

Overview of the Pediatric Patient

Pediatric Assessment Process and Management

A patient under the age of Twelve or under 100 pounds is considered a pediatric patient. Utilization of pediatric treatment guidelines and the extent of care rendered are based on the general impression of the pediatric patient's condition, physical examination findings and the history of the event. (Patient's 12 years or older or over 100 pounds will be treated with adult protocols)

The goal of the pediatric patient assessment process is similar to that of the adult patient; however, children are not little adults. The causes of catastrophic events, such as cardiac arrest, are most often related to respiratory failure, shock or central nervous system injuries. Early recognition and treatment of the pediatric patient's injuries or illness is important to ensure the best outcome.

Special attention and awareness must be given to the pediatric patient's exceptional ability to compensate for respiratory failure and shock. Vital signs are valuable in the assessment of the pediatric patient. However, these statistics have significant limitations and can be dangerously misleading. Hypotension is a late and often sudden sign of cardiovascular decompensation. Tachycardia (which varies by age group) will persist until cardiac reserve is depleted. Bradycardia is an ominous sign of impending cardiac arrest.

Infants and children are able to maintain their blood pressure by increasing peripheral vascular resistance (shunting) and heart rate. **The pediatric patient can be in compensated shock and exhibit a normal blood pressure and skin condition.** This increases the importance of the EMS providers understanding of pediatric vital signs and behavior patterns.

The EMS provider must establish a general impression of the pediatric patient. This impression, which is critical, should be done from the "doorway" of the room. Therefore the pediatric patient will not be disturbed by a "hands-on" assessment. **Three key areas of importance of a general impression are appearance, work of breathing, and circulation to skin.** The three components are known as the Pediatric Assessment Triangle (PAT) established by the American Academy of Pediatrics (2000).

Appearance

The appearance of the pediatric patient should be assessed from the "doorway." The appearance is the most important aspect to consider when determining how sick or injured the child is. Appearance will give the EMS provider insight on oxygenation, neurological status, and ventilation. Remember, the sick child may be alert on the conventional AVPU scale, but still have an abnormal appearance. Children need a more subtle assessment tool; this way life threatening injuries can be identified earlier. A good Mnemonic to remember when assessing appearance is "tickles" (TICLS):

The TICLS Mnemonic (PEPP / AAP 2000)

Characteristic	Features to look for.
<u>T</u>one	Is she moving or resisting examination vigorously? Does she have good muscle tone? Or is she limp, listless, or flaccid?
<u>I</u>nteractiveness	How alert is the child? How readily does a person, object, or sound distract her or draw her attention? Will she reach for, grasp, and play with a toy or exam instrument, like a penlight or tongue blade? Or is she uninterested in playing or interacting with the caregiver or prehospital professional?
<u>C</u>onsolability	Can she be consoled or comforted by the caregiver or by the prehospital professional? Or is her crying or agitation unrelieved by gentle assurance?
<u>L</u>ook / Gaze	Does she fix her gaze on a face? Or is there a "nobody home," glassy-eyed stare?
<u>S</u>peech / Cry	Is her speech or cry strong and spontaneous? Or is it weak, muffled, or hoarse?

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Work of Breathing

Assessing work of breathing must go beyond the rate and quality of respiration that is used for adult assessment. Work of breathing is an accurate indicator of the oxygenation and ventilation status of the pediatric patient. This is another “hands-off” evaluation method, so not to disturb the pediatric and cause more respiratory stress, than whatever is already present.

Characteristics of Work of Breathing (PEPP/ AAP 2000)

Characteristic	Features to look for
Abnormal Airway sounds	Snoring, muffled or hoarse speech, stridor, grunting, wheezing
Abnormal positioning	Sniffing position, tripodding, refusing to lie down
Retractions	Supraclavicular, intercostals, or substernal retractions of the chest wall; head bobbing in infants
Flaring	Nasal flaring

Circulation to Skin

A rapid circulatory assessment is to determine the perfusion status of the pediatric patient. The key is to assess the core perfusion status of the child; assessing the skin and mucous membranes can do this. Circulation to this organ (skin) reflects the overall status of core circulation.

Characteristics of Circulation to Skin (PEPP / AAP 2000)

Characteristic	Features to look for
Pallor	White or pale skin or mucous membrane coloration from inadequate blood flow
Mottling	Patchy skin discoloration due to vasoconstriction
Cyanosis	Bluish discoloration of skin and mucous membranes

Putting it all Together

The goal of pediatric patient care is to identify patients in shock or at risk of shock, initiating care that will directly assist maintaining the patient’s perfusion and safely transporting the patient to an emergency department or trauma center in a timely manner. The benefit of remaining on scene to establish specific treatments verses prompt transport to a definitive care facility should be a consideration of each patient contact. Requesting advanced assistance is another important resource BLS and ILS providers should consider.

NOTES ON PEDIATRIC SHOCK		
Mechanism	Medical	Traumatic
Hypovolemia	Blood Loss – Internal Bleeding	Blood Loss – Trauma
	Fluid Loss – Dehydration	Fluid Loss – Burns
Cardiogenic (Pump failure)	Respiratory Failure	Chest Trauma
	Respiratory Obstruction	Pneumothorax
	Dysrhythmia	Pericardial Tamponade
Vessel Failure	Sepsis	Spinal Cord Injury (neurogenic)
	Anaphylaxis	
	Endocrine Dysfunction	
	Chemical/Poisoning	

Pediatric Patient Age Definitions and Assessment Considerations

Neonate (0-1month): Utilization of APGAR scoring is helpful in assessing the neonate patient.

Infant (1-12 months):

1. Children over six months of age are usually best examined in the arms of a parent. "Stranger anxiety" may be present and may eliminate other assessment options.
2. Approach the infant slowly and calmly. Fast motion and loud noises may startle or agitate the infant.
3. Calm the infant with pacifier, blanket, or favorite toy.
4. Use warm hands and assessment tools.
5. Avoid doing anything potentially painful or distressing until after the assessment is completed.
6. Have caregiver assist in care; this is less threatening to the infant.

Toddler (1-2 years):

1. Approach the toddler slowly; keep physical contact at a minimum until he/she feels familiar with you.
2. Perform the assessment at the level of the toddler by sitting or squatting.
3. Allow toddler to remain in the caregiver's lap.
4. Give limit choices such as "Do you want me to listen to your belly or feel your wrist first"
5. Talk to the toddler, preferably about himself, or recent event. A toddler is the center of his universe.
6. Use simple concrete terms, Use a lot of reassurance.
7. Assessment should be toe-to-head. This is less threatening, and the toddler gets familiar with being assessed.
8. Do not expect the toddler to sit still and cooperate, be flexible.

Preschooler (3-5):

1. A preschool-aged child is a "magical thinker"; concrete concepts must be described in short, simple terms.
2. A preschool-aged child is often very cooperative during the assessment process and may be able to provide a history.
3. Questions should be simple and direct.
4. Do not lie to the child, if the procedure is going to hurt, tell them.
5. Allow the child to handle equipment.
6. Set limits on behavior; for example, "you can cry or scream, but don't bite or kick"
7. Use distractions.
8. Focus on one thing at a time.
9. Play games with immobilized preschoolers to distract him /her and prevent squirming.

School Age (6-13):

1. The school-aged child is usually cooperative and can be the primary sources for the patient history.
2. Explain all procedures simply and completely and respect the patient's modesty.
3. Substance abuse issues may be present in this age group and should be considered during the care of altered level of consciousness cases.
4. Don't negotiate patient care unless the child really has a choice.
5. Let the child be involved in the care. Children at this age are afraid of losing control.
6. Praise the child for cooperating.
7. Reassure the child that being ill or injured is not a punishment.

Adolescent (14-17):

1. The adolescent is more of an adult than a child and should be treated as such. Depending on the nature of the problem, an accurate history may not be possible with parents observing. It may be necessary to separate the parents and child during the assessment.
2. Regardless of who is present, respect the patient's modesty; avoid exposing the adolescent unnecessarily.
3. Explain what you are doing and why.
4. Talk to the teen about care and decision making, when appropriate.
5. Show respect. Speak to the teen directly; do not turn to the caregiver for the initial information.

**PROCEDURE
Assessment of the Pediatric Patient**

Note: **Trauma patients should be treated according to Pediatric PHTLS guidelines.**

1. Scene Size-Up: (Same as adult with following special pediatric considerations.)
 - A. Note anything suspicious at the scene; i.e., medications, household chemicals, other ill family members.
 - B. Assess for any discrepancies between the history and the patient presentation; i.e., infant fell on hardwood floor, however floor is carpeted.

2. General Approach to the Stable/Conscious Pediatric Patient:
 - A. Assessments and interventions must be tailored to each child in terms of age, size and development:
 - Smile if appropriate to the situation.
 - Keep voice at even quiet tone don't yell.
 - Speak slowly; use simple, age appropriate terms.
 - Use toys or penlight as distracters; make a game of assessment.
 - Keep small children with their caregiver(s); encourage assessment while caregiver is holding child.
 - Kneel down to the level of the child if possible.
 - Be cautious in use of touch. In the stable child, make as many observations as possible before touching (and potentially upsetting) the child.
 - Adolescents may need to be interviewed without their caregivers present if accurate information is to be obtained regarding drug use, alcohol use, LMP, sexual activity, child abuse.

 - B. While walking up to the patient, observe/inspect the following:
 - General appearance, age appropriate behavior. Malnourished appearance? Is child looking around, responding with curiosity or fear, playing, sucking on a pacifier or bottle, quiet, eyes open but not moving much or uninterested in environment?
 - Obvious respiratory distress or extreme pain.
 - Position of the child. Are the head, neck or arms being held in a position suggestive of spinal injury? Is the patient sitting up or tripodding?
 - Level of consciousness, i.e. awake vs. asleep or unresponsive.
 - Muscle tone: good vs. limp.
 - Movement: spontaneous, purposeful, symmetrical.
 - Color: pink, pale, flushed, cyanotic, mottled.
 - Obvious injuries, bleeding, bruising, impaled objects or gross deformities.
 - Determine weight - ask child or caretakers or use length/weight tape.

3. Initial Assessment:
 - A. Airway Access/Maintenance with Cervical Spine Control:
 - Maintainable with assistance: positioning.
 - Maintainable with adjuncts: oral airway, nasal airway.
 - Maintainable with endotracheal tube.
 - Listen for any audible airway noises; i.e., stridor, snoring, gurgling, wheezing.
 - Patency: suction secretions as necessary.

 - B. Breathing:
 - Rate and rhythm of respirations. Compare to normal rate for age and situation.
 - Chest expansion - symmetrical.
 - Breath sounds - compare both sides and listen for sounds (present, absent, normal, abnormal).
 - Positioning - sniffing position, tripod position.

