

Minnesota Pre-hospital Pediatric ALS Guidelines



Emergency Medical
Services for Children
Resource Center of Minnesota

Working Together to Save Children's Lives

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Minnesota State EMS Pediatric Guidelines

These pediatric guidelines are provided as a service of the Minnesota Emergency Medical Services for Children Program. They reflect the current state of pediatric pre-hospital care.

These guidelines have been developed to assist the local medical directors with creation of pediatric protocols for their service(s). As guidelines, they are designed to comprehensively cover the potential spectrum of scope of practice for ALS providers. Ambulance Medical Directors have the responsibility to develop and determine service pediatric protocols based on skills and knowledge for their service(s).

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We invite comments and continued review and contributions from interested parties. Please contact the Minnesota EMSC Program. Thank you.

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I. General Guidelines

A. Pediatric Definition, Normal Weights and Vital Signs

1. Age limits for pediatric and adult medical protocols must be flexible
2. It is recognized that the exact age of a patient is not always known
3. Neonatal: 0 – 4 weeks of age
4. Infant: 1 month – 1 year of age
5. For 8 years of age and younger, pediatric orders should always apply
6. Ages 8-18 years, judgment should be used although pediatric orders will usually apply

| <i>Average For Age</i> | <i>Lbs.</i> | <i>(Kg)</i> | <i>Pulse</i> | <i>Blood Pressure (Systolic)</i> | <i>Resp.</i> |
|------------------------|-------------|-------------|--------------|----------------------------------|--------------|
| Premature | 3 | (1.5) | 100 – 180 | 50 – 60 | 40 – 60 |
| Neonatal | 7.5 | (3.5) | 100 – 160 | 60 – 90 | 40 – 60 |
| 1 Year | 22 | (10) | 110 – 170 | 70 – 110 | 20 – 30 |
| 3 Years | 33 | (15) | 80 – 160 | 80 – 110 | 20 – 30 |
| 6 Years | 44 | (20) | 60 – 130 | 90 – 115 | 20 – 30 |
| 8 Years | 55 | (25) | 60 – 120 | 90 – 115 | 12 – 25 |
| 12 Years | 88 | (40) | 60 – 120 | 95 – 120 | 12 – 25 |
| 15 Years | 125 | (55) | 60 – 120 | 100 – 130 | 12 – 20 |

CONSIDER LENGTH BASED CALCULATION SYSTEMS FOR PEDIATRIC PATIENTS

B. General Pediatric Assessment and Care

This provides general guidelines for initial assessment and care of the pediatric patient. The General Pediatric Trauma Assessment & Care is found on page 27. The specific guidelines for Newborn Resuscitation are found on page 9. Use of a length-based resuscitation tape is recommended to assist in determination of appropriate equipment size, vital signs and drug dosages.

1. Perform scene survey
 - a) Assess for hazardous conditions
 - b) Ensure scene safety
 - c) Call for additional assistance if needed (this includes ALS response or intercept)
2. Observe standard universal precautions and assure scene safety
3. Form a first impression of the patient's condition
 - a) Pediatric Assessment Triangle (PAT)

Three Components:

 - (1) *Appearance*
 - (2) *Work of Breathing*
 - (3) *Circulation to Skin*



If patient is unresponsive and not having effective breathing or not breathing, start compressions, please refer to Cardiac Emergencies.

4. Determine patient's level of consciousness (LOC)
 - a) **AVPU:**
 - (1) *Alert*
 - (2) *Voice*
 - (3) *Pain*
 - (4) *Unresponsive*
5. Spine injury consideration
 - a) If significant mechanism of injury, decreased level of consciousness or loss of consciousness, distracting injury, or cervical spine trauma is suspected, manually stabilize the cervical spine
 - b) See General Pediatric Trauma Assessment & Care for more information on caring for the injured patient
6. Assess airway - patency, protective reflexes and possible need for advanced airway management
 - a) Look, listen and feel for signs of airway obstruction
 - b) Open the airway – head tilt / chin lift (if no suspected spinal trauma) or modified jaw thrust if spinal trauma is suspected
 - (1) *Suction airway if necessary*
 - (2) *Consider placing an oropharyngeal or nasopharyngeal airway adjunct if the airway cannot be maintained with positioning and the patient is unconscious*
 - (3) *Consider placing pad under infant/child's shoulder to aid in airway positioning*
7. Assess breathing
 - a) Rate, work of breathing, adequacy of ventilations, auscultation and inspection
 - b) Inspect skin, lips and nail beds for cyanosis

- c) Obtain pulse oximeter reading
 - d) If inadequate ventilations, reposition airway and reassess
 - e) If inadequate ventilation after repositioning airway, suspect foreign body obstruction and refer to Foreign Body Obstruction – Conscious Patient
 - f) Assess for signs of respiratory distress, failure or arrest - refer to appropriate protocol for treatment options
 - g) If child is not breathing or breathing is inadequate
 - (1) Assist ventilations using a bag valve mask (BVM), high-flow (100%) oxygen and nasal or oral airway
 - h) If child is breathing with low oxygen saturation and/or signs of hypoxia
 - (1) If pulse oximeter reading is < 90%, administer high-flow oxygen via non-rebreather mask or blow-by as tolerated
 - i) If child is breathing adequately
 - (1) Consider high-flow oxygen with non-rebreather mask or blow-by as tolerated
8. Assess circulation and perfusion
- a) Determine heart rate
 - b) Skin color and temperature
 - c) Capillary refill time and quality of central and peripheral pulses
 - d) If no pulse or perfusion or evidence of poor perfusion and heart rate (HR) is < 60/minute begin Cardiac Emergencies
 - e) With adequate perfusion and HR > 60/minute, administer high flow 100% oxygen via non-rebreather or blow-by
 - f) Assess and treat for shock
 - g) Obtain vascular access, intra-osseous (IO) or intravenous (IV)
 - h) Administer fluid bolus of normal saline (NS) at 20 ml/kg set to maximum flow rate or push
 - (1) Reassess after initial bolus
 - (2) If signs of shock persist, repeat fluid boluses to maximum total of 60 ml/kg
 - i) Control bleeding
 - j) Keep the patient warm and consider Trendelenburg position (elevation of the long board when spinal injury is suspected)
 - k) Anticipate vomiting and prepare to suction airway as needed
9. Make transport decision – (if not already done)
- a) Notify receiving hospital according to Hospital Destination Guidelines
 - b) Do not delay transport for further assessment or treatment
 - c) Parents should be allowed to stay with child during evaluation and transport if appropriate for the situation
10. Focused history and physical exam
- a) Head-to-toe assessment (toe-to-head)
 - b) SSAMPLE History
 - (1) Signs
 - (2) Symptoms
 - (3) Allergies
 - (4) Medications
 - (5) Past medical history
 - (6) Last meal
 - (7) Events

- c) Consider all potential non-traumatic causes
 - (1) *Hypothermia*
 - (2) *Dehydration*
 - (3) *Sepsis*
 - (4) *Hypoglycemia*
 - (5) *Overdose*
 - (6) *Underlying medical conditions*
- 11. Continuous monitor and assessment
 - a) Vital signs
 - b) Neurological status
 - (1) *AVPU*
 - (2) *Pupillary response*
 - (3) *Distal function and sensation (Circulation, Movement and Sensation - CMS)*
- 12. Treat all life threatening conditions as they become identified
- 13. Follow specific treatment guidelines as appropriate

C. Hospital Destination Guidelines

1. Children with life threatening emergencies should be transported to the nearest hospital with appropriate pediatric and/or trauma capabilities
 - a) Pediatric capabilities include 24-hour-in-house pediatric emergency and intensive care physicians
 - b) Pediatric trauma capabilities include verified Level I and Level II trauma centers prepared for children
 - c) In areas of the state where pediatric center or trauma capabilities are greater than 30 minutes away, ambulance services with their medical directors should plan in advance for the destination determination of critically ill or injured children
2. Children with acutely unstable airways or in cardiac arrest may require transport to the closest hospital
3. Medical control may divert certain categories of pediatric trauma or critical pediatric patients to Level I trauma facilities or pediatric centers
4. Early contact with medical control, with accurate triage information is important in the seriously ill or injured pediatric patient
5. Consider direct transport of a critically ill child to a pediatric center or a critically injured child to a trauma center if the child meets **any** of these physiological criteria:
 - a) Neurological:
 - (1) *The child has decreased mental status – responsive to verbal stimulation or less on the AVPU scale (Alert – Verbally responsive – Pain response – Unresponsive)*
 - (2) *Seizures not responsive to therapy*

- b) Respiratory distress
 - (1) *Respiratory Rate:*
 - a. < 20 or > 60 breaths/minute in infancy (under 6 months)
 - b. < 16 or > 50 breaths/minute in a toddler (6-24 months)
 - c. < 10 or > 40 breaths/minute in a preschooler (2 – 5 years)
 - d. < 10 or > 30 breaths/minute in a school age child
 - (2) *Increased work of breathing*
 - (3) *Worsening or not improving respiratory distress despite therapeutic interventions*
 - (4) *High flow oxygen needed to maintain oxygen saturations \geq 94%*

- c) Circulatory compromise
 - (1) *HR bradycardia or tachycardia:*
 - a. < 80 or > 200 in infancy (under 6 months)
 - b. < 65 or > 180 in a toddler (6 – 24 months)
 - c. < 60 or > 160 in a preschooler (2 – 5 years)
 - d. < 60 or > 120 in a school age child
 - (2) *Shock or diminished perfusion*
 - a. Capillary refill > 2 seconds
 - b. Systolic blood pressures:
 - (i) < 60 mm Hg in infancy (under 6 months)
 - (ii) < 70 mm Hg in a toddler (6 – 24 months)
 - (iii) < 75 mm Hg in a preschooler (2– 5 years)
 - (iv) < 80 mm Hg in a school age child
 - (3) *Dysrhythmia*

II. Newborn Resuscitation

Resuscitation efforts should focus primarily on improving respiratory status and maintaining body temperature.

