

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.

NOTES & PRECAUTIONS:

In trauma patients, airway maintenance with cervical spine control is the primary concern. If unable to establish or maintain an airway, transport the patient to the closest hospital. This includes patients entered into the Trauma System.

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. A magnet will not deactivate a cardiac pacemaker, it will simply pace the underlying rhythm asynchronously at 100, 90, or 85 BPM depending on the life of the battery. 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.

AutoVent 2000 & 3000® Ventilator – 30.025

INDICATION:

Intubated patients requiring prolonged ventilation or crew resources depleted.

PROCEDURE:

1. Auscultate breath sounds. Confirm absence over epigastrium. Monitor EtCO₂.
2. O₂ operation:
 - a. Secure O₂ hose to 50 PSI source and DISS "Oxygen In."
 - b. If O₂ cylinder is used, slowly open the cylinder valve.
3. Select Adult / Child setting. (AutoVent 3000 only)
4. Select desired Breaths Per Minute (BPM). See note below for starting rate.
5. Select desired Tidal Volume (VT). See note below for starting volume.
6. Test the High Pressure Alarm by occluding the output with the palm of your hand. Ensure alarm sounds.
7. Connect the ventilator circuit tubing (Gas Output, Exhalation Valve, PEEP valve or N95 Filter) to the patient valve assembly on ventilator. Do not attach ventilator to patient until control settings are made and proper operation is verified.
8. Attach ventilator circuit to patient.
9. Check hose connection for leaks.
10. Verify chest rise during ventilation. Increase Tidal Volume (VT) set point as required.
11. Auscultate breath sounds. Confirm absence over epigastrium.
12. If High Pressure Alarm activates, see notes for possible causes and solutions.
13. Adjust settings to maintain SpO₂ > 90% and EtCO₂ between 35-45mmHg.

NOTES & PRECAUTIONS:

1. Contraindications include active CPR, suspected pneumothorax, inability to maintain adequate oxygenation (SpO₂ > 90%).
2. Common initial settings:
 - a. 100% oxygen
 - b. Respiratory Rate:
 - i. Adult: 8-12 breaths per minute.
 - ii. Pediatric: 12-20 breaths per minute.
 - iii. Titrate settings for an EtCO₂ between 35 – 45mmHg. Increase rate to lower EtCO₂. Decrease rate if EtCO₂ is too low.
 - c. Tidal Volume (VT):
 - i. Adult: 6-8ml/kg, based on ideal body weight.
 - ii. Pediatric: 4-6ml/kg, based on ideal body weight.
 - d. PEEP of 5cmH₂O
 - i. May increase PEEP to 15cmH₂O in order to increase SpO₂ saturations.
 - ii. PEEP increases intra-thoracic pressure and thereby may decrease blood return to the right heart. Use caution in patients with suspected increased intracranial pressure and patients who are preload dependent.
3. If patient becomes unstable or saturations < 80% disconnect from ventilator and BVM patient with 100% FiO₂.
4. Common causes of high pressure alarms and ventilation problems (DOPE):
 - a. Dislodged: Check tube placement
 - b. Obstruction: Confirm tube is not kinked, suction ETT.
 - c. Pneumothorax: Auscultate for bilateral breath sounds. If suspected pneumothorax see Pneumothorax procedure protocol.

AutoVent 2000 & 3000® Ventilator – 30.025

- d. Equipment: Check ventilator starting at the patient, moving back to the ventilator, looking for obstructions, leaks, and other problems.
5. Consult below charts on longer transports.

TIDAL VOLUME	Oxygen Cylinder Depletion Time Breaths Per Minute								
	8	9	10	12	14	16	18	20	CYL.
1200	64	58	52	44	39	34	30	27	E
	39	35	32	27	23	20	18	16	D
1000	76	68	62	52	45	40	36	32	E
	46	41	38	32	28	24	22	20	D
800	92	83	76	64	56	49	44	40	E
	56	50	46	39	34	30	27	24	D
600	117	106	97	83	72	64	58	52	E
	71	65	59	50	44	39	35	32	D
500	136	124	114	97	85	76	68	62	E
	83	75	69	59	52	46	41	38	D
400	162	148	136	117	103	92	83	76	E
	99	90	83	71	63	56	50	46	D
300	200	184	170	148	131	117	106	97	E
	122	112	104	90	80	71	65	59	D
200	262	243	227	200	179	162	148	136	E
	159	148	138	122	109	99	90	82	D

*All times are in minutes. Time is measured when tanks are at 2,000psi.
RFR Main Oxygen Cylinders are "E" Size, Kit / Gurney are "D" Tanks

AutoVent 2000/3000											
Altitude Conversion Chart											
Altitude		Tidal Volume Settings (ml.)									
(m.)	(ft.)	200	300	400	500	600	700	800	900	1000	1200
500	1640	212	318	424	530	636	742	848	954	1060	1272
1000	3280	226	339	452	565	678	791	904	1017	1130	1356
1500	4920	240	360	480	600	720	840	960	1080	1200	1440
2000	6560	254	381	508	635	762	889	1016	1143	1270	1524
2500	8200	272	408	544	680	816	952	1088	1224	1360	1632
3000	9840	288	432	576	720	864	1008	1152	1296	1440	1728
3500	11480	308	462	616	770	924	1078	1232	1386	1540	1848
4000	13120	328	492	656	820	984	1148	1312	1476	1640	1958
4500	14760	350	525	700	875	1050	1255	1400	1575	1750	2100
5000	16400	374	561	748	935	1122	1309	1496	1683	1870	2244
5500	18040	400	600	800	1000	1200	1400	1600	1800	2000	2400
6000	19680	460	690	920	1150	1380	1610	1840	2070	2300	2760

Average elevation in Redmond is 3077 feet.

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 < 90 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. Plug in the device to high pressure port on O₂ regulator:
 1. For the Pulmodyne O2Max, begin at 5cmH₂O, titrate pressure to a maximum of 10 cmH₂O 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.

Continuous Positive Airway Pressure – 30.030

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. The Pulmodyne O2Max uses a 50PSI port and produces flows up to 140lpm.
- G. The FiO2 is adjustable at 30%, 60%, or 90%
- H. It has an integrated N95 Exhalation Filter and Nebulizer

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.

QuickTrach

- A. Place the patient in a supine position. Assure stable positioning of the neck region and hyperextend the neck.
- B. Locate the cricothyroid membrane (in the midline between the thyroid cartilage and the cricoid cartilage).
- C. Secure the larynx laterally between the thumb and middle finger and reconfirm the location of the cricoid membrane.
- D. Firmly hold the device and puncture the cricothyroid membrane at a 90 degree angle.
- E. After puncturing the cricothyroid membrane, check entry of the needle into the trachea by aspirating air through the syringe. If air is aspirated the needle is in the trachea.
- F. Change the angle of the needle to 60 degrees and advance the device forward into the trachea to the level of the stopper.
- G. Remove the stopper being careful not to advance the device further into the trachea with the needle still attached.
- H. Hold the needle and syringe firmly and slide only the plastic cannula along the needle into the trachea until the flange rests on the neck. Carefully remove the needle and syringe.
- I. Secure the device to the neck.
- J. Apply the connecting tube to the device and ventilate.
- K. Consider sedation with Versed® as with RSI if not already given.

Emergency Cricothyrotomy – 30.040

Needle Cricothyrotomy – (pediatric patients 12 years and younger)

- A. Assemble equipment. 14ga or 16ga angiocath, 3cc syringe, 2.5 mm ETT adapter, oxygen, BVM.
- 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. Quick Trach- If aspiration of air is not possible because of an extremely thick neck, you may remove the stopper and carefully insert needle farther until entrance into the trachea is made.
- E. Needle Cricothyrotomy- If catheter becomes occluded, flush with 2-3 ml of normal saline.

