Tab 500
Medical Procedures/ Equipment

Lucas County Emergency Medical Services
2144 Monroe Street
Toledo, Ohio 43604

TAB 500
MEDICAL PROCEDURES / EQUIPMENT
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SECTION

TAB 500
MEDICAL PROCEDURES / EQUIPMENT
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A
Automated External Defibrillators (AEDs)

Automated external defibrillators have been widely deployed throughout Lucas County. Lucas County EMS, an advocate for early county wide defibrillation, has deployed many AEDs to area fire departments, police agencies and public entities. Additionally, many private organizations, companies and businesses have purchased and deployed AEDs in their workplace.

Life squad units carry in their inventory either a LP 500 or LP 1000 for exchange with area fire departments, police agencies, and public/private entities. A LP AED deployed for use by any of the aforementioned agencies will require a re-stocking of any expendable supplies (i.e., Defib pads, razors, gloves, alcohol pads, etc.). Life Squads should facilitate replacement of any needed expendable supplies upon completion of the incident.

Lucas County EMS does not currently support exchange of supplies with AED's manufactured by:

- Cardiac Science
- Zoll
- Defib Tech
- Phillips

Any LP AED utilized for patient care in the field can be downloaded to retrieve patient data by contacting the Lucas County Annex during normal business hours.

B
Airway Suctioning (Basic / Advanced)

A. Airway Suctioning – Basic

Clinical Indications:

- Obstruction of the airway (secondary to secretions, blood, fluid or any other substance) in a patient who cannot maintain their own airway.

Procedure:

1. Ensure suction device is in proper working order with suction tip in place.
2. Pre-oxygenate the patient prior to suctioning efforts.
3. Explain the procedure to the patient (if responsive).
4. Examine the oropharynx and remove any potential foreign bodies or material that may occlude the airway if dislodged by the suction device.
5. If applicable, remove ventilation devices from the airway.
6. Use the suction device to remove any secretions, blood, fluid or other substances.
7. Re-attach ventilation device (if used) and ventilate or assist patient.
8. Record time and result of suctioning in the patient care report (PCR).

B. Airway Suctioning – Advanced

Clinical Indications:

- Obstruction of the airway (secondary to secretions, blood, fluid or any other substance) in a patient currently being assisted by an airway adjunct such as an endotracheal tube, KING, or Tracheostomy tube.

B
Airway Suctioning (Basic / Advanced)

Airway Suctioning (Basic/Advanced), continued

Procedure:

1. Ensure suction device is in proper working order.

2. Pre-oxygenate the patient prior to suctioning efforts.

3. Attach suction catheter to suction device, keeping sterile plastic covering over catheter

4. Guide for catheter insertion depth:
    a. Endotracheal tubes – suprasternal notch.
    b. KING – suction only the length of the airway.
    c. Cricothyrotomy/Tracheostomy tubes – use judgment for depth of insertion.

5. If applicable, remove ventilation devices from the airway.

6. With the thumb port of the catheter uncovered, insert the catheter through the airway device.

7. Once the desired depth of insertion has been reached, occlude the thumb port and remove the suction catheter slowly. Suctioning should not exceed 10 seconds.

8. A small volume (< 10mL) of normal saline lavage may be used as needed.

9. Re-attach ventilation device (if used) and ventilate the patient.

10. Document time and result of suctioning in the patient care report (PCR).

C
AutoVent 3000

The LSP Automatic Ventilator (AutoVent 3000) time-cycled, constant-flow, gas-powered ventilator offers controlled ventilation at 8 to 20 breaths per minute. The attached Patient Valve Assembly allows a patient to draw supplemental gas flow (up to 36LPM) with spontaneous effort. Designed for transport and emergency medical use, the AutoVent 3000 delivers from 200 to 1200mL in volume and flow rates from 12 to 36 liters per minute. Operating power is obtained from standard 50 psi source gas.

Advantages:

A. Recommended by the American Heart Association over bag-mask ventilation.

B. Gastric insufflation significantly reduced with non-intubated patients due to lower inspiratory pressures.

C. Consistent minute ventilation maintained throughout patient movement and transport.

D. Uniform ventilation and oxygenation during chest compressions.

E. Asynchronous ventilation-to-compression ratios.

F. Pediatric and adult settings.

G. Ease of training and application of use.

H. Allows for patient spontaneous breathing (an effort of -2cm H20 will activate the demand valve).

Indications:

A. Respiratory/cardiac arrest.

B. Patients able to tolerate endotracheal intubation.

C. Patients in need of ventilatory assistance.

D. Patients with tracheostomy tubes in need of ventilatory assistance.

E. Patients with a KING airway.

C
AutoVent 3000

AutoVent 3000, continued

Contraindications:

A. **Not intended for use in patients less than 20Kg (44 lbs.).**

Procedure for patient use:

1. Check for obstructions in the patient's throat or mouth (vomitus, foreign bodies, broken dentures, etc.), and remove if present.

2. Set the tidal volume:
   a. **Adult(s)** – Approximately 600mL of tidal volume sufficient to produce chest rise.
   b. **Pediatrics** – Use only the force and tidal volume needed to just make the chest rise visibly; avoid delivering excessive ventilation during cardiac arrest.

3. Set the BPM control knob to the desired setting.

4. Set the inspiratory time control knob to the desired adult or child position. Rotate the control knob to either position until it is against the end stop.

5. ***Use with a standard resuscitation mask:*** after initial control module settings have been made and a patient airway is established, install the mask on the outlet adapter of the patient valve assembly and place on the patient. Follow established procedural guidelines for opening and maintaining a patent airway.

6. ***Use on patients with an endotracheal tube / KING or tracheostomy tube in place:*** after initial control module settings have been made, connect the patient valve assembly directly to the advanced airway adapter (15mm. inside diameter/22mm. outside diameter dimensions allow this connection).

AutoVent 3000, continued

Special Patient Considerations:

A. If the pressure limit alarm sounds during the inspiratory phase and adequate chest movement does not occur, an increase in airway resistance, a blocked airway and/or a stiff lung is indicated.

   i. Increase the volume delivered to the patient, until adequate chest movement occurs.
   ii. Disconnect the patient from the ventilator and attempt to ventilate via other means if adjustments do not result in satisfactory ventilation of the patient.

B. If the patient is being ventilated by mask, check the patient frequently for signs of vomiting. Should vomiting occur, remove the mask to prevent aspiration which may cause airway obstruction. Immediately clear the mask and patient valve assembly of any foreign material, re-establish the patient's airway, and resume ventilation. If unable to resume ventilation with the patient valve assembly, use a resuscitator bag to continue ventilations.

C. Check contents of oxygen cylinder frequently; should the cylinder require replacement, perform maneuver with minimal interruption to ventilation of the patient.

D. Should patient begin breathing spontaneously (an effort of -2cm H20 will activate the demand valve) it may be desirable to turn the ventilator rate (BPM) to the "0" position. This will allow the patient to breathe spontaneously. The ventilator will deliver 100% source gas to the patient on demand, up to 36 LPM depending on the tidal volume setting. ***WARNING: Monitor the patient closely while using the demand mode. Should the patient's respirations slow, become shallow or labored, return to initial automatic ventilator settings immediately.***

C
AutoVent 3000

AutoVent 3000 Troubleshooting Guide

Indication	Probable Cause	Solution
Decreased tidal volume or decreased chest expansion	Leak around mask or patient valve tubing	Check all connections for leaks
	Inappropriate volume setting	Check control module setting and adjust as required
	Inappropriate inspiratory time setting	Check control module setting and adjust as required
	Decreased lung compliance and/or increased airway resistance	Evaluate patient and correct as required by adjusting control module settings
	Airway secretions	Clear airway of secretions
Increased tidal volume or increased chest expansion	Volume setting to high	Check control module settings and adjust volume as required
	Increased lung compliance	Evaluate patient and correct as required by adjusting control module settings
	Inappropriate inspiratory time setting	Check control module setting and adjust as required
Pressure limit alarm at beginning of inspiratory phase	Airway blockage, kinked tubing, and/or increased airway resistance	Clear airway of secretions or foreign matter; check endotracheal tube; check ventilator tubing
Pressure limit alarm during inspiratory phase	Increased airway resistance	Evaluate patient and adjust ventilator as required
	Decreased lung compliance	Evaluate patient and correct as required by adjusting control module settings
	Coughing	Attempt to alleviate coughing
	Increased airway secretions	Clear airway secretions
Failure of the ventilator to cycle	Gas source failure	Change oxygen cylinder if being used, or evaluate and check gas source outlet
	Cylinder valve closed	Open cylinder valve fully
	BPM control knob in “0” position	Adjust BPM knob to desired rate
	Loose connections	Tighten connections
	Disconnected actuator tubing	Reconnect tubing
	Kinked oxygen supply line and/or actuator tubing	Straighten tubing
	Regulator failure	Change regulator
	Malfunctioning control module	Remove from patient and ventilate by alternate means
Failure of the pressure limit alarm	Alarm outlet is plugged with debris or has malfunctioned	Remove and clean, or replace

D
Beck Airway Airflow Monitor (BAAM™)

This disposable airflow monitor magnifies patient respirations to the sound of a whistle. BAAM™ attaches to the end of an endotracheal tube to assist with blind nasotracheal intubation, tube placement, or to monitor airway status. The whistle pitch varies depending upon strength of respirations.

Clinical Indications:

- As an adjunct to blind nasotracheal intubation in the patient with spontaneous respirations.
- As an aid to re-confirming airway placement or re-assessing respiratory effort in the intubated patient with respiratory effort.

Contraindications:

- Apnea, or inability to hear device during endotracheal tube insertion due to ambient noise.
- Not to be used as the primary method for assessing airway placement in the intubated patient.

Notes / Precautions:

- An unobstructed endotracheal tube with its tip located in the pharynx can also produce the whistle sound. Always confirm proper tube placement.
- Due to the narrow aperture of the BAAM™ device, it is never to be left attached to the endotracheal tube for greater than 15 seconds at any one time for assessment of the previously intubated patient. Partial airway obstruction, hypoxia and increased airway pressure can occur if left in place for prolonged periods.

Procedure

1. Pre-oxygenate and/or ventilate while preparing the patient for nasotracheal intubation;

2. Attach BAAM™ device to the 15 mm adapter of the appropriate sized endotracheal tube. The device will attach to the tube only one way.

3. Proceed with nasotracheal intubation. As the ET tube nears the larynx, an audible increase in whistling will be heard from the device, indicating that the tip of the endotracheal tube is near the entrance of the trachea.

Beck Airway Airflow Monitor (BAAM™), continued

4. Carefully advance the endotracheal tube through the larynx into the trachea when device and airway sounds are at their peak.

5. Quickly remove BAAM™ device and begin ventilating the patient.

6. Confirm tube placement by $EtC0_2$ and auscultation.

BAAM™ Device Use as a Respiratory Monitor:

The BAAM™ can be used as a respiratory monitor for short periods of time when directly connected to the 15 mm connector of an endotracheal tube or tracheostomy tube. The respiratory rate, depth and inspiratory-expiratory force can be ascertained by noting the intensity, duration, and pitch of the whistle sounds. **CAUTION: the 4 mm aperture diameter precludes long term use in this manner as such partial airway obstruction over protracted periods can be injurious to the patient.**

Infection Caution:

The BAAM™ device is designed for single patient use and is disposable-biodegradable to help prevent cross infection in patients.

E
Blood Glucose Analysis

The blood glucose testing process is based on colormetric electrochemical technology. Capillary action at the end of the test strip draws a small amount of blood into the meter reaction chamber and a reading (mg/dl) is displayed. No timing, wiping, or blotting is required. If done properly, the glucose level can be determined to within 10% of clinical laboratory values.

Clinical Indications:

- Any patient with an altered mental status.
- Patients with metabolic or endocrine disorders, and presenting with non-specific complaints.

Contraindications:

- None

Procedure:

1. Open the test strip bottle, remove test strip, and insert into meter.
    a. The meter will run a quick self test.
    b. Coding of test strips per manufacturers guideline.

2. Cleanse the test site, usually a fingertip, with alcohol. Allow the alcohol to dry completely before puncturing the skin.

3. Obtain a blood sample using an approved lancing device.
    a. It is preferred to use a gauze pad (not alcohol) to clean off the first blood that appears and use a second drop for sampling.

4. Touch the test strip to the drop of blood. Blood should be drawn into the test strip and a “beep” heard.

5. Test results will appear in meter window.

Special Considerations:

A. Caution must be used when performing glucose assessment on any patient with a bleeding disorder (e.g., hemophilia).

B. In neonates and infants (< 1 yr. old), a heel stick is the preferred location to obtain a blood sample.

Blood Glucose Analysis, continued

C. If “Lo” appears in the display, refer to manufacturer’s guidelines for BS measurements associated with display.

D. If “Hi” appears in the display, refer to the manufacturer’s guidelines for BS measurements associated with display.

E. Readings should be confirmed on any patient in whom the clinical presentation does not support blood glucose findings.

F. A major cause of erroneous readings is failure to let the alcohol used to clean the test site dry completely prior to testing.

G. Severe dehydration and excessive water loss may cause false low results.

H. Meter failures or errant blood glucose values should not deter standard treatment for patients who present with the signs and symptoms of low blood sugar.

I. Sample sites include: forearm, upper arm, hand, thigh, calf, or fingers.

J. A control solution test (if required) should be performed monthly to assure proper machine calibration.

K. Clean meter after each use.

L. Control solution should be discarded per manufacturer’s guidelines.

M. Refer to the glucose meter owner’s booklet for specific instructions on meter use or maintenance.

F
Capnography
(EtC0_2 Monitoring)

End-tidal carbon dioxide (ETC0_2) is the measurement of carbon dioxide in the airway at the end of each breath. Capnography provides a numeric reading (amount) and graphic display (waveform) of the ETC0_2 throughout the respiratory cycle. ETC0_2 is very useful in the critical patient for determining ventilation adequacy and perfusion. In order for there to be measurable C0_2, there must be cardiac output, lungs that are being ventilated and perfused, and a way for the C0_2 to be excreted.

Clinical Indications:

- All patients with advanced airways placed in the field ***(required by Lucas County EMS Medical Director).***
- Patients with respiratory distress who present to EMS with moderate-to-severe symptomology (utilize O_2 / C0_2 Nasal Filter-Line).

Contraindications:

- None

Notes / Precautions:

- A patient with normal cardiac and pulmonary function will have an ETC0_2 level between 35-45 mm Hg.
- When no C0_2 is detected, 3 factors must be quickly evaluated for cause:
    - Loss of airway function (Improper tube placement, apnea).
    - Loss of circulatory function (Massive PE, cardiac arrest, exsanguination).
    - Equipment malfunction (Tube dislodgement or obstruction).
- All patients with monitored capnography (when available) shall have all waveform data downloaded to the patient care record (PCR).

Procedure:

1. Open tubing connector door (LP12/15) and connect ETC0_2 filterline tubing (orange connector) by turning clockwise:
    a. Tubing should be connected to monitor before being connected to the patient's airway.

2. Verify ETC0_2 display is on.

3. Connect filterline to patient airway (Endotracheal tube / Nasal FilterLine)

F
Capnography
(EtC0_2 Monitoring)

End-Tidal $C0_2$ Monitoring, continued

Special Considerations:

A. $C0_2$ monitoring initiates as soon as the filterline is connected. Display will auto scale to appropriate value parameters.

B. $C0_2$ alarms are preset:
   i. High alarm – 70 mm Hg.
   ii. Low alarm – 5 mm Hg.

C. The apnea alarm will sound and "Alarm Apnea" will be displayed on the screen when no valid breath has been detected for 30 seconds. The $ETC0_2$ monitor is intended only as an adjunct in patient assessment and is not to be used as a diagnostic apnea monitor. An apnea message and alarm will display only if a valid breath has not been detected for 30 seconds. Monitoring should be used with clinical signs and symptoms.

D. Carefully route the patient tubing (filterline) to reduce the possibility of entanglement or strangulation.

E. Filterline tubing is single-patient use.

F. End-tidal $C0_2$ monitoring is appropriate for adult and pediatric patients.

F
Capnography
(EtC0$_2$ Monitoring)

End-Tidal C0$_2$ Monitoring, continued

Troubleshooting Guide

Observation	Possible Cause	Corrective Action
ALARM/APNEA message appears.	No breath has been detected for 30 seconds since last valid breath	First check the patient, then ventilation equipment (if used) for leaks or disconnected tubing
CO^2 FILTERLINE OFF message appears	FilterLine, or any other CO^2 accessories disconnected or not securely connected to the LIFEPAK EtCO²	Connect FilterLine, or any other CO^2 accessories, to input connector or tighten connection.
CO^2 FILTERLINE BLOCKAGE message appears	FilterLine is twisted or clogged. The message appears after 30 seconds of unsuccessful purging. Airway Adapter clogged	Check the FilterLine and if necessary replace it. Check the Airway Adapter and if necessary, replace it.
CO^2 FILTERLINE PURGING message appears	FilterLine tube twisted or clogged with water, or rapid altitude change occurred.	Check the FilterLine and if necessary, untwist or reconnect it.
Et CO^2 values are erratic.	A leak in the tubing. A mechanically ventilated patient breathes spontaneously.	Check for connection leaks and line leaks to patient and correct if necessary. No action required
Et CO^2 values are consistently high or lower than expected.	Physiological cause. Ventilator malfunction. Improper calibration.	Check patient. Check ventilator and patient. Contact qualified service.
XXX appears in place of Et CO^2 value	CO^2 module not calibrated successfully. CO^2 module failed.	Contact qualified service personnel. Contact qualified service personnel

G
Cardioversion

Synchronized electrical cardioversion is the process by which an abnormally fast heart rate or cardiac arrhythmia is terminated by the delivery of a therapeutic dose of electrical current to the heart at a specific moment in the cardiac cycle.

A synchronizing function allows the cardioverter to deliver a shock, by way of the pads, of a selected amount of electrical current over a predefined number of milliseconds at the optimal moment in the cardiac cycle which corresponds to the R wave of the QRS complex on the ECG. Timing the shock to the R wave prevents the delivery of the shock during the vulnerable period (or relative refractory period) of the cardiac cycle, which could induce ventricular fibrillation.

Clinical Indications:

- Unstable Ventricular Tachycardia/Wide-Complex Tachycardia (pulse producing).
- Unstable Paroxysmal Supraventricular Tachycardia (pulse producing).
- Unstable Atrial Fibrillation/Flutter with a Rapid Ventricular Response (pulse producing).

Contraindications:

- Repetitive, self-terminating, short-live tachycardias (i.e., runs of non-sustained VT).
- Unstable Torsades de Pointe (should be treated as VF).

Procedure:

1. Ensure the patient is attached properly to the monitor/defibrillator. (Patient monitoring cables and defibrillation/cardioversion pads).

2. Confirm the rhythm on the monitor coincides with a patient in an unstable condition.

3. Consider the use of sedating medication.

4. Depress the synchronize button, watching for R wave markers on each QRS complex.
    - If the R markers do not appear, or appear elsewhere on the ECG, adjust the ECG size or gain (up/down) until they appear on each R wave.
    - If markers still do not appear, select another lead or re-position ECG electrodes.

Cardioversion, continued

5. Select the appropriate energy level:

   ADULT
   - Monomorphic Ventricular Tachycardia: 100J, 200J, 300J, 360J
   - Supraventricular Rhythms (PSVT / A. Flutter): 100J, 200J, 300J, 360J
   - Supraventricular Rhythms (Atrial Fibrillation): 100J, 200J, 300J, 360J

   PEDIATRIC
   - Monomorphic Ventricular Tachycardia: 1.0J/Kg, 2.0J/Kg, 2,0J/Kg
   - Supraventricular Rhythms (PSVT / A. Flutter / A. Fib): 1.0 J/Kg, 2.0J/Kg, 2.0J/Kg

6. Make certain all personnel are clear of patient.

7. Press and hold the shock button to cardiovert. Stay clear of the patient until you are certain the energy has been delivered. NOTE: It may take the monitor/defibrillator several cardiac cycles to “synchronize”, so there may be a delay between activating the cardioversion shock button and the actual delivery of energy.

8. If the patient’s condition is unchanged, repeat using escalating energy settings as noted above.

9. Repeat until maximum setting or until efforts succeed.

10. Note procedure, response, and time in patient care report (PCR).

H
CPAP

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

Clinical Indications:
Dyspnea / Hypoxemia secondary to congestive heart failure, acute cardiogenic pulmonary edema, pneumonia, chronic obstructive pulmonary disease (asthma, bronchitis, emphysema), submersion / near-drowning, carbon monoxide poisoning **AND must meet the following criteria:**

- Is awake and oriented.
- Is over 12 years old and is able to fit the CPAP mask.
- Has the ability to maintain an open airway (GCS > 10)
- Has a systolic blood pressure above 90mmHg
- Has **at least two (2) or more of the following:**
    - Retractions or accessory muscle use
    - Respiratory rate greater than 24 per minute
    - Pulse oximetry less than 92%
    - Inability to speak in full sentences due to dyspnea

Contraindications:

- Systolic BP < 90 mm Hg.
- Severely depressed level of consciousness
- Inability to maintain airway patency
- Respiratory or cardiac arrest
- Agonal respirations
- Unconsciousness
- Shock associated with cardiac insufficiency
- Penetrating chest trauma
- Persistent nausea/vomiting
- Facial anomalies / stroke obtundation / facial trauma
- Pneumothorax
- Have active upper GI bleeding or history of recent gastric surgery

Continuous Positive Airway Pressure Ventilation (CPAP), continued

Special Notes:

A. CPAP therapy needs to be continuous and should not be removed unless the patient cannot tolerate the mask, experiences respiratory arrest, or begins to vomit.

B. Monitor End-Tidal $C0_2$ via 0_2 / $C0_2$ Nasal FilterLine (packaged with CPAP unit) during field therapies. Monitor for obstructive capnogram (waveform).

C. When indicated, CPAP and nebulizers can be used together to provide better "penetration" of nebulized medications through the respiratory tract. CPAP is useful by "recruiting" additional alveoli to participate in gas exchange. Follow the procedure for nebulized aerosol delivery via CPAP detailed in **Tab 500: Nebulized Aerosols, Section U.**

D. Do not remove CPAP until hospital therapy is ready to be placed on patient.

E. Watch patient for gastric distention, which can result in vomiting.

F. Procedure may be performed on patient with a Do Not Resuscitate (DNR) Order.

G. Due to changes in preload and afterload of the heart during CPAP therapy, a complete set of vital signs should be obtained every 5 minutes.

H. Possible complications include:
- Gastric distention
- Aspiration
- Reduced cardiac output
- Hypoventilation
- Hypotension
- Pulmonary barotraumas
- Severe anxiety / combativeness due to mask intolerance

****** NOTE: Patient's failing to show improvement with application of CPAP may require endotracheal intubation for optimal ventilatory support. ******

Continuous Positive Airway Pressure Ventilation (CPAP), continued

02-RESQ™ System
02-RESQ Generator is a fixed flow venturi device that uses an oxygen supply in conjunction with entrained air to generate an output flow. 02-RESQ Generator uses a 50psi oxygen supply, and can generate flows up to 140 lpm and fractional inspired oxygen ($Fi0_2$) at approximately 30%. The 3-set 02-CPAP valves (5.0/7.5/10.0cm), which are snapped onto the anti-asphyxia housing end of the circuit, are used to maintain preset positive pressure at flow rates from 60 – 140 lpm.

Procedure:

1. Ensure all necessary equipment is available and assembled.
2. Fully explain procedure to the patient.
3. Connect directly to a 50psi oxygen source using the quick connect/disconnect Ohio valve. Listen for leaks.
4. Prior to use, check to be sure the device is free of obstruction and verify proper valve setting for intended use. Verify proper valve function.
5. Apply 0_2 / $C0_2$ nasal filterline to patient. Attach to LP 12/15.
6. Place the delivery mask over the mouth and nose. Have patient hold the mask and instruct him/her to breathe slowly and deeply.
7. Once patient is comfortable with mask, secure with provided straps and tighten to desired fit minimizing any air leakage.
8. Evaluate the response in the patient. Assess breath sounds, oxygen saturation, and general appearance of the patient.
9. Encourage the patient to allow forced ventilation to occur. Observe closely for signs of complication. The patient must be breathing for optimal use of the CPAP device.
10. Document use and patient response in the patient care report (PCR).

H
CPAP

Continuous Positive Airway Pressure Ventilation (CPAP), continued

Recommended CPAP Pressure Valve Settings:

Patient Condition	Initial Valve Setting	No Improvement / Patient tolerating mask
CHF / Pulmonary Edema	**10.0cm**	**10.0cm**
COPD / Asthma / Pneumonia	**5.0cm**	**7.5cm**
Submersion / Near-Drowning	**5.0cm**	**7.5cm**
CO Poisoning	**5.0cm**	**7.5cm**

I
Defibrillation - Automated (AED)

Clinical Indications:

- Patients in cardiac arrest (pulseless, non-breathing).
- Age > 1 year.

Contraindications:

- Pediatric patients (>1) whose body habitus is such that the pads cannot be placed without overlapping.

Procedure:

1. **If multiple rescuers are available, one rescuer should provide uninterrupted chest compressions while the AED is being prepared for use.**

2. Apply defibrillator pads per manufacturer recommendations. Use alternate placement when implanted devices (pacemakers, AICDs) occupy preferred pad positions.

3. Remove any medication patches on the chest and wipe off residue.

4. If necessary, connect defibrillator leads ("white" to the anterior chest pad; "red" to the lateral chest pad).

5. AED analysis of rhythm (Note: automated analysis vs. "PUSH" to analyze).

6. **Stop CPR and clear the patient for rhythm analysis**. Keep interruption in CPR as brief as possible.

7. Defibrillate if appropriate by depressing the "shock" button. **Assertively state "CLEAR" and visualize that no one, including yourself, is in contact with the patient prior to defibrillation**.

8. Begin CPR (chest compressions and ventilations) immediately after the delivery of the defibrillation.

9. After 2 minutes of CPR, repeat rhythm analysis and defibrillate if indicated. Repeat this step every 2 minutes.

Defibrillation - Automated (AED)

10. If “no shock advised” appears, perform CPR for two minutes and then re-analyze

11. **Keep interruption of CPR compressions as brief as possible. Adequate CPR is a key to successful resuscitation.**

***** NOTE: Older system AEDs may not conform to the AHA 2015 Guidelines for automated defibrillation. When using these devices, follow the voice prompts given by the machine. When applicable, the 2015 BLS Guidelines should be followed. *****

J
Defibrillation - Manual

Clinical Indications:

- Ventricular Fibrillation
- Pulseless Ventricular Tachycardia
- Unstable Torsades de Pointes

Contraindications:

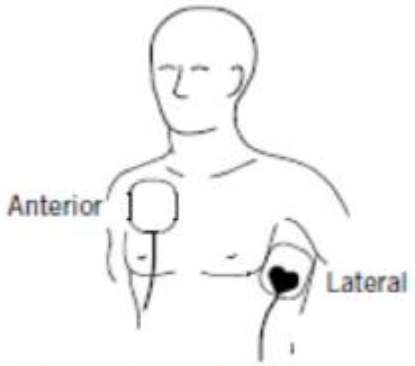
- None in the presence of life-threatening VF or pulseless VT, unless defibrillation energy could be transferred to bystander or provider(s) due to direct patient contact or hazardous environment.

