Assemble equipment.
B. Administer etomidate 0.3 mg/kg IV/IO push. If etomidate unavailable, administer ketamine 1 mg/kg IV/IO. All patients who received ketamine should receive one dose of midazolam.
C. Place the patient in supine position, if patient tolerates.
D. Hyperextend the patient’s neck and straighten the airway by placing a blanket or similar object under the patient’s neck or between the shoulder blades. Note that airway has priority over suspected c-spine injury.
E. Locate and prep the cricothyroid membrane.
   1. Place a finger of the nondominant hand on the thyroid cartilage (Adam’s apple) and slide the finger down to find the cricoid cartilage.
   2. Palpate for the “V” notch of the thyroid cartilage.
   3. Identify the cricothyroid membrane by sliding the index finger down into the depression between the thyroid and cricoid cartilage.
F. Prep the skin over the membrane with povidone-iodine.
G. With a scalpel in the dominant hand, make a 3-4 cm vertical (head to toe) incision through the skin exposing the cricothyroid membrane. (see figure A)
H. Once skin is incised, palpate cricothyroid membrane position and blunt dissect with fingers through subcutaneous tissue until the membrane is readily identifiable. Ignore bleeding until airway is secure (ETT placement usually has a tamponade effect). Consider the use of combat gauze to control bleeding.

I. Relocate the cricothyroid space by touch and sight.

J. Stabilize the larynx with one hand and make a 1.5 cm horizontal incision (arm to opposite arm) through the cricothyroid membrane with the scalpel blade. Drag scalpel blade from one side to the other then turn knife 180 degrees and extend to the other side (some prefer to extend the membrane with forceps). (see figure B)

NOTE: A rush of air may be felt through the opening. Look for bilateral rise and fall of the chest.

K. Dilate with gloved finger and palpate tracheal lumen, ideally identifying the cartilage of the posterior wall of the trachea/cricoid ring.

L. If available, use the tracheal hook on the inferior portion of the tracheal cartilage and increase the opening by raising the hook.

M. Insert the bougie into the tracheal opening. Confirm bougie position with finger, ensuring it passes through membrane. Bougie usually holds up at carina <10cm from the skin (may feel tracheal rings as the bougie advances), do not force if held up as may perforate carina.

N. Insert the 5.5 or 6.0 ETT over the bougie through the opening into the trachea at a 90° angle to the trachea. Ensure the ETT balloon is fully deflated and twist ETT as it passes the skin (hold up here is common). Once in the trachea, direct the tube toward the feet at a 45° angle. Only advance the ETT until the balloon is within the airway and no longer visible. Avoid inserting the airway more than 3-4 inches to avoid mainstem bronchus intubation.

O. Inflate the ETT cuff if applicable. Do NOT let go of the ETT until it is secured (see below).

P. Connect BVM bag to the tube and inflate the lungs. Check breath sounds.

Q. Connect EtCO₂ monitor to confirm placement.

R. If air flows freely, and the patient is breathing on his own, proceed to next step. If the patient is NOT breathing on his own, continue providing respirations via BVM.

S. Secure the ETT using tape or ET tube holder.

T. Suction the patient’s airway, as necessary.
U. Apply a dressing to further protect the tube or catheter and incision using one of the techniques below.
   1. Cut two 4 X 4 s or 4 X 8 s halfway through. Place them on opposite sides of the tube so that the tube comes up through the cut and the gauze overlaps. Tape securely.
   2. Apply a sterile dressing under the patient's tube by making a V-shaped fold in a 4 X 8 gauze pad and placing it under the edge of the catheter to prevent irritation to the patient. Tape securely.

V. Monitor patient's respirations on a regular basis. Reassess air exchange and placement every time the patient is moved.

Precautions:

A. Troubleshooting ET placement.
   1. Unilateral breath sounds and unilateral rise or fall of the chest indicate that the tube is past the carina or patient has a pneumothorax.
   2. Air coming out of the patient's mouth indicates that the tube is pointed away from the lungs. Deflate the cuff on the ET tube, remove the tube, reinsert, inflate the cuff and recheck for air exchange and placement.

B. Control excessive bleeding with direct pressure. Apply combat gauze if necessary with direct pressure.

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: 12 ga Angiocath, 3 or 5 cc 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 patient’s 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 EtCO₂ 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.
4. Dilating membrane for passage of the device may require significant pressure.
Double Sequential External Defibrillation

Indications:
- Refractory to 5 or more shocks AND
- Administered 450 mg Amiodarone AND
- V-fib/pulseless V-tach NEVER converted

Procedure:
A. Prepare the sites for attachment of an additional set of external defibrillation pads by drying the sites and minimizing interference of hair or other obstacles to good pad adhesion.

B. Apply second set of external defibrillation pads in either the anterior-lateral or anterior-posterior position while assuring they do not contact the initial set of pads.

1. Anterior-Posterior Placement:
   a. Place either the ♥ or ✫ therapy electrode over the left precordium. The upper edge of the electrode should be below the nipple. Avoid placement over the nipple, the diaphragm, or the bony prominence of the sternum, if possible.
   b. Place the other electrode behind the heart in the infrascapular area. For patient comfort, place the cable connection away from the spine. Do not place the electrode over the bony prominences of the spine scapula.

2. Anterior-Lateral Placement:
   a. Place the ♥ therapy electrode lateral to the patient’s left nipple in the midaxillary line, with the center of the electrode in the midaxillary line, if possible.
   b. Place the other therapy electrode on the patient’s upper right torso, lateral to the sternum and below the clavicle.

C. Assure that controls for the second cardiac monitor are accessible.

D. Select the maximum energy 360 joules setting on both devices. Charge both devices 15 seconds in advance of the anticipated break in CPR. Assure chest compressions continue while the device is charging.

E. At the prescribed time in the compression cycle, discontinue compressions and assess the rhythm.

F. If a shock is indicated, assertively state “CLEAR” and visualize from the patient’s head to toe to assure no one is touching the patient and deliver the double sequential external defibrillation by depressing both shock buttons approximately one (1) second apart.

G. Immediately resume chest compressions.
End-Tidal CO₂ 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 EtCO₂ monitor. Maintain EtCO₂ 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 CO₂ 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:**
1. Remember: pulse oximetry does not equate to ventilation. You can have a poorly ventilated patient displaying an oxygen saturation of 100%. Excessively high PaCO₂ levels can be detrimental to your patient’s outcome.
2. A sudden drop in CO₂ 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.
3. Do not rely on pulse oximetry or EtCO₂ monitoring solely to determine the efficacy of intubation.
4. Failure to obtain an EtCO₂ numerical reading or waveform requires the following immediate action:
   A. Immediate removal of the endotracheal tube and placement of a rescue airway or BVM ventilation
   OR
   B. Re-visualization of the ETT using direct laryngoscopy.
i-gel Supraglottic Airway Device

Indications:
A. The i-gel is indicated for use in securing and maintaining a patent airway.
B. May be used as primary airway in cardiac arrest and rescue airway for other conditions.

Contraindications
A. Trismus, limited mouth opening.
B. Suspected upper airway obstruction secondary to laryngeal edema, smoke inhalation, foreign body, tumor, mass, abscess.

Sizes

<table>
<thead>
<tr>
<th>i-gel Size</th>
<th>Patient Size</th>
<th>Patient Weight (kgs)</th>
<th>Patient Weight (lbs)</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Neonate</td>
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<td>4-11</td>
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<tr>
<td>1.5</td>
<td>Infant</td>
<td>5-12</td>
<td>11-26</td>
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<tr>
<td>2</td>
<td>Small pediatric</td>
<td>10-25</td>
<td>22-55</td>
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<td>25-35</td>
<td>55-77</td>
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<tr>
<td>3</td>
<td>Small adult</td>
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<td>110-198</td>
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<tr>
<td>5</td>
<td>Large adult</td>
<td>90+</td>
<td>198+</td>
</tr>
</tbody>
</table>

Size should be determined on lean body mass

Procedure
A. Identify correct size i-gel.
B. Lubricate i-gel prior to insertion.
C. Insure that the supplementary oxygen port is capped.
D. Position the patient. The patient should always be in the “sniffing position” prior to insertion unless head/neck movements are considered inadvisable or are contraindicated.
E. If needed, use tongue depressor or curved laryngoscope blade to facilitate passage of i-gel through the oral pharynx.
F. Grasp the lubricated i-gel firmly along the integral bite block.
G. Position the device so that i-gel cuff outlet is facing towards the chin of the patient.
H. Introduce the leading soft tip into the mouth of the patient in a direction toward the hard palate. The leading edge of i-gel's tip must follow the curvature of the patient's hard palate upon insertion. Glide the device downward and backward along the hard palate with a continuous but gentle push until a definitive resistance is felt.
I. Determine appropriate depth of insertion. The incisors should be resting on the integral bite block. A horizontal line (Adult sizes 3,4,5 only) at the middle of the integral bite block represents the correct position of the teeth. If the teeth are located lower than the distal tip of the bite block, then it is likely the device has been incompletely inserted.

J. Secure i-gel to maxilla with holder or tape.

K. If gastric distention is present or fluid is present in the gastric channel of i-gel, an appropriate size nasogastric tube may be passed down the gastric channel.

L. Attach capnography per protocol.

**Notes and Precautions**

A. Do not use excessive force to insert the device or nasogastric tube.

B. Sometimes a feel of “give-way” is felt before the end point resistance is met. This is due to the passage of the i-gel bowl through the faucial pillars (pharyngo-epiglottic folds).

C. Once resistance is met and the teeth are located on the integral bite block, do not repeatedly push the i-gel down or apply excessive force during insertion.