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- Work of breathing - retractions, nasal flaring, accessory muscle use, head bobbing, grunting.
- C. Circulation:
- Heart rate - compare to normal rate for age and situation.
 - Central/truncal pulses (brachial, femoral, carotid) - strong, weak or absent.
 - Distal/peripheral pulses - present/absent, thready, weak, strong.
 - Color - pink, pale, flushed, cyanotic, mottled.
 - Skin temperature - hot, warm, cool.
 - Blood pressure - compare to normal for age of child. Must use appropriately sized cuff.
 - Hydration status - anterior fontanel in infants, mucous membranes, skin turgor, crying tears, urine output history.
- D. Disability - Brief Neurological Examination:
- Assess Responsiveness- AVPU or APGAR
 - Assess pupils.
 - Assess for transient numbness/tingling.
- E. Expose and Examine:
- Expose the patient as appropriate based on age and severity of illness.
 - Initiate measures to prevent heat loss and keep the child from becoming hypothermic.
4. **Rapid Assessment vs. Focused History and Physical Assessment:**
- A. Tailor assessment to the needs and age of the patient.
- B. Rapidly examine areas specific to the chief complaint.
- C. Responsive Medical Patients: Perform focused assessment based on chief complaint. A full review of systems may not be necessary. If chief complaint is vague, examine all systems - proceed to detailed exam.
- D. Unresponsive Medical Patients:
- i. Perform rapid assessment: ABC's, quick head-to-toe exam.
 - ii. Emergency care based on signs and symptoms, initial impressions and standard operating procedures - proceed to detailed exam.
- E. Trauma patient with NO significant mechanism of injury: Focused assessment is based on specific injury site.
- F. Trauma patient WITH significant mechanism of injury: Perform rapid assessment of all body systems -proceed to detailed exam.
5. **Detailed Assessment:**
- A. SAMPLE History - Acquire during/incorporate into physical exam.
- B. Vital Signs (Pulse, Blood Pressure, Respirations, Skin Condition)
- C. Assessment is performed to detect non life-threatening conditions and to provide care for those conditions/injuries. Usually performed en route. May be performed on scene if transport is delayed.
- i. Inspect and palpate each of the major body systems DCAP-BLS-TIC
 - ii. Auscultation of breath and heart sounds.
6. **Ongoing Assessment:**
- To effectively maintain awareness of changes in the patient's condition, repeated assessments are essential and should be performed **at least every 5 minutes on the unstable patient, and at least every 15 minutes on the stable patient.**

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Normal Vital Sign Ranges, Pediatric			
	Heart Rate	Respiratory Rate	Blood Pressure
Infant	100-160/ min	30-60/ min	>60
Toddler	90-150/ min	24-40/ min	>70 + (2 X age)
Preschooler	80-140/ min	22-34/ min	>70 + (2 X age)
School-aged	70-120/ min	18-30/ min	>70 + (2 X age)
Adolescent	60-100/ min	12-16/ min	>90

PROTOCOL

Routine (Initial) Pediatric Care

First Responder Care should be focused on assessing the situation and establishing initial care to treat and prevent shock.

1. Open and/or maintain an open airway. Have suction readily available. Suction nose and mouth as needed.
2. Protect the child from environmental exposure. Give special consideration to warmth of the infant patient especially covering of head to prevent heat loss
3. Reassure patient and parents. Speak softly and calmly maintaining continuous flow of conversation with explanation of exam and treatment. Use age-appropriate communication techniques.
4. Patient positioning will be based on assessment, patient age and development, condition and safety. Toddlers may require parent involvement in positioning. Both the parent and the child should have appropriate seat belts and restrain devices in place for transport.
5. Administer oxygen, preferably 15 L/min by mask. If the patient does not tolerate a mask, then administer 2-4 L/min by nasal cannula or 6 -10 blow by.
6. Ensure EMS has been activated for further care & transport. Provide patient and situation information to responding EMS units.
7. Monitor patient's vital signs, level of consciousness, etc. for any acute changes.

BLS Care should be directed at conducting a thorough patient assessment, providing care to treat for shock and preparing or providing patient transportation.

1. BLS care includes all the components of First Responder Care.
2. Attach pulse oximeter and obtain analysis (if available).
3. Attach cardiac monitor to the patient and evaluate EKG rhythm, if indicated.
4. Initiate ALS intercept, if indicated.
6. Simultaneously with above, obtain history, vitals and perform physical assessment/exam.
 - Vitals are to include pulse, respiration, blood pressure (all ages), capillary refill and pulse-oximetry, and blood glucose level.
5. Establish on-line medical communications as indicated
6. Perform an on-going exam while transporting.
7. Patient transportation should be initiated at earliest possible opportunity.

ALS / ILS Care should be directed at conducting a thorough patient assessment, providing care to treat for shock and preparing or providing patient transportation. The necessity of establishing IV / IO access is determined by the patient's condition and chief complaint. Consideration should also be given to the proximity of the receiving hospital.

ALS / ILS care includes all the components of BLS care. If indicated, establish IV/ IO of Normal Saline (1000cc). IF fluid is not required the pediatric patient will get a saline lock.

Critical Thinking Elements

- When determining the extent of care needed to stabilize the pediatric patient the EMS provider should take into consideration the patient's presentation, chief complaint, risk of shock and proximity to the receiving facility.
- IV access in pediatric patients is difficult and may complicate situation. Indications and benefits versus patient disturbance and complications should be considered.
- If patient exhibits signs of shock, consider bolus of 20cc/kg over 2 minutes.
- If pediatric patient is in emergent need of fluids and/or medications (i.e., cardiac arrest, trauma, decompensating shock or severe burns) and peripheral IV is unobtainable, consider intraosseous infusion.
- Saline Locks may be used as a drug administration route if fluid replacement is not indicated.
- IV access should not significantly delay initiation of transportation or be attempted on scene with a trauma patient meeting load-and-go criteria.

PROCEDURE
Airway Management of the Pediatric Patient

DESCRIPTION: Establishing and maintaining an open airway and assuring adequate ventilation is a treatment priority with all patients. Special consideration needs to be given when caring for the pediatric patient airway due to anatomical differences from the adult.

INDICATIONS: Any pediatric patient.

MATERIALS/EQUIPMENT: PPE, Pocket Face Mask (with barrier protection), Pediatric and Child Bag-Valve-Mask (with reservoir bag and oxygen inlet), Oropharyngeal and Nasopharyngeal airways (of various pediatric sizes), Suction equipment (with connecting tubing and tips) Oxygen Delivery System, Infant and Pediatric Nasal Cannula and Mask, 0-3 Miller and Mac Blades, Laryngoscope handle, tubes 3.5-5.0 Uncuffed, pediatric stylet, tube check device (Carbon dioxide detector, Pediatric or an aspiration bulb)

PROCEDURE:

1. Assess Airway: Assess and establish the presence and adequacy of breathing. If necessary, assure an open airway by utilizing either the head-tilt/chin-lift maneuver or the modified jaw-thrust (without head-tilt) maneuver, with the following special considerations.
 - A. The pediatric airway varies anatomically from the adult airway. The airway is smaller and more flexible, the tongue is relatively larger, and the glottis is higher. These differences must be taken into consideration when positioning the head to maintain the airway (i.e., less hyperextension is needed to open the pediatric airway than the adult).
 - B. The head-tilt/chin-lift maneuver is NOT to be used if there is any possibility of cervical spine injury.
 - C. Airway adjuncts must be of an appropriate size, which is determined by evaluating the patient's airway size and/or utilizing estimation tables. Basic life support may be effectively administered to the pediatric patient without the use of airway adjuncts.
 - D. Mucus, blood and vomit may easily plug small pediatric airways; therefore, careful attention must be given to clearing the airway.
 - E. Adult suction catheters should not be used on pediatric patients.

2. Assess Breathing: Expose the chest and visualize for chest rise and movement, simultaneously listen and feel for air movement at the mouth and nose. This procedure will need to be done initially and after correcting an obstruction and securing the airway.
 - A. If chest is not rising and air exchange cannot be heard or felt:
 - i. Deliver two positive-pressure ventilations. If resistance is felt re-position the head and re-attempt ventilations. If resistance continues, follow AHA or ARC sequences for obstructed airway rescue.
 - ii. Reassess breathing and check for a carotid or brachial pulse.
 - iii. If spontaneous respirations return and a pulse is present, provide supplemental oxygen by NRM or assist respirations with bag-valve-mask at 15L/min. Bags used for resuscitation should be sized for the child or infant and should not be equipped with pressure relief or "pop-off" valve.

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- iv. If the patient remains breathless and a pulse is present, initiate positive-pressure ventilation with supplemental oxygen (15L/min). Ventilation at the rate of 12-20 breaths per minute.
- v. If the patient remains breathless and a pulse is not present, initiate CPR and institute appropriate cardiac protocol.
- B. If noisy, stridorous or snoring respirations render treatment for partial airway obstruction (PAO).
 - i. Reassess effectiveness of airway maneuver.
 - ii. If PAO persists, suction the airway and visualize the pharynx for any evidence of foreign objects. Perform a finger sweep if a foreign object can be seen. Do not perform blind finger sweeps.
 - iii. If PAO persists, treat as if patient in accordance with AHA and ARC guidelines for resolving a COMPLETE AIRWAY OBSTRUCTION (CAO).
- 3. Secure the Airway (only after obstruction corrected).
 - A. Airway adjuncts must be of an appropriate size, which is determined by evaluating the patients' airway size and/or utilizing estimation tables.
 - B. Basic life support may be effectively administered to the pediatric patient without the use of airway adjuncts.
 - C. Oropharyngeal airways may be used if the patient is unconscious (without gag reflex).
 - D. Nasopharyngeal airways may be used if the patient is conscious or has a gag reflex.
- 4. Advanced Airway Control.

Pediatric intubation is relatively uncommon. If the paramedic does not feel confident in the procedure, the airway should be maintained by more basic measures. When intubation is attempted special consideration should be given to the following:

Airway Management and Age Considerations:

If the child is **at least 3-years old**, intubate the patient and provide ventilation at a rate of 20 breaths per minute with high-flow oxygen.

If the child is **less than 3-years old**, position airway and provide ventilation at a rate of 25 – 30 breaths per minute with high-flow oxygen.

- A. Select the appropriate equipment size based on patient size.
- B. Uncuffed tubes are generally used on children less than 8 years old.
- C. Do not hyperextend the child's neck during the intubation attempt. The child's head should be in the "sniffing" position.
- D. Monitor the heart rate closely. If bradycardia develops, discontinue the attempt and immediately hyperventilate the patient.
- E. A straight laryngoscope blade is recommended for infant intubation.
- F. Tube confirmation should be done by: Visualization, Auscultation of lung sounds, and use of a tube checker. (Pediatric Carbon dioxide detector, or aspiration bulb if child is greater than 15kg)
- G. A cuffed tube may be used in conjunction with a manometer to monitor cuff pressures.

Special Considerations:

- Pediatric intubation is relatively uncommon. Attempting a difficult and unfamiliar procedure poses danger to the patient. The greatest danger to the patient is wasting too much time attempting the difficult procedure. Time is precious, if you cannot intubate in two attempts, use another method of airway control **but do not delay the patient's transport.** Do not interrupt ventilation for more than 30 seconds per attempt.
- **Basic life support may be effectively administered without the use of airway adjuncts or intubation.**

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**PROCEDURE
Pediatric Intravenous Cannulation**

DESCRIPTION: Intravenous Cannulation is used in the prehospital setting to establish use a drug administration route (lifeline) and/or provide fluid replacement. Intravenous cannulation should not significantly delay scene times or be attempted while on scene with a trauma patient who meets load-and-go criteria.

MATERIALS/EQUIPMENT: PPE, intravenous fluid (Normal Saline, 1000cc), administration set, buretrol set, intravenous catheter of various sizes, 5 cc–10 cc syringe, providine-iodine or alcohol preps, tourniquet, adhesive tape or commercial site protector, sterile gauze pads, sharps container.

PROCEDURE:

The need for immediate intravenous access of the pediatric patient is rarely encountered in the field. Peripheral access in the neonate or pediatric patient can be challenging, even for the experienced paramedic. Prolonged attempts at IV's are not warranted, attempt IV access enroute.

1. Preparation steps: Preparing for pediatric patient IV access is similar to the procedure for the adult patient. Special consideration should be given to the following steps.
 - A. Do not disguise your intent. Explain to the parent and the patient (if the child is conscious and mature enough to understand) the need for the procedure and briefly describe the procedure.
 - B. Obtain catheter of appropriate size. Catheter size will depend on the condition and accessibility of the patient's veins.
 - i. Cardiac arrest: consider immediate IO access
 - ii. 18 gauge for fluid replacement
 - iii. 20 to 24 gauge for lifelines
 - C. Use a volume-control administration set (Buretrol Set) or micro-drip tubing.
 - D. Saline locks may be substituted if fluid replacement is not indicated.
 - E. Use of an arm splint and a bandage wrap may be required to stabilize the area and prevent the child from disrupting the site.