Procedure:

1. Ensure chest compressions are adequate and interrupted only when necessary.

2. Clinically confirm the diagnosis of cardiac arrest and identify need for defibrillation.

3. Apply defibrillation electrodes to the patient's chest in the proper position (Anterior-Lateral Placement).
   - To perform anterior-lateral placement
     1. Place the ♥ therapy electrode lateral to the patient's left nipple in the midaxillary line, with the center of the electrode in the midaxillary line, if possible.
     2. Place the other therapy electrode on the patient's upper right torso, lateral to the sternum and below the clavicle.



QUIK-COMBO Therapy Electrodes

Defibrillation – Manual, continued

4. Select energy level to be delivered:

   ADULT
   - Biphasic monitor/defibrillator: 200J - (CPR 2/min), 300J - (CPR 2/min), 360J

   PEDIATRIC
   - Biphasic/Monophasic monitor-defibrillator: 2J/Kg, 4J/Kg – (CPR 2/min), 4J/Kg

5. Charge the defibrillator to the selected energy level. Continue chest compressions while the defibrillator is charging.

6. Hold compressions, assertively state “CLEAR” and visualize that no one, including yourself, is in contact with the patient. In the setting where LUCAS™2 is used, it is not necessary to stop compressions during defibrillation. Assure all rescuers are “CLEAR” of the patient.

7. Deliver the countershock by depressing the shock button.

8. Immediately resume chest compressions and ventilations for 2 minutes. After 2 minutes of CPR, analyze rhythm and check for pulse only if appropriate for rhythm.

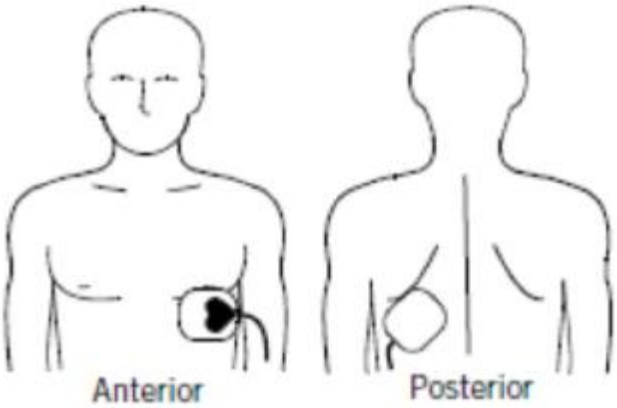
9. Repeat the procedure every two (2) minutes as indicated by patient response and ECG rhythm.

10. Keep interruption of CPR compressions as brief as possible. Adequate CPR is a key to successful resuscitation.

11. In the setting of refractory / recurrent VF or pulseless VT, alternative pad positioning (Anterior-Posterior) should be used as an alternative for defibrillation.

Defibrillation – Manual, continued

12. To perform anterior-posterior placement:
    - Place either the ♥ or + therapy electrode over the left precordium. The upper edge of the electrode should be below the nipple. Avoid placement over the nipple, the diaphragm, or the bony prominence of the sternum, if possible.
    - Place the other electrode behind the heart in the infrascapular area. For patient comfort, place the cable connection away from the spine. Do not place the electrode over the bony prominences of the spine or scapula.



QUIK-COMBO Therapy Electrodes

K
Emergency Disaster Equipment

Lucas County EMS has strategically placed several types of emergency disaster equipment that can be mobilized in the event of a MCI (Mass Casualty Incident):

A. **Municipal Disaster Bags** – contain emergency care equipment and are stored in the following areas:
   - Lucas County EMS Annex
   - Sylvania Township Fire Department
   - Maumee Fire Department
   - Oregon Fire Department
   - Washington Township Fire Department

   Municipal Disaster Bags can be mobilized by contacting the individual municipality where stored or coordinated through Lucas County EMS Dispatch. Contents of the Municipal Disaster Bags are located in Tab 1300, Section I.

B. **Mass Casualty Medical Trailers** – In addition to medical supplies, medical trailers contain Incident Command supplies. Located in the following areas:
   - Oregon Fire Department
   - Springfield Township Fire Department
   - Lucas County EMS Annex

   Mobilization of the mass casualty medical trailers should be coordinated through Lucas County EMS Dispatch. During normal business hours the trailer at the LCEMS Annex can be requested and LCEMS Annex personnel will respond to the scene with the trailer. Trailers requested after hours should be coordinated through LCEMS Dispatch. Contact will be made with either Oregon Fire or Springfield Fire to access the trailers at their location. LCEMS Dispatch may be able to page Annex personnel to respond and deliver the trailer if necessary. LCEMS Dispatch is authorized to allow safety service personnel into the garage area of the Annex for purposes of trailer pick-up if necessary. A vehicle with a 2" ball and tail-light hook up is required to pull the trailer. Contents of the Mass Casualty Medical Trailers are located in Tab 1300, Section H.

C. **Lighting Trailer / Unit** – the emergency lighting unit is located at the Lucas County EMS Annex. Mobilization of the unit should be coordinated through Lucas County EMS Dispatch. During normal business hours LCEMS Annex personnel will respond to the emergency scene if requested. After normal business hours LCEMS Dispatch is authorized to allow safety service personnel access to the garage area of the Annex for purposes of lighting trailer pick-up if necessary. A vehicle with a 2" ball and tail-light hook up is required to pull the trailer. Contents of the lighting trailer are located in Tab 1300, Section G.

K
Emergency Disaster Equipment

Emergency Disaster Equipment, cont.

D. **Oxygen Delivery System** – In addition to oxygen systems available from normal responders, LCEMS stores an oxygen delivery system capable of administering oxygen to multiple patients simultaneously. Oxygen delivery systems are located at:

- Springfield Township Fire Department
- Oregon Fire Department
- Lucas County EMS Annex

Oxygen systems can be accessed by contacting the individual municipality or by coordination through Lucas County EMS Dispatch. Each system can administer oxygen to nine (9) patients when used with appropriate bottle.

L
Endotracheal Intubation

A. Orotracheal Intubation (Adult / Pediatric)

Clinical Indications:

- Patients in deep coma
- Respiratory/cardiac arrest
- Patients where complete airway obstruction appears imminent (i.e., respiratory burns, acute anaphylaxis)

Contraindications:

- Presence of gag reflex.
- Patients where irritation of the pharynx may cause laryngeal spasm.

Complications:

- Accidental intubation of the esophagus
- Insertion of the endotracheal tube too deep into the trachea or right mainstem bronchus.
- Oropharyngeal trauma.
- Fractured teeth or dentures.
- Spasm of the vocal cords.

Procedure

1. Prepare, position, and oxygenate the patient with 100% oxygen.
2. Select proper ET tube (stylet, if used).
3. Have suction unit available for airway suctioning.
4. Limit each intubation attempt to 30 seconds with BVM between attempts.
5. Visualize ET tube pass through vocal cords.
6. Inflate the cuff with the minimum amount of air to provide an effective seal.
7. Auscultate for bilaterally equal breath sounds and absence of sounds over the epigastrium. If unsure of tube placement, remove tube and ventilate patient with BVM.

Endotracheal Intubation, continued

8. Consider using Flex guide (adult patients) or KING airway if ET intubation efforts are unsuccessful. (Note: I-Gel sizes 3/4/5 may prohibit use in pediatric patients).

9. Attach End tidal C02 filter-line (LP15) and confirm capnographic waveform and capnometric value. Continue monitoring throughout patient treatment and transport.

10. Document ETT size, time, result (success) and placement location (centimeter marks at the patient's teeth or lips) on the patient care report (PCR). Document all devices used to confirm initial tube placement. Document positive/negative breath sounds before and after each movement of the patient.

B. Nasotracheal Intubation

Clinical Indications:
- Imminent respiratory arrest where oral intubation cannot be accomplished.
- Rigidity or hypoxia from seizures (e.g. "clenched teeth").
- Trauma to the oral cavity prohibiting oral intubation.
- Patients with severe respiratory distress and depressed gag reflex.

Contraindications:
- Non-breathing or near apneic patient.
- Known or likely fracture/instability of mid-face secondary to trauma.
- Patients with basilar skull fracture.
- Relative contraindications:
  - Blood clotting abnormalities
  - Nasal polyps

Complications:
- Accidental intubation of esophagus
- Insertion of endotracheal tube too deep into the trachea or right mainstem bronchus.
- Oropharyngeal trauma; laryngopharyngeal trauma.
- Fractured teeth or dentures.
- Spasm of the vocal cords.

Endotracheal Intubation, continued

Procedure

1. Prepare, position and oxygenate the patient with 100% oxygen.
2. Select proper ET tube (~ 1mm less than for oral intubation).
3. Lubricate ET tube generously with water-soluble lubricant (Lidocaine Jelly).
4. Pass the ET tube through the largest nostril with the beveled edge against the nasal septum and perpendicular to the facial plate.
5. Use forward and lateral back and forth motion to advance the tube into the oropharynx. **Never force the tube**.
6. Listen form air movement through the tube. Apply firm, gentle cricoid pressure and advance the tube quickly past the vocal cords during inspiration. Look/feel for bulging and anterior displacement of the laryngeal prominence. The use of a BAAM™ device may aid in proper tube placement.
7. Listen over the opening of the ET tube to detect air flow with ventilatory effort.
8. Inflate the cuff with the minimum amount of air to provide an effective seal.
9. Auscultate for bilaterally equal breath sounds and absence of sounds over the epigastrium. If unsure of tube placement, remove tube and ventilate patient with BVM.
10. Attach End tidal C02 filter-line (LP15) and confirm capnographic waveform and capnometric value. Continue monitoring throughout patient treatment and transport.
11. Document ETT size, time, result (success) and placement location on the patient care report (PCR). Document all device used to confirm initial tube placement. Document positive/negative breath sounds before and after each movement of the patient.

Endotracheal Intubation, continued

C. Trauma Patient Intubation (Orotracheal Intubation with C-Spine Control)

Clinical Indications:

- Suspected traumas where manipulation of the C-spine may cause further patient complications.
- Respiratory/cardiac arrest.

Contraindications:

- None in the setting of trauma with a patient in deep coma.

Complications:

- Accidental intubation of the esophagus.
- Insertion of the endotracheal tube too deep into the trachea or right mainstem bronchus.
- Oropharyngeal trauma.
- Fractured teeth or dentures.
- Spasm of the vocal cords.

Procedure

1. After basic manual and adjunctive airway maneuvers, have your partner maintain in-line stabilization while kneeling at the patient's side, facing his head. This is done by placing both hands over the patient's ears with the little, ring, and middle fingers under the occiput, the index fingers anterior to the ears, and the thumbs on the face over the maxillary sinuses.

2. Apply slight pressure in the caudal direction (toward the feet) to support and immobilize the head.

3. Proceed gently with orotracheal intubation, remembering the need to minimize movement of the cervical spine.

4. Inflate the cuff with the minimum amount of air to provide an effective seal.

Endotracheal Intubation, continued

5. Auscultate for bilaterally equal breath sounds and absence of sounds over the epigastrium. If unsure of tube placement, remove tube and ventilate patient with BVM.

6. Attach End tidal C02 filter-line (LP15) and confirm capnographic waveform and capnometric value. Continue monitoring throughout patient treatment and transport.

7. Document ETT size, time, result (success) and placement location (centimeter marks at the patient's teeth or lips) on the patient care report (PCR). Document all devices used to confirm initial tube placement. Document positive/negative breath sounds before and after each movement of the patient.

D. Digital (Tactile) Intubation

Clinical Indications:
- Patients in deep coma.
- Cardiac arrest patients where proper airway positioning is difficult.
- Trauma patients where proper airway positioning is difficult.

Contraindications:
- Conscious patients.
- Unconscious patients with a gag reflex.

Complications:
- Inability to locate airway structures
- Accidental intubation of the esophagus.
- Insertion of the endotracheal tube too deep into the trachea or right mainstem bronchus.
- Oropharyngeal trauma.
- Spasm of the vocal cords.

Endotracheal Intubation, continued

Procedure

1. Prepare, position and oxygenate the patient with 100% oxygen.

2. Select proper ET tube. Insert stylet and bend tube into a “J” shape.

3. Have team member stabilize the patient’s head and neck in an in-line (neutral) position. Place a bite block or oral airway between the patient’s molars to help protect your fingers.

4. Insert your left middle and index fingers into the patient’s mouth. By alternating fingers, “walk” your hand down the midline while simultaneously tugging gently forward on the tongue. This lifts the epiglottis up and away from the glottic opening, within reach of your probing fingers.

5. Palpate the arytenoid cartilage posterior to the glottis and the epiglottis anteriorly with your middle finger. Press the epiglottis forward, and insert the endotracheal tube into the mouth, anterior to your fingers.

6. Advance the tube, pushing it gently with your right hand. Use your left index finger to keep the tip of the ETT against your middle finger. This will direct the tip to the epiglottis.

7. Use your middle and index fingers to direct the tip of the ETT between the epiglottis (in front) and your fingers (behind). Then with your right hand advance the ETT through the cords while simultaneously maneuvering it forward with your left index and middle fingers. This will prevent it from slipping posteriorly into the esophagus.

8. Hold the tube in place with your hand to prevent its displacement.

9. Inflate the cuff with the minimum amount of air to provide an effective seal.

10. Auscultate for bilaterally equal breath sounds and absence of sounds over the epigastrium. If unsure of tube placement, remove tube and ventilate patient with BVM.

Endotracheal Intubation, continued

11. Attach End tidal C02 filter-line (LP15) and confirm capnographic waveform and capnometric value. Continue monitoring throughout patient treatment and transport.

12. Document ETT size, time, result (success) and placement location (centimeter marks at the patient's teeth or lips) on the patient care report (PCR). Document all devices used to confirm initial tube placement. Document positive/negative breath sounds before and after each movement of the patient.

NOTE: Three (3) failed intubation attempts must be reported to Lucas County EMS Dispatch for Medical Director notification.

M
Endotracheal
Medication Administration

Because of the large surface area of the alveoli, and vast blood supply of the pulmonary capillary beds that return blood to the left heart, drugs may be administered down the endotracheal tube. It is important to deliver these medications in sufficient volume to ensure that they do not merely adhere to the inside of the tube. This medication delivery route is the "least preferred." Administration of resuscitation drugs into the trachea results in lower blood concentrations than the same dose given intravascularly.

The use of this route of delivery of medications should be due to inability to deliver these medications through the preferred routes (IV/IO).

Clinical Indications:

- Intubated patients requiring any of the identified medications when intravenous or intraosseous access is not obtainable.

Contraindications:

- Administration of medications not identified.
- Instilling into or through the ResQPOD.
- Administration of medications through a KING airway

Notes / Precautions:

Medications Allowable via Endotracheal Route (dilute medications with 5mL normal saline where indicated):

Narcan	2-2.5 times IV dosage
Epinephrine	2-2.5 times IV dosage – 1mg/mL concentration (dilute with 5mL normal saline

M
Endotracheal
Medication Administration

Procedure:

1. Oxygenate the patient with 100% oxygen.

2. If CPR is in progress, **stop chest compressions briefly** (NO more than 10 seconds) during administration of medications.

3. Disconnect bag-valve device from endotracheal tube connector to instill medication. (NOTE: If EMT tube used, deliver medication through injection port with bag-valve device attached).

4. Re-connect bag-valve device and ventilate patient with 5 full breaths for medication dispersal.

N
External Cardiac Pacing

The external cardiac pacer delivers an electrical stimulus to the heart through externally applied cutaneous electrodes. This electrical stimulus is conducted across the intact chest wall to hopefully stimulate myocardial activity. The mean current required for electrical capture can vary significantly, but is usually 50 to 100 milliamperes (mA).

Clinical Indications:

- Hemodynamically unstable Bradycardia (SBP <100 mm Hg, change in mental status, angina, AMI, CHF). Unresponsive to aggressive oxygenation and ventilation attempts.
- Initial intervention in suspected ischemic disease.
- Symptomatic Bradycardia in the patient with a denervated heart.
- High-degree heart block (Type II second degree block or third degree AV block).

Precautions:

- If capture fails with electrodes placed in the anterior-lateral position, consider an anterior-posterior position.
- Maximum output (LP12/15) is 200 mA.

Procedure:

1. Clip and/or shave hair in desired pad position.

2. Attach appropriate pads and monitoring leads.
    a. Anterior-lateral position
        i. Place the anterior electrode (-) on the patient's upper right torso, lateral to the sternum and below the clavicle.
        ii. Place the lateral electrode (+) lateral to the patient's left nipple in the midaxillary line.
    b. Anterior-posterior position
        i. Place the anterior electrode (+) over the left pericardium. The upper edge of the electrode should be below the nipple. Avoid placement over the nipple, diaphragm or the bony prominence of the sternum.
        ii. Place the posterior (-) electrode on the patient's back in the infra-scapular area. Do not place the electrode over the bony prominence of the spine or scapula.

External Cardiac Pacing, continued

c. For pediatric patients (use correct size pads for patient weight)
    i. Place the anterior electrode (+) to the left of the sternum and center as closely as possible to the point of maximal cardiac impulse.
    ii. Place the posterior electrode (-) on the back, directly behind the anterior electrode to the left of the thoracic spinal column.

3. Adjust gain up or down until there is adequate QRS height for the pacemaker to sense and mark.
    a. If unsuccessful, select another lead or move ECG electrodes until sensing occurs.

4. Power "on" pacemaker module by pressing "PACER" softkey and confirm the presence of QRS markers on the ECG.

5. If not already defaulted, set initial pacing rate at 80 beats per minute. (For pediatric patients set rate at 100 beats per minute).

6. Press "CURRENT" or rotate the selector to increase current until electrical capture occurs. Observe for vertical pacing spikes.

NOTE: Electrical capture is noted by a wide QRS (negative or positive) and a tall broad T-wave in the opposite polarity. Mechanical or ventricular capture is evidenced by a palpable pulse and signs of improving cardiac output.

Special Considerations:

A. Obese patients or patients with large breasts – apply patches to a flat area on the chest if possible. If skin folds prevent good patch adhesion, it may be necessary to spread skin folds apart to create a flat surface.

B. Thin/Lean body weight patient – follow the contours of the ribs and spaces when pressing the patches onto the torso. This limits air spaces or gaps under the electrodes and promotes good skin contact.

C. Patients with implanted pacemakers – apply patches away from internal pacemaker.

External Cardiac Pacing, continued

D. Patients with implanted defibrillators (AICD) – apply patches in the anterior/lateral position and treat patient as any other patient requiring emergency care. If pacing is unsuccessful, it may be necessary to alternate patch placement due to the insulative properties of implanted defibrillator electrodes.

E. If necessary to remove defib/pacer patches for any reason, do not re-use the same patches. Apply new patches.

F. In the setting of peripheral collapse, and IV access unsuccessful, initiate external pacing procedure. Mechanical cardiac capture may improve hemodynamics and blood pressure making it easier to establish IV access.

O
Flex Guide Endotracheal Tube Introducer

The Flex Guide Endotracheal Tube Introducer (gum-elastic bougie) is used to facilitate endotracheal intubation on difficult airways. It should not be confused with the more rigid stylet, which is inserted into the ET tube and used to alter its shape prior to intubation. Unlike the stylet, a bougie is inserted independently of the ET tube and is used as a guide. Since the bougie is considerably softer, more malleable, and blunter than a stylet, this technique is considered to be a relatively atraumatic procedure.

Clinical Indications:

- Difficult intubation with a restricted view of the glottic opening:
  - Short, thick (bull) neck
  - Pregnancy
  - Laryngeal edema (anaphylaxis, burns)
  - Anatomical variation
  - Tumors above the glottic opening
  - Inability to appropriately position the patient for intubation

Contraindications:

- Use of ET tube < 6.0mm

Notes / Precautions:

- Soft tissue damage or bronchial rupture may occur:
  - During blind intubation
  - Positioning past the carina
  - If undue pressure is applied
  - If ET tube is passed over introducer without the use of a laryngoscope
- Single-use device. Do not attempt to clean or sterilize
- For optimal use, store flat in the same shape as packaged. Do not fold or roll up to save space.

Procedure:

1. Perform an optimal direct laryngoscopy.
   a. At a minimum, the tip of the epiglottis must be visible.

O
Flex Guide Endotracheal Tube Introducer

Flex Guide Endotracheal Tube Introducer, continued

2. Begin insertion of introducer.
    a. Tactile confirmation of tracheal “clicking” will be felt as the distal tip of the introducer bumps against the tracheal rings.
    b. If tracheal clicking cannot be felt, continue to gently advance the introducer until “hold up” is felt.
    c. Tracheal “clicking” and “hold up” are positive signs that the introducer has entered the trachea.
    d. Lack of tracheal clicking or hold up is indicative of esophageal placement.

3. Continue advancement of introducer to a depth of approximately 25 cm (thick black line on the Flex Guide is at the corner of the patient’s mouth). This places the distal tip at least 2 to 3 cm beyond the glottic opening.

4. While holding the introducer securely, advance the endotracheal tube over the proximal tip of the introducer.
    a. As the tip of the endotracheal tube passes beyond the teeth, rotate the tube 90 degrees counter clockwise (1/4 turn to the left) so tube bevel does not catch on the arytenoid cartilage.

5. Advance the endotracheal tube to the proper depth.

6. Holding the endotracheal tube securely, remove the introducer.

7. Verify correct placement of the ET tube.

P
Intramuscular (IM) Medication Administration

Intramuscular (IM) injections are administered into the muscle tissue and require adequate perfusion for absorption. This method has a predictable rate of absorption, but its onset of action is considerably slower than IV. ***Medications approved for IM administration by protocol are Atropine Sulfate (via auto-injector), Benadryl, Dilaudid, Epinephrine (1mg/mL), Fentanyl, Glucagon, Ketamine, Morphine, Narcan, Pralidoxime (via auto-injector), Thiamine, Toradol, Valium (via auto-injector), Versed, and Zofran.***

Approved Injection Sites:

- Posterior Deltoid
- Lateral Thigh (Vastus Lateralis Muscle)
- Buttocks (Dorsogluteal Muscle) **NOTE: The Dorsogluteal site is NOT the preferred route for IM injection in the emergent setting. Consideration is given to this injection site area in the event no other sites are available or, as a paramedic, you have been tasked with the responsibility of administering vaccinations and the Dorsogluteal site is preferred.**

Clinical Indications:

- When the rate of absorption needs to be slower and/or prolonged in action.
- When other administration routes are unsuccessful or unavailable.

Contraindications:

- Severe bleeding disorders (i.e., hemophilia) or recent thrombolytic therapy.
- States of severe hypoperfusion or shock.
- When rapid absorption and action of a medication is required (i.e., when IV is preferred).

Notes / Considerations / Precautions:

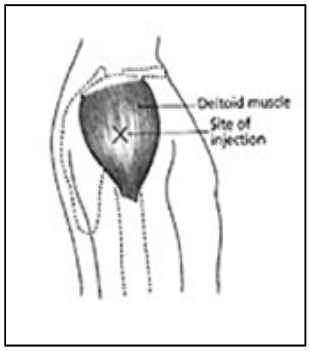
- Appropriate equipment (needle size and length).
- ½" to 1-1/2" needle length (length sufficient to penetrate dermal layer and subcutaneous fat).
- 19-26 gauge needle for aqueous medications.
- 1cc - 3cc syringe
- Deltoid injections: 2mL or less (for medication amounts greater than 2mL, split between both deltoids).
- Vastus Lateralis injections: 3mL or less (for medication amounts greater than 3mL, split between both legs).
- Dorsogluteal injections: 3mL or less (for medication amounts greater than 3mL, split between both gluteal sites).

P
Intramuscular
Medication Administration

Intramuscular Medication Administration, cont.

Procedure (Posterior Deltoid):

1. Prepare equipment.
2. Check label, date, and appearance of medication.
3. Locate appropriate injection site:
    - Posterior Deltoid
        - o Identify the bony portion of the shoulder where the clavicle and scapula meet [the acromioclavicular joint (AC)].
        - o Measure 3 to 4 fingers-width down the arm from AC joint.
        - o Slide 1 to 2 fingers-width posteriorly on the arm.



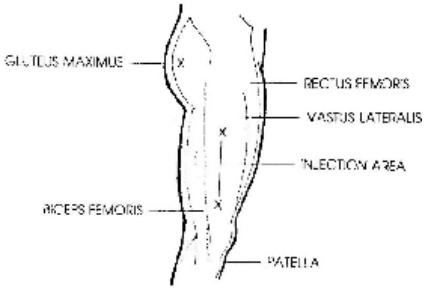
4. Using a circular motion from selected site outward, cleanse the site with alcohol wipe.
5. With one hand, stretch or flatten the skin overlying the selected site. This will allow for smoother entry of the needle.
6. In the other hand, hold syringe like a dart and quickly thrust the needle into the tissue and muscle at a 90-degree angle.
7. Inject medication.
8. After all medication is injected, quickly withdraw syringe and dispose of in an approved container.
9. Gently massage over the injection site to increase absorption and medication distribution.
10. Apply firm pressure and place band-aid over site.
11. Monitor and document the patient's response to the medication in the patient care report (PCR).

P
Intramuscular
Medication Administration

Intramuscular Medication Administration, cont.

Procedure for Lateral Thigh (Vastus Lateralis Muscle):

1. Prepare equipment.
2. Check label, date, and appearance of medication.
3. Locate appropriate injection site:
    - The vastus lateralis muscle, part of the quadriceps group of four muscles of the upper leg, is located on the outer, lateral thigh.
    - Identify about a hand's width above the knee to a hand's width below the groin (or hip joint).
    - Injections outside this area may hit a bone, a nerve or blood vessel.



4. Using a circular motion from selected site outward, cleanse the site with alcohol wipe.
5. With one hand, stretch or flatten the skin overlying the selected site. This will allow for smoother entry of the needle.
6. In the other hand, hold syringe like a dart and quickly thrust the needle into the tissue and muscle at a 90-degree angle.
7. Inject medication.
8. After all medication is injected, quickly withdraw syringe and dispose of in an approved container.
9. Gently massage over the injection site to increase absorption and medication distribution.
10. Apply firm pressure and place band-aid over site.
11. Monitor and document the patient's response to the medication in the patient care report (PCR).

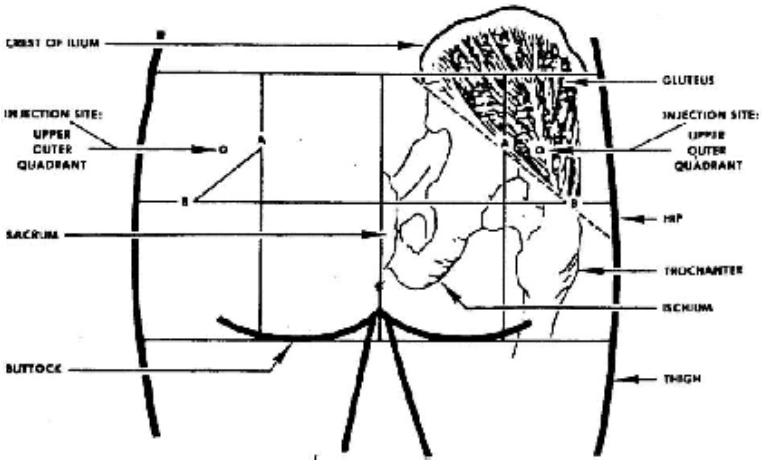
P
Intramuscular
Medication Administration

Intramuscular Medication Administration, cont.

Procedure for Buttocks (Dorsogluteal Muscle):

1. Prepare equipment.
2. Check label, date, and appearance of medication.
3. Locate appropriate injection site:
    - The muscles (gluteal) of this area are thick and are utilized frequently in daily activities, thus causing complete absorption of drugs.
    - Using care in choosing the location for administering the injection will minimize the possibility of hitting bone, large blood vessels, or the sciatic nerve.
        - To identify the injection site, draw an imaginary horizontal line across the buttocks from hip bone to hip bone.
        - Divide each buttock in half with an imaginary vertical line.
        - The four imaginary sections of the buttock are referred to as quadrants.
        - The proper location for an injection is in the upper outer quadrant of either buttock.

