Tennessee Pediatric Resuscitation Guide

EAST TENNESSEE
CHILDREN'S HOSPITAL

Comprehensive Regional Pediatric Centers	
Vanderbilt Children's Hospital Nashville, TN	**Access Center: 866-936-7811 LifeFlight Comm: 800-288-8111**
T.C. Thompson Children's Hospital Chattanooga, TN	**423-778-6101 ED**
East Tennessee Children's Hospital Knoxville, TN	**800-773-0129 ED 865-541-8133 ED**
Le Bonheur Children's Medical Center Memphis, TN	**901-287-6112 ED 888-899-9355 TRANSPORT**

Funding provided by the Tennessee Department of Health Bioterrorism Hospital Preparedness Program.

Updated 01/08

Information for Transport/Referral

- Child's name, age, weight
- Medical history and allergies
- Vital signs and assessment of ABCs
- Present condition
- Medical, nursing and EMS notes
- Laboratory results, x-rays
- Registration information and transfer document

Normal Vital Signs

Age	Heart Rate	Respiratory Rate	Blood Pressure	
			Systolic	Diastolic
Infant to 1 yr	100 - 160	30 - 60	70 - 105	50 - 66
Toddler	80 - 110	24 - 40	75 - 105	50 - 66
Preschooler	70 - 110	22 - 34	80 - 112	50 - 71
School Age	65 - 110	18 - 30	85 - 112	50 - 71
Adolescent	60 - 90	12 - 16	90 - 128	60 - 80

Lowest acceptable systolic blood pressure = 70 + (age in years x 2)

Airway Management

Endotracheal Tube Size: $\frac{16 + (\text{age in years})}{4}$

Depth of ETT Insertion: 3 x tube size = cm at lip line

Confirmation of ETT Placement:

- Auscultation of Bilateral Breath Sounds
- Visualization of Chest Rise and Fall
- Colorimetric CO2 Detection
- Chest X-Ray

Pediatric Trauma Score			
Component	**+2**	**+1**	**-1**
Weight	>20 kg	10 - 20 kg	<10 kg
Airway	Normal	O2 Adjunct: Mask, Cannula, or Oral/Nasal Airways	Assisted Ventilations/ Intubated
Level of Consciousness	Awake	History of LOC or Altered Consciousness	Coma/ Unresponsive
Circulation	SBP >90 mmHg	SBP 50-90 mmHg	SBP <50 mmHg
Fracture	Not Seen or Suspected	Single Closed Fracture	Any Open or Multiple Fractures
Cutaneous	No Visible Injury	Contusion, Abrasion or Laceration <7cm; not through fascia	Tissue has laceration >7cm; any penetrating injury through fascia

Transport children to a pediatric trauma center IMMEDIATELY if:

- Trauma score ≤ 8
- 2nd or 3rd degree burns involving >10% of TBSA
- Paralysis or suspected spinal cord injury
- Drowning or near drowning with injury
- Falls greater than 10 feet
- Altered mental status

Resuscitation Fluid Requirements
20 ml/kg of Normal Saline or Lactated Ringers
Maintenance Fluid Requirements
Infants <10kg --------- 4 ml/kg/hr Children 10-20 kg---- 40 ml/hr plus 2 ml/kg/hr for each kg >10kg Children >20kg-------- 60 ml/hr plus 1ml/kg/hr for each kg >20kg

Pediatric Coma Scale

Eye Opening

Score	>1 year	<1 year
4	spontaneously	spontaneously
3	to verbal stimuli	to verbal stimuli
2	to pain only	to pain only
1	no response	no response

Verbal Response

Score	>1 year	<1 year
5	oriented/appropriate	coos & babble
4	confused	irritable & cries
3	inappropriate words	cries to pain
2	incomprehensible	moans to pain
1	no response	no response

Motor Response

Score	>1 year	<1 year
6	obeys commands	moves spontaneously
5	localizes painful stimuli	localizes painful stimuli
4	withdraws to pain	withdraws to pain
3	decorticate	decorticate
2	decerebrate	decerebrate
1	no response	no response

Defibrillation & Cardioversion

Defibrillation	1st Dose: 2 J/kg Subsequent Doses: 4 J/kg	Use for VF and pulseless VT
Cardioversion (synchronized)	1st Dose: 0.5 - 1 J/kg Subsequent Doses: 1 - 2 J/kg	Use for unstable SVT and VT Consider use with stable SVT and VT after consultation with pediatric cardiologist

