These Region 11 Chicago EMS System Protocols, Policies, and Procedures for EMTs and Paramedics are prehospital medical guidelines for patient assessment, treatment, and transportation within the system. They provide a framework for all patient encounters and Online Medical Control should be consulted in situations where there is not clear direction from the written documents.

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REGION 11 - CHICAGO EMS SYSTEM
EMS PROCEDURES – BLS/ALS

PATIENT ASSESSMENT / MANAGEMENT
Neurologic Status Assessment
Stroke Patient Assessment

AIRWAY / VENTILATORY MANAGEMENT
Advanced Airway Management
Capnography
Continuous Positive Airway Pressure (CPAP)
i-gel Supraglottic Airway Insertion
King Airway Insertion
Needle Cricothyrotomy
Viral Filter

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Cardiac Arrest Management / Incident Command for Cardiac Arrest (ICCA)
LIFEPAK 1000 Defibrillator (LP 1000)
Manual Defibrillation
Synchronized Cardioversion
Transcutaneous Pacing

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Hemorrhage Control
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Pleural (Needle) Decompression
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Alternate Vascular Sits for Patients in Extremis
Epinephrine Auto-Injector (EpiPen)
Intranasal Medication Administration
Intravenous (IV) Insertion / IV Medication Administration
Pediatric Intraosseous (IO) Insertion – EZ-IO
Pediatric Intraosseous (IO) Insertion – Manual
Vaccine Administration

OBSTETRICS / PEDIATRIC MANAGEMENT
Region 11 EMS Pediatric Resuscitation Card
REGION 11
CHICAGO EMS SYSTEM
PROCEDURES

PATIENT ASSESSMENT / MANAGEMENT

Neurologic Status Assessment
Stroke Patient Assessment
NEUROLOGIC STATUS ASSESSMENT

Neurological status assessment involves establishing a baseline and then trending any change in patient neurological status. Glasgow Coma Scale (GCS) or AVPU may be used for this.

<table>
<thead>
<tr>
<th>Points</th>
<th>Pediatric</th>
<th>Adult</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eyes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>No eye opening</td>
<td>No verbal response</td>
</tr>
<tr>
<td>2</td>
<td>Eye opening to pain</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Eye opening to verbal</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Eyes open spontaneously</td>
<td></td>
</tr>
<tr>
<td>Verbal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>No vocalization</td>
<td>No vocalization</td>
</tr>
<tr>
<td>2</td>
<td>Inconsolable, agitated</td>
<td>Incomprehensible sounds</td>
</tr>
<tr>
<td>3</td>
<td>Inconsistently consolable, moaning</td>
<td>Inappropriate words</td>
</tr>
<tr>
<td>4</td>
<td>Cries but consolable, inappropriate interactions</td>
<td>Confused</td>
</tr>
<tr>
<td>5</td>
<td>Smiles, oriented to sounds, follows objects, interacts</td>
<td>Oriented</td>
</tr>
<tr>
<td>Motor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>No motor response</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Extension to pain</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Flexion to pain</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Withdraws from pain</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Localizes pain</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Obey's commands</td>
<td></td>
</tr>
</tbody>
</table>

**AVPU**

A: The patients is alert
V: The patient responds to verbal stimulus
P: The patient responds to painful stimulus
U: The patient is completely unresponsive
**STROKE PATIENT ASSESSMENT**

<table>
<thead>
<tr>
<th>Determine last known well (LKW): The time at which the patient was last known to be without the signs and symptoms of the current stroke or at his/her baseline state of health.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Perform Cincinnati Stroke Scale (CSS):</strong> One or more of the following are abnormal:</td>
</tr>
<tr>
<td>Facial Droop: Have patient show teeth or smile</td>
</tr>
<tr>
<td>Abnormal = One side does not move as the other</td>
</tr>
<tr>
<td><strong>Perform Finger to Nose Test (FTN):</strong> Have the patient touch their nose and then the provider’s finger repeatedly with each hand. A normal exam is when the patient can smoothly touch their nose and the provider’s finger.</td>
</tr>
<tr>
<td>Abnormal = Patient demonstrates dysmetria (unable to touch finger following a straight path) on either side or both</td>
</tr>
<tr>
<td><strong>If abnormal or unobtainable CSS or FTN: Assess stroke severity with 3 Item Stroke Scale (3I-SS):</strong></td>
</tr>
<tr>
<td><strong>Level of Consciousness (AVPU)</strong></td>
</tr>
<tr>
<td>0 = Alert</td>
</tr>
<tr>
<td>1 = Arousable to voice only</td>
</tr>
<tr>
<td>2 = Arousable to noxious stimuli only or unresponsive</td>
</tr>
<tr>
<td>Stroke scale ≥ 4 and last known well ≤ 6 hours transport to Comprehensive Stroke Center</td>
</tr>
</tbody>
</table>
AIRWAY / VENTILATORY MANAGEMENT

Advanced Airway Management
Capnography
Continuous Positive Airway Pressure (CPAP)
i-gel Supraglottic Airway Insertion
King Airway Insertion
Needle Cricothyrotomy
Viral Filter
ADVANCED AIRWAY MANAGEMENT

I. PEDIATRIC ADVANCED AIRWAY MANAGEMENT

Pediatric patients ≤ 8 years of age should have their airway preferentially managed via bag valve mask and oral or nasal airway.

II. ADULT ENDOTRACHEAL INTUBATION

INDICATIONS

Considered for patients with:
- Apnea
- Inadequate respiratory effort, or
- An inability to protect the patient airway (e.g., Glasgow Coma Scale less than or equal to 8)

CONTRAINDICATIONS

- Inability to visualize anatomical landmarks.

EQUIPMENT

- Oral airway
- Bag-valve-mask
- Oxygen
- Suction
- Stethoscope
- Appropriately sized endotracheal tube and stylet
- Appropriately sized Laryngoscope blade and handle
- 10 ml syringe
- Airway tube holder
- Pulse oximeter and capnography

PROCEDURE

1. Apply personal protective equipment.
2. Position patient to open airway, insert oral airway and maintain in-line stabilization for all suspected trauma patients.
3. Create seal with mask on patient's face and assist ventilation with bag-valve-mask device.
4. Assemble all equipment and test for function. Attach pulse oximeter.
5. Remove oral airway, insert laryngoscope blade to visualize vocal cords.
6. Insert the endotracheal tube until the cuff passes through the cords and remove the stylet if used.
7. Immediately connect the EtCO2 detector to the endotracheal tube and confirm placement with EtCO2 waveform.

8. If EtCO2 waveform indicates improper endotracheal tube placement, immediately remove the endotracheal tube and ventilate the patient using the bag valve mask. Consider securing an airway with the Supraglottic Airway.

9. If endotracheal tube placement cannot be visualized with direct laryngoscopy, return to step 3. May repeat for a total of two (2) attempts, then proceed to Supraglottic Airway insertion.

10. All patients, once intubated, should have both lungs auscultated for adequate ventilation. Next auscultate the epigastric area for absence of air movement, then secure the endotracheal tube and insert oral airway. Attach capnography and monitor continuously.

11. If inadequate lung sounds are auscultated on the LEFT side, the tube should be pulled back in 1 cm increments until equal breath sounds are heard.

12. Lung sounds should be continually re-assessed throughout patient contact and whenever patient is moved or position changed. Continually reassess pulse oximeter and capnography.

13. If at any time:
   - The bag becomes difficult to compress,
   - There is evidence of hypoperfusion (changes in vital signs, mental status or decreased capillary refill),
   - Change in tube position does not demonstrate clinical improvement,

   Tube placement verification should be reassessed by direct visualization. Reassess pulse oximeter and capnography. If the endotracheal tube is inappropriately placed, return to step 3.

14. Continue to assist ventilations as indicated.

15. Documentation should include all airway insertion attempts.

II. KING AIRWAY INSERTION

**INDICATIONS**

- Airway management in a non-breathing person without a gag reflex
- Patient is over 4 feet in height.

**CONTRAINDICATIONS**

- Patients under 4 feet in height.
- Intact gag reflex.
- Patients with known esophageal disease
- Patients who have ingested caustic substances
**EQUIPMENT**

- King LTS-D Airway
- 14 French suction catheter
- Water-based lubricant
- 60 ml syringe
- Airway tube holder

**PROCEDURE**

1. Pre-oxygenate the patient.

2. Choose the correct size King Airway:
   - **Size 3** fits 4-5 feet in height **Yellow** connector.
   - **Size 4** fits 5-6 feet in height **Red** connector.
   - **Size 5** fits 6+ feet in height **Purple** connector.

3. Inspect the King Airway for visible damage prior to insertion.

4. Test cuff to ensure there are no leaks.

5. Apply a water-based lubricant to the beveled distal tip and posterior aspect of the tube. Avoid getting lubricant near the ventilatory openings.

6. Position patient’s head. The ideal position for the King Airway insertion is “sniffing position”. The angle of the King Airway does not allow for insertion at a neutral angle.

7. Hold the King Airway at the connector with the dominant hand. With the non-dominant hand, hold the mouth open and apply chin lift, unless contraindicated by cervical spine precautions or patient position. Using a lateral approach, introduce tip into corner of mouth.

8. Advance the tip behind the base of the tongue while rotating tube back to midline so that the blue orientation line faces the chin of the patient.

9. Without exerting excessive force, advance the King Airway until base of connector is aligned with teeth or gums.

10. Inflate the cuffs with the minimum volume necessary to seal the airway. Inflation volumes are located the King Airway. Typical inflation volumes are as follows:
    - **Size 3**: 45-60 ml
    - **Size 4**: 60-80 ml
    - **Size 5**: 70-90 ml

11. Gently ventilate the patient using bag valve mask. If initial ventilations meet resistance perform the following:
    - Slowly pull back on King Airway while gently ventilating.
    - When ventilations suddenly become easy and free flowing with corresponding chest wall rise maintain that level of insertion.
12. Confirm placement to ensure adequate ventilations by auscultation of lung sounds, observing adequate chest rise, and verification of end tidal CO2 waveform.

13. If necessary, add additional volume to cuff to maximize seal of the airway (within cuff size limits).

14. Secure King Airway to patient utilizing tape or appropriate commercial device.

15. Lubricate a 14 French suction catheter prior to inserting into the King Airway’s gastric access lumen.

16. Document the size of King Airway used and the depth of insertion at teeth or lips.

*Note: The King Airway does not protect the airway from aspiration like endotracheal intubation does.*
CAPNOGRAPHY - ALS

DEFINITIONS

Capnography: Analysis and recording of carbon dioxide (CO₂) concentrations in respiratory gases via continuous waveform.

End-Tidal CO₂ (ETCO₂): The amount of carbon dioxide measured at the end of exhalation.

INDICATIONS

- All patients receiving positive pressure ventilations (BVM or advanced airway)
- Confirmation of advanced airway proper placement (i-gel or endotracheal tube)
- Monitor correct position of the advanced airway over time
- Ventilation management
- Early detection of return of spontaneous circulation (ROSC) in patients in cardiac arrest

CONTRAINDICATIONS

None

EQUIPMENT

- Cardiac monitor
- Capnography (ETCO₂) filter line set
- Bag-valve-mask or advanced airway

PROCEDURE

1. Apply personal protective equipment: gloves.
2. Attach capnography filter line set to the cardiac monitor.
3. Verify that the capnography display appears prior to applying the device to the patient. This zeros the device to ensure an accurate reading.
4. Apply the capnography device immediately upon initiating any positive pressure ventilations, or as soon as possible.
5. During bag-mask-ventilation, maintain a continuous seal in order to obtain accurate capnography readings.
6. When an advanced airway is placed, the capnography device shall be applied/re-applied immediately to confirm airway placement, along with assessing bilateral breath sounds and absence of gastric sounds.
7. Visualization of a normal or elevated value with a corresponding normal waveform confirms placement. Extremely low values (<10 mmHg) without the typical waveform implies esophageal placement and the
endotracheal tube should be removed. For patients in shock or cardiac arrest, the value (and height of the waveform) will likely be reduced but the shape of the waveform should be normal.

8. Continuously monitor the waveform, report the capnography reading to Online Medical Control and document capnography reading on the patient care record as follows:

   a. Immediately after placement of an advanced airway
   b. With any change in patient condition
   c. After any patient movement
   d. Every five minutes during transport
   e. Upon transfer of care

9. For patients in cardiac arrest, continuously monitor capnography during resuscitation. A sudden rise in ETCO2, along with an organized rhythm, is a reliable sign of ROSC and should prompt a pulse check at the end of the compression cycle. Do not hyperventilate regardless of the ETCO2 value; elevated values will normalize with proper ventilation. A drop in ETCO2 below normal can signify progressive hypotension or re-arrest.

10. A “shark-fin” waveform on ETCO2 monitoring indicates bronchospasm; treatment with albuterol is indicated.

11. During positive-pressure ventilation, if a “shark-fin” pattern and/or an elevating ETCO2 waveform (“breath stacking”) is visualized, decrease ventilation rate to avoid increases in intrathoracic pressure, which can lead to decrease in venous blood return to the heart and cardiopulmonary arrest.

12. If the ETCO2 filter line becomes kinked or clogged with fluid, disconnect and reconnect the filter line set or exchange it.

