



Emergency Medical
Services for Children

Resource Center of Minnesota

MINNESOTA PRE-HOSPITAL PEDIATRIC GUIDELINES



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 guidelines for their service(s). As guidelines, they are designed to comprehensively cover the potential spectrum of scope of practice for BLS/ALS providers. Ambulance Medical Directors have the responsibility to develop and determine service pediatric guidelines 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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SECTION 1: General Guidelines

Pediatric Definition, Normal Weights and Vital Signs

1. Age limits for pediatric and adult medical guidelines 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. For ages 8 -18 years, judgment should be used although pediatric orders will usually apply.

AVERAGE FOR AGE	LBS.	(KG)	PULSE	BLOOD PRESSURE (SYSTOLIC)	RESP.
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 a calculation system to determine patient's weight for pediatric patients.

General Pediatric Assessment and Care

This provides general guidelines for initial assessment and care of the pediatric patient.

The **General Pediatric Trauma Assessment and Care** is found on page 25.

The specific guidelines for **Newborn Resuscitation** are found on page 9.

Use of a calculation system to determine patient's weight is recommended to assist in appropriate equipment size, vital signs and drug dosages. (These systems include Broselow[®], Handtevy[®], etc.)

1. Perform scene survey.
 - Assess for hazardous conditions.
 - Ensure scene safety.
 - 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.

- **Pediatric Assessment Triangle (PAT)**

Three Components:

- Appearance
- Work of Breathing
- Circulation to skin



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

4. Determine patient's level of consciousness (LOC).
 - **AVPU:**
 - **A**lert
 - Responsive to **V**oice
 - Responsive to **P**ain
 - **U**nresponsive
5. Spine injury consideration:
 - 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.
 - See **Trauma** section for more information on caring for the injured patient.
6. Assess airway – patency, protective reflexes and possible need for advanced airway management.
 - Look, listen and feel for signs of airway obstruction.
 - Open the airway – head tilt/chin lift or modified jaw thrust if spinal trauma is suspected.
 - Suction airway if necessary.

- Consider placing an oropharyngeal or nasopharyngeal airway adjunct if the airway cannot be maintained with position and the patient is unconscious.
 - Consider placing pad under infant/child's shoulder to aid in airway positioning.
7. Assess breathing.
- Rate, work of breathing, adequacy of ventilations, auscultation and inspection.
 - Inspect skin, lips and nail beds for cyanosis.
 - Obtain pulse oximeter reading.
 - If inadequate ventilations, reposition airway and reassess.
 - If inadequate ventilation after repositioning airway, suspect foreign body obstruction and refer to **Foreign Body Obstruction** section.
 - Assess for signs of respiratory distress, failure or arrest – refer to appropriate guideline for treatment options.
 - If child is not breathing or breathing is inadequate:
 - Assist ventilations using a bag valve mask (BVM), high-flow (100%) oxygen and nasal or oral airway.
 - If child is breathing with low oxygen saturation and/or signs of hypoxia:
 - If pulse oximeter reading is < 90%, administer high-flow oxygen via non-rebreather mask or blow-by as tolerated.
 - If child is breathing adequately:
 - Consider high-flow oxygen with non-rebreather mask or blow-by as tolerated.
8. Assess circulation and perfusion.
- Determine heart rate
 - Skin color and temperature
 - Capillary refill time and quality of central and peripheral pulses
 - If no pulse or perfusion or evidence of poor perfusion and heart rate (HR) is < 60/minute, begin compressions and refer to **Cardiac Emergencies** section.
 - With adequate perfusion and HR > 60/minute, administer high-flow 100% oxygen via non-rebreather mask or blow-by.
 - Assess and treat for shock.
 - **IF ALS UNIT:** Obtain vascular access, intra-osseous (IO) or intravenous (IV).
 - **IF ALS UNIT:** Administer fluid bolus of normal saline (NS) at 20 ml/kg set to maximum flow rate or push.

- Reassess after initial bolus.
 - If signs of shock persist, repeat fluid boluses to maximum total of 60 ml/kg.
 - Control bleeding.
 - Keep the patient warm and consider Trendelenburg position (elevation head of the long board when spinal injury is suspected).
 - Anticipate vomiting and prepare to suction airway as needed.
9. Make transport decision (if not done already).
- Notify receiving hospital according to **Destination guidelines**.
 - Do not delay transport for further assessment or treatment.
 - Parents/guardians or caregivers should be allowed to stay with child during evaluation and transport if appropriate for the situation.
 - If decide to transport, please refer to **Safe Transport guidelines**.
10. Focused history and physical exam:
- Head-to-toe assessment (toe-to-head)
 - **SSAMPLE** History
 - **S**igns
 - **S**ymptoms
 - **A**llergies
 - **M**edications
 - **P**ast medical history
 - **L**ast meal
 - **E**vents
 - Consider all potential non-traumatic causes
 - Hypothermia
 - Dehydration
 - Sepsis
 - Hypoglycemia
 - Overdose
 - Underlying medical conditions

11. Continuous monitor and assessment

- Vital signs
- Neurological status
 - AVPU
 - Pupillary response
 - Distal function and sensation (circulation, **m**ovement and **s**ensation – **CMS**)

12. Treat all life-threatening conditions as they become identified.

13. Follow specific treatment guidelines as appropriate.

SECTION 2: Resuscitation

Newborn Resuscitation

“**The Golden Minute**” refers to the first 60 seconds of an infant’s life and marks the goal time for completion of the initial steps, re-evaluation, and initiation of ventilation (if required). **Unnecessary delays must be avoided in the initiation of ventilation, which is the most important step for the successful resuscitation of the newly born.**

Approximately 90% of newborns do NOT require any assistance to begin breathing at birth.

BASIC LIFE SUPPORT

1. Assess the following 3 factors in anticipation of the need for resuscitation:
 - Term gestation?
 - Good tone?
 - Breathing or crying?
2. If the answer to all 3 questions is “yes,” the newly born infant may stay with the mother for routine care:
 - Dry the infant.
 - Warm and maintain normal temperature.
 - A variety of strategies can be used to prevent hypothermia:
 - Thermal blanket
 - Thermal mattress
 - Radiant warmer
 - Plastic wrap with an infant cap
 - Increased room temperature
 - Skin-to-skin contact
3. Stimulate the infant by rubbing the back or flicking the soles of the feet.
4. Position airway.
5. Clear secretions if needed.
6. Provide ongoing observation of breathing, activity and color.
7. Delayed cord clamping for longer than 30 seconds is reasonable for both term and preterm infants who do NOT require resuscitation.

8. If the answer to any of these assessment questions is “no,” providers should anticipate the need for resuscitation.
 - The infant should be moved to a warm environment (e.g., radiant warmer) in anticipation of the need for one or more of the following 3 actions in sequence:
 - Initial steps as outlined above
 - Ventilate and oxygenate
 - Initiate chest compressions
9. Approximately 10% of newborns require some assistance to begin breathing at birth.
10. The decision to progress beyond the initial steps is determined by the simultaneous assessment of **2 vital characteristics**:
 - **Respirations**
 - If apneic or gasping, begin positive pressure ventilation (PPV) using an appropriately sized bag valve mask (BVM) device.
 - Open and position the infant’s airway in the “sniffing” position. Do NOT hyperextend the infant’s neck.
 - Consider suctioning the mouth and then the nasopharynx using the bulb syringe if secretions present.
 - Use BVM ventilation to apply positive pressure ventilation.
 - For infants who continue to have inadequate ventilation:
 - ◆ Deliver breaths using BVM at a rate of 40-60 breaths per minute.
 - ◆ Deliver the breath in a controlled fashion that allows for chest excursion without over inflation.
 - ◆ Pulse oximetry is recommended when PPV is administered.
 - If labored breathing continues or if persistent cyanosis:
 - Oxygen supplementation should focus on low oxygen (21% to 30%) concentration with titration to achieve adequate oxygen saturation (88-95%).
 - High oxygen supplementation (> 65%) is NOT recommended for preterm newborns <35 weeks gestation.
 - Consider the use of continuous positive airway pressure (CPAP) using BVM.
 - Pulse oximetry is recommended when central cyanosis persists beyond the first 5-10 minutes of life or when supplemental oxygen is administered.

- **Heart rate**
 - Auscultation of the precordium, palpation of the brachial artery, or palpation of the umbilical cord stump has not been found to be accurate measures of heart rate.
 - If available, the use of a 3-lead ECG for rapid and accurate measure of the newborn's heart is encouraged.
 - If heart rate <100, if not already done so, begin PPV using an appropriately sized BVM device.
 - If heart rate remains <100, check for chest movement and make corrective ventilation steps if needed.

ADVANCED LIFE SUPPORT

Follow BLS procedures.

- Endotracheal intubation may be indicated when:
 - BVM is ineffective or prolonged
 - Chest compressions are performed
 - Special circumstances (e.g., diaphragmatic hernia)
 - Endotracheal intubation is NOT to be routinely used for suctioning of the trachea for infants born through meconium-stained amniotic fluid.
 - Newborns born through meconium-stained amniotic fluid and vigorous at birth have no increased benefit from intervention.
 - A laryngeal mask airway (LMA) can be utilized to facilitate effective ventilation in term and preterm newborns at >34 weeks gestation when tracheal intubation is unsuccessful or is not feasible.
 - If heart rate <60, start chest compressions and provide 100% oxygen.

BASIC LIFE SUPPORT

Ensure that effective ventilation continues during compressions.

- Compressions are delivered on the lower 1/3 of the sternum to a depth of 1/3 of the anterior-posterior diameter of the chest.
 - Use of the 2-thumb technique is the preferred method as it generates higher blood pressure with less provider fatigue.

- A 3:1 compression-to-ventilation ratio with 90 compressions and 30 breaths is to be used to maximize ventilation.
- A higher ratio (e.g., 15:2) may be considered if the arrest is believed to be of cardiac origin.
- If heart rate remains <60, continue compressions and oxygen and request ALS intercept if not done previously.
 - Discontinue compressions if heart rate >100.
 - Wean oxygen concentration if heart rate recovers.

NOTE: The most sensitive indicator of a successful response to each step is an increase in heart rate.

Less than 1% of newborns require extensive resuscitation measures such as cardiac compressions and medications.

ADVANCED LIFE SUPPORT

- If heart rate remains <60 despite the use of the above steps, including effective ventilator support and chest compressions, IV epinephrine in a dose of 0.01-0.03 mg/kg of 1:10,000 can be given. Endotracheal dosing is not recommended.
- If the heart rate has not responded to other resuscitative measures, volume expansion may be considered when blood loss is known or suspected (pale skin, poor perfusion, weak pulse). Isotonic crystalloid solutions or blood may be considered in a dose of 10 mL/kg. These volume expanders should not be given rapidly when resuscitating premature infants to avoid complications (e.g., intraventricular hemorrhage or IVH).
- If the heart rate has not responded to other resuscitative measures, the presence of a pneumothorax should be considered. If clinical signs are present (asymmetry of breath sounds, decreased responsiveness or decreased heart rate after initial response, or sudden decrease in oxygen saturation), consider the use of a needle thoracostomy especially for those infants who have been provided PPV.
- Neonatal Resuscitation Algorithm in **References** section.

Post-resuscitation Care

1. Assess the infant frequently including pulses, respiratory rate, muscle tone, color, response, and temperature.
2. Temperature should be recorded as a predictor of outcomes and as a quality indicator.
3. Temperature of the newly born should be maintained between 36.5C and 37.5°C after birth through stabilization.
4. Hyperthermia (temperature >38°C) should be avoided because it introduces potential associated risks.
5. Contact medical control for additional instructions.
6. Some infants >36 weeks gestation may benefit from the use of induced therapeutic hypothermia and should be transported, preferably to facilities with the capability to provide this treatment option.
7. The decision to transfer to a facility other than the closest available is to be made through the use of medical control.
8. Transport delivered placenta with the newborn infant.

APGAR Scoring

9. APGAR scoring is routinely assigned to all infants at 1 minute, 5 minutes, and 10 minutes after birth.
10. An APGAR score of 0 at 10 minutes is a strong predictor of mortality and morbidity in late preterm and term infants. Total the value of each of the 5 observations to get the score.

	0	1	2
Heart Rate	Absent	<100	>100
Respiratory Effort	Absent	Slow, Irregular	Good, crying
Muscle Tone	Limp/flaccid	Some flexion	Active movement of extremities
Reflex Irritability	No response	Grimace or some motion	Coughs, sneezes, cries actively
Color	Blue/Pale	Pink body, dusky extremities	Completely pink

Discontinuing Resuscitative Efforts

1. In infants with an APGAR score of 0 after 10 minutes of resuscitation and an undetectable heart rate, it may be reasonable to discontinue any resuscitative efforts.
2. The decision to continue or discontinue resuscitative efforts must be individualized and made in conjunction with appropriate medical control.

Cardiopulmonary Resuscitation: 1 month to onset of puberty

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 to 120/minute (hard/fast).

- Hands only compressions can be performed if the rescuer is unable to perform ventilations; however in pediatrics, provide ventilations if possible.

Infant (1 month to 1 year):

- 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.
- The ratio of compressions to ventilations is **30:2 for one** rescuer and **15:2 for two** rescuers.
- Compression depth is at least one third the AP diameter of the chest or about 1 ½ inch (4 cm).

Child (1 year to the onset of puberty):

- CPR with one or two hands or one hand for a very small child.
 - The ration of compressions to ventilations is **30:2 for one** rescuer and **15:2 for two** rescuers.
 - Compression depth is at least one-third the AP diameter of the chest or about 2 inches (5cm).
- As soon as AED or defibrillator is available, attach it to the patient.

- Try to limit the interruption of compressions.
- If pediatric pads are not available, use adult pads and energy levels.
- Ensure pads do not overlap or touch; pads may be placed with one on front/one on back of chest in smaller children.
- If **unwitnessed arrest**, perform 5 cycles / 2 minutes of CPR; then use AED or defibrillator.
- If **witnessed arrest/collapse**, use AED or defibrillator immediately.
- If you are using an **AED**, give shock. The device will tell you whether the rhythm is “shockable.”
- Continue CPR for 5 cycles / 2 minutes before checking for a pulse.
- Airway adjuncts if needed to obtain adequate ventilations and oxygenation.
- Attach ECG monitor.
- Treat possible causes and specific arrhythmia per guidelines.
- Do not delay transport to the closest hospital and request ALS intercept if available.
- See Pediatric Resuscitation Algorithm in **References** section.

SECTION 3: Airway Management

There are several options available to assist a child with inadequate breathing (apnea, abnormal respiratory rate, inadequate breath sounds, or hypoxemia despite supplementary oxygen). These options include the following:

BASIC LIFE SUPPORT

1. **Bag Valve Mask Ventilation (BVM)** can provide adequate oxygenation and ventilation for a child with apnea or inadequate breathing despite a patent airway. When performed properly, BVM is as effective as ventilation through an ET tube for short periods and may be safer. In the out-of-hospital setting, BVM is especially useful if the transport time is short, or providers are inexperienced in insertion of advanced airways, or have insufficient opportunities to maintain competence in this skill.

- **Face Mask**

Select a face mask that extends from the bridge of the child's nose to the horizontal cleft of the chin. This is to allow covering of the mouth and nose without compressing the eyes.

- A soft rim to the mask is necessary to allow for the creation of a tight seal against the face and to prevent oxygen from escaping under the mask leading to poor ventilatory support.
- A transparent mask is chosen to allow for ongoing assessment of the color of the child's lips and mouth and observe for any vomiting.

- **Ventilation Bag**

Ventilation bags used during CPR should have no pop-off valve or the valve should be in the closed position.

- Self-inflating:
 - Does not require a constant supply of oxygen to ventilate a child.
 - Does require an oxygen reservoir to deliver higher concentrations of oxygen.