A. Evaluation and Treatment Priorities

1. During delivery, suction mouth then nose before delivery of body
 - a) This is especially important if there is meconium in the amniotic fluid
2. Dry infant and maintain warm environment
 - a) Wrap the baby in a thermal blanket
 - b) Cover the infant's head to preserve warmth
3. Assess airway:
 - a) Open and position the airway in the “sniffing” position
 - b) Suction the airway again using bulb syringe, mouth first then nasopharynx
 - c) Avoid hyperextension of the neck
 - d) If thick meconium is present in apneic and/or hypotonic infant:
 - (1) *Initiate endotracheal intubation before the infant takes first breath*
 - (2) *Suction the airway while withdrawing the endotracheal tube (ETT)*
 - (3) *Repeat intubation/suction only once, then if infant remains apneic and hypotonic assist ventilation with BVM or complete intubation*
 - e) If infant becomes bradycardic (< 60)
 - (1) *Discontinue suctioning, provide ventilation and start compressions*

4. Assess breathing and adequacy of ventilation
 - a) Stimulate the infant by rubbing the back or flicking the soles of the feet
 - b) If evidence of central cyanosis:
 - (1) *Central cyanosis is not a good measurement of oxygenation; oxygen saturation measurements should be attempted*
 - (2) *It may take up to 10 minutes for the infant's oxygen saturation to improve after birth to an oxygen saturation of 90%*
 - (3) *American Heart Association recommends that the rescuer should not use 100% oxygen initially during newborn resuscitation*
 - (4) *Use BVM to administer oxygen with a flow of 5-10 one per minute or blow-by administration*
 - (5) *If the heart rate does not improve to > 60, the oxygen should be increased to 100%*
 - c) If infant is apneic:
 - (1) *BVM at 40-60 breaths/minute with 100% oxygen*
 - (2) *If ventilation remains inadequate, consider endotracheal intubation*

5. Assess heart rate – auscultation or palpation of brachial artery or umbilical cord stump
 - a) If heart rate is < 60 after 30 seconds of assisted ventilation with 100% oxygen initiate the following:
 - (1) *Continue ventilation*
 - (2) *Consider endotracheal intubation*
 - (3) *Begin chest compressions and CPR - rate of 100 compressions per minute (hard and fast)*
 - b) If no improvement after 30 seconds of CPR:
 - (1) *Administer 0.1 ml/kg Epinephrine of 1:10,000 (0.01 mg/kg) solution via umbilical vein or other vascular access (max. dose 1.0 mg)*
 - OR**
 - (2) *Administer 0.1 ml/kg Epinephrine 1:1,000 (0.1 mg/kg) solution via ETT*
 - (3) *All attempts should be made to give medications intravenously, ETT administration is less effective*
 - c) If there is a risk of blood loss, consider volume expansion with 10 ml/kg of NS:
 - (1) *Stop CPR when HR > 60*
 - (2) *Check HR every 2 minutes*
 - d) If heart rate is 60–100/minute:
 - (1) *Continue ventilation*
 - (2) *Consider intubation*
 - (3) *Assess oxygen saturation – if less than 90% administer blow-by oxygen*
 - e) If heart rate is > 100/minute
 - (1) *Continue assisted ventilation until patient is breathing adequately on own and is vigorous*

6. Reassess the infant frequently
 - a) Pulse, respiratory rate, tone, color and response
 - b) Check blood glucose
 - (1) *For blood glucose < 45 mg/dl*
 - a. D10W – 3 ml/kg IV or IO
 - c) Monitor for pneumothorax

7. Contact direct medical control for additional instructions
 - a) Continued care of mother
 - b) Place two clamps on umbilical cord 6 and 8 inches from baby, cut umbilical cord between clamps
 - c) Transport delivered placenta to hospital with the baby

B. Apgar Scoring

| SCORE | 0 | 1 | 2 |
|-----------------------------|--------------|-----------------------------|------------------------------|
| Heart Rate | Absent | < 100 | > 100 |
| Respiratory Effort | Absent | Slow, Irregular | Good, Crying |
| Muscle Tone | Limp/Flaccid | Some Flexion | Active Motion of Extremities |
| Reflex, Irritability | No Response | Grimace or Some Motion | Coughs, Sneezes, Active Cry |
| Color | Blue/Pale | Pink body, Extremities Blue | Completely Pink |

C. Considerations for Stopping CPR

1. All actions should be made with direct contact with medical control
2. American Heart Association recommends withholding resuscitation in newborns less than 23 weeks gestational age or less than 400 grams
3. Discontinue resuscitation efforts in newborns without a HR for the first 10 minutes of life

III. Respiratory / Airway Compromise

A. Foreign Body Obstruction – Conscious Patient

1. Do not intervene on patients with a partial obstruction and good air exchange
 - a) Avoid any agitation
 - b) Position comfortably
 - c) Consider alternate methods of oxygen delivery (i.e., blow-by oxygen)
 - d) DO NOT attempt invasive airway maneuvers

2. If patient's airway remains obstructed and patient has poor air exchange, cannot talk, cough or cry with or without cyanosis
 - a) Infant (less than 1 year old):
 - (1) Administer 5 back blows followed by 5 chest thrusts until obstruction is dislodged or infant becomes unconscious
 - (2) If the infant becomes unconscious, position to open airway, perform head-tilt/chin-lift or jaw thrust if trauma is suspected
 - (3) Remove foreign object if visible - DO NOT perform blind sweep
 - (4) Begin sequence for Foreign Body Obstruction - Unconscious Patient
 - b) Child (greater than 1 year old):
 - (1) Administer abdominal thrusts until object is dislodged or child becomes unconscious
 - (2) If the child becomes unconscious, position to open airway, perform head-tilt/chin-lift or jaw thrust if trauma is suspected
 - (3) Remove foreign object if visible: DO NOT perform blind sweep
 - (4) Begin sequence for Foreign Body Obstruction - Unconscious Patient (below)
3. Do not delay transport to the closest hospital

B. Foreign Body Obstruction – Unconscious Patient

1. Assess ABC's and open airway using a head-tilt/chin-lift or jaw thrust if trauma is suspected
2. Remove obstruction if visible - DO NOT perform blind sweep
3. Attempt to ventilate patient using a BVM device with high-flow, 100% oxygen
4. If unsuccessful, reposition airway and attempt BVM assisted ventilation again
5. If patient is not breathing, has no pulse and you are unable to ventilate
 - a) Begin Cardiac Emergencies
6. Each time the airway is opened for ventilations, check the pharynx for the foreign body
7. Continue Cardiac Emergencies until the object is removed, ventilations are successful or child/infant recovers
8. If you successfully remove the airway obstruction:
 - a) Look, listen and feel for air movement, at least 5 seconds and no longer than 10 seconds
 - b) If no air exchange, attempt two ventilations and confirm chest rise
 - c) If no chest rise, and/or breaths do not go in, reposition and try again
 - d) If ventilations are successful, check for pulse; at least 5 seconds and no longer than 10 seconds
 - e) If child has no pulse and is not breathing – begin Cardiac Emergencies
 - f) If the child has a pulse, but is not breathing or not breathing effectively, ventilate (child or infant 1 breath every 3-5 seconds) using a BVM device with high-flow oxygen until
9. Do not delay transport to closest hospital

C. Foreign Body Obstruction – Additional Considerations

1. If attempts to clear airway are unsuccessful, consider the following only if trained:
 - a) Direct visualization and removal of foreign body with Magill forceps
 - b) Deep suction via tracheal intubation using
 - (1) *Large bore suction catheter with a single distal opening*

OR

 - (2) *ETT with Hutchinson's eye removal*
 - c) Endotracheal intubation and ventilate the patient
 - d) Consider surgical airway – needle cricothyrotomy and with needle jet insufflation

D. Upper Airway Compromise (Croup / Non-foreign Body)

1. Calm patient and keep patient in a position of comfort, often upright on parent's lap
2. Be alert for tracheal or esophageal obstruction
3. Assess rate and quality of respirations - note if retractions present
4. For cyanosis and severe stridor
 - a) High flow oxygen if mask agitates patient use blow-by oxygen technique
5. Inhalation therapy
 - a) Racemic epinephrine 0.5 ml (2.25%) in 3 ml saline

OR

 - b) Injectable epinephrine 1:1000 5 ml via nebulizer without dilution
6. Do not try to visualize pharynx
7. Consider a nasal airway in a conscious patient or oral airway in an unconscious patient
8. For respiratory arrest or cyanosis with decreased LOC – assist with BVM
9. Intubate if unable to ventilate

E. Asthma – Breathing Patient

1. High flow oxygen and expedite transport
 - a) Goal is to **improve air exchange** and maintain adequate oxygenation (> 90%)
 - b) The patient may not achieve 100% oxygen saturations
2. Inhalation Therapy
 - a) 2.5mg albuterol or 1.25mg levalbuterol (Xoponex) via nebulizer
 - b) May add 0.5 mg ipratropium bromide (Atrovent) to neb if severe distress

OR

 - c) DuoNeb (0.5 mg ipratropium bromide/2.5 mg albuterol)
 - d) May repeat nebulizer treatments once
3. If no improvement with patient in moderate to severe distress
 - a) Administer nebulized albuterol 2.5 mg mixed with 0.5 mg ipratropium bromide (Atrovent), may repeat once
 - b) Administer terbutaline or epinephrine (select one)
 - (1) *Terbutaline 0.01 mg/kg SQ max, 0.25 mg/dose*