End-Tidal CO₂ 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 ETCO₂ monitor, if available. Maintain ETCO₂ output between 35-40 mmHg.

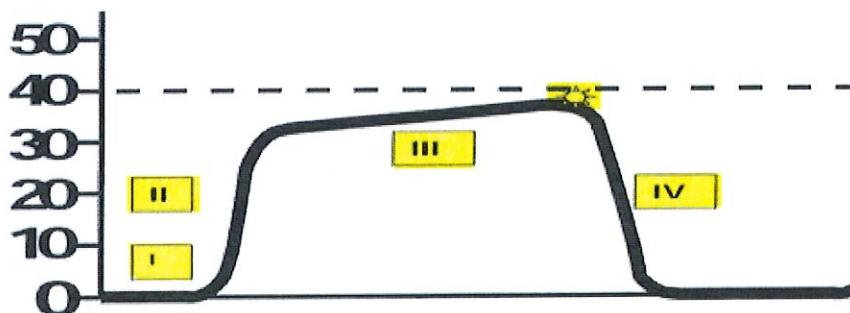
The following approximates the degree of ventilation:

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

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 PaCO₂ levels can be detrimental to your patient's outcome.
- B. A sudden drop in CO₂ 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 ETCO₂ 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 King Airway meets the above stated goals.

SPECIAL CONSIDERATIONS:

- A. If at all possible, avoid intubation in patients with a predicted difficult airway.
- B. In cases when there is a short ETA to hospital (< 10 minutes) or short ETA of more experienced providers (air ambulance), intubation should be deferred.
- C. 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, only 2 attempts at intubation shall be performed. At such time, a backup device (NPA/OPA with BVM or King Airway) 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 extubation.
- 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.

Endotracheal Intubation – 30.060

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:

- A. Prepare, position, and pre-oxygenate as outlined in the orotracheal intubation protocol.
- B. Obtain a full set of vital signs. If patient is hypotensive, “resuscitate before you intubate” and consider:
 - a. Fluid bolus, 500-1000ml
 - b. Epi 1:100,000 1ml q 1min until blood pressure is >90mmhg systolic.
- C. Induction agents. *Give only one.*
 - a. Etomidate 0.3 mg/kg IV/IO push. Single max dose of 30 mg.
 - b. Ketamine 1 - 2 mg/kg IV push. Single max dose of 200 mg.
 - c. Midazolam 0.1 mg/kg IV/IO push. Single max dose of 10 mg.
- D. Paralytic agents. *Give only one.*
 - a. Succinylcholine 1.5 mg/kg IV/IO. See contraindications below.
 - b. Rocuronium 1.0 mg/kg IV/IO.
 - c. Vecuronium 0.1 mg/kg IV/IO.
- E. Adjuncts
 - a. NO DESAT: Increase nasal cannula oxygen to 15 LPM AFTER medications are given.
- F. Assess for apnea and jaw relaxation and gently intubate in a controlled but timely manner when patient becomes relaxed.
- G. Confirm ETT placement, reassess vitals and document as outlined in the orotracheal protocol.
- H. Continued sedation and analgesia are paramount. Continue paralysis as needed.
 - a. Midazolam 0.05 - 0.1 mg/kg IV. Single max dose of 5 mg.
 - b. Ketamine 0.5 - 1 mg/kg IV.
 - c. Fentanyl 1 - 2 mcg/kg IV.
 - d. Rocuronium 1.0 mg/kg IV/IO if Succ's was used as initial paralytic. Use 0.1 - 0.5 mg/kg IV dose if Roc was initially used.
 - e. Vecuronium 0.1 mg/kg IV.

Endotracheal Intubation RSI – 30.061

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

Endotracheal Intubation RSI – 30.061

PEDIATRIC Rapid Sequence Intubation (RSI)

PROCEDURE:

- A. Prepare, position and pre-oxygenate as outlined in endotracheal intubation protocol
- B. Adjuncts
 - a. In head injured patients or where there is risk of increased ICP, consider pre-medicating with **Lidocaine 1.5 mg/kg slow IV/IO** over 30-60 seconds, ideally 2-3 minutes prior to intubation
 - b. **NO DESAT:** increase NC oxygen to 15 lpm AFTER medications are given
 - c. 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. **Succinylcholine – 2 mg/kg IV/IO (see contraindications above)**
 - b. **Rocuronium – 0.6 - 1.0 mg/kg IV/IO**
 - c. **Vecuronium – 0.1 mg/kg IV/IO**
- 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 – 0.5 mg/kg IV/IO**
 - c. **Fentanyl – 1.0 mcg/kg IV/IO**
 - d. **Rocuronium – 0.1 – 0.2 mg/kg IV/IO**
 - e. **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 severe 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

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.

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:

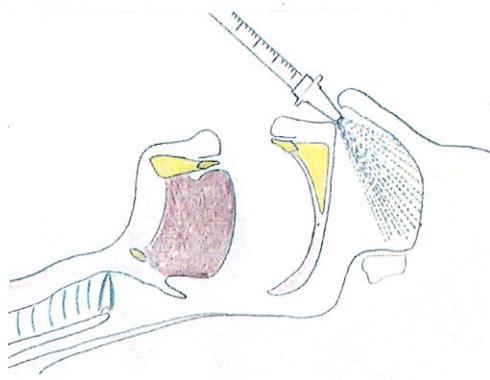
- Patient without IV access requiring urgent medication administration.
- Alternate administration route for fentanyl, morphine or naloxone administration.

CONTRAINDICATIONS:

- Epistaxis.
- Nasal Trauma.
- Nasal septal abnormalities.
- Nasal congestion or discharge.

PROCEDURE:

- Patient should be in a supine or recumbent position. If the patient is sitting then compress the nares after administration.
- Draw up medication into a syringe using appropriate transfer device.
- Remove air from syringe
- Remove transfer device and place atomizer onto syringe and confirm it is secure.
- 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.
- 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 \geq 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 \geq 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
 - 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).

Intraosseous Access & Infusion - 30.090

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 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.

E. Pain Management

1. 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.
2. In the event a patient regains consciousness and complains of severe pain secondary to the IO insertion, temporarily stop infusing the fluids, and administer lidocaine as in E.1 above. Wait approximately 30–60 seconds before continuing fluid administration.
3. If fluids do not flow freely, flush IO site with an additional 10 cc normal saline.

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

- A. Assemble all equipment. 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)
 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.

Intraosseous Access & Infusion - 30.090

C. Needle Insertion

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

PEDIATRIC PROCEDURE WITH MANUAL IO DEVICE:

- A. 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 – Proximal tibia. Palpate the landmarks and note the entry point that is the anteromedial flat surface 1-3 cm below the tibial tuberosity.
- 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 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.

Intraosseous Access & Infusion - 30.090

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.

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 NS.
 2. Connect an extension set between the IV hub and the solution bag and tubing.
 3. All IVs will be started using regular drip sets (15 gtt/cc), 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.

INDICATIONS:

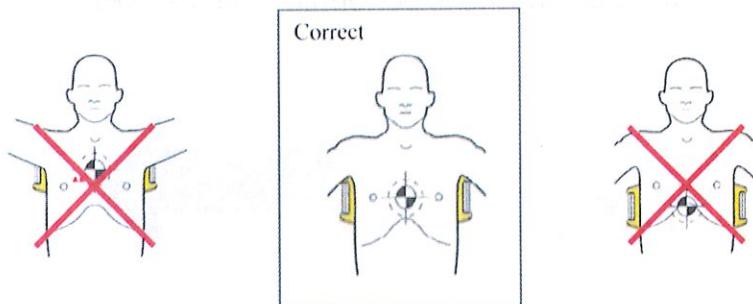
- A. The LUCAS device may be used in patients who have suffered non-traumatic cardiac arrest, when manual CPR would otherwise be used.

