Procedures

Airway Management / General - 30.010

INDICATIONS:
Maintenance and support for airway control and protection and the adequate oxygenation and ventilation of patients.

DELIVERY SYSTEMS

A. Nasal Cannula
Flow rates are generally 4-6 liters/minute. It provides between 24-40% inspired oxygen.

B. Non-Rebreather Mask (NRB)
Provides approximately 90% inspired oxygen.

C. "Blow-By" Oxygen
Typically used in infants or toddlers or those who cannot tolerate a cannula or mask.

MAINTENANCE DEVICES

A. Nasopharyngeal Airway (NPA)
Used in patients who are unconscious or have an altered LOC and are unable to maintain their own airway and who will not accept an OPA.

B. Oropharyngeal Airway (OPA)
Used in patients who are unconscious or have an altered LOC and are unable to maintain their own airway.

C. Bag Valve Mask (BVM)
Used when respiratory drive is compromised and patient needs ventilatory assistance. Proper facial seal and head positioning are required to deliver maximum inspired oxygen and effectively ventilate the patient. Capnography and chest rise and fall should be monitored to ensure proper ventilation.

D. Extraglottic devices (ie Igel, King Airway, etc)
Used in conjunction with bag, oxygen source and waveform capnometry. If prolonged ventilatory assistance is needed, extraglottic devices or endotracheal tubes are preferred to BVM due to potential of gastric insufflation with prolonged BVM.

E. Endotracheal intubation
Used in conjunction with bag, oxygen source and waveform capnometry. If prolonged ventilatory assistance is needed and risk of aspiration is present, endotracheal intubation provides the most secure advanced airway.

F. Cricothyrotomy
Used as a rescue airway option when an advanced airway is required and BVM, extraglottic devices or endotracheal intubation is deemed to be futile. Can be performed with commercially made devices or via a surgical placement of an ET tube.

DIFFICULT AIRWAY ASSESSMENT

When planning for advanced airway management utilizing the listed maintenance devices, the provider will need to assess the potential for difficulty with each device. Based on this difficulty assessment, a primary, secondary (backup) and tertiary plans should be established for which airway management procedures will be performed and communicated with the team of medical providers. Below are considerations for assessing the potential for difficulty with each of the major airway procedure categories:

Difficult Bag Mask Ventilation: (ROMAN)

- R – Radiation/Restriction: prior radiation treatment to the neck, or airway/lung restrictions with conditions like COPD or ARDS
- O – Obesity/Obstruction
- M – Mask seal/Male/Mallampati: beards, blood, or facial debris, male gender and limited visibility of throat structures inside the mouth
- A – Age: patients over age 55
- N – No teeth

Difficult Extraglottic Device Ventilation: (RODS)

- R – Restricted mouth opening: adequate size mouth opening for device/fit
- O – Obstruction/Obesity: something blocking the airway at the level of the glottis
- D – Disrupted/Distorted Airway: injury/abnormality impeding the use of the device
- S – Stiff: stiff lungs from pmhx, airway burns, etc.

Difficult Laryngoscopy/Endotracheal Intubation: (LEMON)

- L – Look: gestalt. Do you think it is going to be a tough intubation?
- E – Evaluated 3-3-2: incisor distance <3 fingerbreadths, hyoid/mental distance <3 fingerbreadths, thyroid-to-mouth distance <2 fingerbreadths)
- M – Mallampati: ability to visualize structures in the upper airway
- O – Obstruction: presence of a condition that could cause an obstructed airway
- N – Neck mobility: limited neck mobility

Difficult Cricothyrotomy: (SMART)

- S – Surgery: previous neck surgery or previous cric/stoma
- M – Mass: hematoma or abscess obscuring ability to ID anatomy
- A – Access/anatomy problems: obesity, edema
- R – Radiation
- T – Tumor

AICD Deactivation – 30.020

DEFINITION:
An AICD is an implanted defibrillator device that consists of: A lead system that senses cardiac activity, logic circuitry to analyze sensed signals, a power supply for device function and generating high voltage, and a capacitor that stores and delivers shocks. This device activates when bradycardia and/or a tachyarrhythmia is detected within programmed parameters.

INDICATIONS:
For verified frequent and recurrent inappropriate AICD discharges, a doughnut magnet may be utilized to deactivate "runaway" devices. Inhibition of AICD devices should be considered when continuous ECG monitoring verifies malfunction and ACLS is readily available.

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 proper positioning and AICD deactivation, tape magnet securely in place and transport.

NOTES & PRECAUTIONS:

A. It is very important to make the correct diagnosis before utilizing this protocol. Be sure that the ECG is showing a normal sinus rhythm 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 normal operation after removal from the magnetic field.
D. Magnets should be stored so as not to come into contact with magnetic sensitive materials, i.e., monitor screens, tapes, credit cards, magnetic door entry cards, and other electronic equipment.
E. A small percentage of AICDs are impervious to magnetic fields (AICD recipients who normally work around magnetic fields have these special units). This will not be deactivated with the doughnut magnet. In such cases, advise OLMC and transport.
F. Consider use of the AICD magnet in deactivating cardiac pacemaker malfunctions. Call OLMC.
G. Identification information of the AICD type, date implanted, and location of implantation should accompany the patient to the hospital. This information is typically found on a wallet card that the patient has.

Continuous Positive Airway Pressure – 30.030

DEFINITION:
Continuous Positive Airway Pressure (CPAP) 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. In patients with CHF, CPAP improves hemodynamics by reducing preload and afterload.

CPAP INCLUSION CRITERIA:

Medical patients who are awake/oriented and able to maintain their own airway while complaining of moderate to severe respiratory distress **exhibiting two or more** of the following:

A. Shows signs and symptoms consistent with either CHF/pulmonary edema, COPD or severe asthma.
B. Retractions or accessory muscle use.
C. Respiratory rate > 25 bpm.
D. SpO2 < 90%.

CPAP EXCLUSIONARY CRITERIA:

A. Respiratory/ Cardiac arrest.
B. Unresponsive to verbal stimuli.
C. Major trauma or suspected pneumothorax.
D. Hemodynamically unstable- B/P < 100 systolic.
E. Inability to maintain patent airway.
F. Active vomiting or GI bleeding.
G. Patients < 8 years old.
H. Not for use with Trach.

PROCEDURE:

A. EXPLAIN and COACH THE PATIENT ON THE PROCEDURE.
B. Ensure adequate oxygen supply to ventilation device.
C. Place the patient on continuous pulse oximetry and end-tidal CO2.
D. Turn on device:
    1. For the Boussignac® and Flow-Safe® CPAP devices start with oxygen flow @ 15 lpm (3-5cm H2O) and adjust as needed up to 25 lpm.
    2. For the Emergent Port O2 CPAP os, begin at 0-2 cm H2O, titrate pressure to a maximum of 10 cm H2O on exhalation.
E. Place the CPAP over the patient's mouth and nose (consider having the patient hold the mask against their face initially to reduce anxiety).
F. Secure the mask with the provided straps.
G. Check for air leaks.
H. Monitor and document the patient's respiratory response to the treatment.
I. Continue to coach patient to keep mask in place and readjust as needed.
J. IF RESPIRATORY STATUS DETERIORATES, REMOVE THE 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. Contact the receiving facility as soon as possible that a patient with CPAP is enroute to their facility so they can be prepared for patient.
B. Reassessment of the patient's status is critical and should be performed and documented every 5-10 minutes until patient is stable.
C. CPAP mask may be removed 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 the **Boussignac** CPAP:
    - 5 cm H2O @ 15 lpm,
    - 7.5 cm H2O @ 20 lpm,
    - 10 cm H2O @ 25 lpm
G. Estimated CPAP pressure delivered by the **Flow-Safe** CPAP:
    - 3-4 cm H2O @ 15 lpm,
    - 6-7 cm H2O @ 20 lpm,
    - 8.5-10 cm H2O @ 25 lpm

Emergency Cricothyrotomy – 30.040

INDICATIONS:
This technique is to be used only when other attempts to establish an airway have been unsuccessful (i.e., you are unable to intubate or ventilate using 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:
Place the patient in a supine position with support under the shoulders and mild hyperextension of the neck. 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.

SURGICAL CRICOTHYROTOMY

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 ET TUBE
D. Trach hook (highly recommended)

PROCEDURE:

A. Assemble equipment

B. Place the patient in the supine position.

C. 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. Have an assistant hold and stabilize the Thyroid Cartilage.

D. 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.

E. Prep the skin over the membrane with povidone-iodine.

F. With a scalpel in the dominant hand, make a 3-4 cm vertical (head to toe) incision through the skin exposing the cricothyroid membrane.

G. Once skin 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 (ET TUBE placement usually has a

tamponade effect)

H. Relocate the cricothyroid space by touch and sight.

I. Stabilize the larynx with one hand and make a 1-inch 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 through 180 degrees and extend to the other side (some prefer to extend the membrane with forceps). NOTE: A rush of air may be felt through the opening. Look for bilateral rise and fall of the chest.

J. Push cover over scalpel and turn scalpel upside down into the cricoid membrane.

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

L. 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 advancement as perforation may occur.

M. Insert the ET tube (5.5 or 6.0 F) or other airway tube over the bougie through the opening into the trachea at a 90° angle to the trachea. Ensure the ET TUBE balloon is fully deflated and twist ET TUBE 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 ET TUBE 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.

N. Inflate the ET cuff if applicable. Do NOT let go of the ET tube until it is secured (see below).

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

P. Connect EtCO2 monitor to confirm placement.

Q. 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.

R. Secure the ET tube using tape or ET Tube holder.

S. Suction the patient's airway as necessary

T. 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 4X 8 gauze pad and placing it under the edge of the catheter to prevent irritation to the patient. Tape securely.

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

V. Consider sedation as with RSI if not already given

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 an 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.

Needle Cricothyrotomy – (pediatric patients 12 years and younger).

A. Assemble equipment. 14ga or 16ga angiocath, 3cc syringe, 2.5 mm ETT adapter, oxygen, BVM. S

B. Place the patient in a supine position with support under the shoulders and mild hyperextension of the neck unless C-Spine injury is suspected.

C. 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.

D. Prepare the area with antiseptic solution.

E. Stabilize the airway between thumb and forefingers.

F. Insert the needle with catheter into the cricothyroid membrane at a 45-60 degree angle caudally (toward the pts feet).

G. When the needle is through the membrane. Stop and aspirate for air to ensure tracheal entry.

H. Advance the catheter over the needle and then remove the needle.

I. Attach the 2.5 ETT adapter to the hub of the catheter and begin ventilations with the BVM.

J. Secure the cannula with tape after confirming correct placement by auscultation for breath sounds (5 point check). Observe for kinking of cannula.

K. Consider sedation with Versed® as with RSI if not already given.

NOTES & PRECAUTIONS:

A. 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. The latter is more commonly seen in infants and children whose tracheas may be deceptively narrow.

B. 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.

C. Needle cricothyrotomy is only a temporizing measure providing oxygenation not adequate ventilation.

D. Needle Cricothyrotomy- If catheter becomes occluded, flush with 2-3 ml of normal saline.

End-Tidal CO_2 Monitoring – 30.050

INDICATIONS:
For use to measure effectiveness of ventilation by measuring the amount of carbon dioxide in exhaled air.