OR

 - (2) *Epinephrine 1:1,000, 0.01 ml/kg SQ/IM up to maximum of .05 ml/dose*
 - c) If patient does not respond to interventions
 - (1) *Magnesium sulfate per medical control, 25 mg/kg IV/IO slowly over 1 minute with a max 2 g/dose and monitor for hypotension*

F. Asthma – Non-breathing Patient or Agonal Patient

1. Oral airway with BVM at 12-20 per minute
2. DO NOT HYPERVENTILATE
3. **ALLOW ADEQUATE TIME FOR LUNG DEFLATION**
 - a) Use cricoid pressure to assist with ventilation or during intubation
4. Consider intubation – ventilation at 12-20 per min
 - a) **ALLOW ADEQUATE TIME FOR LUNG DEFLATION**
5. Consider assisting **exhalation** with manual bilateral chest deflation
6. Administer - epinephrine or terbutaline (select one)
 - a) Epinephrine: 1:1,000, 0.01 mg/kg SQ/IM up to maximum of 0.5 ml/dose
 - b) Terbutaline: 0.01 mg/kg SQ up to maximum of 0.25 mg/dose
7. Inhalation therapy
 - a) 2.5 mg albuterol mixed with 0.5 mg ipratropium bromide (Atrovent) via in-line nebulizer
 - b) If no improvement, nebulize continuously with albuterol only
8. Establish IV/IO
 - a) If patient doesn't respond to other interventions
 - b) Magnesium sulfate per medical control, 25 mg/kg IV/IO slowly over 1 min with max of 2 g/dose and monitor for hypotension
9. For intubated patient, you may administer Midazolam (Versed) 0.1 mg/kg titrated up to 10 mg IV/IO/IM for agitation

G. Anaphylaxis

1. Establish and maintain airway, high flow oxygen
2. If severe S/S (hives, airway constriction, vomiting, hypotension, or known allergic response), administer one of the following:
 - a) Patient 10 kg to 30 kg (22-66 lbs)
(1) ***EpiPen JR IM (0.15 mg epinephrine autoinjector)***
 - b) Patient > 30 kg (> 66 lbs)
(1) ***EpiPen IM (0.3 mg epinephrine autoinjector)***
OR
(2) ***Epinephrine 1:1,000 (0.01 ml/kg IM up to maximum dose of 0.5 ml)***
3. If patient's systolic pressure drops below minimum for age or decreased LOC:
 - a) Administer a 20 ml/kg bolus of IV/IO NS
 - b) If patient's status deteriorates, start CPR and intubate as appropriate
 - c) May repeat bolus if no improvement
4. If after 5 minutes there is no improvement, repeat administration of one of the following:
 - a) Patient 10 kg to 30 kg (22-66 lbs)
(1) ***EpiPen JR IM (0.15 mg epinephrine autoinjector)***
 - b) Patient > 30 kg (> 66 lbs)
(1) ***EpiPen IM (0.3 mg epinephrine autoinjector)***
OR
(2) ***Epinephrine 1:1,000 (0.01 ml/kg IM up to maximum dose of 0.5 ml)***
5. Administer diphenhydramine HCL (Benadryl) 1.0 mg/kg up to 50 mg IV/IO/IM
6. If patient's anaphylaxis includes lower airway (wheezing), consider Albuterol 2.5 mg neb
7. If sting or poisonous bite, immobilize the limb and cool with an ice pack

H. Intubation (without Rapid Sequence Induction - RSI)

The determination to intubate pediatric patients in the pre-hospital setting must include consideration of the severity of the patient's underlying illness or injury, the ability or inability to adequately ventilate the patient by BVM, the comfort and skill level of the pre-hospital provider and the distance to the receiving hospital. In general, patients who can be adequately ventilated via BVM and are being transported short to moderate distances should be cared for in this manner. The intubation protocols below are intended for instances when these circumstances are not met.

1. Continue ventilating patient with BVM and 100% oxygen delivery system (see Asthma – Breathing Patient protocol for specific considerations)
2. Cricoid pressure is not recommended during ventilations
3. Prepare equipment for intubation:
 - a) Suction with rigid suction catheter attached
 - b) 3 ETTs and stylet, the chosen tube and 2 extra tubes, one half size larger and one half size smaller
 - c) Cuffed and uncuffed tubes are acceptable, down size one half the size if using the cuffed tube
 - d) Laryngoscope(s) with curved or straight blades, back up lighting available
 - e) Magill forceps
 - f) Cardiac monitor hooked up to patient
 - g) Pulse oximeter hooked up to patient and functioning
 - h) End-tidal CO₂ detector
 - i) Esophageal intubation detector (not used on children under 5 years old)
4. Pass the tube
 - a) Direct visualization of the vocal cords
 - b) Provider may ask attendant to provide cricoid pressure, (Sellick maneuver) which may manipulate the larynx into a more posterior (deeper) and superior (towards the head) position to facilitate visualization of the cords
5. Patent airway assessment
 - a) Confirm and document proper ETT placement:
 - (1) *Visualized tube passing through vocal cords*
 - (2) *Bilateral breath sounds over lungs and lack of sounds over epigastric area*
 - (3) *Rise and fall of chest wall with ventilations*
 - (4) *Mist in the tube*
 - (5) *Positive end-tidal CO₂ device indication*
 - (6) *Use esophageal intubation detector*
 - (7) *Rising pulse oximeter*
6. Ventilate patient to provide adequate air exchange
(see specific protocols for Asthma – Breathing Patient and Foreign Body Obstruction – Conscious Patient)

7. Secure tube
 - a) If uncertain about ETT placement or patient condition does not improve, directly visualize ETT placement
 - b) Consider the following reasons for failure of clinical improvement in the intubated patient:
 - (1) *Displaced tube*
 - (2) *Obstructed tube*
 - (3) *Pneumothorax*
 - (4) *Equipment failure*
8. Oxygen
 - a) Avoid hyperoxygenation
 - b) Maintain oxygen saturation at 94% if resumption of spontaneous circulation (ROSC), at 100% if no ROSC
9. Ensure post intubation sedation

I. Intubation (RSI)

The determination to intubate pediatric patients in the pre-hospital setting must include consideration of the severity of the patient's underlying illness or injury, the ability or inability to adequately ventilate the patient by BVM, the comfort and skill level of the pre-hospital provider and the distance to the receiving hospital. In general, patients who can be adequately ventilated via BVM and are being transported short to moderate distances should be cared for in this manner. The intubation protocols below are intended for instances when these circumstances are not met.

1. Prepare the equipment, medications and team:
 - a) BVM connected to functioning oxygen delivery system
 - b) Suction with rigid suction catheter attached
 - c) 3 ETTs and stylet, the chosen tube and 2 extra tubes, one half size larger and one half size smaller
 - d) Cuffed and uncuffed tubes are acceptable, down size one half size if using the cuffed tube
 - e) Laryngoscope(s) with curved and/or straight blades, back up lighting available
 - f) Magill forceps
 - g) Cardiac monitor hooked up to patient
 - h) Pulse oximeter hooked up to patient and functioning
 - i) End-tidal carbon dioxide detector
 - j) RSI medications – mix, draw up and label all anticipated drugs
 - k) At least one, preferably two secure IV lines
2. Preoxygenate
 - a) 100% oxygen by mask for 3 minutes or with 8 tidal breaths on 100% oxygen
 - b) See asthma protocol for specific considerations
3. Premedicate
 - a) Atropine 0.02 mg/kg for all children < 5 years old (minimum of 0.1 mg) IV/IO
 - b) Lidocaine 1.5 mg/kg (consider for patients with head injuries or asthma) IV/IO
4. Push sedative (induction of unconsciousness)
 - a) Asthma patients
 - (1) *Ketamine 2 mg/kg (if no head injury) IV/IO*
 - b) All other patients
 - (1) *Etomidate 0.3 mg/kg IV/IO*

5. Pressure on cricoid
 - a) Provider may ask attendant to provide cricoid pressure, Sellick maneuver, which may manipulate the larynx into a more posterior (deeper) and superior (towards the head) position to facilitate visualization of the cords
6. Paralyze
 - a) Succinylcholine (2 mg/kg IV/IO) - contraindicated in major trauma, acute burns or hyperkalemia

OR
 - b) Vecuronium (0.2 mg/kg IV/IO) if succinylcholine contraindicated

OR
 - c) Rocuronium (0.5 - 0.75 mg/kg IV/IO) and wait for paralysis about 30 to 45 seconds
7. Pass the tube (with direct visualization of the vocal cords)
 - a) Provider may ask attendant to provide cricoid pressure, Sellick maneuver, which may manipulate the larynx into a more posterior (deeper) and superior (towards the head) position to facilitate visualization of the cords
 - b) If bradycardia presents during intubation, abandon attempt momentarily and administer 0.5 mg Atropine and hyperventilate with BVM and oral airway until bradycardia improves
8. Patient airway assessment
 - a) Confirm and document proper ETT placement:
 - (1) *Visualized tube passing through vocal cords*
 - (2) *Bilateral breath sounds over lungs and lack of sounds over epigastric area*
 - (3) *Rise and fall of chest wall with ventilations*
 - (4) *Mist in the tube*
 - (5) *Positive end-tidal carbon dioxide device indication*
 - (6) *Use esophageal intubation detector*
 - (7) *Rising pulse oximeter*
9. Post intubation plan
 - a) Secure tube
 - b) If uncertain about ETT placement or patient condition does not improve, directly visualize ETT placement
 - c) Consider these reasons for failure of clinical improvement in the intubated patient:
 - (1) *Displaced tube*
 - (2) *Obstructed tube*
 - (3) *Pneumothorax*
 - (4) *Equipment failure*
10. Oxygen
 - a) Avoid hyperoxygenation
 - b) Maintain oxygen saturation at 94% if resumption of spontaneous circulation (ROSC) at 100% if no ROSC
11. **Ensure** post intubation sedation
12. Paralysis
 - a) Vecuronium: 0.1 mg/kg IV/IO as needed