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 the LUCAS to the backplate without compressing the patient's chest.
- B. Traumatic arrest.
- C. Pregnancy.

PROCEDURE:

- A. All therapies related to the management of cardiopulmonary arrest should be continued as currently defined in protocol and "Cardiac Arrest Best Practices".
- 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 the 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 patients armpits.

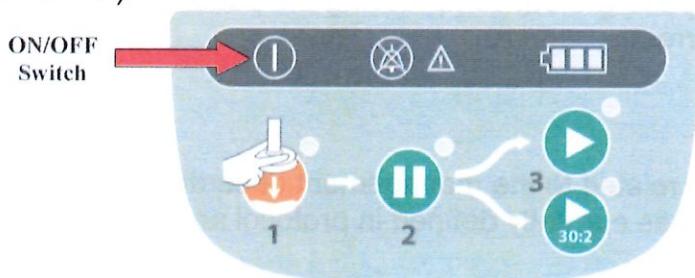


- b. If the patient is already on the stretcher, place the backplate underneath the thorax. This can be accomplished by a single person arm lift, or by log-rolling or sliding the backplate under the patient or raising the torso. Placement should occur during the initial AP pad placement, or during a scheduled pause of

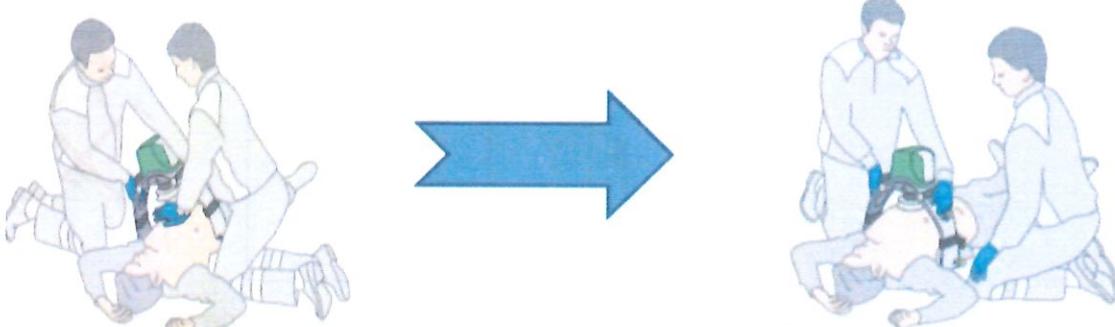
compressions (e.g., after two minutes of uninterrupted compressions).

2. Position of the Compressor.

- Turn the LUCAS device on (the device will perform a three second self-test).



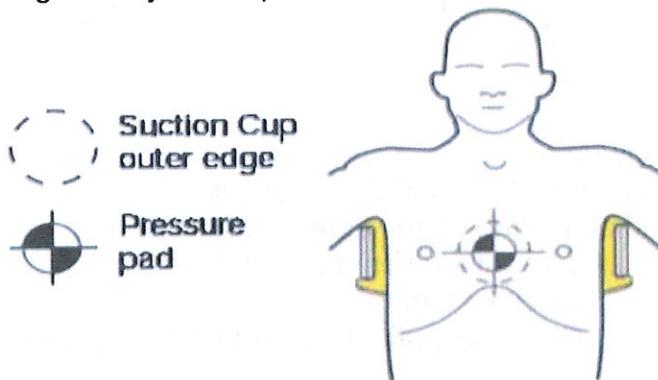
- Remove the LUCAS device from the carrying case using the handles provided on each side.
- With the index finger of each hand, pull the trigger to ensure the device is set to engage the backplate. Once this is complete, you may remove your index finger from the trigger loop.
- Mark the base of the xiphoid process with the supplied felt-tipped marker in the case.
- Approach the patient from the side opposite the person performing manual chest compressions.
- Attach the claw hook to the backplate on the side of the patient opposite from where compressions are being provided.
- Place the LUCAS device across the patient, between the arms of the person who is performing manual CPR.



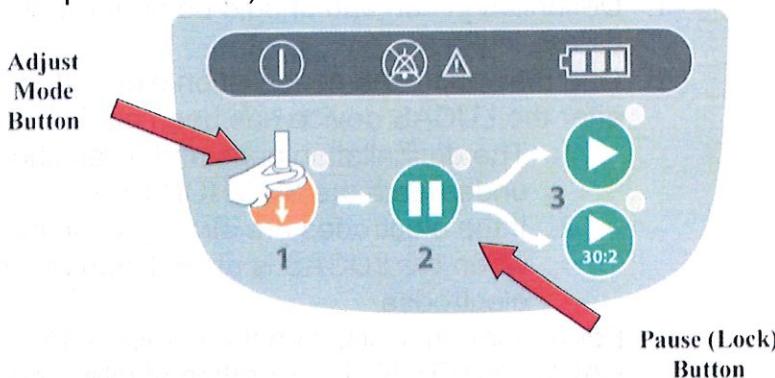
- At this point the person performing manual CPR stops and assists attaching the claw hook to the backplate on their side.
- Pull up once to make sure that the parts are securely attached.

3. Adjust the Height of the Compression Arm.

- 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.



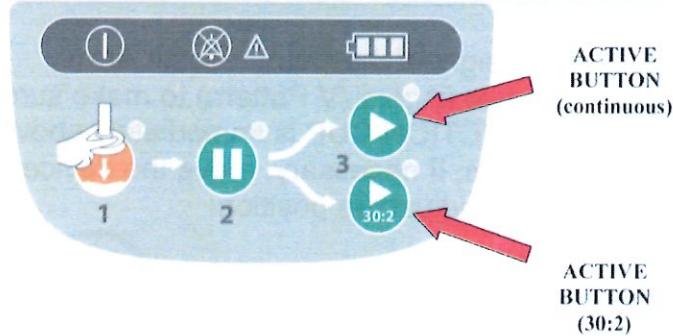
- Press the ADJUST MODE BUTTON on the control pad labeled #1 (this will allow you to easily adjust the height of the compression arm).



- 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).
- 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.
- If the position is incorrect, press the ADJUST MODE BUTTON and repeat the steps.

4. Start Compressions

- Press the ACTIVE (continuous) BUTTON. The 30:2 button is not used in our organization.



5. Patient Adjuncts

- Place the LUCAS stabilization strap behind the patient's head and attach the straps to the LUCAS device.
 - This will prevent the LUCAS from migrating toward the patient's feet.
 - Place the patients arms in the straps provided.

USING THE LUCAS DURING RESUSCITATION

A. Defibrillation

- Defibrillation can and should be performed with the LUCAS device in place.
- One may apply the defibrillation electrodes either before or after the LUCAS device has been put in position.
 - The defibrillation pads and wires should not be underneath the SUCTION CUP.
 - If the electrodes are already in an incorrect position when the LUCAS is placed, you must apply new electrodes.
- 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.
- 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)

- Pulse checks should occur intermittently while compressions are occurring.
- If the patient moves or is obviously responsive, pause the LUCAS device and evaluate the patient.
- 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.
5. Completely raise LUCAS bar so its not restricting the patients chest.