13. Capnography should be used immediately and continuously any time an advanced airway is placed.

14. Capnography monitoring data should be uploaded to the electronic patient care report.

**CAPNOGRAPHY WAVEFORMS**

Normal shape of the capnograph (Normal waveform is depicted below)
Esophageal Intubation (Low values <10 and irregular waveform or flat line)

Obstructed or Dislodged Endotracheal Tube (Sudden loss of normal waveform followed by low irregular waveform or flat line)

Hyperventilation (Normal waveform with reduced height, <35mmHg, and high ventilation rate)
Hypoventilation / Bradypnea (Normal waveform with increased height, >45mmHg)

Hypoventilation / Low tidal volumes (Normal waveform with reduced height, <35mmHg, and slow ventilation rate; A similar reduced height waveform can also be seen with shock – see progressive hypotension below).

Air Trapping / Breath Stacking (Box wave forms that show increasing values with each successive breath)
Bronchospasm ("Shark Fin Pattern")

Return of Spontaneous Circulation (Sudden increase in values in a patient in cardiac arrest)

Progressive Hypotension or Re-arrest (Progressive decrease in values with each successive breath)
CONTINUOUS POSITIVE AIRWAY PRESSURE (CPAP)

Continuous Positive Airway Pressure (CPAP) may be used as an adjunctive therapy for the treatment of patients with suspected Acute Pulmonary Edema, Chronic Obstructive Pulmonary Disease (COPD) or Asthma who present in MODERATE to SEVERE respiratory distress:

**INDICATIONS**

- Pulse Ox less than 92%
- Respiratory rate greater than 25
- Accessory muscle use

Suspect Acute Pulmonary Edema, COPD or Asthma as the cause of respiratory distress in patients with:

- History of CHF/MI, COPD or Asthma
- Orthopnea
- On medications for CHF (furosemide, digoxin, ace inhibitor)
- Pulmonary rales, crackles
- Wheezing
- Lower extremity edema
- Jugular Venous Distension
- STEMI confirmed by 12 lead ECG

**CONTRAINDICATIONS**

- Age less than < 10 years
- Inability to protect airway, significantly altered mental status.
- Hemodynamic instability:
  - Systolic blood pressure less than 100 mmHg
  - Significant arrhythmia (i.e. ventricular tachycardia, 3rd degree heart block)
- Inability to cooperate with fitting and wearing of mask
- Rapid deterioration once mask is placed
- Known or suspected pneumothorax
- Recent gastric, laryngeal, esophageal surgery
- Significant nausea and vomiting.

**EQUIPMENT**

- Boussignac CPAP system or the Flow Safe II EZ CPAP system (private providers may use ventilator based system)
- Appropriate sized mask:
  - Boussignac – Size 5 medium (adult)
  - Flow Safe II EZ – Size large
- Oxygen tank with flow regulator able to generate 25 liters/min flow rate.
- D-tank must have a minimum of 2,000 psi.
BOUSSIGNAC CPAP SYSTEM

PROCEDURE

1. Initiate RMC.

2. Explain procedure to patient (i.e. “I am going to put this mask on your face to help you breathe. Try to relax and breathe normally”).

3. Prepare CPAP system equipment:
   - Insert white end of CPAP system into face mask
   - Connect funnel end of green O2 tubing to oxygen source
   - Turn on O2 and dial flow meter to desired setting (begin with 15 liters per minute (LPM) equaling CPAP of 5.0)

4. Prepare patient:
   - Place in fowler’s or semi-fowler’s position
   - One crew member gently place mask on patient’s face obtaining a proper seal without leaks.
   - Second crew member secure mask to patients face with head strap.

5. Titrate CPAP:
   - Increase flow meter to 25 LPM equaling CPAP of 10 (see tables 1 and 2)
   - Reassess patient for mask seal and ability to cooperate/tolerate mask
   - If patient is unable to tolerate, decrease flow rate to 20 LPM and reassess
   - Continue close monitoring of patient with goal of:
     i. Decreased heart rate
     ii. Decreased respiratory rate/effort
     iii. Improved oxygen saturation

6. Indications for discontinuation of CPAP (Place on 100% oxygen NRB mask):
   - Rapid deterioration (proceed to Advanced Airway Management procedure as indicated)
   - Inability to cooperate with wearing and fitting of mask
   - Hypotension (SBP less than 100 mmHg)
   - Worsening hypoxia (decrease in O2 saturations %)
   - Vomiting or inability to handle secretions
   - Suspected pneumothorax
   - Base station discretion
**TABLE 1:** Liters of O2 Flow = CPAP cm H20

<table>
<thead>
<tr>
<th>Flow (LPM)</th>
<th>CPAP (cm H20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>2.5-3.0</td>
</tr>
<tr>
<td>15</td>
<td>4.5-5.0</td>
</tr>
<tr>
<td>20</td>
<td>7.0-8.0</td>
</tr>
<tr>
<td>25</td>
<td>8.5-10</td>
</tr>
<tr>
<td>&gt;25</td>
<td>&gt;10</td>
</tr>
</tbody>
</table>

**TABLE 2:** Minutes of CPAP use based on Oxygen Tank Size

<table>
<thead>
<tr>
<th>Flow (LPM)</th>
<th>D Tank (minutes)</th>
<th>K Tank (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>70</td>
<td>703</td>
</tr>
<tr>
<td>6</td>
<td>58</td>
<td>598</td>
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<td>8</td>
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<tr>
<td>12</td>
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</tr>
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<td>15</td>
<td>23</td>
<td>199</td>
</tr>
<tr>
<td>20</td>
<td>16</td>
<td>175</td>
</tr>
<tr>
<td>25</td>
<td>14</td>
<td>140</td>
</tr>
</tbody>
</table>
FLOW-SAFE II EZ CPAP System

PROCEDURE

1. Initiate RMC.

2. Explain procedure to patient (e.g. “I am going to put this mask on your face to help you breath. Try to relax and breathe normally”).

3. Prepare CPAP system equipment:
   - Connect oxygen tubing to flow meter or regulator.
   - Turn on O2 and dial flow meter to desired setting: begin with 8-9 liters per minute (LPM) equaling CPAP of 5.0
   - Adjust oxygen flow as indicated on yellow sticker attached to oxygen tubing. *Manometer will not register until placed on patient

4. Prepare patient:
   - Place in fowler’s or semi-fowler’s position
   - One crew member gently place mask on patient’s face obtaining a proper seal without leaks. Place mask on patient’s face and adjust with Velcro strap on each of 4 points.
   - Quick release clips allow fast access to remove mask.
   - Spring action forehead pads allow for adjustment of mask on bridge of nose.
   - Second crew member secure mask to patients face with head strap.

5. Titrate CPAP:
   - Increase flow meter to 13-14 LPM equaling CPAP of 10.0 (see table 3 below)
   - Reassess patient for mask seal and ability to cooperate/tolerate mask
   - If patient is unable to tolerate, decrease flow rate to 10-12 LPM and reassess
   - Continue close monitoring of patient with goal of:
     i. Decreased heart rate
     ii. Decreased respiratory rate/effort
     iii. Improved oxygen saturation

<table>
<thead>
<tr>
<th>TABLE 3: CONNECT TO FLOW SOURCE ONLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPAP Pressure (cm H2O)</td>
</tr>
<tr>
<td>-------------------------</td>
</tr>
<tr>
<td>5.0</td>
</tr>
<tr>
<td>7.5</td>
</tr>
<tr>
<td>10.0</td>
</tr>
<tr>
<td>13.0 (Max)</td>
</tr>
</tbody>
</table>

CAUTION: CPAP pressure will decrease when nebulizer is activated and increase when nebulizer is deactivated. Verify CPAP pressure with manometer and adjust flow meter as needed.
**Only one oxygen source is necessary since the nebulizer portion is built into Flow-Safe II EZ CPAP System**

6. Place medication in medication bowl.

7. Turn nebulizer switch to green (on). (see picture)

8. Adjust oxygen flow to maintain desired pressure:
   - Turning the switch to green will reduce pressure requiring an increase in oxygen flow to maintain original pressure.
   - For CPAP Pressure of 5.0, increase flow to 15-16 LPM
   - For CPAP Pressure of 10.0, increase flow to 24-25 LPM

9. Indications for discontinuation of CPAP (Place on 100% oxygen NRB mask):
   - Rapid deterioration (proceed to Advanced Airway Management procedure as indicated)
   - Inability to cooperate with wearing and fitting of mask
   - Hypotension (SBP less than 100 mmHg)
   - Worsening hypoxia (decrease in O2 saturations %)
   - Vomiting or inability to handle secretions
   - Suspected pneumothorax
   - Base station discretion
KING AIRWAY INSERTION

INDICATIONS

- Airway management in a non-breathing person without a gag reflex
- Patient is over 4 feet in height.

CONTRAINDICATIONS

- Patients under 4 feet in height
- Intact gag reflex
- Patients with known esophageal disease
- Patients who have ingested caustic substances

EQUIPMENT

- King LTS-D Airway
- 14 French suction catheter
- Water-based lubricant
- 60 ml syringe

PROCEDURE

1. Pre-oxygenate the patient.

2. Choose the correct size King Airway:
   - **Size 3** fits 4-5 feet in height **Yellow** connector.
   - **Size 4** fits 5-6 feet in height **Red** connector.
   - **Size 5** fits 6+ feet in height **Purple** connector.

3. Inspect the King Airway for visible damage prior to insertion.

4. Test cuff to ensure there are no leaks.

5. Apply a water-based lubricant to the beveled distal tip and posterior aspect of the tube. Avoid getting lubricant near the ventilatory openings.

6. Position patient’s head. The ideal position for the King Airway insertion is “sniffing position”. The angle of the King Airway does not allow for insertion at a neutral angle.

7. Hold the King Airway at the connector with the dominant hand. With the non-dominant hand, hold the mouth open and apply chin lift, unless contraindicated by cervical spine precautions or patient position. Using a lateral approach, introduce tip into corner of mouth.

8. Advance the tip behind the base of the tongue while rotating tube back to midline so that the blue orientation line faces the chin of the patient.
9. Without exerting excessive force, advance the King Airway until base of connector is aligned with teeth or gums.

10. Inflate the cuffs with the minimum volume necessary to seal the airway. Inflation volumes are located on the King Airway. Typical inflation volumes are as follows:
   - Size 3: 45-60 ml
   - Size 4: 60-80 ml
   - Size 5: 70-90 ml

11. Gently ventilate the patient using bag valve mask. If initial ventilations meet resistance perform the following:
   - Slowly pull back on King Airway while gently ventilating.
   - When ventilations suddenly become easy and free flowing with corresponding chest wall rise maintain that level of insertion.

12. Confirm placement to ensure adequate ventilations by auscultation of lung sounds, observing adequate chest rise, and verification of end tidal CO2 waveform.

13. If necessary, add additional volume to cuff to maximize seal of the airway (within cuff size limits).

14. Secure King Airway to patient utilizing tape or appropriate commercial device.

15. Lubricate a 14 French suction catheter prior to inserting into the King Airway’s gastric access lumen.

16. Document the size of King Airway used and the depth of insertion at teeth or lips.

*Note: The King Airway does not protect the airway from aspiration like endotracheal intubation does.*
INDICATIONS

- Need for advanced airway in an apneic patient without a gag reflex

CONTRAINDICATIONS

- Gag reflex
- Limited mouth opening
- Airway (larynx/pharynx) mass, abscess, trauma

EQUIPMENT

- Suction catheter and suction device
- I-gel airway device
- Water-based lubricant
- Support strap or tape
- ETCO2

PROCEDURE

1. **Prepare for procedure.** Apply personal protective equipment (gloves, facemask, eye protection).

2. **Prepare patient** in sniffing position; maintain in-line stabilization for trauma.

3. **Preoxygenate patient.** Insert nasopharyngeal or oropharyngeal airway. Ventilate patient at 10-12 breaths per minute.

4. **Prepare equipment.** Prepare suction device, suction catheter, I-gel, ETCO2. Select correct size of device based on chart below. Inspect packaging, expiration date and device.

5. **Device preparation.** Remove device from protective cradle or cage package. Place small amount of water based lubricant on cradle or cage surface. Grasp I-gel at integral bite block and lubricate back, sides, front of cuff. Ensure no bolus of lubricant in cuff bowl or elsewhere on device.

6. **Device insertion.** Position device so the I-gel cuff outlet is facing the chin of the patient. Gently press down on chin to open mouth. Introduce soft tip into mouth of patient toward the hard palate.

7. **Device positioning.** Insert adult device (size 3, 4, 5) to horizontal line on integral bite block and insert pediatric devices (size 1.5, 2, 2.5) until definitive resistance felt. Do not apply excessive force. If early resistance during insertion, perform jaw thrust or rotate device.
8. **Confirm tube placement.** Ventilate patient and auscultate bilateral breath sounds. Monitor ETCO2 with waveform capnography.

9. **Secure device.** Attach support strap to integral ring hook or tape maxilla to maxilla.

10. **Suction gastric channel.** Determine proper size of suction catheter based on chart. Apply water-based lubricant to catheter and gastric channel. Advance tube with suction to optimize cuff seal and reduce aspiration. Contraindications to placing a suction catheter include an upper gastrointestinal (GI) bleed or esophageal trauma.

11. **Reassess the patient.** Repeat vital signs.

12. **Troubleshooting for air leak.** This may be due to over ventilation. Ensure slow and gentle squeezing of bag valve mask (BVM) and limit tidal volume to 5 ml/kg. This may also be due to malposition. Advance the tube, pull back and reseat, or remove and insert a larger size.

13. **Complications from the procedure.** These may include laryngospasm, trauma to the airway structures (larynx/pharynx), and gastric regurgitation or aspiration.