13. Sedation
 - a) Midazolam: 0.1 – 0.2 mg/kg IV/IO

OR

 - b) Lorazepam: 0.05 mg/kg IV/IO
14. Consider pain control for injured patients
 - a) Morphine: 0.1 mg/kg IV/IO
15. Consider placement of nasogastric tube (NG tube)

J. ETTs: Type, Diameter and Length

1. ETT diameter
 - a) (Age/4) + 4 uncuffed tubes
 - b) (Age/4) + 3 cuffed tubes
2. ETT length
 - a) 3 x internal diameter of ETT
3. Consider cuffed ETT in toxic ingestions and asthma

K. ETT Chart

| <i>ETT Sizes</i> | <i>Size (mm)(uncuffed)</i> | <i>Size (mm)(cuffed)</i> | <i>ETT Length (cm lip to tip)</i> |
|------------------|--------------------------------|------------------------------|---------------------------------------|
| Premature | 2.5 - 3.0 | 2.5 | 6 + Wt. Kg |
| Newborn | 3.0 - 3.5 | 3.0 | 6 + Wt. Kg |
| 6 months | 3.5 - 4.0 | 3.5 | 11 |
| 18 months | 4.0 | 3.5 | 11 |
| 3 Years | 4.5 | 4.0 | 13 |
| 4 Years | 5.0 | 4.5 | 14 |
| 5Years | 5.0 | 4.5 | 14 |
| 6 Years | 5.5 | 5.0 | 16 |
| 8 Years | 6.0 - 6.5 | 5.5 - 6.0 | 18 |
| 12 Years | 7.0 - 8.0 | 6.5 - 7.5 | 20 - 22 |

IV. Cardiac Emergencies

A. General Guidelines

This is for all cardiac arrests that are not directly related to respiratory failure or airway obstruction

1. If a patient is unresponsive and not breathing or not effectively breathing and there is evidence of poor perfusion, perform chest compressions at a rate of 100/minute (hard/fast)
2. Hands only compressions can be performed if the rescuer is unable to perform ventilations
3. Infant (1 month to 1 year):
 - a) The CPR two thumbs on the sternum technique with the hands encircling the chest is the preferred method but the two fingers below nipple line on the sternum can be used
 - b) The ratio of compressions to ventilations is 30:2 for one rescuer and 15:2 for two rescuers
 - c) Compression depth is one third to one half the AP diameter of the chest (about 1 and one half inches)
4. Child (1 year to the onset of puberty):
 - a) CPR with one or two hands
 - b) The ratio of compressions to ventilations is 30:2 for one rescuer and 15:2 for two rescuers
 - c) Compression depth is at least one third the AP diameter of the chest (about 2 inches)
5. As soon as AED or defibrillator is available, attach it to the patient
6. Try to limit the interruption of compressions
7. If pediatric pads are not available - use adult pads and energy levels
8. Ensure pads do not overlap or touch - pads may be placed with one on front/one on back of chest in smaller children
9. If **unwitnessed arrest** - perform 5 cycles / 2 minutes of CPR then use AED or defibrillator
10. If **witnessed arrest/collapse** - use AED or defibrillator immediately
11. If you are using an **AED** (the device will tell you whether the rhythm is “shockable”), give shock
12. If using a **manual defibrillator**, determine if the rhythm is “shockable” (see following segments on pulseless ventricular tachycardia and ventricular fibrillation)
13. If using a **manual defibrillator**, energy should start at 2 J/kg followed by 4 J/kg and may escalate to a maximum of 10 J/kg
14. Continue CPR for 5 cycles / 2 minutes before checking for a pulse
15. Airway adjuncts if needed to obtain adequate ventilations and oxygenation
16. Attach ECG monitor and obtain IV/IO access
17. Treat possible causes and specific arrhythmia per guidelines
18. Do not delay transport to closest hospital

B. Use of Automatic External Defibrillators (AEDs)

Bystander, First Responders & BLS services

1. Ages < 1 year old
 - a) AEDs may be used if manual defibrillator or dose-attenuated AEDs are unavailable
 - b) Emphasis is placed on high quality CPR
2. Ages 1-8 years old
 - a) Use pediatric pads/or features if available
3. Ages > 8 years old
 - a) Use adult pads and energy levels on AED
4. Do not delay transport to closest hospital
5. If **AED advises NO SHOCK**
 - a) Transport to the hospital
 - b) Ensure airway control
 - c) Continue high quality CPR
 - d) Allow AED to reanalyze every two minutes

C. Asystole and Pulseless Electrical Activity (PEA)

1. Assess ABC's
2. Perform CPR
3. Consider intubation if BVM not adequate or transport time is long
4. IV NS TKO or IO (preferred if IV access not readily available)
5. Look for and correct underlying cause (H's & T's) - refer to appropriate guideline:
 - a) Hypovolemia
 - b) Hypoxia
 - c) Hyper/hypokalemia
 - d) Hypothermia
 - e) Hydrogen ion (acidosis)
 - f) Hypoglycemia
 - g) Tamponade, cardiac
 - h) Tension pneumothorax
 - i) Thromboembolisms – coronary or pulmonary
 - j) Toxins/tablets (drug overdose, accidents)
 - k) Trauma
6. Epinephrine
 - a) IV/IO 1:10,000 (0.1 ml/kg or 0.01 mg/kg), repeat every 3-5 minutes
(1) All attempts should be made to give medications intravenously, ET administration is less effective
 - b) ET 1:1,000 (0.1 ml/kg or 0.1 mg/kg)

D. Bradycardia

1. Assess ABC's and provide oxygen
2. Attach monitor
 - a) Cardiorespiratory compromise (poor perfusion, hypotension, respiratory difficulty, altered consciousness):
 - (1) *For poor perfusion (HR < 60/min) despite adequate oxygenation and ventilations, perform chest compressions - CPR*
 - (2) *Epinephrine IV/IO 0.1 ml/kg 1:10,000 (0.01 mg/kg), repeat every 3-5 minutes*
 - (3) *Atropine 0.02 mg/kg (min dose 0.1 mg / max 1 mg/dose), may repeat one time*
 - (4) *External pacemaker*
 - (5) *If pulseless arrest develops, see Asystole and Pulseless Electrical Activity (PEA) algorithm*
 - b) No cardiorespiratory compromise:
 - (1) *Observe*
 - (2) *Support the ABC's*
 - (3) *Transport to appropriate facility*

E. Supraventricular Tachycardia

1. Assess ABC's and provide oxygen
2. Attach monitor and run continuous EKG strip
 - a) Definition:
 - (1) *QRS < 0.08 (2 small blocks)*
 - (2) *Rhythm regular, no beat to beat variation*
 - (3) *Rate: infant > 220 and child > 180*
 - (4) *P wave absent*
3. Consider and treat possible non-cardiac causes of tachycardia:
 - a) Hypoxia
 - b) Hypovolemia
 - c) Pain
4. If normal perfusion and mental status:
 - a) Consider vagal maneuver
 - b) Infant < 1 year old - ice bag to face or rectal stimulation with a thermometer
 - c) Child > 1 year old - valsalva or unilateral carotid sinus massage
 - d) Establish vascular access
 - e) Adenosine 0.1 mg/kg IV (max first dose 6 mg) rapid IV push with rapid flush
 - f) May repeat and double Adenosine 0.2 mg/kg IV (max dose 12 mg) IV push with rapid flush
5. If inadequate perfusion or decreased mental status:
 - a) During prep for cardioversion may consider vagal maneuver
 - (1) *Infant < 1 year old - ice bag to face*
 - (2) *Child > 1 year old - valsalva or unilateral carotid sinus massage*
 - b) If IV access readily available, may use Adenosine as dosed above
 - c) Synchronized cardioversion at 0.5 – 1 J/kg
 - d) Consider sedation prior to cardioversion if responsive to voice or pain (Midazolam 0.1 mg/kg IV)
 - e) Do not significantly delay cardioversion to sedate patient with poor perfusion
 - f) May increase cardioversion dose to 2 J/kg if initial dose not effective

F. Ventricular Tachycardia (With Pulse)

1. ABC's and provide oxygen
2. Attach monitor/defibrillator and run continuous EKG strip
3. Consider and treat possible causes
4. Evaluate for wide QRS duration (> 0.08 seconds indicates ventricular arrhythmia)
5. If patient is unconscious: AVPU – only responds to deep pain stimuli
 - a) Synchronized cardioversion at 0.5 – 1 J/kg with sedation prior to cardioversion if quickly available
6. If patient is conscious, consider antiarrhythmic medication below:
 - a) Amiodarone 5 mg/kg IV over 20-60 minutes
OR
 - b) Procainamide 15 mg/kg IV over 30-60 minutes
OR
 - c) Lidocaine 1 mg/kg IV bolus
OR
 - d) Sedation and synchronized cardioversion
7. Perform 12 lead EKG
8. Consider antiarrhythmic treatment after cardioversion