D. Do not allow peak airway pressure of ventilation to exceed 40 cm H₂O (e.g., Impact Uni-Vent Model 73X or equivalent).

E. Patients with any condition which may increase the risk of a full stomach e.g., hiatal hernia, sepsis, morbid obesity, pregnancy, or a history of upper gastro-intestinal surgery, etc., may increase the risk of aspiration.
Induced Hypothermia

Purpose:
To define the procedures for induced hypothermia for patients experiencing sudden cardiac arrest, with the aim to reduce body temperature to 32°–34° C (90°-93° F).

Indications:
A. Cardiac Arrest.

Contraindications:
A. Age <13 years old.
B. Traumatic cardiac arrest or suspected significant hemorrhage.
C. Hypothermia already present.
D. Pulmonary edema.
E. Known pregnancy.

Cooling Methods:
A. Exposure combined with ice packs and/or
B. Chilled normal saline (NS); stored at a temperature of approximately 4° C (39° F).

Procedure:
A. Remove patient’s clothing (undergarments may remain).
B. Begin the cooling process with ice packs applied to the groin and axilla (wet towels may be used along with the ice packs).
C. If feasible, establish a large-bore IV. Using a high-pressure bag or other method, rapidly infuse 1 L chilled saline.
D. If ROSC is achieved, obtain a 12-lead ECG if feasible. If STEMI identified, follow STEMI protocol.
E. If ROSC is obtained and patient becomes conscious or makes purposeful movements or responds to verbal stimuli, then discontinue the Induced Hypothermia protocol.
F. If patient begins to shiver or demonstrates non-purposeful movements, administer 5 mg midazolam IV/IO. May repeat to a MAX of 10 mg as long as systolic BP is ≥ 100 mmHg.
Intraosseous Infusion

Definition:
An alternative technique for establishing vascular 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. 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.
C. 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 25mm needle (blue) should be utilized on patients who weigh ≥ 40 kg (approximately 88 lbs. or greater).
   2. The longer EZ-IO 45mm needle (yellow) should be used preferably on all adult humeral IO insertions and tibial insertions where the 25mm needle (blue) is not adequate.
C. Site Selection.
   1. Determine site of needle insertion
      a. Standard site is proximal tibia.
      b. Proximal Humerus is preferred in adult patients to achieve the following:
         • Increased flow rates
         • Decreased pain
         • Closer access to central circulation (heart)
D. Site Landmarks
1. Tibial
   a. Palpate the landmarks at the proximal tibia (patella and tibial tuberosity).
   b. Insertion site should be approximately one finger width to the medial side of the tibial tuberosity.
   c. An alternative site may be used at the distal tibia (especially for morbidly obese patients). Insertion site should be two finger widths proximal to the medial malleolus along the midline of the tibia.
2. Proximal Humerus (Use 45mm needle).
   a. Ensure that the patient’s hand is resting on the abdomen and that the elbow is adducted (close to the body).
   b. “Karate chop” the proximal humerus. Bring thumbs together and slide up the anterior shaft of the humerus until you feel the surgical neck (“golf ball on a tee”).
   c. Approximately 1 cm (depending on patient anatomy) above the surgical neck is the insertion site. Insertion site is located directly on the most prominent aspect of the greater tubercle.

E. Needle Insertion
1. Prep the surface with Betadine and wipe dry with a sterile gauze pad.
2. Stabilize patient’s leg or arm 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.
7. Connect IV tubing and bag to extension tubing or EZ-Connect.
8. Consider additional 10 mL 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.
11. Consider securing with EZ-IO stabilizer device.

F. 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 120 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 F.1 above. Wait approximately 30–60 seconds before continuing fluid administration.
Pediatric EZ-IO™ Procedure (patients weighing 3-39 kg):

1. Assemble all equipment
   A. The EZ-IO 25mm needle should be used on patients who weigh between 3–39 kg (approximately 6–87 lbs.).
   B. Stabilizer should be used to secure needle.

2. Site Selection
   **Proximal Tibia**
   A. Palpate the landmarks at the proximal tibia (patella and tibial tuberosity).
   B. Insertion site is one finger width below the tuberosity and then medial (towards inner leg) along the flat aspect of the tibia (See Fig 1).
   C. If the tibial tuberosity cannot be identified on the child, the insertion site may be two finger widths below the lower portion of patella, then medial along the flat aspect of the tibia.

   **Distal Femur**
   A. Secure the leg out-stretched to ensure the knee does not bend.
   B. Locate upper edge of the patella. Insertion site is one finger width above and then one finger width medial (towards the inner leg) from the upper patella edge. This location will avoid the growth plate of the distal femur (See Fig 2).

3. Needle Insertion
   A. Prep the surface with Betadine® and wipe dry with a sterile gauze pad.
   B. If you have concern that the needle may not reach the bone, gently apply pressure so the needle goes through skin until tip touches bone.
      i. The black 5mm line must be visible outside the skin prior to insertion (See Fig 3).
   C. 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” or “give”.
   D. When needle is in proper position, remove stylet
      i. If insertion fails, leave the needle in place and clamp the EZ-Connect.
      ii. Do not attempt second insertion on same leg).
   E. Apply EZ-Stabilizer.

---

**Figure 1**

**Figure 2**

**Figure 3**
F. Connect extension tubing or EZ-Connect, primed with saline, to IO hub.

G. Confirm the catheter position:
   i. Catheter is stable at a 90-degree angle to the bone.
   ii. Able to aspirate blood.
   iii. Fluids flow without evidence of extravasation.

H. Rapid bolus or “power” flush with approximately 5 mL normal saline

I. Connect IV tubing and bag to extension tubing or EZ-Connect.

J. Consider additional bolus of saline if flow rates slower than expected.

K. Utilize a blood pressure cuff or pressure bag to help infuse fluids.

4. Pain Management
   A. 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 120 seconds) through the IO site. Wait approximately 30–60 seconds before “power” flushing with normal saline.

   B. 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 D.1 above. Wait approximately 30–60 seconds before continuing fluid administration.

**Contraindications (all ages):**

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

B. Previous _significant_ orthopedic procedures (IO within 48 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. All ALS medication may be administered IO.

E. Do not use hypertonic saline through an IO.

F. In the event of driver failure, EZ-IO needle may be inserted manually.
Intravenous Lines and IV Solutions Management
Normal Saline (NS) and Lactated Ringer’s (LR)

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. Lactated Ringer’s is the preferred replacement fluid volume losses in trauma system and burn center patients.
C. 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.
D. Hextend® (6% hetastarch in buffered electrolyte HET) is indicated for Special Operational situations where operational requirements restrict the amount of fluids carried by medical providers.

Precautions:
A. NS and LR should be used with caution in patients with renal impairment (hyperkalemia), cardiac and respiratory disorders (fluid overload), or extremes of age. LR and Hextend® should not be used in patients suffering from severe hypothermia, severe liver disease, or patients in renal failure.
B. Hextend® (6% Hetastarch in Lactated Electrolyte Solution) should not be used in patients with known hypersensitivity to hydroxyethyl starch or patients with intrinsic bleeding.

Procedure:
A. IV access:
   1. Establish IV access and prepare NS or LR.
   2. Connect an extension set between the IV hub and the solution bag and tubing on trauma system and burn center patients. For all other patients, the use of the extension set is optional.
   3. All IVs will be started using regular drip sets. Use blood pump infusion sets (when available) if the patient is trauma system entry or shock is present.
4. Hextend  
   a) For patients in shock, administer 500-mL IV bolus.  
   b) If still in shock after 30 minutes, repeat ONCE.  
   c) No more than 1000 mL of Hextend should be administered to the patient.

B. IV access with an IV lock:
   1. Establish IV access.  
   2. Connect an extension set 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 ports and a slide clamp.
Intravenous Solutions Control and Monitoring

**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. 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.
C. For pediatric patients under 4 feet, the primary method for advanced airway management is endotracheal intubation. The King Airway will be used as an alternative to difficult or failed intubation for patients in this size range.

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 3 feet in height.
   4. Known or suspected caustic ingestion.
   5. Known esophageal disease.

Proper Selection of Tube Size and Inflation Volume
A. Selecting the proper tube size is based on the height of the patient.
B. Recommended tube size and inflation volume as follows:

<table>
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<th>Type</th>
<th>LTD</th>
<th>LTD</th>
<th>LTS-D</th>
<th>LTS-D</th>
<th>LTS-D</th>
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</thead>
<tbody>
<tr>
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<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Tube Color</td>
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<td>Orange</td>
<td>Yellow</td>
<td>Red</td>
<td>Purple</td>
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<tr>
<td>Patient Height</td>
<td>3-3.5 feet</td>
<td>3.5 feet</td>
<td>4-5 feet</td>
<td>5-6 feet</td>
<td>Greater than 6 feet</td>
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<tr>
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<td>30-40 mL</td>
<td>40-55 mL</td>
<td>50-70 mL</td>
<td>60-80 mL</td>
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<td>5-10 years</td>
<td>Adult</td>
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<td></td>
</tr>
</tbody>
</table>
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 the non-dominant hand, hold mouth open and apply tongue-jaw 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. Infl ate tube cuffs to the appropriate volume of air using the 100 mL color-coded King Systems (or other appropriate-size) syringe.

L. 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).

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

N. Attach end-tidal CO₂ monitor.

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

P. 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 French 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. It is important that the tip of the device be maintained at the patient’s midline. Keeping the tip at midline assures that the distal tip is properly placed in the hypopharynx and upper esophagus.

B. Depth of insertion is the key to providing a patent airway. A shallow initial insertion will require deflation of the cuffs to advance the tube deeper.