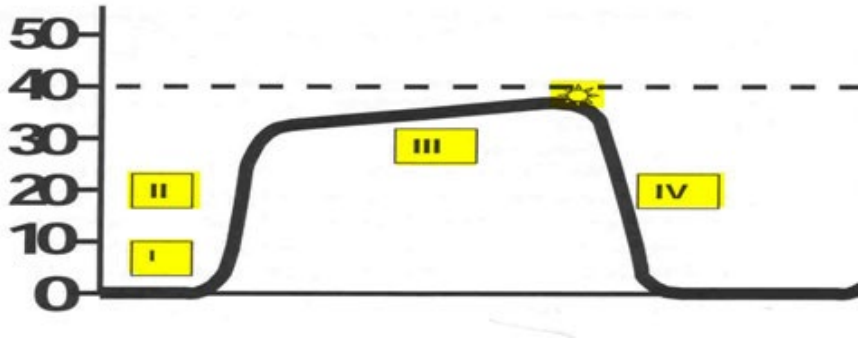
PROCEDURE:
1. Manage airway according to appropriate Airway Management Procedure.
2. Apply $ETCO_2$ monitor, if available. Maintain $ETCO_2$ output between 35-40 mmHg.

The following approximates the degree of ventilation:

> 40 mmHg	**=**	***Hypoventilation***
35 – 40 mmHg	**=**	***Normal ventilation***
30 – 35 mmHg	**=**	***Hyperventilation***
< 30 mmHg	**=**	***Aggressive hyperventilation should be avoided in all patients !***

3. Patients who are posturing, or who have other clinical presentations indicative of head trauma (blown pupil, focal motor findings) should be ventilated to maintain an ETCO2 level between 30-35 mmHg.

NOTES & PRECAUTIONS:
A. **Remember, pulse oximetry does not equate ventilation.** You can have a poorly ventilated patient displaying an oxygen saturation of 100%. Excessively high $PaCO_2$ levels can be detrimental to your patient's outcome.
B. A sudden drop in CO_2 output from normal (35-40 mmHg) to 15-20 mmHg and an obvious change in waveform is indicative of tube displacement, most likely into the hypopharynx. Re-assess tube placement immediately and take corrective action.
C. **DO NOT** rely on pulse oximetry or $ETCO_2$ monitoring solely to determine the efficacy of intubation.



- **PHASE I:** Respiratory Baseline, CO2 free dead space air, normally 0.
- **PHASE II:** Expiratory Upstroke, rapid rise due to mixing of dead space air and alveolar air, should be steep.
- **PHASE III:** Expiratory Plateau, exhalation of mostly alveolar air
- ☼**:** Peak Et CO2 Level, end of exhaled air, peak end tidal CO2 level, normally 35-45mmHg
- **PHASE IV:** Inspiratory Downstroke, inhalation of CO2 free gas, quickly returns to the baseline.

Endotracheal Intubation – 30.060

INDICATIONS:

A. Impending or actual respiratory/ventilatory failure.
B. Absence of protective airway reflexes.
C. Persistent hypoxemia (O_2 sat < 85%) despite maximal therapy.
D. Present or impending complete airway obstruction (e.g., severe airway burns).
E. Anticipated prolonged need for positive pressure ventilation.

CONTRAINDICATIONS:

A. There are no absolute contraindications. However, in general the primary goals of airway management are adequate oxygenation and ventilation, and these should be achieved in the least invasive manner possible before attempting orotracheal intubation. Least invasive = any situation in which the paramedic finds that a NPA, OPA, CPAP, or supraglottic device meets the above stated goals.

SPECIAL CONSIDERATIONS:

A. If at all possible, avoid intubation in patients with a predicted difficult airway.
B. Lack of resources, staff, training, experience, and equipment should be considered a relative contraindication.

COMMENTS:

A. Unconsciousness in and of itself is NOT an indication for advanced airway intervention. Examples could include unconsciousness associated with severe hypoglycemia, dense stroke, head injury, and severe alcohol intoxication.
B. Orotracheal intubation has been associated with worse outcomes among pediatric patients and head injured patients when compared to BLS airway maneuvers. Therefore, it should be considered relatively contraindicated in these populations.
C. Any attempts at advanced airway management in out of hospital cardiac arrest patients shall not interrupt high performance CPR.
D. Avoidance of peri-procedure (before, during and after) hypoxemia AND hyperventilation is paramount to patient survival.
E. Significant morbidity (dysrhythmia/cardiac arrest) and mortality is associated in patients who are hypoxic, hyperkalemic, acidotic, and/or bradycardic prior to intubation.
F. To avoid airway trauma, morbidity, and mortality, after 2 attempts at intubation consider a backup device (NPA/OPA with BVM or supraglottic device) shall be utilized.

Endotracheal Intubation – 30.060

PROCEDURE:

A. Assess airway. LEMON (Look, Evaluate, Malampati, Obstruction/Obesity, Neck mobility).
B. Position. Open airway and maintain proper patient position (head of bed at 20 degrees if possible). C spine precautions if indicated.
C. Pre-oxygenate. 100% oxygen via NRB or BVM/CPAP when applicable. Oxygenate for at least 3 minutes with high flow oxygen whenever possible.
D. NO DESAT: Apply nasal cannula oxygen with end tidal CO2 monitoring at 6 lpm. If following RSI protocol, increase to 15 lpm after pushing RSI medications (see Endotracheal Intubation RSI protocol).
E. Assemble and check all equipment needed; i.e., monitors, pulse oximetry, end tidal CO2, suction, BVM, video or direct laryngoscope, and backup/alternative airways.
F. RSI per protocol when indicated.

TECHNIQUE:

A. Inspect and clear oropharynx of secretions, foreign body, and dentures.
B. Gently insert blade into oropharynx.
C. Locate landmarks, i.e. epiglottis and cords.
D. Insert appropriate size ETT, inflate cuff, place end tidal device, and assist ventilation with BVM. Avoid hyperventilation.
E. Verify ETT placement:
   (a) 5 point auscultation
   (b) end tidal CO2 colorimetric device and monitor with continuous waveform capnography
   (c) chest rise
   (d) oxygen saturation
F. Secure ETT.
G. Document end tidal CO2 value AND print waveform strip.
H. Note ETT depth at the teeth or gum line.
I. Ventilate with 100% O2 and titrate to appropriate saturation.
J. Reassess complete vitals post procedure.
K. Sedation AND analgesia as needed (see RSI protocol).
L. Stabilize patient's head and neck into midline position to decrease chance of extubating.
M. Continuously monitor end tidal CO2, oxygen saturations, and breath sounds after each transfer of pt. DO NOT rely solely on monitoring equipment to determine the efficacy of intubation.
N. Re-visualize ETT placement with video or direct laryngoscope if needed.
O. Keep patient warm.

COMPLICATIONS:

A. Cardiac dysrhythmias.
B. Vomiting and/or aspiration.
C. Esophageal intubation – unrecognized esophageal intubation is a “never event.”
D. Oral trauma.

DOCUMENTATION:

A. Indication for intubation or why not (e.g., difficult airway determined from assessment).
B. Grading of airway view (Cormack/Lehane view 1-4).
C. Document patient positioning and how pre-oxygenation and passive oxygenation were performed.
D. How placement was verified and ETT depth at lip or teeth.
E. Lowest O2 sat during procedure and total intubation attempts.
F. Print out of capnography waveform following intubation AND print out prior to transfer of patient care.
G. Clear rationale documented of any deviation from protocol.
H. All advanced airway attempts/interventions should be reviewed by the department’s supervising physician/medical director for QA.

Endotracheal Intubation RSI – 30.061

OBJECTIVES:

A. To facilitate orotracheal intubation
B. To protect from increased ICP associated with direct laryngoscopy.
C. To reduce the discomfort and trauma of intubation in conscious patients.

INDICATIONS:

Patient meets indications previously noted in the orotracheal intubation protocol AND:

A. Clenched jaw or active gag reflex.
B. Combativeness threatens the airway, spinal cord stability, and/or transport safety.
C. The patient is conscious.

CONTRAINDICATIONS:

A. Inability to ventilate adequately with a bag-valve mask in the event of failed intubation.

PROCEDURE:

Prepare, position, and pre-oxygenate as outlined in the orotracheal intubation protocol. As part of preparing the patient for RSI, physiologically optimize the patient prior to RSI for a MAP > 70 mmHg, SpO2 >95%, and aggressive treatment of any contributing underlying conditions. If patient continues to deteriorate, reconsider use of RSI.

A. Induction agents. *Give only one*.
    a. **Etomidate 0.3 mg/kg IV/IO** push.
        i. For patients with hypotension or ICP
    b. **Ketamine 2 mg/kg IV/IO** push.
        i. May be drug of choice for patients is status asthmaticus
    c. **Midazolam 0.1- 0.2 mg/kg IV/IO** push. Single max dose of 20 mg.

B. Paralytic agents. *Give only one*.
    a. **Rocuronium 1 mg/kg IV/IO**
    b. **Vecuronium 0.1 mg/kg IV/IO**.
    c. **Succinylcholine 1.5 mg/kg IV/IO**. See contraindications below
        i. If rocuronium or vecuronium are contraindicated use Succinylcholine

C. Adjuncts
    a. **NO DESAT**: Increase nasal cannula oxygen to 15 LPM AFTER medications are given.

D. Assess for apnea and jaw relaxation and gently intubate in a controlled but timely manner when patient becomes relaxed.

E. Confirm ETT placement, reassess vitals and document as outlined in the orotracheal protocol.

F. Continued sedation and analgesia are paramount.
    a. Midazolam 1-5 mg IV/IO. Repeat every 15 min, max dose of 20 mg.
    b. Ketamine 1 - 2 mg/kg IV/IO
    c. Fentanyl 1 - 2 mcg/kg IV/IO
    d. Valium 1-5 mg IV/IM every 25 min
    e. Hydromorphone 0.5 – 1 mg IV/IO. Repeat every 15-20 min

G. Continue paralysis as needed.
   a. **Rocuronium 0.1 - 0.2 mg/kg IV/IO.**
      i. Continuous – 0.01-0.012 mg/kg/min IV
   b. **Vecuronium 0.1 mg/kg IV/IO.**
      i. Continuous – 1 mcg/kg/min IV

SUCCINYLCHOLINE CONTRAINDICATIONS

A. Crush or burn injuries more than 24 hours old (due to potential for hyperkalemia).
B. Penetrating eye injuries (relative) due to increased intraocular pressure.
C. Medical history including malignant hyperthermia, myasthenia gravis, muscular dystrophy, dialysis patient if potassium level is not known, or hyperkalemia.
D. Hypersensitivity to the drug.

COMMENTS

A. Repeat boluses of Etomidate should NOT be used for maintenance of sedation after intubation secondary to potential adrenal suppression.
B. Consider sedation utilizing Ketamine for those patients in whom difficult airway is suspected or those patients with suspected lower airway obstruction: i.e. status asthmaticus, COPD, or severe bronchiolitis.

COMPLICATIONS

A. Cardiac dysrhythmias.
B. Hyperkalemia.
C. Fasciculation's from paralysis.
D. Vomiting and/or aspiration.
E. Esophageal intubation – unrecognized esophageal intubation is a "never event".
F. Prolonged paralysis & malignant hyperthermia.
G. Oral trauma.