2. Site selection and preparation. Selecting a site for pediatric patient IV access is similar to the adult patient. Special attention should be given to the following steps.
 - A. Select prominent vein. Antecubital veins, external jugular, dorsal (hand / wrist) veins are possible sites for IV access.
 - B. DO NOT use scalp veins, these are not appropriate for rapid fluid boluses.

Special Considerations:

- Pediatric IV access in the field is relatively uncommon. Attempting a difficult and unfamiliar procedure poses danger to the patient. The greatest danger to the patient is wasting too much time attempting the difficult procedure. **Time is precious, if you cannot establish access in two attempts and I/O in contraindicated, transport the patient without further delay for IV access.**
- The volume of pediatric fluid resuscitation is based on weight and clinical response. Pediatric fluid administration must be carefully regulated.

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PROCEDURE
Pediatric Intraosseous Infusion

DESCRIPTION: Intraosseous (I/O) infusion is defined as a puncture into the medullary cavity of a bone that provides a route for rapid access of fluids and medication. Obtaining emergency intravascular access in critically ill pediatric patients, especially those less than three (3) years old, can be extremely difficult, time consuming and at times impossible when peripheral veins are collapsed and other means are not feasible. Intraosseous access is performed on critically ill children (< 3 years) in whom fluid and/or drug treatment is paramount and intravascular access is not rapidly accessible or feasible.

INDICATIONS:

1. Cardiac arrest.
2. Multi-system trauma with associated shock and/or severe hypovolemia.
3. Severe dehydration associated with vascular collapse and/or loss of consciousness.
4. Any child who is unresponsive and in need of immediate drug or fluid resuscitation and other vascular access is not available.

MATERIALS/EQUIPMENT: PPE, Commercial I/O or 15 – 18 gauge I/O needle, IV solution, administration set, IV aseptic set-up material, Pressure infuser, 10-50 cc Syringe.

PROCEDURE:

1. Observe universal precautions.
2. Assemble and prepare equipment.
3. Locate landmarks of insertion site by palpating the anterior surface of the tibial bone 1–3 cm below the tibial tuberosity and slightly medial. Landmark must avoid the joint and epiphyseal plate.
4. Prep the site with alcohol, set up IV solution as if for regular IV.
5. Measure needle as not to go through bone (Estimate width of big toe)
6. With sterile technique, using a 15-20-gauge bone marrow needle with stylet or commercial I/O needle, insert needle at 90-degree angle or slightly 10-15 degrees inferior through the bone using a firm downward pressure with a twisting motion.
7. Remove inner stylet and attach a 5-10 cc syringe.
8. Connect conventional IV line with pressure infuser.
9. Secure line with tape.
10. Administer drugs and fluids as needed.
11. Assess sight for signs of infiltration or leakage. Discontinue line if either of these occurs.

Special Considerations:

- Do not use an access site that is fractured at or above venipuncture insertion or has obvious indications of infection.
- Do not use an area previously used for venipuncture or IO attempts.
- Placement too shallow or too deep resulting in infusion into surrounding tissues.
- Excessive movement of needle resulting in leakage.
- The volume of pediatric fluid resuscitation is based on weight and clinical response. Pediatric fluid administration must be carefully regulated.

**Procedure
Pediatric Medication Administration**

DESCRIPTION: Medication administration is accomplished by specific routes as indicated by the protocols. Pediatric medication routes and procedure are analogous to the adult patient with the exception of the Intraosseous and Intrarectal routes.

PROCEDURE:

1. Special consideration needs to be given to patient weight and age when administering medications.
2. Resources for medication dosages:
 - A. Medical Control.
 - B. Pediatric Equipment/Drug Age/Weight Chart (see Broselow™ Tape)
 - C. Specific treatment protocol.
 - D. Published (most current edition) Field Guides.

3. Approximate weight based on age.

<u>Age</u>	<u>Weight</u>
Newborn	3 kg / 7 lbs
2 months	5 kg / 8 lbs
6 months	7 kg / 15 lbs
1 year	10 kg / 22 lbs
5 years	20 kg / 44 lbs
7 years	25 kg / 55 lbs
11 years	30 kg / 66 lbs
12 years	adult values

PROCEDURE
Pediatric Intrarectal Ativan Administration

DESCRIPTION: Special circumstances may exist that require the administration of Ativan to be given rectally to pediatric patients.

INDICATIONS: A pediatric patient in status epilepticus without peripheral IV access. This procedure requires a medical control order.

MATERIALS/EQUIPMENT: PPE, Intravenous catheter of various sizes, K-Y Jelly, 1 cc, Syringe, Alcohol, Sharps container, Medication

PROCEDURE:

1. Preparation steps.
 - A. Observe universal precautions for body substance exposures.
 - B. Confirm the drug order, amount to be given, and route.
 - C. Confirm patient is not allergic to the medication.
 - D. Check the medication.
 - i. Is it the **right medication** (name)?
 - ii. Confirm expiration date.
 - iii. Check for coloration and clarity.
 - E. Assemble necessary equipment of appropriate size.
 - F. Using a needleless 1 cc syringe, calculate and draw up the desired volume of the drug.
 - G. Eject any air from the syringe.
 - H. Lubricate the syringe tip with K-Y jelly.
 - I. Confirm again,
 - i. Is it the **right medication**?
 - ii. Is it the **right patient**?
 - iii. Is it the **right dose**?
 - iv. Is it the **right route**?
 - v. Is it the **right time**?
2. Administration
 - A. Insert the lubricated syringe 4-5 cm into the rectum.
 - B. Instill the medication into the rectum.
 - C. Withdraw the syringe.
 - D. Hold buttocks closed for 10 seconds.
 - E. Document the time the medication was administered.
 - F. Properly dispose of the contaminated equipment.
 - G. Monitor the response of the patient to the medication.
3. Alternative Method – Attach a 20 g catheter (without needle) to the syringe hub.

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Special Considerations:

- Do not use the intrarectal routes if intravenous cannulation is obtainable.
- Absorption of the drug is dependent on circulatory management before, after and during the administration.
- Administration of Ativan too high in the rectum may decrease its anticonvulsant effect, because the drug may be absorbed differently and broken down more quickly in the liver.

PROTOCOL

Pediatric Cardiopulmonary Arrest

OVERVIEW: The successful resuscitation of a child in cardiopulmonary arrest is dependent on a systematic approach of initiating life-saving CPR, recognition of any airway obstructions, adequate oxygenation and ventilation, early defibrillation and transferring care to advanced life support providers in a timely manner. The majority of pediatric patients found in non-traumatic cardiac arrest are found to have some form of airway obstruction or respiratory failure.

First Responder / BLS and ILS Care should be focused on assessing the situation and initiating Routine Patient Care to treat for shock.

1. Determine unresponsiveness. Confirm transporting unit and ALS has been activated.
2. Maintain patent airway and assess breathing. If patient is not breathing, give two (2) rescue breaths with BSI (barrier device, etc.).
3. Check for pulse (10 seconds). If no pulse, begin chest compressions and ventilation (CPR).
4. There should always be a strong sense of urgency to access for a cause of respiratory failure and apply an AED to determine if defibrillation is needed.
5. Age and Weight Considerations: If the child is **at least 1-years old**, continue CPR until the AED is attached and turned on. Stop CPR and perform AED analyzing in accordance with the AED procedure and protocol. If less than 8 apply pediatric Defib pads (if available, otherwise use adult pads taking special care to not have them overlap) and proceed with AED voice prompts. CPR should be done for 1 minute prior to defibrillation attempts.
6. Prompt transport; initiate ALS intercept. Immediately turn patient care over to the transporting provider or ALS intercept crew upon their arrival.
7. Complete all necessary cardiac arrest documentation.

ALS Units should focus on maintaining the continuity of care by confirming the patient is in cardiac arrest and continuing resuscitative efforts initiated by the first responders. Timely contact with Medical Control is an important factor in transition of care to the hospital staff.

1. ALS care includes all the components of BLS/ILS care.
2. Airway Management and Age Considerations:
 - A. Intubate the patient and provide ventilation rate of 20 breaths per minute with high-flow oxygen. $ET\ Size = Age + 16 / 4$
 - B. If the **intubation is difficult**, position airway and ventilate with Bag-Valve-Mask at 100% O₂ at 20 breaths per minute.
3. IV Access and Age Considerations:
 - A. Attempt IV access.
 - B. If no obvious peripheral vein can be easily located, immediately proceed to intraosseous access.
4. Identify and treat cardiac dysrhythmias according to appropriate protocols.
5. Shocks delivered to the patient prior to ALS arrival should be taken into consideration during the transition of care. ALS crews may want to utilize the AED equipment and personnel for subsequent defibrillations.

Critical Thinking Elements:

- Bradycardia and Cardiac Arrest in Infants and Children is often related to **hypoxia and poor ventilation**. Ensure proper oxygenation and ventilation.
- Check for foreign body causing airway obstruction

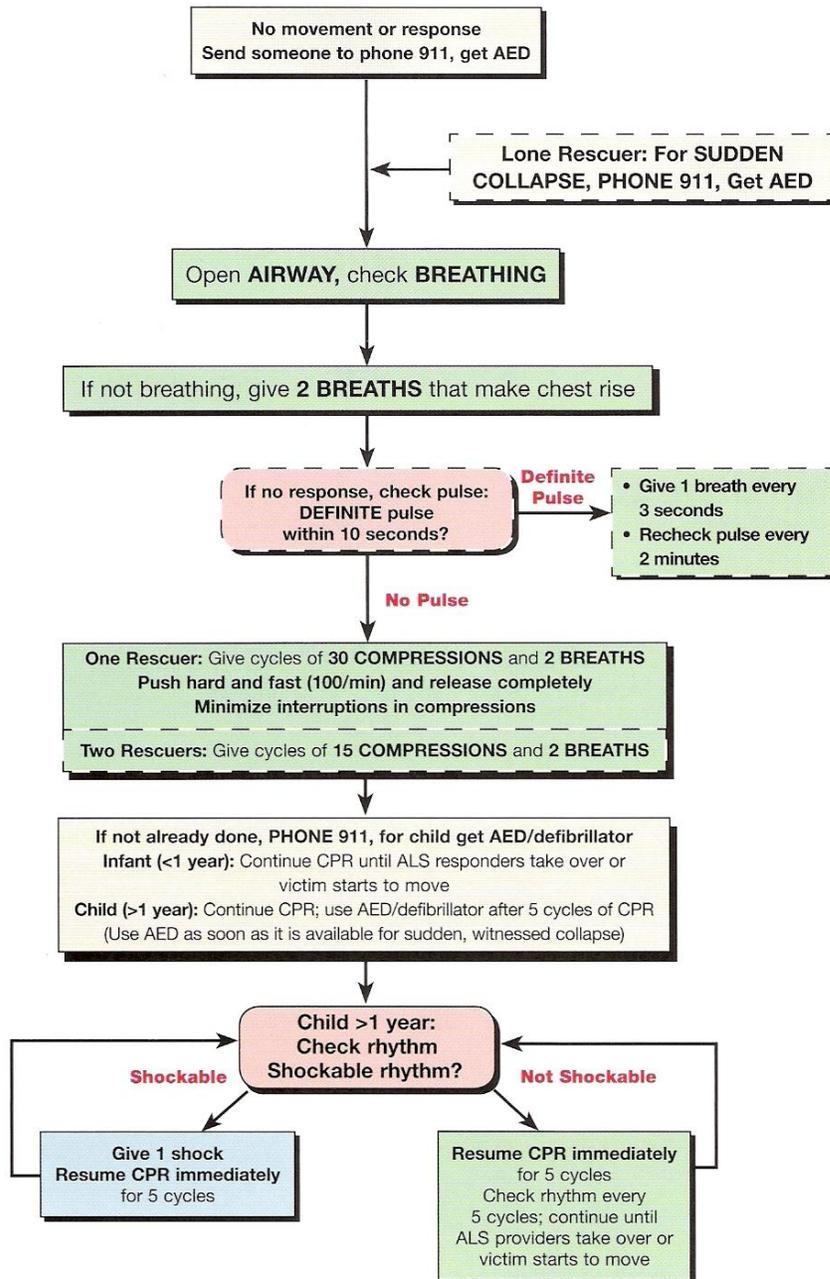


Figure 27. Pediatric BLS Algorithm.