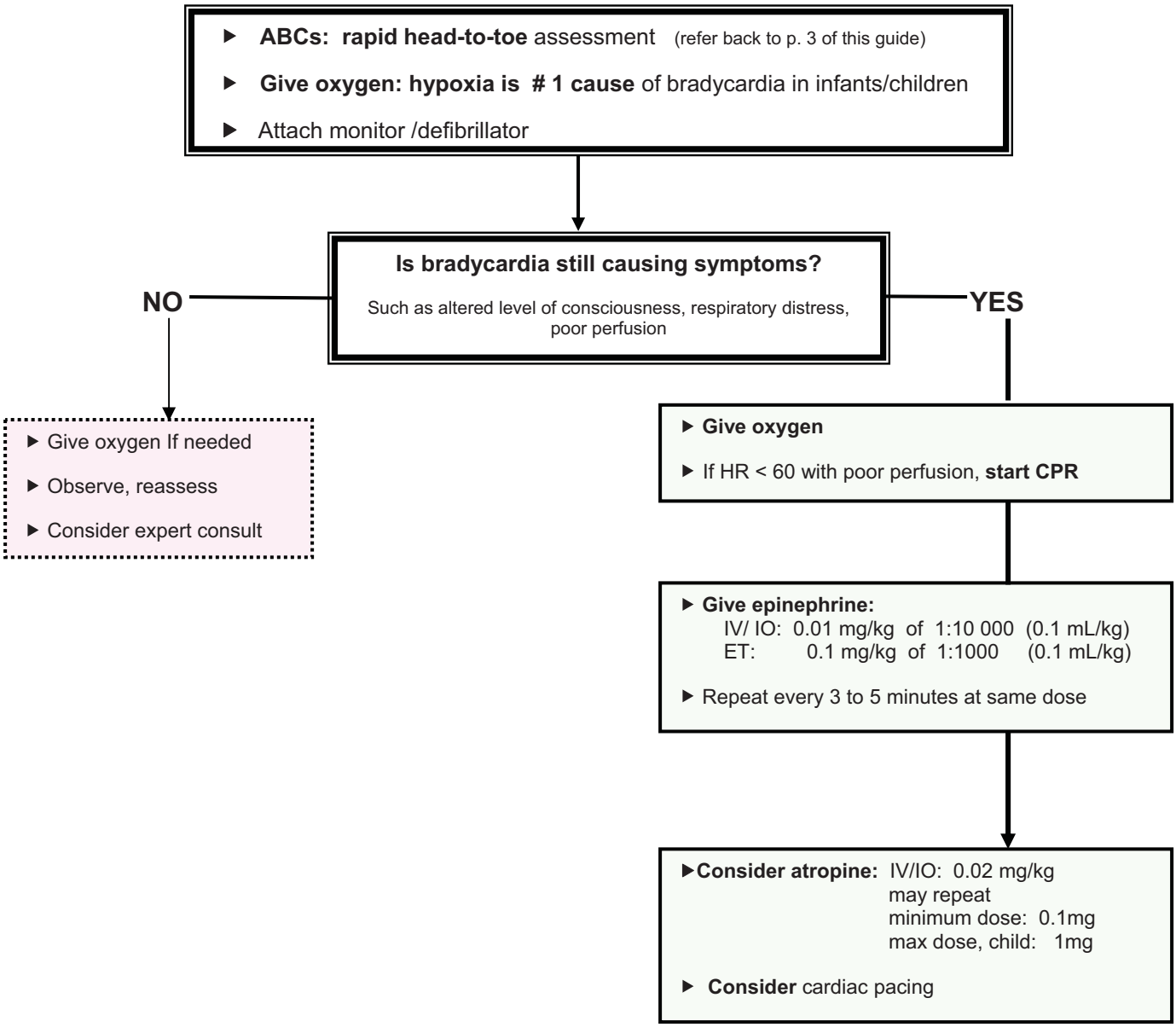
Resuscitation Medications		
Drug	**Dose**	**Comments**
Adenosine (Adenocard)	0.1 mg/kg IV/IO Maximum 1st Dose: 6 mg May double and repeat dose once. Maximum 2nd Dose: 12 mg	Give rapidly. Follow immediately with 10ml NS flush.
Atropine	0.02 mg/kg IV/IO or ETT Minimum Dose: 0.1 mg Maximum dose for child: 0.5 mg Maximum dose for adolescent: 1 mg May repeat once.	Use for symptomatic bradycardia.
Amiodarone (Cordarone)	5 mg/kg IV/IO	May cause hypotension. Do not routinely give amiodarone and procainamide together.
Calcium Chloride	20 mg/kg IV/IO May be repeated in 10 minutes if necessary.	Give slowly. Do not mix with sodium bicarbonate. Indicated for hypocalcemia, hyperkalemia, hypermagnesemia and calcium channel blocker overdose.
Epinephrine	IV or IO: 0.01 mg/kg of 1:10,000 solution ETT: 0.1 mg/kg of 1:1000 solution May repeat dose every 3 - 5 minutes.	
Lidocaine (Xylocaine)	1 mg/kg IV/IO or ETT May be repeated every 5 minutes x 3, followed by 20 - 50 mcg/kg/minute continuous infusion.	
Magnesium Sulfate	25 - 50 mg/kg IV/IO Maximum Dose: 2 GM	May cause hypotension with rapid bolus. Use for documented hypomagnesemia or torsades de pointes.
Sodium Bicarbonate	1 mEq/kg IV/IO	Infuse slowly and only if ventilation is adequate. Do not mix with calcium.

Treatment Medications		
Drug	**Dose**	**Comments**
Albuterol	Nebulizer: 1 unit dose or 0.5 ml of 0.5% solution in 3 ml NS	May be repeated every 20 minutes for severe distress.
Diazepam (Valium) Sedative, Anticonvulsant	0.1 - 0.2 mg/kg IV/IO Maximum Dose: 4 mg Rectal Dose:0.5 mg/kg/dose	May cause respiratory depression and hypotension.
Diphenhydramine (Benadryl) Antihistamine	1.25 mg/kg IV/IO MaximumSingle Dose: 50 mg	Give over 5 minutes.
Epinephrine, Racemic (Vaponefrin) Bronchospasm, Croup	Nebulizer: 0.5 ml diluted in 3 ml NS	May be repeated every 20 minutes for severe distress. Transient relief of subglottic edema and croup.
Etomidate Non-Barbiturate, Sedative-Hypnotic	0.3 mg/kg IV/IO	Very short-acting. No analgesic properties. Decreases ICP.
Fentanyl (Sublimaze) Analgesic	1 - 2 mcg/kg IV/IO or IM	May cause respiratory depression, hypotension and elevated ICP.
Flumazenil (Romazicon) Benzodiazepine Antidote	0.01 mg/kg Maximum Single Dose: 0.5 mg May give doses every 1 minute to a total cumlative dose of 4 mg	Short half-life, may need repeat dosages.
Furosemide (Lasix) Diuretic	0.5 - 1 mg/kg IV/IO Maximum Rate of Infusion: 0.5 mg/kg/minute	
Hydralazine (Apresoline) Antihypertensive	0.1 - 0.2 mg/kg IV/IO or IM Maximum Dose: 20 mg	IV Onset: 5 - 20 minutes
Insulin (Regular)	Maintenance infusion of 0.05 - 0.1 units/kg/hr in DKA	Too rapid decrease of serum glucose may lead to cerebral edema. Optimum rate of serum glucose decrease is 80 - 100 mg/dl/hr.
Ketamine (Ketalar) Dissociative Anesthetic	1 mg/kg IV/IO 1 - 3 mg/kg IM	May increase ICP and BP. Possible hallucinations and emergence reaction.
Lorazepam (Ativan) Sedative, Anticonvulsant	Anxiety/Sedation: 0.05 - 0.1 mg/kg IV q 4 - 8 hours Status Epilepticus: 0.1 mg/kg IV/IO	Give slowly. May cause respiratory depression.