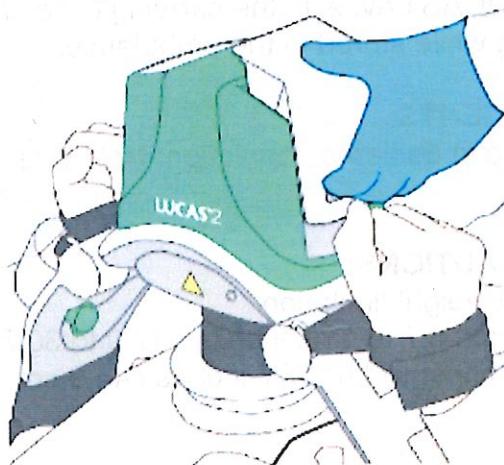
C. Disruption or Malfunction of LUCAS Device

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 our and then upward to remove it.



3. Install a full-charged LUCAS battery. Put it in from above.
4. Wait until the green PAUSE mode LED illuminates.
5. Push ACTIVE (continuous) or ACTIVE to start chest compressions again. The LUCAS Smart Restart feature remember 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.

PEDIATRIC PATIENTS:

1. Not for use in pediatric population. Note size restrictions below.

NOTES & PRECAUTIONS:

1. No patient weight limitation
2. Chest height: 6.7 to 11.9 inches / 17.0 to 30.3 cm
3. Maximum chest width: 17.7 inches / 44.9 cm

King Airway® Placement – 30.110

DEFINITION:

The KING LT-D is a disposable supraglottic airway created as an alternative to endotracheal intubation or mask ventilation. The KING LT-D is designed for positive pressure ventilation as well as for spontaneously breathing patients.

INDICATIONS:

- A. Use of the King LTD airway is indicated if endotracheal intubation cannot be performed and the patient needs a secure airway.
- B. Attempts at endotracheal intubation have been unsuccessful.

CONTRAINDICATIONS:

- A. Intact gag reflex
- B. Airway obstruction.
- C. Known or suspected caustic ingestion.
- D. Known esophageal disease.

PROCEDURE:

- A. Attach pulse oximeter and monitor oxygen saturation.
- B. If vomitus, blood or other foreign material is present in the hypopharynx, rapid and aggressive suctioning and/or manual removal must be done prior to placement of the King Airway.
- C. Ventilate with BVM to optimize oxygen saturation prior to King LTD intubation especially if several endotracheal intubations were attempted.
- D. Estimate patient's height (for sizing of King LTD airway) and select proper tube size.
 - a. 35 - 45 inches Size 2 (Green)
 - b. 41 – 51 inches Size 2.5 (Orange)
 - c. 4 – 5 feet tall Size 3 (Yellow)
 - d. 5 – 6 feet tall Size 4 (Red)
 - e. 6 – 7 feet tall Size 5 (Purple)
- E. Lubricate the posterior distal end of the King Airway with a water-soluble gel.
- F. Place patients head into a "sniffing" position. If suspected or potential cervical spine injury keep patients head in neutral position during insertion.
- G. Using a midline approach, introduce tip into mouth and advance behind base of tongue. The blue orientation line on the tube should face the chin of the patient.
- H. Without using excessive force, advance tube until the base of the connector is aligned with the teeth and/or gums. Never force the tube into position.
- I. Inflate the cuffs using the appropriate volume of air.

King Airway Inflation Volumes		
Size	LTS-D	LT-D
#2	-	25-35 ml
#2.5	-	30-40 ml
#3	40-55 ml	45-60 ml
#4	50-70 ml	60-80 ml
#5	60-80 ml	70-90 ml

- J. Attach bag valve device to the tube with supplemental oxygen. While gently bagging the patient to assess ventilation, simultaneously withdraw the King Airway

King Airway® Placement – 30.110

until ventilation is easy and free-flowing (large tidal volume with minimal airway pressure).

- K. Listen for lung sounds in both lung fields and over epigastrium.
- L. As soon as feasible, secure the King Airway with an endotracheal tube holder.
- M. Monitor oxygen saturation, chest rise, and ETCO₂ monitor.
- N. After successful placement, continue to monitor for adequate ventilations, possible displacement tube and or cuff failure.

SUCTIONING THROUGH THE KING LTS-D:

- A. Use of the gastric access lumen for suctioning and removal of stomach contents will be at the discretion of the user.
- B. Attach a maximum size 18 Fr suction catheter to a portable suction unit
- C. If necessary, lubricate the catheter with a water-soluble gel.
- D. Insert the suction catheter into the opening of the gastric access lumen, and advance to the maximum depth.
- E. Turn on suction unit and maintain continuous suction until there is no further return of stomach contents.
- F. After detaching suction unit, the catheter may be left in place to prevent any additional stomach contents from being expelled from the gastric access lumen.
- G. If active suctioning is not performed, a suction catheter may be placed in the gastric access lumen to act as a passive vent, and to prevent stomach contents from being expelled from the lumen.

NOTES & PRECAUTIONS:

- A. It is important that the tip of the device be maintained in the patient's midline. Keeping the tip at midline assures that the distal tip is properly placed in the hypopharynx and upper esophagus.
- B. Depth of insertion is key to providing a patent airway. A shallow initial insertion will require deflation of the cuffs to advance the tube deeper.
- C. It is extremely important to open the airway and ensure that the tip of the King Airway advances past the base of the tongue.
- D. Unlike the Combitube, the King LTD device is not designed to ventilate the patient if placed in the trachea. If unable to ventilate the patient after placement deflate balloons and adjust depth of tube to optimize ventilation

iGel Placement – 30.115

INDICATIONS:

- A. The iGel is indicated for use in securing and maintaining a patient airway.
- B. May be used as primary airway in cardiac arrest and rescue airway for other conditions.

CONTRAINDICATIONS:

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

SIZES:

i-gel Size	Patient Size	Patient Weight (kgs)	Patient Weight (lbs)
1	Neonate	2.5	4-11
1.5	Infant	5-12	11-26
2	Small pediatric	10-25	22-55
2.5	Large pediatric	25-35	55-77
3	Small adult	30-60	66-132
4	Medium adult	50-90	110-198
5	Large adult	90+	198+

PROCEDURE:

- A. Identify correct size iGel.
- B. Lubricate iGel prior to insertion.
- C. Insure that the supplementary oxygen port is capped.
- D. Position the patient. The patient should always be in the “sniffing position” prior to insertion unless head/neck movements are considered inadvisable or are contraindicated.
- E. If needed, use tongue depressor or curved laryngoscope blade to facilitate passage of iGel through the oral pharynx.
- F. Grasp the lubricated iGel firmly along the integral bite block.
- G. Position the device so that the iGel cuff outlet is facing towards the chin of the patient.
- H. Introduce the leading soft tip into the mouth of the patient in a direction toward the hard palate. The leading edge of the iGel’s tip must follow the curvature of the patient’s hard palate upon insertion. Glide the device downward and backward along the hard palate with a continuous but **gentle** push until a definitive resistance is felt.



- I. Determine appropriate depth of insertion. The incisors should be resting on the integral bite block. A horizontal line (Adult sizes 3,4,5 only) at the middle of the integral bite block represents the correct position of the teeth. If the teeth are located lower than the distal tip of the bite block, then it is likely the device has been **incompletely inserted**.



- J. Secure iGel to maxilla with holder or tape.
- K. If gastric distention is present or fluid is present in the gastric channel of iGel, an appropriate size nasogastric tube may be passed down the gastric channel.

i-gel Size	Maximum Size of Nasogastric Tube (French Gauge) or French Suction Catheter
1	N/A
1.5	10
2	12
2.5	12
3	12
4	12
5	14

- L. Attach capnography per protocol.

PEDIATRIC PATIENTS:

No specific pediatric concerns.