    - ***NOTE: if an injection is given outside of the upper outer quadrant, irreparable injury may be done to the sciatic nerve or the needle may penetrate the gluteal artery and this can cause significant bleeding from the vessel.***



Intramuscular Medication Administration, cont.

4. Using a circular motion from selected site outward, cleanse the site with alcohol wipe.
5. With one hand, stretch or flatten the skin overlying the selected site. This will allow for smoother entry of the needle.
6. In the other hand, hold syringe like a dart and quickly thrust the needle into the tissue and muscle at a 90-degree angle.
7. Aspirate syringe to ensure that inadvertent venous administration is avoided.
    - If blood is aspirated into the syringe, withdraw the syringe and needle and dispose of properly.
    - Do not administer any medication mixed with blood.
    - Begin again at a different site.
8. If no blood is aspirated, slowly inject medication.
9. Inject medication.
10. After all medication is injected, quickly withdraw syringe and dispose of in an approved container.
11. Gently massage over the injection site to increase absorption and medication distribution.
12. Apply firm pressure and place band-aid over site.
13. Monitor and document the patient's response to the medication in the patient

Q
Intranasal (IN) Medication Administration

Medication administration in a certain subgroup of patients can be a very difficult endeavor. For example, an actively seizing or medically restrained patient may make attempting to establish an IV almost impossible which can delay effective drug administration. Moreover, the paramedic or other member of the response team may be more likely to suffer a needle-stick injury while caring for these patients.

In order to improve prehospital care and to reduce the risks of accidental needle-stick, the Mucosal Atomizer Device (MAD) has been authorized for use in certain patients. The MAD allows certain IV medications to be administered into the nose. The device creates a medication mist which lands on the mucosal surfaces and is absorbed directly into the blood stream.

Not all medications may be administered via the intranasal (IN) route. Medications will be limited to:

- **Fentanyl**
- **Glucagon**
- **Ketamine HCL**
- **Narcan (2mg/2mL concentration only)**
- **Versed**
- **Zofran**

Generally, medications administered via the IN route require a higher concentration of drug in smaller volume of fluid than typically used with the IV route***. Avoid giving more than 1-2mL per nares.*** Split the dose between each nares.

Caution: Certain conditions may make nasal administration of a medication ineffective. Epistaxis, excessive mucous, nasal trauma, and septal abnormalities may inhibit absorption. If these conditions are present, alternative routes may be advisable.

Procedure:

A. Load syringe with appropriate dose of medication (draw only the amount to be administered).

B. Attach MAD nasal atomizer.

C. Place atomizer 1.5 cm into the nostril.

Q
Intranasal (IN) Medication Administration

Intranasal (IN) Medication Administration (cont.),

D. Briskly compress the syringe to administer ½ of the medication.

E. Remove and repeat into the other nostril until all of the medication has been administered.

F. Monitor and document the patient's response to the medication in the patient care report (PCR).

R
iTClamp™50
Hemorrhage Control System

The iTClamp™50 quickly controls critical bleeding by closing the skin to create a temporary, contained hematoma until surgical repair. The iTClamp™50 is a self-locking surgical clamp with suture needles that penetrate the skin to evert the skin edges between pressure bars of the device and anchor it to the skin to reduce slippage and leakage. Pressure is evenly distributed across the bars, which seal the skin over a wound. An adjustable locking mechanism increases or decreases pressure across the wound to achieve a fluid tight seal.

Clinical Indications:

- The iTClamp™50 device is a trauma clamp device for the temporary control of severe bleeding in the extremities, axilla, inguinal areas and scalp.

Contraindications:

- The iTClamp™50 is contraindicated where skin approximation cannot be obtained (for example, large skin defects under high tension).

Warnings and Precautions:

- This device is intended for temporary use only; use beyond three hours has not been studied.
- Patients must be seen promptly by medical personnel for device removal and surgical wound closure.
- Only use device as directed to avoid needle stick injury.
- Do not use where delicate structures are near the skin surface, within 10mm, such as the orbits of the eye.
- Will not control hemorrhage in non-compressible sites, such as the abdominal and chest cavities.
- Ensure PPE is utilized to protect against potential splashing of blood during application.
- Single-use, disposable device; not for reuse. Re-use of device may cause cross contamination leading to patient risk and complication(s).
- iTClamp™50 is provided sterile. Do not use if sterility seal has been tampered with or packaging is damaged.
- For extreme extremity injuries not amenable to iTClamp™50 application (e.g. the skin edges cannot be approximated) consider tourniquet application per protocol.

R
iTClamp™50
Hemorrhage Control System

iTClamp™50 Hemorrhage Control System, continued

Application (One-handed operation):

1. Apply appropriate PPE.
2. Open the package by pulling forward on the outer tabs.
3. Remove the device from the package by lifting up, taking care not to close the device until it has been applied to the wound. **NOTE: Device seal will hold device open until broken (See Fig. 1).**
4. If the device has inadvertently closed, push the side buttons inward with one hand, and pull the device open with the other hand.
5. Locate the wound edges **(See Fig. 1).**

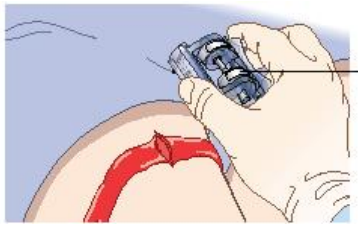


FIGURE 1

6. Align the device parallel to the length of wound edge. Position the needles about 1-2 cm (0.5 – 1 in.) from the wound edge on either side **(See Fig. 2).**

FIGURE 2

7. Press the arms of device together to close the device. Device seal will break with pressure, allowing device to close **(See Fig. 3).**

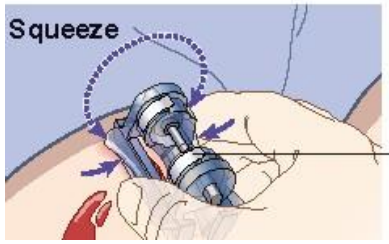
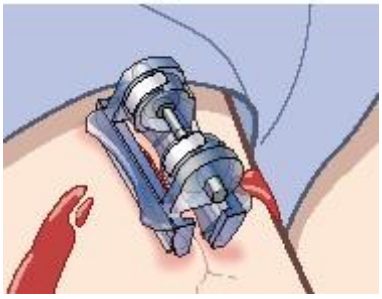


FIGURE 3

iTClamp™50 Hemorrhage Control System, continued

8. Ensure the entire wound is sealed and bleeding stops **(See Fig. 4).**

FIGURE 4



9. A gauze or compression wrap can be placed around the device on the wound to protect the device and increase pressure on the wound to limit hematoma expansion.

IF BLEEDING CONTINUES:

a. If bleeding continues while the device is in the correct position, close the device more firmly by applying further pressure to the arms of the device.

b. If bleeding continues because the wound is too large, apply a second device to the open section.

c. If bleeding continues because the device is not positioned correctly, remove the device according to instructions and reapply.

iTClamp™50 Hemorrhage Control System, continued

Removal from Skin (Two-handed operation):

1. Holding the device by the arms, press the device closed **(See Fig. 5).**

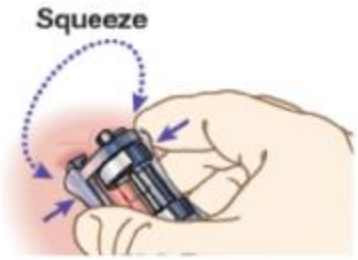


FIGURE 5

2. While maintaining pressure on the arms, press the release buttons with your other hand **(See Fig. 6).**

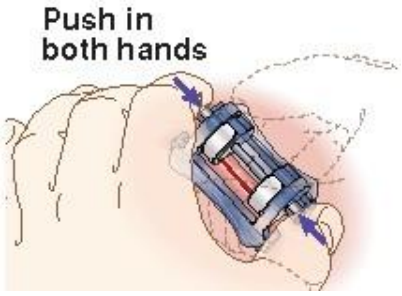
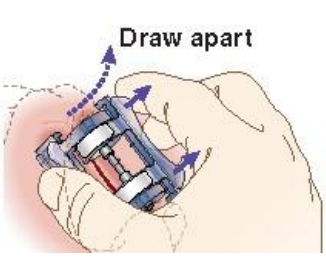


FIGURE 6

3. While pressing the release buttons, pull the arms to open the device and rotate the needles out of the wound **(See Fig. 7 and 8).**



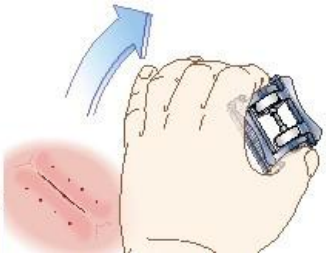
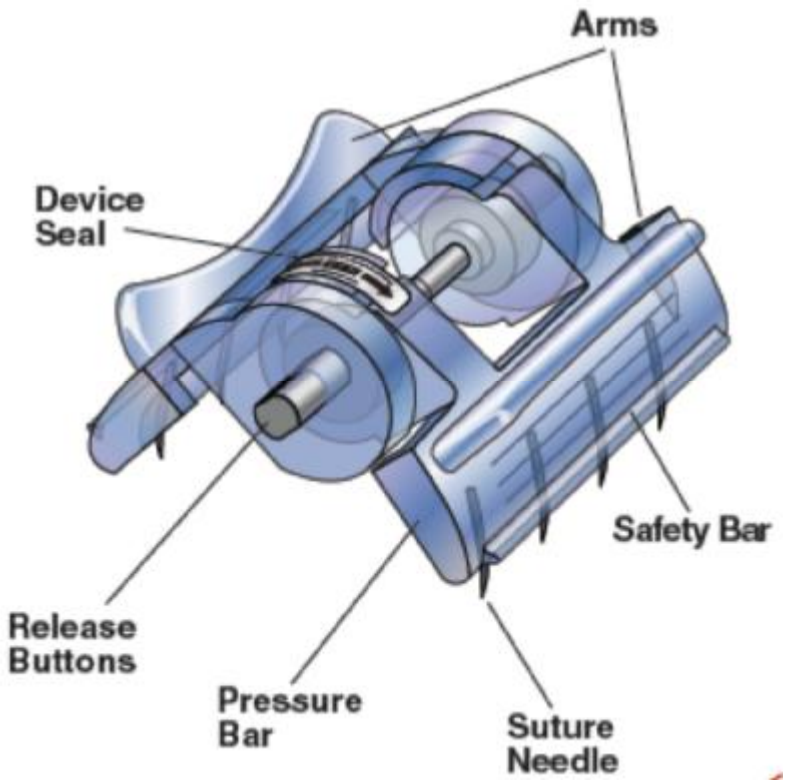


FIGURE 7 **FIGURE 8**

iTClamp™50 Hemorrhage Control System, continued

4. Dispose of the device in accordance with local guidelines for biohazard sharps.

NOTES: This device is intended for temporary use only. Patients must be seen promptly by medical personnel for device removal and surgical wound closure. If the device is being removed for readjustment purposes only, it is ready to reapply at this point.



S
KED
Kendrick Extrication Device

The KED is a device used to immobilize stable patients with suspected cervical spine injuries. This device should be applied according to manufacturer's recommendations. KED application should be practiced often to become proficient in rapid application. The KED requires a minimum of (3) three rescuers to apply.

A. Application

1. Safe scene, standard precautions.
2. Direct personnel to take c-spine control.
3. Explain procedure to patient.
4. Check P.M.S. (pulse, motor, sensory).
5. Apply appropriate size C-collar (evaluate neck before application).
6. Maintain c-spine control. Lean patient forward and place KED behind patient. (Evaluate back while patient is forward).
7. Maintain c-spine control, lean patient back.
8. Pull leg straps down to patient's side.
9. Wrap sides of board around patient and couple the bottom strap (leave loose).
10. Couple the middle strap (leave loose).
11. Adjust the board up under the arm pits by using the adjusting handles.
12. Maintaining neutral spinal alignment, gradually tighten the two lower straps.

KED, continued

13. Couple and tighten the leg straps. Pass the leg straps under the patient's legs and couple to the receiver on the opposite side of the KED. (If groin injury is suspected, the straps should be coupled to same side of the KED).

14. If indicated, pad behind patient's head.

15. Apply forehead strap.

16. Apply chin strap.

17. Couple top torso strap and tighten.

18. Check P.M.S. (pulse, motor, sensory).

19. Move patient onto long board by sliding on long axis.

20. Uncouple leg straps and lower legs.

21. Re-couple leg straps and leave loose.

22. Secure patient to long board.

23. Check P.M.S. (pulse, motor, sensory).

B. Specialized Uses (KED)

1. Pregnant patients:
The chest flaps may be folded inward, leaving the patient's abdomen exposed. Use caution in placement and tightening of the straps.

2. Pediatric Patients:
Adjustments can be made by placing blankets or towels on the patient's chest and securing the KED.

3. Fractured Hip:
Invert the KED allowing equal space above and below the hip. Use existing straps to secure the KED to body and leg.

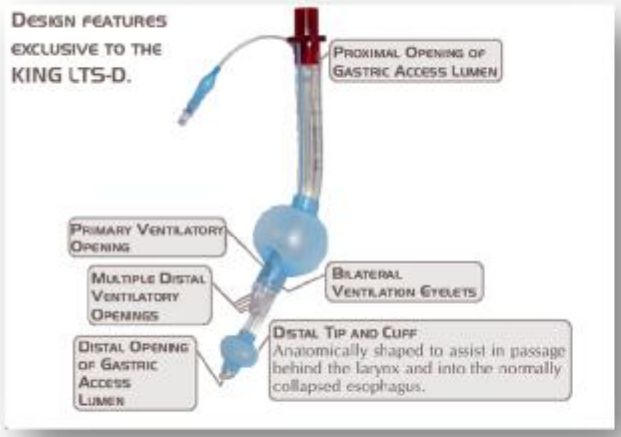
S
KED
Kendrick Extrication Device

KED, continued

4. Use with a Cardiac Monitor:
   Folding the chest flaps inward provides more chest exposure for placement of ECG electrodes, defibrillation pads and chest compressions. Defibrillation can be performed by loosening the two upper chest restraints.

T
KING LTSD Airway

The KING LTS-D is a single use device intended for airway management. It consists of a curved tube with ventilation apertures located between two inflatable cuffs. Both cuffs are inflated using a single valve/pilot balloon. The distal cuff is designed to seal off the esophagus, while the proximal cuff is intended to seal the oropharynx. Attached to the proximal end of the tube is a 15 mm connector for attachment to a standard breathing circuit or resuscitation bag.



Indications for Use:
The KING LTS-D is intended for airway management involving controlled (30 cm H_2O or higher) or spontaneous ventilation. Also indicated for difficult and emergent airway cases and is well suited for ambulatory and office-based anesthesia.

Contraindications:
The following contraindications are applicable for routine use of the KING LTS-D:

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

KING LTSD Airway, continued

Warnings:

- Does not protect the airway from the effects of regurgitation and aspiration.
- High airway pressures may divert gas either to the stomach or to the atmosphere.
- Intubation of the trachea cannot be ruled out as a potential complication of the insertion of the KING LTS-D.
- After placement, perform standard checks for breath sounds and utilize an appropriate carbon dioxide monitor as required by protocol.
- Lubricate only the posterior surface of the KING LTS-D to avoid blockage of the aperture or aspiration of the lubricant.
- The KING LTS-D in not intended for re-use.
- During transition to spontaneous ventilation, airway manipulations or other methods may be needed to maintain airway patency.

Latex-Free:
The KING LTS-D is 100% latex-free and should be considered safe to use on patients who are latex sensitive.

KING LTS-D	3	4	5
Connector Color	Yellow	Red	Purple
Recommended Patient Height	4-5 feet (122-155 cm)	5-6 feet (155-180 cm)	greater than 6 feet (180 cm)
Item #	KLTSD403	KLTSD404	KLTSD405
O.D./I.D.*	18 mm/10 mm	18 mm/10 mm	18 mm/10 mm
Cuff Pressure	60 cm H_2O	60 cm H_2O	60 cm H_2O
Gastric Tube	up to 18 Fr	up to 18 Fr	up to 18 Fr
Cuff Volume	45-60 ml	60-80 ml	70-90 ml

*Ventilation Lumen is not round, but is equivalent to a 10 mm I.D. tube, Max Tube Exchange Catheter: 19 Fr, Max Fiberoptic Bronchoscope: 6 mm OD, Minimum Mouth Opening: 20 mm

T
KING LTSD Airway

KING LTSD Airway, continued

KING LTS-D Insertion Instructions:

1. Using the information provided, choose the correct KING LTS-D size, based on patient height.

2. Test cuff inflation system by injecting the maximum recommended volume of air into the cuffs (refer to sizing information chart). Remove all air from cuffs prior to insertion.

3. Apply a water-based lubricant to the beveled distal tip and posterior aspect of the tube, taking care to avoid introduction of lubricant in or near the ventilatory openings.

4. Have a spare KING LTS-D ready and prepared for immediate use.

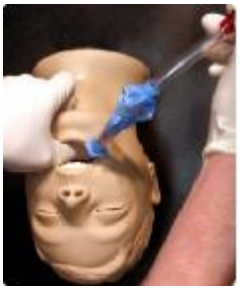
5. Pre-oxygenate.

6. For EMS/Non-Operating room Applications: Ensure gag reflex is not intact.

7. Position the head. The ideal head position for insertion of the KING LTS-D is the “sniffing position”. However, the angle and shortness of the tube also allows it to be inserted with the head in a neutral position.

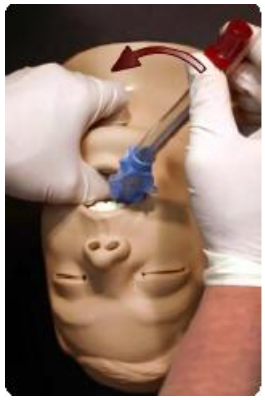
8. Hold the KING LTS-D at the connector with dominant hand. With non-dominant hand, hold mouth open and apply chin lift.

9. With the KING LTS-D rotated laterally 45-90° such that the blue orientation line is touching the corner of the mouth, introduce the tip into mouth and advance behind base of tongue. Never force the tube into position.



KING LTSD Airway, continued

10. As tube tip passes under tongue, rotate tube back to midline (blue orientation line faces chin).

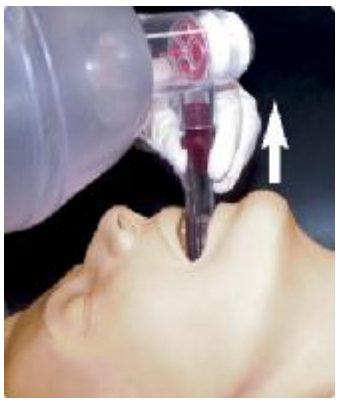


11. Without exerting excessive force, advance KING LTS-D until base of connector is aligned with teeth or gums.

12. For EMS/Non-Operating Room Applications: Fully inflate cuffs using the maximum volume of the syringe included in the EMS kit.

KING LTSD Airway, continued

13. Attach the breathing circuit or resuscitator bag to the 15 mm connector of the KING LTS-D. While gently bagging the patient to assess ventilation, simultaneously withdraw the airway until ventilation is easy and free flowing (large tidal volume with minimal airway pressure).



14. Depth markings are provided at the proximal end of the KING LTS-D which refers to the distance from the distal ventilatory openings. When properly placed with the distal tip and cuff in the upper esophagus and the ventilatory openings aligned with the opening to the larynx, the depth markings give an indication of the distance, in cm, from the vocal cords to the upper teeth.

15. Confirm proper position by auscultation, chest movement and verification of $C0_2$ by capnography.

16. Readjust cuff inflation to 60 cm of H_20 (or to just seal volume). Typical inflation volumes are as follows:
    - Size 3 45-60mL
    - Size 4 60-80mL
    - Size 5 70-90mL

17. Secure KING LTS-D to patient using tape or other accepted means. A bite block can also be used, if desired.

KING LTSD Airway, continued

Removal of the KING LTS-D:

1. Once it is in the correct position, the KING LTS-D is well tolerated until the return of protective reflexes.

2. KING LTS-D removal should always be carried out in an area where suction equipment and the ability for rapid intubations are present.

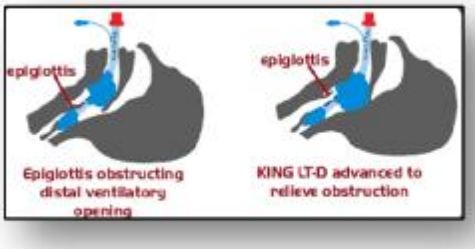
3. For KING LTS-D removal, it is important that both cuffs are completely deflated.

User Tips:

1. The key to insertion is to get the distal tip of the KING LTS-D around the corner in the posterior pharynx, under the base of the tongue. Experience has indicated that a lateral approach, in conjunction with a chin lift, facilitates placement of the KING LTS-D. Alternatively, a laryngoscope or tongue depressor can be used to lift the tongue anteriorly to allow easy advancement of the KING LTS-D into position.

2. Insertion can be also accomplished via a midline approach by applying a chin lift and sliding the distal tip along the palate and into position in the hypopharynx. In this instance, head extension may also be helpful.

3. As the KING LTS-D is advanced around the corner in the posterior pharynx, it is important that the tip of the device is maintained at the midline. If the tip is placed or deflected laterally, it may enter the piriform fossa and the tube will appear to bounce back upon full insertion and release. Keeping the tip at the midline assures that the distal tip is placed properly in the hypopharynx/upper esophagus.



KING LTSD Airway, continued

4. Depth of insertion is key to providing a patent airway. Ventilatory openings of the KING LTS-D must align with the laryngeal inlet for adequate oxygenation/ventilation to occur. Accordingly, the insertion depth should be adjusted to maximize ventilation. Experience has indicated that initially placing the KING LTS-D deeper (base of connector is aligned with teeth or gums), inflating the cuffs and withdrawing until ventilation is optimized results in the best depth of insertion for the following reasons:

U
KING Vision
Video Laryngoscopy

Product Overview and Description
The King Vision™ Video Laryngoscope is a portable, battery operated, rigid, digital video laryngoscope system that incorporates an integrated reusable display with disposable blades designed to visualize the airway while aiding in the placement of airway devices.

Product Components
The King Vision Laryngoscope consists of two primary components:

1) A durable integrated reusable display
2) Disposable blade with a channel for tracheal tube guidance

Instructions for Use:

Important: The King Vision Display must be "OFF" before attaching a blade; otherwise, the video image will become distorted. If this happens, simply turn the Display "OFF" then back "ON".

1. **Preparing the King Vision Video Laryngoscope (the Display and Blade combination) for use**
    - Select the channeled blade to be used.
    - Install the Display into the Blade (only goes together one way). Listen for a "click" to signify that the Display is fully engaged with the Blade. Note that the front and back of the parts are color-coded to facilitate proper orientation.
    - The size #3 (Adult) Channeled blade is designed to be used with standard ETT sizes 6.0 to 8.0. No stylet is needed.
        - o Lubricate the ETT, the guiding channel of the Channeled Blade and the distal tip of the Blade using a water soluble lubricant. Take care to avoid covering the imaging element of the blade with lubricant.
        - o The ETT may be preloaded into the guiding channel with its distal tip aligned with the end of the channel. Note that the ETT tip should not be evident on the screen when loaded properly. Alternatively, the ETT can be inserted into the channel after the blade has been inserted into the mouth and the vocal cords have been visualized.

U
KING Vision
Video Laryngoscopy

KING Vision Video Laryngoscopy, cont.

2. **Powering On**
    - Press the power button on the back of the King Vision Display.
    - The King Vision Display should turn “ON” immediately AND Display shows a moving image.
    - Confirm the imaging of the King Vision is working properly.

    IMPORTANT: If the LED Battery indicator light in the upper left hand corner of the King Vision Display is FLASHING RED, the battery life remaining is limited and the batteries should be replaced as soon as possible.

3. **Insertion of King Vision Blade into the Mouth**
    - Open the patient’s mouth using standard technique.
    - In the presence of excessive secretions/blood, suction the patient’s airway prior to introducing the Blade into the mouth.
    - Insert the blade into the mouth following the midline. Take care to avoid pushing the tongue toward the larynx.
    - As the Blade is advanced into the oropharynx, use an anterior approach toward the base of the tongue. Watch for the epiglottis and direct the Blade tip towards the vallecula to facilitate visualization of the glottis on the Display’s video screen. The King Vision Blade tip can be placed in the vallecula like a Macintosh blade or can be used to lift the epiglottis like a Miller blade. For best results, center the vocal cords in the middle of the Display’s video screen.
    - If the lens becomes obstructed (e.g., blood/secretions), remove the Blade from the patient’s mouth and clear the lens.
    - Avoid putting pressure on the teeth with the King Vision Video Laryngoscope.

4. **ETT Insertion**
    - After you can see the vocal cords in the center of the King Vision Display, advance the ETT slowly and watch for the cuff to pass through the vocal cords. Note that minor manipulation of the blade may be needed to align the ETT tip with the vocal cords.

KING Vision Video Laryngoscopy, cont.

User Tips for ETT Advancement into the Trachea

The most common issue associated with ETT placement with any video laryngoscope is that the blade tip has been advanced too far; there may be a good close-up image of the vocal cords, but the ETT cannot be advanced because the blade/camera is obstructing ETT passage. To address this:

a. Place the Blade tip in the vallecula or,
b. If too close to the vocal cords, withdraw the Blade slightly and gently lift in an anterior direction prior to attempting to advance the ETT

5. Blade Removal

- Stabilize/hold the ETT laterally and remove the King Vision Video Laryngoscope from the mouth by rotating the handle toward the patient's chest. As the blade exits the mouth, the ETT should easily separate from the flexible lateral opening of the channel.
- Turn off Display by pressing and holding the POWER button.

6. Separation and Disposal of the King Vision Parts after use

- After the procedure is complete, separate the King Vision Display from the Blade. Dispose of the Blade and clean/disinfect the Display.
- **NOTE: Do not dispose of the King Vision Display!**

Cleaning and Disinfecting of the Reusable King Vision Display

CAUTION:

- **Do not submerge the KING Vision Display in any liquid as this can damage the Display.**

The King Vision Display is designed for easy cleaning and disinfection. The surfaces of the Display are specifically designed to allow proper cleaning without the need for any specialized equipment or supplies.

The KING Vision Display is intended to have minimal direct patient contact during normal use.

KING Vision Video Laryngoscopy, cont

Cleaning / Disinfection Steps

If the Display is visibly soiled or contamination is suspected, follow the cleaning steps outlined below:

- To prevent liquid from entering the King Vision Display, orient the device with the video screen above the battery compartment (upright/vertical orientation).
- Prepare a mild soap/disinfecting solution. Clean the entire outer surface of the Display with the cleaning solution. A cotton swab may be used to clean the crevices of the purple sealing gasket and the ON/OFF button. Take care to avoid getting fluid inside the opening at the bottom of the battery compartment where the electrical connection is located.
- Remove the battery cover and clean the outer edge on either side of the battery compartment with a cotton swab, taking care to avoid the batteries and their contacts. Clean the battery cover.
- After cleaning, remove any residue with a damp wipe or gauze.
- Use a dry wipe/gauze to remove water or allow the device to air dry.
- Replace battery cover.
- Store the King Vision Display in the supplied storage case or other similar pouch, bag or tray to protect from the environment until it is used again.