C. 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.

D. Adequacy of ventilation and position of the King *must* be re-evaluated any time after a patient has been moved (e.g., floor to stretcher; stretcher to ambulance, etc.).
Left Ventricular Assist Device

Background

Left ventricular assist devices (LVADs) are designed to assist the pumping function of the patient’s left ventricle. The HeartWare HVAD®, HeartMate II® and HeartMate III® devices attach to the apex of the left ventricle (pump inflow) and propel blood to the ascending aorta (pump outflow). All devices utilize an external wearable system that includes a small controller connected to the internal pump by an external driveline and is powered by two batteries. All devices may also be “plugged in” to 110 or 12 V power, depending on the device.

When managing an LVAD patient, follow these general assessment guidelines.

Procedures:

A. Assessing patient with LVAD:
   1. Establish airway and provide supplemental oxygen if any respiratory signs or symptoms are present.
   2. If a patient with an LVAD is having a medical emergency, it does not necessarily mean that it is a device issue. Consider the whole clinical picture and perform a thorough patient assessment, including device function. Infection, volume depletion, stroke, bleeding, and dysrhythmias may be the cause of patient’s symptoms. Most LVAD patients are anticoagulated and are at risk for bleeding complications.
   3. Auscultate heart sounds to determine if the device is functioning. Both the HeartWare HVAD® and HeartMate II® are continuous flow devices and you should hear a “whirring” sound. Because these devices diminish pulsatile flow in the circulation, peripheral pulses may not be palpable. The HeartMate III®, although continuous flow, may provide artificial pulsatility (as well as a pulsatile hum) due to the addition of intermittent speed reduction which was designed into the device. Since this artificial pulse is not synchronized with the patient’s heart rate, it may augment or diminish the native pulse. If a pulse is palpable, a BP can be obtained. Assess other signs of circulation—capillary refill, absence or presence of dizziness, temp/moisture of skin, End-tidal CO₂, and mental status to determine perfusion status.
   4. Standard blood pressure devices may not work. If unable to obtain a blood pressure consider using the following, if available, to estimate perfusion pressure:
      a. End-Tidal CO₂ - Expected values should be between 35 – 45 mmHg.
      b. Other clinical signs – Capillary refill, mental status.
   5. Locate the device to identify which type is in place and follow the device specific troubleshooting guidelines. Intervene appropriately based on the type of alarm and device.
   6. Start Large Bore IV and treat with fluids as needed.
7. Pulse oximetry may not be accurate due to the continuous flow nature of the device. You may not get an accurate reading in the field. 

8. Your cardiac monitor **will** work, and a reliable EKG may be obtained. Because the LVAD creates continuous flow independent of left heart function, not all arrhythmias will be symptomatic, including ventricular arrhythmias. If a patient requires defibrillation, leave the pump running and all components in place. The LVAD does not interfere with electrical conduction. In general, LVAD patients also have an AICD/Pacemaker. Do not place defibrillation pads directly over the pump or AICD/Pacemaker (consider anterior/posterior placement).

9. All ACLS medications may be administered if necessary.

**B. Transporting an LVAD patient:**

1. Transport to the patients designated VAD center. **Call the number on the device to get advice from the LVAD Coordinator on call.**

2. Follow the advice of the LVAD Coordinator for troubleshooting the device. For all other concerns contact OLMC.

3. The patient must be supported by battery power. **Remember to also transport the backup controller and the spare batteries.**

4. The controller should be kept close to the patient, and care taken to not kink the leads.

5. If removing or cutting patients clothing is necessary use caution as not to sever the driveline.

6. Do not put external pressure on any area of the LVAD system.

7. Place gurney straps underneath the leads, and keep the batteries easily accessible.

8. Allow the trained caregiver to ride in the transport vehicle if possible to act as an expert on the device in the absence of consciousness in the patient.


**Potential LVAD hazards with EMS response:**

LVAD patients who are anticoagulated have a higher risk of bleeding and hemorrhage. They should remain on anticoagulant therapy. There are no valves on an LVAD, so there is the risk of retrograde flow and stagnation of blood if the device stops, or flow is impeded. These patients are very pre-load and afterload dependent, so hypovolemia can have a profound effect. If a patient is **hypertensive**, flow through the device may be reduced.
Call Patient’s VAD Center
- OHSU: 503-494-9000 (ask to page LVAD coordinator on call)
- St. Vincent’s: 971-678-4042
- Kaiser: 503-449-4672

Unresponsive LVAD patient

BREATHING? AND VAD HUM?

NO

Initiate CPR and follow ACLS protocols

2nd Responder available and/or trained family member assess LVAD function:
- Look/listen for alarms
- Check driveline connection to LVAD controller
- Check power connection to LVAD controller

If any of the following true?
- Absent VAD hum
- “Pump Off” displayed
- Flow < 1 L/min
- Pulsatility < 1

Perform controller exchange

LVAD restarted AND
MAP > 50 mmHg OR
EtCO₂ > 20 mmHg

YES

Follow standard protocols except NO CHEST COMPRESSIONS because the VAD is likely providing adequate forward flow

NO

Continue CPR and follow ACLS protocols

NO

MAP > 50 mmHg OR
EtCO₂ > 20 mmHg

YES

MAP > 50 mmHg OR
EtCO₂ > 20 mmHg

YES

Follow standard protocols except NO CHEST COMPRESSIONS because the VAD is likely providing adequate forward flow
Trouble Shooting HeartMate II® with Pocket Controllers

When the Pump Has Stopped

- Be sure to bring ALL of the patient’s equipment with them.
- Fix any loose connection(s) to restart the pump.
- If the pump does not restart and the patient is connected to batteries replace the current batteries with a new, fully-charged pair. (see changing batteries section on next page)
- If pump does not restart, change controllers. (see changing controllers section on next page)

Alarms: Emergency Procedures

Yellow or Red Battery Alarm: Need to Change Batteries. See changing batteries section on next page.

Red Heart Flashing Alarm: This may indicate a Low Flow Hazard. Check patient— the flow may be too low. If patient is hypovolemic, give volume. If patient is in right heart failure— treat per protocol. If the pump has stopped check connections, batteries and controllers as instructed in the section above.

Changing Batteries

WARNING: At least one power lead must be connected to a power source at all times. Do not remove both batteries at the same time or the pump will stop.

- Obtain two charged batteries from patient’s accessory bag or battery charger. The charge level of each gray battery can be assessed by pressing the battery button on the battery. (Figures 1 and 2)
- Remove only ONE battery from the clip by pressing the button on the grey clip to unlock the battery. (Figure 3)
- Controller will start beeping, flash yellow signals and will read power disconnect on the front screen.
- Replace with new battery by lining up RED arrows on battery and clip. (Figure 4)
- Slide a new, fully-charged battery (Figure 2) into the empty battery clip by aligning the RED arrows. The battery will click into the clip. Gently tug at battery to ensure connection. If battery is properly secured, the beeping and yellow flashing will stop.
- Repeat previous steps with the second battery and battery clip.
**Changing Controllers**

- Place the replacement Controller within easy reach, along with the batteries/battery clips. The spare Controller is usually found in the patient’s travel case.
- Make sure patient is sitting or lying down since the pump will momentarily stop during this procedure.
- Attach the battery clips to the spare controller by lining up the half moons and gently pushing together and attach the batteries to the spare controller by aligning the RED arrows.
- On the back of the replacement controller, rotate down the perc lock so the red tab is fully visible. Repeat this step on the original controller until the red tab is fully visible.
- Disconnect the drive line from the original controller by pressing down on the red tab and gently pulling on the metal end. The pump will stop and an alarm will sound. **Note:** The alarm will continue until the original controller is put to sleep. You can silence the alarm by holding down the silence button. **Getting the replacement controller connected and pump restarted is the first priority.**

- Connect the replacement Controller by aligning the BLACK ARROWS on the driveline and replacement Controller and gently pushing the driveline into the replacement Controller. The pump should restart, if not complete the following steps:

  **Step 1.** Firmly press the Silence Alarm or Test Select Button to restart the pump.
  **Step 2.** Check the power source to assure that power is going to the controller.
  **Step 3.** Assure the perc lead is fully inserted into the socket by gently tugging on the metal end. **DO NOT** pull the lead.

- After the pump restarts, rotate up the perc lock on the new controller so the red tab is fully covered. If unable to engage perc lock to a fully locked position, gently push the driveline into the controller to assure proper connection. Retry to engage perc lock.

- Disconnect power from the original Controller. The original Controller will stop alarming once power is removed.

- Hold down battery symbol for 5 full seconds for complete shutdown of old controller.
Trouble Shooting HeartMate II®
When the Pump Has Stopped

- Be sure to bring ALL of the patient’s equipment with them.
- Fix any loose connection(s) to restart the pump.
- If the pump does not restart and the patient is connected to batteries replace the current batteries with a new, fully-charged pair. (see changing batteries section on next page)
- If pump does not restart, change controllers. (see changing controllers section on next page)

Alarms: Emergency Procedures

Red Heart Flashing Alarm: This may indicate a Low Flow Hazard. Check patient—the flow may be too low. If patient is hypovolemic, give volume. If patient is in right heart failure—treat per protocol. If the pump has stopped check connections, batteries and controllers as instructed in the section above.

Yellow or Red Battery Alarm: Need to Change Batteries. See changing batteries section on next page.

Changing Batteries

WARNING: At least one power lead must be connected to a power source AT ALL TIMES. Do not remove both batteries at the same time or the pump will stop.