DOCUMENTATION

A. As per Orotracheal Intubation protocol.
B. RSI and sedation/analgesia medications given
C. **Intubation Attempt: Anytime a laryngoscope blade is placed in the mouth and/or an ET tube passes the teeth or through the nares. (EXCEPTION: Laryngoscopy to facilitate removal of an upper airway obstruction only).**

Endotracheal Intubation RSI – 30.061

PEDIATRIC Rapid Sequence Intubation (RSI)

PROCEDURE:

A. Prepare, position and pre-oxygenate as outlined in endotracheal intubation protocol. As part of preparing the patient for RSI, physiologically optimize the patient prior to RSI for stable BP based on age, SpO2 >95%, and aggressive treatment of any contributing underlying conditions. If patient continues to deteriorate, reconsider use of RSI.

B. Adjuncts
- **a. NO DESAT**: increase NC oxygen to 15 lpm AFTER medications are given
- **b.** RSI for pediatrics < 1 year old, **Atropine 0.02 mg/kg IV/IO.** Consider for > 1 year old for vagally mediated bradycardia unresponsive to oxygen therapy.

C. Induction agent *Give only one*
- **a. Etomidate 0.3 mg/kg IV/IO**
- **b. Ketamine 1 mg/kg IV/IO**
- **c. Midazolam 0.1 mg/kg IV/IO. Single max dose of 5 mg.**

D. Paralytic agent *Give only one*
- **a. Rocuronium 0.6 - 1.0 mg/kg IV/IO**
- **b. Vecuronium 0.1 mg/kg IV/IO**
- **c. Succinylcholine 2 mg/kg IV/IO (*see contraindications above*)**

E. Assess for apnea and jaw relaxation and gently intubate in a timely manner

F. Confirm ETT placement, reassess vitals and document as outlined in the endotracheal intubation protocol.

G. **Continued sedation and analgesia are paramount**. Continue paralysis PRN. Do not paralyze the patient without adequate sedation and pain control. Ensure that BP is within normal parameters for age prior to do dosing.
- **a. Midazolam 0.1 mg/kg IV/IO Single max dose of 5 mg.**
- **b. Ketamine 1 mg/kg IV/IO**
- **c. Fentanyl 1.0 mcg/kg IV/IO**

H. Continued paralysis prn.
- **a. Rocuronium 0.1 – 0.2 mg/kg IV/IO**
- **b. Vecuronium 0.05 – 0.1 mg/kg IV/IO**

COMMENTS:
- **a.** Repeat boluses of **Etomidate** should **NOT** be used for maintenance of sedation after intubation due to potential adrenal suppression.
- **b.** Consider sedation utilizing **Ketamine** for those patients in whom a difficult airway is suspected (see endotracheal intubation protocol) or those patients with suspected lower airway obstruction (i.e. status asthmaticus, COPD, or sever bronchiolitis).

POSSIBLE COMPLICATIONS:
- **a.** Cardiac dysrhythmias.
- **b.** Hyperkalemia.
- **c.** Fasciculation's from paralysis.
- **d.** Vomiting and/or aspiration.
- **e.** Esophageal intubation – unrecognized is a **"NEVER EVENT"**.
- **f.** Prolonged paralysis & malignant hyperthermia.
- **g.** Oral trauma.

DOCUMENTATION:
- **a.** As per endotracheal Intubation protocol.
- **b.** RSI and sedation/analgesia medications given

Supraglottic Airway Device 30.062

DEFINITION:
The I-Gel Supraglottic Airway is a sterile single use device intended for airway management. All providers shall be trained in the placement of the I-Gel Supraglottic Airway before using the device in the field. The I-Gel Supraglottic Airway is disposable. The I-Gel Supraglottic Airway allows for stomach access and placement of a NG tube in addition to being disposable.

INDICATIONS:

A. The I-GEL SUPRAGLOTTIC AIRWAY is intended for airway management in patients without controlled or spontaneous ventilation.
B. Attempts at endotracheal intubation have been unsuccessful.

CONTRAINDICATIONS:
The following contraindications are applicable for routine use of the I-GEL SUPRAGLOTTIC AIRWAY:

A. Responsive patients with an intact gag reflex.
B. Patients with known esophageal disease.
C. Patients who have ingested caustic substances.

PROCEDURE:

A. Using the information provided, choose the correct I-GEL SUPRAGLOTTIC AIRWAY based on patient size/weight.
B. Apply lubricant to the beveled distal tip and posterior aspect of the tube, taking care to avoid introduction of lubricant in or near the ventilator openings.
C. Have a spare I-GEL SUPRAGLOTTIC AIRWAY ready and prepared for immediate use.
D. Pre-oxygenate, if possible
E. Position the head. The ideal head position for insertion of the I-GEL SUPRAGLOTTIC AIRWAY is the “sniffing position”.
F. Hold the I-GEL SUPRAGLOTTIC AIRWAY at the connector with dominant hand. With non- dominant hand, hold mouth open and apply chin lift.
G. Without exerting excessive force, advance tube until base of connector is aligned with teeth or gums.

H. Confirm proper position by auscultation, chest movement and verification of CO2 by capnography if available.
I. Secure I-GEL SUPRAGLOTTIC AIRWAY to patient using tape or other accepted means. A bite block can also be used, if desired.

COMMENTS

i-gel size	Patient Size	Patient weight guidance
1	Neonate	2-5 Kg (5-11 lbs.)
1.5	Infant	5-12 Kg (11-25 lbs.)
2	Small pediatric	10-25 Kg (22-55 lbs.)
2.5	Large pediatric	25-35 Kg (55-77 lbs.)
3	Small adult	30-60 Kg (65-130 lbs.)
4	Medium adult	50-90 Kg (110-200 lbs.)
5	Large adult+	90+ Kg (200+ lbs.)

WARNINGS:

A. The I-GEL SUPRAGLOTTIC AIRWAY does not protect the airway from the effects of regurgitation and aspiration. Mandatory: Use Suction Tube when in scope of practice.
B. High airway pressures may divert gas either to the stomach or to the atmosphere.
C. Lubricate the posterior surface of the I-GEL SUPRAGLOTTIC AIRWAY to avoid blockage of the aperture or aspiration of the lubricant.

PEDIATRIC

Same procedure as Adult

External Jugular Cannulation 30.070

Needed items

1. Needle/catheter
2. IV Fluid
3. IV Tubing
4. Antiseptic
5. Tape
6. Sterile Dressing

Technique

A. Place patient in Trendelenburg position to help extend the external jugular vein and decrease the likelihood of introducing air into the vein.
B. Immobilize C-Spine if precautions are indicated.
C. Turn patient's head slightly to the opposite side if no C Spine precautions are indicated.
D. Cleanse with antiseptic.
E. Align needle/catheter in the direction of the vein with the tip of the needle aimed toward the ipsilateral (same side) nipple.
F. Apply light pressure on the inferior aspect of the external jugular to create a tourniquet effect using an assistant if available.
G. Insert needle and enter the vein making certain air is not allowed to enter the vein.
H. Note blood return and advance catheter.
I. Withdraw needle and attach IV tubing.
J. Cover site with sterile dressing.

Document

1. Procedure
2. ABCs
3. Detailed Assessment
4. Vital signs, SpO2
5. Cardiac Rhythm
6. Number of attempts
7. Amount of IV fluid administered.

Contraindication

A. Any trauma to the neck is an absolute contraindication.

High Performance CPR - 30.080

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PURPOSE:

A. Improve survival rates for cardiac arrest.

B. The High Performance CPR (HPCPR) guideline is built upon a common framework including: clearly identified roles, common terminology, interoperability between agencies, similar equipment, continually practiced skills, and a common goal of increased survival for cardiac arrest patients.

PROCEDURE:

A. Agencies and responders are encouraged to do the best you can with the resources available. Agencies should develop practices to identify how they will fill the HPCPR common roles and how to best utilize their resources to achieve success. Agencies and responders should practice and reinforce their skills on a frequent and regular basis utilizing CPR training equipment capable of providing CPR quality feedback as much as possible.

1. HPCPR COMMON ROLES
    a. Scout / Initial Compressor
    b. AED / Monitor Operator
    c. Time Keeper / Coordinator
    d. IV / Airway

B. The common roles are listed in order of priority and should be filled in that order as much as possible and resources allow. It is understood that these rolls may be shared or combined based on the resources available on scene until additional help arrives.

1. SCOUT/INITIAL COMPRESSOR
    a. Responders assuming this role should quickly locate the patient and identify the presence of cardiac arrest. Patients in cardiac arrest will be unconscious and not breathing, or not breathing normally, e.g. agonal respirations, and will not have a pulse. Pulse checks should be achieved in less than 10 seconds.
    b. If possible “Push clothes up” to reveal the chest; otherwise begin compressions on clothing until it can be removed.
    c. Immediately start high quality chest compressions.
    d. High quality chest compressions include compressions on a hard surface with full recoil, the proper depth and appropriate rate. Full recoil means the personnel performing the compressions does not lean or place any weight on the patient between compressions. The proper depth for adult compressions is 50 mm or 2 inches. The appropriate rate is 100-120 per minute. The compressor should count out loud during compressions. Strictly limit interruptions. Do not stop compressions for IV/IO, ETT, or IGEL procedures.

2. AED/MONITOR OPERATOR
    a. The AED / Monitor operator should set up and apply the AED/Monitor to the patient. Do NOT disturb compressor, do not interrupt compressions. Cut or remove the clothes from the patient.
    b. Two minutes of high quality compressions should be completed prior to any rhythm analysis or pulse check.
    c. Depending on resources available on scene the AED / Monitor Operator can initiate BVM- Ventilations until the 1:30 mark at which point they should prepare for rhythm analysis on the AED / Monitor. If resources on scene allow personnel to be dedicated to BVM-Ventilations, follow the guidelines as below.
    d. BVM-Ventilations should be performed at a ratio appropriate for the training level of the provider. If appropriately trained and practiced the ventilations can be performed at a ratio of 10:1 without interruption of compressions. A ratio of 30:2 with brief interruptions for ventilations can be performed until providers can demonstrate proficiency at the practice of 10:1. One of the overall goals of the HPCPR program is to strictly limit interruptions to only 2 minute rhythm checks. CPR Providers are strongly encouraged to learn and practice the 10:1 ratio as this will become the standard practice in the HPCPR program.
    e. As an alternative or, if resources on scene are limited, a passive O2 delivery system can be utilized during the first 6 minutes of HPCPR. Passive O2 delivery systems could be achieved by placing a non-rebreather mask on the patient's face with high flow O2 in place of the BVM.
3. TIME KEEPER COORDINATOR
    a. The Time Keeper / Coordinator starts and monitors the stop watch on scene and communicate the time to all the providers on scene. The Coordinator is responsible to evaluate CPR performance, ensuring the compressor is performing compressions correctly with full recoil, proper depth, and the appropriate rate. The Coordinator is responsible to ensure interruptions to compressions are strictly limited to the 2 minute mark. The Coordinator is also responsible to coordinate compressors and ensure smooth compressor transitions every 2 minutes.
    b. The coordinator also gathers information on scene and relays pertinent information to other providers.
    c. The Coordinator calls out the time **BENCHMARKS**.
        i. **"30 Seconds"** – This allows all the providers on scene to keep track of time.
        ii. **"1 minute"** – The half way mark.
        iii. **"1 minute 30 seconds"** – The trigger for the monitor operator to get into position and prepare for charging. At this point the Coordinator solicits or if necessary designates the next compressor, who should move into position to prepare to take over compressions.
        iv. **"1 minute 45 seconds, Charge The Monitor"** – The Monitor operator selects the energy level and charges the monitor, and checks for a pulse during compression to verify pulse, therefore is in position to check for a pulse during rhythm analysis.

v. **"10, 9, 8, 7, 6, 5, 4, 3, 2, 1 – 2 minutes"** – The pivotal moment that requires strict coordination and practice to ensure the absolutely shortest pause as possible, no more than 10 seconds. Rhythm analysis occurs, clearing the patient, and shocking occurs as appropriate. The next compressor is in position immediately begins compressions following the shock or no shock indication.

vi. AED Specific 2 minute Guideline

d. Do not touch the patient during rhythm analysis. If SHOCK is indicated – Perform 30 compressions while AED is charged and then SHOCK. If NO-SHOCK is indicated check pulse for < 10 seconds and immediately start 2 minutes of CPR if no pulse.