- May not be adequate for situations in which the child's lung compliance is poor, or airway resistance is high, or CPR is needed.
- Flow-inflating Bag:
 - Requires oxygen flow to operate.
 - Requires more experience to deliver safe and effective ventilation.
 - Provider must simultaneously adjust the flow of oxygen, adjust the outlet control valve, ensure a proper seal with the face mask, and deliver the appropriate tidal volume at the correct rate.
- Bag Size:
 - Infants and young children: 450 – 500 mL bag
 - Older children and adolescents: 1000 mL bag
- **Technique**
 - Creating a good seal: the 3rd, 4th, and 5th fingers of one hand are positioned (forming the letter “E”) along the jaw to lift it forward while the thumb and index finger of the same hand (forming the letter “C”) make a seal to hold the mask to the face. The airway is maintained in the “sniffing” or “neutral” position to avoid either neck flexion or hyperextension (NOTE: a towel or roll can be positioned under the shoulders to help maintain this position.)
 - For children with a suspected cervical spine injury, the jaw thrust technique should be used to maintain a neutral position. A 2-person technique may be necessary to ensure c-spine maintenance.
 - For children without suspected cervical spine injury, the chin lift technique should be used to maintain a neutral position.
 - Delivery of ventilation: the bag is then squeezed with the opposite hand to deliver a breath over about 1 second. The force and tidal volume should be just enough to allow for visible chest rise. Gastric inflation is to be avoided as this may interfere with effective ventilation.

- **Monitoring**

- Monitor the following to ensure effective oxygenation and ventilation:
 - Visible chest rise with each breath
 - Oxygen saturation
 - Exhaled CO₂
 - Heart rate
 - Blood pressure
 - Signs of improvement or deterioration
- Check the following if ventilation is not achieved:
 - Verify mask size and ensure a tight face mask seal.
 - Reposition/reopen the airway to ensure neutral airway positioning.
 - Suction the airway if needed.
 - Check the oxygen source.
 - Check the ventilation bag.
 - Consider decompression of the stomach.

ADVANCED LIFE SUPPORT

1. Follow BLS procedures.
2. **Supraglottic Airway Devices:** these may be used for airway management in a child who cannot be intubated or effectively ventilated using the BVM technique. These devices should NOT be used for a child with upper airway obstruction, grossly distorted upper airway anatomy, or significant oropharyngeal trauma.
 - Choose the correct size based upon the child's weight in kilograms (see following charts).

- Ensure that the device is free of any damage.
- If the device has an inflatable cuff, deflate the cuff completely before insertion.
- Using a finger behind the mask of the device, insert the device into the mouth using the palate as a guide.
- Stop advancement when the device cannot be advanced any further. The device should be seated over the glottis. If a cuff is present, inflate as directed by the amount indicated on the package or chart.
- Connect to a bag device and begin ventilation.
- Assess for ability to ventilate based upon chest rise and improvement in the patient's oxygenation.

Supraglottic Airway Devices

LMA Supreme

WEIGHT (kg)	MASK SIZE	MAX. CUFF VOLUME (mL)
< 5	1	4
5-10	1.5	7
10-20	2	10
20-30	2.5	14
30-50	3	20
50-70	4	30

iGel

WEIGHT (kg)	MASK SIZE	DESCRIPTION
2-5	1	Neonate
5-12	1.5	Infant
10-25	2	Small Pediatric
25-35	2.5	Large Pediatric
30-60	3	Small Adult
50-90	4	Medium Adult

King LT-D

LENGTH	SIZE/CONNECTOR COLOR	AGE	INFLATION VOLUME
35-45 in.	2/Green	4	25-35 mL
41-51 in.	2.5/Orange	7	30-40 mL
4-5 ft.	3/Yellow	9	45-60 mL
5-6 ft.	4/Red	14	60-80 mL
>6 ft.	5/Purple	Tall Adult	70-90 mL

3. **Endotracheal Intubation** should be considered for longer transport times by providers who are experienced in the insertion of advanced airways and who have also maintained their competency in this skill set.

- Continue BVM using 100% oxygen.
- Place continuous cardiac and pulse oximetry monitors.
- Prepare equipment for intubation:
 - Suction apparatus with rigid suction catheter attached.
 - ET tube and stylet (see following chart for appropriate sized uncuffed ET tubes).
 - Cuffed tubes are acceptable for all ages, especially in situations where high airway resistance is expected (e.g., aspiration). Cuffed tube sizes are ½ size smaller than the recommended uncuffed ET tube size.
 - Laryngoscope with curved or straight blades, back up lighting available.
 - Magill forceps if foreign body is suspected.
 - End-tidal CO₂ detector or exhaled CO₂ capnography
- Pass the tube orally through the vocal cords with direct visualization.
- Visualization may be improved with manipulation of the larynx into a more posterior and/or superior position.
- Confirm and document proper ETT placement:

- Visualized tube passing through vocal cords
- Positive end-tidal CO₂ device indication
- Equal breath sounds over lungs and lack of sounds over epigastric area
- Rise and fall of chest wall with ventilations
- Condensation noted in the tube
- Rising pulse oximeter
- The depth of the ET tube should be clearly documented and is estimated to be 3 times the ET tube size in centimeters at the patient's lip (e.g., a 5.0 ET tube should be inserted to a depth of 15 cm)
- Ventilate patient to provide adequate air exchange using delivery of each breath over about 1 second. The force and tidal volume should be just enough to allow for visible chest rise.
- Secure tube.
- If uncertain about ETT placement or patient condition does not improve, consider the following reasons for failure of clinical improvement (mnemonic DOPE):
 - **D**isplaced tube
 - **O**bstructed tube
 - **P**neumothorax
 - **E**quipment failure
- Oxygen supplementation:
 - Continue at 100% if no return of spontaneous circulation.
 - Titrate oxygen supplementation to maintain oxygen saturation at 94-99%.
- Ensure gastric emptying and deflation to avoid interference with ventilation:
 - Pass a nasogastric tube if no trauma involved.

- Pass an orogastric tube if trauma involved.
- NG or OG tube should be approximately 2 times the ET tube size (e.g., a 10 French tube should be used for a child successfully intubated using a 5.0 ET tube)
- Medications: unless the child is pulseless, the administration of medications is preferred to ensure patient comfort and to optimize success of intubation.
 - Premedication Agents: (No evidence of *routine* use of these medications.)
 - **Consider** the administration of lidocaine 1-2 mg/kg/dose IV/IO up to 100 mg for children with head injury in an effort to reduce intracranial pressure
 - **Consider** the administration of atropine 0.02 mg/kg/dose IV/IO up to 1 mg in situations where there is an increased risk of bradycardia (e.g., when also giving succinylcholine as a neuromuscular blocking agent) *There is no minimum dose requirement
 - Pre-intubation Sedation Agent
 - Etomidate 0.3 mg/kg/dose IV/IO up to 40 mg (drug of choice for child with head injury)
 - Ketamine 2 mg/kg/dose IV/IO up to 50 mg (drug of choice for child with asthma)
 - Neuromuscular Blocking Agent
 - Succinylcholine 2 mg/kg IV/IO up to 150 mg
 - ◆ Use contraindicated in major trauma, acute burns, hyperkalemia or renal failure
 - ◆ Use atropine (see above) prior to administration of succinylcholine to reduce occurrence of bradycardia
 - OR**
 - ◆ Rocuronium 0.6-1.2 mg/kg/dose IV/IO

OR

◆ Vecuronium 0.1 mg/kg/dose IV/IO

○ Post-intubation Sedation

– Midazolam 0.1 mg/kg/dose IV in 4 mg increments

OR

– Lorazepam 0.1 mg/kg/dose IV in 2 mg increments

Endotracheal Tube Sizes

AGE	UNCUFFED (mm)	CUFFED (mm)	DEPTH (cm)
Premature	2.5 -3.0	2.5	7.5
Newborn	3.0-3.5	3.0	9.0
1 year	4.0	3.5	12.0
2 years	4.5	4.0	13.5
3 years	5.0	4.5	15.0
4 years	5.5	5.0	16.5
5 years	5.5	5.0	16.5
6 years	6.0	5.5	18.0
7 years	6.0	5.5	18.0
8 years	6.0	5.5	18.0
9 years	6.5	6.0	19.5
10 years	6.5	6.0	19.5
11 years	6.5	6.0	19.5
>12 years	7.0	6.5	21.0

Medication/Treatments Table

MEDICATION	DOSE	ROUTE	MAX. DOSE
PRETREATMENT			
Lidocaine	1 - 2 mg/kg/dose	IV/IO	100 mg
Atropine	0.02 mg/kg/dose	IV/IO	1 mg
SEDATION			
Etomidate	0.3 mg/kg/dose	IV/IO	40 mg
Ketamine	2 mg/kg/dose	IV/IO	50 mg
NEUROMUSCULAR BLOCKING AGENT			
Succinylcholine	2 mg/kg/dose	IV/IO	150 mg
Rocuronium	0.6 - 1.2 mg/kg/dose	IV/IO	
Vecuronium	0.1 mg/kg/dose	IV/IO	
POST-INTUBATION SEDATION			
Midazolam	0.1 mg/kg/dose	IV/IO	4 mg increments
Lorazepam	0.1 mg/kg/dose	IV/IO	2 mg increments

SECTION 4: Trauma

General Principles

- Traumatic injuries to children are common and are one of the leading reasons for pre-hospital care of pediatric patients.
- Special attention to the unique characteristics of the pediatric airway, potential for cervical spine injuries, subtle signs of shock, and the potential for child abuse is important.
- Knowledge of normal vital signs across age groups is a key component of the assessment of injured children.
- A tool for accurate weight estimation, equipment size selection, and drug dosing (Broselow[®] tape, Handtevy[®] System, etc.) is also crucial to provide quality care and to avoid any harm of the injured child.
- Early involvement of additional resources, including additional teams, more advanced care options, and the use of medical control, is encouraged.
- Transporting to a pediatric trauma center may be indicated in the severely injured child.

Scene Safety

1. Ensure scene safety before attempting rescue of victims.
2. Consider the potential need for decontamination prior to transport.

Primary Survey

Focus on the recognition and treatment of immediate threats to life. Perform this survey within the first 5-10 minutes of arrival at the scene. Stop survey to treat these life-threatening injuries:

Tension Pneumothorax

Obstructed Airway

Massive Hemothorax

Cardiac Tamponade

Open Pneumothorax

Flail Chest

The primary survey assesses Airway, Breathing, Circulation, Disability and Exposure in a patterned process. These are explained in the guidelines that follow.

Airway with Cervical Spine Stabilization

BASIC LIFE SUPPORT

1. Support or establish a patent airway.
2. Utilize the jaw thrust method if cervical trauma suspected.
3. Keep the child in the neutral or “sniffing” position.
4. The prominent occiput of infants and younger children must be taken into account to allow for neutral positioning of the airway.
 - Padding or support of the torso may be necessary to accommodate a child’s anatomy.
5. Suction the airway if blood or secretions are felt to interfere with airway patency.
6. If the child does not have a patent airway despite positioning and suctioning, start BVM ventilation (see **Airway Management** section) for support.
7. Cervical spine must be protected, especially during any manipulation of the airway, unless there is clearly no evidence of cervical spine injury.
8. Manual immobilization of the cervical spine with maintenance of neutral airway positioning.
9. Cervical immobilization devices must be appropriate for the size of the child and must not interfere with maintenance of airway patency.
10. Reassessment of the airway must be completed after any intervention.

ADVANCED LIFE SUPPORT

1. Follow BLS procedures.
2. Endotracheal intubation should be considered if the airway cannot be maintained by other means (see **Airway Management**).
3. A patent and secure airway must be established before moving on further assessment and interventions.

Breathing

BASIC LIFE SUPPORT

1. Evaluate the child’s chest rise to evaluate for adequacy and symmetry of breathing as well as respiratory rate.

2. Provide supplemental high flow oxygen for any child with respiratory distress or inadequate respiratory effort,
3. Apply continuous pulse oximetry.

ADVANCED LIFE SUPPORT

1. Follow BLS procedures.
2. Consider a pneumothorax if the breath sounds are asymmetric and the patient has respiratory distress at any point in the evaluation including upon reassessment.
3. Needle decompression using an 18-20 gauge over the needle catheter at either the mid-clavicular line at the second intercostal space or at the anterior axillary line at the fifth intercostal space.
4. Decompressing a tension pneumothorax causing respiratory compromise must be done before moving on to further assessment and interventions.

Circulation with Control of External Hemorrhage

BASIC LIFE SUPPORT

1. Assess heart rate, quality of central and peripheral pulses, and capillary refill to assess for the presence of shock.
2. If no pulse or heart rate <60 with evidence of poor perfusion, initiate chest compressions.
3. Although blood pressure is also an important parameter to assess, significant hemorrhagic shock can be present even with a normal blood pressure.
4. Control hemorrhage with the use of direct pressure or a tourniquet.

ADVANCED LIFE SUPPORT

1. Follow BLS procedures.
2. If shock is felt to be present, establish IV/IO access and rapidly administer a bolus of isotonic fluid in a volume of 20 mL/kg.
3. If signs of shock persist, repeat fluid bolus to a maximum of up to 60mL/kg.

Disability

1. Objective measurement of the child's neurologic condition is important to determine degree of compromise and to effectively communicate to downstream providers.
 - **AVPU** scale
 - **A**lert
 - **V**oice – responds to provider's voice
 - **P**ain – responds to painful stimuli
 - **U**nresponsive
 - Glasgow Coma Scale – Infant and Older Child scoring (see page 30)
 - Log-roll the patient to examine the back.
2. Ongoing assessment using an objective measure is important to identify changes in the child's mental status, potential for head injury, and potential need for airway maintenance.

Exposure

1. Apply direct pressure to bleeding sites using manual pressure or pressure dressings if not already done.
2. Hypothermia can quickly develop in an injured child.
3. A warming blanket and warm ambient temperature should be utilized to prevent heat loss.

Secondary Survey

1. Focused History (**SSAMPLE**)
 - **S**igns
 - **S**ymptoms
 - **A**llergies
 - **M**edications
 - **P**ast Medical History
 - **L**ast Meal
 - **E**vents of the injury
2. Complete physical examination from head to toe.
3. Splint extremities with suspected fractures for pain control.

4. Consider associated problems:
 - Use of alcohol or drugs
 - Suspected child abuse
 - Temperature regulation

Treatment of Pain

BASIC LIFE SUPPORT

1. Early treatment of pain is an important aspect of patient care and is often under-recognized and undertreated in pediatric patients. In addition to splinting and immobilization, consider the administration of analgesic medications prior to or during transport.
2. Monitor closely for the development of mental status changes or hypotension.

ADVANCED LIFE SUPPORT

1. Follow BLS procedures. Consider medications for pain treatment.
2. Fentanyl
 - 1-2 mcg/kg/dose IV/IO up to 100 mcg
 - 1-2 mcg/kg/dose IN using atomizer with maximum of 1 cc in each nares (higher concentrations of fentanyl may be necessary for adequate dosing given volume restrictions)
3. Morphine
 - 0.1-0.2 mg/kg/dose IV/IO up to 10 mg
4. Ketorolac
 - 0.5-1 mg/kg/dose IV/IO up to 30 mg
5. Dilaudid
 - 0.45 mg/kg IV/IO

Medication/Treatments Table

MEDICATION	DOSE	ROUTE	MAX. DOSE
Fentanyl	1 - 2 mcg/kg/dose	IV/IO	100 mcg
	1 - 2 mcg/kg/dose	IN	50 mcg
Morphine	0.1 - 0.2 mg/kg/dose	IV/IO	10 mg
Ketorolac	0.5 - 1 mg/kg/dose	IV/IO	30 mg
Dilaudid	0.45 mg/kg/dose	IV/IO	4 mg

Transport

Do not delay transport to the closest hospital and request ALS intercept if indicated. See **Transport** section for details.