- Obtain two charged batteries from patient’s accessory bag or battery charger. The charge level of each gray battery can be assessed by pressing the battery button on the battery. (Figures 3 and 4)
- Remove only ONE battery from the clip by pressing the button on the grey clip to unlock the battery. (Figure 1)
- Controller will start beeping and flashing green signals.
- Replace with new battery by lining up RED arrows on battery and clip. (Figure 2)
- Slide a new, fully-charged battery (Figure 4) into the empty battery clip by aligning the RED arrows. The battery will click into the clip. Gently tug at battery to ensure connection. If battery is properly secured, the beeping and green flashing will stop.
- Repeat previous steps with the second battery and battery clip.
Left Ventricular Assist Device Troubleshooting

Changing Controllers

- Place the replacement Controller within easy reach, along with the batteries/battery clips. The spare Controller is usually found in the patient’s travel case.
- Make sure patient is sitting or lying down since the pump will momentarily stop during this procedure.
- Attach the battery clips to the spare controller by lining up the half moons and gently pushing together and attach the batteries to the spare controller by aligning the RED arrows. ALARMS WILL SOUND—THIS IS OK.
- Depress the silence alarm button (upside-down bell with circle) until the alarm is silenced on the new, replacement Controller.
- Rotate the perc lock on the replacement controller in the direction of the "unlocked" icon until the perc lock clicks into the fully-unlocked position. Repeat this same step for the original Controller until the perc lock clicks into the unlocked position.
- Disconnect the perc lead/driveline from the original controller by pressing the metal release tab on the connector socket. The pump will stop and an alarm will sound.

Note: The alarm will continue until power is removed from the original Controller. Getting the replacement Controller connected and the pump restarted is the first priority.

Connect the replacement Controller by aligning the BLACK LINES on the driveline and replacement Controller and gently pushing the driveline into the replacement Controller. The pump should restart, if not complete the following steps:

Step 1. Firmly press the Silence Alarm or Test Select Button to restart the pump.
Step 2. Check the powersource to assure that power is going to the controller.
Step 3. Assure the perc lead is fully inserted into the socket by gently tugging on the metal end. DO NOT pull the lead.

After the pump restarts, rotate the perc lock on the new controller in the direction of the "locked" icon until the perc lock clicks into the fully-locked position. If unable to engage perc lock to the locked position, gently push the driveline into the controller to assure a proper connection. Retry to engage perc lock.

Disconnect power from the original Controller. The original Controller will stop alarming once power is removed.
HeartWare® Ventricular Assist System
Emergency Operation

**ALARM ADAPTER**
- Used to silence the internal NO POWER ALARM.
- Should only be used on a controller that is NOT connected to a patient’s pump.
- Must be inserted into the blue connector of the original controller after a controller exchange BUT before the power sources are disconnected or the NO Power alarm will sound for up to two hours.

**DRIVELINE CONNECTION**
**To Connect to Controller:**
- Align the two red marks and push together. An audible click will be heard confirming proper connection. (Figure A)
- The Driveline Cover must completely cover the Controller’s silver driveline connector to protect against static discharge. (Figure B)
- NOTE: an audible click should be heard when connecting the Driveline or Driveline extension to the controller. Failure to use the Driveline Cover may cause an Electrical Fault Alarm.

**CONNECTING POWER TO CONTROLLER**
**To Connect a Charged Battery:**
- Grasp the cable of the charged battery at the back end of the connector (leaving front end of connector free to rotate)
- Line up the solid white arrow on the connector with the white dot on the Controller.
- Gently push (but DO NOT twist) the battery cable into the Controller until it naturally locks into place; you should hear an audible click.
- Confirm that the battery cable is properly locked on the controller by gently pulling the cable near the controller power connector.
- DO NOT force the battery cable into the controller connector without correct alignment as it may result in damaged connectors.

**TO DISCONNECT A DEPLETED BATTERY**
- Make sure there is a fully charged battery available to replace the depleted one.
- Disconnect the depleted battery by turning the connector sleeve counterclockwise until it stops.
- Pull the connector straight out from the controller.
HeartWare® Ventricular Assist System
Emergency Operation

**STEPS TO EXCHANGE THE CONTROLLER**

**Step 1:** Have the patient sit or lie down.

**Step 2:** Place the new controller within easy reach.

**Step 3:** Connect back-up power sources (batteries or AC Power) to the new controller.
- Confirm that the power cables are properly locked on the controller by gently pulling on the cable near the connector.
- A "Power Disconnect" alarm will activate if a second power source is not connected to the new controller within 20 seconds of controller power up.
- A "VAD Stopped" alarm will activate if the pump driveline is not connected to the new controller within 10 seconds - this alarm will resolve once the pump driveline is connected.

**Step 4:** Pull back the white driveline cover from the original controller’s silver connector.

**Step 5:** Disconnect the driveline from the original controller by pulling the silver connector away from the controller. Do not disconnect by pulling on the driveline cable. A "VAD Stopped" alarm may activate. Don't panic. You can silence the alarm after restarting the pump, which is the priority.

**Step 6:** Connect the driveline to the new controller (align the two red marks and push together). If the "VAD Stopped" alarm was active on the new controller, it will now resolve.

**Step 7:** The pump should restart. Verify the pump is working (RPM, L/min, Watts).

**Step 8:** IF THE PUMP DOES NOT RESTART, CALL FOR MEDICAL ASSISTANCE IMMEDIATELY.

**Step 9:** Insert the Alarm Adapter into the blue connector on the original controller.
- Disconnect both power sources from the original controller.
- The controller will be turned off and all alarms silenced.

**Step 10:** Slide the white driveline cover up to cover new controller’s silver connector.

**Step 11:** Contact the VAD Center or Implanting hospital for a new backup controller.
Trouble Shooting HeartMate III®
with Pocket Controllers

Changing Controllers

- Place the replacement Controller within easy reach, along with the batteries/battery clips. The spare Controller is usually found in the patient’s travel case.
- Make sure patient is sitting or lying down since the pump will momentarily stop during this procedure.
- Attach the battery clips to the spare controller by lining up the half moons and gently pushing together and attach the batteries to the spare controller by aligning the RED arrows.
- On the back of the replacement controller, rotate down the perc lock so the red tab is fully visible. Repeat this step on the original controller until the red tab is fully visible.

Step 1. Firmly press the Silence Alarm or Test Select Button to restart the pump.

Step 2. Check the power source to assure that power is going to the controller.

Step 3. Assure the perc lead is fully inserted into the socket by gently tugging on the metal end. DO NOT pull the lead.

- After the pump restarts, rotate up the perc lock on the new controller so the red tab is fully covered. If unable to engage perc lock to a fully locked position, gently push the driveline into the controller to assure proper connection. Retry to engage perc lock.
- Disconnect power from the original Controller. The original Controller will stop alarming once power is removed.
- Hold down battery symbol for 5 full seconds for complete shutdown of old controller.

- Connect the replacement Controller by aligning the BLACK ARROWS on the driveline and replacement Controller and gently pushing the driveline into the replacement Controller. The pump should restart, if not complete the following steps:
WARNING: At least one power lead must be connected to a power source AT ALL TIMES. Do not remove both batteries at the same time or the pump will stop.

- Obtain two charged batteries from patient’s accessory bag or battery charger. The charge level of each gray battery can be assessed by pressing the battery button on the battery. (Figures 1 and 2)
- Remove only ONE battery from the clip by pressing the button on the grey clip to unlock the battery. (Figure 3)
- Controller will start beeping and flashing yellow signals and will read POWER DISCONNECT on the front screen. (Figure 4)
- Replace with new battery by lining up RED arrows on battery and clip. Gently tug on battery to ensure connection. If battery is properly secured, the beeping and yellow flashing will stop. (Figure 5)
- Slide a new, fully-charged battery (Figure 4) into the empty battery clip by aligning the RED arrows. The battery will click into the clip. Gently tug at battery to ensure connection. If battery is properly secured, the beeping and green flashing will stop.
- Repeat previous steps with the second battery and battery clip.
**Trouble Shooting HeartMate III® with Pocket Controllers**

*When the Pump Has Stopped*

- Be sure to bring ALL of the patient’s equipment with them.
- Fix any loose connection(s) to restart the pump.
- If the pump does not restart and the patient is connected to batteries replace the current batteries with a new, fully-charged pair. *(see Changing Batteries section on next page)*
- If pump does not restart, change controllers. *(see Changing Controllers section on next page)*

**Alarms: Emergency Procedures**

*Yellow or Red Battery Alarm:*
Need to Change Batteries. See changing batteries section on next page.

*Red Heart Flashing Alarm:*
This may indicate a Low Flow Hazard. Check patient—the flow may be too low. If patient is hypovolemic, give volume. If patient is in right heart failure—treat per protocol. If the pump has stopped check connections, batteries and controllers as instructed in the section above.
Trouble Shooting HeartMate II®
with Pocket Controllers

Modular Cable

The HeartMate 3 has a modular cable connection near the exit site of the driveline (Figure 1). This allows a damaged driveline to be quickly replaced (if damage is external).

- When disconnecting a driveline, NEVER use the modular cable connection.
- If this section of the driveline requires replacement, this must be performed at and by the implanting center. Patients are not given a back-up modular cable.
- If the connection is loose, there will be a yellow/green line at the connection showing (Figure 2). If the line is visible, it can be retightened by turning with the arrow in the locked direction. It will ratchet and stop turning once tight.

Figure 1

Figure 2
LUCAS Chest Compression Device

Indications:
A. The LUCAS device may be used in patients who have suffered non-traumatic cardiac arrest, where manual CPR would otherwise be used.

Contraindications:
A. Patients who do not fit within the device.
   1. Too small patient: If LUCAS alerts with 3 fast signals when lowering the SUCTION CUP, and you cannot enter the PAUSE mode or ACTIVE mode.
   2. Too large patient: If you cannot lock the upper part of LUCAS to the backplate without compressing the patient’s chest.
B. Traumatic arrest.