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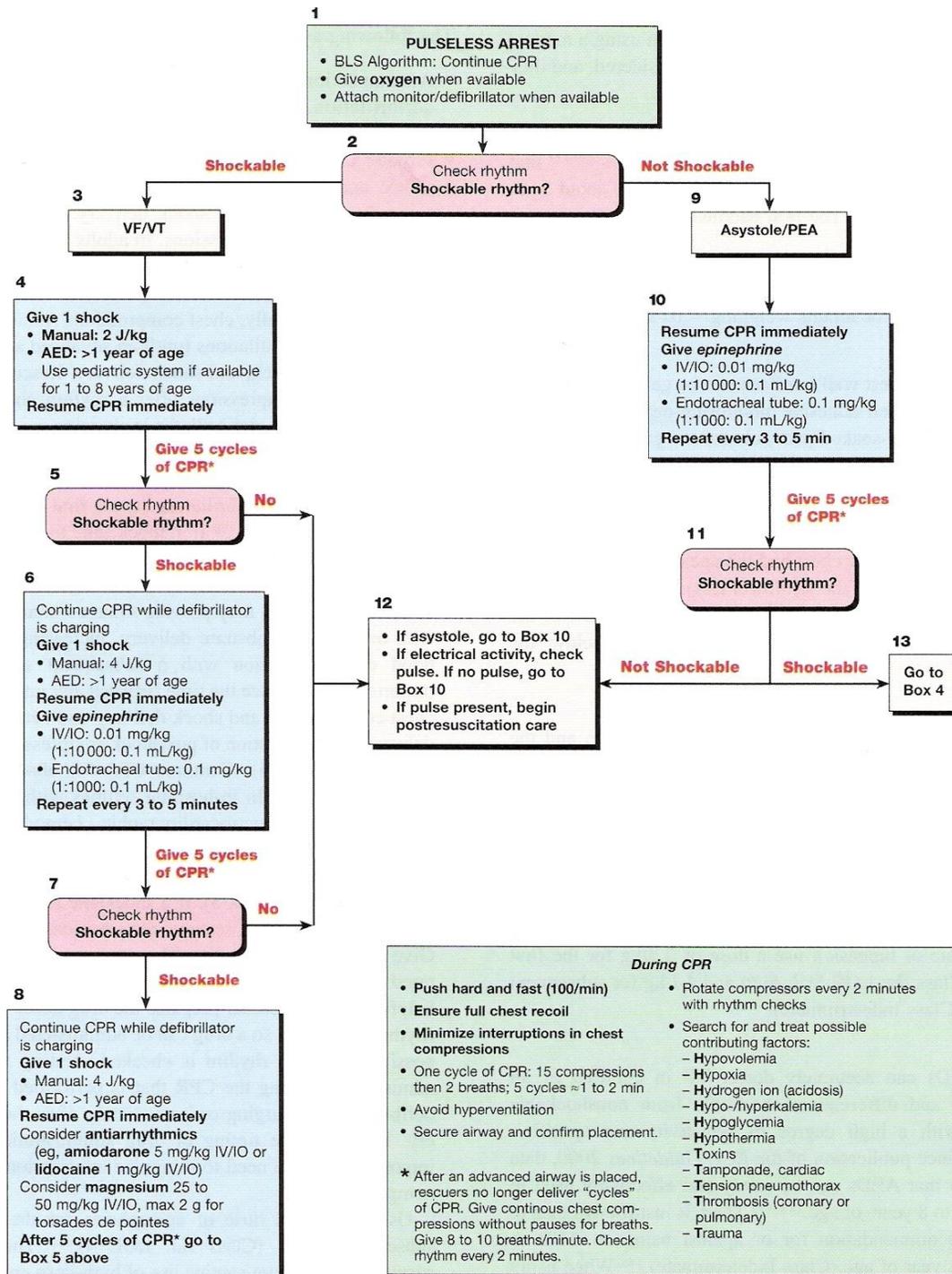
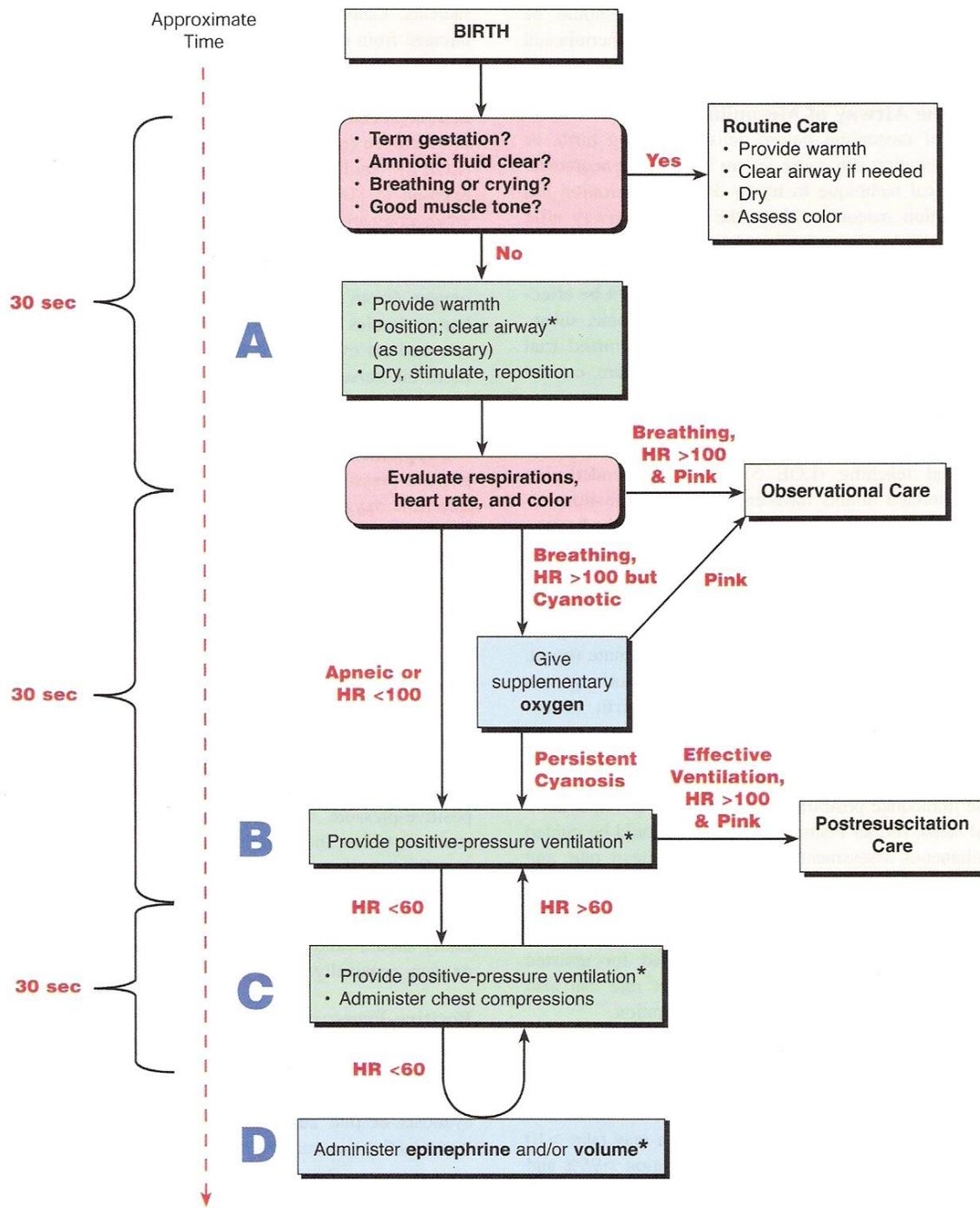


Figure 1. PALS Pulseless Arrest Algorithm.



* Endotracheal intubation may be considered at several steps

Figure. Neonatal Flow Algorithm.

PROTOCOL

ALS Resuscitation of Pediatric Pulseless Rhythms

OVERVIEW: The successful revival of patients in cardiopulmonary arrest is dependent on a systematic approach to resuscitation. ACLS medications are an important factor in successful resuscitation of the pulseless patient when the initial rhythm is not ventricular fibrillation or defibrillation has not been successful in converting ventricular fibrillation. It is important BLS and ILS providers understand the value of ALS intercept in providing the patient with ACLS therapy. ALS providers should also be aware of the value of prompt transport of the cardiac arrest patient to the hospital.

First Responder / BLS and ILS crews are not equipped with ACLS medications and shall treat the cardiac arrest patient in accordance with the Cardiopulmonary Arrest protocol.

ALS Crews

Ventricular Fibrillation and Ventricular Tachycardia without a Pulse

1. Initiate Cardiopulmonary Arrest Protocol.
2. **Manual Defibrillation.**
 - A. Apply **Pediatric** Quick-Combo pads or Fast Patches.
 - B. Evaluate rhythm
 - C. If VF or Pulseless V-Tach, Immediately **DEFIBRILLATE** with 2 joules/kg
 - D. Resume CPR for 5 cycles, and then reanalyze rhythm.
 - E. If VF persists, immediately **DEFIBRILLATE** with 4 joules/kg
 - F. Resume CPR for 5 cycles, then reanalyze rhythm
 - G. If VF persists, immediately **DEFIBRILLATE** with 4 joules/kg

(If the patient converts to a perfusing rhythm, administer **LIDOCAINE** 1 mg/kg IV/IO or 2 mg/kg ET or **AMIODARONE** (single bolus given slowly) 5mg/kg IV or IO.
3. Resume CPR and consider antiarrhythmics
4. **EPINEPHRINE:** Repeat every 3 - 5 minutes.
 - A. **Initial and subsequent dose IV/IO:** 0.1ml/kg (1:10,000) (Minimum 1 ml).
 - B. **ET:** 0.1 m1/kg (1:1000)
5. If no response, continue to alternate **DEFIBRILATION** at 4 joules/kg with each medication bolus followed by 5 cycles of CPR.
6. **LIDOCAINE** 1 mg/kg IV/IO or 2 mg/kg ET. May repeat every 3-5 minutes for a maximum total dose of 3 mg/kg. Alternatively, **AMIODARONE** 5mg/kg IV/IO.
7. **CONTACT MEDICAL CONTROL** and Transport as soon as possible.
8. Consider IV/IO:
 - A. **NARCAN** 0.4 mg IVP.
 - B. **DEXTROSE:**

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- i. If the patient is 0-30 days: D10% (2cc/kg)
- ii. If the patient is less than 2 years: D25% (2cc/kg).
- iii. If the patient is greater than 2 years: D50% (2cc/kg).

Pulseless Electrical Activity (PEA) and Asystole

1. Initiate Cardiopulmonary Arrest Protocol.
2. Consider etiology:
 - A. If hypovolemia or Tamponade, consider fluid bolus of 20 cc/kg x 3.
 - B. **If tension Pneumothorax present, perform bilateral chest decompression.**
3. **EPINEPHRINE**: Repeat every 3 - 5 minutes.
 - A. **Initial and subsequent dose IV/IO: 0.1 ml/kg (1:10,000) (Minimum 1 ml)**
 - B. **ET: 0.1 ml/kg (1:1000)**
4. **CONTACT MEDICAL CONTROL** and transport as soon as possible.
5. Consider IV/IO:
 - A. **NARCAN 0.1 mg/kg IVP up to 2.0 mg.**
 - B. **DEXTROSE:**
 - If the patient is 0-30 days: D10% (2cc/kg)
 - If the patient is less than 2 years: D25% (2cc/kg).
 - If the patient is greater than 2 years: D50% (2cc/kg).
6. Consider Cease Effort order (**Refer to Cease Effort Policy**).
7. Transportation can be initiated at any time during this sequence.