Infant Glasgow Coma Scale

	1	2	3	4	5	6
Eye	Does not open eyes	Opens eyes in response to painful stimuli	Opens eyes in response to speech	Opens eyes spontaneously	NA	NA
Verbal	No verbal response	Inconsolable, agitated	Moaning, consolable at times	Cries but consolable	Smiles, follows objects, interacts	NA
Motor	No motor response	Extension to pain (decerebrate)	Abnormal flexion to pain (decorticate)	Withdraws from pain	Withdraws from touch	Spontaneous or purposeful movements

Adult Glasgow Coma Score

	1	2	3	4	5	6
Eye	Does not open eyes	Opens eyes in response to pain	Opens eyes in response to voice	Opens eyes spontaneously	NA	NA
Verbal	Makes no sounds	Incomprehensible sounds	Uses inappropriate words	Confused, disoriented	Oriented, converses normally	NA
Motor	Makes no movements	Extension to painful stimuli (decerebrate)	Abnormal flexion to painful stimuli (decorticate)	Withdraws from painful stimuli	Localizes painful stimuli	Obeys commands

Pediatric Burns

BASIC LIFE SUPPORT

1. Scene safety

- Assess for any hazardous conditions and if necessary, involve law enforcement and fire rescue to ensure safety of the patient and the providers.
- Observe standard universal precautions.
- Consider the potential need for decontamination prior to transport.

2. Stop the burning process and remove all clothing, jewelry, and rings.

- Thermal burns: use water.
- Dry chemical: brush off and then flush with copious amount of water.
- Caustic liquid: flush with copious amounts of water.
- Electrical: remove from source.

3. Inhalational injuries

- A rapid assessment of the patient's ability to maintain a patent airway is a priority.
- Signs and symptoms of inhalational injury include:
 - Facial burns
 - Singed nasal hairs or eyebrows
 - Carbonaceous deposits in the oropharynx or sputum
 - Oropharyngeal edema
 - Voice change, hoarseness, or stridor
 - Impaired mentation
- Provide supplemental high flow oxygen.
- Support or establish a patent airway.
 - Utilize the jaw thrust method if cervical trauma suspected. Keep the child in the neutral or "sniffing" position to ensure a patent airway.
 - Suction the airway if secretions felt to interfere with airway patency.
 - If the child does not have a patent airway despite positioning and suctioning, start BVM ventilation (see **Airway Management** section) for support.

If you are an ALS unit, endotracheal intubation should be considered if there are signs and symptoms of inhalational injury or the airway cannot be maintained by other means. (See **Airway Management** section.)

Children under the age of 2 years have disproportionately thin skin, which commonly results in full thickness, third degree burns that may initially appear to be partial thickness in depth.

Temperature Regulation: Temperature regulation in the infant and child is also influenced by the child's relatively greater body surface area, thus compromising conservation of body heat. Intrinsic heat generation by shivering is hampered by a relatively small muscle mass. Temperature regulation in infants under six months of age depends less on shivering and more on intrinsic metabolic processes and the environment temperature. Children older than this can generate heat by shivering. **KEEP THE BURN PATIENT WARM.**

Inhalation injury: All pediatric patients with suspected inhalation injury should be prepared for immediate transfer to a burn center.

Burn Assessment

1. Severity

- First degree burns – characterized by simple erythema, pain, and absence of blisters.
- First degree burn area should not be included as part of total body surface area burned assessment or in calculation of fluid resuscitation.
- Second degree (superficial partial thickness) burns – characterized by a red or mottled appearance with associated swelling and blister formation, wet appearance, and extreme pain.
- Deep partial thickness burns – may have blisters.
- If blisters are disrupted, wound bed will be pale and much less moist than superficial partial thickness burns.
- Third degree (full thickness) burns – characterized by a dark, leathery appearance, generally dry and absence of pain; will be firm and inelastic and may have a “carved out” appearance when surrounding viable tissues swell.

2. Percentage of body are burned

- Palmar estimation:
 - The palm of an infant's or child's hand including the fingers roughly equals 1% of total body surface area (TBSA).

- The palm of an older child (>15 years) or adult's hand including the fingers roughly equals 0.8% of TBSA.
- Burn Estimation Chart (see following chart)

3. Burn care

- Wrap burned areas with clean sheet; do not apply any ointments or creams.
- Hypothermia can quickly develop in a burned child.
- A warming blanket and warm ambient temperature should be utilized to prevent heat loss.

ADVANCED LIFE SUPPORT

For patients with significant deep partial thickness or full thickness burns, fluid resuscitation using isotonic fluids at 20 mL/kg IV/IO should be given rapidly.

Early treatment of pain is an important aspect of patient care and is often under-recognized and undertreated in pediatric patients. In addition to splinting and immobilization, consider the administration of analgesic medications prior to or during transport.

Monitor closely for the development of mental status changes or hypotension.

Fentanyl

- 1-2 mcg/kg/dose IV/IO up to 100 mcg
- 1-2 mcg/kg/dose IN using atomizer with maximum of 1 cc in each nares (higher concentrations of fentanyl may be necessary for adequate dosing given volume restrictions)

Morphine 0.1-0.2 mg/kg/dose IV/IO up to 10 mg

Ketorolac 0.5-1 mg/kg/dose IV/IO up to 30 mg

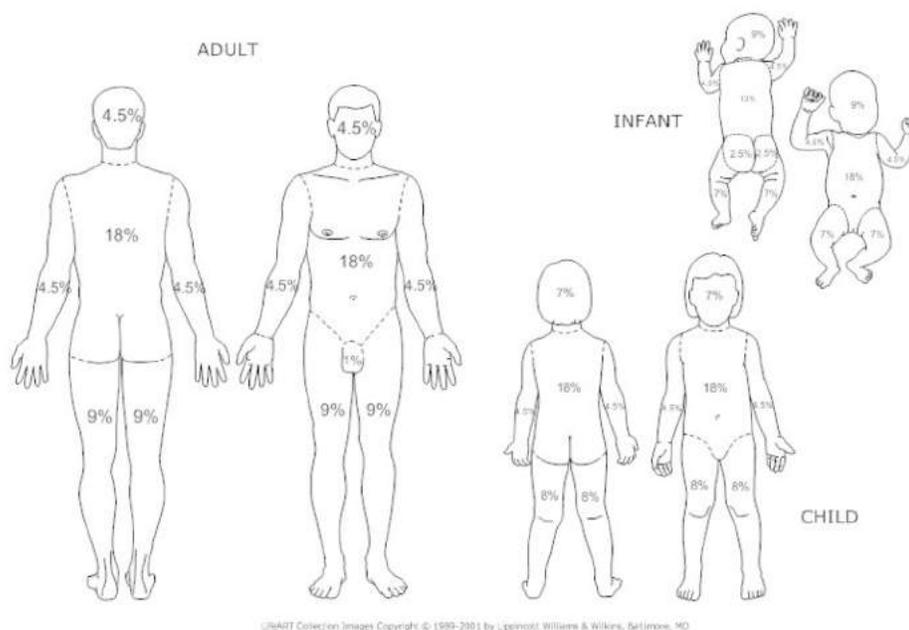
Dilaudid 0.45 mg/kg IV/IO

Transport Decisions

1. Transport of all burn patients is recommended unless cleared by medical control.
2. Transfer directly to a burn center is recommended for patients who meet the following American Burn Association guidelines:

- Partial thickness and full thickness burns of > 10% BSA regardless of specific areas of burns
- Burns that involve the face, hands, feet, genitalia, perineum, or major joints
- 3rd degree burns in any age group
- Electrical burns, including lightning injury
- Chemical burns
- Inhalation injury
- Burn injury in patients with pre-existing medical disorders that could complicate management, prolong recovery or affect mortality
- Any patient with burns and concomitant trauma (such as fractures) in which the burn injury poses the greatest risk of morbidity or mortality
- Burn injury in patients who will require special social and emotional or long-term rehabilitative support such as cases involving suspected child abuse and neglect
- Burned children in hospitals without qualified personnel or equipment for the care of children

Burn Estimation Chart



Child Abuse

Consideration of child abuse:

- The reported injury is not consistent with the injuries found.
- A child who is not mobile is injured.
- Care was not sought in a timely fashion.
- A child has significantly altered mental status.
- The overall condition of the child's environment does not appear to be safe.

Ensure scene safety.

- Assess for any hazardous conditions and involve law enforcement and fire rescue to ensure safety of the patient and the providers.
- Observe standard universal precautions.
- If child's clothing has been changed, place original clothing in a paper bag as well as any towels/cloths used to clean child as well as diapers/pads, etc. Bring these to the emergency department along with the child.

Provide appropriate medical treatments.

Obtain appropriate history and document:

1. Your responsibility is to ask only minimal questions to understand the situation.
2. Questions should include: child's age, health status, living environment, family members/ caregivers, current presenting history and condition, any known allergies or medications that they are currently taking.
3. DO NOT interview the parents/guardians/caregivers or child about the details of the incident.
4. Remain neutral with caregivers.
5. Ascertain who was with the child when the injury was discovered.
6. Be aware of state mandated reporting laws.
7. Report concerns of child abuse to the law enforcement agency where the injury occurred. If a caregiver is the alleged perpetrator, child protective services should also receive a report. Report to the Child Protective Service agency in the county where the child resides.

SECTION 5: Medical

Altered Mental Status

Definition: “Altered Mental Status” refers to any infant or child who displays a change in his or her normal mental state.

Clinical Presentation: Patients with altered mental status can often have:

- Decreased mental status,
- Decreased level of consciousness, or
- Exhibit bizarre behavior.

They can be hypo or hypertensive, be hypo or hyperglycemic and can have alterations in respiratory drive.

BASIC LIFE SUPPORT

1. Maintain airway; administer 10-15 lpm of oxygen.
 - If respirations are ineffective, begin BVM ventilation.
2. Look for signs of trauma and initiate **Spinal Immobilization** guideline as indicated.
3. Check blood pressure and if low, initiate **Hypotension (Shock)** guideline.
4. Check temperature and initiate **Fever, Hyperthermia, or Hypothermia** guidelines as indicated.
5. Check blood glucose:
 - If less than 60 mg/dl and patient is able to maintain airway, initiate **Hypoglycemia** and/or **Known Diabetic** guideline.
6. If opiates suspected (pinpoint pupils, respiratory depression):
 - Give Naloxone 2mg intranasally.
 - Continue supporting respirations.
7. Transport for medical evaluation.

ADVANCED LIFE SUPPORT

1. Follow BLS procedures.
2. Place on cardiorespiratory monitor and continuous pulse oximetry.
3. Consider intubation if necessary.

4. Initiate IV or IO access:
 - Initiate NS or LR 20mL/kg for hypotension or shock.
5. If opiates suspected (pinpoint pupils, respiratory depression):
 - Give Naloxone (0.1 mg/kg IV, IN or IO).
 - Maximum dose of 2 mg/dose.
 - May repeat if effect wears off.
 - Be prepared that the patient may wake up and be violent.
6. After intervention, reassess mental status.
7. If no change, repeat appropriate intervention.
8. Transport for medical evaluation.

Key Points/Considerations

1. It is important to assess and treat any underlying and potential life- threatening conditions (see following table).
2. Obtain complete history and do comprehensive physical exam.
3. If poisoning suspected, contact Poison Control at 1-800-222-1222 for guidance.

AEIOUTIPPS: Possible causes of Altered Mental Status

A —Alcohol	T —Trauma, Temperature
E —Electrolytes	I —Infection
I —Insulin (hypoglycemia)	P —Psychogenic
O —Opiates	P —Poison
U —Uremia	S —Shock, Seizure

Apparent Life Threatening Event (ALTE) / Brief Resolved Unexplained Event (BRUE)

Definition: ALTE/BRUE is an episode that is frightening to the observer and involves some combination of apnea, color change, marked change in tone, choking, or gagging

Important Information: ALTE usually occurs in infants less than 12 months.

It may be a presentation for a variety of different pediatric conditions including:

- Seizures
- Upper airway obstruction
- Gastroesophageal reflux
- Metabolic problems
- Anemia
- Cardiac disease

NOTE: Often patients with ALTE can be well appearing on presentation.

BASIC LIFE SUPPORT

1. Maintain airway:
 - Administer 10-15 lpm oxygen via non-rebreather mask.
 - Assist with BVM ventilation if ineffective respiratory effort.
2. If patient exhibits decreased LOC, **initiate Altered Mental Status guideline.**
3. Complete thorough history and physical assessment.
4. Specifically assess for history of:
 - Apnea
 - Decreased tone
 - Pallor or cyanosis
 - Obtain history of medications or possible toxic exposures/ingestions
5. Treat any identifiable problems (see **Hypoglycemia, Hypothermia** if applicable)
6. Do not delay transport to the closest hospital and request ALS intercept if available.

ADVANCED LIFE SUPPORT

1. Follow BLS procedures.
2. Place on cardiorespiratory monitor and continuous pulse oximetry.
3. Consider intubation if patient is apneic, unresponsive, or difficult to ventilate/oxygenate.
4. Initiate IV/IO:
 - Administer 20 cc/kg NS or LR if signs of shock.
 - May repeat second fluid bolus if signs of shock or hypotension persist.
5. Treat any identifiable causes (see specific guidelines for **Shock, Respiratory Failure, Hypoglycemia, Hypothermia, Seizures**)
6. Transport for medical evaluation.

Key Points/Considerations

1. Determine severity, duration, and nature of episode.
2. Obtain complete medical history.
3. Do comprehensive physical exam.
4. All patients should be transported for medical evaluation, even the well-appearing child.
5. Contact medical control if parent is refusing medical care and/or transport.

Fever

Definition: Defined as a core body temperature of 100.4° F or 38°C or greater.

Clinical Presentation: Fever results in a faster metabolic rate. Patients often present with tachycardia and tachypnea.

Fever can also be associated with:

- Seizures
- Hallucinations
- Other forms of altered mental status

BASIC LIFE SUPPORT

1. Maintain airway, offer 100% oxygen via non-rebreather mask.
 - If respirations are ineffective, begin BVM ventilation.
2. Obtain history and document temperature (rectal or axillary) and if any antipyretic medicine was given.
3. Administer acetaminophen 15 mg/kg PO if >4 hours since last antipyretic.
4. Begin cooling measures if temperature is greater than 103°F or 39.5°C.
 - Passive cooling - remove excessive clothing.
 - DO NOT USE ICE OR RUBBING ALCOHOL TO COOL.
5. If seizing, refer to **Seizure** guideline.
6. Do not delay transport to the closest hospital and request ALS intercept if available.

ADVANCED LIFE SUPPORT

1. Follow BLS procedures.
2. Place on cardio respiratory monitor and continuous pulse oximetry.
3. Assess for signs of hypotension (see following table).
4. If present, establish IV/IO and initiate 20 mL/kg of NS or LR.
 - May repeat 20 mL/kg as needed for hypotension up to 60 mL/kg.
5. Transport for medical evaluation.

Temperature Conversion Table

°FAHRENHEIT	°CELSIUS
98.6	37
100.4	38
102.5	39
104.0	40
105.8	41

Sudden Unexpected Death (SUID) / Sudden Infant Death Syndrome (SIDS)

Definition: Sudden unexplained death of a child less than one year of age

Important Information: In a typical situation, parents/guardians or caregivers check on their supposedly sleeping infant to find him or her dead. This is the worst tragedy parents/guardians or caregivers can face, and leaves them with sadness and a feeling of vulnerability lasting throughout their lives. Since medicine is unable to tell them why their baby died, they often blame themselves.