Protocol for Placement
A. All therapies related to the management of cardiopulmonary arrest should be continued as currently defined.
B. Initiate resuscitative measures:
   1. Manual chest compressions should be initiated immediately while the LUCAS device is being placed on the patient.
   2. Limit interruptions in chest compressions to 10 seconds or less.
   3. Do not delay manual CPR for the LUCAS. Continue manual CPR until the device can be placed.
C. While resuscitative measures are initiated, the LUCAS device should be removed from its carrying case and placed on the patient in the following manner:
   1. Backplate Placement
      a. The backplate should be centered on the nipple line and the top of the backplate should be located below the patient’s armpits.
b. If the patient is already on the stretcher, place the backplate underneath the thorax. This can be accomplished by log-rolling or sliding the backplate under the patient or raising the torso. Placement should occur during a scheduled discontinuation of compressions (e.g., after five cycles of 30:2 or two minutes of uninterrupted compressions).

2. Position the Compressor
   a. Turn the LUCAS device on (the device will perform a three second self test).

   ![ON/OFF Switch]

   b. Remove the LUCAS device from its carrying case using the handles provided on each side.
   c. With the index finger of each hand, pull the trigger to ensure the device is set to engage the backplate. Once this is complete, you may remove your index finger from the trigger loop.
   d. Approach the patient from the side opposite the person performing manual chest compressions.
   e. Attach the claw hook to the backplate on the side of the patient opposite from where compressions are being provided.
   f. Place the LUCAS device across the patient, between the arms of the person who is performing manual CPR.

   ![Positioning Diagram]

   g. At this point the person performing manual CPR stops and assists attaching the claw hook to the backplate on their side.
   h. Pull up once to make sure that the parts are securely attached.
3. Adjust the Height of the Compression Arm
   a. Use two fingers (V pattern) 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.

   b. Press the ADJUST MODE BUTTON on the control pad labeled #1 (this will allow you to easily adjust the height of the compression arm).

   c. To adjust the start position of the compression arm, manually push down the SUCTION CUP with two fingers onto the chest (without compressing the patient’s chest).

   d. Once the position of the compression arm is satisfactory, push the green PAUSE BUTTON labeled #2 (this will lock the arm in this position), then remove your fingers from the SUCTION CUP.

   e. If the position is incorrect, press the ADJUST MODE BUTTON and repeat the steps.
4. Start Compressions
   a. If the patient is not intubated and you will be providing compression-to-ventilation ratio of 30:2 push ACTIVE (30:2) BUTTON to start.
   b. If the patient is intubated and you will be providing continuous compressions push ACTIVE (continuous) BUTTON.

5. Patient Adjuncts
   a. Place the LUCAS stabilization strap behind the patient’s head and attach the straps to the LUCAS device.
      i. This will prevent the LUCAS from migrating toward the patient’s feet.
      ii. Place the patients arms in the straps provided.

Using the LUCAS during Resuscitation

A. Defibrillation
   1. Defibrillation can and should be performed with the LUCAS device in place and in operation. There is no need to stop LUCAS to deliver a shock.
   2. One may apply the defibrillation electrodes either before or after the LUCAS device has been put in position.
      a. The defibrillation pads and wires should not be underneath the SUCTION CUP.
      b. If the electrodes are already in an incorrect position when the LUCAS is placed, you must apply new electrodes.
      c. If double sequential defibrillation is anticipated, consider application of posterior therapy pad/electrode before LUCAS backplate placement.
   3. For rhythm analysis, stop the compressions by pushing the PAUSE BUTTON. The duration of interruption of compressions should be kept as short as possible and should not be > 10 seconds. There is no need to interrupt chest compressions other than to analyze the rhythm.
4. Once the rhythm is determined to require defibrillation, the appropriate ACTIVE BUTTON should be pushed to resume compressions while the defibrillator is charging and then the defibrillator should be discharged.

B. Pulse Checks/Return of Spontaneous Circulation (ROSC)
1. Pulse checks should occur intermittently while compressions are occurring.
2. If the patient moves or is obviously responsive, pause the LUCAS device and evaluate the patient.
3. If there is a change in rhythm, but no obvious indication of responsiveness or ROSC, a pulse check while compressions are occurring should be undertaken. If the palpated pulse is asynchronous, consider pausing the LUCAS device. If the pulse remains, reassess the patient. If the pulse disappears, immediately restart the LUCAS device.
4. A sudden change in EtCO$_2$ may indicate ROSC.

C. Disruption or Malfunction of LUCAS Device
1. If disruption or malfunction of the LUCAS device occurs, immediately revert to manual CPR.

Device Management (Power Supply, Battery Operation)

A. Changing the Battery
1. Push PAUSE to temporarily stop the compressions.
2. Pull the battery out and then upward to remove it.
3. Install a fully-charged LUCAS battery. Put it in from above.
4. Wait until the green PAUSE mode LED illuminates.
5. Push ACTIVE (continuous) or ACTIVE (30:2) to start chest compressions again. The LUCAS Smart Restart feature remembers the settings and start position for 60 seconds.
B. Other Battery Operations

1. When fully charged, the Lithium Polymer battery should allow 45 minutes of uninterrupted operation.
2. There is an extra battery in the LUCAS device carrying case.
3. The battery is automatically charged when the device is plugged into a wall outlet and not in operation. The device should be stored with the LUCAS device plugged into a wall outlet (when detaching from the wall outlet, make sure that the cord is always with the LUCAS device).
4. When the orange Battery LED shows an intermittent light, replace the battery or connect to a wall outlet.
5. Ambulance: LUCAS is connected while stored in the ambulance (always keep a battery installed for the LUCAS device to remain operational).

C. Care of the LUCAS Device After Use

1. Remove the SUCTION CUP and the stabilization strap (if used, remove the patient straps).
2. Clean all surfaces and straps with a cloth and warm water with an appropriate cleaning agent.
3. Let the device and parts dry.
4. Replace the used battery with a fully-charged battery.
5. Remount (or replace) the SUCTION CUP and straps.
6. Repack the device into the carrying case.
7. Make sure that the charging cord is plugged into the LUCAS device.
8. The LUCAS device in the carrying case should be charging on and secure while stored in the ambulance.
Patient Disposition

Purpose:
A. To provide guidance to EMS providers on how to determine whether there is an identified patient.
B. To describe the process of interaction and documentation for people who are not transported by ambulance.
C. To define which people may be left at the scene because they are not considered in need of medical care and/or ambulance transport.
D. To describe the discharge from scene process and documentation requirements.

Philosophy:
A. Every person will be questioned to determine whether or not he/she/they meets the criteria for an identified patient.
B. We acknowledge that 911 can be called for people that are ill or injured, or are perceived to be in need of medical treatment:
   1. Some people may not need a medical evaluation or ambulance transport.
   2. Identified patients with decision capacity have the right to decide whether they want to be treated and/or transported by ambulance.

Definitions:
A. Patient Identification:
   1. Person who has obvious visible evidence of illness or injury.
   2. Person who verbalizes a chief complaint suggestive of potential illness or injury.
   3. Person who has experienced an acute event or is in a circumstance that could reasonably lead to illness or injury.
   4. Person who requests a medical evaluation or assessment.
B. No patient identified determination
   1. Individual 18 years or older; and
   2. Person denies illness or injury; and
   3. Person without obvious visible signs or symptoms of illness or injury; and
   4. Person with minimal or absent mechanism of injury; and
   5. Person who demonstrates mental capacity to decline medical treatment and transport services (refer to Fundamental components of Decision Making Capacity).
C. Lift assists
   1. Person requesting assistance after a fall or slip to the ground in which they are unable to get up under their own power due to a new injury or chronic illness/condition. These individuals may or may not have injuries that would identify them as a patient.

Procedure:
A. Fundamental components of Decision Making Capacity
   1. Person is greater than or equal to 18 years or is an emancipated minor.
   2. Patient must have sufficient information from the EMS provider regarding the potential medical condition and the associated risks to his/her/their health.
   3. Patient must understand that a decision must be made.
4. Patient must understand the risks versus benefits of all options, including not following medical advice.
5. Patient must be able to use the information to make a decision in the setting of his/her/their values and belief systems.
6. Patient must be able to communicate his/her/their choice to the provider.
7. Patient must be acting without coercion or undue influence, including from family, friend and providers.
8. Person is not in immediate danger to themselves or others.
9. It is the responsibility of the EMS provider to identify loss of capacity for medical decision making.

B. Identified patient WITH decision making capacity who refuses needed medical treatment and/or ambulance transport:
   1. Explain the risks and possible consequences of refusing medical treatment and/or ambulance transport.
   2. If a high risk medical condition exists, contact OLMC for consult.
   3. Enlist family, friends, or law enforcement to help better understand the risks versus benefits to the patient.
   4. If patient continues to refuse, determine what exactly what is being refused:
      a. Medical treatment and ambulance transport.
         i. Explain the Refusal of Medical Care and Ambulance Transport Against Medical Advice section of EMS Discharge From Scene.
         ii. Have patient initial this section, and obtain their signature and printed name at the bottom of the form. Give the top copy to the patient after all the information on the form has been completed.
         iii. Complete a full patient care report (see documentation requirements).
      b. Ambulance transport only.
         i. With knowledge and acceptance that evaluation is necessary by a healthcare professional, some patients may choose to seek medical evaluation by an alternate means of transport such as POV or ride from a relative or friend.
         ii. Explain the Assessment or Treatment without Ambulance Transport section of the EMS Discharge From Scene.
         iii. Have patient initial this section, and obtain their signature and printed name at the bottom of the form. Give the top copy to the patient after all the information on the form has been completed.
         iv. Complete a full patient care report (see documentation requirements).