NOTES & PRECAUTIONS:

- A. Do not use excessive force to insert the device or nasogastric tube.
- B. Sometimes a feel of "give-way" is felt before the end point resistance is met. This is due to the passage of the iGel bowl through the faucial pillars (pharyno-epiglottic folds).
- C. Once resistance is met and the teeth are located on the integral bite block, do not repeatedly push the iGel down or apply excessive force during insertion.
- D. Patients with any condition which may increase the risk of a full stomach e.g. hiatal hernia, sepsis, morbid obesity, pregnancy, or a history of upper gastrointestinal surgery, etc., may increase the risk of aspiration.

Left Ventricular Assist Devices LVAD – 30.120

BACKGROUND:

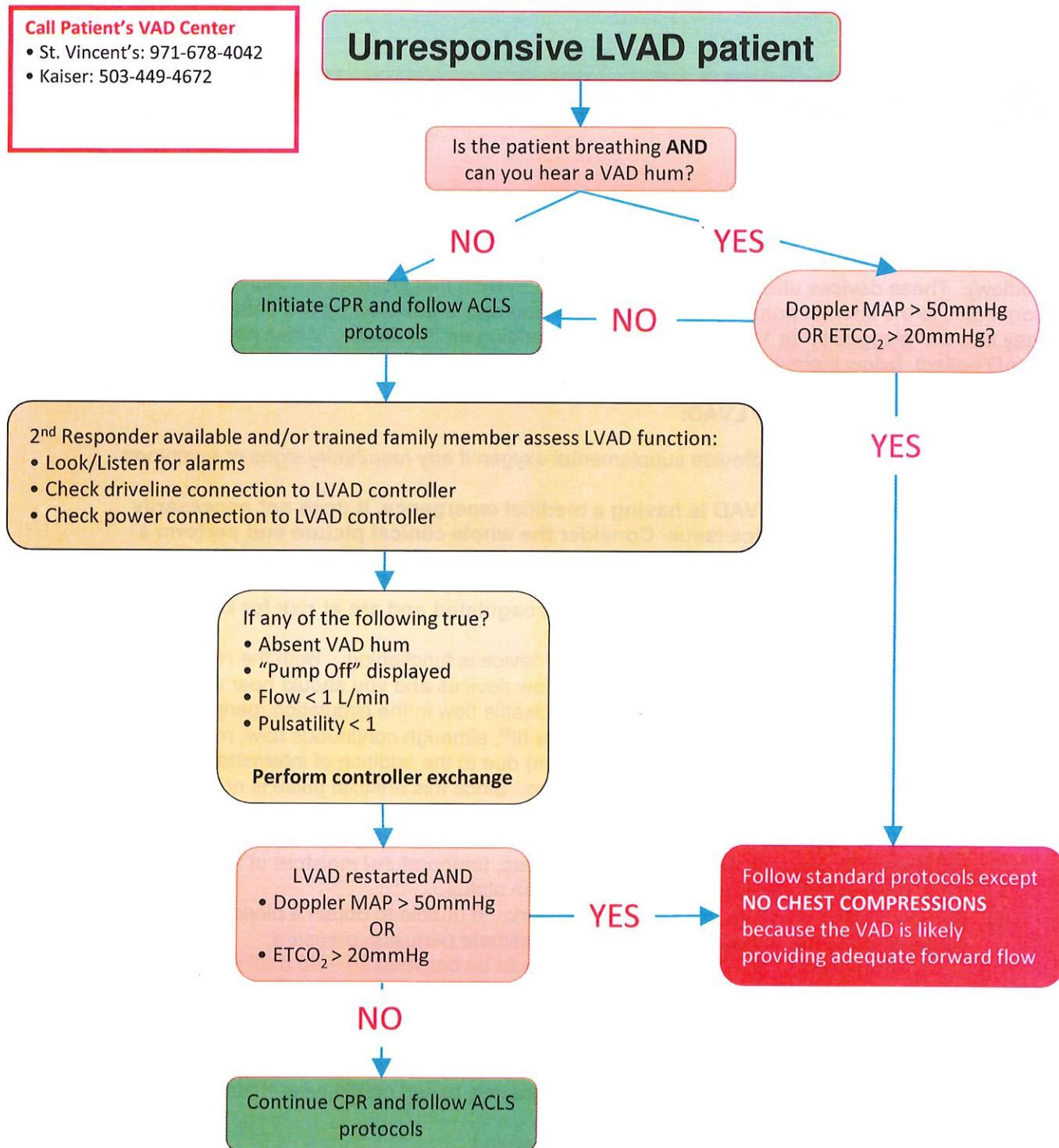
Left ventricular assist devices (LVADs) are designed to assist the pumping function of the patient's left ventricle. The HeartWare HVAD®, HeartMate II®, and HeartMate III® devices attach to the apex of the left ventricle (pump inflow) and propel blood to the ascending aorta (pump outflow). These devices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

ASSESSING PATIENT WITH LVAD:

- A. Establish airway and provide supplemental oxygen if any respiratory signs or symptoms are present.
- B. **If a patient with an LVAD is having a medical emergency, it does not necessarily mean that it is a device issue. Consider the whole clinical picture and perform a thorough patient assessment, including device function. Infection, volume depletion, stroke, bleeding, and dysrhythmias may be the cause of patient's symptoms. Most LVAD patients are anticoagulated and are at risk for bleeding complications.**
- C. Auscultate heart sounds to determine if the device is functioning. Both the HeartWare HVAD® and HeartMate II®, are continuous flow devices and you should hear a "whirring" sound". Because these devices diminish pulsatile flow in the circulation, peripheral pulses may not be palpable. The HeartMate III®, although continuous flow, may provide artificial pulsatility (as well as a pulsatile hum) due to the addition of intermittent speed reduction which was designed into the device. Since this artificial pulse is not synchronized with the patient's heart rate, it may augment or diminish the native pulse. If a pulse is palpable, a BP can be attempted. Assess other signs of circulation—capillary refill, absence or presence of dizziness, temperature/ moisture of skin, end-tidal CO₂, and mental status to determine perfusion status.
- D. Standard blood pressure devices may not work. If unable to obtain a blood pressure consider using the following, if available, to estimate perfusion pressure:
 1. End-Tidal CO₂ - Expected values should be between 35 – 45 mmHg.
 2. Doppler cuff pressure - Estimates the mean arterial pressure. The goal range for Doppler MAP is > 60 and less than 90.
 3. Other clinical signs – Capillary refill, mental status.
- E. Locate the device to identify which type is in place and follow the device specific troubleshooting guidelines. Intervene appropriately based on the type of alarm and device.
- F. Start Large Bore IV and treat with fluids as needed.
- G. Pulse oximetry may not be accurate due to the continuous flow nature of the device. You may not get an accurate reading in the field.
- H. Your cardiac monitor will work, and a reliable EKG may be obtained. Because the LVAD creates continuous flow independent of left heart function, not all arrhythmias will be symptomatic, including ventricular arrhythmias. If a patient requires defibrillation, leave the pump running and all components in place. The LVAD does not interfere with electrical conduction. In general, LVAD patients also have an AICD/Pacemaker. Do not place defibrillation pads directly over the pump or AICD/Pacemaker (consider anterior/posterior placement).
- I. All ACLS medications may be administered if necessary.
- J. **If suspected cardiac arrest, proceed to following flow chart:**