BASIC LIFE SUPPORT

1. Initiate CPR unless there are obvious signs of death.
 - Rigor mortis (stiff limbs)
 - Livor mortis (blood settling in the lower portions of the body)
2. Follow **Cardiac Emergency** guideline.
3. Support the parents/guardians or caregivers and avoid questions or comments suggesting blame; remain non-judgmental.
4. Observe carefully and document.
5. REPORT FINDINGS to receiving hospital:
 - Location and position of child
 - Ambient temperature

- Objects immediately surrounding the child (including type of mattress and bedding)
 - DO NOT REMOVE OR MOVE OBJECTS
 - Behavior of all the people present and the explanations provided
 - Vomitus in mouth or foreign body present
6. Do not delay transport to the closest hospital and request ALS intercept if available.
 7. Contact local law enforcement.

ADVANCED LIFE SUPPORT

1. Follow BLS procedures.
2. Consider intubation.
3. Treat any identifiable causes (**Shock, Respiratory Failure, Hypoglycemia, Hypothermia, and Seizures** – see specific guideline for each).
4. Transport for medical evaluation.

Hyperglycemia

Definition: Hyperglycemia is a condition where blood glucose levels rise excessively. Usually sustained hyperglycemia is due to a deficiency of insulin resulting in diabetes.

Clinical Presentation: Increased thirst, increased urination, fatigue, increased respiratory effort (from an acidotic state), abdominal pain, nausea, vomiting, and other signs of dehydration or decreased perfusion. This is the clinical state of diabetic ketoacidosis DKA.

BASIC LIFE SUPPORT

1. Maintain airway and offer 100% oxygen via non-rebreather mask.
 - If respirations are ineffective, begin BVM ventilation.
2. Check blood glucose (if <60 mg/dL, see **Hypoglycemia** guideline).
3. Contact medical control for glucose >500 mg/dl

4. Do not delay transport to the closest hospital and request ALS intercept if available.

ADVANCED LIFE SUPPORT

1. Follow BLS procedures.
2. Place patient on cardio respiratory monitor and continuous pulse oximetry.
3. Establish IV/IO.
4. For the patient with high blood glucose (>300) and signs of decreased perfusion, begin an IV/IO bolus of 10 mL/kg NS.
5. Transport for medical evaluation.

Key Points/Considerations

1. Hyperglycemia can result from an inadequate supply of insulin or the body's resistance to circulating insulin. This may be the first presentation of diabetes.
2. As the body uses other sources of fuel for metabolism, ketones and acid production occurs. This results in an acidotic state.

Hypoglycemia

Definition: Hypoglycemia is defined as a blood glucose concentration of less than 60 mg/dl in a child and less than 40 mg/dl in a term neonate (<30 days of age). This can occur when a diabetic patient has received too much insulin for their food intake. It may happen when the patient is vomiting and cannot retain food or fluids. Hypoglycemia may accompany hypovolemia and shock.

Clinical Presentation: Tachycardia, tachypnea, sweating, agitation and tremor. When blood glucose is dangerously low, seizures and altered mental status may be seen.

BASIC LIFE SUPPORT

1. Refer to **General Pediatric Assessment guidelines**.
2. Maintain airway: administer 10-15 lpm of oxygen via non-rebreather mask.

3. Begin BVM ventilation with 100% oxygen for ineffective respiratory effort.
4. Check blood glucose.
5. If hypoglycemic, notify medical control to obtain order to administer oral glucose.
6. Attempt oral glucose replacement, unless vomiting or altered mental status.
7. Recheck blood glucose and assess mental status 30 minutes after oral glucose administration.
8. Do not delay transport to the closest hospital and request ALS intercept if available.

ADVANCED LIFE SUPPORT

1. Follow BLS procedures.
2. Place patient on cardio-respiratory monitor and continuous pulse oximetry.
3. Establish vascular access, and:
 - For term neonates (<30 days of age): administer D10W 3mL/kg
 - For infants: administer D10W 5 mL/kg
 - For children < 4 years old: administer D25W 2 mL/kg
 - For children > 4 years old: administer D50W 1 mL/kg maximum of 50 mL initial dose
4. Repeat blood glucose and assess mental status 30 minutes after IV or oral glucose administration.
5. Consider Glucagon IM/IV/SQ:
 - < 20 kg 0.5 mg/dose
 - 20 kg to adult 1 mg/dose every twenty minutes until awake
6. Transport for medical evaluation.

RECIPE FOR D10W

Take a 50 mL bottle of D50W, waste 40mL and replace with 40 mL of NS

RECIPE FOR D25W

Take a 50 mL bottle of D50W, waste 25mL and replace with 25 mL of NS

Medication/Treatments Table

MEDICATION	DOSE	ROUTE	MAX. DOSE
D10W (10 mL D50 and 40 mL diluent)	3 mL/kg (neonate)	IV/IO	Repeat as needed to keep glucose >60
D25W (25 mL D50 and 25 mL diluent)	2mL/kg (<4years)		
D50	1 mL/kg		
Oral Glucose	20-30 mL of D5%W (infant)	PO	Repeat as needed to keep glucose >60

Hyperthermia

Definition: Hyperthermia is the decreased ability of a patient's body to regulate a response to high environmental temperatures. This is often associated with dehydration.

Clinical Presentation:

- **Heat Exhaustion:** Moist, cool skin, cramping, slightly elevated or normal temperature or nausea
- **Heat Stroke:** Hot, dry skin, **Altered Mental Status**, dilated pupils, tachycardia, seizure activity, elevated body temperature, or arrhythmias

BASIC LIFE SUPPORT

1. Ensure adequate airway, administer 10-15 lpm of oxygen via non-rebreather mask.

- Begin BVM ventilation with 100% oxygen if in distress or decreased level of consciousness.
2. Obtain body temperature and blood glucose assessment.
 3. Oral rehydration:
 - Water or electrolyte solution (examples: Gatorade or Pedialyte)
 4. Attempt cooling techniques:
 - Remove from heat source.
 - Remove clothing and cover with wet sheets.
 - Sponge or splash with cool water.
 - Fan to increase evaporation and subsequent heat loss.
 - If vitals are stable, cold packs to axilla and groin.
 5. Aggressive cooling should be stopped if shivering begins.
 6. Do not administer Acetaminophen.
 7. Treat associated symptoms.
 8. **If altered mental status, do not delay transport to hospital.**

ADVANCED LIFE SUPPORT

1. Follow BLS procedures.
2. Place on cardio-respiratory monitor and continuous pulse oximeter; assess for arrhythmias (see specific **Cardiac** guideline).
3. Intubate if unable to adequately ventilate or oxygenate child by BVM.
4. IV/IO:
 - Initiate IV fluids 20 mL/kg
5. Assess for seizure activity and refer to **Seizure** guideline.

6. If altered mental status, do not delay transport to hospital.

Temperature Conversion Table

°FAHRENHEIT	°CELSIUS
98.6	37
100.4	38
102.5	39
104.0	40
105.8	41

Key Points/Considerations

1. Move patient from hot environment to shade.
2. Remove excess clothing.
3. Mortality from heat stroke is usually from dysrhythmia so it is important to recognize early and treat.
4. Altered mental status is the key symptom of heat stroke. These patients need aggressive treatment and transportation to the hospital.

Hypothermia

Definition: Environmental cold exposure leading to drop in core body temperature and injury to exposed body parts (frostbite).

- **Mild Hypothermia:** Core temperature 35–32°C (95–89.6°F); patients have shivering, uncomfortable, red skin, **confusion, and poor judgment**
- **Moderate Hypothermia:** Core temperature 32–28°C (89.6–82.4°F); patients present with **decreased mental status**, pallor, arrhythmias including bradycardia
- **Severe Hypothermia:** Core temperature < 28°C (82.4°F); patient may be **unconscious**, have severely decreased mental status, slow respirations, asystole, bradycardia, or other arrhythmias

Frostbite Presentation: Usually affects the area of skin most exposed to the elements. The skin turns reddened then mottled, bluish, white and /or grey with continued exposure. Pain persists during initial phases, then numbness ensues.

BASIC LIFE SUPPORT

1. Remove any wet clothing from patient and **carefully** move to warm environment. (Do not immerse patient in water.)
2. Maintain airway: administer 10-15 lpm of oxygen via non-rebreather mask.
3. Begin BVM ventilation for with 100% oxygen for:
 - Ineffective respiratory effort
 - Heart rate
 - < 80 for infants
 - < 60 for children
 - Cyanosis despite 100% oxygen via NRB
 - Decreased level of consciousness
4. Check for pulse and if no pulse, begin CPR.
5. Begin active rewarming measures:
 - Put on hats and blankets.
 - Apply heat packs over chest to warm heart.
6. If you begin rewarming, **be certain that you can continue this until patient is delivered to the hospital.**
7. Protect injured (frostbite) areas; **do not rub or place on heated surface.**
8. Protect patient from further heat loss.
9. If patient is awake and alert with intact airway, offer sugar-containing solution to drink.

10. Do not delay transport to the closest hospital and request ALS intercept if available.

ADVANCED LIFE SUPPORT

1. Follow BLS procedures.
2. Place on cardio-respiratory monitor and continuous pulse oximeter.
3. If unable to effectively perform BMV, consider intubation.
4. CPR as indicated. Check pulse for 30 - 60 seconds to adequately confirm lack of pulse or severe bradycardia in the hypothermic patient.
5. Determine core temperature:
 - **Moderate > 30°C (86°F)**
 - Continue CPR if indicated by poor perfusion or HR <60.
 - Defibrillate for VF/VT.
 - Give medications when needed.
 - Ventilate with warmed humidified oxygen.
 - Establish IV and infuse with warm NS.
 - Repeat defibrillation for VF/VT as core temperature rises.
 - **Severe < 30°C (86°F)**
 - Continue CPR.
 - Defibrillate for VF/VT once; do not repeat.
 - Do not give anti-arrhythmic medications until core is >30°C (86°F).
 - Ventilate with warmed, humidified oxygen.
 - Establish IV and infuse with warm NS.
6. Transport for medical evaluation.

Temperature Conversion Table

°FAHRENHEIT	°CELSIUS
77	25
78.8	26
80.6	27
82.4	28
84.2	29
86	30
87.8	31
89.6	32
91.4	33
93.2	34
95	35
96.8	36
98.6	37

Key Points/Considerations

1. Remove wet clothing from the patient before rewarming.
2. Be gentle in the transport of unconscious patients; rough movement can precipitate arrhythmias.
3. If you start rewarming, be certain you can continue until the patient arrives at the hospital.
4. Notify medical control early to activate resources at receiving hospital.

Non-Traumatic Shock/Sepsis

Definition: Hypo-perfusion or shock is defined as decreased effective circulation, with inadequate delivery of oxygen to tissues. Shock may be present in a compensated state (normal blood pressure) or in a decompensated state (low blood pressure).

- **Hypovolemic** shock (cold shock state) is most common cause in pediatrics due to fluid losses from vomiting and/or diarrhea.
- **Distributive** shock (warm shock state) is from inadequate fluid distribution causing hypo-perfusion. Examples include septic shock or anaphylaxis.

Signs of shock:

- Decreased peripheral perfusion
- Mottled skin
- Poor capillary refill (> 2 seconds)
- Poor peripheral pulses
- Decreased LOC
- Low blood pressure

BASIC LIFE SUPPORT

1. If no pulse or evidence of poor perfusion and HR < 60/minute, begin **CPR** and refer to the **Cardiac** guideline section.
2. Obtain vital signs including blood pressure.
3. Maintain airway: administer 10-15 lpm of oxygen if signs of respiratory distress.
 - If respirations are ineffective, begin BVM ventilation.
 - Suction as needed.
4. Do not delay transport to the closest hospital and request ALS intercept if available.

ADVANCED LIFE SUPPORT

1. Follow BLS procedures.
2. Place patient on cardio-respiratory monitor and continuous pulse oximeter.
3. Consider intubation if unable to effectively ventilate with BVM.
4. Obtain IV/IO and initiate 20 ml/kg of NS or LR.
5. Contact medical control as soon as possible to mobilize resources at receiving facility.
6. Reassess patient perfusion status including vital signs.

- If patient is persistently hypotensive or with signs of poor perfusion, repeat 20 ml/kg of NS or LR.

7. Transport for medical evaluation.

Key Points/Considerations

1. Patients who are in a cardiogenic shock state will worsen after fluid resuscitation.
2. Reassessment between fluid boluses is very important component of care.

AGE OF PATIENT	HR		RR		SYSTOLIC BP	TEMP	
Infant	<80	>205	<30	>60	<60	<36°	>38°
Toddler	<75	>190	<30	>60	<70	<36°	>38.5°
≥ 1 yr - < 2 yrs	<75	>190	<24	>40	<70 + (age x 2)	<36°	>38.5°
≥ 2 yrs - < 4 yrs	<60	>140	<24	>40	<70 + (age x 2)	<36°	>38.5°
≥ 4 yrs - < 6 yrs	<60	>140	<22	>34	<70 + (age x 2)	<36°	>38.5°
≥ 6 yrs - < 10 yrs	<60	>140	<18	>30	<70 + (age x 2)	<36°	>38.5°
≥ 10 yrs - < 13 yrs	<60	>100	<18	>30	<90	<36°	>38.5°
≥ 13 yrs - < 18 yrs	<60	>100	<12	>16	<90	<36°	>38.5°

Seizure

Definition: Seizures are a neuromuscular response to an underlying cause such as:

- Epilepsy
- Hypoxia
- Hypoglycemia
- Head injury
- Recent illness
- Poisonings
- Infection

Clinical Presentation may include:

- Altered LOC

- Tonic/clonic muscle movement
- Eye deviation
- Tachycardia/Bradycardia
- Bradypnea/Tachypnea
- Staring episodes

BASIC LIFE SUPPORT

1. Protect airway by suctioning or positioning and apply 100% oxygen via non-rebreather mask.
2. Obtain history and if it includes **hyperglycemia, fever, ingestion or trauma**, follow the appropriate guideline as well as instructions in this section.
3. Monitor patient and place in recovery position.
4. Obtain a blood glucose; if hypoglycemic (<60), refer to **Hypoglycemia** guideline.
5. Do not delay transport to the closest hospital and request ALS intercept if available.

ADVANCED LIFE SUPPORT

1. Follow BLS procedures.
2. Apply cardiac monitor.
3. Support breathing by BVM or intubate for respiratory failure or apnea.
4. Administer medications if seizure activity is present for greater than 5 minutes, or for recurrent seizure activity (see following table).
 - If seizure does not stop within 5 minutes of medication administration, contact medical control.
5. Implement guidelines as determined by history obtained.
6. Transport for medical evaluation. During transport, support breathing as needed.

Key Points/Considerations

1. If a patient has a history of frequent seizures, refer to medical emergency health care information (**Children with Special Health Care Needs** section).
2. Medications used to stop seizures often cause transient **respiratory depression**. Monitor patients closely for apnea after seizure is controlled and support breathing as necessary.
3. Be aware that medications to control seizures may potentiate hypotension in patients.
 - If seizures are due to traumatic brain injury, actively monitor for hypotension.
4. Mortality and morbidity increases with duration and frequency of seizures.
 - Status epilepticus is defined as seizure duration greater than 5 minutes.
 - Often patients with recurrent seizures may be in non-convulsive status epilepticus in between when they appear postictal.
 - Seizure activity metabolizes glucose and hypoglycemia can cause additional seizures. Therefore, it is important to check glucose and treat hypoglycemia.

Medication/Treatments Table

MEDICATION	DOSE	ROUTE	MAX. DOSE
Midazolam	0.1 mg/kg	IV/IO	5 mg
	0.4 mg/kg	IN/IM Buccal	10 mg
Lorazepam	0.1 mg/kg	IV/IO	4 mg
Diazepam	0.1 – 0.3 mg/kg	IV/IO	10 mg
	0.5 mg/kg	PR	10 mg

Behavioral Emergencies

Definition: Behavioral emergencies are situations involving patients who require a medical and/or psychiatric evaluation due to behavioral abnormalities.