G. Ventricular Fibrillation and Pulseless Ventricular Tachycardia

1. As soon as AED or defibrillator is available, attach it to the patient
2. Try to limit the interruption of compressions
3. If pediatric pads are not available - use adult pads and energy levels
4. Ensure pads do not overlap or touch - pads may be placed with one on front/one on back of chest in smaller children
5. If **unwitnessed arrest** - perform 5 cycles / 2 minutes of CPR then use AED or defibrillator
6. If **witnessed arrest/collapse** - use AED or defibrillator immediately
7. Confirm ventricular fibrillation or wide complex ventricular tachycardia
8. Defibrillate 2 J/kg one shock
9. Perform 5 cycles / 2 minutes of CPR then check rhythm and for a pulse
10. If patient converts to a sustainable rhythm at any time, support patient and transport to the hospital
11. If patient is still in ventricular fibrillation or ventricular tachycardia, defibrillate 4 J/kg one shock
12. Consider intubation if BVM not adequate or transport time is long
13. IV NS TKO or IO (preferred if IV access not readily available)
14. Epinephrine
 - a) IV/IO: 0.1 ml/kg (1:10,000) - repeat every 3-5 minutes until stable perfusion rhythm
 - b) ET 0.1 ml/kg (1:1,000) in 3ml NS - repeat every 3-5 minutes until stable perfusion rhythm
15. Defibrillate 8 J/kg (maximum of 10 J/kg) with one shock after 5 cycles / 2 minutes of CPR
16. Consider antiarrhythmics:
 - a) Amiodarone 5 mg/kg bolus IV/IO
OR
 - b) Lidocaine 1.0 mg/kg IV/IO (repeat in 3-5 minutes)
OR

- c) Torsades de Pointes - Magnesium Sulfate, 25-50 mg/kg (max 2 mgs) IV/IO
- 17. Continue CPR and reassess every 5 cycles / 2 minutes
- 18. Consider treatable causes
- 19. Do not delay transport to closest hospital

V. Medical

A. Unconscious - Altered Mental Status

1. Establish and maintain airway, high flow oxygen, assist ventilations as needed
2. If patient is unresponsive and not having effective breathing or not breathing, start CPR compressions
3. Protect cervical spine if trauma possible
4. Place patient on cardiac monitor
5. Obtain history from parent if able to
6. IV/IO NS to keep open (TKO)
7. Check blood glucose
8. If low blood glucose < 50, administer glucose slowly (10 ml/min)
 - a) > 4 yrs old: administer D₅₀W, 1 ml/kg IV/IO
 - b) < 4 yrs old: administer D₂₅W, 2 ml/kg IV/IO
 - c) Neonate: administer D₁₀W, 3 ml/kg IV/IO
9. If low, consider glucagon IM/IV/SQ
 - a) < 20 kg: 0.5 mg/dose
 - b) > 20 kg to adult: 1 mg/dose Q 20 min until awake

*Note: To mix D₂₅W: waste 25 ml of the D₅₀W pre-filled amp and draw up 25 ml of NS
To mix D₁₀W: waste 40 ml of the D₅₀W pre-filled amp and draw up 40 ml of NS*

10. If patient remains unconscious, administer Naloxone (Narcan) 0.1 mg/kg IV/IO/IM/ET up to 2 mg max
11. If known diabetic, consider glucagon
12. For known or possible tricyclic anti-depressant ingestions, consider sodium bicarbonate 1 mEq/kg IV

B. Hypotension (Shock)

1. Signs of shock
 - a) Decreased peripheral perfusion
 - b) Mottled skin
 - c) Poor capillary refill (> 2 seconds)
 - d) Poor peripheral pulses
 - e) Decreased LOC
 - f) Low blood pressure
2. If no pulse or evidence of poor perfusion and HR < 60/minute, begin Cardiac Emergencies
3. With adequate perfusion and HR > 60/minute, administer high flow 100% oxygen via non-rebreather or blow-by
4. Obtain vascular access:
 - a) Administer fluid bolus of NS of 20 ml/kg set at maximum flow rate
 - b) Reassess after initial bolus
 - c) If signs of shock persist, repeat fluid bolus to a maximum of 60 ml/kg
5. If patient is not improving, determine possible cause of hypotension:
 - a) Toxic shock, sepsis, dehydration or toxic ingestion and treat appropriately
 - b) Identify if patient could be at risk of adrenal insufficiency by Medical Alert Bracelet, designation in medical records, or family or medical confirmation
 - c) Medical conditions can include: Congenital Adrenal Hyperplasia (CAH), Addison's disease or chronic steroid use
 - d) If confirmed adrenal insufficiency and shock is present, emergent treatment with steroids is life-saving
 - (1) *Parents or caregivers may give an IM shot of steroids for treatment of illness*
 - (2) ***These patients should be transported to the hospital emergently***
 - (3) *If no steroids are available, alert emergency department/medical control that a patient with probable adrenal crisis is en route and ask that hydrocortisone is ready to administer to the patient on arrival*
6. Keep patient warm and consider Trendelenburg position
7. Anticipate vomiting and prepare to suction airway as needed

C. Hypoglycemia (and/or Known Diabetic Patient)

1. Check blood glucose
2. If you are unable to check the blood glucose and the patient is symptomatic, proceed with the following steps
3. If patient is conscious, symptomatic and able to swallow effectively
 - a) Administer oral glucose or other form of sugar if blood glucose < 50
 - (1) *Newborn to 4 months: oral glucose up to 15 g or allow breast or bottle feeding*
 - (2) *Patients 4 months of age and greater: oral glucose up to 20 g*
 - b) If patient's condition is improving, wait 5-15 minutes, re-check glucose level

4. If patient is unable to swallow, or patient's condition is not improving after oral therapy
 - a) IV/IO NS
 - b) If low blood glucose, administer glucose slowly (10 ml/min)
 - (1) Neonate administer: D₁₀W, 3 ml/kg IV/IO
 - (2) < 4 yrs old administer: D₂₅W, 2 ml/kg IV/IO
 - (3) > 4 yrs old administer: D₅₀W, 1 ml/kg IV/IO

Note: To mix D₂₅W: waste 25 ml of the D₅₀W pre-filled amp and draw up 25 ml of NS
 To mix D₁₀W: waste 40 ml of the D₅₀W pre-filled amp and draw up 40 ml of NS

- c) Consider glucagon IM/IV/SQ
 - (1) < 20 kg: 0.5 mg/dose
 - (2) > 20 kg to adult: 1 mg/dose Q 20 min until awake
5. Do not delay transport to closest hospital

D. Seizures

1. Establish and maintain airway, high-flow oxygen
2. IV/IO NS TKO
3. Cardiac monitor
4. Check blood glucose, treat accordingly
 - a) If low blood glucose, < 50, administer glucose slowly (10 ml/min)
 - (1) Neonate: administer D₁₀W, 3 ml/kg IV/IO
 - (2) < 4 yrs old: administer D₂₅W, 2 ml/kg IV/IO
 - (3) > 4 yrs old: administer D₅₀W, 1 ml/kg IV/IO
5. If patient actively seizing or seizures are repetitive, give one of the following medications and be prepared to manage respiratory depression:
 - a) Midazolam IV/IO (Versed)
 - (1) 0.1 mg/kg IV/IO (up to 10 mg)
 - (2) If seizure not terminated within 10 minutes, give an additional 0.05 mg/kg IV/IO
 - b) If no IV/IO, administer Midazolam IM (Versed)
 - (1) 0.2 mg/kg (up to 10 mg)
 - (2) If seizure not terminated within 10 minutes, give an additional 0.05 mg/kg IM
 - c) Midazolam intranasal (IN) (Versed)
 - (1) 0.2 mg/kg (up to 10 mg)
 - d) Diazepam (Valium)
 - (1) 0.1 mg/kg IV/IO/IM (up to 10 mg)
 - (2) If seizure not terminated within 10 minutes, give an additional 0.05 mg/kg IV/IO/IM
 - (3) Rectally: 0.5 mg/kg ages 2-5 and 0.3 mg/kg ages 6-11
 - e) Lorazepam (Ativan)
 - (1) 0.1 mg/kg IV/IO/IM (up to 4 mg)
 - (2) If seizure not terminated within 10 minutes, give an additional 0.05 mg/kg IV/IO/IM (up to 4 mg)

E. Sudden Infant Death Syndrome

1. Generally infants less than six months of age
2. Treatment guidelines
 - a) Initiate CPR unless there are obvious signs of death: rigor mortis (stiff limbs), livor mortis (blood settling in the lower portions of the body)
 - b) Follow protocol for cardiac arrest
 - c) Support the parents
 - d) Avoid questions or comments suggesting blame and remain non-judgmental
 - e) Observe carefully and note:
 - (1) *Location and position of child*
 - (2) *Ambient temperature*
 - (3) *Objects immediately surrounding the child including type of mattress and bedding*
 - (4) *Behavior of all people present and the explanations provided*
 - (5) *Vomit in mouth or foreign body present*
 - f) DO NOT remove or move any objects
 - g) Document all observations and report them to receiving hospital
 - h) Contact local law enforcement if not already done so

F. Hypothermia

1. Assess ABC's
2. Check pulse for 30 - 60 seconds to adequately confirm pulselessness or severe bradycardia in the hypothermic patient
3. Monitor EKG
4. CPR as indicated
5. Determine core temperature
 - a) > 30 degrees C (86 degrees F)
 - (1) *Continue CPR*
 - (2) *Defibrillate for VF/VT*
 - (3) *Give medications when needed*
 - (4) *Ventilate with warmed, humidified oxygen*
 - (5) *Establish IV and infuse with warm NS*
 - (6) *Repeat defibrillation for VF/VT as core temperature rises*
 - b) < 30 degrees C (86 degrees F)
 - (1) *Continue CPR*
 - (2) *Defibrillate for VF/VT once*
 - (3) *Do not give medications*
 - (4) *Ventilate with warmed, humidified oxygen*
 - (5) *Establish IV and infuse with warm NS*
6. Protect from further heat loss
 - a) Remove wet garments
 - b) Insulate around with blankets to prevent further heat loss
7. Avoid rough handling of the patient
8. Do not delay transport to closest hospital

G. Hyperthermia

1. Ensure adequate airway
2. Oral rehydration (if able to maintain airway)
 - a) Water or electrolyte solution (examples: Gatorade or Pedialyte)
3. Attempt cooling techniques
 - a) Remove from heat source
 - b) Remove clothing and cover with wet sheets
 - c) Sponge or splash with cool water
 - d) Fan to increase evaporation and subsequent heat loss
 - e) If vitals are stable, cold packs to axilla and groin
4. IV fluids: NS or LR 20 ml/kg fluid bolus via large bore catheter
5. Monitor EKG
6. Do not administer Acetaminophen
7. Treat associated symptoms
8. Do not delay transport for cooling in the field

VI. Trauma

A. General Pediatric Trauma Assessment & Care

This provides general guidelines for initial assessment and care of the injured pediatric patient. Use of a length-based resuscitation tape is recommended to assist in determination of appropriate equipment size, vital signs, and drug dosages.