C. Identified patient WITH IMPAIRED decision making capacity who refuses needed treatment and/or transport:
   1. Attempt to treat and transport any person who is incapacitated and has a medical need.
   2. With any medical need, make all reasonable efforts to assure that the patient receives medical care.
   3. Enlist the assistance of family, friends or law enforcement to convince patient to go voluntarily.
   4. If patient is in immediate danger to him/her/Them self or others and transport is NOT feasible, attempt to enlist support from police (POH) or Behavioral Health Professional (Directors Hold).
5. If deemed necessary, consider pharmacological or physical restraint per Patient Restraint Procedure.
6. Complete full patient care report (see documentation requirements).

D. Special Procedure for Consent and Refusal guidelines for minors above the age of 15 years or older and less than 18 years (reflecting Oregon Statutes):
   1. A child under the age of 10 years cannot be left alone even if he or she is not a patient. If no responsible adult is present and the child is not a patient, contact law enforcement.
   2. Minors who are 15 years or older and less than 18 years can consent or refuse treatment.
      a. Minors who are 15 years or older and less than 18 years can consent for treatment without parent or guardian consent.
      b. If a minor age 15 years or older and less than 18 years is refusing treatment/transport contact OLMC.
   3. If a minor age 15 years or older and less than 18 years is not transported, attempt to obtain consent by minor to contact parents or responsible guardian to inform them of EMS call.
      a. Explain and complete Juvenile under 15 years without presence of parent/patient with healthcare POA section of the EMS Discharge from Scene if parents will not be arriving on scene to collect their child.

E. Lift Assists:
   1. If before or after moving the person off the ground, further assessment is needed (i.e. they have new complaints of pain, a possible injury is suspected or there is a potential medical cause for the fall), the now identified patient should be encouraged to seek medical evaluation. A full set of vital signs should be obtained, and other assessments should be completed as necessary. If the patient refuses medical treatment and ambulance transport or ambulance transport only, complete the applicable section of the EMS Discharge From Scene. A complete patient care report should accompany this paperwork. (see documentation requirements).
   2. In the case where lift assistance only is needed, and the person does not have new injuries or complaints, EMS Discharge From Scene documentation is not necessary, and the no patient identified disposition may be used. The narrative of the patient care report should explain the need for lift assistance only and the absence of complaint or injury before and after the move.

Documentation Requirements:
   A. All instances of an identified patient, with or without decision-making capacity, must be fully documented on a patient care report. A signed EMS Discharge From Scene form must be obtained on all patients with decision-making capacity who are refusing medical treatment and/or ambulance transport. The following is considered minimum documentation criteria:
      1. Reason for EMS response.
      2. General appearance and level of consciousness (mental status).
      3. History, vital signs (BP, HR and RR), and physical exam (if patient allows).
      4. Medications and allergies.
      5. Presence of any intoxicants.
      6. Assessment of the patient's decision-making capacity.
      7. Specific risks of refusal that were explained to the patient.
      8. Communication with family, friends, police, and/or OLMC.
B. For “no patient identified” persons, the narrative should include information about why EMS was called and indicate how the “no patient identified” situation was determined.

**High Risk Medical Conditions Requiring OLMC Contact:**

A. EMS providers are required to contact OLMC for the following refusal situations:

1. Suspected impaired decision making capacity.
2. Suspected high risk medical conditions such as:
   a. Age younger than 3 months.
   b. Minor (age 17 years or younger) without a parent or guardian who is refusing care.
   c. Serious chief complaint (including but not limited to): chest pain/dysrhythmia, shortness of breath, first time seizure, poison/OD, suspected sepsis, suspected cervical spine injury, stroke/TIA.
   d. Significant mechanism of injury, or suspicion of injury
3. EMS provider believes patient should have an evaluation.
5. Suspected abuse situation involving a minor, elderly person, or a person with a disability.
6. An unconscious or alter mental status (person or parent/guardian for a minor).

B. Sustained abnormal vital signs:

1. Pulse greater than 120/min or less than 60/min without explanation.
2. Systolic BP greater than 200 mmHg or less than 90 mmHg.
3. Respirations greater than 30/min or less than 10/min.
4. \( \text{SpO}_2 < 90\% \).
Patient Disposition Flow Chart

Assess Patient’s Medical Need

No Patient Identified

- Person is 18 years or older
- Denies illness or injury
- Has no signs or symptoms of illness or injury
- Has minimal or absent mechanism of injury
- Appears competent to decline EMS services

- Discharge from Scene paperwork not necessary
  - Document in narrative complete circumstance of why you were called to scene and how you determined the person is not a patient.

Identified Patient

- Chief compliant and/or EMS medical assessment suggestive of illness or injury
- Requests evaluation or assessment
- Has obvious evidence of illness or injury
- Has experienced an acute event that could reasonably lead to illness or injury
- Is in a circumstance that could reasonably lead to illness or injury

Able to make decisions and transport is advised---refuses ambulance transport against medical advice

- Explain risks of refusing care and/or transport
  - If serious medical need exists contact OLMC
  - Enlist others to help convince patient
  - Complete Refusal of EMS care and Transport AMA section of Discharge from Scene form
  - Fully document circumstances in PCR

Able to make decisions---does not require ambulance transport, agrees to seek medical attention

- PIC must agree with patient's course of action
  - Fully document vital signs and physical findings
  - Complete Assessment and/or Treatment without EMS Transport section of Discharge from Scene form
  - Fully document circumstances in PCR

Impaired capacity to make decision about treatment and/or transport

- 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 complete Discharge from Scene form
  - Fully document circumstances in PCR
  - Document results of OLMC call and who you spoke to in PCR

Minimum Documentation Requirements for ALL Identified Patients

- General appearance and level of consciousness
- History, one complete set of vital signs, and physical exam
- Medications and allergies
- Presence of any intoxicants
- Mental capacity assessment
- Any specific risks that were explained to patient
- Communication with others on scene or OLMC

OLMC Contact Requirement

- Impaired decision making capacity
- Suspected serious medical condition
- Suspected abuse - child or elderly
- Scene conflict regarding medical care
- Minor without guardian refusing care
- Sustained abnormal vital signs
- Significant mechanism of injury or suspicion of injury
- Pediatric patients under 3 months
Emergency Medical Service (EMS) Discharge from Scene

Date: ____________________ Incident Location: ________________________________________________

Patient Name: ___________________________ Agency Run Number: ____________________________

Refusal of EMS Care and Transport Against Medical Advice: I have been assessed and/or treated for illness or injuries by EMS. I have been advised that I have at least one potentially serious illness or injury, which needs further treatment. I understand that failure to treat this illness/injury may lead to permanent disability or death. I understand that signing this form does not preclude me from later obtaining medical care on my own or by requesting another EMS response by calling 911.

My initials here indicates that this section applies to me: __________

Assessment and/or Treatment without EMS Transport: I have been assessed and/or treated for illness or injury by EMS. I have been advised and understand I may need further assessment and treatment. I refuse to be transported by EMS to the hospital for further evaluation. I have decided to use an alternate mode of transportation to seek medical attention. I understand that signing this form does not preclude me from later obtaining medical care by requesting another EMS response by calling 911.

My initials here indicates that this section applies to me: __________

Juvenile under 15 without presence of parent/Patient with Healthcare POA: _______________________________ has been assessed and/or treated for illness or injury by EMS.

As their parent/guardian/POA/school representative (Circle one) I have been advised that they may need further assessment and treatment by a healthcare professional. I refuse further treatment on behalf of him/her by EMS, as well as transport to the hospital. I also understand that signing this form does not preclude me from later obtaining medical care for him/her or requesting another EMS response by calling 911.

My initials here indicates that this section applies to me: __________

Acceptance of Responsibility and Release of EMS (Completion of this area required for all sections)

I understand that EMS has made a good faith determination that I am alert, oriented, and able to make decisions for my ward or for myself. I have read, or have had read to me, the section I have initialed above. My EMS assessment and treatment options were explained to me and I understand them. I have no further questions of EMS at this time. I now knowingly and voluntarily release all individuals, organizations, and entities participating under current protocols, from any liability for any and all claims arising from my decision regarding me or my ward's healthcare.

Patient Name (Printed): ________________________________________________________________

Patient Signature: ___________________________________________________________________

Translator/Parent/ Guardian Name (If applicable): __________________________________________

EMS Provider Name: __________________________________________________________________

EMS Provider Signature: __________________________________________________________________
Patient Restraint

Purpose:
Restraint is used to protect the safety of patients and responders. Patient restraint should be utilized only if the patient is exhibiting behavior that is a danger to self or others.

Procedure:

A. Physical Restraint Guidelines:
   1. ***Perform the Broset Violence Assessment (see below)***
      a. If Broset is $\geq 1$, consider oral benzodiazepine or oral anti-psychotic if patient is cooperative. Consider restraints if patient does not wish to take oral medications.
      b. If Broset is $\geq 3$ or if attacks against objects/individuals are present, patient must be either sedated or restrained or both prior to transport.
      c. DO NOT initiate transport unless safety to patient and EMS/Fire crew members are insured.

B. Physical Restraint Procedures:
   1. Use the minimum level of physical restraint required to accomplish patient care and ensure safe transportation (soft restraints may be sufficient). If law enforcement is needed, call for it prior to attempting restraint procedures. Do not endanger yourself or your crew.
   2. Avoid placing restraints in such a way as to preclude evaluation of the patient's medical status.
   3. Place patient face up on backboard or gurney, NOT PRONE. Closely monitor the patient's respiratory status.
   4. Secure ALL extremities to backboard or gurney. Try to restrain lower extremities first using restraints around both ankles. Next, restrain the patient's arms at his/her sides.
   5. If necessary, utilize cervical spine precautions (tape, foam bags, etc.) to control violent head or body movements.
   6. If patient is on backboard, secure the backboard onto gurney using additional straps if necessary. Secure additional straps to the upper part of the gurney to avoid restricting the wheeled carriage.
   7. Evaluate the patient's respiratory and cardiac status to ensure that no airway compromise exists. Monitor SpO2 if possible.
   8. DO NOT tighten chest straps to the point that they restrict breathing.