Treatment Medications		
Drug	**Dose**	**Comments**
Mannitol Reduction of increased ICP associated with cerebral edema	0.25 – 1gm/kg IV/IO over 20 - 30 minutes	Use a filter when administering.
Methylprednisolone (Solumedrol) Antiinflammatory	Status Asthmaticus: 1-2 mg/kg IV/IO loading dose	Infuse over 5-15 minutes. **For spinal cord injury, consult with neurosurgeon.**
Midazolam (Versed) Sedative, Anticonvulsant	0.1 - 0.2 mg/kg IV/IO	
Naloxone (Narcan) Narcotic Antagonist	0.1 mg/kg IV,IM,SC or ETT Maximum Dose: 2 mg May repeat every 3 - 5 minutes	If total reversal of narcotic effect is not desired, 0.01 mg/kg may be used. May precipitate abrupt withdrawal symptoms in patients addicted to opiates.
Phenytoin (Dilantin) Anticonvulsant	**Loading Dose:** 15 - 20 mg/kg IV/IO	Give loading dose over 20 minutes, not to exceed 0.5 - 1mg/kg/min. May cause cardiac conduction block. **Fosphenytoin (cerebyx)** preferred if available.
Rocuronium (Zemuron) Neuromuscular Blocking Agent	0.6 - 1.2 mg/kg IV/IO	Nondepolarizing agent. Rapid onset of action. Minimal cardiovascular side effects.
Succinylcholine (Anectine) Neuromuscular Blocking Agent	Children: 1 - 1.5 mg/kg IV/IO Infants: 2 mg/kg IV/IO	Depolarizing muscle relaxant. Rapid onset & short duration of action. Avoid in renal failure, burns, hyperkalemic states or neuromuscular disorders. Do NOT use for maintenance of paralysis.
Thiopental (Pentothal) Sedative	2 - 4 mg/kg IV/IO	Ultra short acting. Decreases ICP. No analgesic properties. Potentiates respiratory depressive effects of narcotics and benzodiazepines.
Vecuronium (Norcuron) Neuromuscular Blocking Agent	0.1 mg/kg IV/IO	Nondepolarizing agent. Onset of action: 2 - 3 minutes.