Critical Thinking Elements:

- Pediatric Arrest is often related to hypoxia and poor ventilation. Ensure proper oxygenation and ventilation.
- Prompt Transport of the pediatric patient is an important aspect of successful resuscitation. *Do not spend time at the scene attempting to establish procedures you may not feel confident in or experienced in establishing.*
- Dilute **DEXTROSE 50%** to **DEXTROSE 25%** by diluting 1:1 with Normal Saline.

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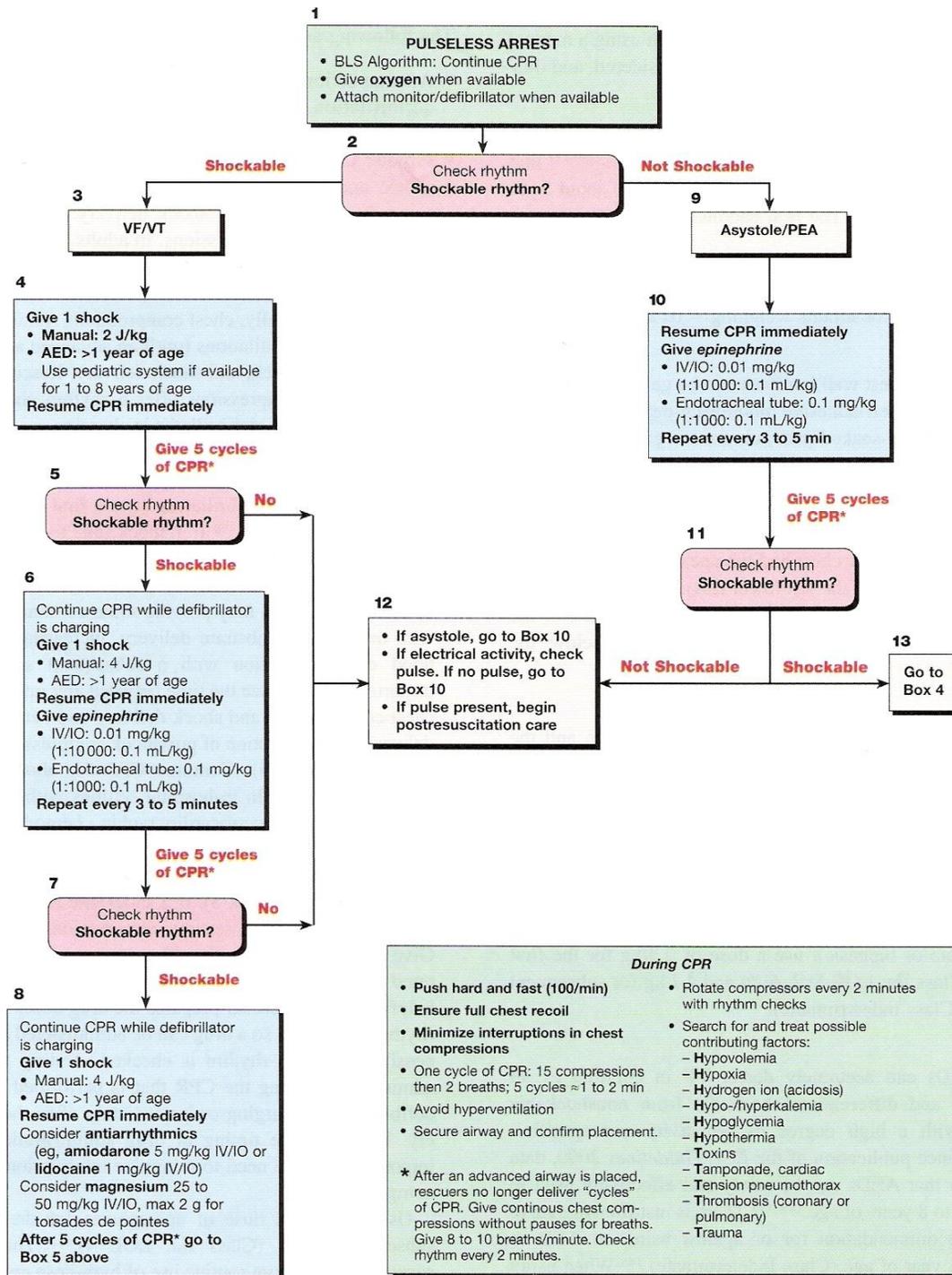


Figure 1. PALS Pulseless Arrest Algorithm.

PROTOCOL

Pediatric Bradycardia

OVERVIEW: Bradycardia is defined as a heart rate (pulse) less than the normal beats-per-minute for a given age group. Determining the stability of the pediatric patient with bradycardia is an important factor in patient care decisions. The assessment of the patient with bradycardia should include evaluation for signs and symptoms of hypoperfusion and hypoventilation.

First Responder Care and BLS Care should be focused on assessing the situation and initiating **Routine (Initial) Pediatric Care** to treat for shock.

1. Render initial care in accordance with the **Routine (Initial) Pediatric Care** Protocol.
 - A. Assess the pediatric patient for signs and symptoms of hypoperfusion and possible causes:
 - B. Respiratory difficulty
 - C. Cyanosis and coolness
 - D. Hypotension or lack of palpable blood pressure
 - E. Decreasing consciousness
 - F. For children less than 12 months of age: Consider initiating chest compressions if, despite oxygen and ventilation, the child continues to appear **hypoperfused** and has a pulse **less than 60 beat per-minute.**
2. **OXYGEN**: *BVM at 15 L/min 100% oxygen if child is in respiratory distress. If child is alert preferably 15 L/min of 100% oxygen by mask. If the patient does not tolerate a mask, then administer 2-4 L/min of 100% oxygen by nasal canal or Blow by at 6-10 L/min.*
3. Prompt transport; initiate ALS intercept. Immediately turn patient care over to the transporting provider or ALS intercept crew upon their arrival.

ALS Care should be directed at continuing or establishing BLS/ILS care, conducting a thorough patient assessment and stabilizing the patient's perfusion.

1. ALS care includes all the components of BLS/ILS care.
2. Consider etiology:
 - A. If hypovolemia is suspected, consider fluid bolus of **0.9% Normal Saline 20 cc/kg x 3.**
 - B. If respiratory distress is present, assure an open airway and adequate ventilation. Treat respiratory component.
3. **CONTACT MEDICAL CONTROL**
4. **EPINEPHRINE** : Repeat every 3 - 5 minutes.
 - A. **Initial and subsequent dose IV/IO:** **0.1 ml/kg (1:10,000) (Minimum 1 ml).**
 - B. **ET:** **0.1 ml/kg (1:1000)**

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5. **ATROPINE 0.02 mg/kg (1 mg minimum)**. Single maximum dosage 0.5 mg (5 ml) IV, ET, IO every 5 minutes. Total maximum dose of 1mg for 6months to 8years, up to 2 mg for greater than 8 years.
6. **External Transcutaneous Pacing:** If the patient remains bradycardic with continued signs of hypoperfusion, attach pediatric combo pads and consider external transcutaneous pacing. **CONTACT MEDICAL CONTROL** for specific rate.

Critical Thinking Elements:

- Before administering epinephrine, always assess for mechanical problems with oxygen delivery.
- Atropine will probably not be effective unless congenital heart block or vagal stimulation is present

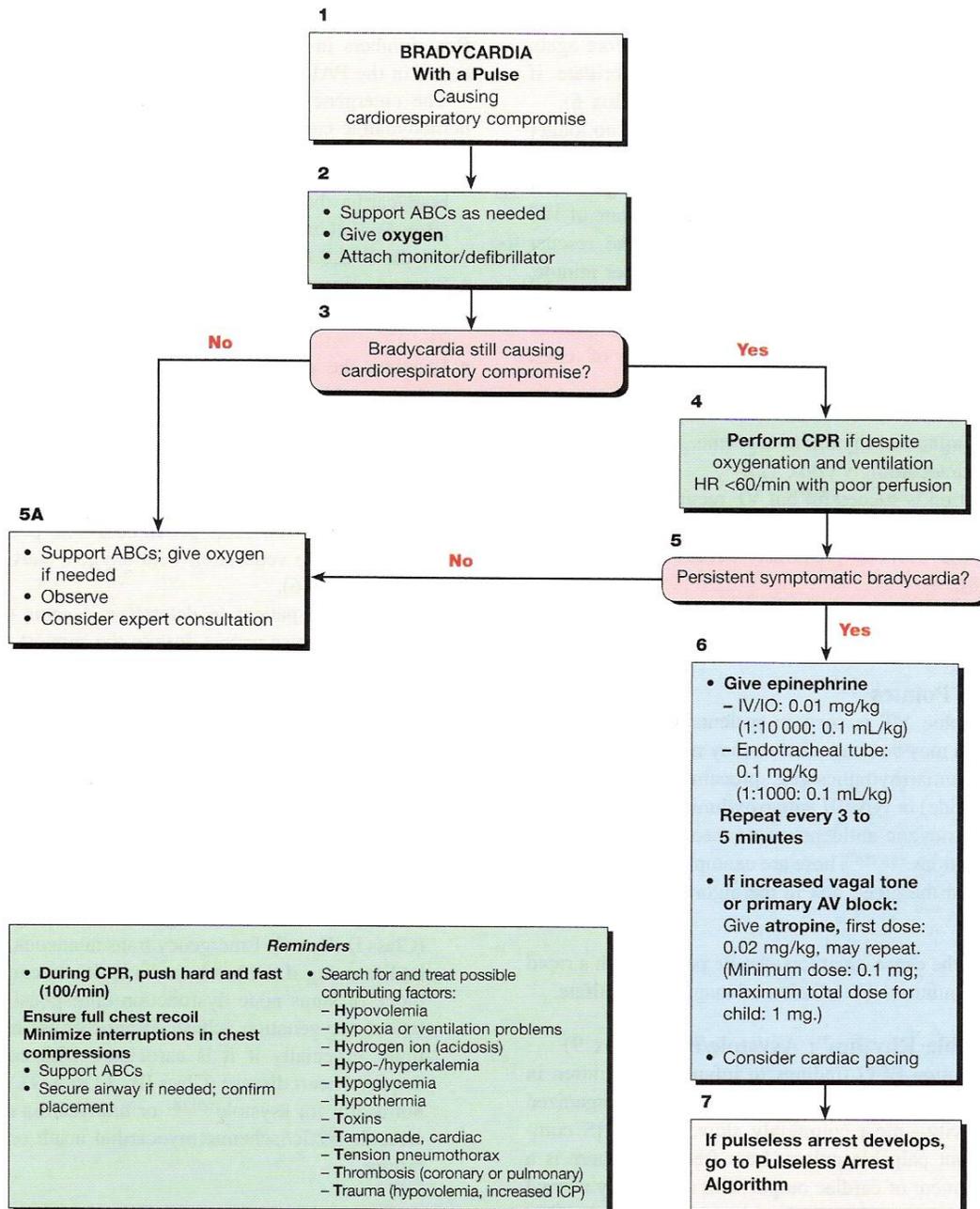


Figure 2. PALS Bradycardia Algorithm.

PROTOCOL

Pediatric Supraventricular Tachycardia with pulse (narrow complex)

OVERVIEW: Tachycardia may be a nonspecific sign of fear, anxiety, pain, **fever**, or shock in the pediatric patient. The Tachycardia needs to be assessed in conjunction with the PAT and ABCDE's. As with all cardiac dysrhythmias assess the heart rate and ECG with knowledge based on ACLS principals and what is the normal range for children. Always ask the child or caregiver about history of illness, congenital heart disease, or cardiac surgery. Narrow complex or Supraventricular Tachycardia is defined as a narrow QRS (<0.08 seconds) and a heart rate of 220 beats/min or greater.

First Responder / BLS are not equipped with ACLS medications and shall treat the patient according to **Routine (initial) Pediatric Care**. Care should be focused on treating for shock, administration of oxygen keeping a patent airway and ALS intercept.