4. IV/AIRWAY

a. The IV/IO skills are to be completed by the appropriately certified personnel during the 2 minute compression periods. Do not interrupt compressions to complete these procedures. If the first line ACLS medication can be administered soon, IV/IO should be given priority over airway. Place an IGEL if unable to intubate without interruption of CPR and consider ETT after ROSC has occurred.

C. Mechanical Chest Compression Devices

1. Zoll Auto Pulse or Lucas Device

a. Follow the manufacturer's instructions regarding appropriate use. MCD's can be utilized for patients older than 18 years old and are appropriate for cardiac arrest of non-traumatic nature.

b. Use of MCD's should not delay or significantly interrupt high quality chest compressions and should be implemented by highly trained and very proficient providers. Agencies and providers who utilize MCD's should be prepared for possible device failure and have the necessary resources available to continue HPCPR without their use.

D. Follow Up

1. Following completion of the cardiac arrest incident providers should complete a thorough and complete patient care report. For QA/QI purposes providers should contact their dispatch agency and advise them that the incident was a cardiac arrest. Providers should also email the EMS DIRECTOR with the following information: Date, Agency, and Incident Number. Include in the Subject line: Cardiac Arrest

LUCAS 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.

C. Pregnancy.

D. LVAD or HVAD patients.

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).
    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.
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 EtCO2 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.

AUTOPULSE:

A. Indications:

1. Cardiac Arrest

B. Warnings/Contraindications:

1. The AutoPulse is intended for use on adults, 18 years of age or older.
2. The AutoPulse is not intended for patients with traumatic injury (wounds resulting from sudden physical injury or violence).
3. When cardiopulmonary resuscitation (CPR) is indicated, it should start immediately and should not be postponed.
4. The AutoPulse must be used only in cases that manual CPR would normally be initiated.
5. Personnel certified in manual CPR must always be present during the AutoPulse operation.
6. Do not use the AutoPulse in the presence of an oxygen-rich (greater than 25% oxygen) atmosphere, flammable anesthetics, or other flammable agents (such as gasoline). Using the AutoPulse near the site of a gasoline spill may cause an explosion.

C. Protocols for Management

https://www.zoll.com/-/media/product-manuals/autopulse/01/12555-001-rev-10-autopulse-system-user-guide-01.ashx

Intranasal Medication Administration – 30.080

DEFINITION:
In the absence of an established IV, intranasal is a rapid route offering high level of bioavailability of the medication being administered. The intranasal route can reduce the risk of needle sticks while delivering effective medication levels. The rich vasculature of the nasal cavity provides a direct route into the bloodstream for medications that easily cross the mucous membranes.

INDICATIONS:

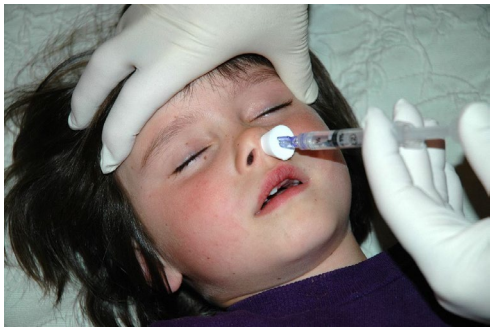
A. Patient without IV access requiring urgent medication administration.
B. Alternate administration route for Fentanyl, Ondansetron, Lorazepam, Midazolam, or Naloxone administration.

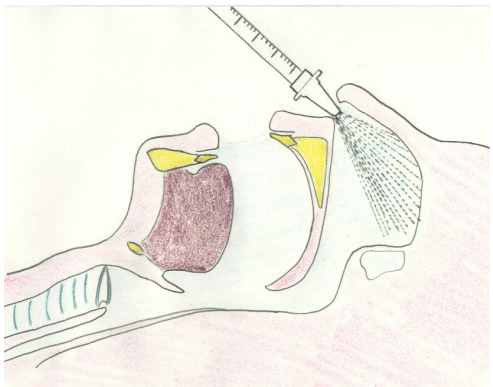
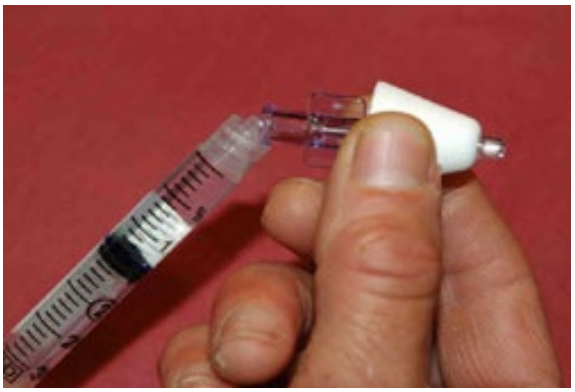
CONTRAINDICATIONS:

A. Epistaxis.
B. Nasal Trauma.
C. Nasal septal abnormalities.
D. Nasal congestion or discharge.

PROCEDURE:

A. Patient should be in a supine or recumbent position. If the patient is sitting then compress the nares after administration.
B. Draw up medication into a syringe using appropriate transfer device.
C. Remove air from syringe
D. Remove transfer device and place atomizer onto syringe and confirm it is secure.
E. Administer medication by briskly compressing the plunger to expel and atomize the medication administering a maximum of 1cc of solution per naris. May repeat PRN every 15 minutes.
F. Evaluate medication effectiveness and continue with treatment protocol



Intraosseous Access & Infusion - 30.090

DEFINITION:
Intraosseous cannulation is an alternative technique for establishing IV access in critical adult and pediatric patients when peripheral IV access is difficult or time-sensitive.

INDICATIONS:

A. Intraosseous infusion is indicated in emergency situations when life-saving fluids or drugs should be administered and IV cannulation is difficult, impossible or too time-consuming to perform.
B. If a peripheral IV cannot be established after two attempts or within 60–90 seconds of elapsed time *and* in:
C. Adult and pediatric patients, within the proper weight range, who present with one or more of the following clinical conditions:
    1. Cardiac arrest.
    2. Hemodynamic instability (BP <90 mmHg and clinical signs of shock).
    3. Imminent respiratory failure
    4. Status epilepticus with prolonged seizure activity greater than 10 minutes, and refractory to IM anticonvulsants. Hemodynamic instability (BP <90 mmHg and clinical signs of shock).
    5. Toxic conditions requiring immediate IV access for antidote.
D. IO placement may be considered prior to peripheral IV attempts in cases of cardiopulmonary or traumatic arrest, in which it may be obvious that attempts at placing an IV would likely be unsuccessful and or too time consuming, resulting in a delay of life-saving fluids or drugs.

EZ-IO™ PROCEDURE:

A. Determine patient's weight.
B. Assemble all necessary equipment
    1. The Standard EZ-IO AD® needle should be utilized on patients who weigh ≥ 40 kg (approximately 88 lbs. or greater).
    2. The EZ-IO PD® needle should be used on patients who weigh between 3–39 kg (approximately 6–87 lbs.).
C. Site Selection (patient's weighing ≥ 40 kg).
    1. Tibia
        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 alternate site may be used at the distal tibia, two finger widths proximal to the medial malleolus along the midline of the tibia.
    2. Proximal Humerus **PREFERED SITE**
        a) Insertion site is located directly on the most prominent aspect of the greater tubercle. Slide thumb up the anterior shaft of the humerus until you feel the greater tubercle, this is the surgical neck. Approximately 1 cm (depending on patient anatomy) above the surgical neck is the insertion site.
        b) Ensure that the patient's hand is resting on the abdomen and that the elbow is adducted (close to the body).

A

D. Needle Insertion
   1. Prep the surface with Betadine® and wipe dry with a sterile gauze pad.
   2. Stabilize patient's leg and begin insertion from a 90-degree angle to the plane of the tibial plateau. Gently advance the needle set into position–do not force. Stop when you feel the "pop" on smaller patients.
   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 Lactated Ringers or Normal Saline** when using the EZ-IO AD® needle, and 5 ml normal saline when using the EZ-IO PD® needle.
   7. Connect IV tubing and bag to extension tubing or EZ-Connect.
   8. Consider additional bolus of saline if flow rates slower than expected.
   9. Utilize a blood pressure cuff or pressure bag to help infuse fluids.
   10. Dress site, secure tubing, and apply wristband.

NIO™ Device Procedure

A. Select appropriate size Adult or Pediatric and prepare equipment
B. Select Site
   1. Humeral Head **(Preferred site)**
      a. Insertion site is located directly on the most prominent aspect of the greater tubercle. Slide thumb up the anterior shaft of the humerus until you feel the greater tubercle, this is the surgical neck. Approximately 1 cm (depending on patient anatomy) above the surgical neck is the insertion site.
      b. Ensure that the patient's hand is resting on the abdomen and that the elbow is adducted (close to the body).
   2. Tibia
      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 alternate site may be used at the distal tibia, two finger widths proximal to the medial malleolus along the midline of the tibia.
C. Placement
   1. Hold the NIO at the base at a 90° angle to the surface against the skin.
   2. With non-dominant hand on the textured dots holding it like a dart, fan out your other fingers to stabilize the NIO against the skin. **(Never grasp over or around the gray locking tabs.)**
   3. Unlock the NIO by rotating the cap 90° in either direction.
   4. Deploy the NIO This is a **TWO-HANDED** procedure
      a. Place dominate hand over the cap of the NIO
      b. Press downward pressure.
      c. While pressing down on the device, squeeze the trigger wings. This deploys the NIO
   5. Post-Deployment
      a. While holding the stabilizer base against the insertion site, gently pull the NIO in a rotating motion upwards.

b. At this point, it is recommended to use the NIO Fixation dressing to affix the stabilizer base to the patient's skin.

Pain Management

A. If the procedure is performed on a conscious patient, immediately following placement of the IO needle, administer **0.5 mg/kg 2% Lidocaine (not to exceed 50 mg) *slowly*** through the IO site. Wait approximately 30–60 seconds before 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 E.1 above. Wait approximately 30–60 seconds before continuing fluid administration.
C. If fluids do not flow freely, flush IO site with an additional 10 cc normal saline.

