

PEDIATRIC PROTOCOL
UH EMS Training & Disaster Preparedness Institute

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PEDIATRIC PROTOCOL

The text is an outline and includes general information on the condition addressed, objectives of care, recognition of the condition (history and physical exam), and the details of pre-hospital treatment.

INTRODUCTION

Illness and injuries in children can cause significant anxiety for prehospital personnel as well as panic in the patient, family, and bystanders. It is important for the EMT/Paramedic to remain calm and take control of the patient and situation. The following guidelines may help in dealing with these situations.

Dealing with the child:

- A. Tell them what's happening. In a frightening situation, it is important to remember to communicate with the child.
- B. Relate and speak on their developmental level.
- C. Be honest with them. Don't say, "This won't hurt" if it will.
- D. Try to enlist their cooperation, if possible.
- E. Do not separate the child from the parent unless they are ill enough to require significant interventions such as airway positioning and ventilation.
- F. Reassure the child frequently.

Dealing with the family:

- A. **REMAIN CALM.** Show efficiency and competence, even if you don't really feel it.
- B. Show a caring and concerned manner for both the family and the patient. If you have negative feelings about the situation (for example, if it is an injury as a result of neglect or abuse), try not to let them show. This will only increase hostility between yourself and the family.
- C. Honestly inform the family of what you are doing and what you think is wrong with the child.
- D. Reassurance is important for the family as well. Involve them in the care (for example, holding the oxygen or talking to the child to calm them). This will help develop some trust between you and the family.

ASSESSMENT

- A. Observation
 - 1. Child's appearance. How ill does the child appear (do you need to do a rapid cardiopulmonary evaluation? Is the child toxic-appearing?). You also can evaluate color, level of consciousness, and respiratory effort by observation.

PEDIATRIC PROTOCOL

ASSESSMENT (Cont.)

2. Behavior. Is this a child who may cooperate with examination and treatment? Is this a child who may be able to give the history by himself? Note the interaction between the adult and child, tuning in to indications of poor interaction that might reflect neglect or abuse.
 3. Environment. Observe for appropriateness of the reported mechanism of injury. If an MVA, collect details on the crash.
- B. History
1. Present illness
 2. Past medical history
 3. Medications, including Tylenol
 4. Allergies
 5. Last meal
- C. Physical Examination
1. ABCDs (Airway / Breathing / Circulation / Disability)
 2. Neurological status (D for disability)
 3. Specific signs related to the organ system involved, according to the chief complaint or ABC exam: hydration status, abnormal respiratory noises, bulging fontanelle, pupils, potentially injured areas.

Vital signs are also an important part of the physical exam. In pediatric patients, these should include heart rate, respiratory rate and capillary refill (normal ≤ 2 seconds). Blood pressure should be obtained when possible in patients who may be in shock or are trauma victims. Normal values vary by age, as shown in the following table.

VITAL SIGNS BY AGE

AGE	RESPIRATIONS	HEART RATE	BLOOD PRESS. (SYSTOLIC)
NEWBORN	30-60	120-160	60-70
1-6 WEEKS	30-60	120-160	70-95
6 MONTHS	30-50	120-160	70-95
1 YEAR	30-40	100-140	80-100
3 YEARS	20-30	100-120	80-100
6 YEARS	18-25	70-110	80-100
10 YEARS	15-20	60-90	90-120

Weight is another important "vital sign", since it determines the dosages of medications and fluids. A child's weight can be estimated by using the Broselow Tape, which translates height into an estimated weight. It is accurate from 3 to about 25 kg. The tape also has guidelines for equipment sizes to be used according to a child's size. Care should be given, however if the child appears "overweight" as the Broselow Tape may under-estimate the weight.

PEDIATRIC PROTOCOL

MEDICATION DOSING

Doses for pediatric medications are always figured according to the patient's weight. Doses can be calculated from:

- a. The "per kilo" dose given in the protocol by using an estimated weight,
- b. Read directly off of a "Broselow Tape",
- c. Obtained from medical control.

Use of OET drugs is de-emphasized in the 2005 AHA guidelines. However when used 10x dosing is for Epinephrine and 2x for Lidocaine and Atropine.

MEDICAL CONTROL ORDERS

Medical Direction orders must be obtained to perform the procedures or administer the medications that are shaded in the algorithms or the body of the text.

ABBREVIATIONS USED

BLS:	Basic Life Support (treatment performed by both EMT-B and EMT-Ps)
ALS:	Advanced Life Support (treatment that, may only be performed by EMT-Ps)
ABCs:	Airway-Breathing-Circulation (initial assessment & treatment mnemonic for all pts)
BCLS:	Basic Cardiac Life Support (American Heart Association's CPR course)
PALS:	Pediatric Advanced Life Support (American Heart Association course in pediatric care)
LOC:	Level of consciousness
ALOC:	Altered level of consciousness
ICP:	Intra-cranial pressure
BVM:	Bag-valve-mask device (also known as the "ambu" bag)
ETT:	Endotracheal tube
IO:	Intraosseous infusion
NS:	Normal Saline
KVO:	Keep vein open
VS:	Vital signs

PEDIATRIC PROTOCOL

CHILD ABUSE

Child abuse is much more common than previously suspected. Many children involved in home "accidents" may indeed be victims of child abuse. Child abuse can be sustained at the hands of a sibling, a parent or baby-sitter, or other family member. One should suspect child abuse when symmetrical hot water burns, head injury, body burns or fractures that cannot be easily explained are discovered in a child. When child abuse is suspected, do not become the accuser. The surroundings should be inspected, and the interaction between the child and family be noted. In all cases, relay your suspicions to emergency department personnel. The paramedic is protected from legal action if suspected child abuse is reported to the appropriate personnel. To report suspicious abuse/neglect, see your respective county

- Cuyahoga County Call-216-696-KIDS
- Lake County Call-440-350-4000 ext-1
- Ashtabula County Call-440-998-1811
- Geauga County Call-440-285-9141 ext-0
- Trumbull County Call-330-372-2010
- Portage County Call-330-296-2273
- Summit County Call-330-379-1880 ext-1
- Lorain County Call-440-329-5340
- Medina County From 07:30 – 16:30, call-330-722-9283 / From 16:30 - 07:30, call-330-725-6631

SUDDEN INFANT DEATH SYNDROME

This syndrome commonly affects many infants a year. The peak incidence is between three months and fifteen months of age, and its cause or causes, for the most part, are unknown. An adequate description of the child's position when found, the amount of bed clothing, and the surrounding room is extremely important information to obtain. Relaying this information to emergency department personnel and other investigating personnel will greatly enhance the effectiveness of the investigation. On occasion, a child found dead in the crib, or reported as a sudden infant death, actually is secondary to trauma incurred in child abuse. Again, the paramedic's observation, when first called to the scene, is often the only reliable observations available for subsequent investigation.

TREATMENT OF MINORS WHEN UNABLE TO LOCATE PARENTS

This must be done in all cases. The consequences of not treating are potentially more dangerous than those of dealing with an objecting family. Attempts to locate parents/guardians should continue by emergency personnel with instructions for parents to contact the receiving emergency facility immediately. Medical Control and police should be notified early.

PARENT REFUSES TO ALLOW TREATMENT OF A MINOR

If care is obviously needed, contact Medical Control and police if necessary.

PEDIATRIC PROTOCOL

TREATMENT

When assessing and treating a pediatric patient, it is important to remember that the majority of pediatric medical emergencies are related to the respiratory system.

1. **Airway**

Positioning is the first step in airway management. The infant or young child's head and neck should be in the neutral ("sniffing") position. The jaw thrust will help lift the tongue off the back of the throat. Oral airways may be placed in unconscious patients, and suction should always be readily available because the child may have a lot of airway secretions.

2. **Breathing**

When assisted ventilation is deemed necessary, it can usually be accomplished by using the bag-valve-mask. Intubation assures a patent, controlled airway, more free hands for other work, and provides an access route for resuscitation medications (see protocol). OXYGEN should always be given at high concentrations, as it is never harmful in itself. However, attempts to give oxygen may cause agitation and worsen respiratory distress in some situations (croup, epiglottitis, trauma). If this occurs, stopping the oxygen or switching to blow-by is indicated.

3. **Circulation**

While vascular access is very important for certain serious conditions, starting an IV in a young child may be very difficult. Never delay on scene for more than TWO attempts; further attempts may be made enroute. INTRAOSSEOUS access may be life saving, but is reserved for those patients with extremely critical conditions (see protocol). When an IV is started hang ONLY Normal Saline, never D5W.

Use of adjuncts such as the "EZ IO" System may help with establishment of emergency IV/IO Access.

4. **D-Stick**

A dextrose stick should be checked on every critically Ill/Injured child.

PEDIATRIC PROTOCOL

I. ALTERED LEVEL OF CONSCIOUSNESS

INTRODUCTION

- A. Altered Level of Consciousness (ALOC) refers to any disturbance in the patient's consciousness. Terms such as coma, obtundation and stupor do not specify the level of consciousness. Patients should be described as:
 - 1. Alert
 - 2. Responsive to voice
 - 3. Fails to recognize parents
 - 4. Responsive to pain only
 - 5. Completely unresponsive
- B. ALOC is caused by a wide variety of disorders, but only a few can be specifically treated in the field:
 - 1. Hypoxia/hypercarbia
 - 2. Hypoglycemia – Vitals to check **D-Stick!**
 - 3. Increased intracranial pressure (ICP)
 - 4. Narcotic intoxication
 - 5. Shock
- C. The leading causes of death in the early hours of ALOC are airway obstruction and respiratory failure.

OBJECTIVES

- A. Prompt recognition of ALTERED LOC
- B. Prevention of further avoidable brain injury.
 - 1. Provide supportive care, focusing on airway management and oxygen.
 - 2. Provide specific therapy, if available

RECOGNITION

- A. History
 - 1. Possible trauma, evidence of ingestion/intoxication, possible seizure, evidence of infection (fever)
 - 2. Existing central nervous system (CNS), cardiac, or respiratory disease, or diabetes
 - 3. Complaints of headache, dizziness, or visual disturbances
 - 4. Evaluate the environment

PEDIATRIC PROTOCOL

ALTERED LEVEL OF CONSCIOUSNESS

- B. Examination
1. Assess airway patency and adequacy of respirations.
 2. Assess level of consciousness, presence of gag reflex.
 3. Examine pupils for size and light reactivity.
 4. Assess perfusion.
 5. Look for focal neurological deficits.
 6. Look for signs of trauma.
 7. Obtain vital signs.

TREATMENT

For patients unresponsive to voice, pain or unresponsive.