### I-gel Size Chart

<table>
<thead>
<tr>
<th>Color</th>
<th>I-gel size</th>
<th>Patient size</th>
<th>Patient weight (kg)</th>
<th>Patient weight (lbs)</th>
<th>Suction catheter size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td>1.5</td>
<td>Infant</td>
<td>5-12 kg</td>
<td>11-25 lbs</td>
<td>10 F</td>
</tr>
<tr>
<td>Grey</td>
<td>2.0</td>
<td>Small pediatric</td>
<td>10-25 kg</td>
<td>22-55 lbs</td>
<td>12 F</td>
</tr>
<tr>
<td>White</td>
<td>2.5</td>
<td>Large pediatric</td>
<td>25-35 kg</td>
<td>55-77 lbs</td>
<td>12 F</td>
</tr>
<tr>
<td>Yellow</td>
<td>3.0</td>
<td>Small adult</td>
<td>30-60 kg</td>
<td>65-130 lbs</td>
<td>12 F</td>
</tr>
<tr>
<td>Green</td>
<td>4.0</td>
<td>Medium adult</td>
<td>50-90 kg</td>
<td>110-200 lbs</td>
<td>12 F</td>
</tr>
<tr>
<td>Orange</td>
<td>5.0</td>
<td>Large adult</td>
<td>90+ kg</td>
<td>200+ lbs</td>
<td>14 F</td>
</tr>
</tbody>
</table>
NEEDLE CRICOPTHYROTOMY

INDICATIONS

- Respiratory obstruction
- Anaphylaxis
- Traumatic airway
- Suspected croup
- Epiglottis with airway obstruction
- Failed endotracheal intubation “with” inability/contraindication to use supraglottic airway

CONTRAINDICATIONS

To be done with caution in patients:
- less than 8 years old or
- suspected barotrauma

EQUIPMENT

- 10 or 14 gauge angiocath
- 10 ml syringe
- 3.0 or 3.5mm ET tube adapter

PROCEDURE

1. Hyperextend neck unless suspected neck trauma.

2. Identify thyroid cartilage and cricoid cartilage. Locate cricothyroid membrane located between these two landmarks.

3. Use angiocath attached to a 10cc syringe; insert catheter through the cricothyroid membrane at a 90-degree angle until a “popping” sensation is felt.

4. Aspirate air to verify placement.

5. Remove syringe; advance catheter tilting it at a 30-degree angle, aiming towards the feet. Remove the needle while advancing the catheter.

6. Once in place, reconnect the syringe and re-verify placement (should aspirate air easily).

7. Connect adapter from 3.0 or 3.5 ET tube to angiocath.

8. Attach bag valve mask and initiate ventilation; you will have difficulty ventilating due to narrowed airway.

9. Auscultate breath sounds.

10. May repeat for total of 2 attempts. Transport with catheter in place.
VIRAL/BACTERIAL FILTER

I. Definition: Device with filter media placed inline to prevent movement of viral or bacterial pathogens from expired air on ventilation during airway management.

II. Specifications:
   1. End connector size: 22 mm ID x 15 mm ID/22 mm OD
   2. Bacterial efficiency 99.999+%; viral efficiency 99.99+% 

III. Indication: Use to prevent pathogen transmission during airway management procedures

IV. Contraindication: None

V. Use of the Viral Filter

1. Bag Valve Mask
   a. Face mask > viral filter > bag device
2. Advanced Airway
   a. I-gel or King Airway SGA > viral filter > ETCO2 connector > bag device

   b. Endotracheal tube > viral filter > ETCO2 connector > bag device

3. CPAP
   a. Face mask > viral filter > CPAP valve

VI. Considerations

1. Minimize aerosol-generating procedures (BVM ventilation, oropharyngeal suctioning, nebulizer treatments, CPAP) for suspected COVID-19 patients.
2. For airway management procedures, wear personal protective equipment (PPE) at minimum to include N-95 mask, gloves, and eye protection.

3. For the CPAP mask, when the filter is placed then the nebulizer cannot be used, the filter will filter out the medication.
REGION 11
CHICAGO EMS SYSTEM
PROCEDURES

CARDIAC MANAGEMENT

12-Lead Electrocardiogram (ECG)
Adult Post-Cardiac Arrest Care & Therapeutic Hypothermia
Cardiac Arrest Management / Incident Command for Cardiac Arrest (ICCA)
LIFEPAK 1000 Defibrillator (LP 1000)
  Manual Defibrillation
  Synchronized Cardioversion
  Transcutaneous Pacing
12-LEAD ELECTROCARDIOGRAM (ECG) - ALS

INDICATIONS

- All patients with suspected Acute Coronary Syndrome (ACS) should have an ECG performed in the prehospital setting
- At a minimum, patients with any of the following signs or symptoms should have a 12-lead ECG performed:
  - Chest pain
  - Symptomatic heart failure
  - Pulmonary edema
  - Shortness of breath
  - Syncope or presyncope
  - Return of spontaneous circulation (ROSC) after cardiac arrest
  - Tachycardia (> 120 bpm) or bradycardia (< 50 bpm)
  - Any of the following atypical symptoms of ACS in patients over age 40 (atypical symptoms of ACS are especially common in women, diabetics and the elderly):
    - Generalized weakness
    - Epigastric pain or nausea/vomiting
    - Diaphoresis
    - Shoulder/arm/jaw pain
    - Atraumatic hypotension

EQUIPMENT

- Cardiac electrodes
- Limb lead and precordial lead attachment to main cable
- Cardiac monitor/defibrillator with 12-lead ECG capability

PROCEDURE

1. Apply personal protective equipment.
2. Perform patient assessment and identify patients requiring an ECG based on above criteria.
3. Insert limb lead and precordial lead attachment into main cable.
4. Insert cable connector into cardiac monitor.
5. If necessary, clean and dry skin or remove excess chest hair with razor.
6. Apply electrodes to limbs and precordial lead sites.
7. Encourage patient to remain still during 12-lead ECG acquisition.

8. Press "12-LEAD" button and enter identifying information (ambulance number and patient initials).


10. Transmit ECG to receiving hospital.

11. Repeat and transmit ECG after:
   - Any change in patient status;
   - Any change in cardiac rhythm; or
   - Administration of any electrical or medical therapies.

12. For patients with very high suspicion for Acute Coronary Syndrome and an initial ECG that does not show STEMI, leave ECG cables in place for continuous ST segment monitoring/repeat ECG.

13. Attach ECG to the electronic patient care report (ePCR).

**CARDIAC LEAD PLACEMENT:**

---

**Limb Lead Electrode Sites**
- RA/R
- LA/L
- RL/N
- LL/F

**Precordial Lead Electrode Sites**
- V1
- V2
- V3
- V4
- V5
- V6

**AHA Labels**
- RA Right Arm
- LA Left Arm
- RL Right Leg
- LL Left Leg

**IEC Labels**
- R Right
- L Left
- N Negative
- F Foot

**Legend**
- V1 C1 Fourth intercostal space to the right of the sternum
- V2 C2 Fourth intercostal space to the left of the sternum
- V3 C3 Directly between leads V2/C2 and V4/C4
- V4 C4 Fifth intercostal space at midclavicular line
- V5 C5 Level with V4/C4 at left anterior auxiliary line
- V6 C6 Level with V5/C5 at left midaxillary line
ADULT POST-CARDIAC ARREST CARE - ALS

PROCEDURE:

1. Confirm Return of Spontaneous Circulation (ROSC):
   a. Identify palpable pulse
   b. Document auscultated blood pressure
   c. Perform 12-lead ECG

2. Assess oxygenation and ventilation:
   a. Maintain oxygen saturation $\geq 94$
   b. Assist spontaneous respirations with BVM as necessary
   c. If no spontaneous respirations, place i-gel or endotracheal tube and attach continuous ETCO$_2$ capnography
   d. Avoid hyperventilation
   e. Titrate ventilation to target ETCO2 of 35-45 mmHg

3. Assess circulation:
   a. If SBP is less than 90 mmHg, administer one 300 ml bolus of NS and repeat as indicated to maintain SBP $\geq 90$ mmHg

4. Assess mental status:
   a. If patient is comatose with GCS $\leq 8$, begin Therapeutic Hypothermia (see indications and contraindications below)
   b. Check blood glucose, treat hypoglycemia accordingly

5. Contact Online Medical Control:
   a. Minimize movement of patient during post-arrest phase
   b. In the radio report, notify Online Medical Control if:
      i. Patient has ST Elevation Myocardial Infarction (STEMI) on 12-lead
      ii. If therapeutic hypothermia has been started

6. Transmit 12-lead ECG and transport patient to STEMI center
THERAPEUTIC HYPOTHERMIA

**INDICATIONS:**
- Adult cardiac arrest with ROSC
- Sustained ROSC for a minimum of 5 minutes after arrest
- Comatose with GCS ≤ 8 (lack of meaningful response to verbal commands)

**CONTRAINDICATIONS:**
- Traumatic cardiac arrest
- Pregnancy
- Do Not Resuscitate (DNR) status
- Patients with known bleeding problem or active bleeding
- Patients with significant known liver disease

**IMPLEMENTATION:**
Apply ice packs to each of the following locations (6 total):

a. 1 to each carotid artery on neck
b. 1 to each axilla
c. 1 to each femoral artery on groin

Snap and then apply ice packs as shown. One over each carotid artery (neck), one in each axilla, and one over each femoral artery (groin).
CARDIAC ARREST MANAGEMENT – BLS/ALS
Incident Command for Cardiac Arrest (ICCA)

INDICATIONS

- Non-traumatic cardiac arrest

CODE TASKS

- Resuscitation must begin and continue where patient is encountered
- Provide high quality, uninterrupted chest compressions
- Provide early defibrillation
- Provide controlled ventilatory management during the resuscitation
- IV/IO access and ALS drug delivery
- End Tidal CO2 monitoring

EQUIPMENT

BLS:
- Automated External Defibrillator
- Bag Valve Mask
- Supraglottic Airway (i-gel)
- Oxygen

ALS:
- Lifepak 1000 monitor/defibrillator/pads (or private provider equivalent)
- Lifepak 15 monitor/defibrillator/ETCO2/pads (or private provider equivalent)
- Bag Valve Mask
- Advanced airway equipment (supraglottic airway or endotracheal tube)
- IV/IO equipment
- ACLS drugs

PROCEDURE

1. Begin and continue resuscitation where the patient is encountered. **DO NOT MOVE THE PATIENT.** Call for an assist company (or as per private provider protocol). Patients should only be moved for scene safety concerns, not for provider convenience. Any delay in initiation of resuscitation will decrease the chance of survival.

2. Initiate high quality uninterrupted chest compressions. Harder-deeper-faster with rate 100-120 per minute (use metronome when available). Use alternate providers to avoid fatigue. Chest compressions should only be interrupted to analyze rhythm and deliver defibrillation (< 10 seconds).

3. Attach cardiac monitor and assess rhythm. Defibrillate if ventricular fibrillation or pulseless ventricular tachycardia (or if AED advises). May initiate care with Lifepak 1000, however, upgrade to Lifepak 15 as soon as manpower allows.
4. Basic airway management with bag valve mask ventilation. Apply End Tidal CO2 to BVM. Monitor ETCO2 to assess quality of CPR. Goal ETCO2: > 10. If < 10 improve quality of chest compressions or switch compressors. Deliver 1 breath every 6 seconds (10 breaths per minute).

5. Continue 2 minute cycles of CPR and defibrillation until assist company arrives. Do not attempt IV/IO access or advanced airway management until at least three providers are on scene.

6. Code commander delegates tasks when assist company arrives.

7. IV/IO access and administration of drugs as per Ventricular Fibrillation / Pulseless Ventricular Tachycardia and Pulseless Electrical Activity / Asystole protocols. The proximal tibia is the preferred site for IO access during cardiac arrest resuscitation.

8. Place supraglottic airway (preferred advanced airway for patients in cardiac arrest). Endotracheal intubation may be performed as backup airway if unable to ventilate/oxygenate with supraglottic airway. Do not interrupt compressions during placement of an advanced airway. Deliver 1 breath every 6 seconds (10 breaths per minute).

9. Apply End Tidal CO2. Monitor waveform and number to assess:

   a. Correct advanced airway position and ventilation;
   b. Quality of CPR;
   c. Return of spontaneous circulation (ROSC).

10. Contact online medical control from the scene (before moving the patient) to discuss the following options:

    a. Continue field resuscitation for a defined period/task achievement and re-contact medical control;
    b. Transport patient with return of spontaneous circulation (ROSC) to closest STEMI center (see Adult Post Cardiac Arrest Care & Therapeutic Hypothermia protocol);
    c. Transport patient with ongoing resuscitation to closest STEMI center; or
    d. Terminate resuscitative efforts.

ALL PATIENTS WITH ROSC OR ONGOING RESUSCITATION MUST BE TRANSPORTED TO A STEMI CENTER.

MANDATORY DOCUMENTATION

1. “Cardiac Arrest” should be listed for paramedic impression for all non-traumatic cardiac arrest victims. Do not use “rule out” for any cardiac arrest impression.

2. All information from the first company on scene should be relayed to the transporting paramedics and included in both patient care records.

3. All mandatory cardiac arrest questions in the ePCR should be completed before record is closed.

4. End-Tidal CO2 number and waveform should be documented in the patient care record.

5. Lifepak 15 “Report>All” should be uploaded to CodeSTAT.
ICCA ROLES AND RESPONSIBILITIES

Cardiac arrest is a shared ALS and BLS response. Successful resuscitation requires a coordinated effort. Upon arrival, resuscitation roles should be clearly delegated by the highest ranking medical member on scene, so that primary code tasks are carried out quickly and efficiently.