ILS Care should be focused on thorough patient assessment, and identifying underlying causes of the SVT.

1. BLS care
2. Establish vascular access (proximal site is preferred) IV **Normal Saline** at *TKO* rate.
3. Consider fluid bolus of 20cc/kg and re-evaluate
4. **CONTACT MEDICAL CONTROL** for orders for second fluid bolus of 20cc/kg.

ALS Care should be focused on thorough patient assessment, and identifying underlying cause of the SVT.

1. FR, BLS, ILS Care.
2. If the child is stable (heart rate is still >220 after above care, child is still alert)
 - A. **ADENOSINE 0.1 mg/kg** very rapidly at closest central IV injection site, followed by 10 ml fluid bolus. Repeat as indicated at 0.2 mg/kg. Maximum single dose 12 mg.
3. If patient is unstable (unable to determine blood pressure, altered level of consciousness, pale / mottled skin):
 - A. **Synchronized cardioversion** 0.5 joules/kg, repeat immediately if necessary at 2 joules/kg.
 - B. If necessary, repeat **Synchronized cardioversion** at 4 joules/kg. (necessary **synchronized cardioversion** would constitute if the SVT did not change to another rhythm.)
4. **CONTACT MEDICAL CONTROL** for additional options.

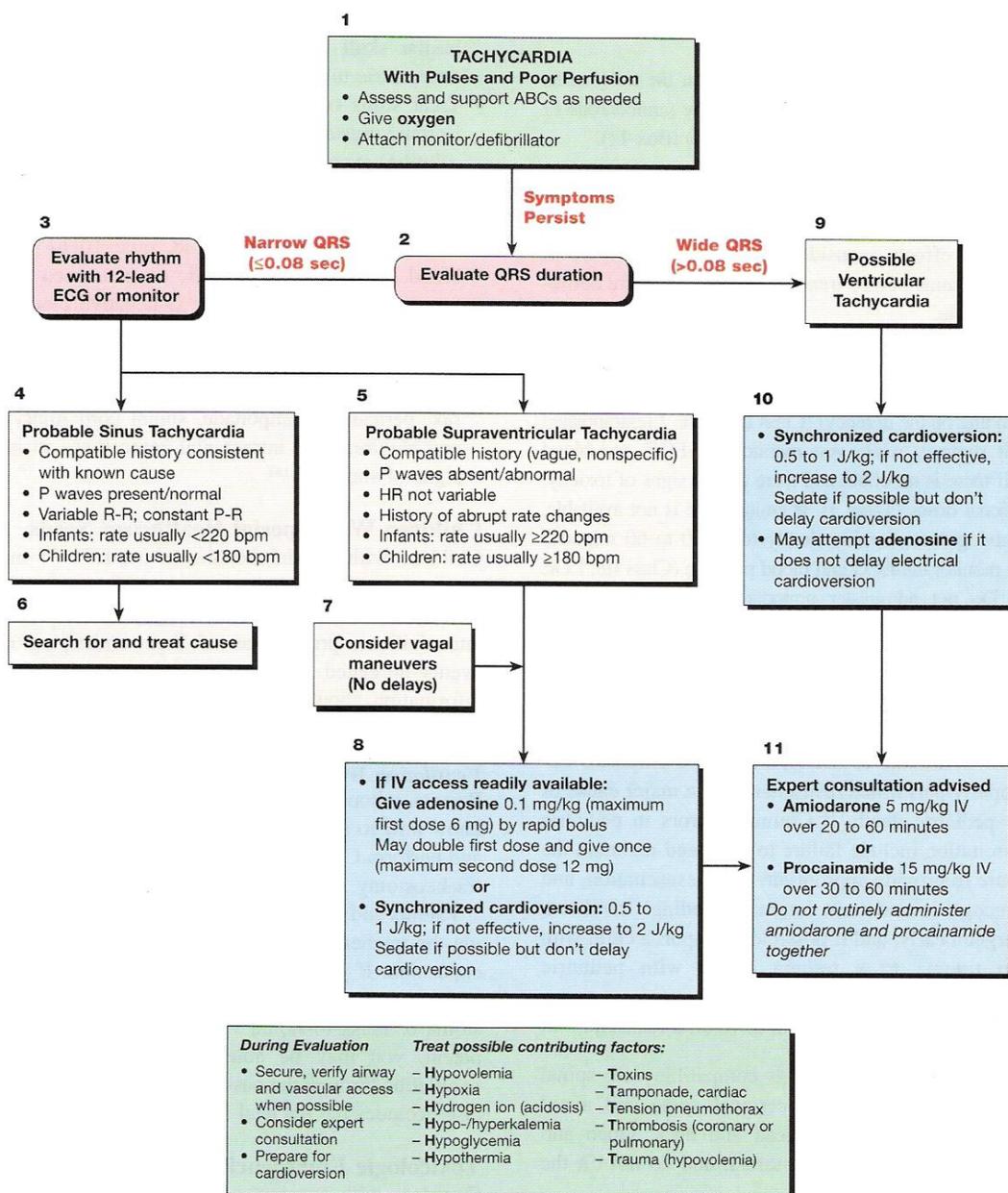


Figure 3. PALS Tachycardia Algorithm.

PROTOCOL

Pediatric Ventricular Tachycardia with pulse (Wide Complex)

OVERVIEW: Tachycardia may be a nonspecific sign of fear, anxiety, pain, fever, or shock in the pediatric patient. The Tachycardia needs to be assessed in conjunction with the PAT and ABCDE's. As with all cardiac dysrhythmias assess the heart rate and ECG with knowledge based on ACLS principals and what is the normal range for children. Always ask the child or caregiver about history of illness, congenital heart disease, or cardiac surgery. Ventricular Tachycardia with a pulse is defined as a wide complex QRS (0.08 seconds) and heart rate of >150 beats/min. The child may have a history of a serious systemic illness.

First Responders / BLS are not equipped with ACLS medications and shall treat the patient according to **Routine (initial) Pediatric Care**. Care should be focused on treating for shock, administration of oxygen, maintaining a patent airway, and ALS intercept.

ILS Care should be focused on thorough patient assessment, and identifying underlying causes of the Ventricular Tachycardia.

1. BLS care
2. Establish vascular access (proximal site is preferred) IV **Normal Saline** at **TKO** rate.
3. Consider fluid bolus of Normal Saline 20cc/kg and re-evaluate.
4. **CONTACT MEDICAL CONTROL** for orders for second fluid bolus of 20cc/kg.

ALS Care should be focused on thorough patient assessment, and identifying underlying cause of the Ventricular Tachycardia.

1. FR, BLS, ILS Care.
2. If the child has stable ventricular Tachycardia with a pulse (heart rate >150, wide complex QRS after above care, and child is alert)
 - A. **CONTACT MEDICAL CONTROL**
 - B. **Lidocaine 1mg/kg IVP bolus** or a single bolus of **Amiodarone 5mg/kg IV or IO**.
 - C. Repeat **Lidocaine 1/mg /kg IVP bolus every 3-5/min** for a total of 3mg/kg is given.
3. If the child has unstable ventricular Tachycardia with a pulse (heart rate >150, wide complex QRS after above care, and child is in shock or altered level of consciousness)
 - A. **Synchronized cardioversion 0.5 joules/kg**, repeat immediately
 - B. If necessary at 2 *joules/kg*.
 - C. Repeat again if necessary at 4 *joules/kg*. (necessary synchronized cardioversion would constitute if the ventricular tachycardia did not change to another rhythm.)
 - D. **CONTACT MEDICAL CONTROL** for more options.

Critical Thinking Elements:

- Cardiac dysrhythmias like VT with a pulse are rare in children.
- Ask caregiver if the child has a chronic or genetic cardiac condition.
- VT with a pulse could be from a serious systemic illness, hypoxia or dehydration.

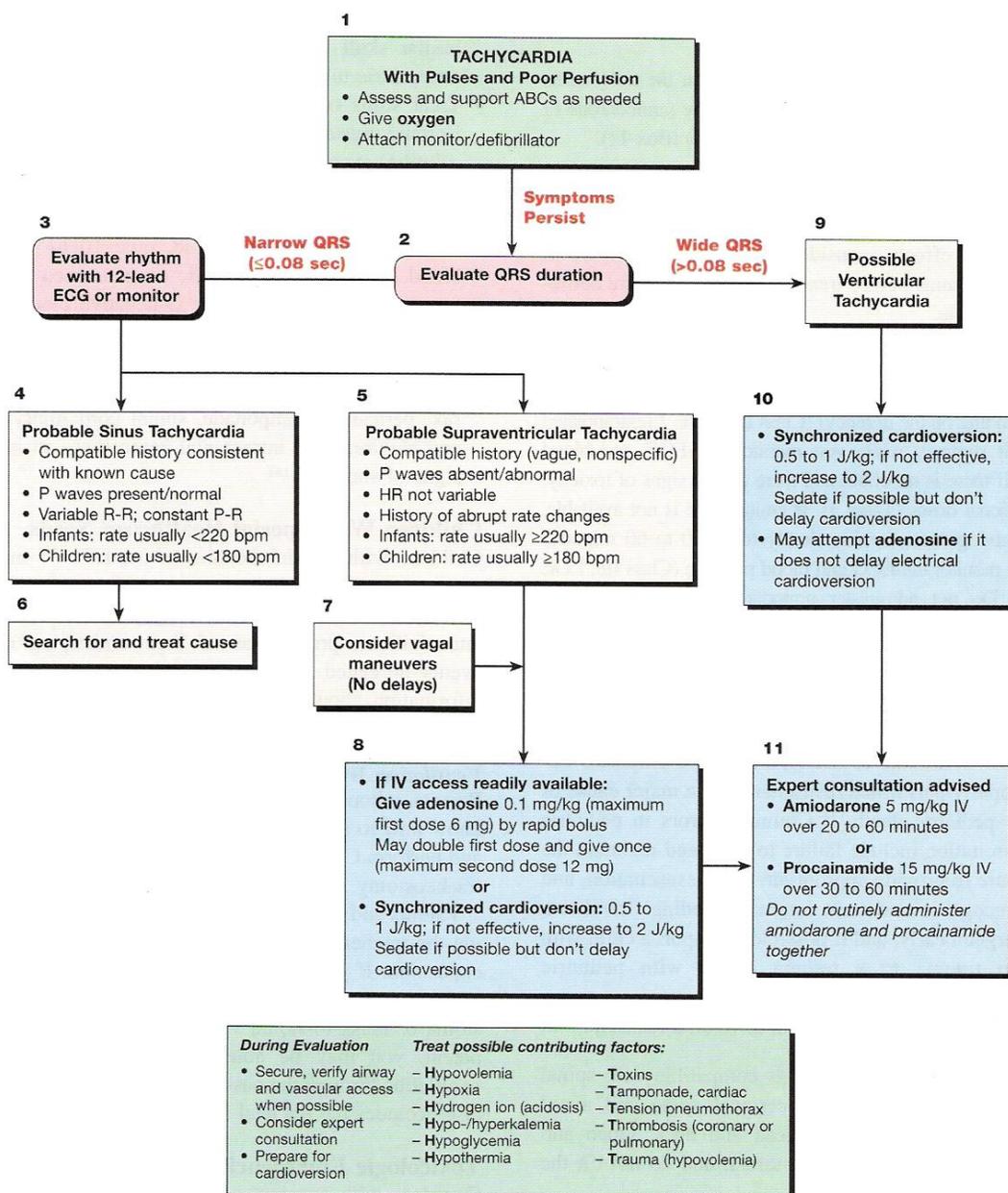


Figure 3. PALS Tachycardia Algorithm.