1. OPEN AIRWAY with head in the "sniffing position", by using the chin lift or jaw thrust maneuver. If trauma suspected, do the above with in-line stabilization, immobilize patient entirely and transport on backboard.
2. Pulse Oximetry, place the patient on high flow oxygen, 100% by partial or non-rebreather mask as tolerated by the patient. Assist ventilation, if needed (inadequate respiratory effort or rate for age, cyanosis, or bradycardia).
3. Apply monitoring electrodes.
4. IF SIGNS OF SEVERELY INCREASED ICP (fixed and dilated pupils or abnormal posturing), assist ventilation, BUT DO NOT HYPERVENTILATE, with bag-valve-mask device.
5. Contact medical control as soon as possible for patients with significant ALOC.
6. Consider intubation if the patient has an absent gag reflex or you are unable to maintain an airway.
7. Initiate IV Normal Saline TKO, draw bloods.
8. If the patient is hypotensive or has inadequate perfusion (weak pulses, capillary refill ≥ 3 sec), administer 20 cc/kg Normal Saline IV as a bolus.
9. Consider 25% Dextrose, 2.0 cc/kg IV PUSH (dilute D50 with equal volume of Normal Saline), if Glucose check is less than 60. Based on glucose check [Dose=0.5Gm/kg]
10. Administer Naloxone (Narcan) 0.1 mg/kg IV PUSH, observe response.
11. Transport rapidly.
12. Monitor ABC's

PEDIATRIC PROTOCOL

CAUTIONS

- A. Supportive care of the respiratory and cardiovascular systems are the highest priority.
- B. Always reassess after every intervention. Perform frequent reassessments during transport.

NOTIFY MEDICAL CONTROL FOR ALL PATIENTS WITH ALOC WHERE THEY FAIL TO RECOGNISE PARENTS, FAIL TO RESPOND TO PAIN, OR ARE COMPLETELY UNRESPONSIVE.

II. ANAPHYLAXIS

INTRODUCTION

- A. Anaphylaxis is the systemic manifestation of any allergic reaction (as compared to a local reaction).
- B. Signs of a mild anaphylactic reaction (these may also be early signs of a more severe reaction) include hives, facial or lip swelling, and GI disturbances (vomiting, diarrhea, abdominal pain).
- C. A severe reaction may involve laryngeal edema, which leads to hoarseness or stridor; bronchospasm, which shows as wheezing and shortness of breath; and/or distributive (vasodilator) shock, which is manifested by, flushed skin, dizziness, increased heart rate and weak pulses.
- D. The inciting agent may be a drug or medication, a food, insect sting/bite or an inhaled agent.

OBJECTIVES

- A. Prompt recognition of the condition.
- B. Reassurance and transport in mild cases.
- C. Treatment of life-threatening manifestations of severe reactions.

PEDIATRIC PROTOCOL

RECOGNITION

- A. History
 - 1. History of previous allergic reactions. Look for Medical Alert tag.
 - 2. Exposure to any possible cause:
 - a. Medication or drug
 - b. Food
 - c. Insect bite or sting
 - d. Animal
 - 3. Family history of allergies
 - 4. Abdominal pains, vomiting or diarrhea? Shortness of breath? Dizziness?
- B. Physical Examination
 - 1. Assess ABCs
 - 2. Look for signs of upper (hoarseness, stridor) or lower (wheezing) airway compromise.
 - 3. Look for signs of shock (flushing, increased heart rate, weak pulses, prolonged capillary refill, dizziness or altered consciousness).
 - 4. Look for cutaneous signs (hives, swelling).
 - 5. Obtain vital signs.

TREATMENT: FOR SEVERE ANAPHYLACTIC REACTIONS

- 1. IF PATIENT HAS STRIDOR OR WHEEZING, and is conscious, allow them to achieve a "position of comfort" and keep the child with the parent.
- 2. Pulse Oximetry, high flow oxygen, 100% by non-rebreather mask as tolerated by the patient. IF SEVERE RESPIRATORY distress or significantly depressed LOC present, assist ventilation with BVM.
- 3. Administer Epinephrine 1:1000 at a dose of 0.01 cc/kg SQ, repeat as needed every 15 minutes, (maximum single dose = 0.5 cc).
- 4. Administer Solumedrol 2.0mg/kg IV PUSH
- 5. IF PATIENT IS NOT HYPOTENSIVE, administer Benadryl 1.0 mg/kg IM or SLOW IV PUSH (over 2 minutes). DO NOT REPEAT.
- 6. If patient is wheezing, but has normal perfusion, give aerosolized albuterol, 2.5 mg in 2cc NS.
- 7. Rapidly transport to an appropriate facility.
- 8. Apply monitoring electrodes.
- 9. Reassess, and contact medical command.
- 10. IF THE PATIENT IS IN SHOCK, start an IV Normal Saline. If the patient is hypotensive and/or unconscious, and the paramedic is unable to obtain an IV after 2 attempts, consider an intraosseous infusion.
- 11. Begin a 20 cc/kg IV bolus of NS.
- 12. IF THE PATIENT IS IN SHOCK, Medical Direction may have the paramedic give Epinephrine (1:10,000) 0.1 cc/kg IV (max. dose = 10 cc).
- 13. If perfusion is still poor after Epinephrine, consider repeating 20 cc NS/kg IV bolus.

PEDIATRIC PROTOCOL

CAUTIONS

- A. SUPPORTIVE CARE OF THE RESPIRATORY AND CARDIOVASCULAR SYSTEMS ARE THE HIGHEST PRIORITY.
- B. Frequent reassessments are mandatory.

NOTIFY MEDICAL DIRECTION OF ALL PATIENTS WITH SEVERE ANAPHYLACTIC REACTIONS.

III. CARDIORESPIRATORY ARREST

INTRODUCTION

- A. This protocol includes the procedures to be used in the assessment and treatment of the immediately life-threatening conditions that include respiratory arrest, severe bradycardia, asystole, ventricular fibrillation, and electromechanical dissociation. This protocol is based on the current American Heart Association guidelines. May change w/ 12/05 AHA updates.
- B. Most cardiac arrests in children are the result of airway compromise and hypoxia. The most common medical causes of pediatric arrest are drowning, SIDS, and upper airway obstruction. Severe respiratory failure from any cause or severe shock may also precipitate a cardiorespiratory arrest. Primary cardiac causes are rare, but include congenital abnormalities and cardiomyopathies.
- C. Because most pediatric cardiac arrests are respiratory in origin, the rhythm of a pulseless patient is almost always asystole or profound bradycardia. Ventricular fibrillation (V-fib) and electromechanical dissociation (EMD) are extremely rare.
- D. Again, because most cardiac arrests are respiratory in origin, ensuring optimal ventilation and oxygenation is the highest priority.
- E. The 2005 AHA guidelines are included that emphasizes high quality, almost continuous CPR during a full arrest.

OBJECTIVES

- A. Rapid and accurate assessment of cardiorespiratory function.
- B. Rapidly establish airway support, ventilation and oxygenation.
- C. Support circulation with effective chest compressions when needed.
- D. Recognize and treat abnormal cardiac rhythms, when present, in order to re-establish normal, spontaneous pulse.

PEDIATRIC PROTOCOL

RECOGNITION

- A. History
 1. If patient is in respiratory arrest, a brief history to identify possible precipitants may be helpful: regurgitation (aspiration), seizure activity, toxic ingestions or exposures, preceding respiratory symptoms.
 2. Determine history of major medical problems, including apnea, cardiac abnormalities, and previous cardiac surgery.
 3. Attempt to estimate the downtime if the collapse was witnessed, or ascertain the last time the baby was seen.
 4. Determine if any resuscitative measures were performed prior to your arrival.
- B. Physical Examination
 1. Confirm unresponsiveness.
 2. Assess for presence and adequacy of respirations.
 3. Check for pulse at brachial (infants), carotid (older children), or femoral artery. May also check apical pulse.
 4. Check the cardiac rhythm via the three-lead monitor. The "quick-look" paddles may be used, but interpretation may be difficult due to artifacts. Run a strip, if possible.