PEDIATRIC EZ-IO™ PROCEDURE (patients weighing 3-39 kg)

A. Assemble all equipment. The EZ-IO PD® should be used on patients who weigh between 3-39 kg (approximately 6-87 lbs.)
   B. Site Selection (Patients weighing 3-39 kg)
   Proximal Tibia
   1. Palpate the landmarks at the proximal tibia (patella and tibial tuberosity).
   2. Insertion site should be one finger width below the tibial tuberosity, then medial along the flat aspect of the tibia.
   3. If the tibial tuberosity cannot be identified on the child, then the insertion site may be two finger widths below the patella, then medial along the flat aspect of the tibia.

   Distal Femur (training video here)
   1. Palpate the landmarks at the distal femur (patella and distal femur)
   2. Insertion site should be on finger width above superior margin of patella, then medial approx. 1-2 cm or one finger width.

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

PEDITRIC Procedure with NIO P™ Patients 3-12 years old

A. Assemble equipment
   1. For patients 3-9 leave spacer in place
   2. For patients 9-12 remove the red spacer

B. To Operate place the designated locating arrow (R for right leg, L for left leg) on the prominent aspect of the tibial tuberosity, aligned parallel to the long axis of the tibia. Locating arrows should be pointing up towards the patients knee.

D. Placement
   1. Hold the NIO at the base at a 90° angle to the surface against the skin.
   2. With non-dominant hand on the textured dots and place the designated location arrow (R for right leg, L for left leg) on the prominent aspect of the tibial tuberosity, parallel to the long axis of the tibia.
   3. Unlock the NIO by rotating the cap 90° in either direction.
   4. Deploy the NIO This is a **TWO-HANDED** procedure
      a) Place dominate hand over the cap of the NIO
      b) Press downward pressure.
      c) While pressing down on the device, squeeze the trigger wings. This deploys the NIO
   5. Post-Deployment
      a) While holding the stabilizer base against the insertion site, gently pull the NIO in a rotating motion upwards.
      b) At this point, it is recommended to use the NIO Fixation dressing to affix the stabilizer base to the patient's skin.

INFANT Procedure with NIO Infant™

A. Identify insertion site
   1. Locate tibial tuberosity and extend patients leg
   2. Insertion site is approx. 1cm medial to the tibia tuberosity or just below the patella, or one pinky finger width and slightly medial along the flat aspect of the tibia.

B. Prepare equipment

C. Placement
   1. Use non-dominate hand to hold and stabilize the limb. Pinch patient's tibia between your fingers to identify the medial and lateral borders and locate the center.
   2. Hold the NIO-I at a 90° angle to the surface against the skin at the insertion site.
   3. Penetrate through the soft tissue to reach bone.
   4. Slowly twist device while applying downward pressure until a change in resistance is felt.
   5. Visualization of the 5mm marker line on the cannula should be obtained to confirm adequate needle length.

D. Secure the pink neddle base with your non-dominant hand and pull the handle straight up with your dominant hand.

E. Use the NIO Fixation dressing to affix the stabilizer base to the limb.

PEDIATRIC PROCEDURE WITH MANUAL IO DEVICE:

A. Assemble equipment
   1. Approved bone marrow needles, 15 or 18 gauge size
   2. Betadine® swabs
   3. Two small syringes (3-5cc)
   4. One large Luer-lock® syringe (35-50cc)
   5. Flush solution
   6. Sterile gauze pads and tape
B. Site Selection as listed above.
C. Prep the surface with Betadine® and wipe dry with a sterile gauze pad.
D. Needle Insertion
   1. Insert the needle at the proximal tibial site, directing the needle caudally. The needle should penetrate the skin and subcutaneous tissue and be pushed through the cortex of the bone using rotation (avoid rocking the needle) until a "pop" or loss of resistance is felt.
   2. Confirm placement of the needle by:
      a. Firm fixation of the needle and free aspiration of marrow/blood.
      b. Infusion of **2-3 cc of LR or NS**, palpating for extravasation or noting significant resistance. If extravasation occurs, further attempts at the site should be avoided.
      c. It is not always possible to aspirate blood/marrow but the line may be patent.
E. Tape and secure IO needle firmly in place.
F. Start Infusion
   1. Although gravity drainage may suffice, pressurized infusions may be needed during resuscitation.
   2. When infusing medications via an IO route, pressure must be applied to the fluid bag in order to maintain flow rates. The EMT must continually monitor the rate of infusion.

F.A.S.T. 1

A. If patient is conscious consider anesthetic.
B. Locate the appropriate site (midline of the manubrium). Clean and prep site.
C. Place the Target / Strain Relief Patch.
D. Place the infusion tube with the introducer.
E. Remove introducer leaving the infusion tube.
F. Aspirate with syringe to ensure proper placement.
G. Attach IV tubing and begin flowing solution.
H. Secure area with Protector Dome.
I. Attach remover to PT and transfer to receiving hospital.

CONTRAINDICATIONS TO IO:

A. Fracture of the selected bone.
B. Previous significant orthopedic injuries or procedures.
C. Infection at the site of insertion.
D. Excessive tissue at insertion site with the absence of landmarks.
E. Failed IO attempt of same bone.

Intraosseous Access & Infusion - 30.090

NOTES & PRECAUTIONS:

A. Osteomyelitis, growth plate injury (in pediatric patients), and extravasation of fluid with compression of popliteal vessels or the tibial nerve may occur.
B. Airway and breathing should be established first in accordance with other protocols.
C. Do not perform more than one attempt in each tibia.
D. Any ALS medication may be administered IO.
E. Do not give Hypertonic Saline though an IO line.

Intravenous Access & Infusion – 30.100

INDICATIONS:

A. Normal Saline is indicated for replacement of fluid volume losses such as in trauma, burns, dehydration, or shock.
B. An IV lock may be substituted for an IV line in all situations, except where IV fluid is the therapy of choice for volume replacement.

PROCEDURE for IV Access:

A. IV access:
   1. Establish IV access and prepare LR or NS.
   2. Connect an extension set between the IV hub and the solution bag and tubing.
   3. All IVs will be started using macro drip sets, unless otherwise indicated.
B. IV access with an IV lock:
   1. Establish IV access.
   2. Connect male adapter plug (with pre-flushed short extension tubing) to IV hub.
   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.

PROCEDURE for IV Medication Infusions:

A. Using a Buretrol® or Soluset® type device:
   1. Establish IV access and prepare solution.
   2. Connect the Buretrol® between the solution bag and the IV tubing.
   3. Place one hour's solution into the Buretrol® and close the connection between the Buretrol® and the solution bag. Note: The number of microdrops/minute=the number of ccs/hour.
   4. Begin infusing solution at the appropriate rate.
   5. If desired, additional solution may be placed in the Buretrol®. The Buretrol® 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 & PRECAUTIONS:

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

Left Ventricular Assist Devices – 30.120

Indication

Evaluation of a patient with an implanted Left Ventricular Assist Device.

Description

A left ventricular assist device (LVAD) is an implantable mechanical pump that helps pump blood from the lower left chamber of a heart (left ventricle) to the ascending aorta and thus the rest of the body. It is a device that is implanted in an advanced heart failure patient who meets specific criteria. It is the best treatment for heart failure, but not a cure for it. Oftentimes, these patients are on a heart transplant list and the LVAD is a bridge to transplant. Other times, patients don't qualify for transplant for various reasons, and the LVAD will be in the patient until s/he dies. Patients with LVAD are dependent on these pumps for survival.

These devices are implanted through open heart surgery. A driveline exits the pump and houses the electrical wires. It is tunneled through the abdomen and comes out at a sterile exit site. Do NOT remove this dressing. This driveline plugs into an external controller that enables patients to look at LVAD numbers, alarms, power level etc. The controller and pump are powered by batteries during the daytime or a wall unit at night. Adequate power to the controller is vital to ensure the pump continues to operate. Loss of power to the patient can stop the pump and kill the patient. These pumps are all pre-load (volume) dependent and afterload (blood pressure sensitive). Lack of hydration or low blood volume can lead to low flows on the pump. High/low blood pressure can prevent adequate flow of blood through the pump.

There are three devices on the market: HeartMate 2, HeartMate 3, and Heartware.

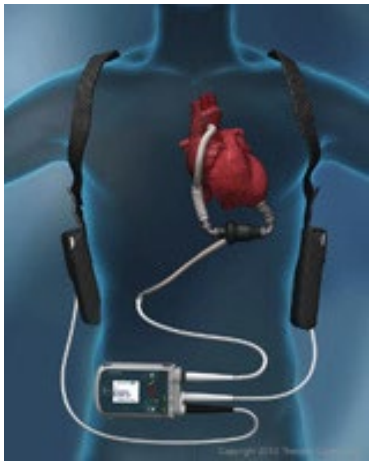
Currently there are two implanting centers. (*OHSU closed in 2018 but may reopen*.)
Providence St. Vincent (Portland): 971-678-4042
Kaiser (Clackamas): 503-449-4672

Components

- Pump
- Controller
- Driveline
- Batteries and Battery Clips (for HeartMate only)
- Wall unit for power
- Battery charger

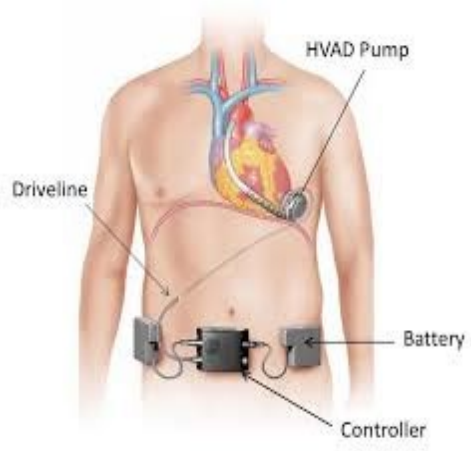
*****ALWAYS ENSURE PATIENT TRANSPORTS WITH THE BACK UP BAG AND EXTRA BATTERIES. ENSURE COMPONENTS ARE SECURE BEFORE TRANSPORT TO AVOID DRIVELINE PULLS*****