Call Patient's VAD Center

- St. Vincent's: 971-678-4042
- Kaiser: 503-449-4672

Unresponsive LVAD patient

- Refer to the LVAD Protocol for detail instructions on the battery and controller.
- The 2 most common causes of pump failure are disconnection of the power and failure of the controller.
- Transport LVAD patient in circulatory arrest to the nearest hospital.
- Patients on LVAD support frequently do not have a palpable pulse or recognizable BP yet have adequate perfusion.
- In the non-invasive assessment of the BP, use a manual BP cuff with Doppler when available, with ETCO₂ as the second option.
- Assess and treat non-LVAD pathology:
 - 5 H's: Hypovolemia, hypoxia, hydrogen ion (acidosis), hypo/hyperkalemia, hypothermia
 - 5 T's: Toxins, tamponade, tension pneumothorax, thrombosis-heart, thrombosis-lung
- **Keep all back-up equipment with the patient during transport!**

Left Ventricular Assist Devices LVAD – 30.120

TRANSPORTING AN LVAD PATIENT:

- A. Transport the LVAD patient in circulatory arrest to the nearest hospital. Call the number on the device and follow advice of the LVAD Coordinator on call for troubleshooting the device.
- B. For all other concerns contact OLMC.
- C. The patient must be supported by battery power. Remember to also transport the backup controller and the spare batteries.
- D. The controller should be kept close to the patient, and care taken to not kink the leads.
- E. If removing or cutting patients clothing, use caution as not to sever the driveline.
- F. Do not put external pressure on any area of the LVAD system.
- G. Place gurney straps underneath the leads, and keep the batteries easily accessible.
- H. Allow the trained caregiver to ride in the transport vehicle if possible to act as an expert on the device in the absence of consciousness in the patient.
- I. Bring all of the patient's equipment.

NOTES AND PRECAUTIONS:

- A. LVAD patients who are anticoagulated have a higher risk of bleeding and hemorrhage.
- B. There are no valves on an LVAD, so there is the risk of retrograde flow and stagnation of blood if the device stops, or flow is impeded.
- C. These patients are pre-load and afterload dependent, so hypovolemia can have a profound effect.
- D. If a patient is **hypertensive**, flow through the device may be reduced.

Trouble Shooting HeartMate II® with Pocket Controllers

When the Pump Has Stopped

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

Alarms: Emergency Procedures



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



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



Changing Batteries

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

- Obtain two charged batteries from patient's accessory bag or battery charger. The charge level of each gray battery can be assessed by pressing the battery button on the battery. (Figures 1 and 2)
- Remove only **ONE** battery from the clip by pressing the button on the grey clip to unlock the battery. (Figure 3)

- Controller will start beeping, flash yellow signals and will read **power disconnect** on the front screen.
- Replace with new battery by lining up **RED** arrows on battery and clip. (Figure 4)
- Slide a new, fully-charged battery (Figure 2) into the empty battery clip by aligning the **RED** arrows. The battery will click into the clip. Gently tug at battery to ensure connection. If battery is properly secured, the beeping and yellow flashing will stop.
- Repeat previous steps with the second battery and battery clip.



Figure 1
Not Charged



Figure 2
Fully Charged



Figure 3



Figure 4

Left Ventricular Assist Devices LVAD – 30.120

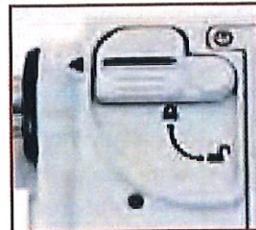
Changing Controllers

- Place the replacement Controller within easy reach, along with the batteries/battery clips. The spare Controller is usually found in the patient's travel case.
- Make sure patient is sitting or lying down since the pump will momentarily stop during this procedure.
- Attach the battery clips to the spare controller by lining up the half moons and gently pushing together and attach the batteries to the spare controller by aligning the RED arrows.



- On the back of the replacement controller, rotate down the perc lock so the red tab is fully visible. Repeat this step on the original controller until the red tab is fully visible.
- Disconnect the drive line from the original controller by pressing down on the red tab and gently pulling on the metal end. The pump will stop and an alarm will sound. **Note:** The alarm will continue until the original controller is put to sleep. You can silence the alarm by holding down the silence button. **Getting the replacement controller connected and pump restarted is the first priority.**

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



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

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

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

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

Trouble Shooting HeartMate II®

When the Pump Has Stopped

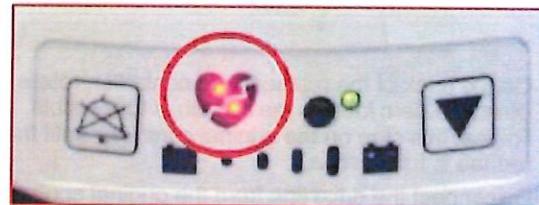
- Be sure to bring ALL of the patient's equipment with them.
- Fix any loose connection(s) to restart the pump.
- If the pump does not restart and the patient is connected to batteries replace the current batteries with a new, fully-charged pair. (see changing batteries section on next page)
- If pump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

Alarms: Emergency Procedures



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

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



Changing Batteries

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

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



Figure 1



Figure 2

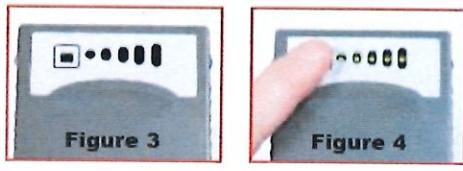


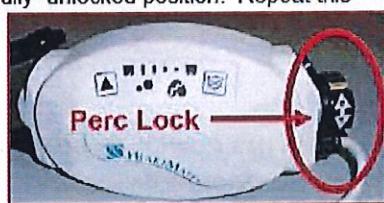
Figure 3

Figure 4

Left Ventricular Assist Devices LVAD – 30.120

Changing Controllers

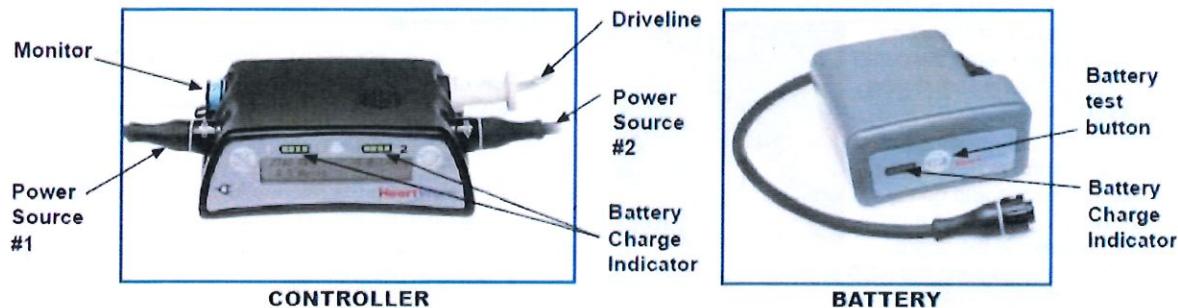
- Place the replacement Controller within easy reach, along with the batteries/battery clips. The spare Controller is usually found in the patient's travel case.
- Make sure patient is sitting or lying down since the pump will momentarily stop during this procedure.
- Attach the battery clips to the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



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

- Connect the replacement Controller by aligning the BLACK LINES on the driveline and replacement Controller and gently pushing the driveline into the replacement Controller. The pump should restart, if not complete the following steps:
- Step 1. Firmly press the Silence Alarm or Test Select Button to restart the pump.
- Step 2. Check the powersource to assure that power is going to the controller.
- Step 3. Assure the perc lead is fully inserted into the socket by gently tugging on the metal end. **DO NOT pull the lead.**
- After the pump restarts, rotate the perc lock on the new controller in the direction of the "locked" icon until the perc lock clicks into the fully-locked position. If unable to engage perc lock to the locked position, gently push the driveline into the controller to assure a proper connection. Retry to engage perc lock.
- Disconnect power from the original Controller. The original Controller will stop alarming once power is removed.