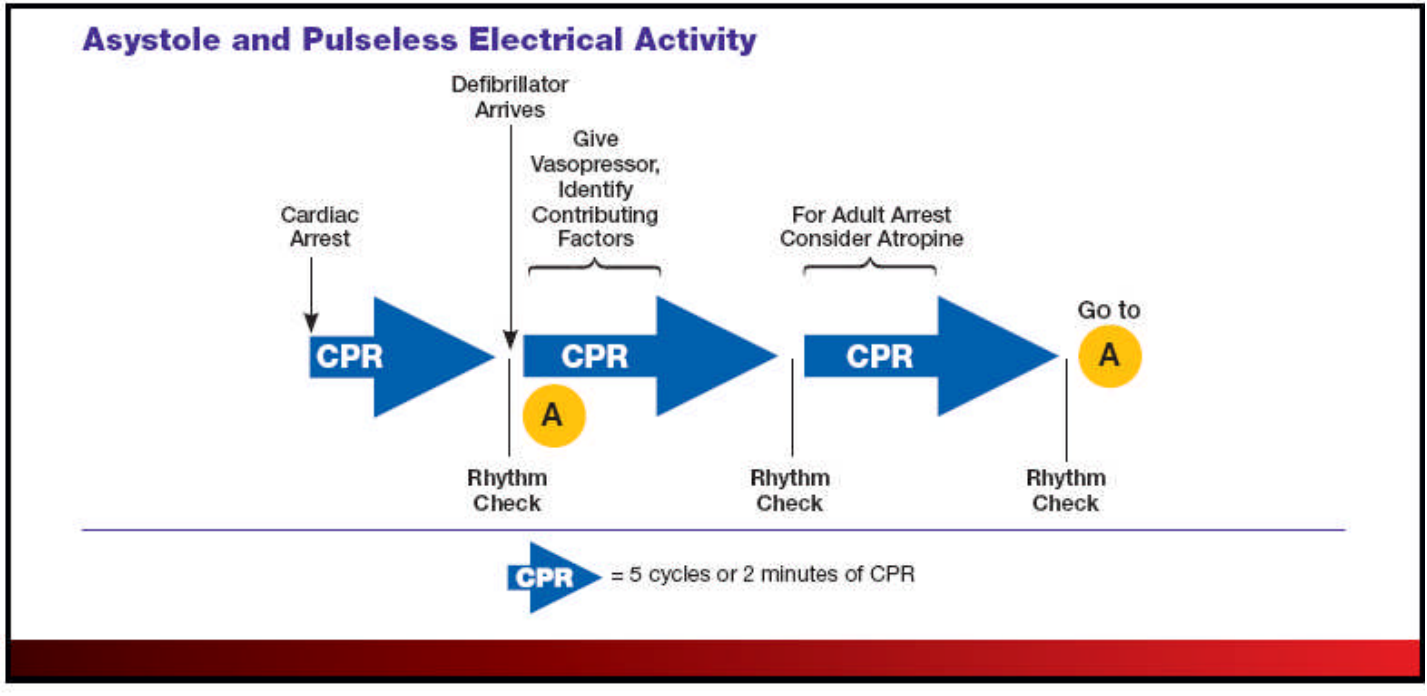
BLS TREATMENT

1. OPEN AIRWAY with head in the "sniffing position", by using the chin lift or jaw thrust maneuver. Use tactile stimulation.
2. If spontaneous, adequate respirations return, administer 100% O₂ by non-rebreather mask, reassess ABCs, and transport to an appropriate facility.
3. IF NO SPONTANEOUS RESPIRATIONS occur after correct positioning, BEGIN BAG-VALVE-MASK VENTILATION with 100% O₂ at 20-40 breaths per minute. If there is no chest rise with ventilation attempts, reposition, check mask fit, and attempt ventilation again. If still no chest rise, consider performing obstructed airway protocol.
4. CHECK FOR PULSE (brachial, femoral, carotid and/or apical).
5. If pulse is present and at a normal rate for age, reassess for spontaneous, effective respirations. If now present, give 100% oxygen by mask. If absent, continue assisted ventilation. Notify and transport to an appropriate facility.
6. IF THERE IS NO PULSE PRESENT OR THE HEART RATE IS LESS THAN 60 WITH SIGNS OF POOR PERFUSION IN AN INFANT OR TODDLER, BEGIN CHEST COMPRESSIONS. For infants the two-finger technique may be used. The sternum should be depressed 0.5 to 1.0 inches, at a rate of 100-120 times per minutes. The one hand technique should be used in children from 1 to 8 years of age, with a compression depth of 1.0 - 1.5 inches and a rate of 100 times per minutes.
7. Notify and transport rapidly to an appropriate facility.
8. Apply monitoring electrodes or use "quick-look" paddles to ascertain rhythm. Follow the appropriate protocol.
9. Monitor ABC's.

FOR RESPIRATORY ARREST WITH A PULSE, CONSIDER INTUBATION

PEDIATRIC PROTOCOL

IV. ASYSTOLE



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V. BRADYCARDIA

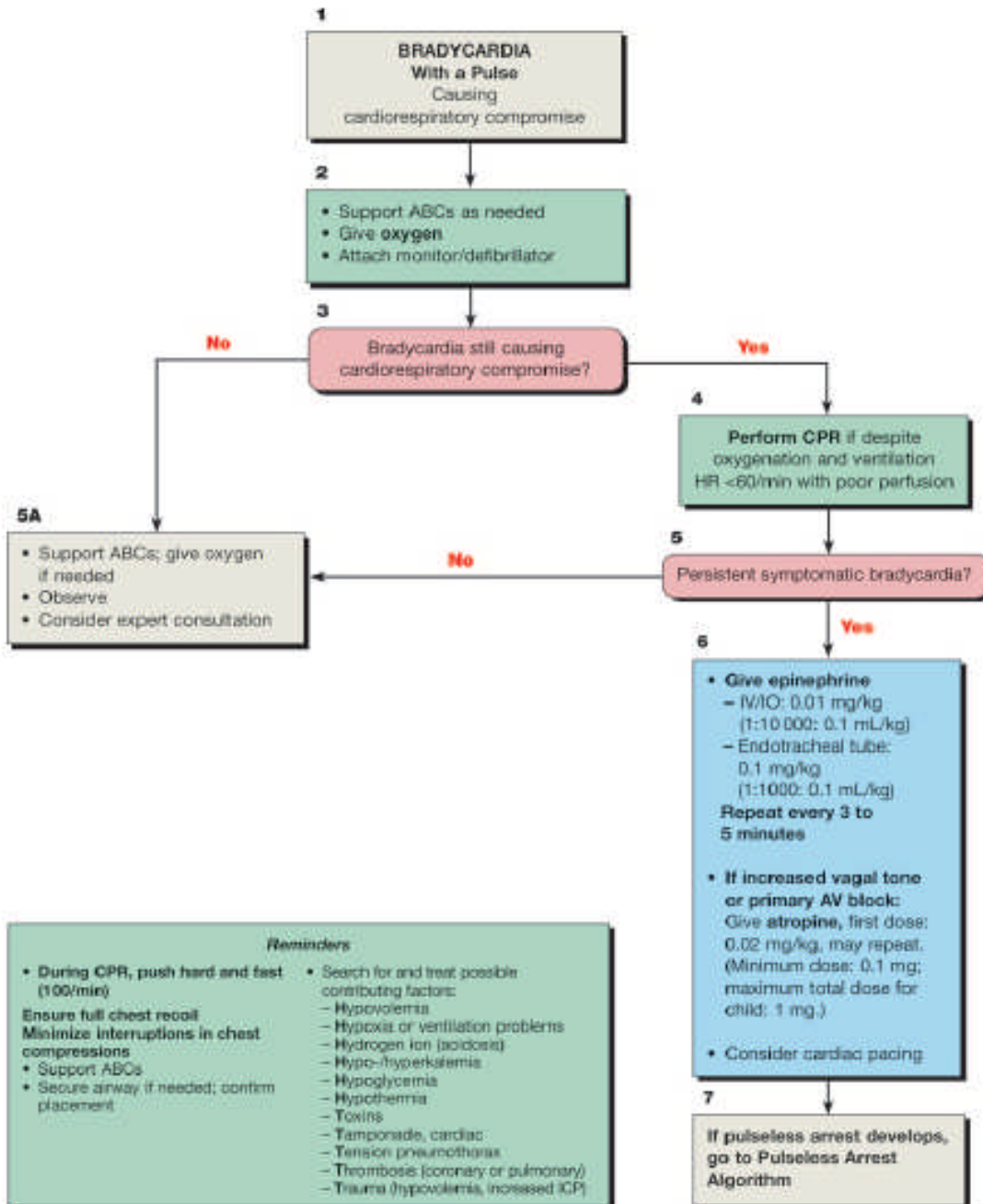
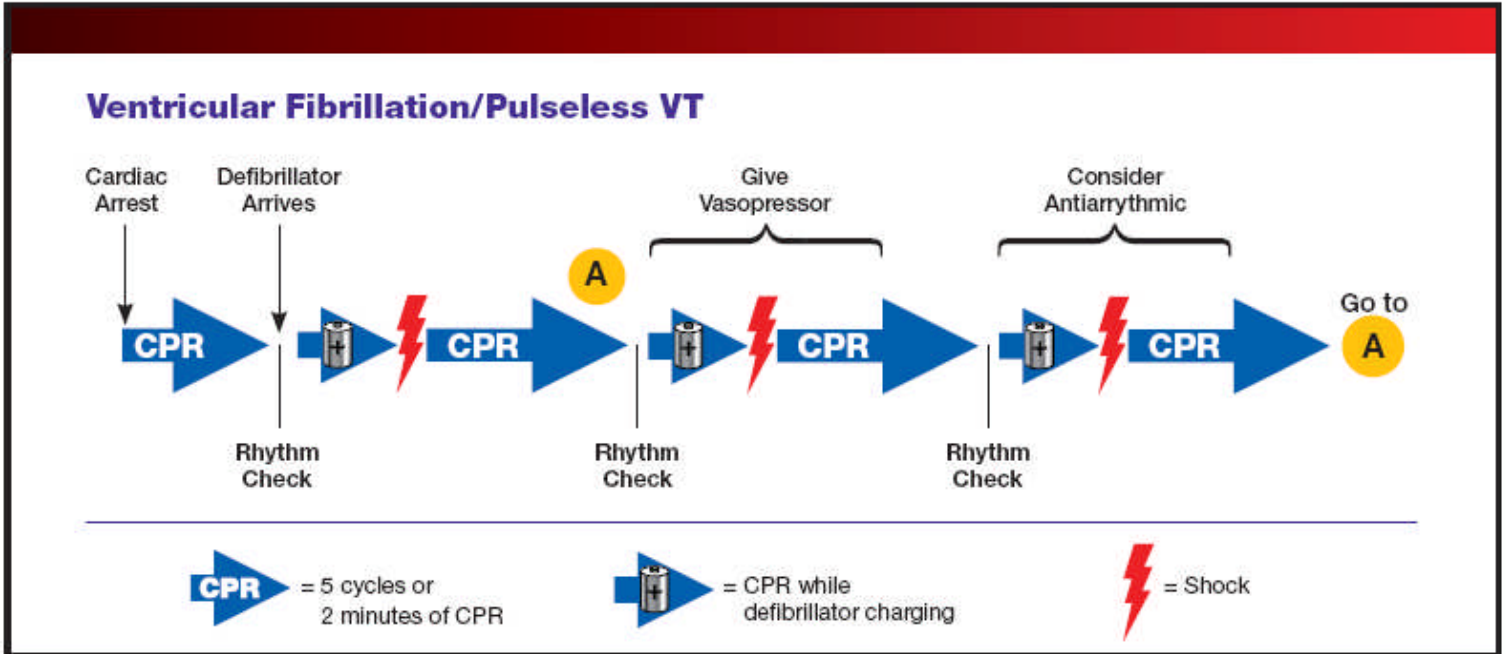


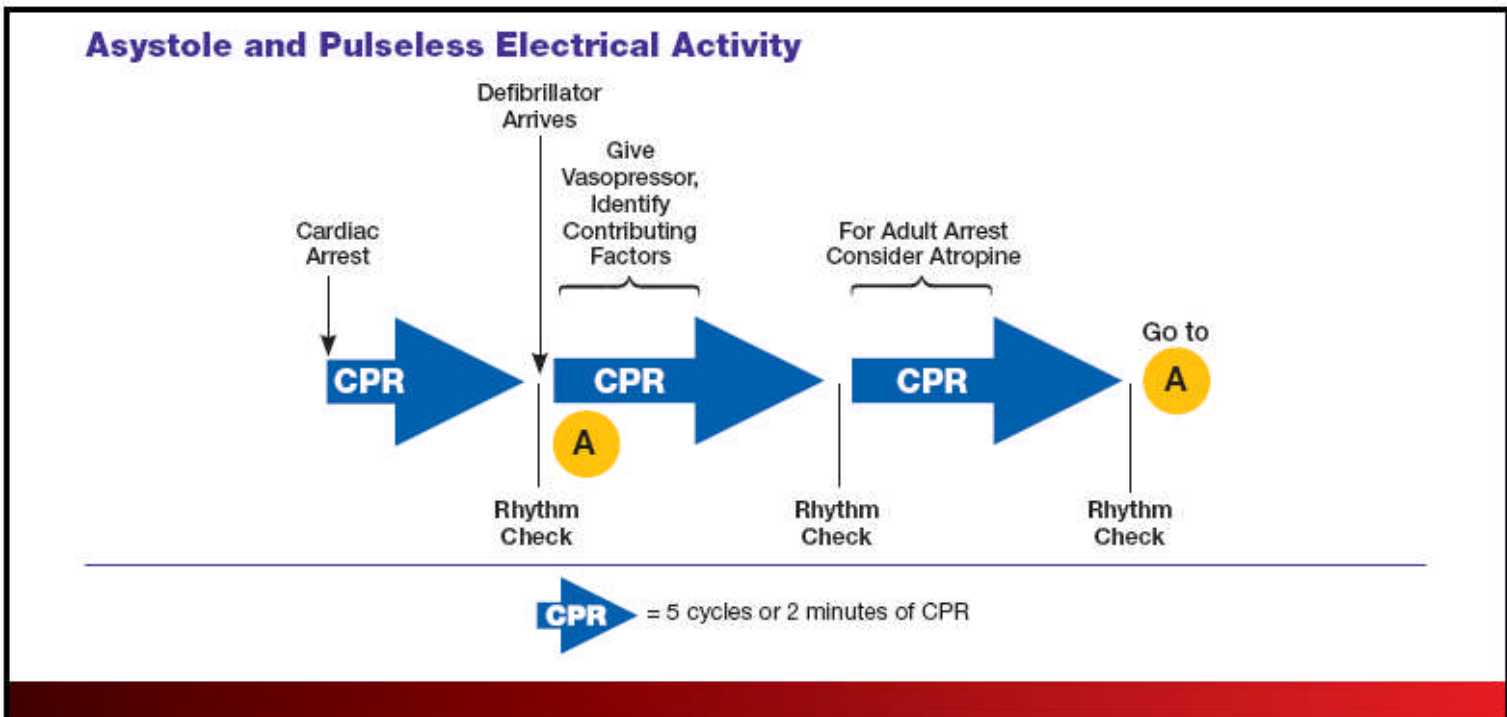
Figure 2. PALS Bradycardia Algorithm.