1. **Code Commander**
   - Highest ranking medical member on scene
   - Oversees all operations
   - Responsible for timing of CPR cycles and defibrillation
   - Requests additional manpower/resources
   - Completes and/or delegates code tasks

2. **Compressor-1**
   - Performs high quality uninterrupted chest compressions
   - Assume compressor 2’s role when relieved

3. **Compressor-2**
   - Monitor’s the effectiveness of compressor 1’s compressions (monitors ETCO2 for compression quality feedback)
   - Assists with seal during bag valve mask ventilation
   - Relieves compressor 1 after 2 minutes or when compression quality decreases

4. **Procedures**
   - Apply cardiac monitor/analyze rhythm
   - Defibrillate
   - Gain IV/IO access
   - Administer medications as per Ventricular Fibrillation / Pulseless Ventricular Tachycardia and Pulseless Electrical Activity / Asystole protocols
   - Basic and advanced airway management
   - Apply and monitor End Tidal CO2

5. **Logistics**
   - Oversee distribution of equipment
   - Set up IV/IO equipment
   - Assemble medications/assist with drug delivery
   - Facilitates communication with online medical control
   - Prepares for transport
   - Relief for other tasks

6. **Liaison/Safety**
   - Control the scene and provide for the safety of the resuscitation team
<table>
<thead>
<tr>
<th>Title: Cardiac Arrest Management / ICCA – BLS/ALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section: Cardiac Management</td>
</tr>
<tr>
<td>Approved: EMS Medical Directors Consortium</td>
</tr>
<tr>
<td>Effective: May 17, 2021</td>
</tr>
</tbody>
</table>

- Data collection/documentation: Patient demographics, medications, medical history, events
- Communicates and assists with family/bystanders
LIFEPAK 1000 DEFIBRILLATOR (LP1000) – BLS/ALS

INDICATIONS

- Unresponsive, not breathing normally, no pulse – AED Mode (BLS)
- Unresponsive, not breathing normally, no pulse – Manual Mode (ALS)
- Conscious and unconscious patients of all ages for the purpose of ECG rhythm recognition and heart rate monitoring – ECG Mode (ALS)

CONTRAINDICATIONS

None

EQUIPMENT

- LIFEPAK 1000 Defibrillator
- QUIK-COMBO Defibrillation pads for adults or children over 8 years old or 25 kg (55 lbs.)
- Infant/Child Reduced Energy Defibrillation pads for children less than 8 years old or 25 kg (55 lbs.)
- 3 wire monitoring cable with electrodes (for ALS)
- Razor

PROCEDURE FOR BLS RESPONDERS – AED MODE

1. Apply personal protective equipment.
2. Verify patient is in cardiac arrest (unconscious, not breathing normally, no pulse).
3. Begin CPR and ICCA.
4. Turn device on and listen to voice prompts.
5. Prepare the patient for defibrillation pad placement. If necessary, clean and dry skin or remove excess chest hair with razor.
6. Select proper defibrillator pad (adult or pediatric) based on patient age and weight. Open the package and remove the protective liner from the electrodes.
7. Apply pads in the anterior-lateral placement or anterior-posterior placement and press down firmly. Pads should not be placed directly over implanted devices (cardiac defibrillators or pacemakers).
8. Connect the pads to the defibrillator.

9. Follow the screen messages and voice prompts provided by the defibrillator.

10. When the patient is connected to the defibrillator, the voice prompt will advise to stand clear of the patient during ECG analysis, which takes 6-9 seconds.

11. If the defibrillator detects a shockable rhythm, it will prepare to shock and charge to the joule setting for the shock number.

12. The voice prompt will state when charging is complete and the shock button will flash.

13. Verbalize “all clear” and visually ensure that all individuals are clear of the patient, stretcher and any equipment connected to the patient.

14. Press the shock button to discharge the defibrillator. If the shock button is not pressed within 15 seconds, the defibrillator disarms the shock button.

15. Immediately resume CPR.

16. If the defibrillator detects a nonshockable rhythm, the voice prompt will advise that no shock is advised and CPR should be resumed.

17. Continue CPR and analyze rhythm every two minutes.

**PROCEDURE FOR ALS RESPONDERS – MANUAL MODE**

1. Convert to manual mode by pressing the menu button and select “YES” to enter manual mode. The ECG tracing and Heart Rate Indicator will appear on the screen.
2. If the displayed ECG rhythm appears shockable, press “CHARGE” to initiate charging of the defibrillator. The screen will indicate that the defibrillator is charging and a charge tone will sound.

3. Verbalize “all clear” and visually ensure that all individuals are clear of the patient, stretcher and any equipment connected to the patient.

4. When the charge is complete, press the flashing shock button to delivery energy to the patient.

5. After delivering a shock, the energy for each subsequent shock is automatically selected based on the energy level configurations (200J, 300J, 360J).

6. To remove an unwanted shock at any time, select “DISARM”.

7. To initiate an automatic rhythm analysis while in manual mode, select “ANALYZE”.

**PROCEDURE FOR ALS RESPONDERS – ECG MODE**

1. Connect the ECG cable.

2. Apply ECG electrodes to the patient’s chest.

3. After the ECG electrodes are connected, the defibrillator displays the patient’s heart rhythm and heart rate in a lead II configuration.

4. While in ECG mode, the defibrillator’s shock capability is disabled; however, the defibrillator continues to evaluate the patient’s ECG for a potentially shockable rhythm. The patient’s status should be reassessed including presence of a pulse.
5. If a shockable rhythm is detected, the defibrillator will prompt to connect the defibrillation pads.

6. Remove the ECG cable and connect the defibrillation pads to the defibrillator.

7. Apply the defibrillation pads to the patient’s chest keeping them at least 2.5 cm (1 inch) away from the ECG electrodes. If necessary, remove the ECG electrodes.

8. Defibrillate as indicated and begin ICCA.

**MANAGING DEFIBRILLATOR DATA**

1. LIFEPAK 1000 data can be uploaded to CODE-STAT.
MANUAL DEFIBRILLATION - ALS

INDICATIONS

- Ventricular fibrillation
- Pulseless ventricular tachycardia

CONTRAINDICATIONS

None

EQUIPMENT

- Cardiac monitor/defibrillator
- Therapy electrode pads
- Therapy cable

PROCEDURE

1. Apply personal protective equipment: gloves.
2. Verify patient is in cardiac arrest (unconscious, pulseless, not breathing normally).
3. If pulseless, begin CPR and Incident Command for Cardiac Arrest (ICCA).
4. Turn device on.
5. Attach therapy pads to therapy cable and connect to the cardiac monitor/defibrillator.
6. If necessary, clean and dry skin or remove excess chest hair with razor.
7. Apply pads in the anterior-lateral placement or anterior-posterior placement (per manufacturer specific guidelines) and press down firmly. Pads should not be placed directly over implanted devices (cardiac defibrillators or pacemakers).
9. Select desired energy:
   a. Adult: Per manufacturer’s guidelines
   b. Pediatric: 2 J/kg (see Pediatric Resuscitation Card)
10. Charge the monitor/defibrillator while continuing chest compressions.
11. Verbalize “all clear” and visually ensure that all individuals are clear of the patient, stretcher and any equipment connected to the patient.

13. Press the shock button to deliver shock to the patient.


15. Pre-charge defibrillator prior to 2-minute rhythm check.

16. Reassess rhythm every two minutes.

17. For persistent ventricular fibrillation or pulseless ventricular tachycardia, administer second and subsequent shocks:

   a. Adult: Second and subsequent doses should be equivalent or higher
   b. Pediatric: 4 J/kg (See Pediatric Resuscitation Card)
SYNCHRONIZED CARDIOVERSION - ALS

INDICATIONS

- Narrow or wide complex tachyarrhythmia (heart rate typically ≥ 150/min) causing the patient to be unstable with signs of shock including:
  - Hypotension (SBP < 100 mmHg)
  - Acutely altered mental status
  - Ischemic chest discomfort
  - Respiratory distress (acute heart failure)

CONTRAINDICATIONS

None

EQUIPMENT

- Cardiac monitor/defibrillator
- Cardiac leads
- Therapy electrode pads
- Therapy cable

PROCEDURE

1. Apply personal protective equipment: gloves.
2. Apply cardiac monitor leads to identify tachyarrhythmia that requires synchronized cardioversion (12-lead ECG if available).
3. Identify and treat underlying causes.
4. Assess adequate oxygenation.
5. Assess pulse and blood pressure.
6. Establish IV access.
7. Consider analgesia prior to procedure per Pain Management protocol.
8. Attach therapy pads to therapy cable and connect to the cardiac monitor/defibrillator.
9. If necessary, clean and dry skin or remove excess chest hair with razor.
10. Apply pads in the anterior-lateral placement or anterior-posterior placement (per manufacturer specific guidelines) and press down firmly. Pads should not be placed directly over implanted devices (cardiac defibrillators or pacemakers). Pediatric pads should be used based on manufacturer weight guidelines.

12. Activate synchronized mode to “SYNC”.

13. Confirm synchronized marker on QRS complexes.

14. Charge monitor to appropriate energy setting:
   a. Adult patients: 100 J
   b. Pediatric patients: 0.5-1 J/kg (See Pediatric Resuscitation Card)

15. Verbalize “all clear” and visually ensure that all individuals are clear of the patient, stretcher and any equipment connected to the patient.

16. Press the shock button to deliver synchronized shock to the patient.

17. Reassess rhythm, patient pulse and blood pressure.

18. For persistent tachyarrhythmia with signs of shock, administer a second synchronized shock:
   a. Adult patients: 200 J
   b. Pediatric patients: 2 J/kg (See Pediatric Resuscitation Card)
TRANSCUTANEOUS PACING - ALS

INDICATIONS

- Bradycardia (HR < 50/min) with a pulse causing the patient to be unstable with signs of shock including hypotension (SBP < 100 mmHg) that continues after atropine administration.

CONTRAINDICATIONS

- Pulseless or asymptomatic bradycardia

EQUIPMENT

- Cardiac monitor/defibrillator
- Cardiac leads
- Therapy electrode pads
- Therapy cable

PROCEDURE

1. Apply personal protective equipment: gloves.

2. Apply cardiac monitor leads and identify bradycardia that requires transcutaneous pacing (12-lead ECG if available).

3. Identify and treat underlying causes.

4. Assess adequate oxygenation.

5. Assess pulse and blood pressure.

6. Establish IV access.

7. Consider analgesia prior to procedure per Pain Management protocol.

8. Attach therapy pads to therapy cable and connect to the cardiac monitor/defibrillator.

9. If necessary, clean and dry skin or remove excess chest hair with razor.

10. Apply pads in the anterior-lateral placement or anterior-posterior placement (per manufacturer specific guidelines) and press down firmly. Pads should not be placed directly over implanted devices (cardiac defibrillators or pacemakers).

12. Activate pacer mode to “PACER”.

13. Note marker on ECG rhythm near the middle of each QRS complex.

14. Select rate and increase to 80 beats per minute

15. Select current and increase to 50 mA.

16. Gradually increase delivered current until electrical capture is achieved (observed pacer spikes followed by wide QRS complexes and tall “T waves”). The average current needed for capture is between 50-100 mA.

17. Palpate the patient’s pulse and check blood pressure to assess for mechanical capture.

18. Reassess patient condition.

19. If pulseless, discontinue pacing and initiate Incident Command for Cardiac Arrest (ICCA) procedure.
REGION 11
CHICAGO EMS SYSTEM
PROCEDURES

TRAUMA MANAGEMENT

Chest Seal (HyFin Vent) Application
Hemorrhage Control
Joint Splinting
Long Bone Splinting
Pleural (Needle) Decompression
Spinal Motion Restriction (SMR)
START/JumpSTART Triage
Tourniquet Application
Traction Splinting
CHEST SEAL (HYFIN VENT) APPLICATION – BLS/ALS

**INDICATIONS**

- Penetrating chest trauma
- Open pneumothorax ("sucking chest wound")
- Frothing or bubbling at opening of wound

**CONTRAINDICATIONS**

- None

**EQUIPMENT**

- HyFin Vented Chest Seal
- 4 x 4 gauze pad (included in package)

**PROCEDURE**

1. Apply personal protective equipment: gloves.
2. Remove clothing.
3. Open package using external red tabs.
4. Wipe any dirt or fluid from skin with gauze.
5. Grip red tab and peel the transparent backing from the chest seal.
6. Center vent over the wound.
7. Firmly press onto the skin to ensure a good seal.
8. Smooth out all edges flat against the skin.
9. Assess front and back of patient carefully for additional wounds and apply second seal as indicated.
10. Monitor patient for development of tension pneumothorax if blood accumulates in all three vented channels of the chest seal.
HEMORRHAGE CONTROL – BLS/ALS

INDICATIONS

- External hemorrhage

CONTRAINDICATIONS

- None

EQUIPMENT

- Pressure Dressing: Emergency Trauma Dressing (ETD) or Emergency (Israeli) Bandage
- CAT (Combat Application Tourniquet)
- Hemostatic gauze

PROCEDURE

1. Apply personal protective equipment: gloves.

2. Apply direct pressure with gloved hand to bleeding site.

3. **For extremity trauma, apply pressure dressing** (ETD or Israeli Bandage).