V
LUCAS®3
Chest Compression System

The LUCAS®3 Chest Compression System is a portable tool designed to overcome problems identified with manual chest compressions. The LUCAS device assists by delivering effective, consistent and continuous chest compressions as recommended in the American Heart Association guidelines.

Intended Use
LUCAS®3 Chest Compression System is to be used for performing external cardiac compressions on adult patients who have acute circulatory arrest defined as absence of spontaneous breathing and pulse, and loss of consciousness.

Contraindications
Do NOT use the LUCAS®3 Chest Compression System in the following cases:

- If it is not possible to position LUCAS safely or correctly on the patient's chest.
- Too small patient: If you cannot enter the **PAUSE** mode or **ACTIVE** mode when the pressure pad touches the patient's chest and LUCAS alarms with 3 fast signals.
- Too large patient: If you cannot lock the Upper Part of LUCAS to the Back Plate without compressing the patient's chest.

Side Effects
Rib fractures and other injuries are common but acceptable consequences of CPR given the alternative of death from cardiac arrest. After resuscitation, all patients should be reassessed and re-evaluated for resuscitation-related injuries. Skin abrasions, bruising and soreness of the chest are common during the use of the LUCAS Chest Compression System.

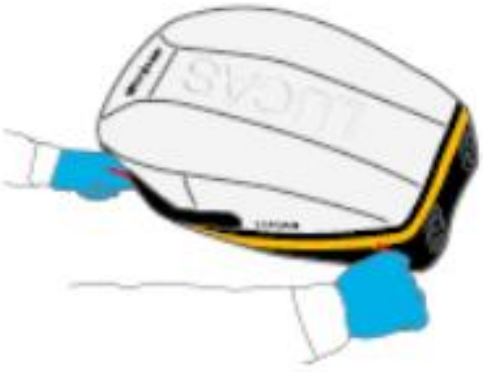
V
LUCAS®3
Chest Compression System

LUCAS®3 Chest Compression System, continued

Instructions for Use:

1. **Arrival at the patient**
   - Confirm cardiac arrest.
   - Immediately start manual compressions.
   - Continue with a minimum of interruptions.

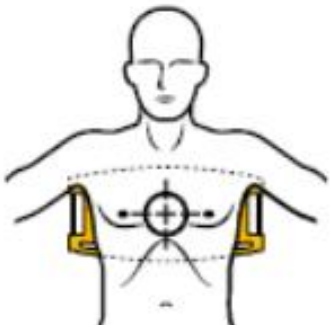
2. **Unpack LUCAS**
   - Open the Carrying Case
   - Push **ON/OFF** on the User Control Panel for 1 second to power up LUCAS in the bag and start the self-test.
   - The green LED adjacent to the **ADJUST** key illuminates when device is ready for use.



V
LUCAS®3
Chest Compression System

LUCAS®3 Chest Compression System, continued

3. **Place the Back Plate**
   Keep interruptions to CPR to a minimum when applying the LUCAS device to the patient. It is possible to deploy the device with interruptions to CPR of less than 20 seconds.
   - Remove the LUCAS Back Plate from the Carrying Case.
   - Minimize interruption to manual CPR by planning for and coordinating the placement of the back plate.
   - Make sure that you support the patient's head.
   - Pause manual CPR briefly while putting the LUCAS Back Plate under the patient, immediately below the armpits. Use one of these procedures:
   - Carefully put the LUCAS Back Plate under the patient, immediately below the armpits.
   - Resume manual CPR immediately



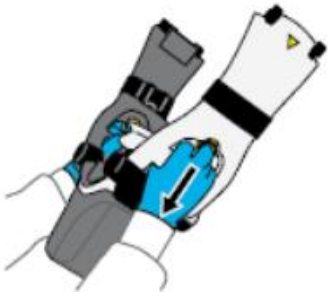
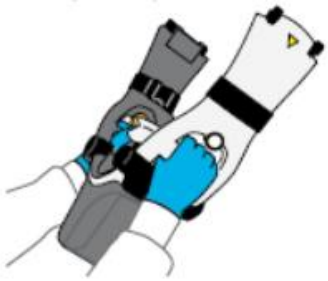
Note: An accurate position of the Back Plate makes is easier and faster to position the Suction Cup correctly.

V
LUCAS®3
Chest Compression System

LUCAS®3 Chest Compression System, continued

4. Attach the Upper Part

- Hold the handles on the support legs to remove the LUCAS Upper Part from the Carrying Case.
- Pull the release rings once to make sure that the claw locks are open.
- Let go of the release rings.

- Minimize interruptions to manual CPR by planning and coordinating the attachment and correct positioning of the Upper Part:
  - During ongoing manual chest compressions, attach the support leg that is nearest to you to the Back Plate.
  - Stop manual CPR while attaching the other support leg to the Back Plate, so that the two support legs lock against the Back Plate.
  - Listen for click. Pull up once to make sure that the parts are correctly attached.

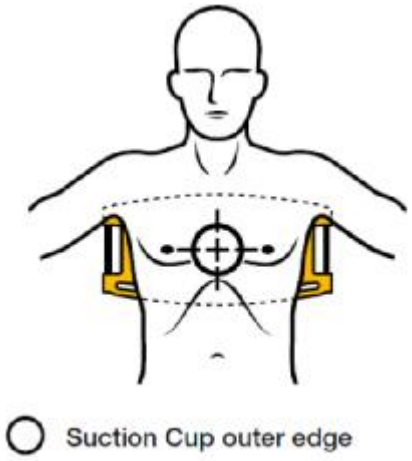

  - NOTE: If the LUCAS Upper Part does not attach to the Back Plate, make sure that the claw locks are open and that you have released the release rings.

V
LUCAS®3
Chest Compression System

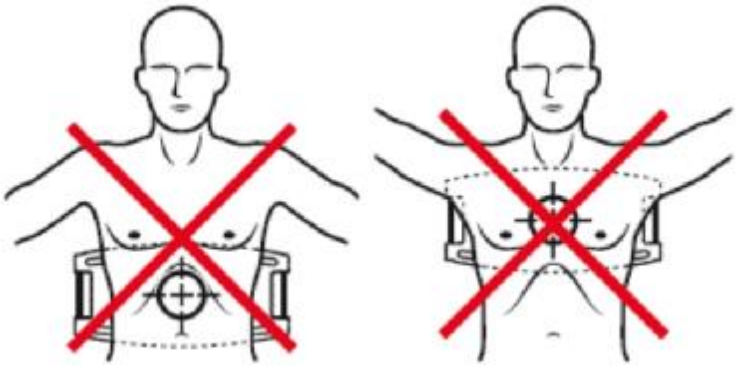
LUCAS®3 Chest Compression System, continued

5. Adjustment and Operation

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



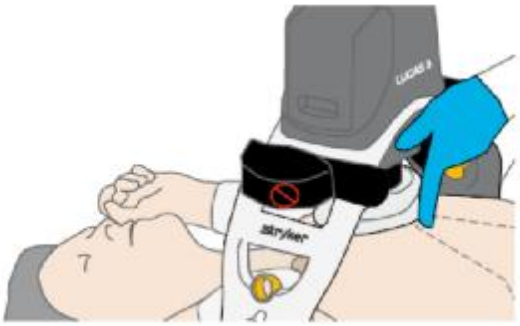
- **WARNING: Incorrect position over chest**
  - If the pressure pad is not in the correct position in relation to the sternum, there is an increased risk of damage to the rib cage and the internal organs. In addition, the patient's blood circulation may be compromised.



V
LUCAS®3
Chest Compression System

LUCAS®3 Chest Compression System, continued

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



- Adjust the height of the Suction Cup to set the Start Position
  - Make sure that the LUCAS device is in the **ADJUST** mode.
  - Push the Suction Cup down until the pressure pad touches the patient's chest without compressing the chest.

V
LUCAS®3
Chest Compression System

LUCAS®3 Chest Compression System, continued

- Push **PAUSE** to lock the Start Position

- Check for proper position. If not, push **ADJUST**, pull up the Suction Cup to readjust the central and/or height position for a new Start Position. Push **PAUSE**.
- Push **ACTIVE (continuous)** OR **ACTIVE (30:2)** to start the compressions.

· **NOTE:** If the Suction Cup is pushed down too hard, or too loose to the chest, the LUCAS device will adjust the Suction Cup to the correct Start Position.

· **NOTE:** If you let the LUCAS device stay in PAUSE mode, it will power off automatically after 30 minutes.

WARNING – Unsatisfactory Position
Immediately start manual CPR again if it is not possible to position the LUCAS device safely or correctly on the patient's chest.

WARNING – Too Small Patient
If the LUCAS device alerts with 3 fast signals when lowering the Suction Cup, and you cannot enter the PAUSE mode or ACTIVE mode. Immediately start manual compressions again.

WARNING – Incorrect Start Position
The patient's blood circulation may be compromised if the pressure pad presses down too heavily or too lightly on the chest. Push the ADJUST key and adjust the height of the Suction Cup immediately.

LUCAS®3 Chest Compression System, continued

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

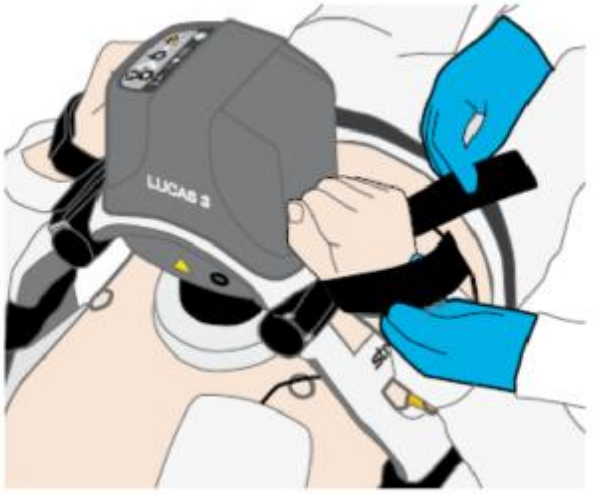
   CAUTION – Stabilization Strap application
   Delay the application of the LUCAS Stabilization Strap if this prevents or delays any medical treatment of the patient.

   - Remove the neck strap, which is a part of the Stabilization Strap, from the Carrying Case (the support legs strap of the Stabilization Strap should already be attached to the support legs).
   - Extend the neck strap fully at the buckles.
   - Carefully lift the patient's head and put the cushion behind the patient's neck. Position the cushion as near the patient's shoulders as possible.
   - Connect the buckles of the support leg straps with the buckles on the neck strap. Make sure that the straps are not twisted.

   - Hold the LUCAS support legs stable and tighten the neck strap tightly.
   - Make sure that the position of the Suction Cup is correct on the patient's chest. If it is not, adjust the position:
     - Push **ADJUST**. Release the neck strap from the support leg straps.
     - Adjust the Suction Cup position
     - When the Suction Cup is in the correct position, start the compressions again
     - Attach the neck strap again

LUCAS®3 Chest Compression System, continued

7. **Secure the patient's arms**
   When you move the patient, you can secure the patient's arms with the Patient Straps of the LUCAS device. This makes it easier to move the patient.



CAUTION – do not lift by the straps
Do not use the straps for lifting. The straps are only to fixate the patient to the LUCAS device.

CAUTION – IV / IO Access
Make sure that IV/IO access is not obstructed.

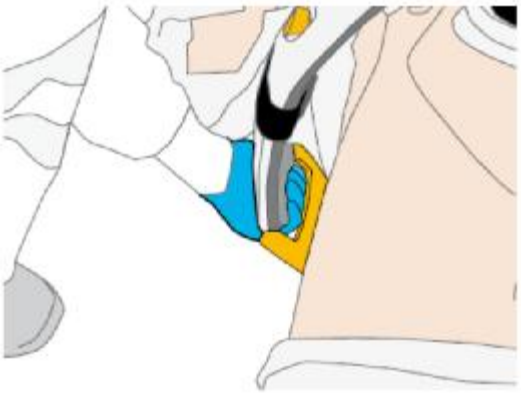
CAUTION – skin burns
The temperatures of the hood and battery may rise above 118^{O} F / 48^{O} C. If hot, avoid prolonged contact to prevent skin burns. Remove patient hands from patient straps.

V
LUCAS®3
Chest Compression System

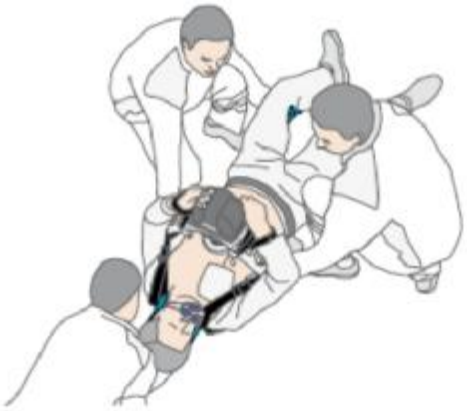
LUCAS®3 Chest Compression System, continued

8. Prepare to lift the patient

- Make a decision about what equipment you will move and where to put the transportation device.
- Those at the patient's side:
  - Put one hand below the claw locks under the support leg



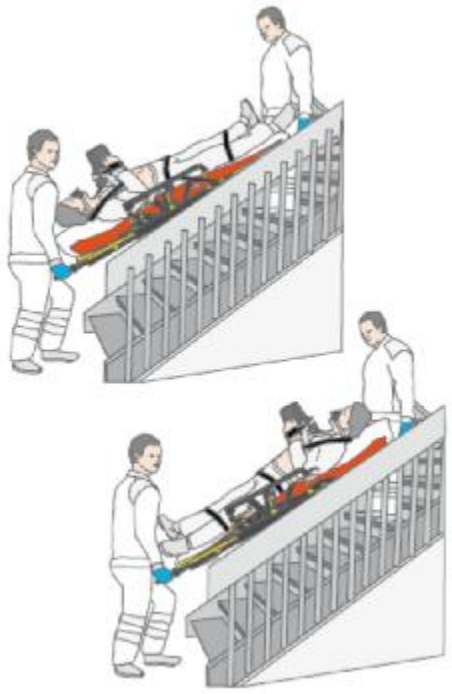
- With the other hand, hold the patient's belt, trousers or under the thigh
- Make sure that the patient's head is stable



V
LUCAS®3
Chest Compression System

LUCAS®3 Chest Compression System, continued

9. **Lift and move the patient**
   The LUCAS Chest Compression System can deliver compressions while you lift or move the patient if:
   - The LUCAS device and the patient are safely positioned on the transportation device.
   - The LUCAS device stays in the correct position and angle on the patient's chest. If necessary, adjust the position of the Suction Cup.



WARNING – Changed position during operation
If the position of the Suction Cup changes during operation or during defibrillation, immediately push **ADJUST** and adjust the position. Always use the LUCAS Stabilization Strap to help secure the correct position.

W
Nasopharyngeal Airway

The nasopharyngeal airway is a flanged disposable airway that is soft and pliable. It is used to maintain compromised airways on conscious and semi-conscious patients with a gag reflex. The airway is measured from the tip of the patient's nose to the earlobe. Nasopharyngeal airways are relatively contraindicated in severe head trauma, basal skull fractures and nasal/maxillofacial fractures.

A. Procedure

1. If no history of trauma, hyperextend the patient's head and neck.

2. Measure nasopharyngeal airway for proper size.

3. Assure or maintain effective ventilation/oxygenation.

4. Lubricate the exterior surface of the tube with a water-soluble gel to prevent trauma during insertion.

5. Push gently up on the tip of the nose and pass the tube into the right nostril. If the septum is deviated and you cannot easily insert the tube into the right nostril, use the left nostril. With the bevel oriented towards the septum, insert the tube gently along the nasal floor, parallel to the mouth. Avoid pushing against any resistance, as this may cause tissue trauma and airway kinking.

6. Verify appropriate position of the airway. Clear breath sounds and chest rise indicate correct placement.

7. Assure or maintain effective ventilation/oxygenation after airway placement.

X
Nebulized Aerosols

Drugs administered by inhalation are delivered with the aid of a small volume nebulizer. A nebulizer uses pressurized oxygen to disperse a liquid into a fine aerosol spray or mist. Inhalation carries the aerosol into the lungs. The specific design depends upon the manufacturer, but they all work on the same principle and typically have the same parts:

- Mouthpiece
- Medication reservoir
- Oxygen port
- Relief valve
- Oxygen tubing
- Oxygen source

Nebulizers can also be attached to a facemask for pediatric or adult patients who cannot hold the nebulizer.

A. Nebulizer

Procedure

1. Put medication into the medication reservoir; screw reservoir in place.

2. Assemble the nebulizer (mouthpiece vs. aero mist mask).

3. Attach oxygen tubing to the oxygen port and oxygen source.

4. Set oxygen source to 8 liters per minute.

5. Place the nebulizer in the patient's mouth (mouthpiece). Instruct patient to exhale and then seal lips around the mouthpiece. Holding the nebulizer, instruct the patient to slowly inhale deeply through the mouth. Upon maximum inhalation, instruct the patient to hold in the medication for one to two seconds before exhaling. This permits maximum deposition and absorption. Continue this process until the medication is completely gone (3-5 minutes).

6. Near the end of a nebulized treatment, condensate will need to be moved down to the bottom of the medication reservoir so it can be drawn into the siphon tube. This can be accomplished by shaking the chamber or striking the chamber with your finger tip.

7. Monitor the patient's pulse rate, ECG, pulse oximeter, color and respiratory effort for either improvement or deterioration.

B. In-Line Aerosol Delivery (Endotracheal Tube)

For a nebulizer to be effective, the patient must have an adequate tidal volume and respiratory rate. If the tidal volume is shallow or respiratory rate low, the medication will not move from the nebulizer into the lungs. For patients with a poor tidal volume/or respiratory rate who cannot pull the medication into their lungs, you can connect nebulizers to a bag-valve mask and/or endotracheal tube.

Lucas County EMS life squads carry an in-line aerosol kit which contains: (1) valved tee, (2) adaptor, (3) accordion style swivel elbow with adaptors for BVM/ATV and ET tube.

Procedure:

1. Remove contents of nebulizer set and in-line aerosol set.

2. Attach small end of valved tee (in-line aerosol set) to the large end of the swivel elbow.

3. Add medication to medication reservoir and attach valved tee assembled in #2.

4. Attach smaller end of elbow swivel to the endotracheal tube (There is a removable cap at this end for tracheal suctioning or for the introduction of medications directly into the ET tube).

5. Attach nebulizer cup to oxygen source; set at 8 liters per minute.

6. Ventilate the patient using either the ATV or BV (If using the bag-valve, oxygen need not be connected unless alternate oxygen source is available).

7. Monitor the patient's pulse rate, ECG, pulse oximeter, color and respiratory effort for either improvement or deterioration.

Nebulized Aerosols, continued

C. Nebulized Aerosol Delivery via CPAP

CPAP and nebulizers can be used together to provide better "penetration" of nebulized medications through the respiratory tract. CPAP is useful by "recruiting" additional alveoli to participate in gas exchange.

Procedure:

1. Assemble necessary equipment:
    a. 02-RESQ CPAP System
    b. Medication Nebulizer Kit
    c. Valved T-Adaptor
    d. Medication (Albuterol / Atrovent)

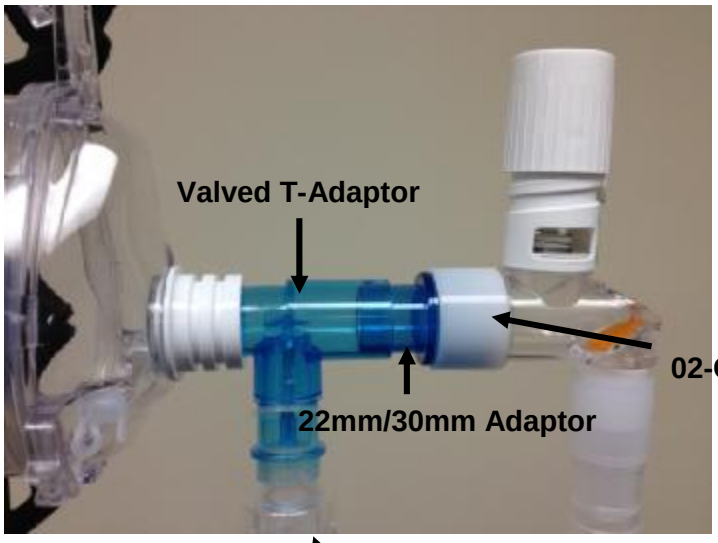
2. Attach nebulizer between the 02-CPAP valve and patient mask utilizing a valved T-adaptor and 22mm/30mm adaptor (blue) contained within the 02-RESQ CPAP system.

3. Add medication to medication reservoir.

4. Attach nebulizer cup to oxygen source; set at 8 liters per minute.

5. Set 02-CPAP valve to desired pressure (5.0/7.5/10.0cm) based upon patient condition. Assure continuous airflow through CPAP system.

6. Monitor the patient's pulse rate, ECG, pulse oximeter, color and respiratory effort for either improvement or deterioration.



Y
Needle Thoracentesis

Clinical Indications:

- Patients with hypotension (SBP < 90), clinical signs of shock, and at least one of the following signs:

    - Jugular vein distention.
    - Tracheal deviation away from the side of the injury (often a late sign).
    - Absent or decreased breath sounds on the affected side.
    - Hyper-resonance to percussion on the affected side.
    - Increased resistance when ventilating a patient.

-or-

- Patients in traumatic arrest with chest or abdominal trauma for whom resuscitation is indicated. These patients ***may*** require bilateral chest decompression even in the absence of the signs listed above.

Procedure: ARS (Air Release System) 14ga x 3.25”

1. PPE (gloves, eye protection, etc.)

2. Administer high flow oxygen.

3. Select Site:
    a. Identify the second intercostal space on the anterior chest at the midclavicular line on the same side as the injury.
    b. Cleanse the site with antimicrobial solution.

4. Remove the red cap with a twisting motion

5. Remove the ARS from case.

6. Insert the ARS into the skin over the superior border of the third rib, midclavicular line, and direct it into the intercostal space at a 90-degree angle to the chest wall. Ensure ARS entry into the chest is not medial to the nipple line and not directed toward the heart.

Needle Thoracentesis

Needle Decompression, continued

7. Insert the ARS into the pleural space. Listen for the sudden escape of air as the tension pneumothorax is decompressed.

8. Remove the needle portion of the ARS and leave the catheter in place. Secure the catheter to the chest wall with dressings and tape.

9. Secure the catheter hub to the chest wall with dressings and tape.

10. Reassess patient including breath sounds, chest excursion, respiratory/ventilatory effort, and vital signs.

11. Monitor closely for recurrence of respiratory distress. Re-development of tension pneumothorax may require attachment of syringe to the catheter to remove pressurized air, or, perform needle decompression a second time with additional ARS.

NOTE: Any chest decompression performed in the field must be reported to Lucas County EMS Dispatch for Medical Director notification.

Z
Oropharyngeal Airway

The oropharyngeal airway (oral airway) is a disposable semi-circular device used to hold the tongue away from the posterior wall of the pharynx. The oropharyngeal airway should not be used in conscious or semi-conscious patients who have a gag reflex.

A. Procedure

1. If no evidence of trauma, hyperextend the patients head and neck. Open the mouth and remove any visible obstructions.

2. Measure oropharyngeal airway for proper size (from angle of the mandible to just beyond the lips).

3. Assure or maintain effective ventilation.

4. Grasp the patient's jaw and lift anteriorly. With your other hand, hold the airway at its proximal end and insert it into the patient's mouth. Follow the curvature of the oral cavity.

5. Verify appropriate position of the airway. Clear breath sounds and chest rise indicate correct placement.

6. Assure or maintain effective oxygenation and ventilation.

AA
Orthostatic Vital Signs

Orthostatic or postural vital signs are serial measurements of blood pressure and pulse that are taken with the patient in the supine, sitting and standing positions. Results are used to assess possible volume depletion. This test is commonly performed on patients who complain of nausea, vomiting, diarrhea, GI bleed, and syncope. The results can help decide if the patient needs fluid replacement, more extensive testing or treatment.

Clinical Indications:

- Patients with suspected intravascular fluid deficit/dehydration.
- Patients ≥ 8 years of age.

Procedure:

1. Assess the need for orthostatics.

2. Obtain patient's pulse and blood pressure while in the supine position.

3. Have the patient sit for one (1) minute.

4. Obtain patient's pulse and blood pressure while sitting.
    - If a patient experiences dizziness upon sitting or is obviously dehydrated based on history or physical exam, formal orthostatic examination should be omitted and ResQGARD breathing and/or fluid resuscitation initiated.

5. Have the patient stand for one (1) minute.

6. Obtain patient's pulse and blood pressure while standing.
    - If patient is unable to stand, orthostatics may be taken while the patient is sitting with feet dangling.
    - If positive orthostatic changes occur while sitting, DO NOT continue to the standing position.

7. **If pulse has increased by 20 bpm or systolic blood pressure decreased by 20 mm Hg, the orthostatics are considered positive.**

8. Document the time and vital signs for supine and standing position in the patient care report (PCR).

BB
Pressure Infusion Bag

The pressure infusion bag may be considered for use in any environment where awkward patient position, physical location, or IV/IO placement does not allow for adequate gravity flow of IV fluid. The device is designed for use during fluid infusion only. It is not appropriate when a specific drip rate is required.

Clinical Indications:

- Inadequate gravity flow of IV fluid.

Contraindications:

- None

Notes / Precautions:

- Device is designed for use during rapid fluid infusion only. It is not appropriate when a specific drip rate is required.
- IV bag must be purged of all air before utilizing the pressure bag or there is significant risk of air embolus.
- The device consists of a sleeve that slides over an IV bag and includes a net bag for easy insertion and removal. The transparent front panel allows for easy visualization of the IV fluids.
- The sleeve has a bladder inside that is inflated using the attached bulb (similar to blood pressure cuff), to create pressure on the fluid bag.
- A large diameter stopcock allows for rapid inflation/deflation. A safety valve bleeds off excess air to eliminate the possibility of over inflation.
- The top of the bag has a loop for hanging from IV poles, carabineers, etc.
- Once inflated, the infusion bag must be checked periodically to confirm maintenance of pressure and flow.
- The pressure bag is latex free.

Procedure:

1. To purge air from the IV bag:
    - Spike the bag as usual
    - Invert the bag and squeeze to expel all of the air from the IV bag, drip chamber, and tubing.

2. Establish IV/IO.

Pressure Infusion Bag, continued

3. Place IV bag into the net pocket of the pressure infusion bag and use the oval-shaped bulb to inflate infusion bag until the desired amount of pressure has been applied.
    - Device should only be inflated after patency of the IV/IO has clearly been established.

4. Once the patient has been delivered to the receiving facility, deflate infusion bag and remove the IV fluid bag.

CC
Pulse / CO Oximetry

Pulse/CO oximetry is a noninvasive patient application that continuously measures functional oxygen saturations (Sp02) and carboxyhemoglobin (SpCO) in the blood. Continuously monitoring Sp02 can provide an early warning when oxygen saturation is decreasing and can help the clinician act rapidly before the patient develops the later signs of hypoxemia. Previously, the blood parameter SpCO could only be obtained from invasive blood gas samples. This new technology assists in identifying the often hidden conditions of carboxyhemoglobinemia (carbon monoxide poisoning). Low levels of both SpCO are normally found in the blood; however, early detection of significantly high levels can lead to proper diagnosis and treatment, and can help improve patient outcome.

Pulse oximetry is a tool to be used in addition to patient assessment. Care should be taken to assess the patient at all times; do not rely solely on SpO2 or SpCO measurements.