PEDIATRIC PROTOCOL

VI. VENTRICULAR FIBRILLATION



VII. PULSELESS ELECTRICAL ACTIVITY



PEDIATRIC PROTOCOL

10. Notify hospital and transport rapidly.
11. If PERICARDIAL TAMPONADE (**VOLUME**) is the suspected cause, repeat Epinephrine with the 1:1000 solution at the same volume every 3 - 5 minutes and rapidly transport to the nearest appropriate facility.
12. If TENSION PNEUMOTHORAX is the suspected cause, the physician should direct the paramedic to perform NEEDLE DECOMPRESSION on the effected side. If there is still no response, repeat Epinephrine with the 1:1000 solution at the same volume every 3 - 5 minutes and rapidly transport to the nearest appropriate facility.

CAUTIONS

- A. Continue BCLS procedures throughout the resuscitation.
- B. If resuscitation efforts are not producing positive results, reassess the basics:
 1. Are ventilation and oxygenation adequate? Check ventilation rate, ETT position and oxygen hook-ups. A nasogastric tube may be needed to deflate a distended stomach that is interfering with the ability to ventilate.
 2. Are chest compressions being performed correctly? Is there a palpable femoral pulsation with compressions?
 3. Is the IV or IO line infiltrated?

NOTIFY MEDICAL COMMAND AT THE EARLIEST POSSIBLE TIME.

PEDIATRIC PROTOCOLS

I. DIABETIC EMERGENCIES

INTRODUCTION

- A. Patients with Insulin-Dependent Diabetes Mellitus (IDDM) may experience two types of emergencies:
 - 1. Hyperglycemia and ketoacidosis (DKA).
 - 2. Hypoglycemia.
- B. These conditions may be difficult to distinguish clinically. Blood sugar should be tested by glucometer.

OBJECTIVES

- A. Prompt recognition of hypoglycemia or ketoacidosis in a patient known to have IDDM.
- B. Appropriate field treatment of the condition:
 - 1. Glucose, orally or intravenously to the patient with hypoglycemia.
 - 2. IV fluid bolus for the child with DKA.

RECOGNITION

- A. History
 - 1. Patient known to have IDDM.
 - a. How long have they had IDDM?
 - b. Insulin dose Toyoc? Once or twice a day? Pump
 - c. If patient checks blood sugar, what was it at last check?
 - 2. Have there been recent changes in dose, activity or food intake?
 - 3. Concurrent illness (cold, gastroenteritis, etc.).
 - 4. DKA may be precipitated by inadequate insulin, illness or infection, and emotional stress. Symptoms include:
 - a. Lethargy.
 - b. Abdominal pain, nausea/vomiting.
 - c. Dehydration/shock.
 - d. Increased respiratory rate and depth.
 - e. Increased urination.
 - f. Increased thirst.

PEDIATRIC PROTOCOL

5. Hypoglycemia often occurs in the early morning. Symptoms include:
 - a. Hunger.
 - b. Sweating.
 - c. Irritability or lethargy.
 - d. Dizziness.
 - e. Convulsions.
- B. Examination
 1. Assess ABCs. Patient may have airway and/or respiratory compromise as a result of depressed level of consciousness or convulsions.
 2. Assess for dehydration and/or decreased perfusion. Patients with true DKA are always dehydrated.
 3. Assess neurological status.
 4. Test blood sugar by glucometer.

TREATMENT

1. Maintain airway, breathing and circulation.
2. Pulse Oximetry, assess hydration and perfusion, neuro status.
3. IF BLOOD SUGAR < **60**, and patient is awake with an intact gag reflex, give orange juice with sugar. If level of consciousness depressed, consider oral instant glucose.
4. Transport to an appropriate facility.
5. IF PATIENT IS UNRESPONSIVE OR SEIZING, open airway with head in the "sniffing position", by using the chin lift or jaw thrust maneuver, if possible.
6. Begin high f low oxygen, 100% by non-rebreather mask. ASSIST VENTILATION IF NEEDED (cyanosis, apnea or bradycardia).
7. CONSIDER IV Normal Saline, drawing bloods if possible.
8. For the patient with LOW BLOOD SUGAR (< 60), administer 25% DEXTROSE 2.0 cc/kg IV PUSH (0.5gm/kg). Glucagon 0.5 cc IM may be given only after IV access unsuccessful x 2.
9. For the patient with HIGH BLOOD SUGAR (> 200) and signs of shock, begin a 20 cc/kg IV bolus of NS.
10. Apply monitoring electrodes.
11. Contact medical command as soon as possible.
12. Monitor ABC's and transport rapidly.

CAUTIONS

- A. Supportive care of the respiratory and cardiovascular systems are the highest priority.
- B. Always reassess after every intervention. Perform frequent reassessments during transport.

PEDIATRIC PROTOCOLS

II. NEONATAL RESUSCITATION

INTRODUCTION

- A. Although the great majority of newborns have little trouble in making the transition from the uterus to the external environment, some will need help.
- B. Simple measures such as airway positioning, suctioning, stimulation, drying and warming are usually enough. ALS is rarely required.
- C. Neonatal problems usually result from birth asphyxia, and bradycardia or asystole and almost always respond well to adequate ventilation with 100% oxygen.
- D. **It is important to dry a newborn and keep them warm.**

OBJECTIVES

- A. Recognize the newborn at increased risk for needing resuscitation.
- B. Mothers should be transported to an appropriate facility prior to delivery, if possible.
- C. Management of the newborn should focus on the basics:
 - 1. Airway management
 - 2. Effective ventilation
 - 3. Circulation
 - 4. Maintenance of body temperature

RECOGNITION

- A. History - a rapid history to identify newborns at risk for complications should include:
 - 1. Is labor premature? (Estimated due date)
 - 2. Are twins expected?
 - 3. Is thick, particulate meconium present? (This will change management)
 - 4. Is there recent drug exposure? (Cocaine, narcotics, etc.)
- B. Physical Exam and assess the following:
 - 1. Respiratory effort
 - 2. Heart rate
 - 3. Muscle tone
 - 4. Color

PEDIATRIC PROTOCOL

TREATMENT

1. If birth has not yet occurred, assist the delivery process:
 - a. Control the speed of the delivery - the head should be delivered over 5-10 seconds.
 - b. After the head is delivered, suction the mouth, then both nares using a suction bulb (squeeze bulb before inserting).
 - c. **IF THERE IS THICK OR PARTICULATE MECONIUM**, suction deep into the hypopharynx using a DeLee suction trap or other large-bore suction (a bulb alone is not adequate). Clear the mouth and pharynx well before delivering the shoulders.
 - d. Deliver the shoulders and the rest of the baby.
 - e. Tie or clamp and cut the cord at 6 and 9 inches from the baby's skin.
2. After birth, or initially if the baby is already born, position the baby with head slightly down, **SUCTION, DRY AND WARM THE BABY** (to further clear the airway, stimulate respirations, and decrease heat loss by evaporation). If thick meconium is present and baby was not suctioned prior to delivery, suction deeply into the mouth and throat before drying or stimulating.
3. Assess presence and adequacy of spontaneous respirations.
4. **IF NO (OR INADEQUATE) RESPIRATIONS, ASSIST VENTILATION** with a BVM and 100% oxygen at a rate of 40/minute.
5. **ASSESS HEART RATE.** Palpate brachial or femoral pulse, or the base of the umbilical cord.
6. **IF HR < 80 BPM**, assist ventilation with BVM and 100% O₂, begin chest compressions, and rapidly transport to an appropriate facility. Notify the receiving facility.
7. **IF THE HEART RATE is Between 80 and 100**, continue ventilation until above 100. If holding around 80 and not increasing, begin chest compressions.
8. **IF HR > 100, BUT COLOR IS DUSKY OR BLUE**, give high-flow oxygen by mask, keep warm, and transport.
9. **IF HR > 100, and BABY is PINK or acrocyanotic (blue extremities)**, keep warm and transport.
10. If prolonged ventilation is required, consider intubation with appropriate sized ETT (size 0 or 1 laryngoscope blade).
11. Monitor ABC's of baby and mother.
12. Transport rapidly.

PEDIATRIC PROTOCOL

CAUTIONS

- A. Thoroughly dry the baby and keep it warm. Hypothermia is a major complication of home or field deliveries.
- B. When ventilating a newborn, remember the volume of air for each breath should be just enough for the chest to begin to rise. The first few breaths may require more pressure, then the lungs are expanded and less pressure is needed.
- C. If heart rate does not respond to ventilation with 100% oxygen and chest compressions, rapid transport to the hospital for vascular access and medications is imperative. Notify receiving hospital.

**NOTIFY HOSPITAL FOR ANY BABY REQUIRING VENTILATION OR CHEST COMPRESSIONS
NOTIFY HOSPITAL FOR ANY BABY WITH MECONIUM.**

PEDIATRIC PROTOCOL

RESPIRATORY DISTRESS: UPPER AIRWAY DISEASE

INTRODUCTION

- A. Causes of upper airway obstruction in the pediatric patient include croup, epiglottitis, inhaled foreign bodies, congenital anomalies, subglottic stenosis and tracheitis. Identifying the specific condition is not necessary for the delivery of quality pre-hospital care.
- B. The hallmark of upper airway obstruction is the presence of inspiratory stridor. Other signs and symptoms may include hoarseness, barking cough, drooling and inability to swallow, muffled voice, choking or gagging, and signs of increased work of breathing.
- C. Agitation often increases the amount of obstruction, further compromising the airway.