4. Place sterile non-adherent pad over wound and wrap bandage around limb.

5. For **ETD**: Pull the pressure dressing tight and wrap to cover the pad area by beginning on the edge farthest from the torso. For additional pressure, twist bandage so the twisted portion of the bandage is over the pad, wrap around the limb, twist back, and finish the wrap. Secure the bandage with Velcro fastener.

6. For **Israeli Bandage**: When the bandage reaches the pressure bar, insert the fabric into the pressure bar and reverse the direction of the wrap. Wrap the bandage to cover the edges of the pressure bar. Secure the bandage by hooking the ends of the closure bar into the fabric.

7. Reassess patient for hemorrhage control.

8. **For extremity injury amendable to tourniquet placement**, if direct pressure or pressure dressing is ineffective or impractical, apply tourniquet.

9. Route the band around the limb, pass the tip through the slit of the buckle.

10. Place the tourniquet 2-3 inches proximal to wound (not over the joint) directly to the skin.
11. Pull band tightly and fasten it back on itself all the way around the limb but not over the rod clips.

12. Tighten band so the tips of three fingers cannot be slide between the band and limb, otherwise re-tighten and re-secure.

13. Twist the rod until the bleeding has stopped.

14. Secure the rod inside a clip and lock it into place.

15. Check for bleeding and distal pulse.

16. If bleeding not controlled or distal pulse is present, tighten the tourniquet.

17. If bleeding still not controlled, place a second CAT above and side by side to the first.

18. Route the band between the clips and over the rod.

19. Secure the rod and band with time stamp.

20. Record time of application.

21. For junctional (groin or axillary) injury not amendable to tourniquet placement, if direct pressure/pressure dressing is ineffective or impractical, apply hemostatic gauze.

22. Pack wound tightly with hemostatic gauze (or plain gauze if not available), and apply direct pressure.

23. Reassess the patient and evaluate frequently for bleeding.

24. Pain assessment and management as indicated.

25. Inform subsequent providers regarding interventions performed.
Prehospital External Hemorrhage Control Protocol

Apply direct pressure/pressure dressing to injury

Direct pressure effective (hemorrhage controlled)  
Wound amenable to tourniquet placement (e.g. extremity injury)  
Apply a tourniquet*

Direct pressure ineffective or impractical (hemorrhage not controlled)  
Wound not amenable to tourniquet placement (e.g. junctional injury)  
Apply a topical hemostatic agent with direct pressure#
JOINT SPLINTING – BLS/ALS

INDICATIONS

- Stabilize and reduce pain in joint injury with deformity

CONTRAINDICATIONS

- None

EQUIPMENT

- Rolled gauze (Kerlix)
- Splinting material
- Padding material
- Triangle bandage or arm sling (as needed)

PROCEDURE

1. Apply personal protective equipment: gloves.
2. Completely expose the injured area (extremity).
3. Directs application of manual stabilization of the injury.
5. Assess pain scale and consider pain management.
6. If distal vascular function is compromised, gently attempt to restore normal anatomic position.
7. Select and measure appropriate splint based on injury.
8. Apply the splint and pads as necessary.
9. Immobilize the bone above and below the injury site.
10. Secure the entire injured extremity.
12. Elevate extremity fractures to limit swelling, when possible.
13. Apply ice/cool packs to limit swelling in suspected fracture or soft tissue injury.
LONG BONE SPLINTING – BLS/ALS

INDICATIONS

- Stabilize and reduce pain in long bone injury with deformity

CONTRAINDICATIONS

- None

EQUIPMENT

- Rolled gauze (Kerlix)
- Splinting material
- Padding material
- Triangle bandage or arm sling (as needed)

PROCEDURE

1. Apply personal protective equipment: gloves.
2. Completely expose the injured area (extremity).
3. Directs application of manual stabilization of the injury.
5. Assess pain scale and consider pain management.
6. If distal vascular function is compromised, gently attempt to restore normal anatomic position.
7. Select and measure appropriate splint based on injury.
8. Apply the splint and pads as necessary.
9. Immobilize the joint above and below the injury site.
10. Secure the entire injured extremity.
11. Immobilize the hand/foot in position of function.
13. Elevate extremity fractures to limit swelling, when possible.
14. Apply ice/cool packs to limit swelling in suspected fracture or soft tissue injury.
PLEURAL (NEEDLE) DECOMPRESSION - ALS

INDICATIONS

This procedure is to be used for patients with:

- Evidence of thoracic trauma AND:
  1. Traumatic arrest OR
  2. Signs of tension pneumothorax (all of the following):
     a. Hypotension (systolic blood pressure < 90 mmHg) AND
     b. Respiratory distress or respiratory failure AND
     c. Absent or diminished breath sounds on the affected side

- Suspected tension pneumothorax in non-traumatic cardiac arrest (e.g. PEA arrest with subcutaneous emphysema)

CONTRAINDICATIONS

- Isolated, decreased breath sounds without hypotension and respiratory distress

EQUIPMENT

- Adult: 14 gauge x 3.25 inch over the needle catheter or Air Release System (ARS)
- Pediatric: 16-18 gauge x 1.5-2 inch over the needle catheter
- Alcohol prep pad

PROCEDURE

1. Apply personal protective equipment (gloves).
2. Palpate the chest locating the second intercostal space on the midclavicular line (between the 2\textsuperscript{nd} and 3\textsuperscript{rd} ribs) on the same side as the injury.
3. Properly cleanse the insertion site with alcohol prep pad.
4. Insert the needle at a 90-degree angle to the chest wall, just over the top of the 3\textsuperscript{rd} rib in the midclavicular line.
5. Listen for rush of air.
6. Remove needle leaving only the catheter in place.
7. Dispose of the needle in the proper container.
8. Reassess for improvement in patient condition.
INDICATIONS

Traumatic injury with:

- Acutely altered level of consciousness (GCS < 15, evidence of intoxication)
- Midline neck or back pain and/or tenderness
- Focal neurological signs or symptoms (i.e. numbness or motor weakness)
- Severe or painful distracting injury (unreliable examination or assessment)
- For pediatric patients: torticollis (neck muscle spasm causing the head to tilt to one side)

CONTRAINDICATIONS

- Penetrating traumatic injury to the neck

EQUIPMENT

- Cervical collar
- Scoop stretcher or padded long backboard
- Ambulance cot

PROCEDURE

1. Apply personal protective equipment: gloves.
2. Limit motion of the spine by keeping head, neck, and torso in alignment.
3. Determine appropriately sized cervical collar.
4. Use fingers to measure the patient’s lateral neck from the base of the shoulder to the bottom of the chin.
5. Adjust cervical collar based on measured neck size.
6. Apply cervical collar and secure it in place.
7. Assess cervical collar after application as it should not occlude mouth opening, obstruct airway, breathing, or be loose as to allow the chin to sink below the collar chin piece.
8. **If extrication is not required**: Children in a booster seat and adults can be allowed to self-extricate. Place patient on ambulance cot. For infants and toddlers already strapped in a car seat with a built-in harness, extricate the child while strapped to the car seat.

9. **If extrication is required**: For infants and toddlers already strapped in a car seat with a built-in harness, extricate the child while strapped to the car seat. For other situations, use a padded long backboard or a scoop stretcher.

10. Reassess the patient. If head elevation is required, elevate 30 degrees and maintain neck/torso alignment.

11. Minimize flexion, extension, and rotation of the spine during patient transfers.

12. Padding can be used for pediatric patients or severe kyphosis to maintain SMR.

13. Secure patient to ambulance cot appropriately.
REGION 11 MODIFIED START/JumpSTART TRIAGE ALGORITHM

1- Life-Saving (Focused) Interventions that may be performed during the triage process include: control of major hemorrhage, basic airway opening maneuvers, and chest decompression if within the responder’s scope of practice and only if the necessary equipment is immediately available.
TOURNIQUET APPLICATION – BLS/ALS

INDICATIONS

- Life threatening extremity hemorrhage not controlled by pressure dressing.

CONTRAINDICATIONS

- None

EQUIPMENT

- Combat Application Tourniquet (CAT)

PROCEDURE

1. Apply personal protective equipment: gloves.
2. For extremity injury amendable to tourniquet placement, if direct pressure/pressure dressing is ineffective or impractical, apply a tourniquet.
3. Route the band around the limb, pass the tip through the slit of the buckle.
4. Place the tourniquet 2-3 inches proximal to the wound (not over the joint) directly to skin.
5. Tighten band so that three fingers cannot be slid between the band and limb, otherwise re-tighten and re-secure.
6. Twist the rod until the bleeding has stopped.
7. Secure the rod inside the clip and lock it into place.
8. Check for bleeding and distal pulse. If bleeding not controlled or distal pulse is present, tighten tourniquet. If bleeding not controlled, place second CAT above and side by side to first.
9. Route the band between the clips and over the rod. Secure rod and band with TIME strap.
10. Record time of tourniquet application on TIME strap.
11. Reassess frequently for bleeding.
12. Pain assessment and management as indicated
13. Inform subsequent medical providers of tourniquet placement location and time of application.
TRACTION SPLINTING – BLS/ALS

INDICATIONS

- Stabilization of a closed mid-shaft femur fracture to reduce pain, prevent further injury, in a hemodynamically stable patient

CONTRAINdications

- Open fracture or partial amputation
- Hip or pelvis injury
- Knee or lower leg injury

EQUIPMENT

- Traction splint with all associated equipment (ankle hitch, straps, splint) – Adult or Pediatric size

PROCEDURE

1. Apply personal protective equipment: gloves.
2. Completely expose the injured area (extremity) – remove shoe and sock.
3. Directs application of manual stabilization of the injured leg [not necessary when using a unipolar device (Sager or similar) that is immediately available].
4. Directs application of manual traction (not necessary when using a unipolar device, but must be applied before elevating leg, if the leg is elevated at all).
5. Assess motor, sensory, and distal circulation in the injured extremity.
6. Assess pain scale and consider pain management.
7. Prepare and adjust splint to proper length.
8. Position the splint at the injured leg.
9. Apply proximal securing device (ischial strap).
10. Apply distal securing device (ankle hitch).
11. Apply appropriate mechanical traction.
12. Position and secure support straps.
| REGION 11 |
| CHICAGO EMS SYSTEM |
| PROCEDURE |
| Title: Traction Splinting – BLS/ALS |
| Section: Trauma Management |
| Approved: EMS Medical Directors Consortium |
| Effective: July 1, 2021 |


15. Secure splint and patient to long board or stretcher for transport.
MEDICATION ADMINISTRATION / ACCESS

Adult Intraosseous (IO) Insertion
Alternate Vascular Sites for Patients in Extremis
Epinephrine Auto-Injector (EpiPen)
Intranasal Medication Administration
Intravenous (IV) Insertion / IV Medication Administration
Pediatric Intraosseous (IO) Insertion – EZ-IO
Pediatric Intraosseous (IO) Insertion – Manual
Vaccine Administration
ADULT INTRAOSSEOUS (IO) INSERTION – EZ-IO

INDICATIONS:
- Intravenous access is indicated
- Two (2) unsuccessful peripheral intravenous attempts
- Patient is unresponsive to verbal stimuli/unconscious AND has one of the following:
  - Cardiac arrest
  - Impending arrest
  - Shock

APPROVED I.O. SITES:
- Proximal medial tibia
- Distal tibia (medial malleolus)
- Proximal Humerus

CONTRAINDICATIONS
- Infection at the site selected for insertion (choose alternate site)
- Fracture of the bone selected for IO infusion (choose alternate site)
- Excessive tissue preventing identification of landmarks (choose alternate site)
- Previous significant orthopedic procedures. (IO within 24 hours, prosthesis- choose alternate site)

EQUIPMENT:
- EZ-IO Driver
- EZ-IO needle set
- 10 ml syringe
- Normal Saline IV solution, regular IV tubing
- Tape
- Skin prep pad
- Sterile gloves
- Dressing

PROCEDURE:
1. Select appropriate insertion site
2. Prepare insertion site using aseptic technique
3. Identify Landmarks:
   i. **Proximal Tibia:** Palpate tibial tuberosity, move (2) fingers below and medial to it
   ii. **Distal Tibia:** Palpate medial malleolus move fingers two (2) finger width above it (inside ankle bone)
   iii. **Proximal Humerus:** Adduct arm (humerus against body) with the elbow at 90 degrees, the hand on the umbilicus, and the elbow resting on ground or stretcher. Palpate the mid-shaft humerus
continuing proximally toward the humeral head identifying a small protrusion, the greater tuberosity insertion site.

4. Prepare the EZ-IO driver and appropriate needle set.
5. Stabilize site and insert appropriate needle set.
6. Drill until loss of resistance is felt.
7. Remove EZ-IO driver from needle set while stabilizing catheter hub.
8. Remove stylet from catheter.
9. Confirm placement by attempting to aspirate bone marrow or blood.
10. Flush with 10 ml of normal saline.
11. Assess for signs of infiltration.
12. Begin utilizing pressure bag for infusion if IO flushes easily and no infiltration.
13. Dress site, secure tubing.
14. Monitor EZ-IO site for swelling.
15. **MAXIMUM 2 ATTEMPTS (2ND ATTEMPT MUST BE AT ALTERNATE SITE)**
ALTERNATE VASCULAR SITES FOR PATIENTS IN EXTREMIS

INDICATIONS

- Cardiac arrest
- Severely unstable patient
- To access indwelling lines (PIC, Hickman, etc.), fistulas, or shunts when other sites not readily accessible

CONTRAINDICATIONS

- No blood return on access
- Known infection in line

EQUIPMENT

- 5 ml sterile saline in 10 ml syringe
- Alcohol wipes
- Sterile gloves
- 19 gauge straight needle 1” (for heparin caps)

PROCEDURE FOR SITES WITH HEPARIN CAP

1. Identify type of site and assess proper needle usage (1” needle would be the best as a 1.5” needle may puncture the catheter).