Bradycardia with a Pulse

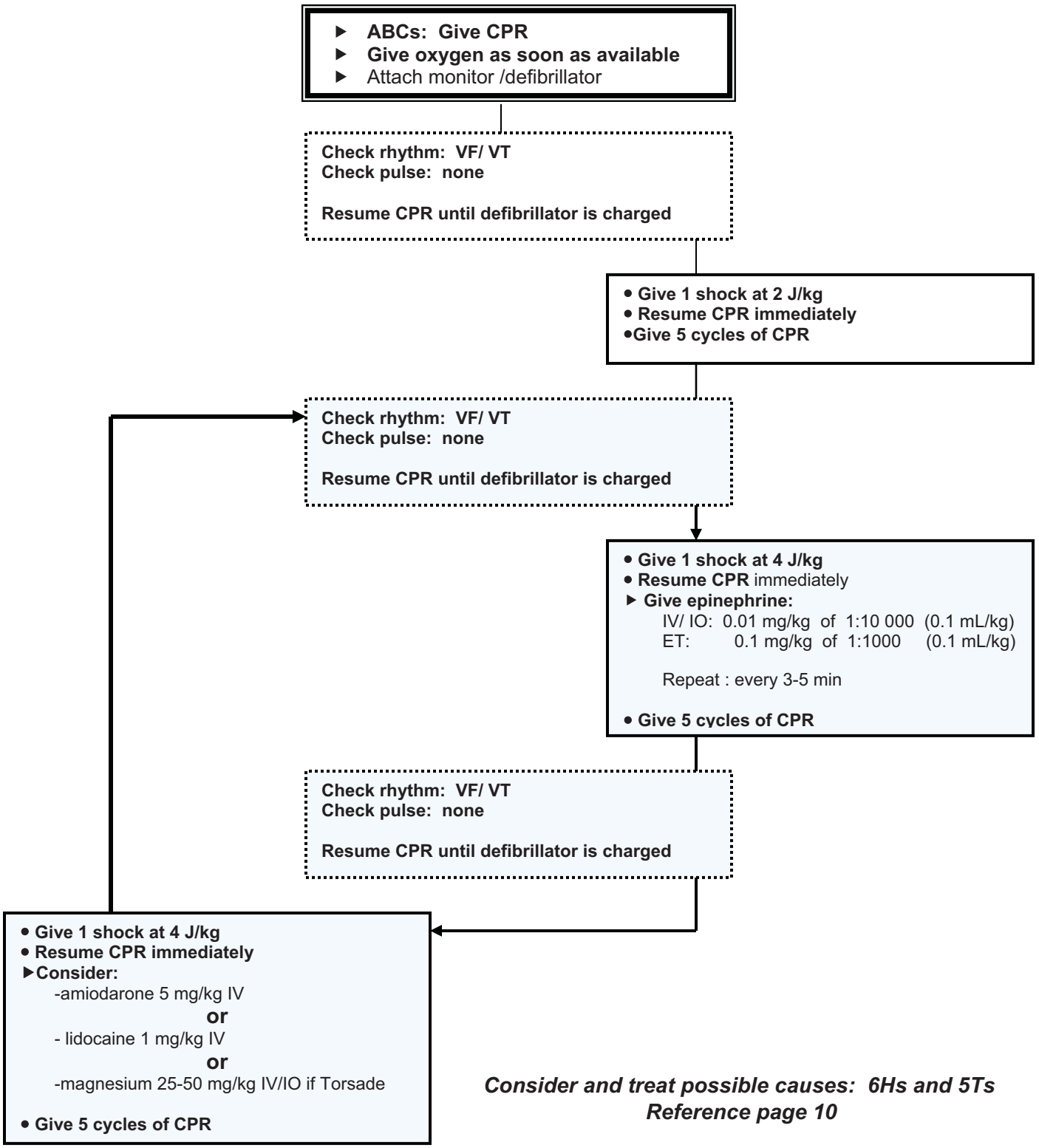
ECC Handbook p.76



Consider and treat possible causes: 6Hs and 5Ts
Reference page 10

Pulseless Arrest – VF and Pulseless VT

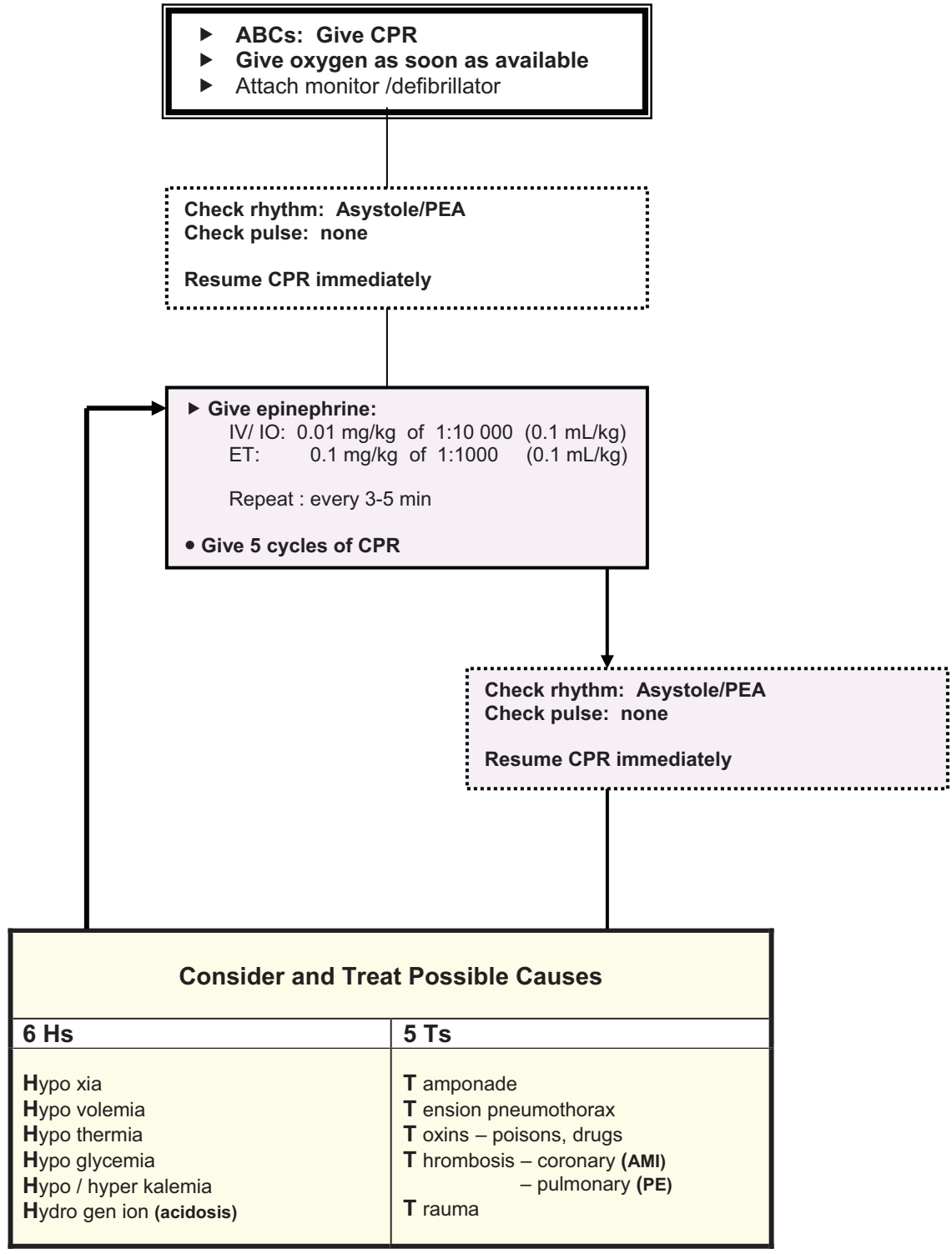
ECC Handbook p.77



Consider and treat possible causes: 6Hs and 5Ts
Reference page 10

Pulseless Arrest – Asystole and PEA