1. Perform scene survey
 - a) Assess for hazardous conditions
 - b) Mechanics of injury (MOI)
 - c) Ensure scene safety
 - d) Call for additional assistance if needed (this includes ALS response or intercept)
 - e) Triage multiple patients as appropriate
2. Observe standard universal precautions
3. Form a first impression of the patient's condition
 - a) Pediatric Assessment Triangle (PAT)

Three Components:

- (1) *Appearance*
- (2) *Work of Breathing*
- (3) *Circulation to Skin*



***If patient is unresponsive and not having effective breathing or not breathing, start compressions.**

4. Determine patient's LOC
 - a) **AVPU**
 - (1) *Alert*
 - (2) *Voice*
 - (3) *Pain*
 - (4) *Unresponsive*

5. Spine injury consideration
 - a) If significant MOI, decreased level of consciousness or loss of consciousness, distracting injury, or cervical spine trauma is suspected, manually stabilize the cervical spine

6. Assess airway - patency, protective reflexes and possible need for advanced airway management:
 - a) Look for signs of airway obstruction
 - b) Open the airway – head tilt/chin lift (if no suspected spinal trauma) or modified jaw thrust if spinal trauma is suspected
 - c) If jaw thrust does not open the airway, use the head tilt/chin lift method
 - d) Opening the airway is a priority
 - (1) *Suction airway if necessary*
 - (2) *Consider placing an oropharyngeal or nasopharyngeal airway adjunct if the airway cannot be maintained with positioning and the patient is unconscious*
 - (3) *Consider placing pad under infant/child's shoulder to aid in airway positioning*

7. Assess breathing:
 - a) Rate, work of breathing, adequacy of ventilations, auscultation and inspection
 - b) Inspect skin, lips and nail beds for cyanosis
 - c) Obtain pulse oximeter reading
 - d) If inadequate ventilations, reposition airway and reassess
 - e) If inadequate ventilation after repositioning airway, suspect foreign body obstruction and refer to Foreign Body Obstruction – Unconscious Patient guidelines
 - f) Assess for signs of respiratory distress, failure or arrest
 - g) Refer to appropriate protocol for treatment options
 - h) If child is not breathing or breathing is inadequate:
 - (1) *Assist ventilations using a BVM with 100% oxygen*
 - (2) *If the airway cannot be maintained by other means, including attempts at assisted ventilation or if prolonged assisted ventilation is anticipated, consider endotracheal intubation*
 - (3) *Consider pneumothorax if respiratory distress together with a significant MOI and decreased breath sounds*
 - (4) *Symptoms such as jugular venous distension and tracheal deviation may be absent in children*
 - (5) *Needle decompression*
 - a. Use 18-20 gauge over the needle catheter
 - b. Mid-clavicular line – 2nd intercostals space

OR

 - a. Mid-axillary line – 5th intercostals space
 - i) If child is breathing adequately
 - (1) *Consider administering high-flow oxygen with non-rebreather mask or blow-by as tolerated*

8. Assess circulation and perfusion:
 - a) Determine heart rate
 - b) Skin color and temperature
 - c) Capillary refill and quality of central and peripheral pulses
 - d) Control hemorrhage – direct pressure, elevation, pressure point or pressure dressing as needed
 - e) Check for a pulse no more than 10 seconds
 - f) If no pulse or perfusion or HR is < 60/minute and evidence of poor perfusion
 - (1) *Initiate chest compression and ventilations*
 - g) Assess and treat for shock
 - (1) *Obtain vascular access*
 - a. IV/IO access
 - (2) *Administer fluid bolus of NS at 20 ml/kg set to maximum flow rate*
 - a. Reassess after initial bolus
 - b. If signs of shock persist, repeat fluid bolus to a maximum total of 60 ml/kg

9. Make transport decision – (if not already done):
 - a) Notify receiving hospital according to trauma and destination guidelines
 - b) Do not delay transport for further assessment or treatment
 - c) Immobilize the patient on a pediatric backboard or age/size appropriate device to immobilize the head, neck and spine

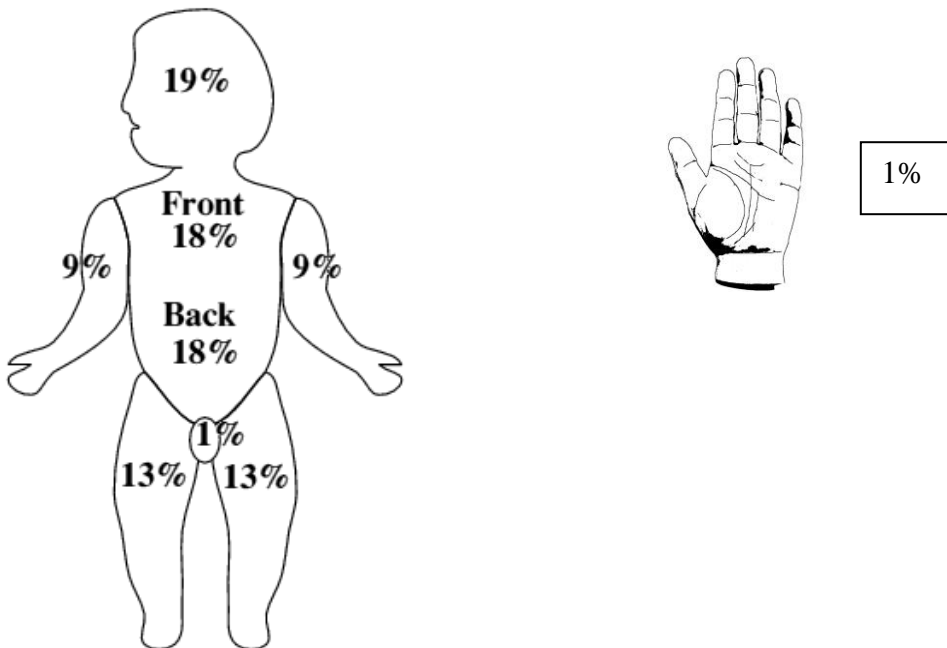
10. Focused history and physical exam:
 - a) Head-to-toe assessment (toe-to-head)
 - b) SSAMPLE History
 - (1) *Signs*
 - (2) *Symptoms*
 - (3) *Allergies*
 - (4) *Medications*
 - (5) *Past medical history*
 - (6) *Last meal*
 - (7) *Events*
 - c) Consider all potential non-traumatic causes
 - (1) *Hypothermia*
 - (2) *Overdose*
 - (3) *Underlying medical conditions*

11. Continuous monitor and assessment
 - a) Vital signs
 - b) Neurologic status
 - (1) *AVPU*
 - (2) *Pupillary response*
 - (3) *Distal function and sensation (Circulation, Movement and Sensation - CMS)*

12. Treat life threatening conditions as they become identified

B. Burns

1. General burn care - transport of all burn patients is recommended unless cleared by medical control
 - a) Ensure scene safety, perform scene survey and general pediatric assessment
 - b) Stop burning process:
 - (1) *Thermal burns – use water*
 - (2) *Dry chemical – brush off and then flush with copious water*
 - (3) *Caustic liquid – flush with copious water*
 - (4) *Electrical – remove from source, immediate cardiac monitoring*
 - c) Prevent hypothermia secondary to burn care
 - d) Determine burn severity:
 - (1) *Superficial partial-thickness (1st degree) ex. sunburn red*
 - (2) *Deep partial-thickness (2nd degree) ex. blisters*
 - (3) *Full thickness (3rd degree) ex. charred and nontender*
 - e) Estimate % burned (see picture below)
 - f) Transport all burn patients with:
 - (1) *Burns to face, hands, feet or perineum*
 - (2) *20 - 30% total body surface area burn partial thickness*
 - (3) *All full thickness of any size*
 - g) Remove jewelry on affected areas
 - h) Consider IV/IO access
 - i) Burn sheets applied to burned area or dry sterile dressings
 - j) Pain management
 - (1) *Morphine 0.1 /kg IV/IO/IM Titrate to effect up to 0.1 mg/kg repeat every 20 minutes as needed*
2. Burn Chart
 - a) Refer to adult burn chart > 10 years old



3. Palmar Method
 - a) The palm of the patient's hand (including fingers) can be used to estimate 1% of total body surface area (TBSA) for infants and children
 - b) Approximately 0.5% for children > 15 years old