Clinical Presentation: They may have intentions to harm themselves or others. Self-harm behaviors may include cutting of arms or ingestions. They may display aggressive, destructive or violent behaviors.

BASIC LIFE SUPPORT

1. Law enforcement should be contacted if patient is deemed a threat to themselves or others present. Do not interact with the patient until scene safety is ensured.
2. Determine if the patient is at risk of hurting themselves or others and if they have a specific plan.
3. Ensure safety of the patient and yourself:
 - Remove any possible weapons (lighters, matches, medications, knives, pens/pencils, and glasses) from the patient.
 - Use restraints if necessary.
 - Wear a mask to protect yourself from patient spitting.
4. Assess and maintain airway patency, consider oxygen 10-15 lpm via non-rebreather mask.
 - If respirations are ineffective, begin BVM ventilation with 100% oxygen.
 - Suction airway as needed.
5. Examine patient and treat any injuries with appropriate dressings or splints.
6. Transport for medical or psychological evaluation.

ADVANCED LIFE SUPPORT

1. Follow BLS procedures.

2. Apply cardio-respiratory monitor and continuous pulse oximetry.
3. Maintain airway.
4. If there is a history of ingestion or signs and symptoms of a toxidromal state, follow **Poison** guidelines.
5. Check glucose and treat if **Hypo or Hyperglycemia** per those guidelines.
6. If patient poses an immediate threat to himself/herself or others and is agitated:
 1. Consider giving Ketamine 3-5 mg/kg IM.
 - Do not attempt to place an IV if patient is still agitated.
 - If sedation occurs, monitor airway and consider obtaining IV access and a 20 mL/kg bolus.
7. Transport for medical or psychological evaluation.

Key Points/Considerations

1. Be aware that parents/guardians or caregivers may help keep patient calm or may be a source of anxiety for the patient and possibly escalate the situation.
2. Clearly state and explain your actions while providing care to the patient:
 - Vital signs and monitoring
 - Behaviors you expect from the patient during transport, i.e. not injuring self or others
3. Do not make promises or bargains that you will not be able to fulfill.

Adrenal Insufficiency Conditions with Shock

Definition: Hypoperfusion or shock is defined as decreased effective circulation, resulting in inadequate delivery of oxygen to tissues. Most patients respond to stresses on the body by having their adrenal gland produce steroids. Medical conditions that limit this response include congenital adrenal hyperplasia (CAH), Addison's disease and chronic steroid use. If there is confirmed adrenal insufficiency and infection, emergent treatment with steroids is life-saving.

Signs of septic shock:

- Decreased peripheral perfusion
- Mottled skin
- Poor capillary refill (> 2 seconds)
- Poor peripheral pulses
- Decreased LOC
- Low blood pressure
- Vomiting

BASIC LIFE SUPPORT

1. If no pulse or evidence of poor perfusion and HR < 60 beats/minute, begin **CPR** and refer to **Cardiac** section.
2. Obtain vital signs including blood pressure; look for Medical Alert Bracelet.
3. Maintain airway; administer 10-15 lpm of oxygen if signs of respiratory distress.
 - If respirations are ineffective, begin BVM ventilation.
 - Suction as needed.
 - Parents/guardians or caregivers may give an IM shot of steroids for treatment of this illness.
 - If no steroids available, alert the emergency department medical control that a patient with probable **adrenal crisis** is being transported and ask that hydrocortisone is ready to administer on arrival.
4. Emergent transport for medical evaluation.

ADVANCED LIFE SUPPORT

1. Follow BLS procedures.

2. Place patient on cardio-respiratory monitor and continuous pulse oximeter.
3. Consider intubation if unable to effectively ventilate with BVM.
4. Obtain IV/IO and initiate 20 ml/kg of NS or LR.
5. Contact medical control as soon as possible to mobilize resources at receiving facility as stated above.
6. Consider IV or IM steroids if patient has not received any from their caregivers. Dose of hydrocortisone is unique with each patient; looks for the amount in their care plan.
7. Reassess patient perfusion status including vital signs.
 - If patient is persistently hypotensive or with signs of poor perfusion, repeat 20 ml/kg of NS or LR.
8. Transport for medical evaluation.

Key Points/Considerations

1. Patients who are in a cardiogenic shock state will worsen after fluid resuscitation.
2. Reassessment between fluid boluses is a very important component of care.

AGE OF PATIENT	HR		RR		SYSTOLIC BP	TEMP	
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≥ 4 yrs - < 6 yrs	<60	>140	<22	>34	<70 + (age x 2)	<36°	>38.5°
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≥ 10 yrs - < 13 yrs	<60	>100	<18	>30	<90	<36°	>38.5°
≥ 13 yrs - < 18 yrs	<60	>100	<12	>16	<90	<36°	>38.5°

Respiratory

Foreign Body Obstruction – Conscious Patient

BASIC LIFE SUPPORT

1. For patients with a partial obstruction and good air exchange:
 - Avoid any agitation.
 - Position comfortably.
 - Consider alternate methods of oxygen delivery (i.e., blow-by oxygen).
 - **DO NOT** attempt invasive airway maneuvers.
2. For patients with obstruction and poor air exchange with an inability to talk, cough, or cry:

Infant (less than 1 year old):

- Administer 5 back blows followed by 5 chest thrusts to dislodge the obstruction.
- If the patient becomes unconscious, follow **FBO Unconscious** guideline.
- Remove foreign object **if visible** - **DO NOT** perform blind sweep.

Child (greater than 1 year old):

- Administer abdominal thrusts to dislodge the obstruction.
- If the child becomes unconscious, follow **FBO Unconscious** guideline.
- Remove foreign object **if visible**: **DO NOT** perform blind sweep.
- For patients with obstruction and poor air exchange with an inability to talk, cough, or cry:
 - Do not delay transport to the closest hospital and request ALS intercept if available.

Foreign Body Obstruction – Unconscious Patient

BASIC LIFE SUPPORT

1. Assess ABCs 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 obstruction.
3. Attempt to ventilate patient using a BVM device with high-flow oxygen at 100%.

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, begin CPR.
6. Each time the airway is opened for ventilations, check the pharynx for the foreign body.
7. Continue CPR until the object is removed, ventilations are successful, or child/infant recovers.
8. If you successfully remove the airway obstruction:
 - Look, listen and feel for air movement for at least 5 seconds and no longer than 10 seconds.
 - If no air exchange, attempt two ventilations and confirm chest rise.
 - If no chest rise and/or breaths, do not go in; reposition and try again.
 - If ventilations are successful, check for pulse for at least 5 seconds and no longer than 10 seconds.
 - If child has no pulse and is not breathing, begin CPR.
 - 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 at 100%.
9. Do not delay transport to the closest hospital and request ALS intercept if available.

ADVANCED LIFE SUPPORT

1. Follow BLS procedures.
2. Direct visualization and removal of foreign body with Magill forceps.
3. Deep suction via tracheal intubation using:
 - Large bore suction catheter with a single distal opening

OR

 - ETT with Hutchinson's eye removal
4. Consider endotracheal intubation and ventilate the patient.
5. If unsuccessful with above, consider surgical airway, including needle cricothyrotomy and with jet insufflation.

Upper Airway Compromise (Non-foreign Body)

Definition: Upper airway compromise not related to a foreign body can be caused by croup, epiglottitis or tracheitis.

Signs of upper airway compromise:

- Stridor/"barky cough"
- Increased work of breathing, chest retractions
- Respiratory distress

BASIC LIFE SUPPORT

Attempt to calm the patient and keep in a position of comfort, often upright on parents/guardians or caregiver's lap.

1. Patient may be fatigued and have inadequate ventilation.
2. Closely monitor rate and quality of respirations as well as work of breathing.
3. For cyanosis and severe stridor, administer high flow oxygen as best tolerated by the patient.
4. Do not try to visualize pharynx.
5. For respiratory arrest or patient with inability to maintain airway independently, assist with BVM ventilation.
6. Do not delay transport to closest hospital and request ALS intercept if available.

ADVANCED LIFE SUPPORT

1. Follow BLS procedures.
2. Inhalation therapy:
 - Racemic epinephrine 0.5 ml (2.25%) in 3 mL saline

OR

 - Injectable epinephrine (1:1000) 5 mL via nebulizer without dilution
3. Intubate if unable to ventilate.

Asthma

Definition: Chronic inflammatory disease of the lower airway. Can be triggered by smoke, allergens or exercise.

Signs of asthma exacerbation:

- Audible wheezing
- Increased work of breathing, chest retractions
- Out of breath, unable to speak in complete sentences
- Respiratory distress

BASIC LIFE SUPPORT

1. Attempt to keep the patient calm and in an upright position.
2. Administer high flow oxygen and expedite transport.
3. Closely monitor rate and quality of respirations as well as work of breathing and mental status.
4. Administer inhalation therapy via nebulizer or inhaler:
 - Albuterol 2.5 mg (2 puffs)
5. If no improvement and patient in moderate to severe distress:
 - Repeat inhalation therapy as above.
 - Consider administration of epinephrine:
 - For patient 10 kg to 30 kg (22-66 lbs), EpiPen[®] JR IM (0.15 mg epinephrine autoinjector)
 - For patient > 30 kg (> 66 lbs), EpiPen[®] IM (0.3 mg epinephrine autoinjector)
 - Epinephrine 1:1,000 (0.01 ml/kg IM up to maximum dose of 0.5 ml)
6. If patient is or becomes apneic or unresponsive:
 - Begin BVM ventilation at rate of 12-20 breaths per minute with goal of chest rise with each delivered breath.
 - Allow adequate time for expiration/lung deflation.
 - Avoid hyperventilation and overextension of chest rise.
7. Do not delay transport to closest hospital and request ALS intercept if available.

ADVANCED LIFE SUPPORT

1. Follow BLS procedures.
2. Alternative inhalation therapies via nebulizer:
 - Albuterol 2.5mg
 - Levelbuterol (Xoponex) 1.25 mg
 - DuoNeb (0.5 mg ipratropium bromide/2.5 mg albuterol)
3. Consider administration of epinephrine or terbutaline:
 - Epinephrine: 1:1,000, 0.01 mg/kg SQ/IM up to maximum of 0.5 ml/dose

OR

- Terbutaline: 0.01 mg/kg SQ up to maximum of 0.25 mg/dose
4. Continuous Inhalation Therapy – nebulizer continuously with albuterol only.
 5. Additional medications to consider:
 - Dexamethasone 0.6 mg/kg PO, IM or IV to maximum of 16 mg

OR

 - Methylprednisolone 2 mg/kg IV to maximum of 60 mg
 - Magnesium sulfate per medical control, 25 mg/kg IV/IO slowly over 1 minute with max of 2 g/dose and monitor for hypotension and sedation
 6. Consider intubation:
 - As sedation medication, use ketamine 2 mg/kg IV up to 50 mg with titration to effect.
 - Ensure ongoing sedation using one of the following:
 - Ketamine 1 mg/kg/dose IV up to 25 mg
 - Midazolam 0.1 mg/kg/dose IV up to 10 mg
 - Lorazepam 0.1 mg/kg/dose IV up to 8 mg
 - Consider assisting exhalation with manual bilateral chest deflation.
 - Monitor very closely for development of pneumothorax.

Anaphylaxis

Definition: An allergic emergency of immediate hypersensitivity.

Signs of allergic emergencies:

- Swelling of the lips and tongue
- Respiratory distress, caused by upper and/or lower airway swelling
- Hives
- Vomiting
- Shock

BASIC LIFE SUPPORT

1. Attempt to keep the patient calm and in an upright position.
2. Administer high flow oxygen and expedite transport.
3. Closely monitor rate and quality of respirations as well as work of breathing and mental status.

4. If severe S/S (hives, stridor, wheezing or vomiting), administer one of the following:
 - For patient 10 kg to 30 kg (22-66 lbs), **EpiPen® JR IM** (0.15 mg epinephrine autoinjector)
 - For patient > 30 kg (> 66 lbs), **EpiPen® IM** (0.3 mg epinephrine autoinjector)
- OR**
- Epinephrine 1:1,000 (0.01 ml/kg IM up to maximum dose of 0.5 ml)
5. If after 5 minutes there is no improvement, **repeat administration of epinephrine** as above.
6. If wheezing is present, consider Albuterol 2.5 mg via nebulizer or 2 puffs from an inhaler.
7. If sting or poisonous bite, immobilize and elevate the limb and cool with an ice pack.
8. Do not delay transport to the closest hospital and request ALS intercept if available.

ADVANCED LIFE SUPPORT

1. Follow BLS procedures.
2. Administer diphenhydramine HCL (Benadryl) 1-2 mg/kg up to 50 mg PO/IV/IM for ongoing symptoms.
3. Administer dexamethasone 0.6 mg/kg PO/IV/IM up to 16 mg

OR

Methylprednisolone 1 mg/kg up to 125 mg IV

4. If patient's systolic pressure drops below minimum for age or decreased LOC:
 - Administer a 20 ml/kg bolus of IV NS.
 - If patient's status deteriorates, intubate as appropriate.
 - May repeat bolus if no improvement.

Cardiac

Asystole & Pulseless Electrical Activity (PEA)

Definition: Asystole is a form of cardiac arrest with a complete absence of electrical activity of the heart. Cardiac arrest with PEA indicates the presence of cardiac electrical activity in the absence of a pulse.

Clinical Presentation: Asystole and PEA are both forms of cardiac arrest – an absence of vital signs.

BASIC LIFE SUPPORT

1. Begin CPR.
2. Attach AED leads and follow AED instructions.
3. Consider oral-pharyngeal airway.
4. Consider possible causes (see following table).
5. Do not delay transport to the closest hospital and request ALS intercept if available.

ADVANCED LIFE SUPPORT

1. Follow BLS procedures.
2. Place on cardio-respiratory monitor and continuous pulse oximetry.
3. Confirm asystole in at least 2 leads or identify PEA.
4. If at any time a cardiac rhythm, other than asystole, is noted on the monitor, treat based on the appropriate guideline.
5. Consider intubation if BVM not adequate and ventilate with 100% oxygen.
6. Establish IV/IO access and start NS infusing at 20 mL/kg.
7. Administer Epinephrine
 - May repeat every 3-5 minutes prn
 - 1:10,000 (0.1 mL/kg or 0.01 mg/kg) IV/IO
 - Repeat every 3-5 minutes.
 - All attempts should be made to give medications intravenously. ET administration is less effective.
 - ET 1:1,000 (0.1 mL/kg or 0.1 mg/kg)

8. Patient should be reassessed for return of vital signs every 10 mL/kg of fluid, 5 cycles of CPR and after each intervention.
9. Consider possible causes (see following table).
10. Transport for medical evaluation.

Key Points/Considerations

CAUSES OF PEA: THE 5 "H'S" AND 5 "T'S"	
Hypoxia	Tamponade (Cardiac)
Hypovolemia	Tension Pneumothorax
Hypo- or Hyperkalemia	Toxic Overdose
Hypothermia	Thrombosis, Pulmonary – PE
Hydrogen ion (Acidosis)	Thrombosis, Coronary – ACS

Medication/Treatments Table

MEDICATION	DOSE	ROUTE	MAX. DOSE
Epinephrine 1:10,000 (0.1 mg/mL)	0.01mg/kg Repeat q 3-5 minutes prn	IV/IO	1 mg
Epinephrine 1:1,000 (1 mg/mL)	0.1 mg/kg dilute in NS to 3-5 mL Repeat q 3-5 minutes prn	ETT	NA

Bradycarrhythmias

Definition: A heart rate that is slow compared to normal heart rates for the patient's age. The most common cause of bradycardia in a child is hypoxia. Cardiac rhythm disturbance may be due to abnormal pacemaker or electrical conduction.