2. Use sterile gloves.

3. Wipe site with alcohol.

4. Attempt aspiration of blood. If blood return, attach IV tubing.

5. No blood aspirated, proceed to gently flush with 5 ml of sterile saline (if any resistance is met, stop procedure), if no resistance attach IV tubing.

6. Remove syringe barrel leaving needle in place and insert IV tubing tip; tape in place.

7. Regulate drip rate.

8. Inject drugs as needed through IV tubing parts.
EPINEPHRINE AUTO-INJECTOR (EpiPen)

**INDICATIONS:**
- Allergic Reactions

**CONTRAINDICATIONS:**
- None

**MEDICATION:**
- EpiPen Auto-Injector - Adult dose 0.3 mg of epinephrine
- EpiPen Jr Auto-Injector - Pediatric dose 0.15 mg of epinephrine
  
  **Use an EpiPen 0.3 mg auto-injector for children over 25 kg (55 lb) and EpiPen Jr 0.15 mg auto-injector for children less than 25 kg (55 lb).**

**PROCEDURE**

1. Obtain appropriate Epi-pen (adult dose 0.3 mg or pediatric dose 0.15 mg).

2. Make sure the medication is not discolored or expired.

3. Remove safety cap from auto-injector, if possible wipe patient’s thigh with alcohol wipe. However, do not delay administration of the drug.

4. Place the tip of the auto-injector against the lateral part of the patient’s thigh, midway between the waist and the knee.

5. Push injector firmly against the thigh until the injector activates, hold the injector in place until the medication is injected about 10 seconds.

6. Remove the injector from the patient’s thigh and dispose of it in the proper biohazard container.

7. Reassess and record patient’s vital signs after using the auto-injector.

8. Record the time and dose of injection on your patient care report.

**REFERENCES:**
- Illinois EMSC Pediatric Allergic Reaction/Anaphylaxis BLS Care Guidelines.
- Brady Emergency Care 12th Edition
INTRANASAL MEDICATION ADMINISTRATION

INDICATIONS

- Opiate overdose (Adults & Pediatrics)
- Hypoglycemia without IV access (Adults only)
- Seizures (Adults & Pediatrics)

CONTRAINDICATIONS

- Nasal trauma

EQUIPMENT

1. Mucosal Atomizer Device (MAD)
2. Syringe

PROCEDURE

1. Draw up dose of medication into syringe
2. Expel air from syringe
3. Remove needle and attach MAD to syringe
4. Insert tip of MAD into nostril.
5. Rapidly administer medication (1ml max per nostril; recommend giving ½ the volume in each nostril)
6. Assess for response; if none, consider alternative route for drug administration (e.g. IM)
INTRAVENOUS (IV) INSERTION / IV MEDICATION ADMINISTRATION

I. INTRAVENOUS ACCESS

INDICATIONS

• See Initiation of Patient Care policy

CONTRAINDICATIONS

• Extremity with AV fistula (unless patient is in extremis)
• Extremity on the same side of previous mastectomy
• Avoid burn site

EQUIPMENT

• Tourniquet
• IV catheter
• Alcohol wipes/skin prep
• Tape
• Dressing material

II. SALINE LOCK

INDICATIONS

Saline locks are to be used in situations in which:

• IV access is only precautionary
• No active fluid or medication treatment is expected during transport

CONTRAINDICATIONS

• Cardiac arrest patients
• Patients who appear unstable:
  o Imminent cardiovascular collapse
  o Severe respiratory distress
  o Significant arrhythmias
• Trauma
• Fluid resuscitation:
  o Dehydration
  o Hypotension
• Any patient requiring:
  o Medication drip infusions
  o IV Boluses medication, eg. D50, etc.

EQUIPMENT

• Luer lock connector
• Saline for flush
• Syringe with straight needle
• Tape
• Alcohol wipes

PROCEDURE FOR CONVERSION TO IV FLUID INFUSION

1. Prepare IV tubing and bag as per routine
2. Remove rubber port
3. Insert distal end of primed IV tubing connected to saline lock or angiocath
4. Secure IV line with tape
5. Set appropriate drip rate

III. MEDICATION ADMINISTRATION

INDICATIONS

• Direct ECP/ECRN order
• Protocol

CONTRAINICATION

• Known allergy

EQUIPMENT

• Syringe
• Needleless set-up/needle
• Medication
• Alcohol Wipe
PEDIATRIC INTRAOSSEOUS (IO) INSERTION – EZ-IO

INDICATIONS:

- Pediatric patients who are in shock, arrest, impending arrest, are unstable, unconscious or when immediate vascular access is needed

APPROVED IO SITES:

- Proximal medial tibia
- Distal tibia (medial malleolus)

CONTRAINDICATIONS

- Infection at the site selected for insertion (choose alternate site)
- Fracture of the bone selected for IO infusion (choose alternate site)
- Previous significant orthopedic procedures (IO within 24 hours, prosthesis- choose alternate site)
- If known history of osteogenesis imperfecta and osteoporosis
- If two attempts are unsuccessful with the EZ IO

EQUIPMENT:

- EZ-IO Driver
- EZ-IO needle set
- 10 ml syringe
- Normal Saline IV solution, regular IV tubing
- Tape
- Gloves
- Dressing
- Skin prep
- Towel roll/blanket

PROCEDURE:

1. Support the leg on a towel roll/blanket. Externally rotate leg.
2. Select appropriate insertion site.
3. Prepare insertion site using aseptic technique.
4. Identify Landmarks:
   i. **Proximal Tibia**: Palpate tibial tuberosity, move (2) fingers below and medial to it.
   ii. **Distal Tibia**: Palpate medial malleolus move fingers two (2) finger width above it (*inside ankle bone*).
5. Prepare the EZ IO driver and appropriate needle set.
6. Stabilize site and insert appropriate needle set.
7. Drill until loss of resistance is felt.
8. Remove EZ-IO driver from needle set while stabilizing catheter hub.
9. Remove stylet from catheter.
10. Confirm placement by attempting to aspirate bone marrow or blood.
11. Flush with 10 ml of normal saline.
12. Connect primed tubing and begin utilizing pressure if IO flushes easily.
13. Dress site, secure tubing.
14. Monitor EZ-IO site for swelling.
INDICATIONS

If a child presents meeting all of the following criteria, paramedics should immediately gain vascular access through the intraosseous route:

AGE: 6 years or less
PRESENTATION: Shock, arrest, impending arrest
LOC: Unconscious, non-responsive to verbal stimuli
UNSUCCESSFUL IV's: Two quick IV attempts have been unsuccessful or no peripheral veins are readily apparent or obtainable. In full cardiac arrest - may attempt intraosseous as first procedure.

CONTRAINDICATIONS

- If history is known, bone disorders such as osteogenesis imperfecta and osteopetrosis (excessive calcification causing spontaneous fractures)
- Cellulitis at the site
- Recently fractured bones due to extravasation of blood/fluid into the subcutaneous tissue
- If two attempts are unsuccessful

EQUIPMENT

- Bone marrow aspiration needle (size 15-18 ga.)
- 3 ml non-luer lock or luer lock and adapter syringe
- Normal saline IV solution; regular IV tubing
- Tape
- Sterile gloves
- Towel roll

PROCEDURE

1. Support the child's leg on towel roll. Externally rotate leg slightly.

2. Select insertion site:
   a. Preferred site: Anteriomedial tibia, two fingerbreadths below the tibial tuberosity.
   b. Second choice: Distal one-third of the femur, two fingerbreadths above the patella
      (Note: This site is more difficult to penetrate)

3. Find the landmarks by palpating approximately two fingerbreadths below the tibial tuberosity. Move fingers inward to medial plane of bone.
<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>4.</td>
<td>Using aseptic technique, put on sterile gloves and clean skin using a circular motion starting at the center and moving outward from the insertion site.</td>
</tr>
<tr>
<td>5.</td>
<td>Place the bone marrow needle at a 90° angle away from the epiphyseal plate (POINT TIP OF NEEDLE TOWARD THE FOOT).</td>
</tr>
<tr>
<td>6.</td>
<td>Insert the needle with firm downward pressure using a rotary motion to penetrate the skin and subcutaneous tissues and then the periosteum and bone cortex.</td>
</tr>
<tr>
<td>7.</td>
<td>A “pop” or sudden loss of resistance will herald entrance into the medullary cavity. A child of less than 4 years old will only require a penetration depth of 2-4 mm.</td>
</tr>
<tr>
<td>8.</td>
<td>Remove stylet from needle and aspirate with 3 ml syringe. A flashback or aspiration of bone marrow (looks like dark blood) will confirm proper placement. Do not aspirate more than 1 ml of bone marrow. Occasionally, no bone marrow can be aspirated because:</td>
</tr>
<tr>
<td></td>
<td>a. The needle may not be in the medullary cavity because it went completely through the bone;</td>
</tr>
<tr>
<td></td>
<td>b. The point of the needle is in the cortex of the bone;</td>
</tr>
<tr>
<td></td>
<td>c. The distal opening may be lying against a small piece of bone. Try turning the needle in a semicircular motion to clear the obstruction.</td>
</tr>
<tr>
<td>9.</td>
<td>Immediately flush needle with Normal Saline once proper placement is confirmed. Attach IV tubing and begin IV infusion. IV fluid should flow freely without significant subcutaneous infiltration. Fluid challenges in children should be calculated at 20 ml NS/Kg of body weight.</td>
</tr>
<tr>
<td>10.</td>
<td>To secure needle: the needle should remain stabilized with little assistance. The flange of the needle depth guard should be adjusted by screwing it down until it is flush with the skin. Tape needle in place.</td>
</tr>
<tr>
<td>11.</td>
<td>Restrain child as necessary to protect site and reassess site for displacement or infiltration.</td>
</tr>
</tbody>
</table>
VACCINE ADMINISTRATION

INDICATIONS

- Adult or pediatric (age ≥ 6 years) recipient that has not previously received the vaccine or as an annual schedule

CONTRAINDICATIONS

- Age less than 6 years
- Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component
- Additional vaccine specific contraindications

EQUIPMENT

- CDC Vaccine Information Statement (VIS)
- Vaccine Administration Record (VAR)
- Alcohol swab
- Needle (1 inch length, 22-25 gauge)
- Syringe
- Vaccine medication

PROCEDURE

1. Provide recipient the appropriate CDC Vaccine Information Statement (VIS).

2. Complete the information for the Vaccine Administration Record (VAR).

3. Review completed VAR, this serves as written consent for vaccination.

4. Apply personal protective equipment.

5. Prepare and verify appropriate name, medication, dose, route, and expiration date.

6. The injection site (left or right deltoid) should be identified and cleansed with alcohol pad.

7. Select 1-inch needle (22-25 gauge) and draw up vaccine medication with syringe.

8. Stretch the skin flat between the thumb and forefinger.

9. Insert the needle at 90 degrees to the skin and deliver medication in a quick, steady manner.

10. If possible, monitor the patient for allergic reaction 15-20 minutes after administering vaccine.
ADMINISTRATION

A. Intramuscular Injection Site

Give in the central and thickest portion of the deltoid muscle – above the level of the armpit and approximately 2–3 fingerbreadths (~2") below the acromion process. See the diagram. To avoid causing an injury, do not inject too high (near the acromion process) or too low.

B. Needle Insertion

Use a needle long enough to reach deep into the muscle.
Insert needle at a 90° angle to the skin with a quick thrust.
(Before administering an injection of vaccine, it is not necessary to aspirate, i.e., to pull back on the syringe plunger after needle insertion.³)
Multiple injections given in the same extremity should be separated by a minimum of 1", if possible.


C. Emergency Treatment for Vaccine Reactions

Administering any medication, including vaccines, has the potential to cause an adverse reaction. To minimize the likelihood of an adverse event, screen patients for vaccine contraindications and precautions prior to vaccination. When adverse reactions do occur, they can vary from minor to the rare and serious. Be prepared for any type of reactions.

<table>
<thead>
<tr>
<th>Reaction</th>
<th>Signs and Symptoms</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Localized</td>
<td>Soreness, redness, itching or swelling at the injection site</td>
<td>Apply a cold compress to the injection site. Consider giving an analgesic or antipruritic medication.</td>
</tr>
<tr>
<td>Slight bleeding</td>
<td></td>
<td>Apply pressure and an adhesive compress over the injection site.</td>
</tr>
<tr>
<td>Continuous bleeding</td>
<td></td>
<td>Place thick layer of gauze pads over site and maintain direct and firm pressure.</td>
</tr>
<tr>
<td>Psychological fright, pre-syncope and syncope</td>
<td>Fright before injection is given</td>
<td>Have patient sit or lie down for the vaccination.</td>
</tr>
<tr>
<td></td>
<td>Patient feels “faint” (e.g. light-headed, dizzy, weak, nauseated or has visual disturbance)</td>
<td>Have patient lie flat. Loosen any tight clothing and maintain open airway. Apply cool, damp cloth to patient’s face and neck. Keep them under close observation until fully recovered.</td>
</tr>
<tr>
<td>Fall without loss of consciousness</td>
<td></td>
<td>Examine the patient to determine if injury is present before attempting to move the patient. Place patient flat on back with feet elevated.</td>
</tr>
<tr>
<td>Loss of consciousness</td>
<td></td>
<td>Check to determine if injury is present before attempting to move the patient. Place patient flat on back with feet elevated.</td>
</tr>
<tr>
<td>Anaphylaxis</td>
<td><strong>Skin and mucosal symptoms</strong> such as generalized hives, itching or flushing; swelling of lips, face, throat or eyes. <strong>Respiratory symptoms</strong> such as nasal congestion, change in voice, sensation of throat closing, stridor, shortness of breath, wheezing, or cough <strong>Gastrointestinal symptoms</strong> such as nausea, vomiting, diarrhea, cramping abdominal pain. <strong>Cardiovascular symptoms</strong> such as collapse, dizziness, tachycardia, hypotension</td>
<td>See the Allergic Reaction and/or Anaphylaxis Region 11 EMS Protocol – ALS.</td>
</tr>
</tbody>
</table>
ALLERGIC REACTION and/or ANAPHYLAXIS - ALS

RMC

Secure and maintain airway

Severity of reaction?