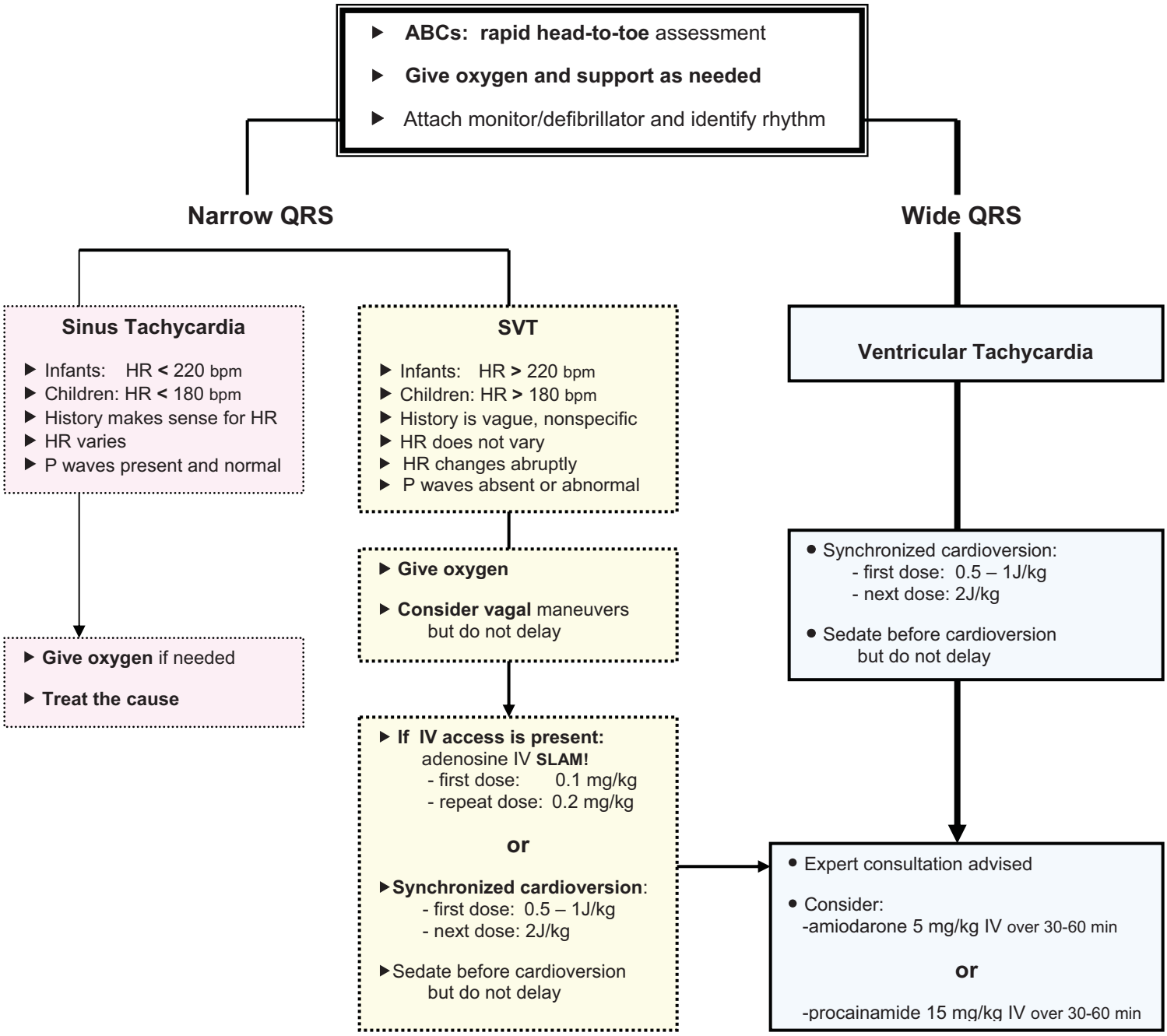
ECC Handbook p.77



Consider and Treat Possible Causes	
6 Hs	**5 Ts**
Hypo xia **H**ypo volemia **H**ypo thermia **H**ypo glycemia **H**ypo / hyper kalemia **H**ydro gen ion **(acidosis)**	**T** amponade **T** ension pneumothorax **T** oxins – poisons, drugs **T** hrombosis – coronary **(AMI)** – pulmonary **(PE)** **T** rauma