Clinical Presentation: Nonspecific symptoms such as lightheadedness, dizziness, syncope, and fatigue. Or patient may have shock, hypotension, altered level of consciousness (ALOC), slow or absent breathing, or sudden collapse.

BASIC LIFE SUPPORT

1. Refer to Guidelines for **All Cardiac Emergencies** and begin CPR.
2. Provide 100% oxygen and assisted ventilation if indicated.

3. Initiate CPR if HR <60 and signs of shock or collapse.
4. Attach AED (if patient is 12 months or older) and follow AED instructions.
5. Do not delay transport to the closest hospital and request ALS intercept if available.

ADVANCED LIFE SUPPORT

1. Follow BLS procedures.
2. Place on cardio-respiratory monitor and continuous pulse oximeter.
3. Intubate and ventilate with 100% oxygen if indicated.
4. Perform CPR if, despite oxygenation and ventilation, HR is <60 and poor perfusion.
5. Establish IV/IO access.
6. Consider intraosseous cannulation if unable to rapidly establish venous access.
7. Give Epinephrine if no response to above measures.
 - Repeat every 3-5 minutes as needed
 - 1:10,000 (0.1 ml/kg or 0.01 mg/kg) IV/IO
 - Repeat every 3-5 minutes.
 - All attempts should be made to give medications intravenously.
 - ET 1:1,000 (0.1 ml/kg or 0.1 mg/kg)
8. Reassess after 2 minutes (5 cycles) of CPR
9. Intravenous fluid boluses may be infused if indicated (NS 20 mL/kg)
10. If at any time a cardiac rhythm other than bradycardia is noted, treat based on the appropriate guideline
11. Transport for medical evaluation

Key Points/Considerations

CPR should be performed with as few interruptions as possible.

POSSIBLE CONTRIBUTING FACTORS: THE 5 “H’s” AND 5 “T’s”	
Hypoxia	Tamponade (Cardiac)
Hypovolemia	Tension Pneumothorax
Hypo- or Hyperkalemia	Toxic Overdose
Hypothermia	Thrombosis, Pulmonary - PE
Hydrogen ion (Acidosis)	Thrombosis, Coronary - ACS

Medication/Treatments Table

MEDICATION	DOSE	ROUTE	MAX. DOSE
Epinephrine 1:10,000 (0.1 mg/mL)	0.01mg/kg Repeat q 3-5 minutes prn	IV/IO	1 mg
Epinephrine 1:1,000 (1 mg/mL)	0.1 mg/kg dilute in NS to 3-5 mL Repeat q 3-5 minutes prn	ETT	5 mg

Tachyarrhythmia with Pulse

Definition: A heart rate that is fast compared to normal for the patient's age, and too fast for the child's level of activity and clinical condition.

Clinical Presentation: Nonspecific symptoms such as:

- Lightheadedness
- Dizziness/Altered mental status
- Hypotension/shock
- Syncope
- Fatigue
- Sudden collapse

BASIC LIFE SUPPORT

1. Maintain airway; administer 10-15 lpm of oxygen via non-rebreather mask.
2. Begin BVM ventilation with 100% oxygen for ineffective or insufficient respiratory effort.
3. Check pulse; verify heart rate.
4. If no pulse, move to appropriate pulseless algorithm.
5. Do not delay transport to the closest hospital and request ALS intercept if available.

ADVANCED LIFE SUPPORT

1. Follow BLS procedures
2. Place on cardio-respiratory monitor/defibrillator; attach continuous pulse oximeter; obtain blood pressure; monitor and run continuous EKG strip.

3. If patient has a wide complex tachycardia (QRS > 0.08 sec), is hypotensive and unconscious – only responds to deep pain stimuli – then deliver synchronized cardioversion.
 - Consider sedation if this will not significantly delay cardioversion (Midazolam 0.1mg/kg IV/IO or Propofol 1mg/kg IV/IO).
 - Cardiovert with 0.5-1J/kg synchronized shock.
 - If patient’s rhythm does not convert, repeat synchronized cardioversion at 2J/kg.
4. Consider intubation and ventilate with 100% oxygen if indicated.
5. Establish IV/IO access.
 - Consider intraosseous cannulation if unable to rapidly establish venous access.
 - Intravenous fluid boluses may be infused if indicated.
6. If at any time a cardiac rhythm other than tachycardia is noted, treat based on the appropriate guideline.
7. Transport for medical evaluation.

Key Points/Considerations

POSSIBLE CONTRIBUTING FACTORS: THE 5 “H’s” AND 5 “T’s”	
Hypoxia	Tamponade (Cardiac)
Hypovolemia	Tension Pneumothorax
Hypo- or Hyperkalemia	Toxic Overdose
Hypothermia	Thrombosis, Pulmonary - PE
Hydrogen ion (Acidosis)	Thrombosis, Coronary - ACS

CLASSIFICATION OF TACHYARRHYTHMIAS	
Narrow Complex	Wide Complex
Sinus tachycardia Infants <220/min Children <180/min	Supraventricular tachycardia (SVT) with aberrant conduction
Atrial flutter	Ventricular tachycardia
SVT Infant >220/min Children >180/min	

Ventricular Fibrillation and Pulseless Ventricular

Tachycardia

Definition: Patient with no pulse, absent vital signs and ventricular fibrillation (V Fib) or ventricular tachycardia (VT) on the cardiac monitor.

Clinical Presentation: Pediatric cardiac arrest usually represents the terminal event of progressive shock, hypotension, or respiratory failure.

BASIC LIFE SUPPORT

1. Initiate age appropriate CPR.
2. As soon as AED is available, attach it to the patient.
 - Limit the interruption of compressions.
 - If pediatric pads are not available, use adult pads and energy levels.
 - Ensure pads do not overlap or touch; pads may be placed with one on front/one on back of chest in smaller children.
3. Maintain airway, bag-mask ventilate with 100% oxygen.
4. Perform 2 minutes (5 cycles) of CPR before reassessing; avoid interruption of compressions.
5. Do not delay transport to the closest hospital and request ALS intercept if available.

ADVANCED LIFE SUPPORT

1. Follow BLS procedures.
2. Attach patient to cardio-respiratory monitor or AED and continuous pulse oximetry.
3. If rhythm is V Fib or VT, and the patient has no pulse, immediately defibrillate at 2J/kg or as AED directs.
4. If at any time, a rhythm other than V Fib or pulseless VT appears, treat as per that guideline.
5. Consider intubation and ventilate with 100% oxygen.
6. Consider intraosseous cannulation if unable to rapidly establish venous access.
7. Consider 20 ml/kg NS or LR if signs of shock.
8. Reassess after 2 minutes (5 cycles) of CPR.
9. If patient converts to a sustainable rhythm at any time, support patient and transport to the hospital.
10. If rhythm is unchanged, defibrillate at 4 J/kg, and give:
 - Epinephrine
 - IV/IO: 0.1 ml/kg (1:10,000)
 - Repeat every 3-5 minutes until stable perfusion rhythm.

- ET
 - 0.1 ml/kg (1:1,000) in 3ml NS
 - Repeat every 3-5 minutes until stable perfusion rhythm.

11. If rhythm is unchanged:

- Defibrillate at 8 J/kg (maximum of 10 J/kg) with a shock after 2 minutes (5 cycles) CPR.

12. Consider antiarrhythmics:

- Amiodarone 5 mg/kg bolus IV/IO

OR

- Lidocaine
 - 1.0 mg/kg IV/IO
 - Repeat in 3-5 minutes.

OR

- Torsades de Pointes – Magnesium Sulfate
 - 25-50 mg/kg (max 2 mgs) IV/IO

13. Restart compressions immediately and reassess after 2 minutes of CPR.

14. Transport for medical evaluation.

Key Points/Considerations

1. Push hard, push fast, allow complete chest recoil.
2. Manual defibrillation at set doses is preferred. However, if manual defibrillation equipment not available, may use AED to provide shocks as indicated.
3. CPR should be performed with as few interruptions as possible.

Supraventricular Tachycardia

Definition: A heart rate that is fast compared to normal for the patient's age, and too fast for the child's level of activity and clinical condition. It is an arrhythmia often caused by electrical stimulation of the atrium via re-entry phenomenon.

- QRS < 0.08 (2 small blocks on ECG)

- Rhythm regular, no beat to beat variation
- Rate: infant > 220 and child/adult >180
- P wave absent

Clinical Presentation: Nonspecific symptoms such as lightheadedness, dizziness, syncope, and fatigue. Or patient may have shock, hypotension, altered mental status, respiratory distress, or sudden collapse. SVT must be differentiated from sinus tachycardia and ventricular tachycardia.

BASIC LIFE SUPPORT

1. Maintain airway; administer 10-15 lpm of oxygen via non-rebreather mask.
2. Begin BVM ventilation with 100% oxygen for ineffective or insufficient respiratory effort.
3. Check pulse; verify heart rate.
4. If no pulse or poor perfusion, proceed to appropriate **Asystole/PEA** guideline and begin CPR.
5. If normal perfusion and normal mental status:
 - Consider vagal maneuvers:
 - Infant/young infant apply an ice bag to face or perform rectal stimulation with a thermometer
 - Older child: encourage a Valsalva maneuver like bearing down or blowing into a straw
6. If inadequate perfusion or decreased mental status: transport for medical evaluation.

ADVANCED LIFE SUPPORT

1. Follow BLS procedures.
2. If vagal maneuvers do not change the heart rate and normal perfusion and mental status continues, establish IV/IO access.
3. Administer Adenosine 0.1mg/kg IV/IO (maximum first dose 6 mg) rapid IV push with rapid NS flush.
4. May double dose and repeat Adenosine at 0.2 mg/kg IV/IO (maximum first dose 12 mg) rapid IV push with rapid NS flush.
5. If this fails to convert the SVT to NSR, and patient is still stable, transport to the hospital.

6. If this fails to convert the SVT to NSR and the patient is unstable (hypotensive or decreased mental status), consider synchronized cardioversion.
 - Consider sedation if this will not significantly delay cardioversion (Midazolam 0.1mg/kg IVIO).
 - Cardiovert with 0.5-1J/kg synchronized shock.
 - If patient's rhythm does not convert, repeat synchronized cardioversion at 2J/kg.
7. Transport to the hospital regardless of whether or not cardioversion is successful.

Medication/Treatments Table

MEDICATION	DOSE	ROUTE	MAX. DOSE
Adenosine	0.05-0.1 mg/kg Repeat every 3-5 minutes	IV/IO	12 mg
Midazolam	0.1 mg/kg for sedation prior to cardioversion	IV/IO	5 mg

Poisons and Overdoses

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

- 24/7 service
- HIPAA compliant
- No cost

General Care

1. External contamination only:
 - Protect medical and rescue personnel.
 - Remove contaminated clothing.
 - Brush off any solid material from skin.
 - Flush contaminated skin or eyes with copious amounts of water.
 - Contact medical control before transport to allow adequate preparation time.
2. Internal ingestion - major overdose, altered LOC or depressed CNS:
 - Establish and maintain airway; intubate as needed.
 - If patient shows signs of poor perfusion or HR < 60/minute, begin CPR.
 - If unconscious/unresponsive, attach AED and follow instructions.
 - Check blood glucose.
 - Cardiac monitor.
3. Unknown ingestion; treat per **Poisons and Overdoses** guidelines.

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.

Cholinergic Agents

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

“SLUDGE” – **S**alivation, **L**acrimation, **U**rination, **D**efecation, **G**astric upset, **E**mesis
OR

“DUMBBELS” – **D**iarrhea, **U**rination, **M**iosis, **B**ronchorrea, **B**ronchospasm, **B**radycardia, **E**mesis, **L**acrimation, **S**alivation/Sweating

BASIC LIFE SUPPORT

Evaluate and treat per **Poisons and Overdoses** general guidelines.

ADVANCED LIFE SUPPORT

- Follow BLS procedures.
- Treatment: administer atropine first if suspecting cholinergic exposure when patient exhibits above symptoms.
- Diagnostic dose: Atropine 0.02 mg/kg/dose IV/IM (minimum 0.1 mg and maximum dose 5 mg)
 - If patient develops dry mouth or dilated pupils, they are probably not seriously poisoned.
 - If patient remains symptomatic after diagnostic dose, proceed with therapeutic dose.
- Therapeutic dose: Atropine 0.02 – 0.08 mg/kg/dose IV/IM
 - If patient develops dry mouth or dilated pupils, they are probably not seriously poisoned.
 - Repeat dose every 10 minutes as needed until bronchial secretions clear and breathing eases.
- CHEMPACK Project Containers
 - Children weighing 15 to 40 lbs: Atropine Sulfate IM 0.5 mg auto-injector (AtroPen[®])
 - Children weighing 40 to 90 lbs: Atropine Sulfate IM 1 mg auto-injector (AtroPen[®])

- Children weighing > 90 lbs and adults: Atropine Sulfate IM 2 mg auto-injector (AtroPen[®])
- Pralidoxime (2PAM)
 - If multiple doses of Atropine are needed, administer a one-time dose of Pralidoxime: 20 – 40 mg/kg in 100 mL NS IV over 30 minutes (maximum dose 2 grams)
 - Repeat in one hour
- Diazepam
 - Seizures may present with 2PAM treatment.
 - Give 0.2 – 0.5 mg/kg either IV/IM, repeated every 5 minutes as required for seizure control (maximum 10 mg).

Calcium Channel Blockers (CCBs)

(i.e. Verapamil, Nifedipine and Diltiazem)

Toxicity by Organ System

- **Cardiac/Cardiovascular:** Bradycardia, hypotension, dysrhythmia, cardiac block and asystole
- **CNS:** Confusion, agitation, dizziness, lethargy, slurred speech and seizure
- **GI:** Nausea, vomiting
- **Metabolic:** Lactic acidosis, hyperglycemia (from inhibition of insulin release)
- **Respiratory:** Dyspnea, cough, pulmonary edema

BASIC LIFE SUPPORT

Management

1. Evaluate and treat per **Poisons and Overdoses** general care guidelines.
2. STAT transport to Emergency Department.
3. Monitor blood sugar (hyperglycemia possible in CCB overdose).
4. Monitor and document serial heart rate and blood pressure.

ADVANCED LIFE SUPPORT

- Follow BLS procedures.
- Hypotension:
 - IV/IO NS 20-40 ml/kg fluid bolus
 - Calcium gluconate for a child: 60 mg/kg or 0.6 mL/kg of 10% solution over 10 minutes. Repeat every 10-20 minutes for up to 12 doses.
 - Glucagon: 0.05 – 0.1 mg/kg IV/IM/SC (1 mg maximum)
- Bradycardia
 - Atropine: 0.02 mg/kg IV, may repeat every 5 minutes (up to 2 mg maximum)
 - External pacemaker as per medical control
- Seizures follow **Seizure guidelines** for dosages
 - Midazolam IV/IO/IM/IN (Versed)
 - 0.1 mg/kg IV/IO (up to 10 mg)
 - If seizure not terminated within 10 minutes, give an additional 0.05 mg/kg IV/IO/IM
 - Diazepam (Valium)
 - 0.1mg/kg IV/IO/IM (up to 10 mg)
 - If seizure not terminated within 10 minutes, give an additional 0.05 mg/kg IV/IO/IM. Rectally: 0.5 mg/kg ages 2-5 and 0.3 mg/kg ages 6-11
 - Lorazepam (Ativan)
 - 0.1 mg/kg IV/IO/IM (up to 4 mg)
 - If seizure not terminated within 10 minutes, give an additional 0.05 mg/kg IV/IO/IM (up to 4 mg)

Beta Blocker

(i.e. Propranolol, Atenolol, Carvedilol, Labetalol and Metoprolol)

Toxicity by Organ System

- Cardiac/Cardiovascular: Bradycardia, bradydysrhythmias, heart block, hypotension
- CNS: Lethargy, seizures, coma
- GI: Nausea, vomiting
- Metabolic: Hypoglycemia
- Respiratory: Respiratory depression

BASIC LIFE SUPPORT

Management

1. Evaluate and treat per **Poisons and Overdoses** general care guidelines.
2. STAT transport to Emergency Department.
3. Monitor serial blood sugar (hypoglycemia well documented in pediatric overdose of Beta Blocking agents).
4. Monitor and document serial heart rate and blood pressure.