Left Ventricular Assist Devices – 30.120



HeartMate 2

HeartMate 3



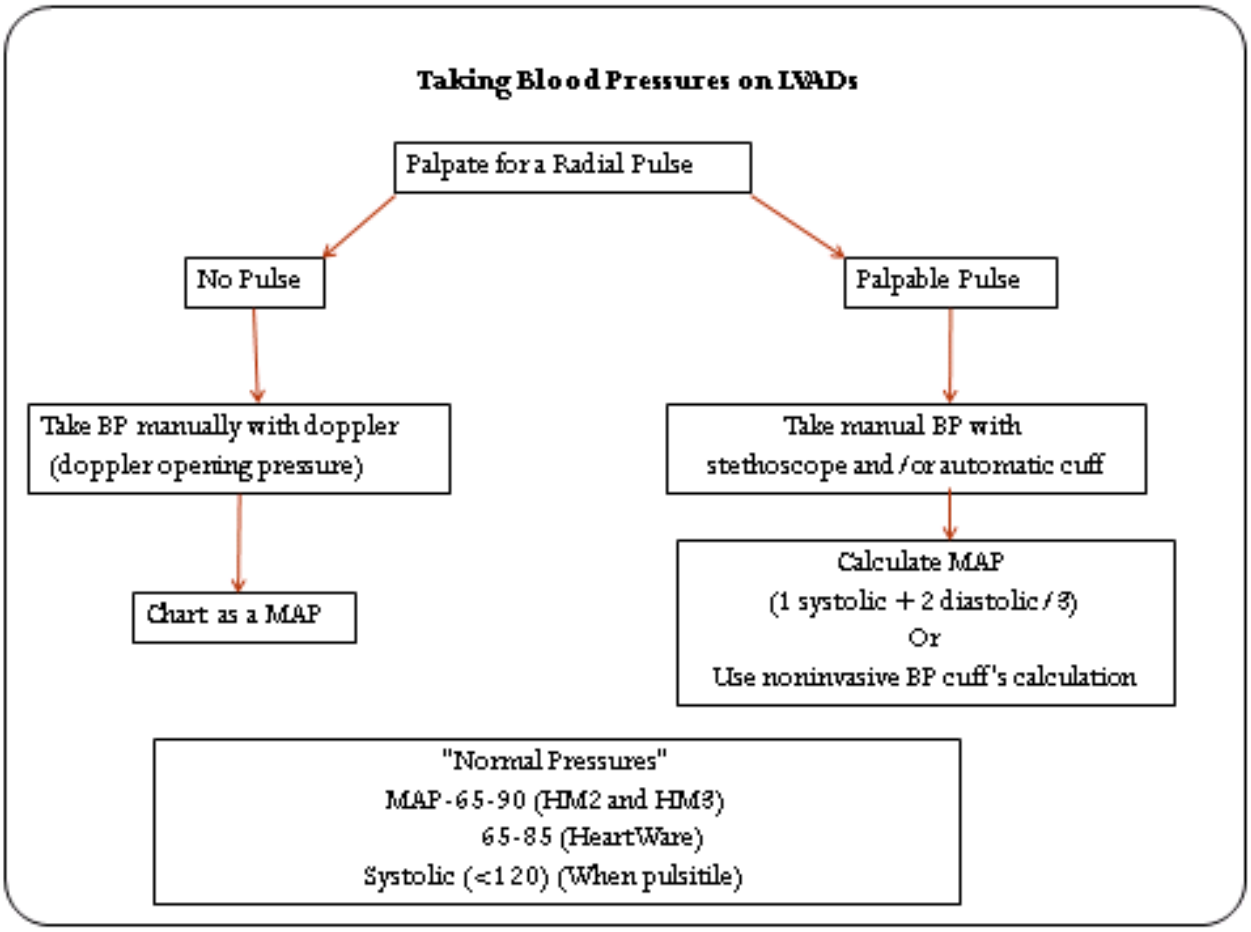
HeartWare

Notes and Precautions

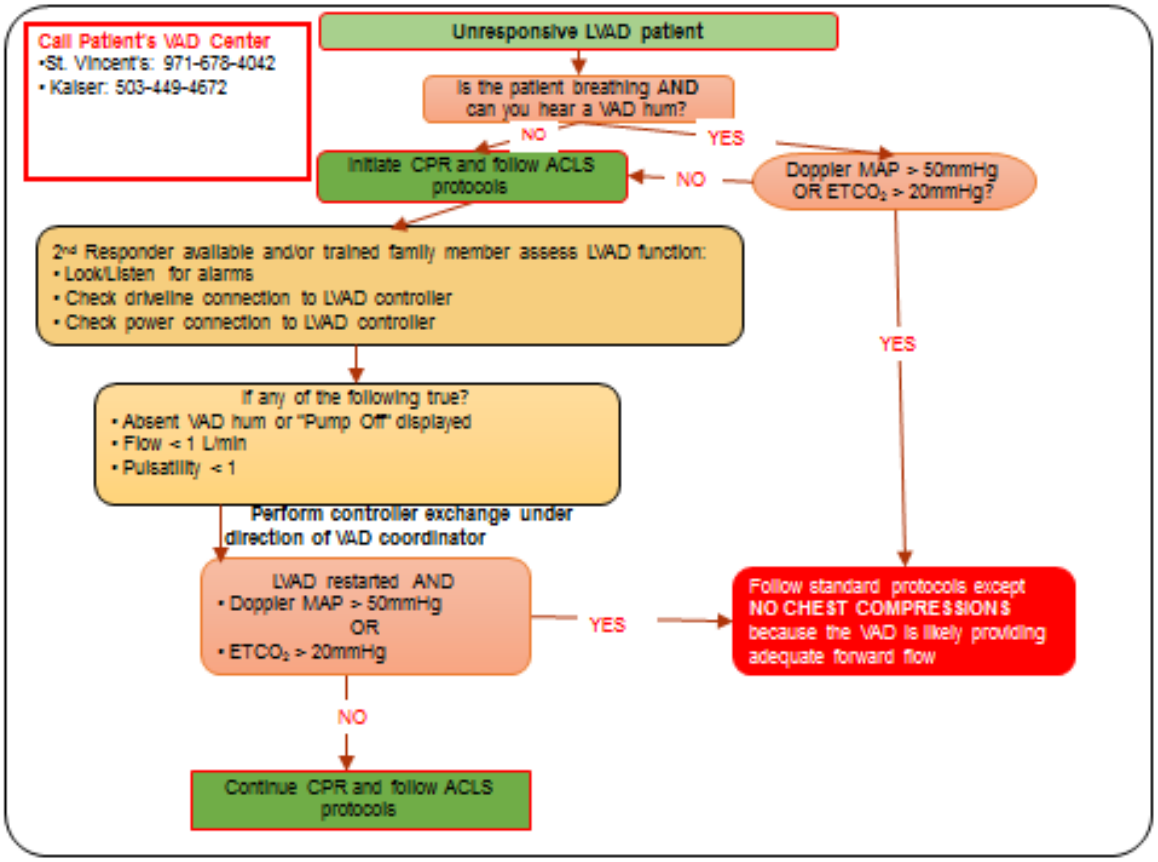
1. Blood pressure may be difficult to obtain on these patients. If a pulse is palpable, you may use a regular automated cuff. If no pulse is palpable, you can only obtain blood pressure via Doppler. The mean arterial pressure goal is 60-90. Pulse pressure may be narrow.
2. Common presenting non pump-related complications include bleeding (GIBs most commonly), infection, and stroke.
3. All ACLS drugs and defibrillation may be administered. Patient's LVAD does not need to be unplugged in order to defibrillate or pace the patient. Leave everything attached. Most patients do have ICDs and pacemakers.
4. If the patient is in sustained VT or VF, shock the patient as would be indicated. The patient in this rhythm may still be alert/oriented due to the LVAD. However, prolonged VT and VF will deteriorate the right ventricle and increase ischemia, which effects long term LVAD prognosis.
5. The LVAD does not affect the patient's EKG.
6. Any mode of transportation is permissible; these patients can fly.
7. Be sure to bring all of the patient's equipment during transport. Ensure the patient has adequate back-up power.
8. Ensure 2 batteries are connected to patient at all times, and NEVER disconnect both batteries at the same time.
9. For any device related alarms and complications, utilize the LVAD coordinator to talk EMS through any LVAD emergency procedures such as a controller exchange.
10. Please call the patient's LVAD center if the patient/family has not already reached out to the on-call LVAD coordinator.

TREATMENT	1. Listen to concerns from the patient and family members who have received device specific training. Allow them to manage device. Bring the trained caregiver with the patient during transport if possible. Speak with the patients LVAD coordinator to rule out any issues with the pump and help determine treatment plan. 2. These patients still have heart failure. Be hesitant about pushing IV fluids unless clear signs of hypovolemia or hypotension are present. 3. Provide respiratory and ventilator assistance per standard. 4. Provide CPR ONLY if one or a more of these conditions are met: MAP < 50, EtCO2<20, pump has stopped working and replacing the controller did not restart it. See flowsheet for more information. 5. Arrhythmias: • Many of these patients have chronic runs of VT and intermittent VF. • Majority of LVAD patients have ICDs/PMs. They may have maxed out the shocks from the ICD before you arrive, so shock if indicated by rhythm. • Always treat sustained VF with appropriate ACLS protocols, even if the patient is awake and alert. Prolonged lack of treatment can increase ischemia and worsen right ventricular function for the patient, which shortens lifespan and increases complications. • You may administer any anti-arrhythmics per protocol • No need to disconnect any LVAD component before defibrillation or pacing. You will not harm the device.
PRECAUTIONS	Always transport **ALL** components of the device with the patient. Ensure the driveline and controller are secure before moving a patient. Driveline pulls can lead to driveline exit site infection, the #1 cause of morbidity and mortality in this patient population.
SPECIFIC INFORMATION NEEDED	1. Past Medical History. • These patients generally have other co-morbid factors which may be the cause for acute medical care. Don't overlook these factors. 2. Device Information. • It is important to bring all components and information about the device, as well as the trained caregiver responsible, with the patient to the hospital. • Ensure the patient brings the back-up bag, which includes a spare controller and at least 2 fully charged batteries. For patients outside of Portland, encourage patient/family to bring

	all batteries.
PHYSICAL FINDINGS	1. Altered cardiac physiology. • Due to the LVAD, this complicates patient assessment while limiting the effectiveness of normal tools. 2. Talk to the patient to assess mentation and general status. 3. Check blood glucose. 4. Most LVADs are continuous flow devices; HeartMate 3 has pulsatility every 2 seconds so you may pick up on an artificial pulse of 30bpm. Most patients may NOT have a palpable pulse. Accordingly, • SpO2 may not be accurate. If they don't appear short of breath, no need to treat low sp02 readings. • If the patient has a palpable pulse, you can obtain a standard blood pressure cuff reading. If the patient doesn't have a palpable pulse, blood pressure can only be assessed by Doppler. 5. Check all LVAD connections to ensure adequate power and connection to the controller. 6. For HeartMate 3 patients, ensure the external modular portion of the driveline is connected (no yellow line visible). 7. Listen for "hum" for HeartMate 2 and HeartWare patients, or "pulsation" for Heartmate 3 patients, in epigastric region to verify device is on and functioning properly. 8. Common complications include: bleeding (most notably GI bleeding), stroke, infection, and pump thrombosis. 9. Apply ETCO2 for monitoring of cardiorespiratory status. • ETCO2 < 20 verifies poor perfusion, perform CPR. • ETCO>20 verifies pump is perfusing adequately, do not perform CPR.


Taking Blood Pressures on LVADs
Palpate for a Radial Pulse
No Pulse
Palpable Pulse
Take BP manually with doppler (doppler opening pressure)
Take manual BP with stethoscope and / or automatic cuff
Chart as a MAP
Calculate MAP
(1 systolic + 2 diastolic / 3)
Or
Use noninvasive BP cuff's calculation
"Normal Pressures"
MAP - 65-90 (HM2 and HM3)
65-85 (HeartWare)
Systolic (<120) (When pulsitile)

Left Ventricular Assist Devices – 30.120



Orogastric Tube Insertion and Maintenance – 30.135

OVERVIEW:

While a patient is being ventilated with a BVM, trapped air can gather in the stomach increasing the risk of vomiting and aspiration. In addition, an enlarged stomach pushes against the diaphragm to increase intrathoracic pressure, decrease venous return and interferes with lung ventilation.