SEVERE SYMPTOMS OR > 1 MILD SYMPTOM* SINGLE MILD SYMPTOM**

Monitor
Estabish vascular access

Epinephrine 0.3mg
1:1,000 IM
(May repeat x1 in 5-10 min)

Benadryl 50mg IM

Epinephrine 0.3mg
1:1,000, IV
Repeat every 5 minutes as indicated

If wheezing, Albuterol 2.5 mg
MIXED WITH Atrovent 0.5 mg via nebulizer
Repeat Albuterol as needed

Administer fluid bolus 300 ml if BP < 100
Repeat as indicated

Sustained severity/deterioration?

Epinephrine 0.1mg as 1ml
1:10,000, IV
Repeat every 5 minutes as indicated

Transport and contact Medical Control
as appropriate

Benadryl 50 mg IM

*Severe symptoms of an allergic reaction may include any combination of the following:
RESPIRATORY – Shortness of breath, wheezing, repetitive coughing
CARDIOVASCULAR – Pale, cyanotic, low blood pressure, dizzy
THROAT – Tightness, hoarse, trouble breathing/swallowing
MOUTH – Swelling of the tongue and/or lips
SKIN – Diffuse hives or redness
GI – Repetitive vomiting, severe diarrhea
NEURO – Anxiety, confusion, sense of doom

**Mild symptoms of an allergic reaction may include any combination of the following:
NOSE – Itchy/runny nose, sneezing
MOUTH – Itching
SKIN - Few hives, mild itching
GI – Mild nausea/discomfort
# VACCINE ADMINISTRATION RECORD (VAR)

Site Name/Location: _____________________________________________________________ Date: __________________

<table>
<thead>
<tr>
<th>Name</th>
<th>VIS Reviewed Y N</th>
<th>Date of Vaccine Administration</th>
<th>Vaccine Manufacturer</th>
<th>Vaccine Lot Number</th>
<th>Vaccine Expiration Date</th>
<th>Dose</th>
<th>Injection Site</th>
<th>Injection Route</th>
<th>Vaccine Administrator Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

**Vaccine Information Statement (VIS); Injection Site:** RA = right arm, LA = left arm; **Injection Route:** IM = Intramuscular

<table>
<thead>
<tr>
<th>Name of Vaccine Administrator</th>
<th>Signature of Vaccine Administrator</th>
<th>Initials</th>
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<tbody>
<tr>
<td></td>
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REGION 11
CHICAGO EMS SYSTEM
PROCEDURES

OBSTETRIC / PEDIATRIC MANAGEMENT

Region 11 EMS Pediatric Resuscitation Card
## Region 11 EMS Pediatric Resuscitation Card

<table>
<thead>
<tr>
<th>AGE</th>
<th>WEIGHT IN KG</th>
<th>HEART RATE PER MINUTE</th>
<th>SYSTOLIC BLOOD PRESSURE</th>
<th>RESPIRATORY RATE</th>
<th>BLADE SIZE</th>
<th>ETT SIZE</th>
<th>1st CARDIOVERSION dose 0.5J/kg</th>
<th>2nd CARDIOVERSION dose 1.5J/kg</th>
<th>1st DEFIBRILLATION dose 2J/kg</th>
<th>2nd &amp; subsequent DEFIBRILLATION dose 4J/kg</th>
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<tbody>
<tr>
<td>NB</td>
<td>3</td>
<td>&gt; 100-180</td>
<td>&gt; 60</td>
<td>30-60</td>
<td>0-1</td>
<td>2.5-3</td>
<td>2 J</td>
<td>3 J</td>
<td>6 J</td>
<td>12 J</td>
</tr>
<tr>
<td>1 mo</td>
<td>4</td>
<td>100-180</td>
<td>&gt; 60</td>
<td>30-60</td>
<td>0-1</td>
<td>2.5-3</td>
<td>2 J</td>
<td>4 J</td>
<td>8 J</td>
<td>16 J</td>
</tr>
<tr>
<td>2 mo</td>
<td>5</td>
<td>100-160</td>
<td>&gt; 60</td>
<td>30-60</td>
<td>0-1</td>
<td>2.5-3</td>
<td>3 J</td>
<td>5 J</td>
<td>10 J</td>
<td>20 J</td>
</tr>
<tr>
<td>3 mo</td>
<td>6</td>
<td>100-160</td>
<td>&gt; 60</td>
<td>30-60</td>
<td>1</td>
<td>3.5-4</td>
<td>4 J</td>
<td>7 J</td>
<td>14 J</td>
<td>28 J</td>
</tr>
<tr>
<td>4 mo</td>
<td>7</td>
<td>100-160</td>
<td>&gt; 60</td>
<td>30-60</td>
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<td>3.5-4</td>
<td>4 J</td>
<td>7 J</td>
<td>14 J</td>
<td>28 J</td>
</tr>
<tr>
<td>6 mo</td>
<td>8</td>
<td>100-160</td>
<td>&gt; 60</td>
<td>30-60</td>
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<td>3.5-4</td>
<td>4 J</td>
<td>7 J</td>
<td>14 J</td>
<td>28 J</td>
</tr>
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<td>9</td>
<td>100-160</td>
<td>&gt; 60</td>
<td>30-60</td>
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<td>28 J</td>
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<tr>
<td>1 yr</td>
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<td>90-150</td>
<td>&gt; 70</td>
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<td>4-4.5</td>
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<td>10 J</td>
<td>20 J</td>
<td>40 J</td>
</tr>
<tr>
<td>2 yr</td>
<td>12</td>
<td>90-150</td>
<td>&gt; 70</td>
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<td>12 J</td>
<td>24 J</td>
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</tr>
<tr>
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<td>80-140</td>
<td>&gt; 75</td>
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<td>14 J</td>
<td>28 J</td>
<td>56 J</td>
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<tr>
<td>4 yr</td>
<td>16</td>
<td>80-140</td>
<td>&gt; 75</td>
<td>22-34</td>
<td>2</td>
<td>4.5-5</td>
<td>8 J</td>
<td>16 J</td>
<td>32 J</td>
<td>64 J</td>
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<tr>
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<td>18</td>
<td>70-120</td>
<td>&gt; 80</td>
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<td>2</td>
<td>4.5-5</td>
<td>9 J</td>
<td>18 J</td>
<td>36 J</td>
<td>72 J</td>
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<tr>
<td>6 yr</td>
<td>20</td>
<td>70-120</td>
<td>&gt; 80</td>
<td>18-30</td>
<td>2</td>
<td>5-5.5</td>
<td>10 J</td>
<td>20 J</td>
<td>40 J</td>
<td>80 J</td>
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<tr>
<td>8 yr</td>
<td>26</td>
<td>70-120</td>
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<td>18-30</td>
<td>2-3</td>
<td>5.5-6.5</td>
<td>13 J</td>
<td>26 J</td>
<td>52 J</td>
<td>104 J</td>
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<tr>
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<td>30</td>
<td>70-120</td>
<td>&gt; 80</td>
<td>18-30</td>
<td>2-3</td>
<td>5.5-6.5</td>
<td>14 J</td>
<td>28 J</td>
<td>56 J</td>
<td>112 J</td>
</tr>
<tr>
<td>10 yr</td>
<td>34</td>
<td>70-120</td>
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<td>18-30</td>
<td>2-3</td>
<td>5.5-6.5</td>
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<td>68 J</td>
<td>136 J</td>
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<td>&gt; 80</td>
<td>18-30</td>
<td>2-3</td>
<td>5.5-6.5</td>
<td>18 J</td>
<td>36 J</td>
<td>72 J</td>
<td>144 J</td>
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<td>70-120</td>
<td>&gt; 80</td>
<td>18-30</td>
<td>2-3</td>
<td>5.5-6.5</td>
<td>19 J</td>
<td>38 J</td>
<td>76 J</td>
<td>152 J</td>
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<td>60-100</td>
<td>&gt; 90</td>
<td>12-16</td>
<td>3</td>
<td>6-7.0</td>
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<td>40 J</td>
<td>80 J</td>
<td>160 J</td>
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<tr>
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<td>44</td>
<td>60-100</td>
<td>&gt; 90</td>
<td>12-16</td>
<td>3</td>
<td>6-7.0</td>
<td>22 J</td>
<td>44 J</td>
<td>88 J</td>
<td>176 J</td>
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<td>46</td>
<td>60-100</td>
<td>&gt; 90</td>
<td>12-16</td>
<td>3</td>
<td>6-7.0</td>
<td>23 J</td>
<td>46 J</td>
<td>92 J</td>
<td>184 J</td>
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<td>60-100</td>
<td>&gt; 90</td>
<td>12-16</td>
<td>3</td>
<td>6-7.0</td>
<td>24 J</td>
<td>48 J</td>
<td>96 J</td>
<td>192 J</td>
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<tr>
<td></td>
<td>50</td>
<td>60-100</td>
<td>&gt; 90</td>
<td>12-16</td>
<td>3</td>
<td>7.0-8</td>
<td>25 J</td>
<td>50 J</td>
<td>100 J</td>
<td>200 J</td>
</tr>
</tbody>
</table>

### % Body Surface Area

- < 30%: Good Pupils, Equal, Responsive
- 30-50%: Good Pupils, Equal, Responsive
- 50-70%: < 30% Pupils, No Responsiveness
- 70-90%: No Pupils, No Responsiveness
- > 90%: No Pupils, No Responsiveness

### Pediatric Glasgow Coma Scale (PGCS)

<table>
<thead>
<tr>
<th>VERBAL RESPONSE</th>
<th>MOTOR RESPONSE</th>
<th>EYE OPENING</th>
<th>SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spontaneously</td>
<td>Spontaneously</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>To Verbal Command</td>
<td>To Shout</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>To Pain</td>
<td>To Pain</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>No Response</td>
<td>No Response</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Obey</td>
<td>Spontaneous</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Localizes Pain</td>
<td>Localizes Pain</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Flexion - Withdrawal</td>
<td>Flexion - Withdrawal</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Flexion - Abnormal</td>
<td>Flexion - Abnormal</td>
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<td>3</td>
</tr>
<tr>
<td>Extension</td>
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<td>2</td>
</tr>
<tr>
<td>No Response</td>
<td>No Response</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

### Age Grouping

- > 1 Year
- < 1 Year
- 2-5 Years
- 6-12 Months
- 12-18 Months
- 18-24 Months
- 2-5 Years
- 6-12 Months
- 12-18 Months
- 18-24 Months

### APGAR Scoring

<table>
<thead>
<tr>
<th>A = Appearance (color)</th>
<th>P = Pulse (heart rate)</th>
<th>G = Grimace (onset irritability)</th>
<th>A = Activity (muscle tone)</th>
<th>R = Respiratory Effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue, Pale</td>
<td>Absent</td>
<td>No Response</td>
<td>Limb</td>
<td>Weak Cry, Hypoventilation</td>
</tr>
<tr>
<td>Blue Hands &amp; Feet</td>
<td>&lt;100/min</td>
<td>Grunts, agitated and restless</td>
<td>Some Flexion of Extremities</td>
<td>Good, Strong Cry</td>
</tr>
<tr>
<td>Entirely Pink</td>
<td>≥100/min</td>
<td></td>
<td>Active Motion</td>
<td></td>
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</table>

### Total Pediatric APGAR Score

1 MIN 5 MIN

<table>
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<th>0</th>
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<th>2</th>
<th>1MIN</th>
<th>5MIN</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>A</th>
<th>P</th>
<th>G</th>
<th>A</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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</tr>
</tbody>
</table>

### Verbal Response

- <100/min: Absent
- ≥100/min: Present

### Motor Response

- Spontaneously: Good, Strong Cry
- Flexion - Abnormal: Grunts, agitated and restless
- Flexion - Withdrawal: Localizes Pain
- No Response: No Response

### Eye Opening

- < 30%: Good Pupils, Equal
- 30-50%: Good Pupils
- 50-70%: < 30% Pupils
- 70-90%: No Pupils
- > 90%: No Pupils