Tachycardia with Poor Perfusion

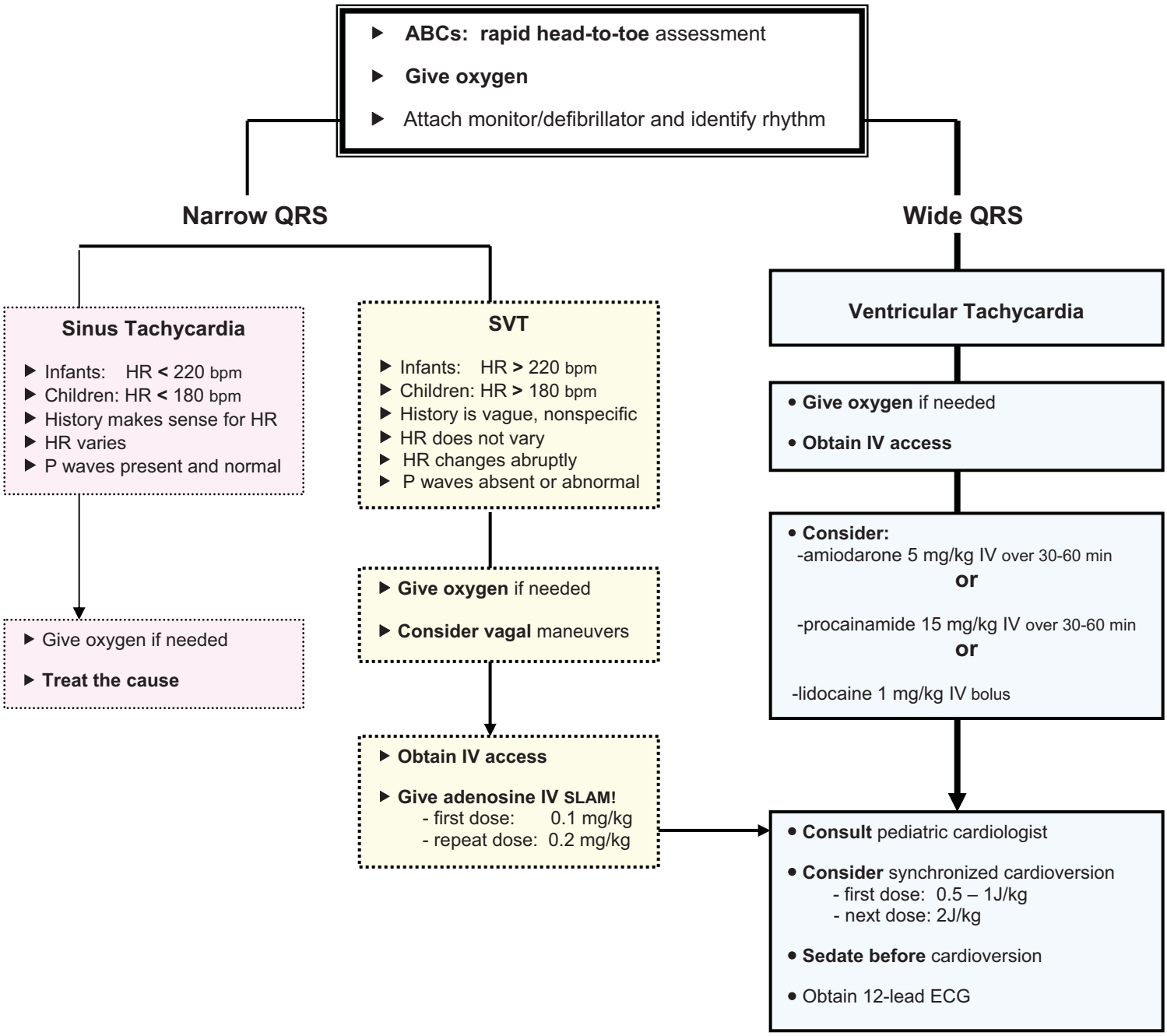
ECC Handbook p.78



Consider and treat possible causes: 6Hs and 5Ts
Reference page 10

Tachycardia with Adequate Perfusion

ECC Handbook p.79



Consider and treat possible causes: 6Hs and 5Ts
Reference page 10

Mark 1 Autoinjector Usage

Approximate Age (each type)	Approximate Weight	Number of Autoinjectors
3-7 years	13-25 kg	1
8-14 years	26-50 kg	2
>14 years	>51 kg	3

While Mark 1 is not approved for pediatric use, it should be used for initial treatment in circumstances for children with severe, life-threatening nerve agent toxicity for whom IV treatment is not possible or available or for whom more precise IM (mg/kg) dosing would be logistically impossible. If a Mark 1 kit is the only available source of atropine and pralidoxime after a nerve agent exposure, it should not be withheld from even the youngest child.

Precise Dosing for Atropine and Pralidoxime

- Atropine 0.02-0.05 mg/kg IV/IO every 10-20 minutes until atropine effect (dry flushed skin, tachycardia, mydriasis, fever) is observed.
- Pralidoxime 20-50 mg/kg IV/IO or IM

The anticonvulsants and the dosage guidelines which can be used to treat children exposed to a nerve agent who have either a severe exposure or who are experiencing a seizure are:

- Diazepam 0.05-0.3 mg/kg (maximum dose: 10 mg) IV/IO or IM
- Lorazepam 0.1 mg/kg (maximum dose: 4 mg) IV/IO or IM
- Midazolam 0.1 mg-0.2mg/kg (maximum dose: 10 mg) IV/IO or IM

Data indicate that Phenytoin, Phenobarbital, Tegretol and Valproic Acid do NOT work for nerve agent-induced seizures.