Do not use the pulse oximeter to monitor the patients for apnea.

Indications
Pulse/CO oximetry is indicated for use in any patient who is at risk of developing hypoxemia or carboxyhemoglobinemia. SpO2 monitoring may be used during no motion and motion conditions, and in patients who are well or poorly perfused. SpCO accuracies have not been validated under motion or low perfusion conditions.

Contraindications
None

Monitoring Considerations
The quality of the SpO2 and SpCO readings depends on correct sensor size and placement, adequate blood flow through the sensor site, and limiting patient motion and sensor exposure to ambient light. For example, with very low perfusion at the sensor site, readings may be lower than core arterial oxygen saturation.

CC
Pulse / CO Oximetry

Pulse / CO Oximetry, continued

Use the following criteria to select the appropriate pulse oximeter sensor:

- Patient size (adult, pediatric, infant) and weight
- Patient perfusion to extremities
- Patient activity level
- Available application sites on the patient's body
- Sterility requirements
- Anticipated duration of monitoring

To help ensure optimal performance

- Use a dry and appropriately sized sensor
- Choose a site that is well perfused. The ring finger is preferred.
- Choose a site that least restricts patient movement, such as finger of the non-dominant hand.
- Be sure the fleshy part of the digit completely covers the detector
- Keep the sensor site at the same level as the patient's heart
- Apply the sensor according to the directions for Use
- Observe all warnings and cautions noted in the directions for Use

Factors which may reduce the reliability of the pulse/CO oximetry reading include:

a. Poor peripheral circulation (blood volume, hypotension, hypothermia).
b. Excessive pulse/CO oximeter sensor motion.
c. Fingernail polish (may be removed with acetone pad).
d. Carbon monoxide bound to hemoglobin.
e. Irregular heart rhythms (atrial fibrillation, SVT, etc.)
f. Jaundice
g. Placement of BP cuff on same extremity as monitoring probe.

DD
ResQCPR™ System
(ACD-CPR + ITD)

The ResQCPR™ System includes the following two components:

1. **ResQPUMP® ACD-CPR Device**
2. **ResQPOD® ITD 16**

Indications for Use:
The ResQCPR System is intended for use as a CPR adjunct to improve the likelihood of survival in adult patients (≥ 16 years of age) with non-traumatic cardiac arrest.

ResQCPR System Component: ResQPUMP ACD-CPR Device
The ResQPUMP is a multi-use, hand-held device that includes a suction cup for attachment to the patient's chest (with clothing removed), and a handle for the rescuer to hold onto.

The ResQPUMP **enables the rescuer to perform active compression-decompression cardiopulmonary resuscitation (ACD-CPR),** which differs from standard CPR. During ACD-CPR, the chest is actively re-expanded (decompressed) after each compression; with standard CPR, the chest re-expands passively. The ResQPUMP design allows the operator to use the same body position and compression technique as in standard CPR. Active chest decompression is achieved when the rescuer maintains a firm grip on the ResQPUMP, bends at the waist and pulls his or her body weight upwards after compression. The suction cup sticks to the chest and transfers the lifting force to the middle of the ribcage. Compression force is transferred to the chest as in standard CPR via the device's piston. The handle includes a force gauge that displays the forces exerted during both chest compression and decompression (chest wall recoil). The ResQPUMP has a battery-powered metronome integrated into the handle to guide the rescuer in the appropriate compression/decompression rate. The metronome emits two-tone signals of the same duration, one low and one high pitch tone. The signal (set at 80/minute) guides the rescuer to compress and decompress at the appropriate rate and for equal amounts of time (50% duty cycle).

If suction difficulties occur, adjust the angle of the ResQPUMP on the chest to obtain an adequate seal. It may be necessary to shave hair from the middle of the chest to achieve good suction. NOTE: If suction difficulties persist, the ResQPUMP can still be used for compressions without causing additional harm to the patient, as long as it does not distract from CPR quality.

DD
ResQCPR™ System
(ACD-CPR + ITD)

ResQCPR System, cont.

ResQCPR System Component: ResQPOD ITD 16

The ResQPOD ITD 16 is a non-sterile, single patient use, disposable impedance threshold device (ITD) that **limits passive air entry into the lungs during the chest wall recoil (decompression) phase of CPR**, thereby reducing intrathoracic pressure when rescuers are not providing a breath. Lowered intrathoracic pressure results in greater venous return (preload) which, in turn, results in greater cardiac output on the subsequent compression. It is inserted into the airway circuit between the patient and the ventilation source, and can be used with either a facemask or advanced airway (e.g. endotracheal [ET] tube). The ResQPOD may be used with standard ventilation sources (e.g. bag-valve or demand-valve resuscitators, rescuer's mouth, automated ventilator). It does not restrict the patient's ability to exhale, nor the rescuer's ability to ventilate. The ResQPOD allows the rescuer to provide periodic positive pressure ventilation while impeding passive inspiratory gas exchange during the chest recoil phase. The ResQPOD ITD 16 includes a safety check valve that allows inspiration at -16 cmH2O. The check valve is a design safety feature in the event that the patient begins to breathe independently while the device is in place within the airway circuit. Timing assist lights provide guidance to the rescuer on the proper ventilation rate for a patient.

Procedure for ResQCPR System Use:

1. Assure the patient is pulseless and that resuscitation is indicated.

2. Place ResQPUMP; turn on metronome and begin performing compressions to appropriate depth (2" or 5 cm) at rate of 80/min.

3. Attach ResQPOD to facemask as soon as chest compressions begin; whenever possible use a 2-handed technique to maintain a tight facemask seal and airway position.

4. Continue to provide continuous chest compressions at 80/min. Do not pause compressions for ventilations. Turn on ResQPOD timing assist lights and provide asynchronous ventilations; ventilate once (over one second until chest rises) each time light flashes (10/min).

5. Rotate ACD-CPR duties every two minutes to avoid fatigue.

ResQCPR System, cont.

6. Once an advanced airway (e.g. ET tube, KING Airway) is placed:
    - Confirm tube placement and secure by appropriate method
    - Move the ResQPOD to the airway (timing lights: ON)
    - Provide asynchronous ventilations; ventilate once (over one second until chest rises) each time light flashes (10/min).
    - Perform continuous chest compressions at 80/min. Do not pause compressions for ventilations.

7. If the patient has a return of spontaneous circulation (ROSC), the ResQPOD should be immediately removed from the airway circuit and use of the ResQPUMP should be discontinued. If the patient re-arrests, resume use of the ResQCPR System immediately.

NOTE: ***Signs and symptoms of improved cerebral blood flow (e.g. eye opening, gagging, spontaneous breathing, and limb or body movement) have been reported in patients without a spontaneous pulse but who are undergoing resuscitation with the ResQCPR System. If these are noted, check quickly to see if a spontaneous pulse has returned. If the patient remains in cardiac arrest, continue resuscitation with the ResQCPR System and gently restrain the patient as necessary to continue resuscitative efforts. If a spontaneous pulse has returned, discontinue ResQCPR.***

Ensuring High-Quality CPR with the ResQCPR System:

- Check the ResQPUMP's force gauge at regular intervals to ensure that the appropriate forces needed to compress and decompress are being delivered.

- Use the ResQPUMP's metronome as a guide for compressing and decompressing at the rate of 80/min. NOTE: This rate is slightly slower than the rate recommended for standard CPR in order to allow sufficient time for blood return to the chest, and to reduce rescuer fatigue.

- Rotate ACD-CPR duties every two minutes to avoid fatigue.

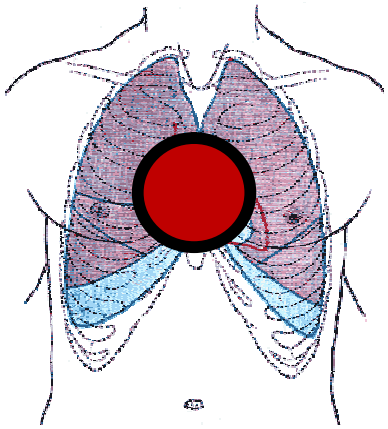
- Avoid unnecessary interruptions.

DD
ResQCPR™ System
(ACD-CPR + ITD)

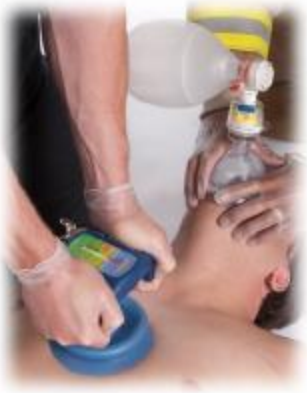
ResQCPR System, cont.

Instuctions Related to Use of the ResQPUMP:

ResQPUMP Positioning: The ResQPUMP's compression point is the same as for standard manual CPR. Position the suction cup in the middle of the sternum between the nipples (mid-nipple line). Make sure that the edge of the suction cup does not extend below the xiphoid process, as this could result in inadequate suction and/or rib injury.



RESCUER POSITION: Kneel close to the patient's side. For optimal position, shorter rescuers may find it beneficial to be slightly elevated by kneeling on padding. If the patient is in bed (with hard surface under torso), it will be necessary to kneel next to the patient or stand on a platform of sufficient height. Grasp the ResQPUMP's handle with both hands, placing the heels of the hands near the gauge with wrists slightly bent.



DD
ResQCPR™ System
(ACD-CPR + ITD)

ResQCPR System, cont.

COMPRESSIONS WITH THE RESQPUMP: Compress the chest to the recommended depth (e.g. 2" or 5 cm), observe the force required to achieve that depth, and then use that force target as a guide. The amount of force required will vary according to how compliant the chest is. Compress with shoulders directly over the sternum, with arms outstretched and elbows locked. Use the large thigh muscles to compress, bending at the waist. Compress at a rate of 80/min and use the metronome to guide the compression rate. Start and stop the metronome by pressing the red button on the force gauge. Compress the chest on one tone and lift on the other tone. **Note: The compression rate using the ResQPUMP (80 compressions per minute) is different than the current AHA-recommended rate of 100-120 compressions per minute for standard C P R.**

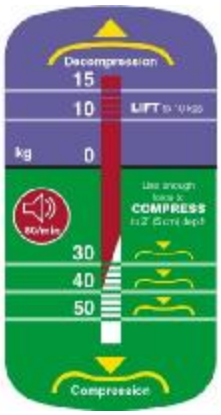
DD
ResQCPR™ System
(ACD-CPR + ITD)

ResQCPR System, cont.

COMPRESSION FORCE: The red arrow tip indicates the force being applied. The approximate amount of force required to compress the chest two inches (5 cm) is as follows:

- 30 kg (≈ 65 lb) of force: soft/supple chest
- 30 - 40 kg (≈ 65 - 90 lb) of force: chest of medium/average compliance
- 50 kg (≈ 110 lb) of force: stiff/rigid chest

Once it has been determined how much force is required to compress the chest to the appropriate depth, use that amount of force as a guide for continued compressions.



DECOMPRESSIONS WITH THE RESQPUMP: To provide active decompression, use the large muscles in the thighs to lift, bending at the waist.

DD
ResQCPR™ System
(ACD-CPR + ITD)

ResQCPR System, cont.

DECOMPRESSION FORCE: Decompress (lift) the chest until the tip of the red arrow on the force gauge registers -10 kg (≈ –20 lb.) of force. This amount of upward force must be exerted to fully achieve the benefits of active decompression. Closely monitor the force gauge and suction cup seal during use. If the suction cup dislodges, reposition it with the next compression; then, on the next decompression, lift until just before the suction cup releases but do not exceed -10 kg (≈ -20 lb.) of lift. Use a 50% duty cycle, spending equal time compressing and decompressing.

SUCTION CUP REMOVAL: Lift up an edge of the suction cup lip to release the vacuum under the cup. This will free the cup from the patient's chest.

TROUBLESHOOTING:

1. If suction difficulties occur, adjust the angle of the ResQPUMP on the chest to obtain an adequate seal. It may be necessary to shave hair from the middle of the chest to achieve good suction. NOTE: If suction difficulties persist, the ResQPUMP can still be used for compressions (with the metronome disabled) without causing additional harm to the patient, as long as it does not distract from CPR quality.

2. Rib fractures can occur with any method of CPR, even if performed correctly. If it appears that rib fractures have occurred, check to make sure the suction cup is properly positioned and that compression depth is appropriate. The occurrence of rib fractures is not sufficient reason to discontinue ACD-CPR.

3. If there are questions about whether the ResQPUMP is functioning properly, consider discontinuing its use and perform standard manual CPR instead.

DD
ResQCPR™ System
(ACD-CPR + ITD)

ResQCPR System, cont.

INSTRUCTIONS RELATED TO THE USE OF THE RESQPOD ON A FACEMASK

1. It is important to insert the ResQPOD into the ventilation circuit as soon as chest compressions begin. In most cases this will involve placement on a facemask; however, never delay the initiation of chest compressions while waiting to place the ResQPOD.

2. Attach the ResQPOD to the facemask.

3. **Obtaining and maintaining a tight facemask seal throughout both chest compressions and ventilations is critical.** To achieve this, spread out the cushion of the mask.

4. Use a two-handed technique to maintain proper airway positioning and obtain a tight facemask seal. Place the facemask onto the patient, covering the nose and mouth. Obtain a tight facemask seal by either:
    a) Using the thumb and base of the palm; or
    b) Forming a "C" with thumb and index finger.

5. Place the remaining fingers on the bony part of the lower jaw and lift the lower jaw to the facemask. Do not push the facemask into the face to try and obtain a seal.

6. Tilt the head back and continue to lift the lower jaw to the mask.

7. Attach the ventilation source to the top of the ResQPOD.

8. To perform continuous chest compressions and ventilate asynchronously with a facemask, the timing lights will be turned on and the rescuer should provide a positive pressure ventilation on the upstroke of ACD-CPR every time the light flashes.

9. The ResQPOD is disposable and intended for single patient use. Cross contamination may occur if the device is used on multiple patients.

DD
ResQCPR™ System
(ACD-CPR + ITD)

ResQCPR System, cont.

INSTRUCTIONS RELATED TO USING RESQPOD ON AN ADVANCED AIRWAY

1. Insert the advanced airway and confirm tube placement. Secure the tube with a commercial tube restraint device.

2. Attach the ResQPOD to the top of the airway and attach the ventilation source to the top of the ResQPOD; avoid interrupting CPR to do this.

3. Turn on the timing assist lights. To activate, slide the ON/OFF switch to the ON position.

4. Perform ResQCPR with continuous chest compressions (no pauses for ventilations). Ventilate asynchronously when the timing lights flash (10/min) and over proper duration (e.g. one second) until the chest rises.

5. If an end-tidal carbon dioxide detector is used, place it in the airway circuit between the ResQPOD and the ventilation source.

ADDITIONAL INSTRUCTIONS

1. If there is a return of spontaneous circulation (e.g. palpable pulse) and chest compressions are no longer indicated, immediately remove the ResQPOD from the airway circuit. Failure to do so may cause shortness of breath and difficulty breathing. Support respirations as indicated.

2. Immediately replace the ResQPOD in the ventilation circuit if the patient re-arrests and chest compressions are again indicated.

3. If vomit or secretions enter the ResQPOD, remove the ResQPOD from the facemask or airway adjunct and use the ventilation source to clear the material from the ResQPOD. Suction the patient as needed, then re-attach the ResQPOD and resume use. Discontinue use of the ResQPOD if it cannot be cleared or if positive pressure ventilation is compromised in any way with the device in place.

DD
ResQCPR™ System
(ACD-CPR + ITD)

ResQCPR System, cont.

ENSURING HIGH QUALITY CPR WITH THE RESQCPR SYSTEM

- Check the ResQPUMP's force gauge at regular intervals to ensure that the appropriate forces needed to compress and decompress are being delivered.

- Use the ResQPUMP's metronome as a guide for compressing and decompressing at a rate of 80/min. NOTE: This rate is slightly slower than the rate recommended for standard CPR in order to allow sufficient time for blood to return to the chest, and to reduce rescuer fatigue.

- Rotate ACD-CPR duties every 2-minutes to avoid fatigue.

- Use the ResQPOD's timing assist lights to guide the proper ventilation rate. Ventilate over one second duration and do not hyperventilate.

- Avoid any unnecessary interruptions.

CARE AND MAINTENANCE OF THE RESQCPR SYSTEM

The ResQPOD is intended for single patient use only and should be discarded after use. Failure to do so may cause cross contamination between patients. The ResQPUMP should be cleaned and disinfected after every use.

- **ResQPUMP Cleaning:** To clean the handle, wipe with damp cloth and mild detergent. The suction cup may be replaced with a new suction cup, or cleaned. To clean the suction cup, wash it with a mild detergent and rinse with tap water. NEVER immerse the handle in water or autoclave to clean. Doing so may cause permanent damage.

- **ResQPUMP Chemical Disinfection:** The handle and suction cup may be chemically disinfected after washing. Wipe the cup and handle with a bleach solution (5% chlorine, minimum). Wipe the handle with a dampened cloth to remove chemical residue. Do NOT immerse the handle. The cup may be rinsed with water. Wipe with a clean dry cloth and allow to air dry.

ResQCPR System, cont.

- **ResQPUMP Function Testing:** Before placing the ResQPUMP into service and following each use, the following functional tests should be performed:

    1. Inspect the handle and suction cup for visible damage. Do not use the ResQPUMP if there is obvious damage to the suction cup or handle. NOTE: Replacement suction cups are available from the LCEMS Annex.

    2. Compress the ResQPUMP against a smooth hard surface with approximately 50 kg of force, using the force gauge on the ResQPUMP as a guide. Observe for an increasing gauge reading.

    3. Pull up on the handle with approximately 10 to 15 kg of force, using the decompression force gauge as a guide. Observe for a decreasing gauge reading and check for proper suction. The gauge should move smoothly within the compression and decompression ranges.

    4. Ensure that the force gauge reads zero when no force is applied. If it does NOT read zero, contact LCEMS Annex for force gauge calibration.

    5. Assess the metronome's battery level by pressing on the metronome button for more than three seconds. If the battery is okay, first, a long high-note beep will be heard, followed by three short beeps. If one long low-note beep is heard, or if no beep is heard, the device should be replaced as well.

FORCE GAUGE CALIBRATION

If the zero reading of the force gauge has drifted away from the zero line, the gauge should be adjusted or re-calibrated. Contact the LCEMS Annex for any necessary adjustments that are needed.

EE
ResQGARD
Impedance Threshold Device

The ResQGARD is an impedance threshold device (ITD) that provides therapeutic resistance to inspiration in spontaneously breathing patients. During inspiration, a negative pressure (created from expansion of the thorax) draws air into the lungs. When inspiratory impedance is added to the ventilation circuit, it enhances the negative pressure (vacuum) in the chest, which pulls more blood back to the heart, resulting in increased preload and thus, enhanced cardiac output on the subsequent cardiac contraction. The ResQGARD provides therapeutic benefit as soon as it is placed into the circuit and may be helpful in establishing intravenous access.

Clinical Indications:

- Spontaneously breathing patients ≥ 25 lbs (≥12Kg). who are experiencing symptoms of low blood circulation or hypotension (< 100 mm Hg [adults]; < 90 mm Hg [children]), which can be secondary to a variety of causes such as:
  - **Hypovolemia**
    - Internal hemorrhage
    - External hemorrhage
    - Dehydration
  - **Trauma-Related Hypovolemia**
    - Abdominal trauma (penetrating /blunt)
    - Extremity trauma (penetrating / blunt)
  - **Hypotension**
    - Dialysis
    - Sepsis
    - Orthostatic intolerance
    - Medication reaction

Contraindications:

- Patients < 25 lbs (< 12Kg).
- Penetrating / blunt chest trauma
- Patients with flail chest
- Patients with ongoing, known uncontrolled blood loss
- Shortness of breath, respiratory insufficiency
- Congestive heart failure (active pulmonary edema)

EE
ResQGARD
Impedance Threshold Device

Impedance Threshold Device (ResQGARD), continued

Contraindications (Relative):

- Blood loss of unknown rate
  - In the situation where life-threatening bleeding is not under control, the ResQGARD may accelerate bleeding. For this reason it is important to have bleeding under control before applying the ResQGARD. In cases where the rate of blood loss is unclear, the recommendation is to use the ResQGARD as you would a fluid challenge in the field (i.e., if a fluid challenge is indicated, then the ResQGARD would be too). If it is believed that the administration of fluids would worsen bleeding and "permissive hypotension" is desired (i.e., maintaining systolic BP at 90), then the ResQGARD should not be used. Since the use of an ITD may be fluid-sparing and can be discontinued immediately, a trial application of the ResQGARD may be considered.

Notes / Precautions:

- The safety and effectiveness in persons suffering from arterial stenosis or asthma has not been established.
- Prolonged use for more than 30 minutes has not been clinically evaluated.
- If respiratory distress develops during use of the ResQGARD, immediately discontinue use.
- With a patient complaint of nausea and/or vomiting, the ResQGARD should only be used with the facemask w/o strap to allow for easy removal.

Procedure for Field Application:

- <u>Using the ResQGARD on a facemask</u>:
  1. Identify the need for ResQGARD application (indication for use).
  2. Reassure patient; positioning as necessary.
  3. Vital signs (evaluate P, RR, and BP).
  4. Apply cardiac monitor.
     - i. Acquire automated BP prior to ResQGARD use.
       - a. If automated BP analysis is not available, acquire manual or palpated BP (monitor BP before, during, and after ResQGARD use).
     - ii. Attach pulse oximeter probe for continuous $Sp0_2$ monitoring before, during, and after ResQGARD use.

EE
ResQGARD
Impedance Threshold Device

Impedance Threshold Device (ResQGARD), continued

5. Connect the ResQGARD with $EtC0_2$ filterline to vented facemask provided; make sure all pieces fit together snugly.

6. Explain to the patient that the device will make it slightly more difficult to take a breath but that the resistance is what may make them feel better.

7. Gently (but firmly) hold the ResQGARD over the nose and mouth (or have the patient hold), establishing and maintaining a tight face seal with the facemask. The head strap (e.g., ResQSTRAP) may be used if the patient does not want to hold the ResQGARD in place except in case of nausea and/or vomiting.

8. Attach $EtC0_2$ filterline to LP12/15 (if available) for continuous capnometric/capnographic analysis.

9. Have patient breathe in slowly (over 2-3 seconds) and deeply; exhale normally. Breathe at a rate of 10-16/minute.

10. If supplemental oxygen is used, attach the tubing to the oxygen port on the ResQGARD and deliver 1-15 liters per minute. Do not exceed 15 lpm.

11. Explain to the patient that the device will make it slightly more difficult to take a breath but that the resistance is what may make them feel better.

12. Attach $EtC0_2$ filterline to LP12/15 (if available) for continuous capnometric/capnographic analysis.

Special Patient Considerations:

A. In a patient without intravenous (IV) access, applying the ResQGARD may make it easier to establish an IV because of the improvement in blood pressure. The ResQGARD should be used in conjunction with other indicated treatments for hypotension (e.g., fluids, vasopressors, patient positioning). Once the patient is feeling better and the blood pressure has stabilized and risen to an acceptable level (e.g. > 110 mm Hg in adults), it is recommended that you continue ResQGARD treatment for approximately 10 minutes before discontinuing its use. Frequently assess the patient and vital signs for returning symptoms of hypotension. If the patient begins to decompensate, the ResQGARD should be re-applied.

Impedance Threshold Device (ResQGARD), continued

B. If the ResQGARD has been applied in the field, and transport is indicated, the ResQGARD should be removed from the patient upon transfer to the ED staff. The ResQGARD should not be left in the hands of untrained healthcare providers.

C. In the setting of orthostatic intolerance, ResQGARD use may result in improved blood pressure and patient presentation without the use of cojunctive therapies (i.e., fluid, vasopressors, patient positioning). Once the patient is feeling better and the blood pressure has stabilized and risen to an acceptable level, ResQGARD treatment should continue for approximately 10 minutes before discontinuing its use. Reassess the patient's vital signs frequently (minimum of 3 measurements) after ResQGARD use, including orthostatic measurements of pulse and blood pressure. The orthostatic intolerant patient, who after adequate assessment maintains a stabilized blood pressure and pulse after ResQGARD discontinuation, may not require transport by a life squad. All details of patient assessment/treatment before, during and after ResQGARD use must be included in the patient care report (PCR).

D. The ResQGARD is single-patient use only.

E. Serial blood pressures every 5 minutes, pulse oximetry, and continued patient assessment are necessary for evaluating ResQGARD effectiveness.

FF
ResQPOD
Impedance Threshold Device

The ResQPOD is an impedance threshold device that prevents air from entering the chest during CPR. When air is prevented from rushing into the lungs as the chest wall recoils, the vacuum (negative pressure) in the thorax is greater. This enhanced vacuum pulls more blood back to the heart, doubling blood flow during CPR. Studies have shown that this mechanism increases cardiac output, blood pressure and survival rates.

Clinical Indications:

- The ResQPOD should be utilized to assist with control of ventilatory rate and improve cardiac preload for patients (> 1 year of age) who are receiving CPR.
- It may be utilized with an endotracheal tube, KING airway, tracheostomy tube, or with a BV/Mask.

Contraindications:

- Not to be used on patients with spontaneous circulation. It should be removed from the respiratory circuit once spontaneous circulation is achieved.
- Flail chest
- Pediatrics < 1 year of age

Notes / Precautions:

- Remove the ResQPOD if a pulse returns.
- Avoid unnecessary delays or interruptions in chest compressions.
- Remove secretions from ResQPOD by shaking or blowing out with the ventilation source.
- Timing assist light can be used to guide the ventilation rate. Separate timing assist light packaged with ResQPOD can be used to guide appropriate chest compression rate.
- Do not give medications through the ResQPOD. Instill through ET only.

ResQPOD attached to BVM (Procedure):

1. With oral/nasal airway in place, attach ResQPOD to mask.

2. Start CPR at age-appropriate ratio of compressions to ventilations.
3. Maintain tight mask seal throughout ventilation with bag-valve device.

FF
ResQPOD
Impedance Threshold Device

Impedance Threshold Device (ResQPOD), continued

ResQPOD attached to advanced airway (Procedure):

1. Confirm tube placement; secure with commercial tube restraint.
2. Connect ResQPOD directly to ET, King airway, or tracheostomy tube.
3. Connect adapter to ventilation port of ResQPOD.
4. Connect $EtC0_2$ filterline to adapter; filterline attached to monitor (LP12/15).
5. Connect ventilation source (bag-valve device or ATV).
6. Perform continuous chest compressions.
7. Turn on ResQPOD timing assist lights. Ventilate asynchronously at timing light flash rate.
8. Upon return of spontaneous circulation (ROSC), and $EtC0_2$ > 40 mm Hg, remove the ResQPOD from the ventilation circuit. In the event that spontaneous circulation is lost, re-attach the ResQPOD to the advanced airway and utilize as outlined above.
9. Carefully monitor placement of the advanced airway after movement of the patient, placement of the ResQPOD, and/or removal of the ResQPOD.
10. Document the ResQPOD procedure and results in the patient care report (PCR).

GG
Restraints

Clinical Indications:

Any patient who may harm himself/herself or others may be restrained to prevent injury to the patient or crew. This restraint must be in a humane manner and used only as a last resort. Other means to prevent injury to the patient or crew must be attempted first. These efforts could include reality orientation, distraction techniques, or other less restrictive therapeutic means. Physical or chemical restraint should be a last resort technique.

Procedure:

1. Attempt less restrictive means of managing the patient.

2. Ensure that there are sufficient personnel available to physically restrain the patient safely.

3. Restrain the patient in a lateral or supine position. No devices such as backboards, splints, or other devices will be on top of the patient. The patient will **never** be restrained in the prone position.