HeartWare® Ventricular Assist System Emergency Operation



ALARM ADAPTER

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



DRIVELINE CONNECTION

To Connect to Controller:

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



Figure A

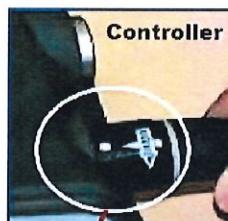


Figure B

CONNECTING POWER TO CONTROLLER

To Connect a Charged Battery:

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



TO DISCONNECT A DEPLETED BATTERY

- Make sure there is a fully charged battery available to replace the depleted one.
- Disconnect the depleted battery by turning the connector sleeve counterclockwise until it stops.
- Pull the connector straight out from the controller.

HeartWare® Ventricular Assist System Emergency Operation

STEPS TO EXCHANGE THE CONTROLLER

Step 1: Have the patient sit or lie down.

Step 2: Place the new controller within easy reach.

Step 3: Connect back-up power sources (batteries or AC Power) to the new controller.

- Confirm that the power cables are properly locked on the controller by gently pulling on the cable near the connector.
- A "Power Disconnect" alarm will activate if a second power source is not connected to the new controller within 20 seconds of controller power up
- A "VAD Stopped" alarm will activate if the pump driveline is not connected to the new controller within 10 seconds - this alarm will resolve once the pump driveline is connected

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

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

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

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

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

Step 9: Insert the Alarm Adapter into the blue connector on the original controller.

- Disconnect both power sources from the original controller.
- The controller will be turned off and all alarms silenced.

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

Step 11: Contact the VAD Center or Implanting hospital for a new backup controller.



Step 3



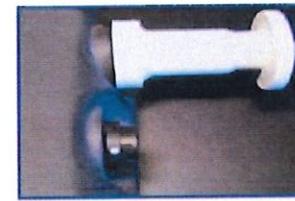
Step 4



Step 6



Step 9



Step 10

Left Ventricular Assist Devices LVAD – 30.120

Trouble Shooting HeartMate III® with Pocket Controllers When the Pump Has Stopped

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

Alarms: Emergency Procedures



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



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



Trouble Shooting HeartMate III®

Changing Batteries

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

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

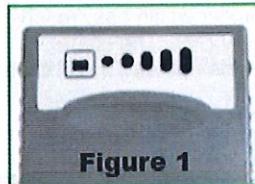


Figure 1

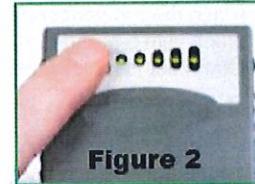


Figure 2



Figure 3

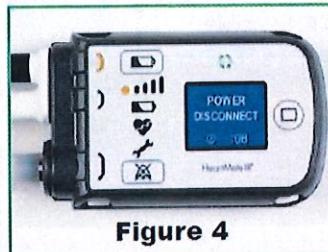


Figure 4

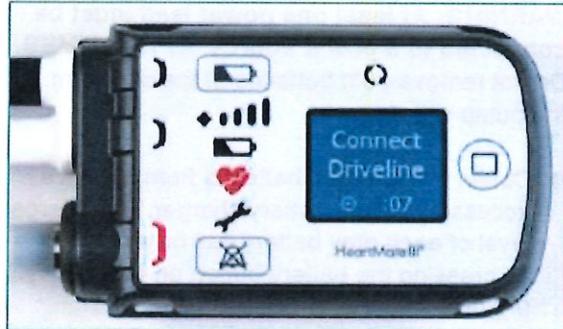


Figure 5

Trouble Shooting HeartMate III® with Pocket Controllers

Changing Controllers

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



- Disconnect the drive-line from the original controller by pressing down on the red tab and gently pulling on the metal end. The pump will stop and an alarm will sound. Note: The alarm will continue until the original controller is put to sleep. You can silence the alarm by pressing the silence button. Getting the replacement controller connected and pump restarted is the first priority.



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

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

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

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

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



Trouble Shooting HeartMate III® with Pocket Controllers

Modular Cable

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

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

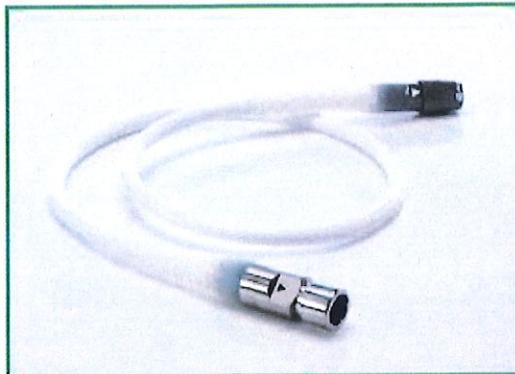


Figure 1

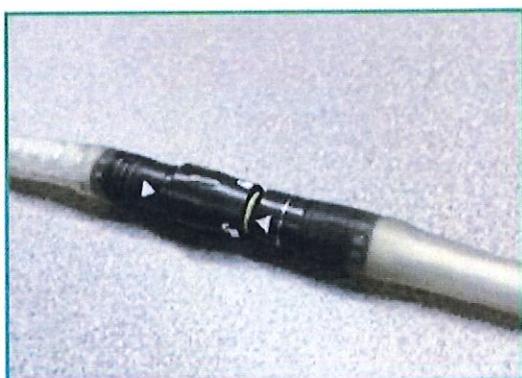
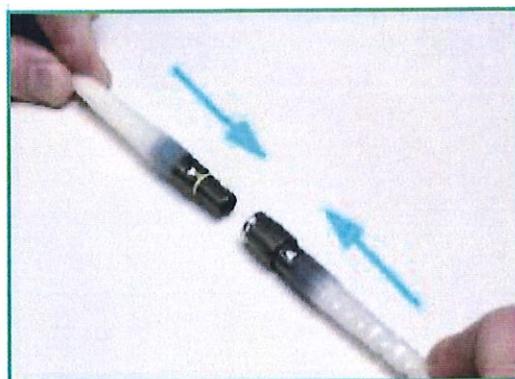


Figure 2



Nasotracheal Intubation – 30.130

INDICATIONS:

- A. When definitive airway control is required.
- B. Patient has spontaneous ventilations and laryngoscopy is difficult.

CONTRAINDICATIONS:

- A. Nasotracheal intubation is not generally recommended in patients who are apneic, who have mid-facial fractures or nasal fractures, or who are suspected of having a basal skull fracture.

PREPERATION:

- A. Choose ET tube 1 mm smaller than optimal for orotracheal intubation.
- B. Inspect equipment: Suction, laryngoscope, and ETT cuff.
- C. Lubricate ETT tube.
- D. Pre Oxygenate patient with 100% Oxygen.
- E. Monitor SpO₂.
- F. Determine which naris clearest.
- G. Spray Neo-Synephrine spray into naris.
- H. Anesthetize naris with Lidocaine jelly 2%.

PROCEDURE:

- A. Insert & advance ETT along nasal floor.
- B. Anytime the patient goes 30 seconds without ventilation, stop the procedure and ventilate for 30-60 seconds before intubation is re-attempted.
- C. If impassable, try the other naris.
- D. The curve of the tube should follow the curvature of the anatomy.
- E. Gently advance the ETT while rotating it medially 15-30 degrees until maximal air flow is heard through the tube.
- F. Swiftly advance ETT during inhalation.
- G. Inflate cuff with 5-8 cc of air.
- H. Confirm placement by auscultating breath sounds bilaterally.
- I. Successful intubation confirmed by bilateral breath sounds, absence of epigastric sounds, positive SpO₂ and ETCO₂ readings.
- J. If attempts fail, withdraw tube, pre Oxygenate and re-direct the ET tube.
- K. Secure ET tube
- L. Ventilate with 100% Oxygen. Auscultate breath sounds FREQUENTLY

NOTES AND PRECAUTIONS

- A. Auscultate breath sounds frequently.
- B. Document: SpO₂, ETCO₂, GCS, lung sounds, absence of epigastric sounds, methods used to verify ETT placement, chest rise, condensation present, ETT depth, naris used.