OBJECTIVES

- A. Prompt recognition of the presence of upper airway compromise.
- B. Approach the patient slowly and calmly.
- C. Avoid any interventions, which increase agitation and worsen stridor.

RECOGNITION

- A. History
 1. History of witnessed aspiration or sudden episode of choking and gagging.
 2. History of barking cough (croup) or high fever and increased drooling (epiglottitis).
 3. History of existing tracheal anomaly or past history of intubation (especially in the neonatal period).
- B. Physical Exam
 1. Approach slowly and calmly. Leave child with parent during evaluation. Do not attempt to look in the mouth. Do not force the child to lie down. If any interventions cause agitation - STOP.
 2. From a distance, assess presence of audible stridor, skin color, level of consciousness, respiratory rate, and work of breathing.
 3. Slowly approach and attempt to obtain vital signs and listen to breath sounds.

PEDIATRIC PROTOCOL

TREATMENT

1. Maintain airway, breathing and circulation.
2. If patient is conscious with adequate ventilation, keep the child with the parent and allow him/her to find the position of maximum comfort.
3. Pulse Oximetry, give high-flow oxygen by mask as tolerated. Let parent hold mask. Remove if it causes significant agitation.
4. **IF PATIENT IS CYANOTIC OR HAS DEPRESSED LOC** –separate child from parent and **OPEN THE AIRWAY** by placing the head in the "sniffing position" and using the chin lift or jaw thrust.
5. If result is ineffective respirations, ventilate with a BVM device and 100% oxygen. If unable to ventilate, reposition and try again. If still unable to ventilate, and there is strong history consistent with foreign body aspiration, perform obstructed airway maneuvers (see protocol).
6. **IF THIS DOES RESULT IN EFFECTIVE RESPIRATIONS**, contact medical direction and receiving facility. Consider Racemic Epinephrine with consult of Medical Direction
7. Transport rapidly.
8. Apply monitoring electrodes to the unconscious patient.

CAUTIONS

- A. Agitation increases airway obstruction.

IF ANY INTERVENTIONS CAUSE AGITATION - STOP!

PEDIATRIC PROTOCOL

RESPIRATORY DISTRESS: FOREIGN BODY AIRWAY OBSTRUCTION

INTRODUCTION

- A. Foreign bodies may cause partial or complete obstruction if they are actually in the larynx or trachea, or by compression if they are stuck in the upper esophagus.
- B. Agitation often increases the amount of obstruction, further compromising the airway.
- C. Attempts to clear the airway should only be made if foreign body aspiration is witnessed or very strongly suspected and there is complete airway obstruction.
- D. Even with complete obstruction, positive-pressure ventilation may be successful.

OBJECTIVES

- A. Prompt recognition of the presence of upper airway compromise by a foreign body.
- B. Approach the patient slowly and calmly.
- C. Avoid any interventions, which increase agitation and worsen stridor if the obstruction is partial (see Upper Airway protocol).
- D. Clear the airway if the obstruction is complete.

RECOGNITION

- A. History
 - 1. Very acute onset of respiratory distress.
 - 2. History of witnessed aspiration or sudden episode of choking and gagging.
- B. Physical Exam
 - 1. If patient is awake, approach slowly and calmly. Leave child with parent during evaluation. Do not attempt to look in the mouth. Do not force the child to lie down. If any interventions cause agitation, STOP!
 - a. Assess presence of audible stridor, skin color, level of consciousness, respiratory rate, and work of breathing.
 - b. Slowly approach and attempt to obtain vital signs and listen to breath sounds.
 - 2. If child unconscious, assess for breath sounds, chest excursion, color, and heart rate.

PEDIATRIC PROTOCOL

TREATMENT

1. Maintain airway.
2. Assess extent of obstruction.
3. If Patient is conscious with only PARTIAL OBSTRUCTION, keep the child with the parent and allow him/her to find the position of maximum comfort. If coughing, encourage the child to persist, as this is the most effective means of clearing the airway.
4. Pulse Oximetry, give oxygen by mask as tolerated. Let parent hold mask. Remove if it causes significant agitation.
5. If obstruction is complete (no air exchange), the cough becomes ineffective or there is increasing respiratory distress and stridor, perform the following:
6. For the CONSCIOUS INFANT (up to 12 months), deliver 5 back blows followed by 5 chest thrusts. For the CONSCIOUS CHILD, perform the Heimlich Maneuver with the patient sitting in your lap or standing. Repeat the sequence of maneuvers until either the foreign body is expelled or the patient becomes unconscious.
7. IF THE PATIENT IS OR BECOMES UNCONSCIOUS, open the airway by placing the head in the "sniffing position" and using the chin lift or jaw thrust. Attempt to ventilate with rescue breathing or a BVM device. If unable to ventilate, reposition and try again.
8. If still unable to ventilate, deliver 5 back blows, then 5 chest thrusts to an infant. For the child, abdominal thrusts are performed, 5-10 times.
9. Open the victim's mouth and if a foreign body is seen, remove it. NEVER PERFORM BLIND FINGER SWEEPS OF THE MOUTH OR THROAT, AS THIS WILL ONLY PUSH THE OBJECT FURTHER DOWN.
10. Reposition the airway and attempt to ventilate.
11. If still unable to ventilate, repeat the sequence.
12. Contact medical control and receiving facility.
13. Rapidly transport while continuing attempts to ventilate and clear the airway.
14. If unable to ventilate and unable to clear the airway, and the patient is cyanotic or bradycardic, consider intubation (may push obstructing object into one mainstem bronchus and allow some ventilation, but also may remain in trachea and be even more difficult to remove).

CAUTIONS

- A. Agitation increases airway obstruction in the awake, breathing patient. If any interventions cause agitation - STOP!
- B. NEVER PERFORM BLIND FINGER SWEEPS IN AN INFANT OR YOUNG CHILD!

PEDIATRIC PROTOCOL

RESPIRATORY DISTRESS: LOWER AIRWAY DISEASE

INTRODUCTION

- A. The lower airway diseases likely to be the cause of respiratory distress in infants and children include pneumonia, asthma, and bronchiolitis (a viral pneumonia in infants that causes wheezing).

OBJECTIVES

- A. Prompt recognition of the patient in respiratory distress.
- B. Assess the adequacy of ventilation and assist, if needed.
- C. Provide oxygen to all patients.
- D. Begin treatment for wheezing.

RECOGNITION

- A. History
 1. May help differentiate the cause inpatient with difficulty breathing.
 2. Determine history of previous wheezing episodes or a history of asthma.
 3. Rate of onset of symptoms, presence of cold symptoms or cough, presence of fever, history of previous episodes, presence of wheezing.
- B. Physical Exam
 1. Signs of respiratory distress (increased work of breathing) include: Tachypnea, retractions, grunting, nasal flaring, and accessory muscle use.
 2. Adequacy of ventilation is assessed mainly by chest wall rise, air exchange and breath sounds.
 3. Dusky skin, cyanosis and depressed LOC indicate respiratory failure, no matter what other signs are or are not present.
 4. Normal respiratory rates vary with age.
 5. Listen for symmetry of breath sounds and for abnormal breath sounds: wheezing, rales (crackles), and rhonchi.

PEDIATRIC PROTOCOL

TREATMENT

1. If patient is conscious with adequate ventilation, keep the child with the parent and allow him/her to find the position of maximum comfort.
2. Pulse Oximetry, high-flow oxygen by mask as tolerated. Let parent hold mask.
3. If patient is cyanotic or fails to recognize parent, separate child from parent and OPEN THE AIRWAY by placing the head in the "sniffing position" and using the chin lift or jaw thrust.
4. If this does result in effective respirations, maintain the open airway and give high-flow oxygen by non-rebreather mask.
5. If this does not result in effective respirations, ventilate with a BVM device and 100% oxygen. If unable to ventilate, reposition and try again.
6. Contact medical control and receiving facility.
7. Transport to an appropriate facility
8. Apply monitoring electrodes to patient who is in moderate to severe distress.
9. If the patient is wheezing (and/or the patient is known to have asthma)
If patient is < 10kg: Administer Albuterol unit dose, 2.5 mg in 2 cc NS by aerosol
If patient is ≥ 10kg Administer Albuterol unit dose, 5.0 mg in 2 cc NS by aerosol
10. If the patient is in severe respiratory distress (increased work of breathing with cyanosis or unconsciousness), administer epinephrine (1:1000) 0.01 cc/kg SQ (max dose 0.5 cc).
11. If patient deteriorates to respiratory arrest, burns, intubate the patient with an appropriate sized ET tube.
11. Monitor ABC's

CAUTIONS

- A. In asthmatics, severe respiratory distress may be present, but wheezing is not heard. This is because the airways are so narrowed there is not enough air movement to cause noise. Consider giving an Albuterol aerosol to known asthmatics in severe respiratory distress, even if no wheezing is heard.
- B. A patient with signs of respiratory failure needs assisted ventilation even if they are still breathing.

CALL MEDICAL CONTROL FOR ALL WHEEZING PATIENTS AND THOSE WITH SEVERE RESPIRATORY DISTRESS AND/OR RESPIRATORY FAILURE.

PEDIATRIC PROTOCOL

SHOCK

INTRODUCTION

- A. Shock is the state where there is inadequate perfusion to meet the metabolic demands of the tissues. There are different types of shock, including hypovolemic (from dehydration or hemorrhage), distributive or relative hypovolemia (sepsis, anaphylaxis), and cardiogenic (heart failure). The most common cause of shock in pediatric patients is hypovolemia; cardiogenic shock is rarely seen but needs to be considered.
- B. Signs of shock include increased heart rate, prolonged capillary refill (> 2 seconds), cool, clammy, pale or mottled skin, weak or absent peripheral pulses, and depressed level of consciousness.
- C. Children compensate well for decreases in cardiac output, and keep their BP normal much longer than adults. Hypotension occurs very late in children, and is a sign of severe, decompensated shock.

OBJECTIVES

- A. Recognition of shock, and its severity.
- B. Provide supplemental oxygen to increase oxygen delivery to the cells.
- C. Begin fluid resuscitation for patients in late compensated or decompensated shock.

RECOGNITION

- A. History
 - 1. Symptoms of GI loss (vomiting, diarrhea) and dehydration
 - a. Dry mouth.
 - b. No tears.
 - c. Sunken fontanelle (infants) or sunken eyes.
 - d. Poor skin turgor.
 - e. Decreased urination.
 - 2. Potential or obvious hemorrhage.
 - 3. History of fever, other signs of infection.