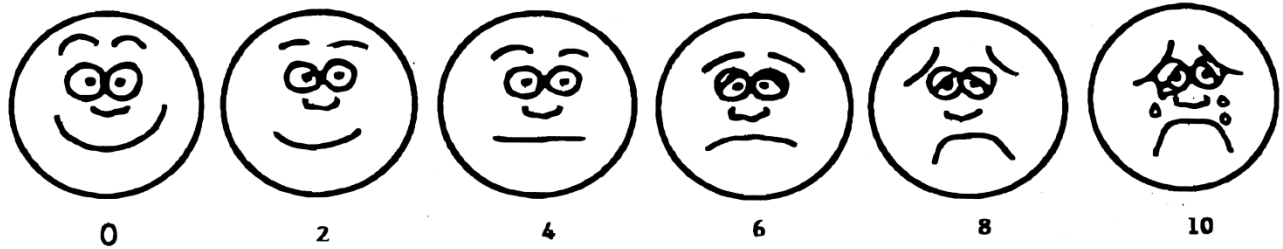
C. Pain Medications

1. Nitrous Oxide (Nitronox)
 - a) Non-narcotic for the treatment of musculoskeletal pain, burns and kidney stones
 - b) Do not use in patients with the following:
 - (1) *Altered mental status*
 - (2) *Alcohol or drug intoxication*
 - (3) *Head injury with altered mental status*
 - (4) *Abdominal pain*
 - (5) *COPD*
 - (6) *Pneumothorax / chest injuries*
 - (7) *Pregnancy*
 - c) Dosages - self administered
2. Morphine Sulfate
 - a) Narcotic analgesic for moderate to severe pain
 - b) Side effects include respiratory depression, hypotension, nausea and vomiting and CNS depression
 - c) Dosage: 0.1 mg/kg IV/IM titrate to effect (up to 15 mg/dose total)
 - d) Reversed with Narcan: 0.1 mg/kg IV/IO/IM may repeat once
 - e) Consider treatment with Zofran: 0.15 mg/kg PO/IV/IO to prevent nausea or vomiting
3. Ketorolac (Toradol)
 - a) Non-narcotic non-steroidal anti-inflammatory drug (NSAID) for treatment of musculoskeletal pain, renal colic and biliary colic
 - b) Do not use in patients who have the following:
 - (1) *Aspirin or NSAID allergy*
 - (2) *Renal disease*
 - (3) *GI bleed*
 - (4) *Bleeding problems like Hemophilia*
 - (5) *Trauma*
 - c) Dosage: 0.5 - 1.0 mg/kg IV/IM (max dose 30 mg IV or 60 mg IM)

D. Pediatric Pain Rating Scale

1. Use the Wong-Backer scale to rate pain in a cooperative, communicative child
2. Use the FLACC scale to rate pain in a non-cooperative, non-communicative child
3. Use the Visual Analog Scale to rate pain in a cooperative, communicative child who is older than 7 years old

Wong-Baker Faces Pain Rating Scale

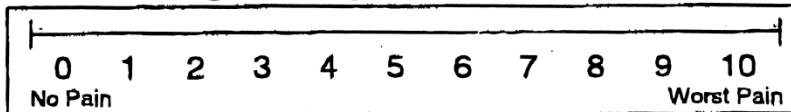


FLACC Scale

| Categories | Scoring | | |
|---------------|--|--|---|
| | 0 | 1 | 2 |
| Face | No particular expression or smile | Occasional grimace or frown, withdrawn, disinterested | Frequent to constant quivering chin, clenched jaw |
| Legs | Normal position or relaxed | Uneasy, restless, tense | Kicking, or legs drawn up |
| Activity | Lying quietly, normal position, moves easily | Squirming, shifting back and forth, tense | Arched, rigid or jerking |
| Cry | No cry (awake or asleep) | Moans or whimpers; occasional complaint | Crying steadily, screams or sobs, frequent complaints |
| Consolability | Content, relaxed | Reassured by occasional touching, hugging or being talked to, distractable | Difficult to console or comfort |

Each of the five categories (F) Face; (L) Legs; (A) Activity; (C) Cry; (C) Consolability is scored from 0-2, which results in a total score between zero and ten.

Visual Analog Scale ages 7 and above



E. Drowning and Near Drowning

1. Protect and immobilize possible cervical spine injuries
2. Establish and maintain airway (airway and ventilation are the highest priority since this is a respiratory arrest)
3. Perform CPR as indicated by heart rate
4. Intubate as indicated using in-line stabilization
5. IV NS TKO
6. Cardiac monitor
7. Check temperature
8. Evaluate, protect against and/or treat Hypothermia per guidelines
9. Initiate appropriate ALS algorithm
10. All near-drowning patients who required rescue breathing (mouth-to-mouth or BVM ventilation) or had any change in level of consciousness should be transported
11. Near-drowning patients not being transported should be cleared by medical control
12. Do not terminate resuscitation of a drowning patient in the field without contacting medical control

F. Child Abuse – Neglect

1. Consider child abuse
 - a) Any injury without a consistent history or explanation
 - b) Injury in a non-mobile child
 - c) Significant injury reportedly resulting from a household fall
 - d) Unconscious child with no history or a history of a insignificant fall
 - e) Severity of injury is inconsistent with the history
2. Initiate appropriate medical treatments
 - a) Obtain and document detailed history
 - b) Avoid questions or comments suggesting blame or MOI
3. Observe carefully and note
 - a) Location and position of a child
 - b) Surroundings, scene and situation
 - c) Who is/was present at the time of injury
4. If concern for child abuse, notify law enforcement and/or social services as per protocol as soon as possible

VII. Children with Special Health Care Needs (CSHCN)

Available from the National EMSC (NRC) office on-line at:

http://www.childrensnational.org/files/PDF/EMSC/PubRes/Prehospital_Protocols_for_CSHCN_EP000987_2002.pdf

Note: This document is 10 years old but is still one of the best sources for treatment of children with special health care needs. Providers need to ask the caregivers of children for their personal care plans and for advice on how to help the specific child with special health care needs

A. General Patient Care

1. Tracheostomy
2. Ventilators
3. Apnea Monitors
4. Central Lines
5. CSF Shunts
6. Feeding Tubes
7. Internal Pacemakers / Defibrillators
8. Vagus Nerve Stimulator
9. Colostomy

VIII. Poisons and Overdoses

Contact the Poison Control Center at 1-800-222-1222 for specific information.

A. General Care

1. External contamination only:
 - a) Protect medical and rescue personnel
 - b) Remove contaminated clothing
 - c) Brush off any solid material from skin
 - d) Flush contaminated skin or eyes with copious amounts of water
 - e) Contact medical control before transport to allow adequate preparation time
2. Internal ingestion - major overdose, altered LOC or depressed CNS:
 - a) Establish and maintain airway - intubate as needed
 - b) If patient shows signs of poor perfusion or HR < 60/minute - begin Cardiac Emergencies
 - c) If unconscious/unresponsive - attach AED and follow instructions
 - d) Obtain vascular access (20 ml/kg NS) IV/IO
 - e) Check blood glucose
 - f) Cardiac monitor
3. Unknown ingestion – treat per Foreign Body Obstruction – Unconscious Patient

B. Unknown and/or Poly Drug Ingestion

1. Evaluate and treat per Poisons and Overdoses general guidelines
2. DO NOT induce vomiting but anticipate nausea and vomiting and prepare suction
3. Bring empty bottles or containers to the hospital to aid identification
4. Do not bring hazardous materials or open/unsealed containers

C. Cholinergic Agents

Carbamates, Parathion, Diazinon, Malathion, nerve gas agents, certain mushrooms and organophosphate insecticides

1. “SLUDGE” – Salivation, Lacrimation, Urination, Defecation, Gastric upset, Emesis
OR
“DUMBBELS” – Diarrhea, Urination, Miosis, Bronchorrea, Bronchospasm, Bradycardia, Emesis, Lacrimation, Salivation/Sweating
2. Evaluate and treat per Poisons and Overdoses general guidelines
3. Treatment - administer atropine first if suspecting cholinergic exposure when patient exhibits above symptoms
 - a) Diagnostic dose: Atropine 0.02 mg/kg/dose IV/IM (minimum 0.1 mg and maximum dose 5 mg)
 - (1) *If patient develops dry mouth or dilated pupils, they are probably not Seriously poisoned*
 - (2) *If patient remains symptomatic after diagnostic dose, proceed with therapeutic dose*
 - b) Therapeutic dose: Atropine 0.02 – 0.08 mg/kg/dose IV/IM
 - (1) *If patient develops dry mouth or dilated pupils, they are probably not Seriously poisoned*
 - (2) *Repeat dose every 10 minutes as needed until bronchial secretions clear and breathing eases*
 - c) CHEMPACK Project Containers
 - (1) *Children weighing 15 to 40 lbs: Atropine Sulfate IM 0.5 mg auto-injector (AtroPen®)*
 - (2) *Children weighing 40 to 90 lbs: Atropine Sulfate IM 1 mg auto-injector (AtroPen®)*
 - (3) *Children weighing > 90 lbs and adults: Atropine Sulfate IM 2 mg auto-injector (AtroPen®)*
 - d) Pralidoximine (2PAM)
 - (1) *If multiple doses of Atropine are needed, administer a one-time dose of Pralidoximine: 20 – 40 mg/kg in 100 mL NS IV over 30 minutes (maximum dose 2 grams)*
 - (2) *Repeat in one hour*
 - e) Diazepam
 - (1) *Seizures may present with 2PAM treatment*
 - (2) *Give 0.2 – 0.5 mg/kg either IV/IM, repeated every 5 minutes as required for seizure control (maximum 10 mg)*

D. Tricyclic Antidepressants

Amitriptyline, Desipramine, Nortriptyline, Clomipramine, Doxetin and Imipramine

1. Evaluate and treat per Poisons and Overdoses general guidelines
2. Respiratory depression
 - a) Maintain airway, high flow oxygen
 - b) Intubate if indicated