C. Pharmacological Sedation Guidelines:
   1. If Broset is greater than 3 or verbal, physical threats or attacks on objects, then physical restraint procedure MUST be initiated unless sedated to RASS of $+1$ or less.
   2. Evaluate the patient's respiratory and cardiac status to ensure that no airway compromise exists. Monitor SpO2 if possible.
   3. DO NOT tighten chest straps to the point that they restrict breathing.

D. Pharmacological Sedation Procedure:
   ***Obtain initial Richmond Agitation Sedation Score (RASS) (see below)***
   1. Evaluate the personnel needed to safely restrain the patient.
### Procedures

2. If RASS score is $\geq +2$, attempt to determine cause of agitation (i.e. drug or alcohol intoxication or withdrawal, medical or psychiatric problem) and consider oral benzodiazepine or oral antipsychotic.

3. If RASS score is $\geq +3$, patient is an immediate threat to responders, bystanders or patient:
   a. Administer midazolam (2.5-5 mg IV, IO or 5-10 mg IM/IN) PLUS ziprasidone (10-20 mg IM) or haloperidol (5-10 mg IV, IO, IM).
   b. Titrate midazolam 2.5-5 mg IV, IO or 5 mg IM/IN as needed every 5 minutes to control agitation.

4. Cause unknown or likely psychiatric:
   a. Administer ziprasidone (10-20 mg IM) or haloperidol (5-10 mg IV, IO, IM to a MAX dose of 10 mg). If initial dose of haloperidol has no effect after 10 minutes, repeat haloperidol (MAX dose of haloperidol is 10 mg IV, IO, IM).
   b. If 10 minutes after administration patient remains agitated, administer midazolam (2.5 mg IV/IO or 5mg IM/IN). May repeat once.

5. Cause likely drug ingestion (especially stimulants), withdrawal or postictal state:
   a. Administer midazolam (2.5-5 mg IV/IO or 5-10 mg IM/IN).
   b. If initial 2.5 mg IV or 5 mg IM/IN dose has no effect after 10 minutes, give an additional dose. (MAX dose is 5 mg IV/IO or 10 mg IM/IN).
   c. Consider and treat hypoxia, head injury or hypoglycemia.
   d. If 10 minutes after administration of the second dose, the patient remains combative, administer either ziprasidone or haloperidol as described above.

6. Assess vital signs within the first 5 minutes, if possible and thereafter as appropriate (at least every 10 minutes and before additional medication).

7. After administration of haloperidol, consider diphenhydramine 25 mg IV or IM if the patient shows signs of acute dystonic reaction. May repeat once.

8. Monitor patients ECG, obtain 12-lead and start IV, if possible.

9. Repeat RASS score every 10 minutes and at patient hand off to hospital. Goal is RASS score of 0 to -1.

### Precautions:

A. Haloperidol may cause postural hypotension, tachycardia, and acute dystonic reactions.

B. Ziprasidone or haloperidol may induce Torsades de Pointes in patients with history of prolonged QT or patients taking QT-prolonging drugs.

C. Ziprasidone or haloperidol is preferred for patients with known psychiatric disorders. Midazolam is preferred for patients who are known or suspected to be under the influence of stimulants or other intoxicants, who are in withdrawal, or who are postictal.

D. Call OLMC for pediatric patients.

### Special Note

A. If ziprasidone (Geodon) is unavailable, use haloperidol per Drug Protocol 20.142.
Richmond Agitation Sedation Scale (RASS)

<table>
<thead>
<tr>
<th>Score</th>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>+4</td>
<td>Combative</td>
<td>Overtly combative and violent; immediate danger to EMS.</td>
</tr>
<tr>
<td>+3</td>
<td>Very agitated</td>
<td>Aggressive; verbally and physically uncooperative towards EMS.</td>
</tr>
<tr>
<td>+2</td>
<td>Agitated</td>
<td>Frequent non-purposeful movement; agitated when touched or moved.</td>
</tr>
<tr>
<td>+1</td>
<td>Restless</td>
<td>Anxious but movements not aggressive or dangerous to EMS or self.</td>
</tr>
<tr>
<td>0</td>
<td>Alert and calm</td>
<td>Not fully alert, but has sustained awakening (eye opening/eye contact) to voice (&gt; 10 seconds).</td>
</tr>
<tr>
<td>-1</td>
<td>Drowsy</td>
<td>Briefly awakens with eye contact to voice (&lt; 10 seconds).</td>
</tr>
<tr>
<td>-2</td>
<td>Light Sedation</td>
<td>Movement or eye opening to voice (but no eye contact).</td>
</tr>
<tr>
<td>-3</td>
<td>Moderate sedation</td>
<td>No response to voice but movement or eye opening to physical stimulation.</td>
</tr>
<tr>
<td>-4</td>
<td>Deep sedation</td>
<td>No response to voice or physical stimulation.</td>
</tr>
<tr>
<td>-5</td>
<td>Unarousable</td>
<td>No response to voice or physical stimulation.</td>
</tr>
</tbody>
</table>

Score 0 = Low risk of violence
Score 1-2 = Moderate risk of violence (preventative measures should be taken)
Score ≥ 3 = High risk of violence (preventative measures are required)
Patient Restraint

Level of Agitation?
Obtain RASS score

- **Combative (+4)**
  - Very agitated (+3)
  - **Midazolam**
    - 2.5–5 mg IV/IO
    - or
    - 5–10 mg IM/IN
  - **PLUS**
    - **Ziprasidone** 10–20 mg IM
    - OR
    - **Haloperidol** 5–10 mg
    - IV, IO, IM

- **Agitated (+2)**
  - (Not immediate danger)
  - **Olanzapine**
    - 10 mg ODT
    - OR
    - **Alprazolam (Xanax)**
    - 0.25 mg PO

- **Restlessness (+1)**
  - Supportive measures with optional sedation
Patient Restraint Flow Chart

Immediate threat to safety?

Yes

Midazolam
2.5–5 mg IV/IO or
5–10 mg IM/IN

PLUS

Ziprasidone
10–20 mg IM
OR
Haloperidol
5–10 mg IV, IO, IM

Midazolam
2.5–5 mg IV/IO or
5 mg IM/IN

10 minutes
between steps!

No

Etiology of Behavior?

ALCOHOL
OR DRUGS

Midazolam
2.5 mg IV/IO or
5 mg IM/IN

PSYCHIATRIC

Ziprasidone
10–20 mg IM
(MAX of 20 mg)
OR
Haloperidol
5–10 mg IV, IO, IM
(MAX of 10 mg)

Midazolam
2.5 mg IV/IO or
5 mg IM/IN

Ziprasidone
10–20 mg IM
OR
Haloperidol
5–10 mg IV, IO, IM

Midazolam
2.5 mg IV/IO or
5 mg IM/IN

Haloperidol
5–10 mg
IV, IO, IM

Midazolam
2.5 mg IV/IO or
5 mg IM/IN
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 O₂, 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 O₂ 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 30 breaths per minute for neonates and 8-10 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 /ventilation rate

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<tr>
<th></th>
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<tr>
<td></td>
<td>No advanced airway</td>
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<td>Compressions / minute</td>
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<table>
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<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>No advanced airway</td>
<td>Advanced airway present</td>
</tr>
<tr>
<td>Compressions / minute</td>
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<td>100</td>
</tr>
<tr>
<td>Breaths / minute</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Compressions / Breath ratio</td>
<td>3:1</td>
<td>120</td>
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</table>
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 trauma patients who have appropriate mechanism(s) of injury and who present with either pelvic pain or pelvic instability.
B. Consider pelvic wrap in unconscious trauma patients who have appropriate mechanism(s) of injury and who are in shock.

Procedure: Application of a SAM Pelvic Sling II™
A. Remove objects from patient’s pocket or pelvic area. Place SAM Pelvic Sling II™ gray side up beneath patient at level of trochanters (hips).

B. Place BLACK STRAP through buckle and pull completely through.
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.

Procedure: Application of a Pelvic Sheet Wrap
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.

C. Hold ORANGE STRAP and pull BLACK STRAP in opposite direction until you hear and feel the buckle click. Maintain tension and immediately press BLACK STRAP onto surface of SAM Pelvic Sling II™ to secure.
PICC Line Access

A Peripherally Inserted Central Line (PICC) is a common method of maintaining long-term venous access in select patients. PICC lines are typically inserted into the antecubital fossa, and then threaded into central circulation. PICC lines are flushed with heparin to maintain patency and therefore it is imperative to aspirate 5 mL of blood from the line prior to use.

Indications:
A. PICC lines may be accessed when there is a need for drug or fluid administration and traditional means of venous access are unsuccessful.
B. Patient or patient’s caregiver requests use of PICC line.

Contraindications:
A. Inability to aspirate or infuse through the catheter.
B. Catheter located in any place other than the patient’s upper arm.
C. Need for rapid fluid resuscitation.