Patient Restraint – 30.140

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 SpO₂ 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: Contact OLMC for administration of two or more medications IV
 - a. Haloperidol 5 mg IM/IV
 - b. Versed or Ativan 2 mg IM/IV
 - c. Benadryl 25-50 mg IM/IV
 - d. Probable Excited Delirium: Ketamine 4 mg/kg IM or 1 mg/kg IV

Patient Restraint – 30.140

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.
- B. Contact Medical Control for IV administration of two or more medications.

Pelvic Immobilization – 30.150

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 – 30.160

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 antecubital fossa, and then threaded into central circulation. PICC lines are flushed with heparin to maintain patency and therefore it is imperative to aspirate 5 ml of blood from the line prior to use.

INDICATIONS:

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

CONTRAINdications:

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

PROCEDURE:

- A. Use clean gloves and maintain sterility as much as possible.
- B. If there is a needleless type port on the distal end of the catheter, perform the following: (*figure 1*)
 1. Scrub the port with an alcohol pad 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 (needleless port may not have a clamp)
 4. Attempt to aspirate at least 5 ml of blood. Blood should draw freely. If it does not, remove the syringe and DO NOT use the catheter for access.
 5. If blood aspirates freely, remove the 10 ml syringe with blood and discard.
 6. Attach a 10 ml syringe with NS and gently flush the line. Never use a smaller syringe. If line does not flush, remove the syringe and DO NOT use the catheter for access.
 7. If line flushes, remove the syringe and attach the catheter to the end of the IV tubing and begin infusion of NS. Adjust the rate to the needs of the patient within the limits of the catheter.
 8. Administer medications through 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 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.

PICC Line Access – 30.160

11. Attach the catheter to the end of the IV tubing.
12. Unclamp the catheter and begin infusion of NS. Adjust the rate according to the needs of the patient within the limits of the catheter.
13. Administer medications through 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.

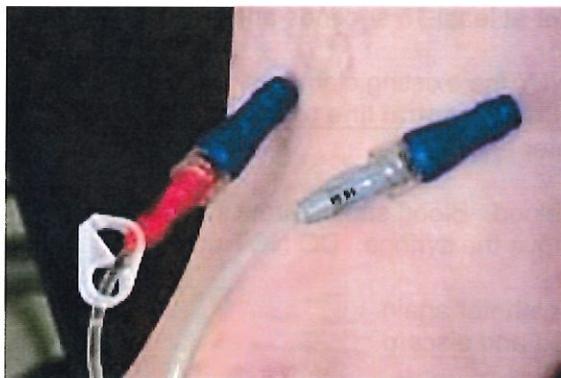
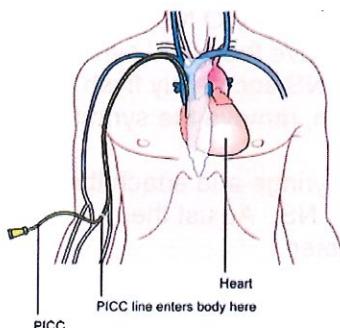


Figure 1- Needless port

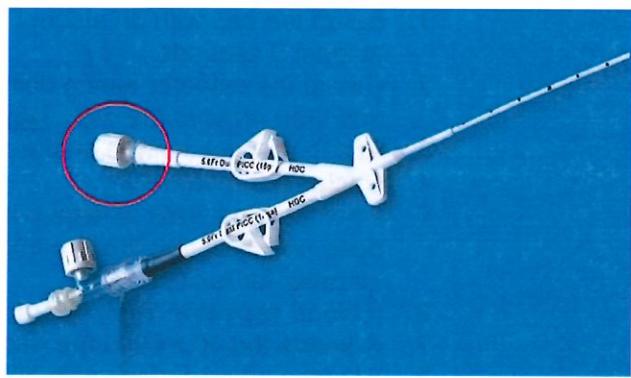


Figure 2 – Non-needleless type port with cap

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, goggles, gown).
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, goggles, gown).
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.

C. Suctioning with Meconium Aspirator

1. **If meconium is lightly stained and newborn is vigorous do not suction infant.**
2. Assemble equipment: Suction unit, appropriate size ET tube, personal protective equipment (gloves, goggles, gown.)
3. Attach required monitoring equipment.
4. Turn suction unit on and confirm mechanical suction is present.
5. After infant has been intubated, attach meconium aspirator to end of ET tube.
6. Cover thumbhole to begin suctioning while slowly withdrawing the ET tube. (Do not suction for more than 15 seconds.)
7. Monitor patient's oxygen saturation and heart rate and stop if patient becomes bradycardic.
8. Re-oxygenate patient for at least 2 – 3 minutes between suctioning attempts.
9. If patient has not been intubated and meconium is thick, at the least, aggressive oropharyngeal suctioning should be carried out with the largest diameter suction device available.

NOTES & PRECAUTIONS:

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

Sports Equipment Removal – 30.170

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.

While backboard and straps are being prepared:

D. Chest Access

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

E. Back Board Utilization

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

Sports Equipment Removal – 30.170

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.

TASER® Barb Removal – 30.190

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 – 30.200

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.

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 angiocatheter 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 attach 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:

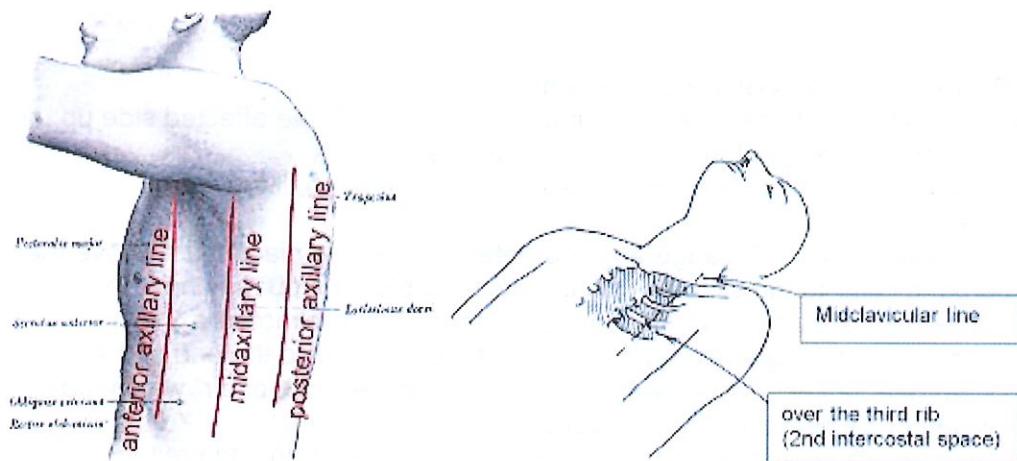
- A. Expose the entire chest.
- B. Establish landmarks to identify second intercostal space, mid-clavicular line.
- C. Clean chest vigorously with appropriate antiseptic. Nick skin with scalpel.

Tension Pneumothorax Decompression – 30.200

- 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 – 30.210

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 *uncomfortable*, administer **Midazolam 2.5 mg IV or 5 mg IM**. May replace with **Lorazepam 1 mg IV or 2 mg IM**.
- 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 to a MAX of 2.5mg**. (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.