OVERVIEW

Critical Thinking for Pediatric Tachycardia Rhythms

Differences Between Sinus Tach, SVT, and V-Tach (Pediatric)			
Feature	Sinus Tachycardia	Supraventricular Tachycardia	Ventricular Tachycardia
History	<ul style="list-style-type: none"> • Fever • Volume Loss • Hypoxia • Pain 	<ul style="list-style-type: none"> • Congenital Heart disease • Nonspecific symptoms (poor feeding, fussiness) 	<ul style="list-style-type: none"> • Serious systemic illness
Heart Rate	<220 beats/min	>220 beats/min	>150 beats/min
Respiratory Rate	Variable	Constant	Variable
QRS Interval	Narrow, <0.08	Narrow, <0.08	Wide, >0.08
Assessment	Hypovolemia Hypoxia Painful Injury	CHF may be present	CHF may be present
Possible Treatments	<ol style="list-style-type: none"> 1. Fluids 2. Oxygen 3. Splinting 4. Analgesia 5. Sedation 	<ol style="list-style-type: none"> 1. Adenosine 2. Synchronized Cardioversion 	<ol style="list-style-type: none"> 1. Synchronized Cardioversion 2. Lidocaine 3. Amiodarone

PROTOCOL

Routine Pediatric Trauma Care

OVERVIEW: The majority of pediatric contacts the prehospital professional will face involve traumatic injuries. Trauma care in the pediatric patient must be aggressive, due to the child's ability to compensate and therefore "hide" obvious signs and symptoms of shock. In addition pediatric patients may not always have obvious injuries. The anatomical position and size of internal organs are drastically different compared to the adult trauma patient. In addition children may not bruise or show marks of impact, thus disguising underlying life-threatening problems. When the pediatric patient presents as a possible trauma patient, treat them as such. Keep within the "platinum 10" minutes of scene time, effectively immobilize the spine, keep warm, and treat the child's pain and anxiety. Recognizing the potential life-threatening injuries due to trauma will save the pediatric patient.

First Responder/ BLS Care should be focused on an accurate assessment, identifying the mechanism of injury, and possible life-threatening injuries.

1. Routine (initial) Pediatric Care.
2. Pulse oximetry if available.
3. Administer oxygen non-rebreather 15 L/min or what the child will tolerate.
4. Immobilize spine as indicated if properly trained.
 - A. Pediatric or infant cervical collar.
 - B. Adult backboard, padded to conform to pediatric patient or better off with C.
 - C. Use Pediatric approved spinal immobilization device.
5. Splint / immobilize fracture(s) as indicated.
6. Keep Warm.
7. Reduce anxiety through communication and distraction techniques.
8. Initiate ALS intercept.

ILS Care should be focused on an accurate assessment, identifying the mechanism of injury, and possible life-threatening injuries. Shock should be initially treated with boluses of fluid to see if there is a positive outcome.

1. First responder / BLS Care
2. Cardiac Monitor
3. Establish vascular access, Normal Saline, IV. Set at TKO rate.
4. Fluid Bolus per **Pediatric Shock Protocol**.
 - A. Assess lung sounds between boluses.
 - B. Assess for over hydration.

ALS Care should be focused on an accurate assessment, identifying the mechanism of injury, and possible life-threatening injuries. Shock should be initially treated with fluid boluses to see if there is a positive outcome, in addition to reducing pain and anxiety with pharmacological interventions.

Critical Thinking Elements:

- **Children are prone to hypothermia in traumatic situations, keep the patient warm.**
- Traumatic situations are just as "traumatic" for the parent. Remember, you might have the child and parent to deal with on scene and in the ambulance.
- Use a pain scale to determine pain level of the pediatric patient.

PROTOCOL

Pediatric shock

OVERVIEW: The pediatric patient in shock can pose a challenge to the prehospital professional. Since pediatric patients have young, strong cardiac systems, they can compensate extremely well. This compensation can mask the signs and symptoms of shock until the child's cardiovascular system tires, and therefore decompensates. Once the pediatric patient shows signs of decompensated shock, prognosis for a full recovery is poor.

First Responder / BLS care should be focused on a rapid trauma assessment and staying on scene no longer than ten minutes.

1. Routine Pediatric Trauma Care.
2. Place Patient in a supine position.
3. (BLS) transport should be initiated ASAP. (Do not wait for an ALS intercept).

ILS and ALS care should be focused on a rapid trauma assessment, and identifying the cause of the shock.

1. First Responder / BLS Care.
2. Establish vascular access. IV Normal Saline at TKO rate.
3. Cardiac monitor
4. Types of shock

Distributive Shock:

1. Administer fluid bolus IV **Normal Saline** 20cc/kg.
2. If suspected allergic reaction, refer to allergic reaction / anaphylaxis protocol.
3. Reassess pediatric patient.
4. If no response to initial fluid bolus and history of fever / infection, repeat fluid bolus **Normal Saline** to a *maximum of 60cc/kg*.

Cardiogenic Shock:

Refer to **Bradycardia Protocol**, **Tachycardia Protocol**, or **Cardiac Arrest Protocol**.

Hypovolemic Shock:

1. Administer fluid bolus 20cc/kg IV **Normal Saline**.
2. If no response to initial fluid bolus, repeat at 20cc/kg, to a *maximum of 60cc/kg*.

ALS Care should be focused on an accurate assessment, identifying the mechanism of injury, and possible life-threatening injuries. Shock should be initially treated with fluid boluses to see if there is a positive outcome, in addition to reducing pain and anxiety with pharmacological interventions.

Critical Thinking Elements:

- Pediatric patients have young, strong, cardiovascular systems. This category of patients will compensate for shock as long as they have the energy to do so. Once pediatric patients start to decompensate due to shock, it is exceedingly difficult to reverse the process. Therefore, it is imperative that shock is identified and treated early!

**PROTOCOL
Pediatric Burns (Thermal, Electrical, and Chemical)**

OVERVIEW: Pediatric burn care is the same as for adults. Remove the patient from harm, treat the burn, and relieve the pain. One aspect that the prehospital provider needs to be aware of is suspicious burns. These are burns that the pediatric patient has that have familiar patterns (i.e. car cigarette lighter, circumferential) or that the story doesn't fit the injury. Pediatric burns still carry a high index of suspicion for abuse and neglect. Follow local protocol for reporting abuse and neglect if suspected.

First Responder / BLS Care needs to focus on removing the child from harm, trauma assessment, and identifying potential for respiratory distress.

1. Assess scene safety, stop burning process.
2. **Routine Pediatric Trauma Care.**
3. Administer 100% oxygen by the most appropriate route. Consider nebulized saline when airway is compromised by the burn.
4. Assess for potential for respiratory compromise, support ventilation with BVM, **refer to Respiratory Distress Protocol.**
 - a. Abnormal airway sounds: Stridor, wheezing, grunting, horse sounding voice, seal-like barking cough, or diminished respirations or apnea.
 - b. Abnormal breathing patterns: Retractions, Tachypnea.
 - c. Abnormal Appearance: Soot in nose or around mouth, singed eyebrows or hair.
5. Remove constricting clothing and jewelry.
6. Assess percentage of depth of burn.
7. If thermal burns:
 - a. Superficial (1st degree) < 5%:
 - i. Cool burn area with water or saline.
 - b. Partial or full thickness (1st, 2nd, or 3rd degree).
 - i. Cover burn wounds with clean, dry sheets or sterile nonstick dressings.
 1. An example would be a hospital sheet or burn sheet.
 - c. **Refer to Pediatric Shock Protocol.**
8. If electrical Burns:
 - a. Full Spinal Immobilization (if properly trained)
 - b. Identify exit and entrance wounds.
 - c. Identify the voltage and amperage and current type (AC or DC) of electrical shock.
 - d. Assess neurovascular status of affected part.
 - e. Cover burn wounds with clean, dry sheets or sterile nonstick dressings.
9. If chemical burns:
 - a. If powder chemical, brush away excess.
 - b. Remove clothing if possible.
 - c. If fluid chemical, Irrigate area with copious amounts of sterile water or saline ASAP and during transport.
 - d. Identify type of chemical the patient was exposed to.

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ILS Care should focus on trauma assessment, and possible fluid therapy due to other possible underlying trauma associated with the burn.

1. First Responder and BLS Care.
2. If thermal burns: Establish vascular access, IV **Normal Saline** at *TKO rate*.
3. If indicated due to shock, fluid Boluses per **Pediatric Shock Protocol**.
4. If electrical burns: Cardiac monitor
 - Assess cardiac monitor for dysrhythmias and treat according to appropriate SMO.
5. Establish vascular access, IV **Normal Saline** at *TKO rate*.
6. If indicated due to shock, fluid Boluses per **Pediatric Shock Protocol**.
7. If Chemical burns: Establish vascular access, IV **Normal Saline** at *TKO rate*.
8. If indicated due to shock, fluid Boluses per **Pediatric Shock Protocol**.

ALS Care should focus on trauma assessment, fluid therapy for underlying shock, and pain and anxiety management.

1. ILS Care
2. Consider early airway control if burn involves respiratory tract. Intubate early before stridor
3. **Refer to Pediatric Pain Protocol**

Critical Thinking Elements:

- Wet dressings on burns may cause hypothermia in the pediatric patient. This is due to the pediatric patient's skin integrity is broken, thus not insulating the body. In addition the pediatric patient has a larger surface area to body mass than adults, making them prone to hypothermia.
- Burn shock does not occur until hours after the burn. If the Pediatric patient is in shock, consider the cause something besides the burn.

**PROTOCOL
Pediatric Pain Control**

OVERVIEW: Historically pediatric pain has been overlooked due to language barriers between the EMS provider and the patient. Pediatric pain must not be ignored and must be treated and identified if appropriate. The EMS provider must use clinical observations and a pain scale to rate the pain of the child. Treat the child's pain just like the adult patient.

First Responder / BLS / ILS Care Should focus on the reduction of the patient's pain through supportive type measures.

1. Routine Trauma Pediatric Care.
2. Assess level of pain using pain scale.
3. Place patient in a position of comfort.
4. Reassure patient.
5. Consider ice or splinting injured extremity.
6. Reassess level of pain using pain scale.

ALS Care Should focus on the pharmaceutical management of the pain.

1. FR, BLS, ILS care.
2. Administer **Morphine Sulfate 0.05mg-0.1mg/kg IV/IM** (maximum dose 2 mg). May repeat in 5-10 minutes at half the initial dose. **(Two Rivers Fire Dept and Valders Fire Dept Only)**
3. Alternative pain medication: **Fentanyl 1-2 mcg/kg IV** over 1 minute.
4. **Contact Medical control for Children under 5 years old prior to administration of a medication.**

Special Note: See Appendix B for pain scales.

Critical Thinking Elements:

- Monitor the patient for respiratory depression when giving narcotics.
- Use caution in administering pain medications to Multi-system trauma patients, abdominal pain of unknown etiology, and head injury patients.
- MS and Fentanyl will lower patients BP

**PROTOCOL
Pediatric Closed Head Injury**

OVERVIEW: The cause of closed head injury is many, usually involving vehicular accidents or not wearing proper recreational safety gear (helmets). The most effective way of determining the extent of closed head injury is level of consciousness and mechanism of injury. The head is the largest body part; in turn making the pediatric patient “top heavy”, falling head first during a trauma. The head is the body part that is more seriously injured than any other body part of the pediatric patients. Proper management of a closed head injury patient can affect what long term damage is done by the injury.

First Responder / BLS Care needs to focus on trauma assessment and recognizing the child’s level of consciousness and spinal immobilization.

1. Routine Pediatric Trauma Care
2. Oxygen and ventilation. Oxygen should be delivered by whatever means tolerated by the pediatric patient. Optimal is high flow 15l/min at 100% oxygen.
3. Consider Intubation if child is greater than 3 years of age. RSI may be indicated.

Ventilation Rates in Closed Head Injury	
Patient Category	Rate of Ventilation
A Alert	None
V Response to Verbal	Normal for age*, usually none.
P Response to Pain Pupils equal Both pupils fixed and dilated Pupils asymmetric	Normal for age* Above normal rate,** until pupils constricts Above normal rate,** until pupil constrict
U Unresponsive Pupils equal Both pupils fixed and dilated Pupils asymmetric Child posturing	Normal for age* Above normal rate,** until pupils constrict Above normal rate,** until pupil constrict Above normal rate,** until posturing stops
*30 breaths/min for infants; 20 breaths/min for toddlers and children *35 breaths/min for infants; 25 breaths/min for toddlers and children	

ILS Care needs to focus on trauma assessment and recognizing the child’s level of consciousness.