4. The patient must be under constant observation by the EMS crew at all times. This includes direct visualization of the patient as well as cardiac and pulse oximetry monitoring.

5. The extremities that are restrained will have a circulation check at least every 10 minutes. The first of these checks should occur as soon after placement of the restraints as possible. Document findings on the PCR.

6. If the above actions are unsuccessful, or the patient is resisting the restraints, consider administering medications per protocol. (**Tab 900, Behavioral / Agitated Delirium Protocol, Section F).**

7. If a patient is restrained by law enforcement personnel with handcuffs or other devices EMS personnel cannot remove, a law enforcement officer must accompany the patient to the hospital in the transporting EMS vehicle.

HH
SAM Chest Seal

The SAM® Chest Seal is an occlusive dressing designed to treat open chest wounds, a life-threatening situation that could lead to tension pneumothorax. The featured hydrogel adhesive allows for the ability to reseal, making it ideal for venting. The SAM® Chest Seal includes a large coverage area and the inclusion of a highly and rapidly absorbent 5” x 9” pad to help clean the wound.

The SAM® Chest Seal features a one-way valve when its cap is removed. This provides for low-resistance flow of air out of the chest cavity while preventing ingress. The valve is also designed to prevent blockage internally. With the cap in place, the dressing is occlusive.

The vacuum-sealed pouch has tear notches at each side, but can also be peeled to provide the medic with a sterile field.

The SAM® Chest Seal is 9.2” x 7.6” and includes a 5” x 9” pad to clean and dry the wound.

Procedure:

1. Open package and remove 5” x 9” pad. Clean and dry the area around the chest wound.

2. Grip tab and remove clear liner.

3. Place dressing, adhesive side down, centered over the wound.

4. Press dressing firmly to ensure adhesion.

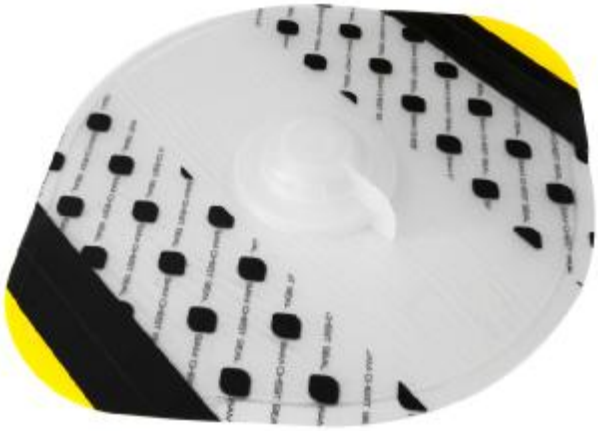
5. Lift and remove cap for one-way valve operation. (Reattaching cap will stop one-way valve operation).

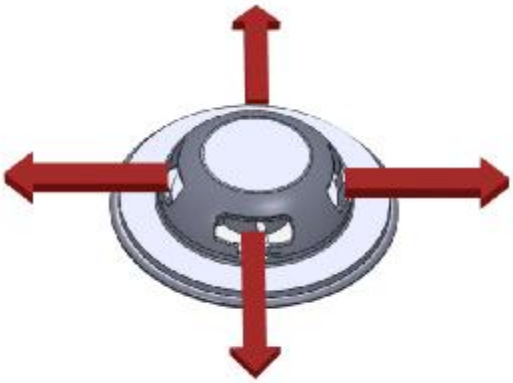
6. One or both tabs can be used to facilitate placement, or lifting/removal of dressing.

7. Remove dressing using standard dressing removal protocol.

HH
SAM Chest Seal

SAM® Chest Seal, cont.





II
Spinal Motion Restriction

Low-Risk Characteristics / Mechanisms

- Simple rear-end collision
- Ambulatory on scene at any time
- No neck pain on scene
- No midline cervical tenderness

THESE LOW-RISK FACTORS ALLOW SAFE OMISSION OF SMR IN PATIENTS WITH GCS = 15

High-Risk Characteristics / Mechanisms

- Age > 65
- Trauma triage criteria
- Axial loads / diving injuries
- Sudden acceleration/deceleration, lateral bending forces to neck/torso
- Violent impact to head, neck, torso, pelvis
- Numbness, tingling, paresthesias

IF ANY OF THE ABOVE, STRONGLY CONSIDER SMR

Potential mechanism for unstable spine injury?

Yes

Altered LOC (GCS < 15)? Unreliable interaction?

All No

Any Yes

Possible spine injury Apply SMR

Spinal Tenderness?
OR
Anatomic deformity of spine?
OR
Neurologic deficit or complaint?

All No

Any Yes

Possible spine injury Apply SMR

Omit SMR

Unreliable Patient Interactions

- Language barriers, inability to communicate
- Lack of cooperation during exam
- Evidence of drug/alcohol intoxication
- Painful distracting injury such as long-bone fracture

Motor / Sensory Exam

- Wrist / hand extension bilaterally
- Foot plantarflexion bilaterally
- Foot dorsiflexion bilaterally
- Gross sensation in all extremities
- Check for parasthesias

Spinal Motion Restriction (SMR)

- Refer to SMR Procedures for preferred packaging methods and tools

II
Spinal Motion Restriction (SMR)

Background:
The position of the National Association of Emergency Medical Service Physicians (NAEMSP) and the American College of Surgeons - Committee on Trauma (ACS-COT) regarding emergency medical services spine precautions and the use of long spine boards are based upon the belief that:

- Long spine backboards have been commonly used to attempt to provide rigid spinal immobilization among emergency medical services for trauma patients. However, the benefit of the use of long backboards is largely unproven.
- The long spine backboard can induce pain, patient agitation and respiratory compromise.
- The long spine backboard can decrease tissue perfusion at pressure points, leading to the development of pressure sores.
- Utilization of long spine backboards for spinal immobilization should be judicious so that the potential benefits outweigh the risks.
- Whether or not a long spine backboard is used, attention to spinal motion restriction among at-risk patients is paramount. These include application of a cervical collar, adequate security to a stretcher, minimal movement during transfers and maintenance of inline stabilization during all necessary movement or transfers. ***Long spine backboards should be used judiciously/sparingly and are recommended only for extrication purposes***.

Purpose:
To provide guidelines that may help reduce the incidence of negative effects caused by traditional spinal immobilization while continuing to provide appropriate care to patients with possible spinal injury by implementing various methods to achieve spinal motion restriction (SMR). Proper use of this procedure should result in a more thorough patient assessment. Your evaluation should help you decide if possible benefits of applying SMR outweigh the known risks associated with the procedure and equipment. This selective spinal motion restriction protocol is a screening tool derived from widely accepted medical research, current practice, and expert consensus. It is designed to identify a subset of patients that may be safely transported to the emergency department for definitive evaluation without the application of certain spinal immobilization equipment. ***The use of a long spine board is not required to provide adequate spine precautions and restriction.***

Indications:
Apply spinal motion restriction to any patient identified to have a potential spine injury that might benefit from splinting and packaging. A complete patient assessment should be performed prior to application of SMR.

II
Spinal Motion Restriction (SMR)

Spinal Motion Restriction (SMR) – cont.

Patients Warranting Spinal Motion Restriction (SMR):

- Cervical, thoracic or lumbar pain or tenderness.
- Signs (physical exam findings) or symptoms (complaints) of a neurologic deficit.
- High risk mechanism (for example: axial load; sudden deceleration; lateral force bend; penetrating with spine involvement).
- Poor communication (altered level of consciousness; pediatric patient; language barrier; unreliable interaction).
- Age > 65 with questionable mechanism of blunt impact to the head, neck and/or trunk.

Procedure:

The following are acceptable methods and tools that achieve spinal motion restriction. This list is arranged from the least invasive to the most invasive:

- Fowler's, Semi-Fowler's, or supine positioning on the gurney with cervical collar only.
- Supine position with vacuum mattress device splinting from head-to-toe.
- Child car seat with appropriate supplemental padding.
- Supine positioning on scoop stretcher, secured with strap system and appropriate padding including head blocks – avoiding log roll movement adds benefit.
- Supine positioning with long backboard, secured with strap system and appropriate padding including head blocks.

1. Provide manual stabilization to restrict gross head movement. Alert, cooperative, sober patients may be allowed to self-limit movement with or without cervical collar, especially if already ambulating before your arrival.

2. Place appropriately sized cervical collar.

3. Obtain history and perform careful examination to evaluate for complaints of pain, numbness, or tingling as well as GCS, neurologic deficits, spine tenderness, deformity, or painful distracting injury.

Spinal Motion Restriction (SMR) – cont.

4. Extricate patient while limiting flexion, extension, rotation, and distraction of the spine. Tools such as pull sheets, scoop stretchers, and other flexible devices may be used as needed. Long backboards have low friction surfaces and may result in more spine movement from torso and head slippage. **These should have limited utilization.**

5. If the patient is to be transported on a hard device, apply adequate padding to prevent tissue ischemia and increase patient comfort.

6. Place the patient in the best position suited to protect the airway.

7. Repeat your neurologic examination and regularly reassess motor / sensory function.

8. Consider the use of SpO2 and ETCO2 to monitor respiratory function.

9. Carefully document your exam findings from before and after patient movement and packaging.

If the patient experiences negative effects from a particular SMR method, alternative measures should be implemented.

SMR Special Considerations:

A. Patients with acute or chronic difficulty breathing: SMR is known to reduce respiratory function by as much as 20%. Respiratory compromise is experienced most by geriatric and pediatric patients secured to a long backboard. ***Exercise caution when applying SMR to patients with difficulty breathing and position appropriately.***

B. Pediatric patients: Avoid movements that provoke increased spinal motion. If you choose to apply SMR using a car seat, ensure that proper assessment of the patient's back is performed. Patients with mental delay are considered unreliable.

Spinal Motion Restriction (SMR) – cont.

C. Combative patients: Avoid methods or interactions that provoke increased spinal motion or agitation.

D. Spinal motion restriction should reduce, rather than increase, patient discomfort. SMR that increases pain should be avoided. Full spinal immobilization as traditionally practiced has often caused more injuries than it has prevented. Spinal immobilization can be painful, and can induce pressure sores, and needless radiological studies to chase down what is in fact provider-induced pain. Studies have shown that patients in EDs spend anywhere from one to three hours on backboards.

E. The goal of SMR is to prevent further spinal injury during patient extrication, treatment, and transport. Patients with suspected spinal injuries should be maintained in what is for them a “neutral”, in-line position. This position will vary from patient to patient depending on the presence of arthritis or other spinal abnormalities. A patient’s cervical spine should never be moved if movement increases pain, neurologic deficits, or neck spasms.

F. SMR should be accomplished using the most appropriate tools for the specific circumstance. The EMS spinal motion restriction “tool box” may include vacuum splints, cervical collars, short boards (KED), scoop stretchers, long boards, straps, head immobilization devices, tape, as well as soft materials such as pillows and pull sheets.

G. Incorporate equipment that allows for the comfortable immobilization of patients in such a fashion that further harm is not induced.

H. Ill-fitting equipment is worse than no equipment at all. For example, more harm can be caused by a cervical collar that hyperextends a patient’s injured cervical spine than by omitting a collar altogether.

I. Appropriate SMR depends on an accurate history and physical exam of the spine.

Spinal Motion Restriction (SMR) – cont.

J. Spinal immobilization should not be utilized in order to extricate and move a patient as handled historically in the past.

K. There is no evidence that supine immobilization of the spine is better than placing patients in a semi-fowler's position. It is also clearly less comfortable.

L. Full spinal immobilization of penetrating thoracic trauma patients increase mortality and morbidity. Alert, neurologically intact victims of penetrating thoracic trauma without spinal pain do not need spinal immobilization.

M. Spinal motion restriction of a patient with isolated neck pain is acceptable, and encouraged. This may include use of a cervical collar and thoracic vacuum splinting, pillows, the KED, etc. Patients with isolated cervical pain may be sat up in a Semi- or High-Fowler's position. Patients who are laid supine will be substantially more comfortable with their knees elevated.

N. Spinal immobilization should be reserved primarily for patients who have received a high impact with resulting multiple systems blunt trauma, and/or who are unable to provide accurate information to field responders. This level of immobilization is more comfortable if vacuum splinting is utilized.

O. Pull sheets, or other flexible devices (Smith Cot / MegaMover) should be employed for moving patients whenever possible; backboards should be used only if these other devices are unavailable.

P. Spinal movement and discomfort are reduced by allowing patients to self-extricate when possible, and with assistance, to place them onto gurneys (cots). Back-boarding patients from a standing position is discouraged.

Q. Logrolling patients is very uncomfortable and leads to increased spinal movement. The preferred technique to getting patients onto boards is to "forklift" the patient onto the backboard. Use of a scoop stretcher helps avoid log roll movement adds benefit.

R. Responders should document all history and exam findings on the PCR. The patient's neurologic status pre- and post-immobilization, along with interventions, should also be documented.

Spinal Motion Restriction (SMR) – cont.

S. In patients without midline neck/spinal pain or tenderness, ALOC, intoxication, or distracting injury, SMR should be withheld as long as the patient can be accurately evaluated.

References:

1. Practice Management Guidelines for the Screening of Thoracolumbar Spine Fracture. Eastern Associations for the Surgery of Trauma: Practice Management Guideline Committee Revised *07-17-2006.*

2. Position Statement EMS Spinal Precautions and the Use of the Long Backboard (2013). National Association of EMS Physicians and American College of Surgeons Committee on Trauma. *PreHospital Emergency Care 2013, 17, 392-393.*

3. Bouland A, Jenkins J, Levy, M (2013). Assessing attitudes toward spinal immobilization. *The Journal of Emergency Medicine, 45, 4, 117-125*.

4. Leonard, J, Mao J, Jaffe D (2012). Potential Adverse Effects of Spinal Immobilization in Children. *Journal of Pre-Hospital Emergency Care, 16, 513-518.*

5. State of Arizona Spinal Motion Restriction Protocol

JJ
Splinting

Clinical Indications:

- Immobilization of an extremity for transport, either due to suspected fracture, sprain, or injury.
- Immobilization of an extremity for transport to secure medically necessary devices (i.e., intravenous catheters).

General Splinting Procedure:

A. Assess and document pulses, sensation, and motor function prior to placement of the splint. If no pulses are present and a fracture is suspected, consider reduction of the fracture prior to placement of the splint.

B. Remove all clothing from the extremity.

C. Select a site to secure the splint both proximal and distal to the area of suspected injury, or the area where the medical device will be placed.

D. Do not secure the splint directly over the injury or device.

E. Place the splint and secure with Velcro, straps, tape, or bandage material depending on the splint manufacturer and design.

F. Document pulses, sensation, and motor function after placement of the splint. If there has been deterioration in any of these 3 parameters, remove the splint and reassess.

G. Document the time, type of splint, and the pre and post assessment of pulse, sensation, and motor function in the patient care report (PCR).

Traction Splinting

Traction splints are used to immobilize suspected femur fractures. Guidelines set forth by the equipment manufacturer should be followed when applying the device. Splint application should be practiced often to become proficient in rapid application.

Splinting, continued

Hare Traction Splint (Application Procedure):

1. Assess neurovascular function.

2. Place the ankle device over the ankle.

3. Place the proximal end of the traction splint on the posterior side of the affected extremity, being careful to avoid placing too much pressure on genitalia or open wounds. Make certain the splint extends proximal to the suspected fracture. If the splint will not extend in such a manner, reassess possible involvement of the pelvis.

4. Extend the distal end of the splint at least 6 inches beyond the foot.

5. Attach the ankle device to the traction crank.

6. Twist until moderate resistance is met.

7. Reassess alignment, pulses, sensation, and motor function. If there has been deterioration in any of these 3 parameters, release traction and reassess.

8. Document the time, type of splint, and the pre and post assessment of pulse, sensation, and motor function in the patient care report (PCR).

Sager Traction Splint (Application Procedure):

1. Assess neurovascular function.

2. **Position the splint –** Place the splint between the patient's legs and apply the thigh strap snugly against the injured limb, seating the cushion against the patient's perineum. Extend the inner shaft of the splint to place the pulley wheel just beyond the patient's heel. When positioning the splint, the pulley wheel should be facing the injured limb.

Splinting, continued

3. **Set the splint –** Apply the ankle harness firmly around the ankle above the medial and lateral malleolus. Pull the control tabs on the ankle harness to shorten the ankle sling, pulling it up against the sole of the foot. You are now ready to administer dynamic traction. Extend the splint shaft to achieve the amount of desired traction, while observing the amount registered on the traction scale. Check the thigh strap, re-tighten to retain snug fit.

4. **Secure the splint –** Slip the largest leg cravat under the hollow behind the knee and see-saw it up to the upper thigh. Follow with the shortest cravat under the knee and see-saw down under the lower leg. Place the remaining cravat under the knee and then secure all three cravats binding the leg and splint together. Wrap the figure-8 strap snugly around the ankles and over the feet.

5. Reassess alignment, pulses, sensation, and motor function. If there has been deterioration in any of these 3 parameters, release traction and reassess.

6. Document the time, type of splint, and the pre and post assessment of pulse, sensation, and motor function in the patient care report (PCR).

KK
Subcutaneous Medication Administration

Subcutaneous (SQ) injection is one of the simpler forms of drug administration. It is a method by which drugs are delivered directly into the subcutaneous or fatty tissue from where they are absorbed into the systemic circulation.

Clinical Indications:

- When the rate of absorption needs to be slower and/or prolonged in action.
- When other administration routes are unsuccessful or unavailable.

Contraindications:

- Severe bleeding disorders or recent thrombolytic therapy.
- When rapid absorption and action of a medication is required.

Notes / Precautions:

- Approved injection site(s): Dorsolateral aspect of the upper arm is preferred.
- Appropriate equipment (needle size and length).
- 5/8" needle, 25 gauge, or manufactured tuberculin 1mL syringe with attached needle.

Procedure:

1. Prepare equipment.

2. Check label, date, and appearance of medication.

3. Locate appropriate injection site:
    - Dorsolateral aspect of the upper arm
        - o The subcutaneous tissue over the tricep muscle of the upper arm.

4. Using a circular motion from selected puncture site outward, cleanse site with alcohol wipe.

5. Pull the skin away from the underlying muscle by "tenting" or pinching the site.

6. Quickly insert the needle at a 45-degree angle into the subcutaneous tissue. Having bevel of the needle facing upward eases insertion, making it less painful.

KK
Subcutaneous Medication Administration

7. Aspirate syringe to ensure that inadvertent venous administration is avoided.
    - If blood is aspirated into the syringe, withdraw the syringe and needle and dispose of properly.
    - Do not administer any medication mixed with blood.
    - Begin again at a different site.

8. If no blood is aspirated, slowly inject the medication.

9. After all medication is injected, quickly withdraw syringe and dispose of in an approved container.

10. Gently massage over the injection site to increase absorption and medication distribution.

11. Apply firm pressure and place a band-aid over the injection site.

12. Monitor and document the patient's response to the medication in the patient care report (PCR).

LL
Surgical Airways

Extreme circumstances prohibit successful ventilation. In these situations, performing a surgical airway may be the only way to ensure your patient's survival. Two different techniques, needle cricothyrotomy and open cricothyrotomy, both provide access to the airway through the cricothyroid membrane.

Airway assessment should be focused on:

1. Patient's ability to maintain their own airway without further interventions;

2. Any needs for non-surgical interventions:
    a. Obstructed airway procedures
    b. Manual airway maneuvers
    c. Airway adjunctive equipment
    d. Positive pressure ventilation (BVM)
    e. Medication administration

3. The need for a surgical airway after all other airway skills/procedures have been exhausted.

A. Surgical Cricothyrotomy (Adult Patients)

Indications:

Surgical cricothyrotomy procedure should ***only*** be attempted when ***total airway obstruction is present and all other airway maneuvers have failed (i.e., facial trauma, foreign body obstruction, edema of the trachea or posterior oropharynx).***

Complications:

- Asphyxia
- Aspiration
- Creation of a false passage into the tissues
- Subglottic stenosis
- Hemorrhage
- Laryngeal stenosis
- Laceration of the esophagus
- Laceration of the trachea
- Mediastinal emphysema
- Vocal Cord paralysis

Surgical Airways, continued

Procedure

1. Standard precautions (PPE)
2. Patient positioning; supine with neck in a neutral position.
3. Locate physical landmarks (thyroid notch, cricothyroid interval, cricoid cartilage and sternal notch.
4. Use aseptic technique as time and conditions allow. Prep area with alcohol.
5. With one hand, stabilize the thyroid cartilage.
6. Using a #11 scalpel, make a vertical incision into the skin that overlies the cricothyroid membrane (1-1 ½" in length). This should expose the cricothyroid membrane.
7. Make a 1cm length horizontal incision into the cricothyroid membrane.
8. Remove scalpel and insert gloved finger into opening created. Hemostats may be used to widen the opening if necessary.
9. Insert a cuffed 6.0 endotracheal tube through the cricothyroid membrane incision. Direct the ET tube inferiorly into the trachea.
10. Inflate the cuff with 3-10cc of air and ventilate the patient
11. Auscultate chest for equal bilateral lung sounds.
12. Secure ET tube to prevent dislodgement.
13. Oxygenate patient by BVM or ATV.

Surgical Airways, continued

B. Surgical Needle Cricothyrotomy (Pediatric)

Under most circumstances an airway for a pediatric patient is provided by repositioning the head, use of an airway adjunct or endotracheal intubation. In rare circumstances a surgical airway may be necessary for adequate ventilation (i.e., upper airway foreign body, severe oral/facial injuries, anaphylaxis, or laryngeal fracture).

Surgical needle cricothyrotomy should ***only*** be attempted when ***total airway obstruction is present and all other airway maneuvers have failed***

Complications:

- Incorrect placement missing the airway
- Asphyxia
- Aspiration
- Creation of a false passage into the tissues
- Subglottic stenosis or edema
- Hemorrhage
- Laryngeal stenosis or trauma
- Laceration of the esophagus
- Laceration of the trachea
- Mediastinal emphysema
- Vocal cord trauma or paralysis
- Delayed soft tissue infection

Procedure

1. Standard precautions (PPE).

2. Patient positioning; supine with neck in a neutral position.

3. Palpate the cricothyroid membrane anteriorly, between the thyroid cartilage and cricoid cartilage. If time allows, prep area with alcohol.

4. Using a 1-1/4” 14ga catheter attached to a 3mL syringe, Puncture the skin and cricothyroid membrane in the midline position.

5. Direct the needle at a 45° angle inferiorly. Aspiration of air confirms entry into the tracheal lumen.

Surgical Airways, continued

6. Remove the syringe with needle attached while advancing the plastic catheter.

7. Attach the catheter hub to the IV extension set with 3.0mm ET adaptor; Ventilate using BVM.

8. Auscultate chest for adequate ventilation.

9. Secure catheter hub and IV extension set; the catheter should be held by hand until the airway is turned over to the ED staff.

NOTE: Any surgical airway performed in the field must be reported to Lucas County EMS Dispatch for Medical Director notification.

MM
Temperature Monitoring
Non-Invasive / Invasive

Purpose
This protocol outlines the indications and procedures for use of non-invasive and invasive temperature monitoring in the prehospital environment.

Non-Invasive Temperature Monitoring (Braun ThermosScan PRO 4000)

Clinical Indications:

- Monitoring body temperature in a patient with suspected infection, hypothermia, hyperthermia, or to assist in evaluating resuscitation efforts.

The Braun ThermoScan PRO 4000 thermometer has been developed for accurate, safe and fast human body temperature measurements in the ear. The shape of the thermometer probe prevents it from being inserted too far into the ear canal which could perforate the tympanic membrane.

Braun ThermoScan measures the infrared heat generated by the eardrum and surrounding tissues. To help ensure accurate temperature measurements, the sensor itself is warmed to a temperature close to that of the human body. When the thermometer is placed in the ear, it continuously monitors the infrared energy until a temperature equilibrium has been reached and an accurate measurement can be taken.

Procedure:

1. To achieve accurate measurements, make sure a new, clean probe cover is in place before each measurement.

2. When the probe cover is in place, the thermometer turns on automatically. Wait for the ready signal beep.

3. Fit the probe snuggly into the ear canal, then push and release the Start button.

4. If the probe has been inserted into the ear canal during the complete measuring process, a long beep will signal the end of the measuring process. The thermometer detects that an accurate temperature measurement has been taken. The result is shown on the display screen.
    a. When you take a temperature measurement, the <ExacTemp> light can be of help. It flashes during the measuring process when the probe is correctly positioned, and lights up continuously when the thermometer detects that an accurate measurement has been taken.

Temperature Monitoring, continued

5. For the next measurement, eject the used probe cover (push ejector) and put on a new, clean probe cover. The thermometer will turn on automatically. Wait for the ready signal. Fit the probe snugly into the ear canal, then push and release the Start button.

The Braun ThermoScan ear thermometer turns off automatically after 60 seconds of inactivity. It can also be turned off by pressing the <I/O> button for at least three seconds. The display will shortly flash <OFF> and steadily display the word <OFF> after releasing the button.

Temperature Taking Hints:

A. A temperature measurement taken in the right ear may differ from a measurement taken in the left ear. Therefore, always take the temperature in the same ear.

B. The ear must be free from obstructions or excess cerumen (wax) build-up in order to take an accurate measurement.

C. External factors may influence ear temperatures, particularly when an individual has:
   i. Been lying on one ear or the other
   ii. Had their ears covered
   iii. Been exposed to very hot or very cold temperatures, or
   iv. Been recently swimming or bathing

D. For persons wearing hearing aids or ear plugs, remove the device and wait 20 minutes prior to taking a temperature.

E. Us the untreated ear if ear drops or other ear medications have been placed in the ear canal.

Temperature Monitoring, continued

Body Temperature

Normal body temperature is a range. The following table shows that ranges of normal also vary by site. Therefore, readings from different sites, even if taken at the same time, should not be directly compared.

Normal Ranges by site:

Site	Fahrenheit	Centigrade
Axillary	94.5 – 99.1	34.7 – 37.3
Oral	95.9 – 99.5	35.5 – 37.5
Rectal	97.9 – 100.4	36.6 – 38.0
ThermoScan	96.4 – 100.4	35.8 – 38.0

A person's normal temperature range tends to decrease with age. The following table shows normal ThermoScan ranges by age:

Age	Fahrenheit	Centigrade
0 – 2	97.5 – 100.4	36.4 – 38.0
3 – 10	97.0 – 100.0	36.1 – 37.8
11 – 65	96.6 – 99.7	35.9 – 37.6
> 65	96.4 – 99.5	35.8 – 37.5

Temperature Monitoring, continued

Non-Invasive Temperature Monitoring (Smiths Medical Tympanic Ear Sensor)

Clinical Indications:

- Monitoring body temperature in a patient with suspected infection, hypothermia, hyperthermia, or to assist in evaluating resuscitation efforts.

The Smiths Medical Tympanic Ear Sensor has been developed for accurate, safe and fast human body temperature measurements in the ear. The shape and make-up of the ear sensor prevents it from being inserted too far into the ear canal which could perforate the tympanic membrane.

When the tympanic sensor is placed in the ear, it continuously monitors the infrared energy until temperature equilibrium has been reached and an accurate measurement can be taken.

Tympanic Ear Sensor Insertion (single-patient use):

1. Compress foam collar on ear sensor probe.

2. Insert probe following the natural contour of the ear canal until seated. Release foam collar and allow to re-expand to hold in place.