INDICATIONS:

To alleviate gastric distention, reduce aspiration and facilitate ventilation in intubated patients.

CONTRAINDICATIONS:

A. Known alkali or acid ingestion.
B. Known esophageal varices.
C. Esophageal obstruction.
D. Suspected epiglottitis or croup.

PROCEDURE:

A. Assemble equipment:
    a. Proper size orogastric tube
    b. Lubricant
    c. 30 or 60 cc syringes
    d. Suction unit

Gastric Tube Size Guide	
Age	**Size**
Less than 1 year	Refer to Pediatric Guide
1 yr. to 16 yrs.	10 – 14 French
Older than 16 yrs.	Up to 18 French

B. With patient's head in a neutral position measure tube length from xiphoid process to angle of jaw to corner of the mouth. Place a mark on the tube to indicate how far to advance the tube.
C. Lubricate end of tube; about 3-4 inches.
D. Gently insert tube and advance toward posterior oropharynx.
E. For non-traumatic patients, repositioning the head into a slightly flexed forward position may facilitate OG tube passage past the hypopharynx and into stomach.
F. Continue to insert tube to the measured mark). Secure tube with tape.
G. Attach syringe to the distal end of the OG tube.
H. Confirm tube placement by placing stethoscope over epigastrium and auscultate while inserting 30-66 cc of air in tube. You should hear gastric gurgling.
I. Secure tube in place with tape.
J. Place the tube to low continuous suction as needed, gastric contents should be visible in tubing.
K. Document tube size and depth; color, consistency and amount of gastric contents.

Orogastric Tube Insertion and Maintenance – 30.135

NOTES AND PRECAUTIONS:

A. OG tube placement can cause bradycardia
B. Do not delay transport for this procedure
C. Monitor oxygen saturation and end tidal CO_2 continuously

Patellar Dislocation Reduction – 30.145

INDICATION:

Isolated non-traumatic lateral patellar dislocation.

CONTRAINDICATIONS:

A. Direct traumatic mechanism of injury (impact directly to the knee).
B. Any sign of associated patella fracture (crepitus).
C. Any associated injury to same extremity (femur fracture, tibia/fibula fracture, pelvic fracture).

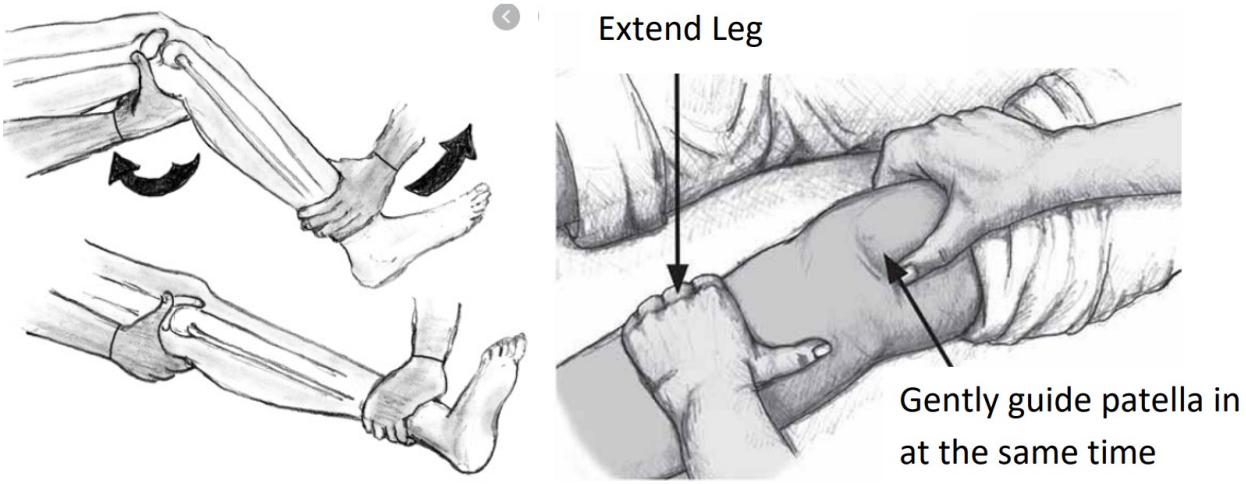
PROCEDURE:

A. Follow Pain Management protocol.
B. Patient will usually present with the knee flexed and an obviously laterally displaced patella.
C. Gently apply pressure to the lateral aspect of the patella (directing it medially) while extending the leg.

NOTES & PRECAUTIONS:

A. Reductions **should not** be attempted for medial dislocations, as these commonly have associated fractures.

B. Patients should be splinted and transported regardless of success of reduction attempt. If a patient does not want transport after successful reduction, **OLMC contact is mandatory as part of the refusal process.**



Patient Restraint – 30.150

PURPOSE:
Physical and chemical restraint is used to protect the safety of patients and responders. Patient restraints should be utilized only when necessary and in those situations where the patient is exhibiting behavior that presents a danger to themselves and/or others.

PROCEDURE:

A. **Physical Restraint Guidelines**:

1. Use the minimum level of physical restraints required to accomplish patient care and ensure safe transportation (Soft restraints may be sufficient). If law enforcement or additional manpower 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.

- **Physical Restraint Procedure**:
  1. Place patient face up on long backboard, NOT PRONE. Closely monitor the patient's respiratory status.
  2. Secure ALL extremities to backboard. Try to restrain lower extremities first using flexcuffs around both ankles. Next, restrain the patient's arms at his/her sides.
  3. If necessary, utilize cervical spine precautions (tape, foam bags, etc.) to control violent head or body movements
  4. Secure the backboard onto gurney for transport using additional straps if necessary. Remember to secure additional straps to the upper part of the gurney to avoid restricting the wheeled carriage.
  5. Evaluate the patient's respiratory and cardiac status continually to ensure that no respiratory compromise exists. Monitor SpO_2 if possible.
  6. DO NOT tighten chest straps to the point that they restrict breathing.

B. Chemical Restraint Guidelines:
Sedative agents may be needed to restrain the violently combative patient. These patients may include alcohol and/or drug-intoxicated patients and restless, combative, head-injury patients.

Chemical Restraint Procedure:

1. Evaluate the personnel needed to safely attempt restraining the patient.
2. Attempt to determine if the patient's agitation is related to a drug/alcohol intoxication or withdrawal, medical or psychiatric problem.
3. Consider:
   a. **Haloperidol 5-10 mg IM may repeat for a max of 10 mg**,
   b. **Versed 2 – 5 mg IN/IM/IV**
   c. **Benadryl 25-50 mg IM/IV**
   d. Probable Excited Delirium: **Ketamine 1 - 2 mg/kg IM/IV.** May repeat once

4. Consider and treat medical causes of combativeness (hypoxia, head injury, hypoglycemia)

5. Vital signs should be assessed within the first 5 minutes and thereafter as appropriate (at least every 10 minutes and before additional medication) if possible.

NOTES & PRECAUTIONS:

A. 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.

Pelvic Immobilization – 30.160

INDICATIONS:

A. For pelvic instability in the presence of trauma.
B. For pelvic pain without instability as a comfort measure.

PELVIC WRAP PROCEDURE:

A. Fold the sheet smoothly lengthwise to about 9 inches wide (do not roll) and apply underneath the pelvis, centered on the greater trochanters. Assure the patients pockets are empty (if applicable) to avoid placing pressure on the objects into the patient.
B. Tighten the sheet around the pelvis and adjust the tension to try to return the pelvis to normal anatomical position.
C. Secure using a knot or clamps if available.

PELVIC SLING PROCEDURE:

A. Place the Pelvic Sling underneath the pelvis, centered on the greater trochanters. Assure the sling is smooth and that the patients' pockets are empty (if applicable) to avoid placing pressure on the objects into the patient.
B. Move the adjustable strap so that it will allow enough tension to be made.
C. Place the strap through the buckle and pull tension until the buckle makes a popping sound. This indicates sufficient tension has been achieved.
D. Secure the strap by the Velcro to the side of the splint.

NOTES & PRECAUTIONS:

A. Blood loss in a pelvic fracture can be significant. Monitor closely and treat per Shock Protocol.
B. Consider placing prior to extrication from a vehicle if feasible.
C. The Pelvic Sling is contraindicated in isolated hip fractures.

PICC Line Access – 30.170

DEFINITION:
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 actecubital 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 for at least 15 seconds and allow to dry for at least 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 LR or 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 LR or 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.

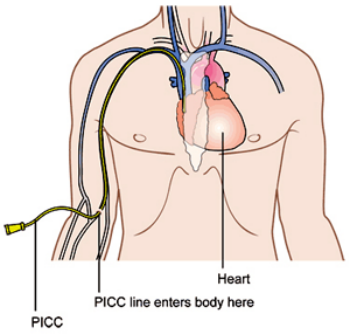
C. If there is a capped needle-type port on the distal end of the catheter, perform the following: *(figure 2)*
    1. Scrub the cap with an alcohol pad for at least 15 seconds and allow to dry for at least 5 seconds.
    2. Clamp the catheter tubing using ONLY the existing clamp on the catheter and 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 LR or 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 LR or 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 & 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 reinjection of 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 by due to the viscosity of the fluid.



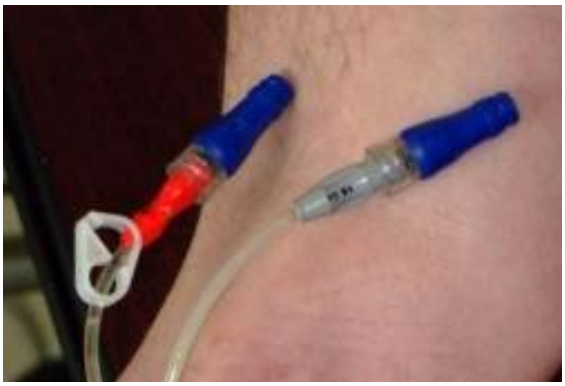


Figure 1- Needless port

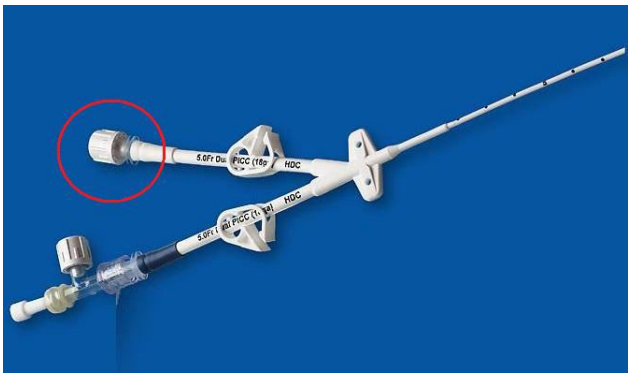


Figure 2 – Non-needless type port with cap

Sports Equipment Removal – 30.180

DEFINITION:
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.