PEDIATRIC PROTOCOL

- B. Physical Exam
1. Assess ABCs.
 2. Evaluate for signs of shock as above.
 - a. Skin color, temperature, and capillary refill.
 - b. Feel pulses (peripheral and central) for quality and rate.
 - c. Evaluate level of consciousness (LOC).
 - d. Obtain vital signs
 3. Assess Severity of shock
 - a. Early compensated shock.
 - b. Late compensated shock: cool and/or pale skin, weak peripheral pulses, altered LOC.
 - c. Decompensated shock: hypotension, unconscious (fails to respond to pain), absent peripheral pulses, weak central pulses.

TREATMENT

1. Maintain airway, breathing and circulation.
2. Pulse Oximetry, high flow oxygen via non-rebreather if tolerated.
3. Control external hemorrhage, if present. Keep patient warm.
4. Apply monitoring electrodes.
5. Contact Medical Control as soon as possible.
6. If the patient is in late compensated or decompensated shock, start an IV Normal Saline, if unable to obtain an IV after 2 attempts, start an intraosseous infusion.
7. Give Normal Saline 20 cc/kg IV or IO BOLUS (GIVE AS FAST AS POSSIBLE)
8. If Glucose check is < 60, 0.5 grams/kg of D50 or D25W by IV or IO
9. Reassess patient after fluid bolus. May repeat bolus if needed.
10. Transport rapidly.
11. Monitor ABC's.

CAUTIONS

- A. Normal pediatric vital signs vary with age. Consult tables for normal ranges.
- B. Obtaining the blood pressure is not essential. If you do, use the correct size cuff.
- C. Reassess after each intervention.

CONTACT MEDICAL CONTROL FOR ANY CHILD IN SHOCK.

PEDIATRIC PROTOCOL

STATUS EPILEPTICUS

INTRODUCTION

- A. Most seizures are short and self-limited. Status occurs when a patient has either continuous seizures or consecutive seizures without regaining consciousness for more than 20 minutes.

OBJECTIVES

- A. Prevention of further avoidable brain injury.
 - 1. Provide supportive care, focusing on airway management.
 - 2. Provide specific therapy to stop seizures.

RECOGNITION

- A. History
 - 1. Does child have a known seizure disorder? If so, what medications are they taking? Missed doses?
 - 2. Other precipitating factors: Fever, toxins, and hypoglycemia.
- B. Examination
 - 1. Evaluate airway patency and adequacy of respirations (chest excursion, rate, cyanosis?)
 - 2. Note type of seizure activity present: Generalized or focal; tonic-clonic, stiff or limp; eye rolling or gaze preference; urinary incontinence.

PEDIATRIC PROTOCOL

TREATMENT

1. Open airway with head in the "sniffing position", by using the chin lift or jaw thrust maneuver, if possible.
2. Pulse Oximetry, high flow oxygen by non-rebreather mask. Assist ventilation, if needed (cyanosis, apnea or bradycardia).
3. Apply monitoring electrodes.
4. Consider IV Normal Saline TKO, draw bloods if possible.
5. Administer Diazepam (Valium) 0.5-0.7 mg/kg rectally (max. 20 mg) or 0.25 mg/kg by SLOW IV PUSH (max. IV dose 10 mg). May use Lorazepam (Ativan) 0.1 mg/kg IV, instead of Diazepam, if available.
6. Check glucose level. If glucose < 60, administer 25% Dextrose 2.0 cc/kg IV PUSH.
7. Transport rapidly.
8. Monitor ABC's.

CAUTIONS

- A. Supportive care of the respiratory and cardiovascular systems are the highest priority.
- B. Always reassess after every intervention. Perform frequent reassessments during transport.

NOTIFY MEDICAL CONTROL FOR ALL PATIENTS IN STATUS EPILEPTICUS.

Midazolam (Versed)
Administer 0.1 mg/kg via IM/IO

PEDIATRIC PROTOCOL

SUPRAVENTRICULAR TACHYCARDIA

INTRODUCTION

- A. Supraventricular tachycardia (SVT) is one of the more common dysrhythmias in childhood.
- B. It is often difficult to distinguish from simple sinus tachycardia.
- C. SVT does not need to be treated emergently if patient is cardiovascularly stable.

OBJECTIVES

- A. Recognize SVT.
- B. Evaluate hemodynamic stability. Treat rhythm only if patient is in cardiogenic shock.

RECOGNITION

- A. History
 - 1. Usually non-specific. In infants there may be irritability or lethargy, poor feeding, increased respiratory rate, sweating or pallor. Older children may complain of palpitations, chest pain, increased respiratory rate, sweating, or pallor.
 - 2. In sinus tachycardia, there is usually a history consistent with fever, pain and/or anxiety or volume loss (diarrhea, vomiting, or hemorrhage).
- B. Examination
 - 1. Very fast heart rate, often too fast to count in infants.
 - 2. Exam may be very non-specific.
 - 3. Signs of congestive heart failure (CHF): increased respiratory rate, increased work of breathing, rales or crackles on auscultation, large liver.
 - 4. Signs of cardiogenic shock (hemodynamic instability): prolonged capillary refill, weak or absent pulses (peripheral or central), and depressed consciousness.
 - 5. In sinus tachycardia, the exam may show fever, signs of dehydration, or hemorrhage. There should be no signs of CHF.

PEDIATRIC PROTOCOL

TREATMENT

1. If patient is unconscious or showing signs of shock, open airway with head in the "sniffing position", by using the chin lift or jaw thrust maneuver.
2. Pulse Oximetry, high flow oxygen by non-rebreather mask. Assist ventilation if patient in severe respiratory distress.
3. Apply monitoring electrodes.
4. If patient is showing no signs of CHF or shock, transport the patient to an appropriate facility.
5. If patient is showing signs of CHF or shock, contact medical control.
6. If IV access is available:
 - First dose: Administer Adenosine 0.1 mg/kg (Max dose= 6mg) IV PUSH.
 - Second dose: Administer Adenosine 0.2 mg/kg (Max dose= 12mg) IV PUSH.
7. If the patient is unconscious and in cardiogenic shock perform SYNCHRONIZED CARDIOVERSION at 1 Joule/kg. (Do not delay cardioversion in order to obtain vascular access).
8. If there is no response, repeat cardioversion at 2 joules/kg (no more than two attempts).
9. If no response, consider intubation with an appropriate-sized ET tube.
10. IV Normal Saline enroute, draw bloods.
11. Transport rapidly.
12. Monitor ABC's.

CAUTIONS

- A. Never cardiovert a conscious patient.
- B. If needed, do not delay cardioversion in order to obtain vascular access.
- C. Your monitor-defibrillator may not allow you to choose a charge low enough to cardiovert infants. If that is the case, transport as rapidly as possible to the nearest appropriate facility.

NOTIFY MEDICAL DIRECTION FOR ALL PATIENTS WITH SVT AND SIGNS OF CONGESTIVE HEART FAILURE OR SHOCK.

PEDIATRIC PROTOCOL

SUPRAVENTRICULAR TACHYCARDIA

Part 12: Pediatric Advanced Life Support IV-177

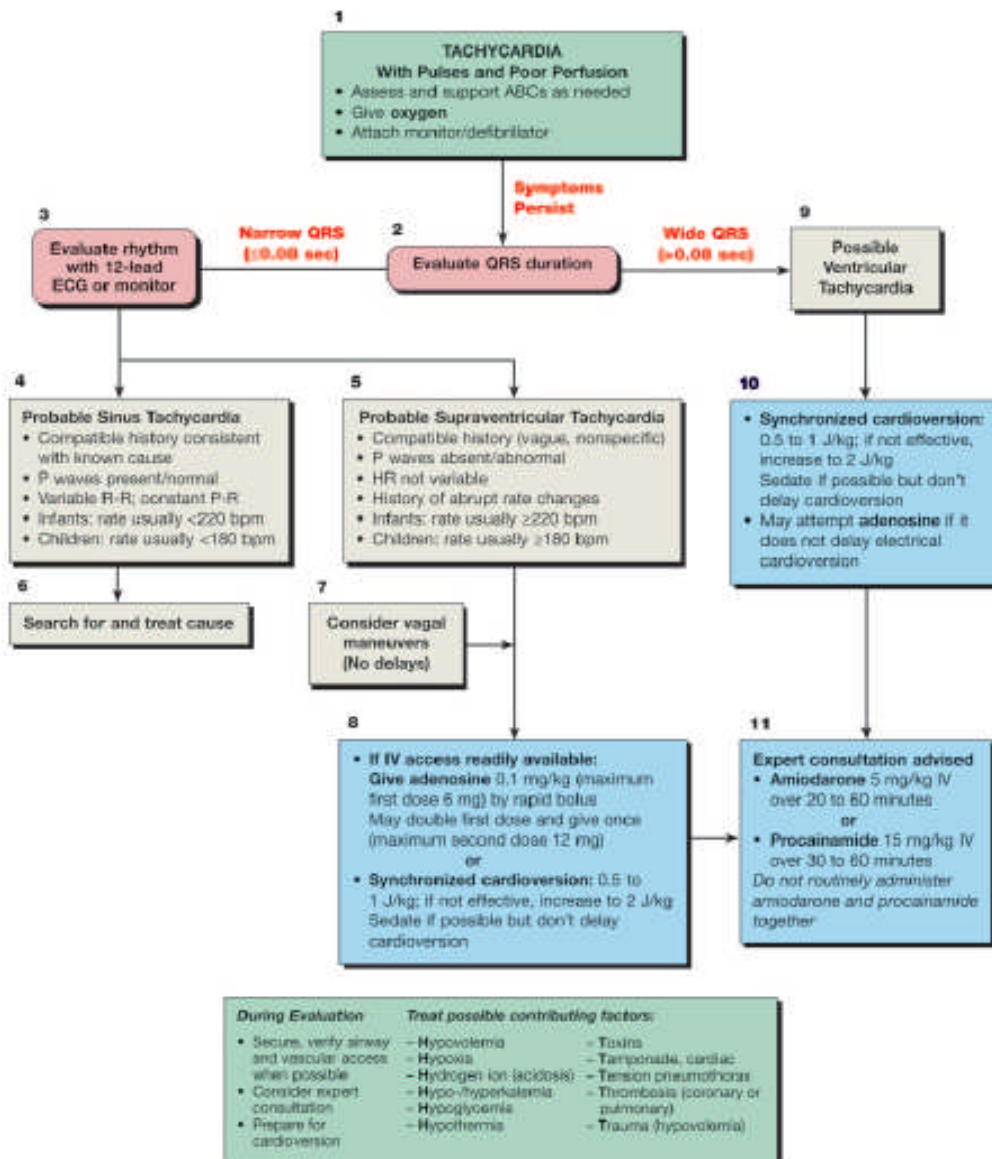


Figure 3. PALS Tachycardia Algorithm.