### Total Body Surface Area

- < 1%: Good Pupils, Equal
- 1-5%: Good Pupils
- 5-10%: < 30% Pupils
- 10-15%: No Pupils
- > 15%: No Pupils
<table>
<thead>
<tr>
<th>AGE</th>
<th>WEIGHT IN KG</th>
<th>FLUID DOSIS</th>
<th>0.9 NS</th>
<th>20ml/kg IV</th>
<th>0.9 NS</th>
<th>10ml/kg IV</th>
<th>0.9 NS</th>
<th>5ml/kg IV</th>
<th>0.9 NS</th>
<th>3ml/kg IV</th>
<th>0.9 NS</th>
<th>1ml/kg IV</th>
<th>0.9 NS</th>
<th>0.5ml/kg IV</th>
<th>0.9 NS</th>
<th>0.25ml/kg IV</th>
<th>0.9 NS</th>
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<tbody>
<tr>
<td>NB</td>
<td>3</td>
<td>30 ml</td>
<td>0.1 ml</td>
<td>0.2 ml</td>
<td>1 ml</td>
<td>x</td>
<td>12-24 ml D12.5%</td>
<td>15 ml</td>
<td>x</td>
<td>0.3 ml</td>
<td>x</td>
<td>x</td>
<td>0.7 ml</td>
<td>0.3 ml</td>
<td>0.1 ml</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>1 mo</td>
<td>4</td>
<td>80 ml</td>
<td>0.1 ml</td>
<td>0.3 ml</td>
<td>1 ml</td>
<td>x</td>
<td>16-32 ml D12.5%</td>
<td>20 ml</td>
<td>x</td>
<td>0.4 ml</td>
<td>x</td>
<td>x</td>
<td>1 ml</td>
<td>0.4 ml</td>
<td>0.2 ml</td>
<td>x</td>
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</tr>
<tr>
<td>2 mo</td>
<td>5</td>
<td>100 ml</td>
<td>0.2 ml</td>
<td>0.3 ml</td>
<td>1 ml</td>
<td>0.1 ml</td>
<td>20-40 ml D12.5%</td>
<td>25 ml</td>
<td>x</td>
<td>0.5 ml</td>
<td>0.1 ml</td>
<td>1 ml</td>
<td>1.2 ml</td>
<td>0.5 ml</td>
<td>0.2 ml</td>
<td>x</td>
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<tr>
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<td>120 ml</td>
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<td>0.4 ml</td>
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<td>0.1 ml</td>
<td>24-48 ml D12.5%</td>
<td>30 ml</td>
<td>x</td>
<td>0.6 ml</td>
<td>0.1 ml</td>
<td>x</td>
<td>1.5 ml</td>
<td>0.6 ml</td>
<td>0.2 ml</td>
<td>x</td>
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</tr>
<tr>
<td>4 mo</td>
<td>7</td>
<td>140 ml</td>
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<td>0.4 ml</td>
<td>1.4 ml</td>
<td>0.1 ml</td>
<td>28-56 ml D12.5%</td>
<td>35 ml</td>
<td>x</td>
<td>0.7 ml</td>
<td>0.1 ml</td>
<td>x</td>
<td>1.8 ml</td>
<td>0.7 ml</td>
<td>0.3 ml</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>6 mo</td>
<td>8</td>
<td>160 ml</td>
<td>0.3 ml</td>
<td>0.5 ml</td>
<td>1.6 ml</td>
<td>0.2 ml</td>
<td>32-64 ml D12.5%</td>
<td>40 ml</td>
<td>x</td>
<td>0.8 ml</td>
<td>0.1 ml</td>
<td>x</td>
<td>2 ml</td>
<td>0.8 ml</td>
<td>0.3 ml</td>
<td>x</td>
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</tr>
<tr>
<td>9 mo</td>
<td>9</td>
<td>180 ml</td>
<td>0.3 ml</td>
<td>0.5 ml</td>
<td>1.8 ml</td>
<td>0.2 ml</td>
<td>36-72 ml D12.5%</td>
<td>45 ml</td>
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<td>0.9 ml</td>
<td>0.2 ml</td>
<td>x</td>
<td>2 ml</td>
<td>0.9 ml</td>
<td>0.3 ml</td>
<td>x</td>
<td></td>
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<td>10</td>
<td>200 ml</td>
<td>0.3 ml</td>
<td>0.7 ml</td>
<td>2 ml</td>
<td>0.2 ml</td>
<td>20-40 ml D25%</td>
<td>50 ml</td>
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<td>1 ml</td>
<td>0.2 ml</td>
<td>0.1 ml</td>
<td>3 ml</td>
<td>1.2 ml</td>
<td>0.5 ml</td>
<td>0.2 ml</td>
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<tr>
<td>2 yr</td>
<td>12</td>
<td>240 ml</td>
<td>0.4 ml</td>
<td>0.8 ml</td>
<td>2.4 ml</td>
<td>0.2 ml</td>
<td>24-48 ml D25%</td>
<td>60 ml</td>
<td>0.1 ml</td>
<td>1.2 ml</td>
<td>0.2 ml</td>
<td>0.1 ml</td>
<td>3 ml</td>
<td>1.2 ml</td>
<td>0.5 ml</td>
<td>0.2 ml</td>
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</tr>
<tr>
<td>3 yr</td>
<td>14</td>
<td>280 ml</td>
<td>0.5 ml</td>
<td>0.9 ml</td>
<td>2.8 ml</td>
<td>0.3 ml</td>
<td>28-56 ml D25%</td>
<td>70 ml</td>
<td>0.1 ml</td>
<td>1.4 ml</td>
<td>0.3 ml</td>
<td>0.1 ml</td>
<td>3.5 ml</td>
<td>1.4 ml</td>
<td>0.6 ml</td>
<td>0.3 ml</td>
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<tr>
<td>4 yr</td>
<td>16</td>
<td>320 ml</td>
<td>0.5 ml</td>
<td>1.1 ml</td>
<td>3.2 ml</td>
<td>0.3 ml</td>
<td>32-64 ml D25%</td>
<td>80 ml</td>
<td>0.2 ml</td>
<td>1.6 ml</td>
<td>0.3 ml</td>
<td>0.1 ml</td>
<td>4 ml</td>
<td>1.6 ml</td>
<td>0.6 ml</td>
<td>0.3 ml</td>
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</tr>
<tr>
<td>5 yr</td>
<td>18</td>
<td>360 ml</td>
<td>0.6 ml</td>
<td>1.2 ml</td>
<td>3.6 ml</td>
<td>0.4 ml</td>
<td>36-72 ml D25%</td>
<td>90 ml</td>
<td>0.2 ml</td>
<td>1.8 ml</td>
<td>0.4 ml</td>
<td>0.1 ml</td>
<td>4.5 ml</td>
<td>1.8 ml</td>
<td>0.7 ml</td>
<td>0.4 ml</td>
<td></td>
</tr>
<tr>
<td>6 yr</td>
<td>20</td>
<td>400 ml</td>
<td>0.7 ml</td>
<td>1.3 ml</td>
<td>4 ml</td>
<td>0.4 ml</td>
<td>40-80 ml D25%</td>
<td>100 ml</td>
<td>0.2 ml</td>
<td>2 ml</td>
<td>0.4 ml</td>
<td>0.2 ml</td>
<td>5 ml</td>
<td>2 ml</td>
<td>0.8 ml</td>
<td>0.4 ml</td>
<td></td>
</tr>
<tr>
<td>8 yr</td>
<td>24</td>
<td>480 ml</td>
<td>0.8 ml</td>
<td>1.6 ml</td>
<td>4.8 ml</td>
<td>0.5 ml</td>
<td>48-96 ml D25%</td>
<td>120 ml</td>
<td>0.2 ml</td>
<td>2.4 ml</td>
<td>0.5 ml</td>
<td>0.2 ml</td>
<td>5 ml</td>
<td>2 ml</td>
<td>0.9 ml</td>
<td>0.4 ml</td>
<td></td>
</tr>
<tr>
<td>10 yr</td>
<td>26</td>
<td>520 ml</td>
<td>0.9 ml</td>
<td>1.7 ml</td>
<td>5 ml</td>
<td>0.5 ml</td>
<td>52-104 ml D25%</td>
<td>130 ml</td>
<td>0.3 ml</td>
<td>2.6 ml</td>
<td>0.5 ml</td>
<td>0.2 ml</td>
<td>5 ml</td>
<td>2 ml</td>
<td>1 ml</td>
<td>0.5 ml</td>
<td></td>
</tr>
<tr>
<td>9 yr</td>
<td>28</td>
<td>560 ml</td>
<td>0.9 ml</td>
<td>1.9 ml</td>
<td>5 ml</td>
<td>0.6 ml</td>
<td>56-112 ml D25%</td>
<td>140 ml</td>
<td>0.3 ml</td>
<td>2.8 ml</td>
<td>0.5 ml</td>
<td>0.2 ml</td>
<td>5 ml</td>
<td>2 ml</td>
<td>1.1 ml</td>
<td>0.6 ml</td>
<td></td>
</tr>
<tr>
<td>10 yr</td>
<td>30</td>
<td>600 ml</td>
<td>1 ml</td>
<td>2 ml</td>
<td>5 ml</td>
<td>0.6 ml</td>
<td>30 ml D50%</td>
<td>150 ml</td>
<td>0.3 ml</td>
<td>3 ml</td>
<td>0.6 ml</td>
<td>0.3 ml</td>
<td>5 ml</td>
<td>2 ml</td>
<td>1.2 ml</td>
<td>0.6 ml</td>
<td></td>
</tr>
<tr>
<td>12 yr</td>
<td>32</td>
<td>640 ml</td>
<td>1.1 ml</td>
<td>2.1 ml</td>
<td>5 ml</td>
<td>0.6 ml</td>
<td>32 ml D50%</td>
<td>160 ml</td>
<td>0.3 ml</td>
<td>3.2 ml</td>
<td>0.6 ml</td>
<td>0.3 ml</td>
<td>5 ml</td>
<td>2 ml</td>
<td>1.3 ml</td>
<td>0.6 ml</td>
<td></td>
</tr>
<tr>
<td>13 yr</td>
<td>34</td>
<td>680 ml</td>
<td>1.2 ml</td>
<td>2.3 ml</td>
<td>5 ml</td>
<td>0.7 ml</td>
<td>34 ml D50%</td>
<td>170 ml</td>
<td>0.3 ml</td>
<td>3.4 ml</td>
<td>0.7 ml</td>
<td>0.3 ml</td>
<td>5 ml</td>
<td>2 ml</td>
<td>1.4 ml</td>
<td>0.7 ml</td>
<td></td>
</tr>
<tr>
<td>15 yr</td>
<td>36</td>
<td>720 ml</td>
<td>1.2 ml</td>
<td>2.4 ml</td>
<td>5 ml</td>
<td>0.7 ml</td>
<td>36 ml D50%</td>
<td>180 ml</td>
<td>0.3 ml</td>
<td>3.6 ml</td>
<td>0.7 ml</td>
<td>0.3 ml</td>
<td>5 ml</td>
<td>2 ml</td>
<td>1.4 ml</td>
<td>0.7 ml</td>
<td></td>
</tr>
<tr>
<td>12 yr</td>
<td>40</td>
<td>800 ml</td>
<td>1.3 ml</td>
<td>2.7 ml</td>
<td>5 ml</td>
<td>0.8 ml</td>
<td>40 ml D50%</td>
<td>200 ml</td>
<td>0.3 ml</td>
<td>4 ml</td>
<td>0.8 ml</td>
<td>0.4 ml</td>
<td>5 ml</td>
<td>2 ml</td>
<td>1.6 ml</td>
<td>0.8 ml</td>
<td></td>
</tr>
<tr>
<td>13 yr</td>
<td>44</td>
<td>880 ml</td>
<td>1.5 ml</td>
<td>2.9 ml</td>
<td>5 ml</td>
<td>0.9 ml</td>
<td>44 ml D50%</td>
<td>220 ml</td>
<td>0.3 ml</td>
<td>4.4 ml</td>
<td>0.9 ml</td>
<td>0.4 ml</td>
<td>5 ml</td>
<td>2 ml</td>
<td>1.8 ml</td>
<td>0.9 ml</td>
<td></td>
</tr>
<tr>
<td>15 yr</td>
<td>46</td>
<td>920 ml</td>
<td>1.5 ml</td>
<td>3.1 ml</td>
<td>5 ml</td>
<td>0.9 ml</td>
<td>46 ml D50%</td>
<td>230 ml</td>
<td>0.3 ml</td>
<td>4.6 ml</td>
<td>0.9 ml</td>
<td>0.4 ml</td>
<td>5 ml</td>
<td>2 ml</td>
<td>1.8 ml</td>
<td>0.9 ml</td>
<td></td>
</tr>
<tr>
<td>16 yr</td>
<td>48</td>
<td>960 ml</td>
<td>1.6 ml</td>
<td>3.2 ml</td>
<td>5 ml</td>
<td>1 ml</td>
<td>48 ml D50%</td>
<td>240 ml</td>
<td>0.3 ml</td>
<td>4.8 ml</td>
<td>1 ml</td>
<td>0.4 ml</td>
<td>5 ml</td>
<td>2 ml</td>
<td>1.9 ml</td>
<td>1 ml</td>
<td></td>
</tr>
<tr>
<td>adol</td>
<td>50</td>
<td>1000 ml</td>
<td>1.7 ml</td>
<td>3.3 ml</td>
<td>5 ml</td>
<td>1 ml</td>
<td>50 ml D50%</td>
<td>250 ml</td>
<td>0.3 ml</td>
<td>5 ml</td>
<td>1 ml</td>
<td>0.5 ml</td>
<td>5 ml</td>
<td>2 ml</td>
<td>2 ml</td>
<td>1 ml</td>
<td></td>
</tr>
</tbody>
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