Guidelines for Potassium Iodine (KI) Dose Administration

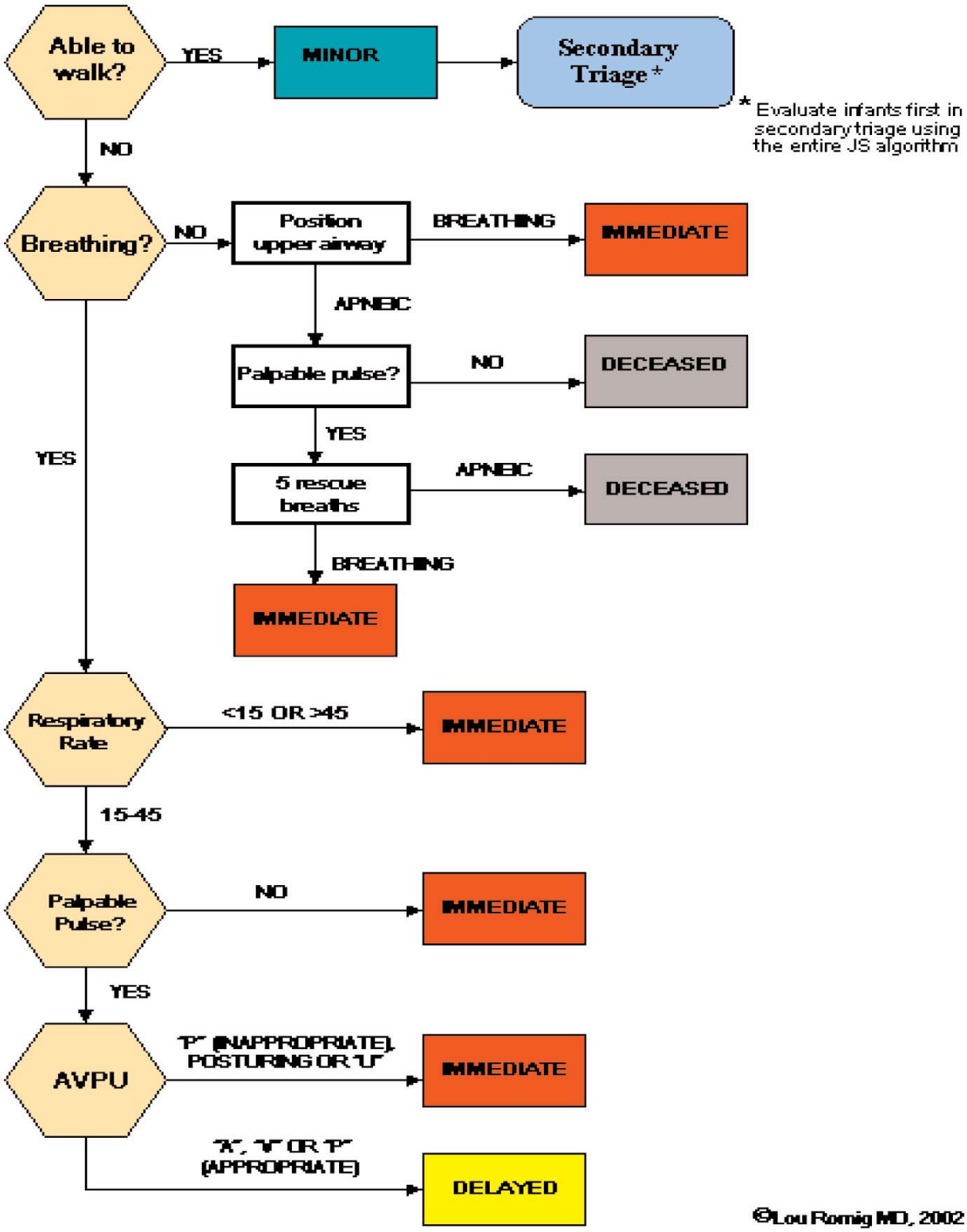
Patient Age	Exposure, GY(RAD)	KI Dose*(mg)
> 40 years	>5 (500)	130
18-40 years	0.1 (10)	130
12-17 years	0.05 (5)	65
4-11 years	0.05 (5)	65
1 month-3 years	0.05 (5)	32
Birth-1 month	0.05 (5)	16
Pregnant or Lactating Women	0.05 (5)	130

Children/adolescents weighing more than 70 kg should receive the adult dose (130 mg).

Program for Pediatric Preparedness of the National Center for Disaster Preparedness

Columbia University Mailman School of Public Health

JumpSTART Pediatric MCI Triage©



Tennessee Emergency Medical Services for Children

TN EMSC

Category A – Biological Agents

Agent	Incubation	Contagious & Isolation	Symptoms	Treatment	Post Exposure Prophylaxis & Vaccination
Anthrax Inhalational	1-6 days	No **Isolation Precaution Standard**	Fever Fatigue Chills Cough Chest pain Followed by Severe Respiratory Distress and Shock **Children with inhalational dx may have "atypical" presentations including primary meningoencephalitis.** **Children may have an abnormal chest x-ray but with other forms of anthrax usually have normal x-ray.**	*** Children** **Cipro 10-15mg/kg/day IV q 12 hrs (not to exceed 1g/d)** **or Doxycycline 2.2mg/kg IV q 12 hrs for patients < 45kg , adult dose for > 45 kg** **Plus 1 or 2 other antibiotics (including penicillin, rifampin, clindamycin, vancomycin, imipenem, and chloramphenicol)** * Adult Cipro 400mg IV BID or Doxycycline 200mg IV, then 100mg IV Bid or PCN 4 mill units IV 4 hr	Cipro 500mg PO bid or Doxycyclin 100mg PO bid in conjuction with vaccine Women who are or might be pregnant should use Ciprofloxacin, or if otherwise contraindicated, Amoxicillin 500mg PO tid as Doxycycline may have more potential for adverse fetal and maternal effects
Cutaneous			Papule, fluid-filled vesicle, black eschar	Cutaneous same as Inhalational	
Botulism	12-72 hrs	No **Isolation Precaution Standard**	Dizziness Dry mouth and throat Difficult speaking or swallowing Blurred vision Eventual respiratory failure.	*** Children Same as adult regime: Reverse Trendelenburg (20-25°) with support of cervical spine for infants not on a ventilator.** * Adult One vial trivalent botulism or heptavalent antitoxin, mechanical ventilation	Everyone that is known or suspected of having been exposed should be closely monitored and treated with antitoxin at the first sign of disease