PEDIATRIC PROTOCOL

SUSPECTED TOXIC INGESTION OR EXPOSURE

INTRODUCTION

- A. This protocol should be used in the treatment of a patient with a history or physical findings suggestive for a toxic ingestion. Toxins may be ingested, inhaled, or absorbed through the skin, either by accident or intentionally.
- B. While there are countless numbers of potential toxins and poisons, few have specific antidotes. The same basic principles for treatment in the field apply for almost all.
- C. Exposure to toxins is not always an obvious diagnosis, and should be considered in any patient with bizarre behavior, altered consciousness, unexplained seizures, trauma, or a history of previous suicide attempts.

OBJECTIVES

- A. Prompt recognition of the patient with a toxic exposure.
- B. Assess and maintain the respiratory and cardiovascular systems.
- C. Treat specific symptomatology.

RECOGNITION

- A. History
 1. If ingestion, attempt to determine what was taken, maximum possible dose, and when it was taken. **BRING THE BOTTLE WITH YOU.** If the specific toxin is unknown, determine what medications are in the home.
 2. If inhalation exposure, determine what, where (ventilated space?) and how long.
 3. Determine the symptoms that have occurred, and any treatments that have been given prior to your arrival (Ipecac, other medications, shower, etc.).
 4. Evaluate the environment.
- B. Examination
 1. Assess airway patency and adequacy of respirations
 2. Assess perfusion.
 3. Assess level of consciousness, presence of gag reflex.
 4. Examine pupils for size and light reactivity.
 5. Look for neurologic deficits.
 6. Look for signs of trauma.
 7. Obtain vital signs.

PEDIATRIC PROTOCOL

TREATMENT

1. Maintain airway, breathing and circulation.
2. If necessary, open airway with head in the "sniffing position", by using the chin lift or jaw thrust maneuver. Assist ventilation, if needed (inadequate respiratory effort or rate for age, cyanosis, or bradycardia).
3. Assess LOC, pupils and look for focal neurologic deficits.
4. Pulse Oximetry, high flow oxygen by non-rebreather mask as tolerated by the patient, **DO NOT DELAY FOR INHALED TOXINS.**
5. If exposure is through the skin, thoroughly flush the area with water. If the exposure is to the eyes, irrigate with copious amounts of NS.
6. Contact Medical Control or poison center for information about specific toxins and treatment.
7. Transport the patient to an appropriate facility.
8. If the patient has poor perfusion, go to the Shock Protocol.
9. Apply monitoring electrodes (if **DYSRHYTHMIAS**, begin appropriate protocol).
10. **IF THE PATIENT HAS ABSENT OR INADEQUATE RESPIRATIONS** or is unresponsive with an absent gag reflex, consider intubation with an appropriate-sized ET tube.
11. Consider IV Normal Saline TKO, draw bloods if possible.
12. Consider Naloxone (Narcan) 0.1 mg/kg IV PUSH.
13. Consider 25% Dextrose 2 cc/kg IV PUSH (dilute D50 with equal volume of Normal Saline).
14. Monitor ABC's.

CAUTIONS

- A. Supportive care of the respiratory and cardiovascular system are the highest priority!
- B. Always reassess after every intervention. Perform frequent reassessments during transport.
- C. Ipecac is no longer routinely given.
- D. Consider consult with Poison Control for more information.

**NOTIFY MEDICAL CONTROL FOR ALL PATIENTS WITH SHOCK OR
NEUROLOGIC ABNORMALITY.**

PEDIATRIC PROTOCOLS

MAJOR TRAUMA

INTRODUCTION

- A. Trauma is the most common cause of death in children over one year of age. It has been estimated that with optimal field and hospital care, 20-40% of these deaths might be prevented.
- B. Although the protocols for treating major trauma in the child and adult are similar, certain important factors exist for the pediatric patient that may affect management.
 - 1. Blunt trauma is by far more common than penetrating trauma.
 - 2. Multi-system involvement is the rule and must be suspected with a significant mechanism.
 - 3. Increased incidence of associated head injury, which is frequently the cause of fatalities.
 - 4. Hypothermia is a major concern.
 - 5. Higher incidence of respiratory failure.
 - 6. Children maintain normal blood pressure until shock is very advanced (hypotension will not occur until >40% of blood volume has been lost).
 - 7. Psychological impact is different: children are scared and don't know what's happening, so it's very important to talk to them and enlist their cooperation if needed. Also, you need to view the entire family as your patient when a child is hurt.
- C. Despite these differences, the standard ABCDE of trauma resuscitation is the same for all patients, regardless of their size.
- D. Do not waste time on scene. If possible, perform some procedures and assessments enroute. SURVIVAL IS DIRECTLY RELATED to the speed with which definitive treatment of major traumatic injury is delivered.

OBJECTIVES

- A. Recognition of conditions or situations, which constitute potential major trauma.
- B. Rapid, appropriate field stabilization.
- C. Recognition of conditions, which require immediate transport.
- D. Transport to the nearest appropriate trauma center.

PEDIATRIC PROTOCOL

RECOGNITION

- A. Any pediatric patient (through the age of 14 years, i.e., up to the 15th birthday) should be considered to have (or have the potential for) major trauma if:
 - 1. The patient has obvious injuries to more than one body system or parts.
 - 2. There is any evidence of physiologic derangement (compensated or decompensated shock, respiratory distress or hypoventilation, altered level of consciousness) or a Pediatric Trauma Score ≤ 8 .
 - 3. Any of the following high-risk mechanisms occurred:
 - a. Unrestrained passenger in an MVA, > 45 mph.
 - b. Ejection from a vehicle.
 - c. Death of another occupant in a vehicle.
 - d. Pedestrian struck by vehicle, > 20 mph.
 - e. Pedestrian thrown or run over.
 - f. Fall from height > 20 feet.
 - g. Penetrating injury to the head, neck, torso, or extremities above the knees or elbows.
- B. Strict adherence to the ABCDE approach of the trauma primary survey should allow you to identify most of the significant injuries which require field treatment.

TREATMENT

- A. For any critically injured patient, field time should be limited -- no more than 10 minutes, if possible. Whenever possible, procedures should be performed during transport.
- B. Initial Assessment (Primary Survey):
 - 1. Assess and assure that the AIRWAY is clear. While using manual in-line c-spine stabilization, place head in the "sniffing position", using the jaw thrust maneuver (an oral airway may be placed in an unconscious patient).
 - 2. Assist ventilation for:
 - a. Apnea.
 - b. Severe respiratory distress.
 - c. Hypoventilation or other evidence of severe head injury.
 - 3. If ventilation is adequate, pulse oximetry; high flow oxygen by non-rebreather mask.
 - 4. Assess for pulses and perfusion (cap refill, skin temperature, quality of pulses).

PEDIATRIC PROTOCOL

5. Perform a brief neurologic exam:
 - a. Level of consciousness (AVPU)
 1. Alert
 2. Responsive to Verbal stimuli
 3. Responsive only to Pain
 4. Unresponsive
 - b. Pupils for size and reactivity.
 6. Control external hemorrhage, if present.
- C. If any of the following immediately life-threatening conditions are discovered during the initial assessment, interrupt the assessment at that point, perform the appropriate treatment and transport immediately.

CONTACT MEDICAL CONTROL OR HOSPITAL AS SOON AS POSSIBLE.

1. **INADEQUATE AIRWAY OR VENTILATION.**
 - a. Follow Respiratory Arrest protocol.
 - b. Orally intubate the patient with an appropriate-sized ETT while maintaining manual inline c-spine stabilization.
2. **CARDIAC ARREST: No pulse present, and no apical impulse heard.**
 - a. Begin chest compressions.
 - b. Apply monitoring electrodes.
 - c. Perform Asystole protocol, or protocol appropriate for rhythm.
 - d. If arrest is secondary to penetrating trauma, transport immediately and perform CPR enroute.
3. **DECOMPENSATED SHOCK, as identified by absent peripheral pulses, weak central pulses, or hypotension, with altered level of consciousness.**
 - a. Establish vascular access enroute. Limit attempts at peripheral IV's to two attempts, consider Intraosseous.
 - b. Administer Normal Saline 20 cc/kg IV bolus.
 - c. Reassess patient after fluid bolus, and repeat bolus as needed.
4. **SIGNS OF SEVERELY INCREASED ICP (dilated or unresponsive pupils, posturing, significant hypoventilation)**
 - a. Begin bag-valve-mask ventilation with 100% O₂ at 20 breaths per minute.
Can consider BVM in extreme cases of ICP
 - b. Consider orally intubating the patient with an appropriate sized ET tube while maintaining manual in-line c-spine stabilization.
5. **SIGNS OF A TENSION PNEUMOTHORAX (unilateral absent breath sounds, +/- tracheal shift, compromised perfusion).**
 - a. Per medical command, consider thoracic needle decompression of the suspected pneumothorax.

PEDIATRIC PROTOCOL

- D. If any of the following conditions are discovered, transport immediately after completing the primary survey.
 - 1. Penetrating injury to the head, neck, chest, abdomen or back.
 - a. Stabilize the impaled object, if present. Do not remove it.
 - b. Consider establishing vascular access enroute. Limit attempts at peripheral IVs to two attempts, consider Intraosseous.
 - c. Consider Normal Saline 20 cc/kg IV bolus.
 - 2. A significantly deformed extremity fracture or dislocation with poor perfusion distal to the injury.
 - a. Consider applying a traction splint for a femur fracture.
 - b. For other fractures, splint the fracture in the position in which it is found. Do not attempt to straighten it!
- E. **IMMOBILIZE THE ENTIRE SPINE** with appropriate devices. Apply appropriate size cervical collar.
- F. Place on cardiac monitor.
- G. Contact Medical Control or receiving hospital as soon as possible.
- H. Enroute, cover open wounds, eviscerations, and minor burns with clean, saline-soaked dressings. Immobilize unstable fractures or dislocations in the position in which they are found.
- I. A brief secondary survey may be performed enroute.
- J. Frequent monitoring of ABC's enroute.

TRANSPORT DESTINATION

- A. The determination of transport destination is a field decision, which should be made as rapidly as possible. Notify the receiving hospital as soon as possible, so the appropriate trauma team can be mobilized.
- B. Patients with major trauma will have the best chance for survival if definitive treatment is accomplished without delay. Therefore it is in the best interest of these patients to be delivered from the field to a facility capable of providing definitive care (surgery, pediatric intensive care), even when this means bypassing another facility which is capable of stabilization, but not definitive care. Pediatric patients have special needs, and are best treated in trauma centers, which recognize, and deal with, those needs.

PEDIATRIC PROTOCOL

CAUTIONS

- A. Do not delay transport to perform non-emergent procedures or treatments.
- B. The chance for survival from cardiac arrest secondary to blunt traumatic injury is practically non-existent. Whenever the victim of blunt trauma cardiac arrest is one of several trauma victims, EMS efforts should always be directed at the non-arrested, salvageable patients. Efforts directed at the trauma arrest victim should never compromise, limit, or delay the care provided to the other victims.