Procedure:
A. Use clean gloves and maintain sterility as much as possible.
B. If there is a needleless type port on the distal end of the catheter, perform the following: (figure 1)
   1. Scrub the port with an alcohol pad and allow to dry for 5 seconds.
   2. Attach a 10 mL syringe (without saline) to the port.
   3. Unclamp if necessary (needless port may not have a clamp).
   4. Attempt to aspirate at least 5 mL of blood. Blood should draw freely. If it does not, remove the syringe and DO NOT use the catheter for access.
   5. If blood aspirates freely, remove the 10 mL syringe with blood and discard.
   6. Attach a 10 mL syringe with NS and gently flush the line. Never use a smaller syringe. If line does not flush, remove the syringe and DO NOT use the catheter for access.
   7. If line flushes, remove the syringe and attach the catheter to the end of the IV tubing and begin infusion of NS. Adjust the rate to the needs of the patient within the limits of the catheter.
   8. Administer medications though IV tubing port if indicated.
C. If there is a capped needle-type port on the distal end of the catheter, perform the following: (figure 2)
   1. Scrub the cap with an alcohol pad and allow to dry for 5 seconds.
   2. Clamp the catheter tubing using ONLY the existing clamp on the catheter and then remove the cap. Never allow a central line to be open to air.
   3. Attach a 10 mL syringe on the catheter end.
   4. Unclamp the catheter.
   5. Attempt to aspirate at least 5 mL of blood. Blood should draw freely. If it does not, re-clamp the line and remove the syringe. DO NOT use the catheter for access.
   6. If blood aspirates freely, clamp the catheter again.
   7. Remove the 10 mL syringe with blood and discard.
   8. Attach a 10 mL syringe with NS.
   9. Unclamp and gently flush the line. Never use a smaller syringe. If line does not flush, re-clamp the line and remove the syringe. DO NOT use the catheter for access.
  10. If line flushes, re-clamp and remove the syringe.
  11. Attach the catheter to the end of the IV tubing.
  12. Unclamp the catheter and begin infusion of NS. Adjust the rate according to the needs of the patient within the limits of the catheter.
  13. Administer medications though IV tubing port if indicated.

Notes and Precautions:
A. Do not administer medications, flush or aspirate with less than a 10 cc syringe. Smaller size syringes generate too much pressure and can damage the catheter.
B. Do not attempt to reinject aspirated blood as it may contain clots.
C. The maximum flow rates for a PICC line is 125 mL/hr for less than size 2.0 French, and 250 mL/hr for catheters over 2.0 size French.
D. Keep patient’s arm straight to avoiding kinking the PICC line and obstructing flow.
E. Ensure all line connections are secure.
F. PICC lines access the patient’s central circulation and the risk of infection is high. Avoid contamination to ports and connections while accessing.
G. Do not administer the following medications through a PICC line:
   a. Adenosine – The line may rupture during rapid infusion due to over pressurization.
   b. Dextrose 50% – The catheter can be damaged due to the viscosity of the fluid.
Figure 1 - **Needleless** port

Figure 2 – Needle type port with cap
Selective Spinal Immobilization

Immobilize using a **Full Spinal Immobilization** or **Spinal Motion Restriction** if the patient has a mechanism with the potential for causing spinal injury and meets ANY of the following clinical criteria:

A. Altered mental status.
B. Evidence of intoxication.
C. Distracting pain/injury (extremity fracture, drowning, etc.).
D. Neurologic deficit (numbness, tingling, paralysis).
E. Spinal pain or tenderness.
F. Comorbid age factors (<12 or >65 yrs) may impact the EMS Provider’s ability to assess the patient’s perception and communication of pain. A conservative approach to immobilizing these patients is strongly recommended.
G. Distracting situation (communication barrier, emotional distress, etc.).

**Key Considerations:**

A. If any immobilization techniques cause an increase in pain or neurologic deficits, immobilize patient in the position found or position of greatest comfort.
B. For isolated penetrating head, neck, or torso trauma, immobilization of the cervical spine is unnecessary unless there is overt neurologic deficit or an adequate physical examination cannot be performed, e.g., a patient with altered mental status or a patient with distracting injury.
C. For patients who are awake and alert and who do not have neurological deficits, spinal precautions can be maintained by [application of a rigid cervical collar and securing the patient firmly to the EMS stretcher](#), and may be most appropriate for:
   - Patients who are found to be ambulatory at the scene
   - Patients who must be transported for a protracted time, in particular interfacility transfers.
D. Regularly assess the patient’s respiratory status during transport. Loosen straps as needed to avoid respiratory compromise.
E. For patients in spinal motion restriction, position patient in a supine position on gurney during transport when feasible.
F. Patients in the third trimester of pregnancy should have the right side of the backboard elevated six inches.
G. Pad backboards for all inter-facility transports. If feasible, especially in prolonged scene transports, pad backboards.
H. If sports injury, immobilize patient per **Sports Equipment Removal** protocol.
Procedure for Full Spinal Immobilization:
A. Temporarily immobilize the cervical spine with rigid extrication collar and continuous manual in-line support. Immobilize thoracic and lumbosacral spine to long backboard, 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 backboard.
B. After immobilizing patient’s body from the neck down, secure head and cervical spine to long backboard 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 backboard. 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 back 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.
E. Complete a secondary exam to include serial neurological status after immobilization.
F. Treat pain per Pain Management protocol.

Pediatric Considerations:
A. Children require extra padding behind the T-spine and shoulders and are best immobilized on a pediatric backboard.
B. If using an adult backboard:
   1. Since the pediatric patient is at risk of sliding from side to side on a backboard, it is recommended that the EMS Provider 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.
   2. 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 EMS Provider’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:
Tension Pneumothorax Decompression (Thoracentesis)

Definition:
The emergency decompression of a tension pneumothorax using an over the needle catheter.

Indications:
To warrant chest decompression in the field, the patient must be in immediate risk of dying with:
A. High clinical suspicion AND;
B. Progressive respiratory distress AND;
C. Shock symptoms with low or rapidly decreasing blood pressure.
   AND at least ONE of the following:
   1. Decreased or absent breath sounds.
   2. Consistent history (i.e., chest trauma, COPD, asthma).
   3. Distended neck veins.
   4. Tracheal shift away from affected side (late sign).
   5. Asymmetrical movement on inspiration.
   6. Hyper-expanded chest on affected side.
   8. Increased resistance to positive pressure ventilation, especially if intubated.

EMS witnessed traumatic arrest patients with abdominal or chest trauma for whom resuscitation is indicated should have bilateral chest decompression performed even in the absence of the above signs.

Procedures:
A. Expose the entire chest.
B. Establish landmarks to identify second intercostal space, mid-clavicular line.
C. Clean chest vigorously with appropriate antiseptic.
D. On affected side, locate the mid-clavicular line and insert a large gauge over-the-needle catheter with syringe attached along the superior margin of the third rib.
E. If the air is under tension, the barrel will pull easily and “pop” out of the syringe.
F. Remove syringe, advance catheter, and remove needle.
Specific Precautions:

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

B. Tension pneumothorax is a rare condition, but can occur with trauma, spontaneously, or as a complication of intubation. Tension takes time to develop, but forceful positive ventilation may increase the rate of development.

C. Simple or non-tension pneumothorax is not life threatening and should not be decompressed in the field.

D. The ideal decompression catheter length is three inches.

E. Possible complications:
   1. Creation of pneumothorax if none existed previously.
   2. Laceration of lung or pericardium. Stop needle advancement once it has popped through the pleura and advance the catheter only.
   3. Laceration of blood vessels (always slide the needle above the rib).
   4. Infection. Clean rapidly but vigorously (use sterile gloves if possible).

F. Tension pneumothorax can be precipitated by the 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 50 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 10 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, consider sedation and/or analgesia.
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:
Video Laryngoscope

Device should not be used until training has been received by a qualified trainer. The video laryngoscope is an intubation device used to improve grade of view as well as provide better confirmation of tube placement. The device incorporates a LED light source and a miniature camera to view the larynx during the procedure of laryngoscopy.

Indications:

A. The video laryngoscope may be used in all adult patients who require endotracheal intubation (pediatric VL with agency approval).
B. Device can be used for Direct Laryngoscopy (DL) and/or Video Laryngoscopy (VL).

Procedure:

A. Ensure patient requires intubation. Follow Endotracheal Intubation protocol.
B. Position the patient in the optimal position for laryngoscopy.
C. Turn on the device.
D. Look into the mouth and suction, if needed; identify possible difficulties of intubation.
E. IMPORTANT: Insert the blade into the mouth following the mid-line position over the tongue. Slide the blade slowly down the tongue until you see the epiglottis.
F. Apply distal pressure on the device blade until vocal cords or arytenoids are visualized on the screen. Care must be taken not to get the camera too close to the glottic opening or it will obstruct the view of the advancing ET tube or bougie.
G. Visualize the epiglottis on the screen. Lift the tongue forward and upward to expose a view of the vocal cords or arytenoids.
H. When the device is in the optimal position, the vocal cords or arytenoids should be viewed in the central upper section of the screen. The vocal cords or arytenoids should not take up more that 25% of the screen. If the blade is too close to the vocal cords or arytenoids, it will make it difficult to place ET tube or bougie through the vocal cords.
I. While looking through the mouth under direct visualization, place the bougie into the mouth and advance through the cords, then intubate with ET tube.
J. Look back to the screen. Locate the tip of the ET tube or bougie and gently advance the ET tube or bougie through the vocal cords.
K. The screen view can be used to confirm the correct insertion depth of the ET tube. Stop advancing the ET tube when the black line reaches the vocal cords.
L. Turn off device.
**Notes and Precautions:**

A. If not using the bougie, it is recommended to use a stylet in the ET tube for stability purposes.

B. If resistance is encountered after the ET tube passes through the vocal chords, rotate the ET tube 90 degrees clockwise or withdraw the stylet approximately 3-5 cm and then advance the ET tube.

C. If unable to visualize under VL, perform DL in the usual fashion.

D. Discard disposable blade after every use.

E. Device should be decontaminated after each patient use.