3. Hypotension
 - a) IV/IO NS 20 ml/kg fluid challenge
 - b) May repeat once in 10 minutes
4. Arrhythmias - wide QRS complex (> 120 msec), ventricular arrhythmias
 - a) Sodium bicarbonate (NaHCO₃): 1mEq/kg slow IV push
 - b) May repeat if QRS does not narrow
5. Seizures
 - a) Administer Lorazepam as per seizure algorithm

E. Calcium Channel Blockers

Verapamil, Nifedipine and Diltiazem

1. Evaluate and treat per poisons and overdoses general guidelines
2. Hypotension
 - a) IV/IO NS 20 ml/kg fluid challenge, may repeat once in 10 minutes
3. Bradycardia
 - a) Atropine: 0.02 mg/kg IV, may repeat every 5 minutes (up to 2 mg maximum)
 - b) Epinephrine: 0.01 mg/kg (1:10,000) IV/IO, may repeat every 3 – 5 minutes (1 mg maximum)
 - c) Glucagon: 0.05 – 0.1 mg/kg IV/IM/SC (1 mg maximum)
 - d) Calcium gluconate for a child: 60 mg/kg or 0.6 mL/kg of 10% solution over 10 minutes
 - e) External pacemaker as per medical control
4. Seizures
 - a) Administer diazepam or midazolam as per Seizures algorithm

F. Beta Blocker overdose with Bradycardia

Propranolol, Atenolol, Carvedilol, Lobetolol and Metoprolol

1. Evaluate and treat per Poisons and Overdoses general guidelines
2. Hypotension
 - a) IV/IO NS 20 ml/kg fluid challenge (may repeat once in 10 minutes)
3. Bradycardia:
 - a) Atropine: 0.02 mg/kg IV, may repeat every 5 minutes (up to 2 mg maximum)
 - b) Epinephrine: 0.01 mg/kg (1:10,000) IV/IO, may repeat every 3 – 5 minutes (1 mg maximum)
 - c) Glucagon: 0.05 – 0.1 mg/kg IV/IM/SC (1 mg maximum)
 - d) External pacemaker as per medical control
 - (1) Sodium Bicarb if QRS widens > 100 msec and 1 mEq/kg slow push
 - (2) Ca gluconate: 60 mg/kg or 0.6 mL/kg of 10% solution over 10 minutes
4. Hypoglycemia
 - a) Check blood glucose
 - b) If blood glucose < 50, administer glucose slowly
 - (1) < 4 yrs old: administer D25W, 2 ml/kg IV/IO
 - (2) > 4 yrs old: administer D50W, 1 ml/kg IV/IO
5. Seizures
 - a) Administer diazepam or midazolam as per Seizures algorithm

G. Cocaine

1. Evaluate and treat per Poisons and Overdoses general guidelines
2. Hypotension
 - a) IV NS 20 ml/kg fluid challenge (may repeat once in 10 minutes)
3. Seizures
 - a) Administer diazepam or midazolam as per Seizures algorithm
4. Dysrhythmias
 - a) Lidocaine: 1mg/kg IV
 - b) Repeat 0.5 – 1.0 mg/kg every 10 – 15 minutes if still having arrhythmias
5. Hypertension
 - a) Usually short-lived and followed by hypotension
 - b) Treat with Benzodiazepines as in next section regarding agitation
6. Psychosis, severe agitation or hyperthermia
 - a) Midazolam (Versed):
 - (1) IV/IM 0.05 - 0.1 mg/kg dose, titrate every 2 - 3 minutes (up to 5 mg maximum)
 - b) Diazepam (Valium):
 - (1) IV/IM 0.05 - 0.2 mg/kg dose slowly, titrate every 2 - 3 minutes (up to 5 mg maximum)
 - c) Be prepared for respiratory depression

H. Opiates

Heroin, Fentanyl, Methadone, Hydrocodone, Oxycodone, Propoxyphene and Codeine

1. Evaluate and treat per Poisons and Overdoses general guidelines
2. Respiratory depression
 - a) Establish and maintain airway, high flow oxygen and intubate as needed
 - b) Narcan (Naloxone): 0.1 mg/kg (may repeat up to 2 mg total dose)
3. Hypotension
 - a) Narcan (Naloxone): 0.1 mg/kg (may repeat up to 2 mg total dose)
 - b) IV/IO NS fluid challenge 20 mL/kg (may repeat once in 10 minutes)

I. Carbon Monoxide Poisoning

Carbon monoxide (CO) reduces blood oxygenation by displacing oxygen from hemoglobin. The responder must exercise caution and not expose themselves to fumes. CO is heavier than air and settles to the ground and lower levels, making children more vulnerable to its effects. Any pediatric patient who has any altered mental status or was unresponsive in the confirmed presence of CO requires ED evaluation. Pediatric patients may require special consideration if they cannot, due to age, describe symptoms.

1. Evaluate and treat per Poisons and Overdoses general guidelines for internal ingestion
2. Administer high flow oxygen to all suspected victims of carbon monoxide poisoning
 - a) Via non-rebreather or BVM, with nasal/oral adjunct for the unresponsive patient
 - b) Blow-by is not recommended for suspected CO poisoning
 - c) Anticipate nausea and vomiting and prepare suction
 - d) Consider intubation with poor respiratory effort

J. Children Found at Methamphetamine Lab Sites

Any child found in an environment where methamphetamine is made or used is at risk for toxicity. Children found in these settings may also be at risk for various types of abuse or neglect, which should be addressed in a medical as well as social services evaluation. The ongoing safety of the child must be considered when making a judgment about the need for an acute assessment.

Decontamination is necessary to prevent cross-contamination of toxic substances found at Meth lab sites. Decontamination simply means thoroughly washing in order to remove any potentially harmful residue from persons removed from a hazardous site. Decontamination is necessary to protect the individual from continued exposure, as well as to prevent possible secondary contamination of other persons, equipment and facilities with which a contaminated individual might come in contact.

All persons removed from a clandestine lab should be properly decontaminated at the scene and dressed in clean clothing prior to any additional questioning or evaluation. Decontamination is necessary regardless of the age of the person removed from the lab and whether or not the lab was in use at the time of removal.

The best recommendation for a child is to have a facility such as a tent or camper available at the scene in which the child can be given a warm shower and then dressed in age and gender appropriate clothing to minimize the psychological impact of the decontamination process.

All of the child's clothing should be removed and the child should be thoroughly washed with soap and water in a warm shower as soon as possible. Care should be taken with a child's personal possessions, which may contain chemical/drug contamination. In cases of gross chemical/drug contamination it is necessary to remove a child's clothing and provide clean attire prior to removing the child from scene (grossly soiled clothing must remain at the scene and should be handled as evidence by law enforcement.) Also the child should not come into your care with any personal items from their homes including, but not limited to:

- Blankets
- Toys
- Bottles and/or formula
- Diapers
- Contact lenses

Only items provided by responders on scene or by medical professionals at evaluation should come with the child to the hospital. There may be an exception for certain personal items such as eyeglasses, which will have to be cleaned by professionals at the scene. Decisions regarding specifics of decontamination are most appropriately made by trained HAZMAT personnel at the scene.

All children found at methamphetamine lab sites should be transported as soon as possible for a medical screening exam at an appropriate emergency department.

1. For children with obvious injury or illness, or toxin exposure, begin treatment and transport to the nearest appropriate hospital
 - a) Patients who are tachycardic, hyperthermic or severely agitated, refer to Cocaine section and Poisons and Overdoses general guidelines

2. For all children who are not obviously injured or ill:
 - a) Perform a basic assessment
 - b) Check vital signs (temperature, blood pressure, pulse and respiration)
3. Child welfare personnel should evaluate placement options and implement short-term shelter for child

Appendix

A. Pre-hospital Pediatric Destination Guideline Development

Advanced planning by the medical director of each service or the regional medical direction consortium should inventory the capabilities of receiving hospitals for each service or region and consider the service needs (and mutual aid) for the primary service area. This worksheet is designed to assist in this assessment.

Pediatric trauma patients should be transported according to trauma triage protocols. Considerations for transporting pediatric trauma patients are included below. All critical pediatric patients should be taken to the nearest hospital with pediatric capabilities. Centers with pediatric capabilities will vary in different regions of the state.

In general, patients in **cardiac arrest** or with an **unmanageable airway** should be taken to the nearest facility. Longer transport (up to 30 minutes travel time) to reach a pediatric center should be considered in the transport of a critically ill child. The length of time to reach a pediatric center should be considered in the choice of where to transport the pediatric patient. The hospital capabilities to consider should include:

- Airway
 - Is someone always available who is able and willing to intubate children?
 - Does the emergency department have a triage protocol for identifying children in severe respiratory distress?
 - Do they have a pediatric rapid sequence induction training (including PALS / CALS training)?
 - Are these always available?
- Vascular access
 - Does the department regularly start IV's on children?
 - Down to what age are they comfortable?
 - Are personnel trained in the use of IO?
- Protocols
 - Does the department have a pediatric transfer protocol?
 - Criteria to transfer based on vital signs and specific injury pattern
 - Mechanisms to contact referring hospitals and transport services (ground or helicopter)
 - Does the department have pediatric treatment protocols?
- Trauma capability per American College of Surgeons and the MN proposed trauma plan – MDH
 - Are surgeons readily available?
 - In house or on call?
 - Are they experienced at and comfortable with treating children?
 - Are operating rooms staffed and available?
 - Are there additional surgical specialists available (i.e., orthopedic specialists or neurosurgeons)
- Does this hospital have a Pediatric emergency department?
 - Staffed 24 hours/day?
- Does this hospital have a PICU?
 - Staffed by intensivist 24 hours/day?
- Backup
 - Is anesthesia backup available?
 - In house or on call?
 - Is pediatric backup available?
 - In house or on call?