ADVANCED LIFE SUPPORT

1. Follow BLS procedures.
 - Bradycardia
 - Atropine: 0.02 mg/kg IV, may repeat every 5 minutes (up to 2 mg maximum)
 - Sodium Bicarbonate: Consider empiric NaHCO_3 in patients with QRS widening (>100 msec)
 - External pacemaker as per medical control
2. Hypotension
 - IV/IO NS 20-40 ml/kg fluid challenge.
 - Calcium gluconate for a child: 60 mg/kg or 0.6 mL/kg of 10% solution over 10 minutes. Repeat every 10-20 minutes for up to 12 doses.
 - Glucagon: 0.05 – 0.1 mg/kg IV/IM/SC (1 mg maximum)
3. Seizures
 - Midazolam IV/IO (Versed)
 - 0.1mg/kg IV/IO (up to 10 mg)
 - If seizure not terminated within 10 minutes, give an additional 0.05 mg/kg IV/IO
 - If no IV/IO, administer Midazolam IM (Versed)
 - 0.2 mg/kg (up to 10 mg)
 - If seizure not terminated within 10 minutes, give an additional 0.05 mg/kg IM
 - Midazolam intranasal (IN) (Versed)
 - 0.2 mg/kg (up to 10 mg)

- Diazepam (Valium)
 - 0.1 mg/kg IV/IO/IM (up to 10 mg)
 - If seizure not terminated within 10 minutes, give an additional 0.05 mg/kg IV/IO/IM
 - Rectally: 0.5 mg/kg ages 2-5 and 0.3 mg/kg ages 6-11
 - Lorazepam (Ativan)
 - 0.1 mg/kg IV/IO/IM (up to 4 mg)
 - If seizure not terminated within 10 minutes, give an additional 0.05 mg/kg IV/IO/IM (up to 4 mg)
4. Hypoglycemia
- If blood glucose < 50, administer glucose slowly
 - < 4 yrs old: administer D25W, 2 ml/kg IV/IO
 - 4 yrs old: administer D50W, 1 ml/kg IV/IO

Amphetamine/Stimulants

Toxicity by Organ System

- **Cardiac/Cardiovascular:** Tachycardia, hypertension, stroke,
- **CNS:** Agitation, hallucinations, excited delirium, tremor, seizure
- **Metabolic:** Hyperthermia
- **Ocular:** Mydriasis
- **Dermal:** Diaphoresis

BASIC LIFE SUPPORT

Management

1. Evaluate and treat per **Poisons and Overdoses** general care guidelines.
2. Hyperthermia: Cooling measures, i.e. remove from warm environment, cooling blankets, etc.

ADVANCED LIFE SUPPORT

1. Follow BLS procedures.
2. Seizures, agitation, tachycardia, hypertension
 - Midazolam IV/IO (Versed)

- 0.1 mg/kg IV/IO (up to 10 mg)
- If seizure not terminated within 10 minutes, give an additional 0.05 mg/kg IV/IO
- If no IV/IO, administer Midazolam IM (Versed)
 - 0.2 mg/kg (up to 10 mg)
 - If seizure not terminated within 10 minutes, give an additional 0.05 mg/kg IM
- Midazolam intranasal (IN) (Versed)
 - 0.2 mg/kg (up to 10 mg)
- Diazepam (Valium)
 - 0.1 mg/kg IV/IO/IM (up to 10 mg)
 - If seizure not terminated within 10 minutes, give an additional 0.05 mg/kg IV/IO/IM
 - Rectally: 0.5 mg/kg ages 2-5 and 0.3 mg/kg ages 6-11
- Lorazepam (Ativan)
 - 0.1 mg/kg IV/IO/IM (up to 4 mg)
 - If seizure not terminated within 10 minutes, give an additional 0.05 mg/kg IV/IO/IM (up to 4 mg)

Opiates

Toxicity by Organ System (specific opioid toxicities in parentheses)

- **Cardiac:** hypotension, bradycardia, QRS widening (propoxyphene, tramadol), QTc prolongation (methadone)
- **CNS:** lethargy, coma, seizures
- **Gastrointestinal:** gastric hypomotility, constipation
- **Pulmonary:** respiratory depression, hypoxia, non-cardiogenic pulmonary edema (may be associated with naloxone)
- **Ocular:** miosis

BASIC LIFE SUPPORT

Management

1. Evaluate and treat per **Poisons and Overdoses** general care guidelines.
2. Naloxone (Narcan[®]) is indicated for significant **respiratory depression, hypoxia or coma.**
 - Pediatric naloxone dosing: initial dose 0.1 mg/kg IV repeated up to 4 mg total

3. Naloxone dosing by other route: In an emergency, naloxone can be dosed intramuscular (IM), intranasal (IN), or endotracheal (ET).
- IM dosing for adults or children should be given in 2 mg doses.
 - IN dosing for adults or children should be given in 1 mg doses.
 - Endotracheal doses should be given in doses 2-3 times the desired effect of an IV dose.

SECTION 6: Children with Special Health Care Needs (CSHCN)

Assessment of a Child with Special Health Care Needs

Definition: Children with special health care needs (CSHCN) are children who have chronic health issues (physical, developmental, behavioral or emotional) and who require health and related services that other children do not require.

Clinical Presentation: Children with multiple medical problems, neurological disorders, sensory deficits (hearing and vision loss) and children with uncommon or complex medical conditions, chronically ill and technology dependent children.

BASIC LIFE SUPPORT

1. Refer to **General Pediatric Assessment** Guidelines.
2. Ask if child has special health care needs and look for a medical alert bracelet/necklace.
3. Ask for Emergency Health Information Sheet (and, if appropriate, for Life with Dignity (DNR) Order).
4. Assess ABCs; know that interventions may vary according to age, but also to patient's size and medical condition.
5. See specific guidelines for **Tracheostomy, Ventilator, Feeding Tube and Seizures**.
6. Explain interventions to children and family members when appropriate.
7. Transport in position of comfort for medical evaluation.

ADVANCED LIFE SUPPORT

1. Follow BLS procedures.
2. Place cardiorespiratory monitor and continuous pulse oximetry.
3. See specific guidelines for **Tracheostomy, Feeding Tube, Seizures**.
4. Transport in position of comfort for medical evaluation.

Key Points/Considerations

- Family members are many times the best resource for patient care.
- Interventions may vary according to age, but also on size. and medical condition.

Feeding Tube

Definition: Feeding tubes are used in the home care setting to provide feedings for children. They can be placed in the stomach or jejunum (upper part of small intestine) through the nose, mouth or abdomen.

Indications: Impaired or insufficient oral intake.

Clinical presentation: These tubes may be positioned in the nasal orifice or percutaneous.

BASIC LIFE SUPPORT

1. Refer to **General Pediatric Assessment** Guidelines.
2. Obtain accurate history and include type of feeding tube, size, its patency, accessibility, including how and when it was placed.
3. Document site of feeding tube, whether present or not, for color, drainage and/or malfunction.
4. Assess for dehydration (see **Non-traumatic Shock** section).
5. If stoma is bleeding, apply sterile dressing and use pressure to stop bleeding.
6. Keep NPO and nothing per feeding tube.
7. If tube is out or broken, bring any parts of the broken tube with you.
8. Transport in position of comfort for medical evaluation.

ADVANCED LIFE SUPPORT

1. Follow BLS procedures.
2. If feeding tube is percutaneous and has come out:
 - Place an 8 fr suction catheter in the stoma 2-3 inches to prevent it from closing.
 - Tape the tube to the skin.

3. If patient has G-tube and is in respiratory and/or abdominal distress:
 - G-tube may be gently aspirated or opened to air to allow for gastric content drainage and decompression.
 - Wrap end with diaper (a G-tube button needs access adapter to do this).
4. Transport in position of comfort for medical evaluation.

Key Points/Considerations

- Family members are many times the best resource for patient care.
- Some tubes continue on to the jejunum; do not try to replace or remove tube.

Tracheostomy

Definition: A tracheostomy is a surgical opening that creates a stoma between the trachea and the anterior surface of the neck in order to bypass the upper airway.

Indication: Upper airway obstruction, long-term ventilation and facilitating the movement of secretions in those with ineffective, or no gag or swallow reflex.

BASIC LIFE SUPPORT

1. Refer to **General Pediatric Assessment** guidelines.
2. Position child to open and assess airway (placing a towel roll under the shoulders).
3. Assist ventilations with bag valve with 100% O₂ if patient is apneic, unresponsive, or if the patient has severe respiratory distress or depression.
4. If unable to ventilate, suction tracheostomy, then reattempt ventilatory efforts.
5. If still unable to ventilate: attempt BVM (may need to place gloved finger over tracheostomy).
6. Initiate CPR as indicated for specific **Cardiac** section.
7. Perform tracheal, oral and nasal suctioning for secretions.
 - Oxygenate between passes with the suction catheter.
8. Transport for medical evaluation.

ADVANCED LIFE SUPPORT

1. Follow BLS procedures.
2. Place on cardio-respiratory monitor and continuous pulse oximeter.
3. If unable to ventilate through tracheostomy, change tracheostomy tube with a same sized or smaller tracheostomy tube.
4. If unable to pass a smaller tracheostomy tube:
 - Pass an endotracheal tube through stoma about 1-2 inches.
 - Secure and ventilate.
 - Gauge depth based on breath sounds - a right main-stem intubation is likely.
5. If still unable to ventilate, attempt oral endotracheal intubation or place other airway adjuncts.
6. Attempt to ventilate via BVM applied to the tracheostomy site, or cover the site and ventilate through the mouth.

Once airway is secure:

7. If stridor or wheezing present, administer nebulized epinephrine.
8. For abdominal distension, place NG tube or open gastric tube to decompress stomach.
9. Continue to reassess airway with suctioning, positioning and ventilation.
10. Transport for medical evaluation.

Key Points/Considerations

- Keep patients NPO and nothing per gastric tubes if they have respiratory distress or a respiratory rate > 60.
- If patient has a gastric tube, open it up to allow for gastric decompression (may need adapter for GT buttons).
- Family members are many times the best people to change tracheostomy tube, suction and use as a resource for patient care.

Medication/Treatments Table

MEDICATION	DOSE	ROUTE	MAX. DOSE
Epinephrine 1:1000 (1mg-mL)	2mL in 3mL saline	Neb	Call for additional doses

SECTION 7: Safely Transporting Children in Ambulances

1. Immobilize the child on an age-appropriate device to maintain the head, neck, spine, and extremities.
2. The receiving hospital may not be the nearest facility, especially if specialty pediatric care is felt to be necessary. Contact medical control to aid with decision making regarding destination.
3. Notify receiving hospital according to trauma and destination guidelines

DO	DO NOT
<ul style="list-style-type: none">✓ Secure pediatric patients in an appropriate child restraint system.✓ Consider a child's age and weight when determining an appropriate restraint system.✓ Transport children who are not patients, properly restrained, in an alternate passenger vehicle, whenever possible.✓ Allow parents and caregivers to ride in the patient compartment with their child, but only if they are also properly restrained.	<ul style="list-style-type: none">✗ TRANSPORT A CHILD ON A PARENT'S LAP ON THE STRETCHER.✗ Transport a child in a child restraint seat on the multi-occupant "bench seat" or "CPR Seat."✗ Transport children in their own safety seats if the seat was involved in a crash, unless no other alternatives are available and the seat is undamaged.✗ Leave monitoring devices or other equipment unsecured in a moving EMS vehicle.

Destination

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 guidelines. 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 guideline for identifying children in severe respiratory distress?
 - Do they have a pediatric rapid sequence induction training (including PALS / CALS training)?
 - Are they always available?
- Vascular access
 - Does the department regularly start IVs on children?
 - Down to what age are they comfortable?
 - Are personnel trained in the use of IO?

- Guidelines
 - Does the department have a pediatric transfer guideline?
 - 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 guidelines?
- 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?

SECTION 8: Family Centered Care (FCC)

Definition: Family Centered Care is a mutually collaborative health care effort between family, patient and provider and has proved essential in providing effective patient care. It is an art as well as a skill, and therefore, it requires practice.

Demonstration: Demonstration of family centered care is in one's actions and behaviors when caring for patients. These actions and behaviors include: Attention to human needs, Respect, Patient accountability, Inclusiveness, Communication with families, Collaboration with families, and Cultural and Developmental Competency.

Family centered care is demonstrated in practice, not just policy development.

Attention to Human Needs: Treat patients and families as individuals and people with problems just like yourself. Use a person's name. It is okay to ask a parent/guardian or caregiver their first name so that you can call them by name. Let them know what to expect in advance (if you can). Treat families and their relatives with respect and consider the needs of the entire family. Include families in the decision making process.

Respect: Treat others with the same respect that you want to receive yourself. This starts with your patient and their family and it shows in your interaction with your partner, colleagues, hospital staff and the public.

Patient Accountability: At the end of a call, can you say: "I did my very best for my patient. I considered their needs and the needs of the entire family."

Inclusive: Provide direct, honest and open communication. Use a calm and nonjudgmental tone of voice. Engage the child and family; treat both with respect. Include a family member in resuscitation and decision making as they desire and are capable. If possible, designate a crew member to be a liaison to the family in order to facilitate communication and continuity.

Communicate with Families: Identify yourself to the child and the family.

Identify a team member that would interact with the family and keep them updated. Ask them how they would like to be addressed and how the patient likes to be addressed. Watch for ways to distract the child, i.e., a story, toy, blanket, humor, pen light, etc. Watch for verbal and non-verbal cues as to whether they seem to understand the information that is being presented. Speak simply about what you are doing.

Tell the family what you are about to do and what they can expect.

Pay attention to your tone of voice. Allow and encourage conversation between the parent/guardian or caregiver and the child. Ask open-ended questions, i.e., “tell me about your pain.”

Touch the child in a non-invasive way as well as allow the family to touch and nurture their child if at all possible.

Collaboration with Families: Empower the patient and the family by involving them in the care as well as the decision making process. Family Centered Care is a skill requiring competency and caring. Like any other fine-tuned skill, it requires practice. Gather staff and develop language on how to describe the situation so information is consistent. Family Centered Care = compassion.

Cultural Competency: Respect, sensitivity, and an understanding of the unique cultural and religious differences. Be aware of any language barriers.

If at all possible, engage an interpreter that is able to understand some of the emotional issues as well as medical terminology associated with a trauma.

An understanding of the hierarchy of the family is key to a positive outcome.

Developmental Competency: Use appropriate language for the age.

When in pain or hurt, children often regress to childhood issues or more infantile responses. They may still need attachment items late in life. Describe what you will be doing. Use eye contact and touch when appropriate. Be respectful at all times.

Infants: General calming measures (soft voices, gentle pats, pacifiers or rocking)
Allow parents/guardians or caregivers to stay close and bonded with the child and help them to anticipate the situation if possible.

Toddlers: toys, teddy bear, blanket

Parents/guardians/caregivers or family members are often a great source of comfort and nurturing. Allow them to be present.

School Age: attachment objects, honesty about procedures, “no owies until I tell you,” imaginary thinking (I made the car crash, I told a lie and that is why mom is hurt). Refrain from conversations about a child’s treatment unless you are including them.

Adolescents: Physician and provider honesty is key, as well as paying attention to pain. Help them to participate in their own care and take their views seriously.