1. First Responder / BLS Care
2. Establish vascular access IV **Normal Saline TKO.**
3. Cardiac Monitor, assess cardiac monitor for dysrhythmias. **Refer to appropriate protocol**

ALS Care needs to focus on trauma assessment and recognizing the child’s level of consciousness.

1. ILS Care
2. Establish vascular access IV/IO **Normal Saline TKO.**
3. If seizure activity:
4. **1mg Ativan IVP or rectal.** May repeat every 15 min. at half the initial dose.
5. If airway is compromised administer RSI Protocol.
 - a. Lidocaine 1mg/kg
 - b. Atropine 0.5mg
 - c. Versed 0.05 to 0.1mg/kg
 - d. 2 mg/kg Succinylcholine or 0.15 to 0.2 mg/kg of vecuronium IV if succinylcholine contraindicated
 - e. Secure airway (See general Advanced Airway Protocol).

PROTOCOL

Pediatric Respiratory Arrest

OVERVIEW: When the pediatric patient enters respiratory arrest, cardiac arrest and poor outcome is sure to follow. Assisted ventilations with a BVM can be the most useful skill in resuscitation of the child in respiratory arrest. Remember the pediatric patient responds to oxygenation very favorably. Try to identify the cause of the respiratory arrest, after securing a patent airway and proper ventilation.

First Responder / BLS Care needs to focus on securing the airway and good technique in ventilation with BVM.

1. Assess Airway (If patient not breathing, or agonal respirations)
2. Perform airway maneuver, maintaining in-line C-spine stabilization.
 - a. Jaw Thrust
 - b. Suction
 - c. Oropharyngeal or nasopharyngeal airway.
3. Administer 100% oxygen. Support ventilation with appropriately sized BVM.
4. If chest rise is inadequate:
 - a. Relieve upper airway obstruction.
 - b. Reposition airway.
 - c. Consider back blows, chest / abdominal thrusts. (Age specific)
5. Refer to **Respiratory Distress Protocol** if breathing resumes.
6. If hypoperfusion is present, refer to Pediatric Shock Protocol.
7. Routine Initial Pediatric Care
8. If available, apply pulse oximetry device and document oxygen saturation.
9. Transport initiated ASAP, with ALS intercept.

ILS Care needs to focus on securing the airway, good techniques in ventilation, and identifying the underlying cause (s) in the respiratory arrest.

1. First responder / BLS care.
2. Secure airway as appropriate, see Procedure: Pediatric Airway Control
3. Consider underlying etiologies and treat according to appropriate protocol

Airway obstruction	Metabolic (Altered LOC SMO)
Cardiac (Dysrhythmia SMO)	Hypovolemia (Shock SMO)
CNS Injury	Respiratory distress
Anaphylaxis	Near drowning
Poisoning/overdose	Carbon monoxide exposure
Suffocation	SIDS
4. Initiate IV if possible, **Normal Saline, TKO.**

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ALS Care should focus on an appropriate airway, underlying etiologies and corrective measures of the respiratory arrest. If poor ventilation or compliance consider gastric distention as a complication.

CONTACT MEDICAL CONTROL

1. If poor compliance or ventilation consider tension pneumothorax: consider chest decompression, on affective side, 14-18 gauge angiocath.
2. Insert oral or nasal Gastric tube in prolonged situations.
3. In severe cases consider RSI.

Critical Thinking Elements:

- Studies have shown that BLS management of pediatric airways is just as effective as ALS intubation. **Do not spend time on scene with intubation procedures.**
- Gastric distention is very common in pediatric patients and may cause poor compliance. Ventilating too fast or giving too much tidal volume is the top two reasons for distention. Consider proper ventilation techniques and appropriate BVM size for the pediatric patient.

PROTOCOL

Pediatric Respiratory Distress / Respiratory Failure

OVERVIEW: Respiratory distress is common in the pediatric patient. The small airways of the pediatric patient are compromised more quickly during medical and traumatic problems. Identifying the degree of respiratory distress of the pediatric patient is crucial for stopping a process that can lead into respiratory failure. In respiratory failure the child has lost the energy and drive to compensate for the lack of oxygen. If not treated immediately respiratory failure will lead to arrest.

First Responder should focus on a thorough focused exam of the respiratory system and treating distress with oxygen therapy.

1. Routine Initial Pediatric Care.
2. Administer 100% oxygen. Highest concentration should be obtained via the least threatening manner to the child.
3. Assess work of breathing: Retractions, nasal flaring, tripod position, chest rise / fall, open mouth pursed lips breathing, tachypnea, tachycardia / bradycardia, altered level of consciousness.
4. Assess abnormal airway sounds: Wheezing, grunting, stridor, hoarseness, diminished or absent breath sounds, "barking" cough.
5. Position of comfort for the patient: Create a low stress environment.
6. Ensure ALS has been activated.

BLS Care should focus on a thorough focused exam of the respiratory system and treating distress with oxygen and medication therapy.

1. First Responder care.
2. If available, apply pulse oximetry device and document oxygen saturation.
3. Call for ALS intercept.
4. If the patient has a prescribed *inhaler* (upon Medical Control orders) *assist patient with administration of a metered dose of the inhaler.* May repeat x 1 with Medical Control order.
5. If wheezing or absent/ diminished breath sounds, administer nebulizer treatment of **Proventil (Albuterol)** 2.5mg in 3cc of normal saline over 15 minutes. *If still in respiratory distress may repeat X 1 after CONTACT MEDICAL CONTROL.*

ILS and ALS Care should follow the same guidelines of BLS care. IV should only be initiated if warranted and will not increase the anxiety of the pediatric patient.

1. BLS Care.
2. Consider IV, saline lock.
3. EKG Monitor
4. If asthma or respiratory wheezing is suspected, and patient is increasing in respiratory distress and progressing to respiratory arrest.
5. **Epinephrine** 1:1000 solution. **0.01 mg/kg IM injection.** *May repeat every 20 minutes. Maximum single dose = 0.3mg (0.3 cc)*

If epiglottitis is suspected: symptoms may include altered level of consciousness, fever, hoarseness, brassy cough, inspiratory stridor, drooling, tripod position.

FR, BLS, ILS, ALS

1. Routine FR, BLS, ILS, ALS Care.

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2. **Do not look in the child's mouth or attempt to visualize the interior of the throat.**
3. **Do not agitate the child.** The child should be kept as calm as possible.
4. **(ILS, ALS only)** IVs should NOT be attempted.
5. Maintain the airway and give Oxygen by mask at 10 - 15 L/min by best means tolerated by patient (i.e., sitting in parent's lap /blow-by method).
6. **Paramedic Only:** Administer Racemic Epinephrine 0.5ml with 3ml Normal Saline in a nebulized unit at 6L/min O2. This may need to be repeated if transport times and extended and symptoms worsen after initial improvement.
7. Transport the patient sitting up.
8. Contact receiving hospital or Medical Control depending on circumstances.

PROTOCOL
Pediatric Tracheostomy with Respiratory Distress

OVERVIEW: With today's technology and improving home health care more critical care patients are being sent home early. Home health care and family members can duplicate the care they receive in the hospital. This allows the patient to return spending less time in the hospital decreases home earlier and health care costs. EMS is activated when there is a problem with complex medical equipment, or the patient relapses into a more critical condition. EMS providers need to gain knowledge of critical care medicine they did not need years ago.

First Responder / BLS Care need to ensure that the child has a patent and adequate airway.

1. Routine Initial Pediatric Care
2. Administer 100% oxygen. Highest concentration should be obtained via the tracheostomy collar.
3. Assess work of breathing: Retractions, nasal flaring, Tripod position, Chest rise / fall, open mouth pursed lips breathing, Tachypnea, Tachycardia / bradycardia, altered level of consciousness.
4. Assess abnormal airway sounds: Wheezing, grunting, Stridor, hoarseness, diminished or absent breath sounds, "barking" cough.
5. Position of comfort for the patient: Create a low stress environment.
6. If Tracheostomy tube is obstructed with secretions.
 - a. Suction with whistle-tip catheter.
 - b. Repeat suction after removing inner catheter of tracheostomy tube.
 - c. Break up thick secretions with saline (2-5ml), then suction airway
 - d. Have caregiver change tracheostomy tube.
7. If airway continues to be obstructed or ventilation effort inadequate.
 - a. Ventilate with 100% oxygen
 - b. If tracheostomy tube is still not patent.
 - i. Ventilate with BVM on tracheostomy tube.
 - ii. Ventilate mask to mouth while covering stoma.
8. Insure ALS intercept.

ILS Care needs to ensure that the child has a patent and adequate airway.

1. First Responder / BLS Care.
2. Cardiac Monitor
3. Consider Saline lock.

ALS Care needs to ensure that the child has a patent airway, and if not provide an adequate airway for the pediatric patient.

1. ILS Care
2. If airway is still obstructed:
 - a. Insert appropriately sized ET tube in stoma.
 - b. Reassess patency of airway.

Critical Thinking Elements:

- Caregivers are trained in the critical care equipment that their child is utilizing. When there is a call EMS for assistance it is usually because initial methods have not relieved the initial distress or caregivers are frustrated or panicked.

**PROTOCOL
Pediatric Altered Level of Consciousness**

OVERVIEW: The EMS professional needs to consider all causes of the child's altered level of consciousness. A good assessment is paramount to identify life-threatening injuries, then lead into focusing on causes for the event and child's past medical history.

First Responder Care needs to focus on identifying life threatening injuries and activating EMS transport.

1. Routine Initial Pediatric Care.
2. Ensure EMS has been activated for further care and transport.

BLS Care needs to focus on a thorough assessment and considering the causes of the altered mental status.

1. First Responder care with blood glucose monitoring test if available.
2. Keep warm or cool depending on the temperature.
3. Consider other causes of altered mental status and refer to indicated protocols.
4. Initiate ALS intercept
5. If suspected hypoglycemia – Consider **Glucose if patient is conscious enough to swallow.**
6. If capable obtain Blood sugar, If < 60 mg/dl, and child unable to swallow oral glucose, administer **Glucagon 1mg IM.**

ILS Care needs to conduct a thorough assessment, consider causes of the altered mental status, and treat with IV therapy if needed.

1. BLS Care
2. If inadequate respiratory effort, secure airway as appropriate. **Refer to respiratory distress or respiratory arrest protocol.**
3. Establish IV **Normal Saline** TKO or Saline lock.

ALS Care should encompass all areas of care in addition to total stabilization of the pediatric patient.

1. ILS Care
2. Blood glucose monitoring test and dextrose dosages.
 - a. If blood sugar is <60 mg/dl administer Dextrose

Dextrose Administration Guideline		
AGE	DOSE	DILUTE
Newborn < 1 month	D10W 2-4ml/kg/bolus	1 part D50W 4 parts normal saline
Child < 2 years old	D25W 2-4ml/kg/bolus	1:1 D50W with normal saline
Child > 2 years old	D50W 1-2ml/kg/blous	Do not dilute D50W

1. If unable to establish an IV and child unable to take oral glucose paste.
 - **Glucagon 1mg IM.**
 - If no response to Dextrose or child has signs/symptoms of opiate overdose.
 - **Narcan** IM or IV:
 - *Newborn to eight years—0.4mg.*
 - *Eight years to adult—2mg.*

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- Repeat X1 after 2 minutes, if no change in level of consciousness.

Critical Thinking:

- Altered level of consciousness in a child can range from trauma to a systemic infection. A good past medical history might provide clues to the altered LOC.
- Mistaken ingestion of medications can be a cause of the altered LOC.
- Titrate Narcan to effect, to prevent possible seizure activity in pediatric patients.
- Dextrose may be given rectally if needed.