3. Connect the temperature probe to the LP15 temperature adaptor cable.

4. Connect the temperature adaptor cable to the TEMP port on the LP15 monitor/defibrillator

NOTES:

- The temperature area on the display is not activated until the monitor/defibrillator detects a temperature between 24.8° and 45.2°C (76.6° and 113.4°F). To manually activate the temperature monitoring area, use the speed dial to outline and select the temperature area on the Home Screen. From the menu, select **ON.**
- The temperature probe may require 3 minutes to equilibrate after placement on the patient monitoring site.
- Confirm that the temperature reading appears and is stable.

MM
Temperature Monitoring
Non-Invasive / Invasive

Temperature Monitoring, continued

Invasive Temperature Monitoring (Esophageal Probes)
Invasive temperature probes (defined as thermometers placed in the esophageal space) may be used when available by paramedic providers trained in its use according to training guidelines.

I. Clinical Indications:

1. Accurate core temperature measurements are necessary to optimize patient care in the following circumstances:
    a. Management of intra- / post- cardiac arrest therapeutic hypothermia
    b. Concern for significant hyperthermia
    c. Concern for significant hypothermia
2. Patient is 16 years of age or greater
3. Patient is unconscious

II. Contraindications:

1. Caustic ingestion
2. Active upper GI hemorrhage
3. Known esophageal disease (varices, esophageal cancer, etc)

Esophageal Temperature Probe Placement
Proper placement of the esophageal probe sensor is essential for the accurate measurement of core body temperature. If it is too high in the esophagus the reading will be affected by tracheal air. Placement in the lower third of the esophagus, in proximity to the heart and aorta, will reflect core temperature.

Esophageal Probe Insertion (ORAL):

5. Measure from the corner of the mouth to the earlobe to 2cm above the xiphoid process to determine the insertion length.

6. Lubricate 6 to 8 inches of the probe with Xylocaine jelly.

7. Insert the probe orally and into the esophagus to the pre-measured depth. Probe placement may be facilitated with laryngoscopy (i.e., Laryngoscope blade/handle, KING Vision)

Temperature Monitoring, continued

Esophageal Probe Insertion (NASAL):

1. Measure from the tip of the nose to the earlobe to 2cm above the xiphoid process to determine the insertion length.

2. Lubricate 6 to 8 inches of the probe with Xylocaine jelly.

3. Insert the probe in one of the nostrils and gently advance it toward the posterior nasopharynx and into the esophagus to the pre-measured depth.

Esophageal Probe Insertion (KING LTSD):

1. Measure from the corner of the mouth to the earlobe to 2cm above the xiphoid process to determine the insertion length

2. Lubricate 6 to 8 inches of the probe with Xylocaine jelly.

3. Insert the probe through the gastric lumen of the KING-LTSD airway. Advance probe to the pre-measured depth.

Temperature Monitoring Procedure (LifePak 15)

1. Connect the temperature adapter cable to the TEMP port on the LP15 monitor/defibrillator.

2. Connect the temperature probe to the temperature adapter cable.

NOTES:

- The temperature area on the display is not activated until the monitor/defibrillator detects a temperature between 24.8° and 45.2°C (76.6° and 113.4°F). To manually activate the temperature monitoring area, use the speed dial to outline and select the temperature area on the Home Screen. From the menu, select **ON.**
- The temperature probe may require 3 minutes to equilibrate after placement on the patient monitoring site.
- Confirm that the temperature reading appears and is stable.

Temperature Monitoring, continued

Cleaning and Disposal

Esophageal temperature probes are disposable and intended for single-patient use. Do not clean and reuse temperature probes. Dispose of the contaminated waste in approved container.

MM
Temperature Monitoring
Non-Invasive / Invasive

Temperature Monitoring, continued

Troubleshooting Tips for Temperature Monitoring (LP15)

Observation	Possible Cause	Corrective Action
CHECK SENSOR message appears and value is "---"	Temperature value is out of range	• Check that probe is positioned properly.
	Temperature probe is dislodged or positioned incorrectly	• Check that probe is positioned properly.
	Probe not connected to cable, or cable not connected to device	• Check that probe and cable are connected properly.
	Damaged cable or probe	• Replace damaged cable or probe.
CHECK SENSOR message appears while value is displayed	Temperature probe is dislodged and value is below 31°C (87.8°F)	• Check that probe is positioned properly.
	Temperature probe is dislodged and value is above 41.0°C (105.8°F)	• Check that probe is positioned properly.
TEMP: ACCURACY OUTSIDE LIMITS message appears and value is **XXX**	Temperature accuracy check failed	• Turn device off and then on again. • If problem persists, contact qualified service personnel.
XXX appears in place of temperature reading	Temperature module is not calibrated	• Turn device off and then on again. • If problem persists, contact qualified service personnel.
	Temperature module failed	• Turn device off and then on again. • If problem persists, contact qualified service personnel.
Temperature area of home screen is blank	Initial temperature not automatically displayed until device detects temperature	• Allow up to 3 minutes for probe to equilibrate. • Check that probe is positioned properly
	Temperature probe not detected by device	• Check connections between probe, adapter cable, and device.

NN
Tourniquets

Clinical Indications:

- Life threatening extremity hemorrhage that cannot be controlled by other means.
- Serious or life threatening extremity hemorrhage and tactical considerations prevent the use of standard hemorrhage control techniques.

Contraindications:

- Non-extremity hemorrhage
- Proximal extremity location where tourniquet application is not practical.

Procedure:

1. Place tourniquet proximal to wound.

2. Tighten per manufacturer instructions until hemorrhage stops and/or distal pulses in affected extremity disappear.

3. Secure tourniquet per manufacturer instructions.

4. Note time of tourniquet application and communicate this to receiving care providers.

5. Dress wounds per standard wound care protocol.

6. If delayed or prolonged transport and tourniquet application time > 45 minutes: consider reattempting standard hemorrhage control techniques and removing tourniquet.

7. If one tourniquet is not sufficient or not functional to control hemorrhage, consider the application of a second tourniquet more proximal to the first.

Tourniquets, continued

Combat Application Tourniquet® (C-A-T): Instructions for Use

To prepare for use, store the C-A-T® in its one-handed configuration:

1. Pass the tip through the inside slit in the buckle. Pull 6" of band through, fold it back and adhere the band to itself.
2. Flatten the loop formed by the band. Place the buckle in the middle of the flattened band.
3. Fold the C-A-T® in half placing the buckle at one end.

Instructions for Use: One-handed application:

1. Insert the wounded limb through the loop formed by the band.
2. Pull the band tight and securely fasten the band back on itself.
3. Adhere the band around the limb. Do not adhere the band past the rod clip.
4. Twist the rod until bright red bleeding has stopped and the distal pulse is eliminated.
5. Place the rod inside the clip locking it in place. Check for bleeding and distal pulse.
6. Adhere the band over the rod, inside the clip, and fully around the limb.
7. Secure the rod and band with the strap. Prepare for transport and reassess.

Instructions for Use: Two-handed application:

1. Route the band around the limb and pass the tip through the inside slit of the buckle. Pull the band tight.

Tourniquets, continued

2. Pass the tip through the outside slit of the buckle. The friction buckle will lock the band in place.

3. Pull the band very tight and securely fasten the band back on itself. When the band is pulled tight, no more than 3 fingers will fit between the band and the limb.

4. Twist the rod until bright red bleeding has stopped.

5. Place the rod inside the clip locking it in place. Check for bleeding and distal pulse. If bleeding is not controlled, apply a second tourniquet proximal to the first and reassess.

6. Secure the rod inside the clip with the strap. Prepare the patient for transport and reassess. Record the time of application.

The C-A-T® is a single use product

OO
Tracheostomy Tube Care

A tracheostomy is a surgical opening (stoma) in the front of the neck into the trachea. A tracheostomy tube ("trach tube") is an artificial airway passed through this opening that allows a patient to breathe.

There are several types of tracheostomy tubes, and they come in many sizes. The size is written on the wings or flanges of the tube. The inner and outer diameters are often on the wings as well. All tracheostomy tubes have a standard outer opening or hub outside the neck so a bag-mask device can be attached. For some tubes, an adapter may be needed to make this connection.

Oxygen Delivery and Assisted Ventilation (Procedure):

1. Provide blow-by oxygen. Place a pediatric face mask a short distance above the tracheostomy tube or stoma and give oxygen at 10 – 15L/min.

2. Secure a face mask directly over the tracheostomy tube opening and secure the straps around the neck.

3. Attach a bag-mask device to the tracheostomy tube adapter. Attach a bag-mask device directly to the outer end of the tracheostomy tube.

Clearing an Obstructed Tracheostomy Tube (Procedure):

1. Position patient. Ensure that the outer opening of the tube is clear.

2. Check that the tube is in the proper location. The wings or flange should be against the neck, and the obturator should not be in place.

3. If a fenestrated tube (holes for upward flow of air to the upper airway) is in place, remove the decannulation plug.

4. If a double lumen tube is in place, remove the inner cannula to clear secretions.

5. If none of the above maneuvers work, suction the tube with a suction catheter.

OO
Tracheostomy Tube Care

Suctioning a Tracheostomy Tube (Procedure):

1. Choose a suction catheter small enough to pass through the tube.

2. Prepare suction unit for use. Attach suction catheter.

3. Give oxygen (over tracheostomy tube) with a mask, and then loosen secretions by placing 1-2 mL of normal saline into the tube with a syringe.

4. Insert the suction catheter approximately 2 inches (5 cm) into the tube. If the patient begins to cough, the catheter is through the tube and into the trachea, and the depth of insertion is too deep. Do not use suction while inserting the catheter, and never force the catheter.

5. Cover the suction port (hole) and suction for 3-5 seconds, while slowly removing the catheter. Never suction for longer than 10 seconds. Always monitor heart rate and coloring during this procedure. Stop suctioning immediately if the heart rate drops significantly or the patient's coloring worsens.

6. If the obstruction is removed, and the patient can breathe on his/her own, do not suction further. If additional suctioning is needed, apply oxygen (by blow-by or direct ventilation) and repeat steps 3 to 5.

7. Always provide supplemental oxygen after suctioning by using the blow-by method or with manual ventilations.

Removing an Old Tracheostomy Tube (Procedure):

1. Position the patient with the head and neck hyperextended to expose the tracheostomy site.

2. Apply oxygen over the mouth and nose, and occlude (close off) the stoma or tracheostomy tube.

3. If the existing tube has a cuff, deflate it. Connect a 10 mL syringe to the valve on the pilot balloon. Draw air out until the balloon collapses. Cutting the balloon will not deflate the cuff.

OO
Tracheostomy Tube Care

Tracheostomy Tube Care, continued

4. Cut or untie the cloth ties that hold the tracheostomy tube in place.

5. Withdraw the tracheostomy tube using a slow, steady, outward and downward motion.

6. Assess airway for patency and adequate ventilation.

7. Provide oxygen and ventilation through the stoma as needed.

Replacing a Tracheostomy Tube (Procedure):

1. Insert a tracheostomy tube of the same size and model whenever possible. If this is not available, use a smaller tube or an endotracheal tube of the same outer diameter as the tracheostomy tube.

2. If the tube uses an insertion obturator, place this in the tube. If the tube has an inner and outer cannula, use the outer cannula and obturator for insertion.

3. Moisten or lubricate the tip of the tube (and obturator) with water, sterile saline, or a water-soluble lubricant.

4. Hold the device by the flange (wings) or hold the actual tube like a pencil.

5. Gently insert the tube with an arching motion (follow the curvature of the tube) posteriorly and then downward. Slight traction on the skin above or below the stoma may help.

6. Once the tube is in place, remove the obturator, attach the bag-mask device, and attempt to ventilate. If the tube uses an inner cannula, insert to allow mechanical ventilation with a bag-valve device.

7. Check for proper placement by watching for bilateral chest rise, listening for equal breath sounds, and observing the patient. Signs of improper placement include lack of chest rise, unusual resistance to assisted ventilation, air in the surrounding tissues, and lack of patient improvement.

8. If the tube cannot be inserted, withdraw the tube, administer oxygen, and ventilate as needed.

Tracheostomy Tube Care, continued

9. Use a smaller-size tracheostomy tube for the second attempt. If still unsuccessful with a smaller tracheostomy tube, insert and endotracheal tube through the stoma. Check the length of the original tracheostomy tube, note the markings on the endotracheal tube, and advance it to the same depth as the original tube. The inserted portion of the endotracheal tube will be approximately half the distance needed for oral insertion. Do not advance the tube too far, or it may go into the right mainstem bronchus.

10. If still unsuccessful, use a suction catheter as a guide. Insert a small sterile suction catheter through the tracheostomy tube. Without applying suction, insert the suction catheter into the stoma. Slide the tracheostomy tube along the suction catheter and into the stoma, until it is in the proper position. Remove the suction catheter. Assess ventilation through the tracheostomy tube.

11. If still unsuccessful, consider orotracheal intubation or transport the patient with ventilation through the stoma using a pediatric mask, or through a bag-mask device over the nose and mouth while covering the stoma with a sterile gauze.

12. After proper placement, cut the ends of the tracheostomy ties or tape diagonally (allows for easy insertion), pass through eyelets (openings) on the flanges, and tie around the patient's neck, so that only a little finger can pass between the ties and the neck.

PP
Tube-Chek
(Esophageal Detection Device)

The Tube-Chek is a soft, pliable, disposable device to assist in determining and documenting the correct placement of an endotracheal or nasotracheal tube. Its use should not eliminate clinical judgment for confirming endotracheal tube placement in the field.

Clinical Indications:

- To assist in determining and documenting the correct placement of an endotracheal or nasotracheal tube.

The Tube-Chek is to be used on all intubated patients as a first-line confirmation for ET tube placement with the following precautions:

A. Endotracheal tube obstruction, morbid obesity, pulmonary edema, mainstem bronchus intubation, severe bronchospastic or obstructive lung disease may lead to equivocal results due to decreased air available for aspiration.

B. Pharyngeal intubations may yield erroneous results. Monitor tube depth. Caution should be used in scenarios where the ET tube may kink.

C. The inflating properties of the bulb will be adversely affected in temperatures close to freezing.

D. Tube-Chek use is contraindicated with patient weight's less than 20Kg (44lbs.).

E. Aggressive BLS ventilation (BVM) prior to intubation and Tube-Chek use may create false/positive values due to esophageal insufflation.

F. The Tube-Chek is contraindicated in pregnancy.

Procedure

1. Complete intubation.

2. Place the Tube-Chek over the proximal end of the ETT. Squeeze the bulb to remove air prior to securing the bulb on the tube.

3. Once secured on the tube, release the bulb.

PP
Tube-Chek
(Esophageal Detection Device)

Tube-Chek, continued

4. If the bulb expands evenly and easily, this indicates probable tracheal intubation. Assessment of the patient's breath sounds should also be performed.

5. If the bulb does not expand easily, this indicates possible esophageal intubation and the need to reassess airway placement.

6. Document time and result in the patient care report (PCR).

QQ
Venous Access – Alternative Routes

With advancements in home health care, an increasing number of patients are being released to their homes with implanted venous access devices. These include double, triple, multi-lumen, and implanted medication ports. This is in addition to the existing population with implanted AV-fistulas and AV-grafts used in dialysis. ***Alternate venous access is only to be used in life-threatening situations.***

Clinical Indications:

- Venous access when traditional means are unsuccessful.
    - Only in those patients with life threatening situations such as cardiac arrest, lethal arrhythmias, or in-extremis from a readily treatable cause.

Contraindications:

- Patients where traditional IV access is available.

Notes / Precautions:

- Venous access devices can be complicated. Consider contact with ***On-Line Medical Control*** for guidance.
- Alternate access devices provide a direct line into patient circulation; therefore, the introduction of air can be extremely hazardous.
    - There is a risk that catheters which do not contain anti-reflux valves may allow blood to flow back, or air to enter, when they're unclamped and the end cap is off. It is always prudent to keep the clamps closed except when aspirating or infusing.

Broviac/Hickman/Groshong and other double/triple lumen catheters - Silicone tube inserted into the distal superior vena cava or right atrium, usually via the cephalic vein. The catheter enters the skin through an incision in the chest. Most lines are kept heparinized and protected via an injectable cap.

Procedure:

1. Prepare equipment: 10-12mL syringe (empty), 10mL pre-filled saline syringe.

2. If more than one lumen is available (Broviac's can have one, two, or three lumens), select the largest lumen available (you will not always be able to tell the largest).

Venous Access – Alternative Routes, continued

3. Remove cap on the end of the catheter.
4. Prep the end of the lumen with alcohol swab.
5. Using a 10-12mL syringe, (after unclamping the lumen) aspirate 10mL of blood with the syringe and discard. If unable to aspirate blood, re-clamp the lumen and attempt to use another lumen (if present).
6. Flush lumen with 5-10mL normal saline using a pre-filled saline syringe. If catheter does not flush easily, re-clamp the selected lumen and attempt to use another lumen (if present).
7. Attach IV administration set and observe for free flow of IV fluid.
8. If shock is not present, allow fluid to run at KVO rate to prevent the central line from clotting.
9. Record procedure, any complications, and fluids/medications administered in the patient care report (PCR).

PICC Line – Peripherally Inserted Central Catheter. Usually inserted into the right atrium via the antecubital vein.

Procedure:

1. Prepare equipment: 10-12mL syringe (empty), 10mL pre-filled saline syringe.
2. If more than one lumen is available (PICCs can have one, two, or three lumens), select the largest lumen available (you will not always be able to tell the largest).

Venous Access – Alternative Routes, continued

3. Remove cap on the end of the catheter.

4. Prep the end of the lumen with alcohol swab.

5. Using a 10-12mL syringe, (after unclamping the lumen) aspirate 10mL of blood with the syringe and discard. If unable to aspirate blood, re-clamp the lumen and attempt to use another lumen (if present).

6. Flush lumen with 5-10mL normal saline using a pre-filled saline syringe. If catheter does not flush easily (NOTE: a PICC line will generally flush more slowly and with greater resistance than a typical intravenous catheter), re-clamp the selected lumen and attempt to use another lumen (if present).

7. Attach IV administration set and observe for free flow of IV fluid. Due to the length of the catheter and the internal lumen, PICC lines are not optimal for rapid fluid resuscitation, as in trauma or massive internal bleeding. In most cases, fluids may be infused at a fairly rapid rate without harm to the catheter. Using a pressure bag will augment the fluid flow.

8. If shock is not present, allow fluid to run at KVO rate to prevent the central line from clotting.

9. Record procedure, any complications, and fluids/medications administered in the patient care report (PCR).

Internal Subcutaneous Infusion Ports – Access should not be attempted without specialized Huber needle.

Procedure:

1. Prepare all necessary equipment: 10-12mL syringe (empty), 10mL pre-filled saline syringe.

2. Locate the site by visualization and palpation. These ports are generally found in the upper chest and present as a dome shaped protrusion.

QQ
Venous Access – Alternative Routes

3. Clean access site with alcohol swab.

4. Secure access point firmly between two fingers and attach 10-12mL syringe to Huber needle.

5. Aspirate 10mL of blood with syringe. If unable to aspirate blood, re-clamp the catheter and do not attempt further use.

6. Flush catheter with 5-10mL normal saline using a saline pre-filled syringe. If catheter does not flush easily, re-clamp the catheter and do not attempt further use.

7. Attach IV administration set and observe for free flow of IV fluid.

8. If shock is not present, allow fluid to run at KVO rate to prevent the central line from clotting.

9. Record procedure, any complications, and fluids/medications administered in the patient care report (PCR).

Hemodialysis AV-Fistulas / AV-Grafts – An AV-Graft is a tube that diverts blood flow from an artery to a vein**.** A fistula ("shunt") is a surgically created arterio-venous vessel anastomosis. Both are used for patients requiring hemodialysis and should ***NOT*** be routinely accessed by prehospital personnel. ***AV-Fistulas / AV-Grafts should only be accessed as a last resort if the patient is in cardiac arrest and peripheral IV, IO or external jugular access cannot be established.***

Procedure:

1. Access must be made using a 14ga or 16ga IV catheter. Do not use anything smaller. Prep site with alcohol swab.

2. If unsuccessful in accessing site (no obvious blood return or flow of fluids), hold direct pressure over site for 5-8 minutes for a fistula and 8-15 minutes for a graft to prevent hemorrhaging. Do not continue attempting to access.

Venous Access – Alternative Routes, continued

3. Record procedure, any complications, and fluids/medications administered in the patient care report (PCR).

RR
Venous Access - Extremity

Clinical Indications:

- Any patient where intravenous access is indicated (significant trauma or mechanism, emergent or potentially emergent medical condition).

Procedure:

1. Paramedics can use intraosseous access where threat to life exists as outlined in the **Venous Access – Intraosseous Protocol (Tab 500, Section SS).**

2. Use the largest catheter bore necessary based upon the patient's condition and size of veins.

3. Fluid and setup choices:
   a. Normal Saline with a macro drip (10gtt/cc) for trauma or hypovolemia.
   b. Lactated Ringers with a macro drip (10gtt/cc) for trauma or hypovolemia.
   c. Normal Saline with a macro drip (10gtt/cc) for medical conditions, and
   d. D_5W with a micro drip (60gtt/cc) for medication infusions.

4. Rates are preferably:
   a. Adult (KVO): 60cc/hr (1gtt/6 seconds for a macro drip set)
   b. Pediatric (KVO): 30cc/hr (1gtt/12 seconds for a macro drip set)

5. If shock is present:
   a. Adult: 250-500cc fluid boluses repeated as long as lungs are dry and BP < 90. Consider a second IV line.
   b. Pediatric: 20cc/kg boluses repeated PRN for poor perfusion.

Saline Locks

At times it is desirable to have rapid vascular access available, although there may be no immediate indication for either fluid or medication administration. These patients may have a saline lock placed.

Should the need arise; the saline lock may subsequently be used for immediate medication or fluid administration. This saves time should medication or fluid administration become necessary. It eliminates the need for unnecessary fluid administration, and it significantly decreases the likelihood of an IV being inadvertently pulled out during patient movement and transport.

RR
Venous Access - Extremity

Venous Access-Extremity (Saline Locks), cont.

General Considerations for Saline Lock Placement:

A. A saline lock IV may be placed, using standard IV techniques, whenever it is desirable to have rapid vascular access available, but there is no immediate indication of IV medications or fluids.

B. Should the need arise; the saline lock may subsequently be used for immediate medication or fluid administration with the following considerations:
    i. If the need for fluid resuscitation is necessary, attach a regular IV setup directly to the saline lock extension set.
    ii. If a medication is subsequently administered via saline lock, it must either be re-flushed with a saline-filled syringe, or have an IV attached to it. This will ensure delivery of the medication and re-flush of saline lock extension set and catheter.

C. If continuous medication and/or fluid administration are required, a standard IV setup should be initiated.

D. Medications with potential blood pressure effects (lowering of BP) should only be considered through a standard IV set up.

E. Consider a saline lock for secondary access points for patients that may require specialized care (i.e., STEMI).

F. Saline locks may be placed, when appropriate, in any age patient.

G. Contra-Indications:
    i. Multiple unsuccessful attempts have been made.

RR
Venous Access - Extremity

Venous Access-Extremity (Saline Locks), cont.

Procedure for Saline Lock Placement:

1. Attach 10mL pre-filled saline syringe to saline lock tubing.
2. Prime saline lock with normal saline (approximately 0.4mL).
3. Establish intravenous access using proper aseptic technique and appropriate sized catheter.
4. Attach saline lock to catheter hub. Flush with 5mL normal saline and check for patency of line or infiltrate. (Note: an infiltrated line should be discontinued and another attempt made starting at #1).
5. Remove saline-filled syringe and secure saline lock in place using venigard or tape.
6. Medications administered through the saline lock must be either flushed with a saline-filled syringe or attached IV bag.
7. To access saline lock luer-lock port, swab injection site with alcohol prep and allow to air dry. Use a luer-lock connector without a needle and flush after each use.
8. If continuous medication and/or fluid therapy is necessary, consider traditional IV set up.

SS
Venous Access – Intraosseous

Intraosseous (IO) vascular access permits the administration of life-saving fluids and medications in critically ill patients. Although used primarily in the past for pediatric patients, technology now allows safe and efficient use of intraosseous access in adults as well. Intravenous or intraosseous drug administration is now the preferred route of medication administration in cardiac arrest. This protocol describes the authorized technique for intraosseous access using the EZ-IO® Product System.

Description

A. The intraosseous route uses the vascular network of the long bones. Fluids or medications are injected into the bone marrow cavity and pass into the venous sinusoids to the central venous channels and then to the systemic circulation via the emissary and nutrient veins. It is quickly accessible with the appropriate equipment and does not collapse during shock as the venous system does. Crystalloid, blood, antibiotics, and the classic resuscitative drugs have all been delivered successfully via this route. To date, no drug has been specifically contraindicated for use by intraosseous infusion.

B. Although technology has made intraosseous vascular access for both adults and children more efficient and comfortable, there are still relative risks and disadvantages to the procedure. Risks of disturbing growth plates in children, pain during infusion of fluids or medication, and potential for creating infection in affected bone mean that the benefits of the technique must be balanced against those risks.

Due to tremendous advances in intraosseous technology, clinicians today are able to rapidly gain access to the intraosseous space in both adults and children alike. The EZ-IO® Product System is indicated whenever fluid or pharmacological therapy is critical but traditional vascular access techniques are not possible or require too much time to achieve successful insertion.

Generally, intraosseous lines will be initiated after unsuccessful attempts to establish peripheral IV access. ***In the setting of vascular collapse (i.e., cardiac arrest), intraosseous lines should be attempted first.***

SS
Venous Access – Intraosseous

Venous Access – Intraosseous, continued

EZ-IO Product System®

Clinical Indications:

- EZ-IO® is indicated for "acute patients" in whom 1-2 peripheral (or external jugular) IV attempts have been unsuccessful **OR** in whom no potential IV sites are obvious on initial examination. Ultimately, any patient who exhibits an acute need for fluids or medication is a possible candidate for EZ-IO®. "**Acute patients" who:**
  - Have limited or no vascular access;
  - Previously required central venous access for infusion due to difficult vascular access;
  - Have an immediate need for drugs or fluids;
  - Require multiple IV sticks to obtain vascular access for medication or fluid administration;
  - Require intubation or sedation;
  - Need access in emergencies;
  - Are in cardiac or respiratory arrest

Contraindications:

- Not intended for conscious, non-life threatening patients.
- Select alternate insertion site if:
  - Infection at the area of insertion
  - Known or suspected fracture of bone selected for IO insertion
  - Excessive tissue and/or absence of adequate anatomical landmarks
  - Previous significant orthopedic procedures (IO within 24 hours in the same extremity, prosthetic limb or joint)

Considerations:

- Due to the anatomy of the IO space you will note flow rates to be slower than those achieved with IV catheters
  - Ensure the administration of a 10mL rapid bolus (flush) with a syringe.
  - Use a pressure infusion bag for continuous infusions.

Precautions:

- The EZ-IO® AD, LD and PD are not intended for prophylactic use.
- If the bony cortex has been penetrated during a failed insertion attempt, further attempts should not be made on the same extremity.