Focus on giving them some sense of control. Pain management is key.

Adolescents as well as adults are afraid of pain. The anticipation of pain can be worse than the pain itself. Some transitional objects/toys/stuffed animals can also be useful. Respect their privacy and modesty as much as possible. Allow them to discuss what is happening both with and without caregivers around.

Teaching Points:

The “art of family-centered-care” requires practice and thoughtfulness.

Family Centered Care is an art as well as a skill and therefore it requires practice. Are we willing to join hands in order to practice our skills? As a parent/guardian or caregiver, I need you. As a provider, you need me. We all want to make a difference in our own lives, in our communities, and in the lives of our children. It is never going to be “ok” for a parent/guardian/caregiver or a child to be where we are in this event. As parents/guardians/caregivers or patients our wish would be to never need this type of help.

Family Centered Care is looking into the eyes of a parent/guardian/caregiver or child and seeing the hurt as well as the hope. The hope is the easy part. Listen before you speak and help us to understand. As a parent/guardian or caregiver I most likely have had little practice in what I am about to do in this emergency situation. You, as a provider have an awareness of the possibilities before me. We are all standing in one of the most intimate and vulnerable experiences of any human being. “I will most likely not remember all the medical information you communicate to me. What I will remember is how you made me feel, even when you delivered bad news.”

Give Life a Chance Law

Definition: Under Minnesota state law, a mother or her designee may safely relinquish care and custody of a newborn child under the age of 7 days old to an employee of a “safe place” which include a hospital, urgent care or ambulance service. The mother is immune from criminal or civil liability if acted in good faith and the child is unharmed.

DO: Accept the baby, no questions asked and transport newborn to a hospital.

DO NOT: Ask identity of baby, mother or designated person nor call the police.

Clinical Presentation: It may be difficult to determine age of infant; this guideline should be used for any abandoned infant. The infant may have symptoms of hypothermia, hypoglycemia, and dehydration.

BASIC LIFE SUPPORT

1. Refer to **General Pediatric Assessment** guidelines.
2. Obtain vital signs.
3. Assure newborn is warm and dry.
4. Maintain airway, administer 10-15 lpm of oxygen if signs of respiratory distress.
 - If respirations are ineffective, begin BVM ventilation.
 - Suction as needed.
5. Check glucose, offer infant oral glucose if <60 mg/dl.
6. Do not delay transport.

ADVANCED LIFE SUPPORT

1. Follow BLS procedures.
2. Place on cardio-respiratory monitor and continuous pulse oximeter.
3. Intubate if unable to effectively ventilate with BVM.
4. Assess for signs of shock and obtain IV/IO if necessary.
 - Give NS or LR 10 mL/kg
 - Give D10W, if glucose <60 mg/dL
5. Refer to **Assessment of the Neonate** guideline as needed.
6. Contact medical control.
7. Transport for medical evaluation.

SECTION 9: Preparedness

Disaster/Mass Casualty Incident

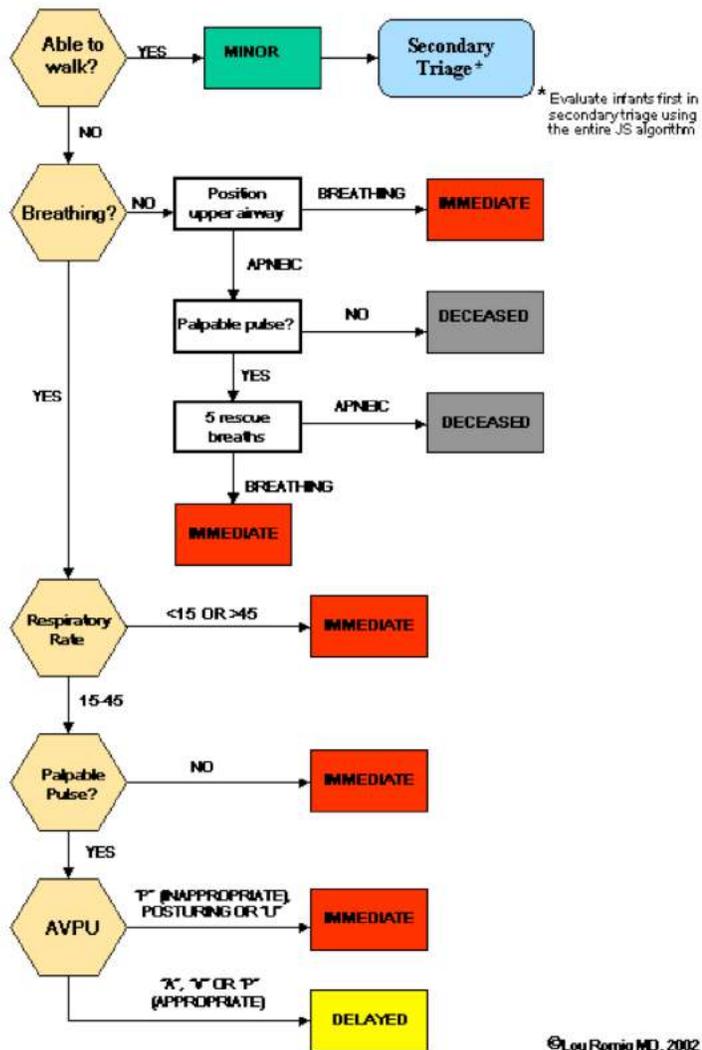
Definition: Mass Casualty Incidents are events incurring casualties large enough to disrupt the normal deployment of the emergency healthcare services of the affected community. A disaster event includes natural occurrences such as tornados, earthquakes, floods and man-made occurrences such as intentional harm or destruction inflicted on a group of people.

Incident Management System: it is imperative that first responders set up an incident management system. EMS responders will likely be assigned to a medical group that will be responsible for triage, treatment or transport of victims.

Triage

First responders will be responsible for immediate triage of all patients. For pediatric patients, it is recommended that the Jump START triage system be used.

JumpSTART Pediatric MCI Triage[®]



Treatment

Consider type of injury and exposure and refer to appropriate treatment guideline:

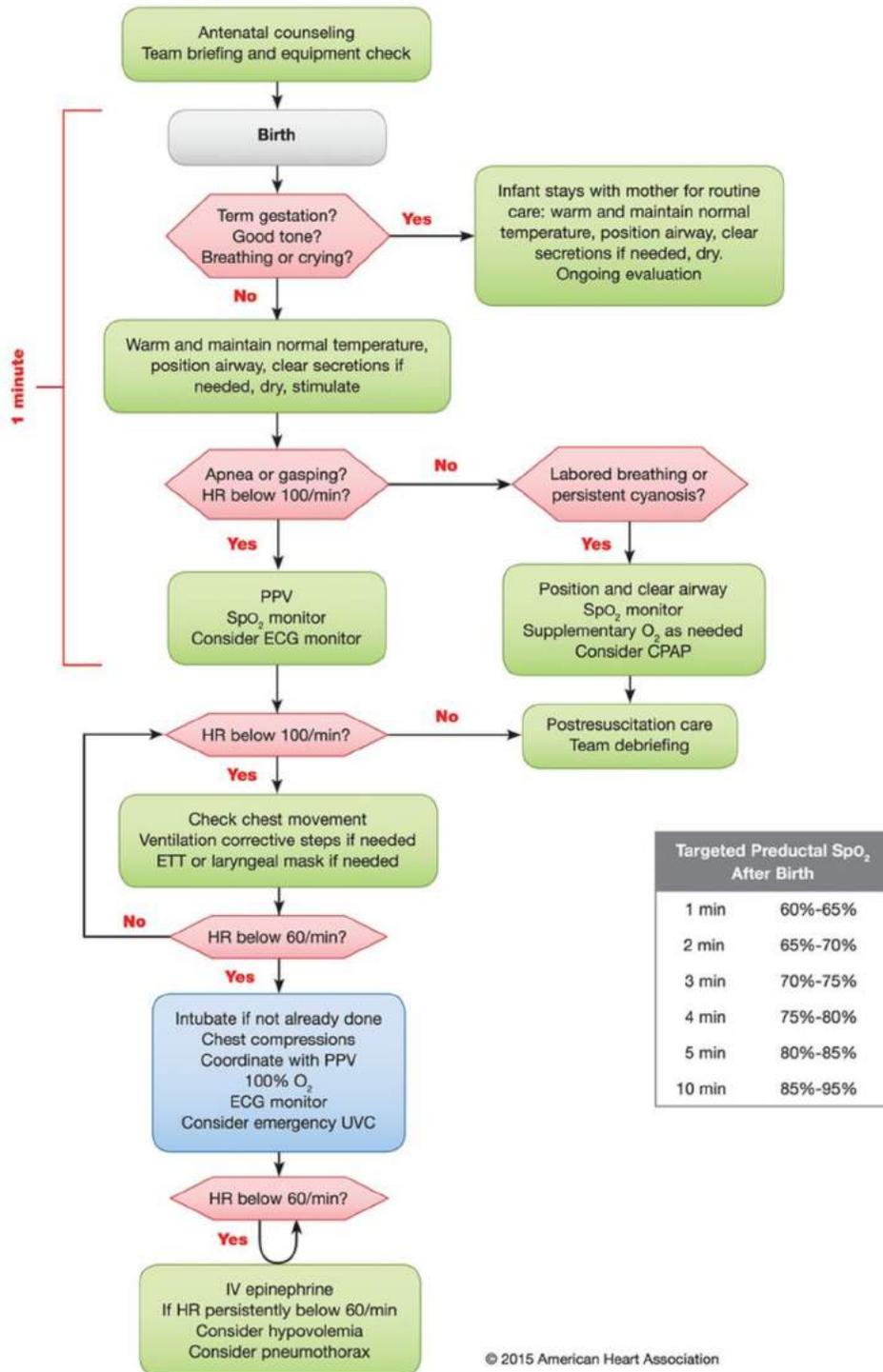
- Burn
- Trauma
- Poisons and Overdoses
- Cholinergic

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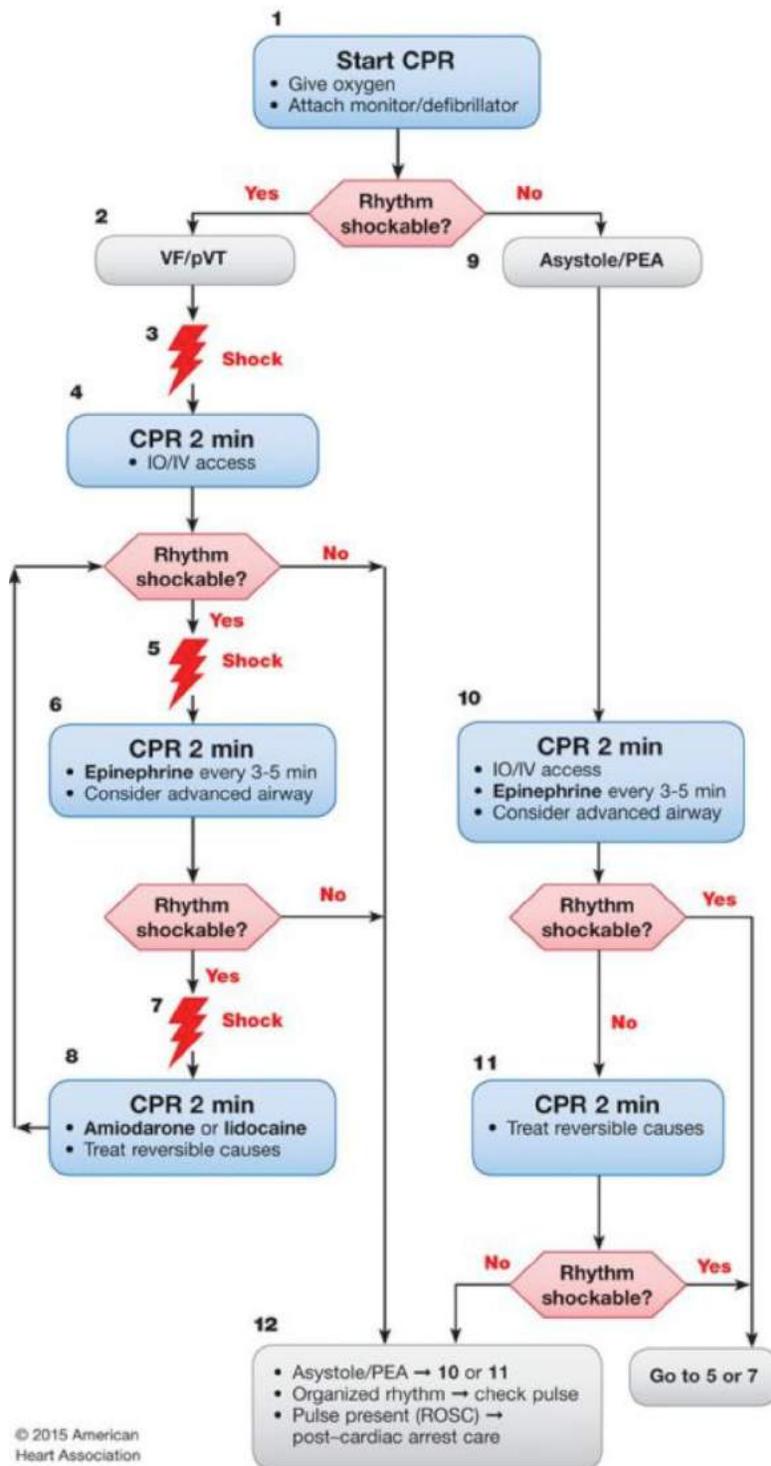
Neonatal Resuscitation Algorithm—2015 Update



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Pediatric Cardiac Arrest Algorithm—2015 Update



CPR Quality
<ul style="list-style-type: none"> • Push hard (≥$\frac{1}{3}$ of anteroposterior diameter of chest) and fast (100-120/min) and allow complete chest recoil. • Minimize interruptions in compressions. • Avoid excessive ventilation. • Rotate compressor every 2 minutes, or sooner if fatigued. • If no advanced airway, 15:2 compression-ventilation ratio.
Shock Energy for Defibrillation
First shock 2 J/kg, second shock 4 J/kg, subsequent shocks ≥ 4 J/kg, maximum 10 J/kg or adult dose
Drug Therapy
<ul style="list-style-type: none"> • Epinephrine IO/IV dose: 0.01 mg/kg (0.1 mL/kg of 1:10 000 concentration). Repeat every 3-5 minutes. If no IO/IV access, may give endotracheal dose: 0.1 mg/kg (0.1 mL/kg of 1:1000 concentration). • Amiodarone IO/IV dose: 5 mg/kg bolus during cardiac arrest. May repeat up to 2 times for refractory VF/pulseless VT. • Lidocaine IO/IV dose: Initial: 1 mg/kg loading dose. Maintenance: 20-50 mcg/kg per minute infusion (repeat bolus dose if infusion initiated >15 minutes after initial bolus therapy).
Advanced Airway
<ul style="list-style-type: none"> • Endotracheal intubation or supraglottic advanced airway • Waveform capnography or capnometry to confirm and monitor ET tube placement • Once advanced airway in place, give 1 breath every 6 seconds (10 breaths/min) with continuous chest compressions
Return of Spontaneous Circulation (ROSC)
<ul style="list-style-type: none"> • Pulse and blood pressure • Spontaneous arterial pressure waves with intra-arterial monitoring
Reversible Causes
<ul style="list-style-type: none"> • Hypovolemia • Hypoxia • Hydrogen ion (acidosis) • Hypoglycemia • Hypo-/hyperkalemia • Hypothermia • Tension pneumothorax • Tamponade, cardiac • Toxins • Thrombosis, pulmonary • Thrombosis, coronary

American Heart Association, <https://eccguidelines.heart.org>

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