<u>While backboard and straps are being prepared</u>:

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

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

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

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

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

Suctioning – 30.190

INDICATIONS:
When patient is exhibiting respiratory difficulty secondary to secretions in airway or the potential for aspiration exists.

PROCEDURE:

A. Oral Suctioning
1. Pre-oxygenate patient with 100% oxygen.
2. Assemble equipment: Suction unit with tonsil tip or dental tip, personal protective equipment (gloves, eye pro).
3. Attach required monitoring equipment.
4. Turn suction unit on and confirm mechanical suction is present.
5. Insert tip without suction.
6. Cover thumbhole to begin suction if using a tip other than dental tip.
7. Apply suction for < 15 seconds.
8. Monitor patient's oxygen saturation.
9. Re-oxygenate patient for at least 2 – 3 minutes between suction attempts.

B. Tracheal Suctioning
1. Pre-oxygenate patient with 100% oxygen.
2. Assemble equipment: Suction unit, correct size suction catheter, sterile rinse, personal protective equipment (gloves, eye pro).
3. Attach required monitoring equipment.
4. If patient is being ventilated with BVM prior to suctioning, have someone else remove the bag from end of ET tube prior to suction attempt.
5. Insert catheter into the ET tube without applying suction.
6. Advance catheter as far as possible.
7. Withdraw slowly using **intermittent** suction while rotating catheter.
8. Do not suction more than 15 seconds.
9. Monitor patient's oxygen saturation.
10. Rinse catheter in sterile saline.
11. Re-oxygenate patient for at least 2 – 3 minutes between suction attempts.

NOTES & PRECAUTIONS:
Oral and tracheal suctioning can cause trauma to the oropharynx and airway, bradycardia, or hypoxia. It should not delay other resuscitation.

Synchronized Cardioversion – 30.195

INDICATIONS:

A. Have a rate over 150 beats per minute
B. Patients that are exhibiting hemodynamically unstable tachycardias (wide or narrow complex) and exhibit one or more of the following.
   1. Altered mental status
   2. Chest Pain
   3. Syncope
   4. Dyspnea
   5. Hypotension
   6. Pulmonary congestion
   7. CHF
   8. AMI

PROCEDURE:

A. Explain procedure and reassure patient
B. Initiate sedation with **Versed** 2.5mg-5mg IV/IO/IN/IM or **Ativan** 0.5-4mg IV **Peds** 0.1mg/kg IV max 4mg
   1. May defer sedation if patients level of consciousness is significantly diminished and the patient is hemodynamically unstable- administration after procedure is acceptable
C. Place pads anterior posterior if possible.
D. Set cardiac device to Synchronize
   1. May need to reset this again for subsequent shocks
E. Select appropriate initial energy setting per manufactures recommendation.
   1. Zoll recommends 70J, 120J, 150J, 200J.
F. Clear the patient and deliver the shock
G. Re-assess the patient and repeat the procedure as required.

NOTES & PRECAUTIONS:

A. <u>Contraindications</u>

Supraventricular tachycardia induced by non-cardiac conditions

1. Medications (digitalis toxicity)
2. Hypovolemia
3. Hyperthermia
4. Hypoxia (etc.)

B. Considerations

1. If energy is delivered without synchronization, ventricular fibrillation could. result
2. Depending on the device used, synchronization may be required after each. counter shock
3. Ensure synchronization is turned OFF if defibrillation becomes necessary.

TASER® Barb Removal – 30.200

INDICATIONS:

Taser® barbs should be removed at the request of law enforcement if:

A. The patient has been adequately subdued so as not to pose a danger to Fire/EMS personnel. AND,
B. The barbs are not embedded in the face, neck or groin areas.

PROCEDURE:

A. Perform patient assessment.
B. Monitor vitals and LOC. Ensure that vitals are in the normal limits for the situation.
C. Expose the area where Taser barb has implanted under the skin.
D. Cut wires from the barb if still attached.
E. Place thumb and forefinger above and below the barb parallel to the portion of the shaft implanted in the patient's skin.
F. Spread your thumb and forefinger apart to stretch the skin tightly over the barb.
G. Holding tension, use 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.
H. Assess the skin where the barb was removed. The skin should be cauterized from the electrical current. Dress the wound to prevent infection.
I. Contact OLMC if unsure whether to transport.

NOTES & PRECAUTIONS:

A. Patients should be in police custody and monitored by Police for the safety of medical personnel.
B. Do not remove Taser® Barbs from the face, neck or groin area. Stabilize the barbs and transport to the Emergency Department.
C. Tasers® emit two barbs. Make sure both are removed. Treat all barbs as a bio-hazard and dispose as you would any other sharps.
D. Potential trauma may have occurred before (during a struggle) or after the patient was hit by the Taser® (patient falls and hits head).
E. Consider whether the patient meets criteria for Altered Mental Status or Poisonings and Overdoses protocols.
F. CAUTION: Where barbs have wires still connected to the Taser® Gun, shock can still be delivered.

Tension Pneumothorax Decompression – 30.210

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 significantly symptomatic or in extremis (at risk of death) 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:

A. Decreased or absent breath sounds
B. Consistent history (i.e., chest trauma, COPD, asthma).
C. Distended neck veins.
D. Tracheal shift away from affected side (late sign).
E. Asymmetrical movement on inspiration.
F. Hyper-expanded chest on affected side.
G. Drum-like percussion on affected side.
H. Increased resistance to positive pressure ventilation, especially if intubated.
I. Persistent Hypoxemia

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.

PROCEDURE for Anterior-Axillary placement:

A. Place the patient in either lateral recumbent position with the affected side up, or supine, with the head of the bed up 40-45 degrees.
B. Identify the fourth or fifth intercostal space in the anterior axillary line. Prep the area.
C. Insert at least a 14 or 16 gauge angiocath with needle placed just above the rib, perpendicular to the skin. As you traverse the pleura, you may hear the distinctive rush of air from the decompressed tension pneumothorax. May attached a 10cc syringe partially filled with saline or water to the end of their angiocath/needle set. This allows them to visualize the “rush of air” which may otherwise not be heard in a noisy trauma bay.
D. Remove the needle and leave the catheter in place, securing it to prevent dislodgment. Create flutter valve as needed.
E. Re-evaluate the patient to ensure a positive clinical effect and continue to monitor the patient closely as you complete the evaluation and resuscitation.

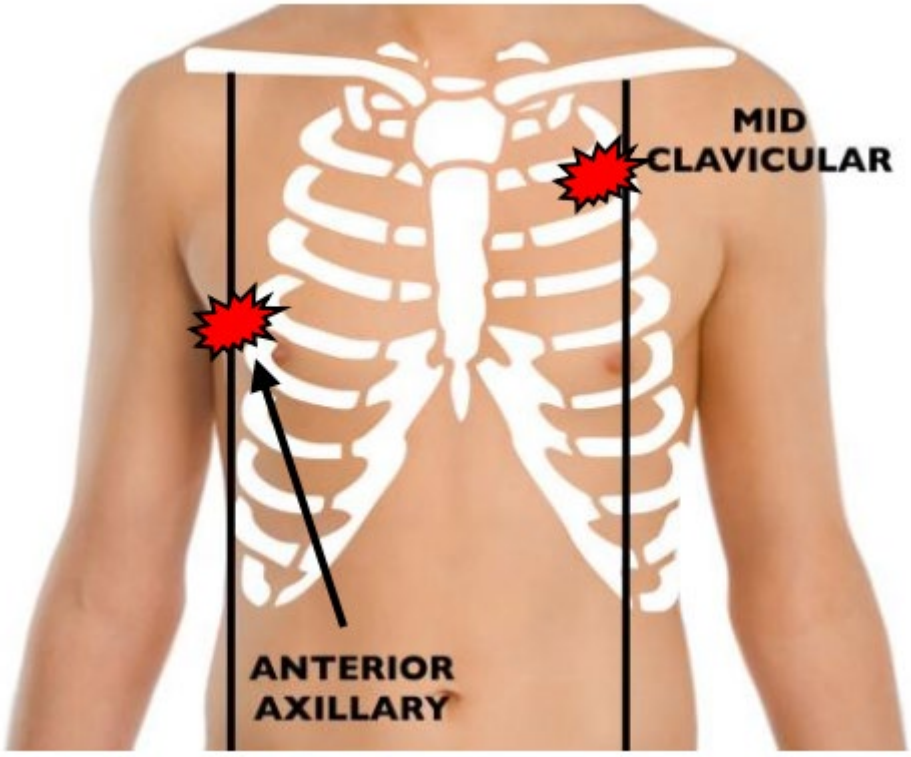
PROCEDURE for Mid-Clavicular placement:

A. Expose the entire chest.
B. Establish landmarks to identify second intercostal space, mid-clavicular line.
C. Clean chest vigorously with appropriate antiseptic. Nick skin with scalpel.

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.
G. Attach Heimlich valve and secure to patients chest.

NOTES & 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:
    a. Creation of Pneumothorax if none existed previously.
    b. Laceration of lung or pericardium. Stop needle advancement once it has popped through the pleura and advance the catheter only.
    c. Laceration of blood vessels. (Always slide the needle above the rib).
    d. 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 – 30.220

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 with evidence of inadequate perfusion, (e.g. altered mental status, chest pain, hypotension, and other signs of shock). HR <50 BPM.

PROCEDURE:
A. Ensure ECG pads are attached and monitor displays a rhythm.
B. Attach pacing electrodes to anterior and posterior chest just to the left of the sternum and spinal column, respectively. Alternatively pads may be placed in the standard anterior and lateral position as with defibrillation. If there is difficulty in obtaining capture, try alternative position.
C. Begin pacing at a heart rate of 60-80 BPM and 30 mA current output.
D. Increase current by increments of 10 mAs while observing monitor for evidence of electrical capture. Confirm mechanical capture by checking pulses and BP.
E. If patient is comfortable at this point, continue pacing. If patient is *un*comfortable, administer **Midazolam 2.5 mg IV/IO/IN or 5 mg IM.** May replace with **Lorazepam 1 mg IV/IO/IN or 2 mg IM** or **Ketamine 15-30mg IV/IO/IM Initial dose may increase to total dose of 1-2mg/kg if needed. (**see med sheet)
F. If patient still complains of pain, repeat dose of Midazolam once to max of 5 mg.
G. If the patient remains unconscious during pacing, assess capture b^{y} observing the monitor and evaluating pulse and blood pressure changes. In the event of electrical capture and no pulses, follow PEA protocol.
H. If there is no response to pacing and drugs, consult with OLMC. If a change in pacing rate is desired, contact OLMC.

PEDIATRIC PATIENTS:
Use above guidelines except:
A. Give **Midazolam 0.1 mg/kg IV/IO to a MAX of 2.5 mg**. (May repeat once after 5 minutes.) If more needed, call OLMC.
B. Use anterior/posterior pad placement first for patients less than 1 year.
C. Begin pacing at smallest mA output.
D. Increase current in increments of 10 mA while observing monitor for evidence of electrical capture.
E. Confirm mechanical capture by checking pulses and BP.
F. Contact OLMC for adjustments to rate based on age and response to pacing.

NOTES & PRECAUTIONS:
Transcutaneous pacing should not be used in the following settings:
A. Asystole.
B. Patients meeting Death In The Field criteria.
C. Patients in traumatic cardiac arrest.