Tennessee Emergency Medical Services for Children

TN EMSC

Category A – Biological Agents

Agent	Incubation	Contagious & Isolation	Symptoms	Treatment	Post Exposure Prophylaxis & Vaccination
Pneumonic Plague	2-3 days	Yes **Isolation Precaution** Standard Droplet	Headache High fever General weakness Glandular swelling Painful buboes Pneumonia Hemorrhages maybe present in the skin and mucous membranes **Children younger than 1y/o are more susceptible to meningitis, cervical and/or submaxillary buboes**	***Children** **Streptomycin 15 mg/kg/day IM q 12 hrs (not to exceed 2/g/day)** **or Gentamicin 2.5 mg/kg IV/IM q 8 hrs (q 12 hrs for <1 wk or premature infants)** * Adults Streptomycin 1g IM q 12 hrs (should be avoided in pregnant or lactating women) or Gentamicin 2mg/kg IV/IM load dose then 1-1.75mg/kg IV/IM q 8 hrs per renal function	***Children** **Doxycycline 2.2mg/kg for patients , 45kg or Tetracycline 6.25-12.5mg/kg PO qid for patients ≥ 8 yes or ciprofloxacin 20mg/kg PD bid –MAX 1g/day** Adults: Doxycyclin 100mg PO bid or Tetracycline 250mg Po qid (should be avoided in pregnant or lactating woman or Ciprofloxacin 500mg PO bid
Smallpox	7-17 Days	Yes **Isolation Precaution** Standard Contact Airborne	High fever Small blister which develop into pustular vesicles usually more prevalent of the extremities and face May develop hemorrhages on skin and mucous membranes	Supportive Vaccination recommended within 3-5 days for those exposed. VIG or cidofovir, an antiviral drug with substantial renal toxicity, may improve outcomes if given within 1-2 days after exposure: however there is no definitive evident to suggest that they are better than vaccine alone.	Vaccinia immune globulin and or vaccine
Tularemia	1-21 days	No **Isolation Precaution** Standard	Fever, chills Malaise Headache	***Children** **Streptomycin 15 mg/kg/day IM q 12 hrs (not to exceed 2/g/day) or Gentamicin 2.5 mg/kg IV/IM q 8 hrs** * Adults Streptomycin 1g IM q 12 hrs (should be avoided in pregnant or lactating women) or Gentamicin 3-5mg/kg IV/IM q day	Doxycycline 100mg PO bid or Tetracycline 500mg PO qid or Ciprofloxacin 500 mg PO bid

Tennessee Emergency Medical Services for Children

TN EMSC

Category A – Biological Agents

Agent	Incubation	Contagious & Isolation	Symptoms	Treatment	Post Exposure Prophylaxis & Vaccination
Viral Hemorrhagic Fevers	2-21 days	Yes **Isolation Precaution** Standard Contact Airborne Droplet	Headache Fever Chills Malaise Myalgia Diarrhea begins within 3-5 days of infection, Bleeding Petechiae Hypotension, Shock	CCHF/arenaviruses: Ribavirin	Everyone that is known or suspected of having been exposed should be closely monitored and treated with arenaviruses at the first sign of disease

Isolation Precautions:

Standard: Gown, gloves and if body fluid splash or spray possible wear eye protection. Wash hands with antimicrobial soap or waterless antiseptic agent

Contact: Same as Standard Precautions but includes, private room, limit patient movement to essential purpose only and use of dedicated equipment or disinfect between pts

Droplet: Same as Standard Precautions but includes, private room, surgical mask on patient transport and limit movement to essential purposes only

Airbone: Same as Standard Precautions but includes, private negative pressure room, N95 respirator, surgical mask on pt during transport, door closed at all times

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FYI:
If you are NOT sure whether a bioterroism report is true or not, check with credible sources such as CDC's Health-Related Hoaxes and Rumors Web site at http://www.cdc.gov/hoax rumor.htm.

Anthrax
* Transmission of anthrax infection from person to person is unlikely.
* Symptoms of anthrax and the flu are similar. A runny nose is a rare symptom of anthrax. A person who has a runny nose along with other common flu-like symptoms is far more likely to have the common cold or flu than to have anthrax.

Smallpox
* When transport is necessary, minimize the dispersal of respiratory droplets by placing a mask on the patient.
* Vaccination within 3 days of exposure will completely prevent or significantly reduce the severity of the disease in the vast majority of people.
* Vaccination 4-7 days after exposure likely offers some protection from disease or may modify the severity of disease.

Blast Injury Categories

Category	Characteristics	Body Part Affected	Type of Injuries
Primary 1°	**Unique to HE**, results from the impact of over-pressurization wave with body surfaces	Gas filled structures are most susceptible – lungs, GI tract, and middle ear	•Blast lung – pulmonary barotrauma •TM rupture and middle ear damage •Abdominal hemorrhage and perforation •Globe (eye) rupture •Concussion (TBI without physical signs of head injury)
Secondary 2°	Results from flying debris and bomb fragments	Any body part may be affected	•Penetrating ballistic (fragmentation) or blunt injuries •Eye penetration (can be occult)
Tertiary 3°	Results from individuals being thrown by the blast wind	Any body part may be affected	•Fracture and traumatic amputation •Closed and open brain injury
Quaternary 4°	All explosion related injuries not due to 1°, 2° or 3° mechanisms	Any body part may be affected	•Burns (flash, partial and full thickness) •Crush injuries •Closed and open brain injury •Asthma, COPD, or other breathing problems from dust, smoke, toxic fumes •Angina, hypertension •Hyperglycemia, other chronic diseases worsened

LE are classified differently because they lack the self-defining HE over-pressurization wave. LE's mechanisms of injuries are characterized as due to ballistics (fragmentation), blast wind (not blast wave) and thermal forces. There is some overlap between LE and HE 2°, 3°, and 4°.