MEDICAL COMMAND

- A. CONTACT MEDICAL CONTROL OR THE RECEIVING HOSPITAL FOR ANY PATIENT THAT FITS MAJOR TRAUMA CRITERIA.
- B. Make contact with the receiving facility as early as possible. Include the following information:
 - 1. Which squad is calling?
 - 2. This is a trauma patient.
 - 3. Age and sex.
 - 4. Brief mechanism (e.g.: fall, MVA, pedestrian struck, assault).
 - 5. Identified major injuries or conditions
 - 6. Management to this point.
 - 7. An ETA.

PEDIATRIC PROTOCOL

ENDOTRACHEAL INTUBATION

INTRODUCTION

- A. The first priority in any management algorithm of the seriously ill or injured child is airway management-- the "A" of "ABCs". A patent airway with adequate ventilation must be established for every patient.
- B. Anatomic and physiologic differences between children and adults
 1. Head is large and the neck is very short.
 2. The tongue is relatively large, and is the most common cause of airway obstruction in the unconscious patient. The use of the "jaw thrust" maneuver often relieves this obstruction.
 3. Airways are smaller diameter, so are more easily obstructed.
 4. The larynx is higher and more anterior.
 5. The epiglottis is usually long and floppy, so must often be lifted up and out of the way.
 6. The trachea is flexible and may "kink" if the neck is hyper-extended.
 7. The narrowest part of the trachea is below the level of the cords, at the cricoid cartilage. This acts as a "physiologic cuff", so we do not use cuffed tubes on children less than 8 years old.
 8. The trachea is short, so right mainstem intubation and accidental extubation is common.

INDICATIONS

- A. Most pediatric patients can be effectively ventilated using a bag-valve-mask device, and this is often the preferable technique to use in the field, as it shortens field time.
 1. Patient must be correctly positioned: "sniffing position", often used in combination with chin lift or jaw thrust.
 2. Oral airway may be used to improve ventilation (hold tongue off the posterior pharyngeal wall) in unconscious patients.
- B. Indications for ventilation/intubation:
 1. Respiratory arrest/cardiac arrest.
 2. Respiratory failure
 - a. Severe respiratory distress with cyanosis or unconsciousness.
 - b. hypoventilation (rate too slow or too shallow).
 3. Protect the airway of an unconscious patient (also to protect the airway that may close due to severe smoke inhalation).

PEDIATRIC PROTOCOL

- C. Advantages of intubation vs. bag-valve-mask ventilation:
1. Intubate if unable to maintain patent airway with positioning, jaw thrust, or oral airway.
 2. Provides access for medication administration during arrest.

EQUIPMENT

- A. Laryngoscope blades.
1. Straight blades are preferred for intubating children.
 - a. Provides greater displacement of the tongue for better visualization.
 - b. Used better to gather the long epiglottis for easier visualization and tube insertion.
- B. Endotracheal tubes:
1. Cuffed tubes should never be used in children under 8 years old.
 - a. The cricoid ring acts as a natural cuff.
 - b. The trachea is easily damaged.
 2. The correct ET tube can be approximated by the diameter of the child's little finger, or the diameter of the nares.
 3. A stylet should be used to curve the tube.

PROCEDURE

1. Place head in the "sniffing position." You may need to place a folded towel under the shoulders to get better positioning. If head or neck injuries involved, have assistant maintain manual in-line stabilization.
2. Pre-oxygenate with bag-mask ventilation and 100% O₂. Monitor heart rate during procedure. Each attempt should not last longer than 30-45 seconds.
3. For the breathing infant, an assistant should restrain the shoulders and maintain head and neck position.
4. Choose the appropriate blade.
5. Estimate the ET tube size and have one size smaller and larger available. Insert stylet and curve the distal ET tube like "hockey stick."
6. Insert the laryngoscope blade in the right corner of the mouth and slide it along the tongue. When using a straight blade, advance the tip into the hypopharynx and proximal esophagus. Then, pull the blade to the center of the mouth, forcing the full length of the tongue into the left side of the mouth. Exert upward force along the axis of the laryngoscope handle to elevate the tongue and mandibular block of tissue (do not "rock" back using the upper teeth or gums as a fulcrum).
7. If secretions, blood, etc. obscure the view, suction with a large-bore catheter.

PEDIATRIC PROTOCOL

8. Under direct visualization, slowly withdraw the blade (an assistant may apply cricoid pressure). As the tip of the blade is withdrawn, the anterior wall of the esophagus/posterior wall of the larynx will drop down, giving a clear view of the larynx and vocal cords with the epiglottis held up by the blade.
9. Insert the ETT into the right angle of the mouth and along the right side of the pharynx to the cords. Keep the tube to the right to avoid blocking the view of the cords. Do not take your eyes off the vocal cords while placing the tube.
10. Gently, but firmly, push the tip of the tube through the cords and the cricoid ring. Firm pressure may be needed because there should be a snug fit at the cricoid ring. Advance the tube until the distal marker is at the vocal cords. If the tube is the correct size, this should place the tip at the mid-tracheal position.
11. Remove the stylet while your right hand holds both the tube and the patient's head to avoid changing position (a finger holding the tube to the roof of the mouth usually works well). Never let go of the tube!
12. Hand ventilate with the Ambu-bag. Look for symmetrical chest movement. Verify tracheal position by noting color change from purple to yellow on end tidal CO₂ detector. Auscultate bilaterally and over the stomach to confirm proper positioning of the tube (some sounds will be heard in the stomach even with a correctly positioned uncuffed tube). If no breath sounds are heard on the left, the tip is probably in the right mainstem bronchus. Pull the tube back until breath sounds are equal, then another 1 cm. If you are unable to directly visualize as the tube passes through the cords or if the tube moves later, an accurate positioning can be accomplished by auscultation. Advance the ETT until breath sounds are not heard on the left, and then position the tube as above.
13. Immediately secure the tube to the child's upper lip and face (Remember that there is no cuff to hold the tube in place).
14. IF uncertain that ET tube is in the trachea, remove and ventilate with BVM.

COMPLICATIONS

- A. Hypoxemia - avoid by proper bag-mask ventilation prior to intubation attempts.
- B. Vomiting and/or aspiration of stomach contents may be avoided by the use of cricoid pressure, which compresses the proximal esophagus.
- C. If the laryngoscope is used improperly, you may dislodge teeth or lacerate lips or gums.
- D. Overzealous use of the stylet, insertion of a tube that is too large, or use of a cuffed tube may result in trauma to the trachea.
- E. Reasons for deterioration of the intubated patient:
 1. Esophageal intubation.
 2. Mainstem bronchus (usually right) intubation.
 3. Pneumothorax.
 4. Obstruction of the ET tube with mucus, secretions, blood or tissue.
 5. Disconnection from O₂ source.

**Can consider use of cuffed ET tubes per AHA Standards.

***Note: correct ET tube size is typically 0.5 less than non-cuffed sizes

PEDIATRICPROTOCOL

INTRASOSSEOUS INFUSION

INTRODUCTION

- A. The bone marrow provides us with a vascular access route that is as good as a peripheral IV, but remains easy to find and enter in states of circulatory collapse.
- B. The bone marrow provides a non-collapsible route for venous access: a rich network of vascular sinusoids converge into venous channels which empty into a vein that exits the bone and joins the systemic circulation (fig 1). The circulation time of dye from an intraosseous infusion in the tibia to the heart has been documented to be 10 seconds, and in a fibrillating dog sustained with chest compressions, the circulation time was only 15 seconds. It has also been shown that the hemodynamic response to intraosseous Epinephrine is as rapid as with peripheral IV injection.
- C. A young child's bone is soft and porous, so placing the needle is easy.

INDICATIONS

- A. For a critical patient, rapid access may be critical. If peripheral IV access is not obtained after two attempts, an intraosseous line should be placed. Possible situations include:
 - 1. Cardiopulmonary arrest.
 - 2. Decompensated shock from dehydration, sepsis or hemorrhage (hypotension, absent pulses, unresponsive).
- B. Use only in patients who are unresponsive to pain. Do not use if patient is awake, because it is a very painful procedure.
- C. Easy and very safe in children under age 3 years. After that, the risk increases because bones are harder and the marrow space is relatively smaller.
- D. Contraindications:
 - 1. Gross infection at the intended insertion site.
 - 2. Newly fractured bone (or suspicion of fracture) at the intended site.
 - 3. Osteogenesis Imperfecta (a congenital bone disease = the bones fracture very easily).

**Can consider use of such intraosseous infusion access techniques such as the Pediatric EZ-IO.

***For use of Pediatric EZ IO, reference EZ IO manual.

PEDIATRIC PROTOCOL

SITES

- A. Proximal tibia (preferred site).
 - 1. Two finger-widths below the tibial tuberosity on the anteromedial (flat) surface (fig 2).
- B. Sites are away from the ends of the bone to avoid damage to the growth plate.

PROCEDURE

- A. Insertion
 - 1. Locate insertion site. Cleanse with alcohol or betadine.
 - 2. Adjust the depth guard on the needle (Infants: cover at least half of the needle length).
 - 3. Stabilize the tibia, but do not hold hand in line of the needle.
 - 4. Insert the needle perpendicular to the skin surface, and advance until it touches bone.
 - 5. Penetrate the bony cortex with firm pressure and a rotary "screwdriver" motion. A "pop" and sudden lack of resistance signal entry into the marrow cavity.
 - 6. Remove the stylet, and check the position by injecting saline. May hook up to regular IV tubing.
 - 7. Lower the depth guard until it is against the skin and tape in place. Tape IV tubing to the leg to avoid accidental dislodging.
 - 8. If resistance increases significantly during infusion, oozing appears at the insertion site, or there is swelling or discoloration of the leg, D/C the line.
 - 9. If another line is started, it must be done in a different bone, because the hole in the bony cortex does not close immediately.

PEDIATRIC PROTOCOL

INFUSION

1. You can infuse essentially any fluid or medication that can go through a peripheral IV.
2. If giving medications, may attach syringe directly to hub (always follow injection with 5 cc flush of saline).
3. Alternately, may attach IV tubing to hub. If a fluid bolus is needed, pressure around the IV fluid bag will be needed to assure flow. "Pull-push" syringe method (three-way stopcock) may be used.
4. Adequate flow rates for IV boluses can be accomplished if the fluid is under pressure.

COMPLICATIONS

- A. Complications are rare.
- B. Local infection may occur. Osteomyelitis is very rare.
- C. Fluid or medications may leak into surrounding tissue.
- D. Abnormal growth of the bone is unlikely if the growth plate is avoided.
- E. Fat embolism is rare in infants. Risk increases with age.