SS
Venous Access – Intraosseous

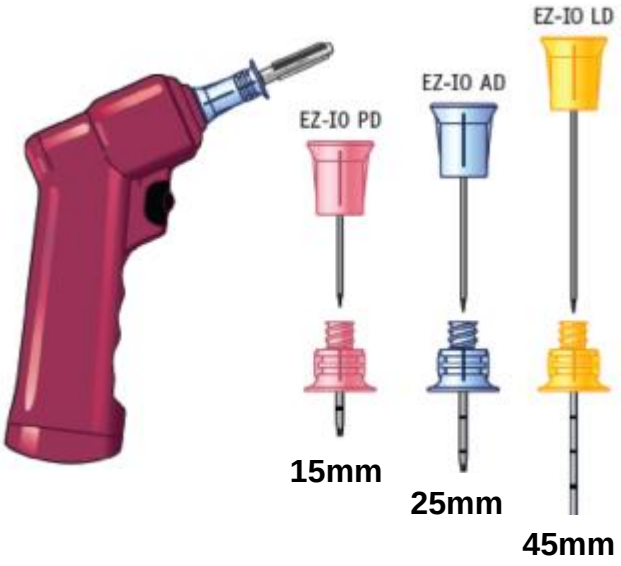
Venous Access – Intraosseous, continued

Potential Complications:

- Localized bleeding and infiltration of fluid and drugs into surrounding tissues, including possible compartment syndrome.
- Bone fracture in small newborns or patients with osteoporosis or congenital bone disease.
- Fat embolus.

Equipment:

- EZ-IO™ driver
- EZ-IO™ needle set
  - PD (3-39Kg) – 15mm **(LCEMS not currently stocking PD needle set)**
  - AD (40Kg and greater) – 25mm
  - LD (Excessive Tissue) – 45mm
- Alcohol prep
- Extension set or EZ-Connect
- 10mL saline-filled syringe
- Normal Saline IV bag with administration set
- Tape or gauze
- Pressure Infusion Bag



SS
Venous Access – Intraosseous

The "Rights" of the EZ-IO:

1. **The Right Site –** Site selection is dependent on:
    a. Absence of contraindications – such as fracture of the target bone, local infection, inability to locate the landmarks or scar indicative of prior joint surgery.
    b. Accessibility of the site.
    c. Ability to monitor and secure the site.
    d. Desired flow rates – Traditionally the proximal humerus site delivers higher volumes of fluid per minute. This may be of consideration if fluid volume resuscitation is required.

2. **The Right Needle** – Selection is based on:
    a. Needle Length (15mm, 25mm, and 45mm).
    b. Soft tissue depth estimated by using your finger.
    c. Visualization of a black line after penetration of the skin.
    d. The 45mm LD needle should be considered for all proximal humerus insertions (patients >40Kg).
    e. Special situations
        i. Excessive soft tissue
        ii. Excessive muscle tissue
        iii. Edema

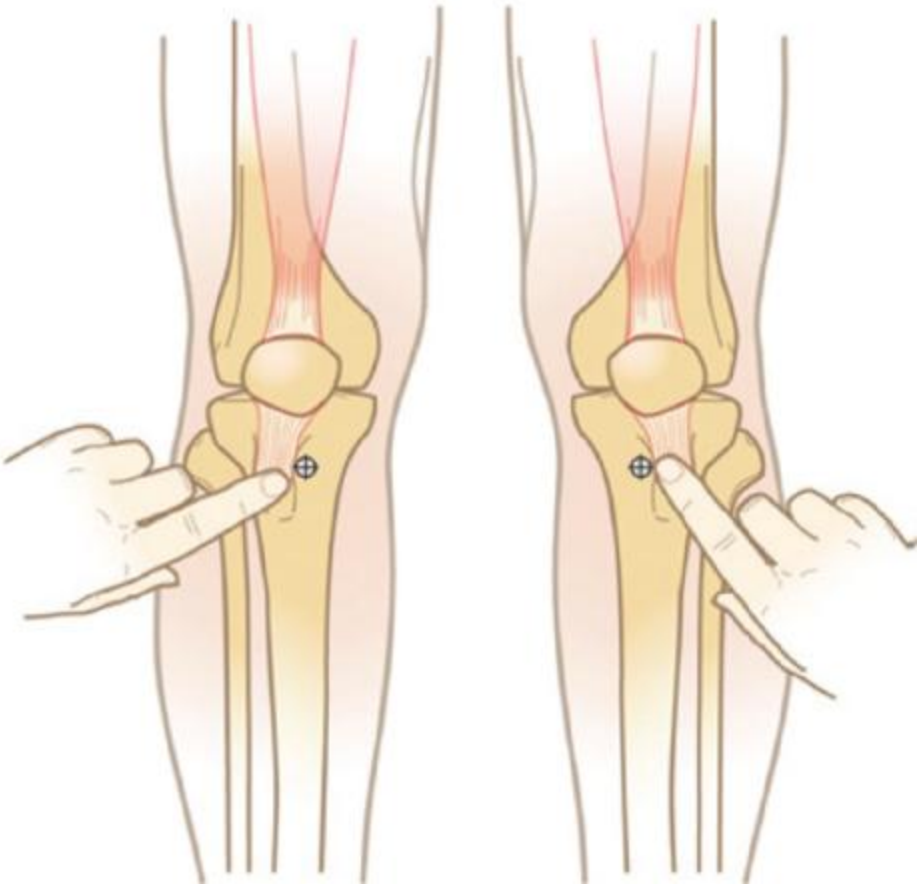
3. **The Right Flush –** The intraosseous space is occupied with bone marrow which is held in place by a thick fibrin network. In order to obtain maximum flow rates you must displace this thick fibrin mesh.
    a. The medullary space must be pressure flushed to obtain maximum flow rates.
    b. 10mL of normal saline is required for initial bolus.
    c. Flush must overcome initial resistance felt with bolus administration.
    d. More than one flush may be required to achieve maximum flow rate.

4. **The Right Amount of Pressure –**
    a. The pressure in the medullary space is approximately 1/3 of the patient's arterial pressure.
    b. Pressurizing fluids for infusion are required to obtain maximum flow rates.
    c. For aggressive fluid resuscitation a rapid infuser may increase flow rates.

SS
Venous Access – Intraosseous

EZ-IO AD (Adult) Sites

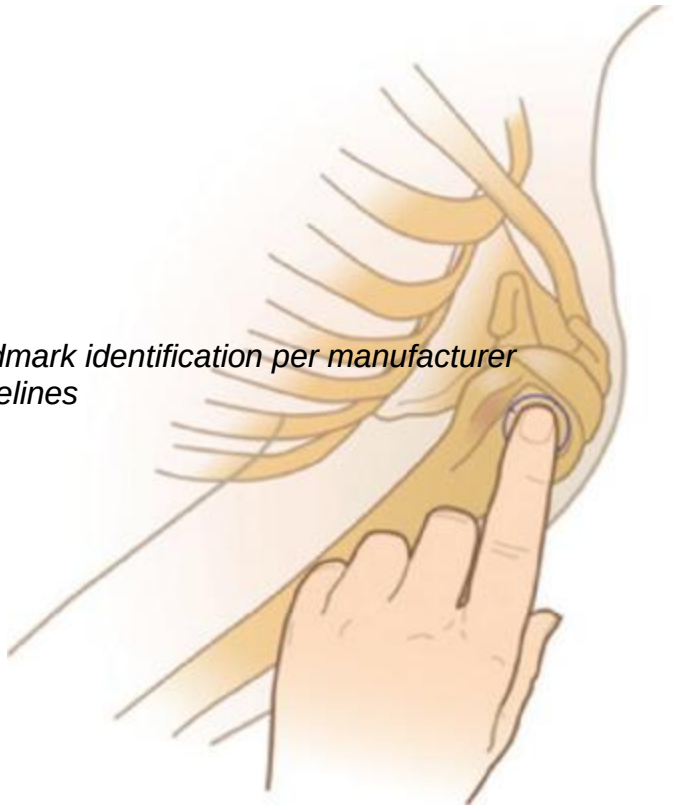
1. **Proximal Tibia –** Insertion site is approximately 2cm (2 finger-breadths) below the patella and approximately 2cm medial to the tibial tuberosity (depending on patient anatomy).



Landmark identification per manufacturer guidelines

EZ-IO AD / LD (Adult) Sites, cont.

2. **Proximal Humerus (at the greater tubercle) –** Insertion site is located directly on the most prominent aspect of the greater tubercle.
    a. Ensure that the patient's hand is resting on the abdomen and that the elbow is adducted (close to the body). Slide thumb up the anterior shaft of the humerus until you feel the greater tubercle.
    b. Approximately 1cm (depending on patient anatomy) above the greater tubercle is the insertion site.
    c. The 45mm needle is recommended on patients >40Kg.
    d. Once insertion is completed secure the arm in place to prevent movement and accidental dislodgement of the IO catheter.



Landmark identification per manufacturer guidelines

SS
Venous Access – Intraosseous

EZ-IO (Pediatric) Sites

1. **Proximal Tibia –** Primary site for insertion
   - The tibial tuberosity is often difficult or impossible to palpate on very young patients. Where the tibial tuberosity cannot be palpated, the insertion site is identified "two finger widths below the patella and then medial along the flat aspect of the tibia."
   - The traditional approach to IO insertion in more mature patients – where the tuberosity can be palpated, is "one finger width distal to the tibial tuberosity along the flat aspect of the medial tibia."
   - *Landmark identification per manufacturer guidelines*

Procedure:

1. Assemble necessary equipment.

2. Prepare insertion site using aseptic technique.

3. Prepare IV infusion system:
   a. Flush EZ-Connect extension with 10mL pre-filled saline syringe (leave attached).
   b. Spike IV fluid bag with 10gtt administration set.

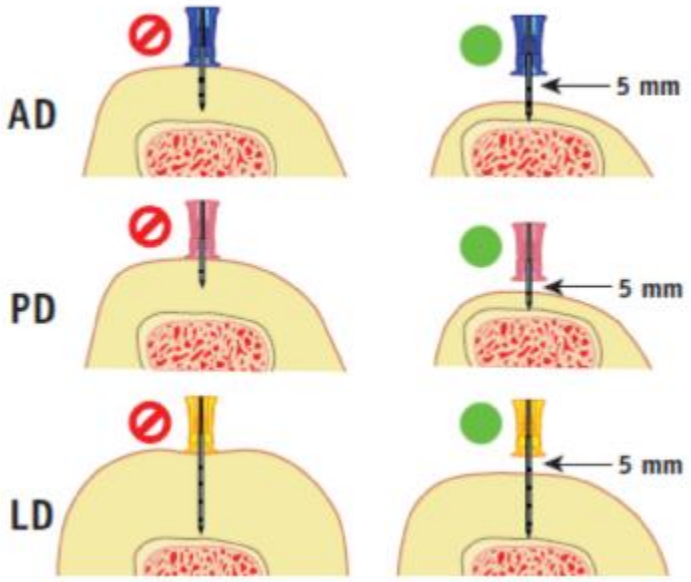
4. Select the appropriate needle set and securely seat on the driver.
   a. PD (3-39Kg) – 15mm
   b. AD (40Kg and greater) – 25mm
   c. LD (Excessive Tissue) – 45mm

5. Remove and discard the needle set safety cap from the IO needle. (Do not touch the needle set with your hand or fingers).

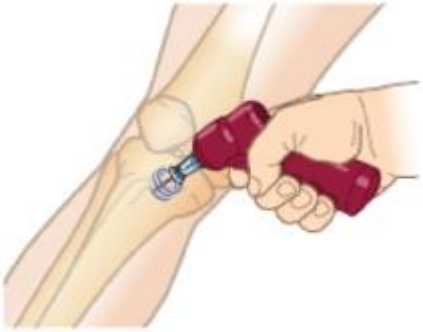
6. Select and stabilize appropriate insertion site.

7. Position driver at insertion site with needle set at a 90-degree angle to the bone. Gently power or press needle set until needle set tip touches bone.

8. Ensure at least 5mm of the catheter is visible. If not, consider use of the longer needle set, if possible. (See figure on next page)



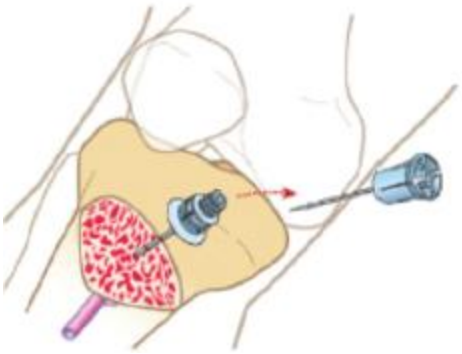
9. Penetrate bone cortex by squeezing the driver's trigger and applying gentle, steady downward pressure.



10. Release the driver's trigger and stop insertion process when:
    a. A sudden "give" or "pop" is felt upon entry into the medullary space.
    b. A desired depth is obtained.
    c. **Use gentle-steady pressure. Do not use excessive force. Allow the catheter tip rotation and gentle downward pressure to provide the penetrating action**. If the diver stalls and will not penetrate the bone, you may be applying too much downward pressure.

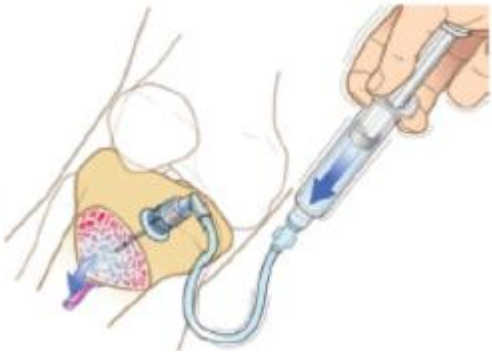
11. Stabilize catheter hub and remove EZ-IO driver (needle is held onto the driver by a magnet).

12. Remove stylet from the body of the IO by twisting counterclockwise and unscrewing.



13. Confirm catheter stability.

14. Attach primed EZ-Connect extension set to catheter hub luer lock. **Do not attach a syringe directly to the EZ-IO catheter hub.**



15. (Prior to flush consider the aspiration of a small amount of blood to confirm placement) Flush the EZ-IO AD catheter with 10mL of NS through the extension. Flush the EZ-IO PD catheter with 5mL of NS through the extension. **NO FLUSH = NO FLOW**. Failure to appropriately flush the IO catheter may result in limited or no flow.

16. Once the IO catheter has been flushed, administer fluids or medications.

17. If line flushes with syringe without signs of significant subcutaneous infiltration, attach the 10gtt IV line to the extension set. If the line flushes with difficulty, try repeating aspiration and flush. If unable to flush, remove the EZ-IO needle and reattempt at an alternate site.

18. Apply EZ-Stabilizer (if available) or secure needle with gauze and tape, but maintain surveillance of the site for signs of infiltration. Avoid taping completely around the limb.

19. Fill out the information on the yellow wristband (if available) and apply to the patient. Preferred location is the wrist of the patient, whenever possible.

20. Use pressure infuser bag to maintain flow through site while not actively pushing boluses of fluid or medication.

21. Following administration of medications, flush the line with at least 10mL of IV fluid.

22. Should significant infiltration occur, remove the needle and place pressure at the puncture site.

23. Hypertonic solutions, such as Dextrose 50% and Sodium Bicarbonate, should be diluted and pushed slowly.

Manual Access – EZ-IO:

In the unlikely event of driver failure or multiple critical patients in which a sufficient quantity of drivers is not available, consider manual access:

1. Firmly grasp both the stylet and catheter hubs.
2. Twist the needle set back and forth (maintaining a 90-degree angle) while gently pushing into position.

Manual Access – EZ-IO (cont.):

3. Manual insertion is considerably slower and the following should be considered:
    a. Failure to hold both the stylet and the catheter hubs during the insertion process may lead to inadvertent catheter separation and insertion failure.
    b. Failure to maintain a 90-degree angle while inserting the needle set manually may lead to extravasation (caused by the creation of a larger than needed pathway for the catheter).

Special Considerations

A. Driver:
    1. Drivers are sealed – **Do not try to open.**
    2. Batteries are not replaceable (Drivers are designed for 1000 insertions).
    3. Daily testing is not necessary or recommended.
    4. Follow the Driver's "Instructions for Use" when cleaning. Ensure that you clean the entire driver (including the drive shaft tip). Do not submerse the driver.
    5. Remember the Driver is rugged – but not indestructible.

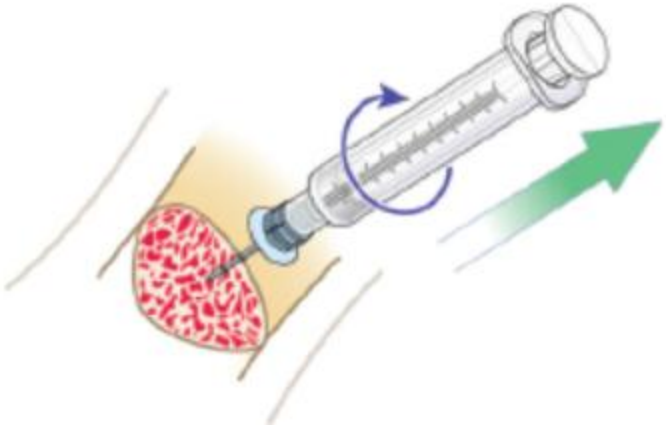
B. Needle Set:
    1. Single use only.
    2. One size DOES NOT fit all!! Consider the patient first.
    3. Use WEIGHT and SIZE, not AGE as the decision tool for which needle set to use.
    4. Remember "Easy Does it" – don't use excessive insertion forces. Glide the needle set into place.

C. Usage Tips:
    1. NO FLUSH = NO FLOW
    2. Flushing (bolus) of normal saline clears the pathway for medications and fluids.
    3. IV flow rate slows – REFLUSH with syringe of normal saline.
    4. Pressure improves flow – Regulate pediatric infusions.

SS
Venous Access – Intraosseous

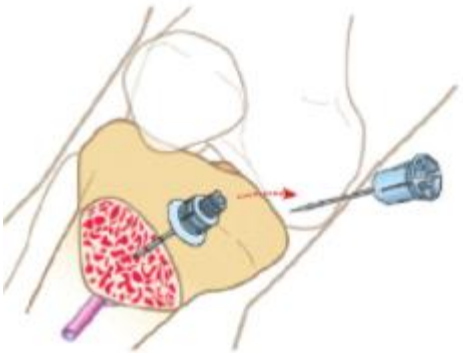
EZ-IO Removal (Procedure):

1. Stabilize the extremity.
2. Attach luer-lock syringe.
3. Continuously rotate clockwise while slowly and gently applying traction to catheter. **Do not rock or bend the catheter during removal.**
4. Once removed immediately place catheter in appropriate sharps container.
5. Dress site as appropriate.



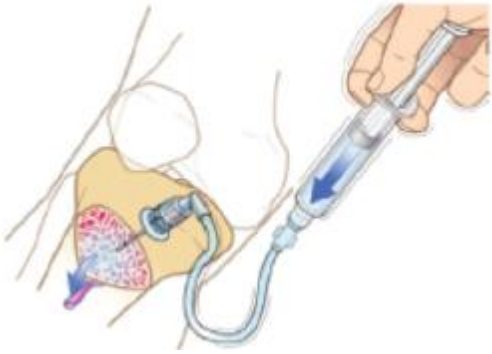
11. Stabilize catheter hub and remove EZ-IO driver (needle is held onto the driver by a magnet).

12. Remove stylet from the body of the IO by twisting counterclockwise and unscrewing.



13. Confirm catheter stability.

14. Attach primed EZ-Connect extension set to catheter hub luer lock. **Do not attach a syringe directly to the EZ-IO catheter hub.**



15. (Prior to flush consider the aspiration of a small amount of blood to confirm placement) Flush the EZ-IO AD catheter with 10mL of NS through the extension. Flush the EZ-IO PD catheter with 5mL of NS through the extension. **NO FLUSH = NO FLOW**. Failure to appropriately flush the IO catheter may result in limited or no flow.

16. Once the IO catheter has been flushed, administer fluids or medications.

17. If line flushes with syringe without signs of significant subcutaneous infiltration, attach the 10gtt IV line to the extension set. If the line flushes with difficulty, try repeating aspiration and flush. If unable to flush, remove the EZ-IO needle and reattempt at an alternate site.

18. Apply EZ-Stabilizer (if available) or secure needle with gauze and tape, but maintain surveillance of the site for signs of infiltration. Avoid taping completely around the limb.

19. Fill out the information on the yellow wristband (if available) and apply to the patient. Preferred location is the wrist of the patient, whenever possible.

20. Use pressure infuser bag to maintain flow through site while not actively pushing boluses of fluid or medication.

21. Following administration of medications, flush the line with at least 10mL of IV fluid.

22. Should significant infiltration occur, remove the needle and place pressure at the puncture site.

23. Hypertonic solutions, such as Dextrose 50% and Sodium Bicarbonate, should be diluted and pushed slowly.

Manual Access – EZ-IO:

In the unlikely event of driver failure or multiple critical patients in which a sufficient quantity of drivers is not available, consider manual access:

1. Firmly grasp both the stylet and catheter hubs.
2. Twist the needle set back and forth (maintaining a 90-degree angle) while gently pushing into position.

Manual Access – EZ-IO (cont.):

3. Manual insertion is considerably slower and the following should be considered:
    a. Failure to hold both the stylet and the catheter hubs during the insertion process may lead to inadvertent catheter separation and insertion failure.
    b. Failure to maintain a 90-degree angle while inserting the needle set manually may lead to extravasation (caused by the creation of a larger than needed pathway for the catheter).

Special Considerations

A. Driver:
    1. Drivers are sealed – **Do not try to open.**
    2. Batteries are not replaceable (Drivers are designed for 1000 insertions).
    3. Daily testing is not necessary or recommended.
    4. Follow the Driver's "Instructions for Use" when cleaning. Ensure that you clean the entire driver (including the drive shaft tip). Do not submerse the driver.
    5. Remember the Driver is rugged – but not indestructible.

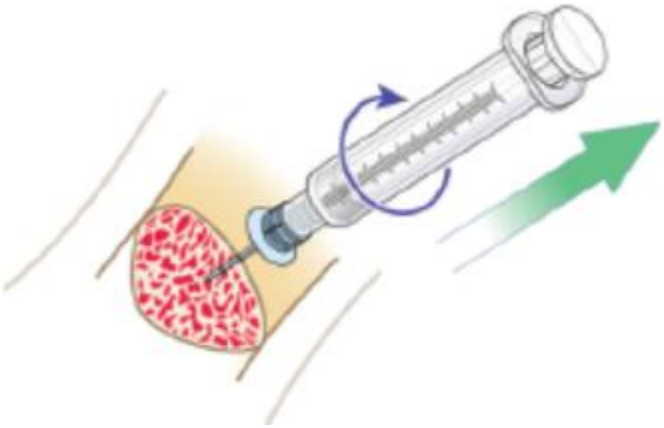
B. Needle Set:
    1. Single use only.
    2. One size DOES NOT fit all!! Consider the patient first.
    3. Use WEIGHT and SIZE, not AGE as the decision tool for which needle set to use.
    4. Remember "Easy Does it" – don't use excessive insertion forces. Glide the needle set into place.

C. Usage Tips:
    1. NO FLUSH = NO FLOW
    2. Flushing (bolus) of normal saline clears the pathway for medications and fluids.
    3. IV flow rate slows – REFLUSH with syringe of normal saline.
    4. Pressure improves flow – Regulate pediatric infusions.

SS
Venous Access – Intraosseous

EZ-IO Removal (Procedure):

1. Stabilize the extremity.
2. Attach luer-lock syringe.
3. Continuously rotate clockwise while slowly and gently applying traction to catheter. **Do not rock or bend the catheter during removal.**
4. Once removed immediately place catheter in appropriate sharps container.
5. Dress site as appropriate.



TT
I-GEL Airway

The i-**gel** airway is a supraglottic airway management device, made of a medical grade thermoplastic elastomer, which is soft, gel-like and transparent. The **i-gel** is designed to create a non-inflatable anatomical seal of the pharyngeal, laryngeal and perilaryngeal structures while avoiding the compression trauma that can occur with inflatable supraglottic airway devices.

An integrated gastric channel can provide an early indication of regurgitation, facilitates venting of gas from the stomach and allows for passing of a nasogastric tube to empty the stomach contents.

A. Indications for Use:

- Initial airway control in cardiac arrest.
- Apneic patient when endotracheal intubation is not possible or not available.
- Patient must be **unconscious, without a gag reflex.**
- No history of esophageal foreign body, disease or caustic ingestion.
- Failed airway

B. Contraindications-Precautions

- Obstructive lesions below the glottis.
- Trismus, limited mouth opening, pharyngo-perilaryngeal abscess, trauma or mass.
- Conscious or semi-conscious patients with an intact gag reflex.
- Do not allow peak airway pressure of ventilation to exceed 40cm H20.
- Do not use excessive force to insert device.
- Particular care should be taken with patients who have fragile and vulnerable dental work, in accordance with recognized airway management.
- Use care to avoid the introduction of lubricant in or near the ventilatory openings.

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

I-Gel Airway, continued

C. Procedure:

1. Grasp the lubricated i-gel firmly along the integral bite block (tube portion of the device). Position the device so that the i-gel cuff outlet is facing toward the chin of the patient.
   a) NOTE: Be sure that there is only a thin layer of lubricant on the end of the i-gel to avoid blowing it into the lungs with ventilation effort.
   b) Suction the upper airway PRIOR to insertion as needed.

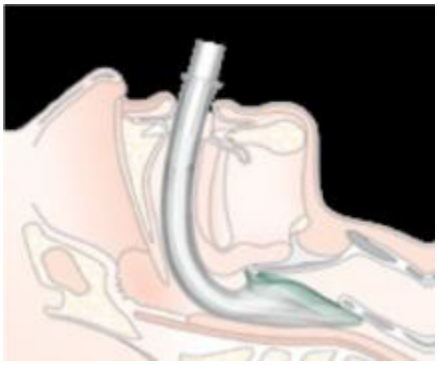
2. The patient should be in the "sniffing" position, with head extended and neck slightly flexed forward. If cervical injury is suspected, use modified "jaw thrust" instead of any flexion at the neck. The chin should be gently pressed down/inferior before proceeding to insert the i-gel.

3. Introduce the leading soft tip into the mouth of the patient in a direction toward the hard palate.

4. Glide the device downwards and backwards along the hard palate with a continuous, but gentle push until a definitive resistance is felt.

5. **WARNING:** Do not apply excessive force on the device during insertion. It is not necessary to insert your fingers or thumbs into the oral cavity of the patient during insertion of this device. If there is resistance during insertion, a "jaw thrust" and slight rotation of the device is recommended.

6. Once inserted, the tip of the device should be located into the upper esophageal opening and the cuff should be located against the laryngeal framework. The incisors should be resting on the integral bite block.



I-Gel Airway, continued

D. Post Procedure Placement (Assessment)

1. Auscultate breath sounds, check for chest rise and confirm placement with EtC02 and Sp02 monitoring.

2. Secure the tube

3. Place the NG tube / suction catheter in the side gastric port and advance to appropriate position, apply suction to decompress the stomach as needed.

4. Continue to monitor, sedate per protocol as necessary.

5. Consider definitive airway placement, as necessary
    a) Endotracheal tube placement
    b) You can intubate through the i-gel tube with a Bougie or a 5.0 ET tube.

E. Removal

1. Ensure suctioning equipment is ready, roll patient onto left side

2. Carefully remove i-gel airway with gentle, but firm traction. Suction as needed.

3. Insert an oropharyngeal or nasopharyngeal adjunct, as needed.

4. Continue ventilations with a BVM at 10-15 LPM flow, as needed or place non-rebreather mask at 10 LPM.

F. PEARLS of Use

1. This is not a definitive airway and aspiration can occur with this device.

2. Preload the gastric port with a nasogastric tube / suction catheter of appropriate size to prevent any fluid leakage from the port during insertion.

3. Apply a small amount of lubricating gel to the tip of the i-gel to aid in insertion, but do not over-lubricate!