

Pediatric Prehospital Treatment Protocols



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Pediatric Primary Survey

1. Establish scene safety
2. Evaluate airway and protective airway reflexes, looking for:
 - Cyanosis - Intercostal retractions
 - Stridor - Absent breath sounds
 - Drooling - Bradycardia
 - Nasal flaring - Apnea or bradypnea
 - Choking - Tachypnea
 - Grunting
3. Basic airway/spinal immobilization prn.
 - Open airway using suction, jaw thrust and chin lift (and/or head tilt if no suspected spinal trauma). Consider placement of oral pharyngeal airway if child unconscious.
 - If cervical spine trauma suspected, immobilize spine with cervical immobilization device and backboard. Manual immobilization initially if emergency intervention required. Infants and young children may require under-shoulder support to achieve neutral cervical spine position.
4. Oxygen prn.
 - Use nasopharyngeal or oral pharyngeal airway, mask, or oxygen by blow-by, as tolerated, with child in position of comfort.
5. Assist ventilation prn.
 - Ventilate with bag-valve @ 100% oxygen. Use chest rise as indicator of adequate ventilation. If chest rise is inadequate, consider:
 - Repositioning the airway
 - Foreign body in airway
 - Inadequate bag volume, or activated pop-off valve
 - Rescue breathing includes two initial, slow breaths (1-1/2 sec) then rate of 30 breaths/min for an infant or 20 breaths/min for a child.
6. Stop hemorrhage. Evaluate and support circulation.
 - Assess perfusion using:
 - Heart rate - Mental status
 - Skin signs - Quality of pulse
 - Capillary refill - Blood pressure
 - Compression rate is at least 100/min for infant and children with a 5:1 compression:ventilation ratio. Depth is 1/3 of chest cavity for infant and child.
7. Establish level of responsiveness.
8. Do environmental assessment, including consideration of intentional injury.
9. Determine appropriate treatment protocol.

PULSELESS ELECTRICAL ACTIVITY

The absence of a detectable pulse and the presence of some type of electrical activity other than V-fib or V-Tach define this group of arrhythmias. The summary term Pulseless Electrical Activity (PEA) incorporates electromechanical dissociation (EMD) and a heterogeneous group of rhythms that includes pseudo-EMD, idioventricular rhythms, ventricular escape rhythms and bradysystolic rhythms.

Field Treatment - BLS

PEDIATRIC PRIMARY SURVEY: Provide family psychosocial support if CPR is not indicated.

CPR: Continue as appropriate

VENTILATE: Via Bag-Valve Mask, 100% O₂

AED: Apply ASAP

Field Treatment - ALS

AIRWAY: Intubation not necessary if airway patent and adequate ventilations with BVM. Ventilate with 100% oxygen.

IV ACCESS: Intraosseous lines are the preferred method for rapid vascular access in cardiac arrest patients.

EPINEPHRINE: 1:10,000 (standard dose therapy) 0.01 mg/kg ♦ 0.1 ml/kg. Maximum dose ♦ 1 mg or 10 ml IO, IV.

FLUID BOLUS: 20 ml/kg. Reassess. Repeat twice prn.

TRANSPORT:

Considerations:

- If Intraosseous or intravenous access cannot be immediately established, give drugs down the ET tube. Epinephrine 1:1000, 0.1 mg/kg ♦ 0.1 ml/kg ET, diluted in 1-2 ml of NS is standard dose therapy.

- Intubation not necessary if airway patent and adequate ventilations with BVM. Ventilate with 100% oxygen.

- Intraosseous lines are the preferred method for rapid vascular access in cardiac arrest patients.

Base Physician Order:

DOPAMINE: Drip @ 2-20 ug/kg/min for shock refractory to IV fluids. Refer to Pediatric Dopamine Chart

ASYSTOLE

Asystole represents the total absence of electrical activity in the heart. There is no rhythm, although an occasional P wave may be seen.

Field Treatment - BLS

PEDIATRIC PRIMARY SURVEY: Provide family psychosocial support if CPR is not indicated.

CPR: Continue as appropriate

VENTILATE: Via Bag-Valve Mask, 100% O₂

AED: Apply ASAP

Field Treatment - ALS

AIRWAY: Intubation not necessary if airway patent and adequate ventilations with BVM. Ventilate with 100% oxygen.

IV ACCESS: Intraosseous lines are the preferred method for rapid vascular access in cardiac arrest patients.

EPINEPHRINE: 1:10,000 (standard dose therapy) 0.01 mg/kg → 0.1 ml/kg. Maximum dose → 1 mg or 10 ml IO, IV.

Base Physician Order:

DECLARATION OF DEATH: If patient remains in asystole for five (5) minutes after adequate ventilation and initial medications, if no reversible causes are identified.

Ventricular Fibrillation - Pulseless Ventricular Tachycardia

V-Fib: Ineffective, non-perfusing rhythm characterized by bizarre, rapid, irregular electrical wave forms of varying form and amplitude.

V-Tach: Regular or slightly irregular rhythm. Heart rate normally 100-200. A-V disassociation. QRS complexes wide and bizarre (greater than 0.12 seconds)

Field Treatment - BLS

PEDIATRIC PRIMARY SURVEY: Provide family psychosocial support if CPR is not indicated.

CPR: Continue as appropriate

VENTILATE: Via Bag-Valve Mask, 100% O₂

AED: Apply ASAP

Field Treatment - ALS

Defibrillate: 2 joules/kg (max. 200 joules or biphasic equivalent).

Airway: Intubation not necessary if airway patent and adequate ventilations with BVM. Ventilate with 100% oxygen.

Vascular Access: Intraosseous lines are the preferred method for rapid vascular access in cardiac arrest patients.

Epinephrine: 1:10,000 (standard dose therapy) 0.01 mg/kg \diamond 0.1 ml/kg every 3-5 minutes. Maximum dose \diamond 1 mg or 10 ml IO, IV.

Defibrillate: 4 joules/kg (max. 360 joules or biphasic equivalent)

Lidocaine: 1mg/kg IV or IO X3, or 3 mg/kg ET. No further Lidocaine if given via ET

Defibrillate: 4 joules/kg (max. 360 joules or biphasic equivalent)

Transport:

Contact Base:

Considerations:

Refer to Broselow Tape for drug dosages.

Neonatal Resuscitation

Field Treatment - BLS

Position the airway.

Suction the mouth and nasopharynx.¹

Dry and keep warm with thermal blanket or dry towel. Cover scalp with stocking cap.

Stimulate by drying vigorously including the head and back.

Clamp and cut the cord.

Evaluate respirations.

Assisted bag-valve-mask ventilation 40-60 breaths/minute with 100% oxygen for severe respiratory depression. Use blow by or mask with 100% oxygen for mild distress.

Check heart rate at umbilical cord stump or stethoscope.

Field Treatment - ALS

Heart Rate less than or equal to 60/min.

Continue assisted ventilation.

Begin chest compressions at 120/min.

If no improvement after 1 minute, perform endotracheal intubation if BLS airway measures ineffective.

If no improvement, establish vascular access and give epinephrine (1:10,000) 0.01 mg/kg (0.1 ml/kg) IV or IO, or 0.03 mg/kg (0.3 ml/kg) ET. Repeat q 3-5 min. prn.

Reassess heart rate and respiration enroute. Contact Base

Glucagon 1 mg IM

Heart Rate 60 - 80 min.

Continue assisted ventilation

If no improvement after 1 minute of ventilation with 100% oxygen, begin chest compressions.

Reassess heart rate and respirations en route.

Glucagon 1 mg IM

Contact Base

Heart Rate 80-100 & Rising

Give oxygen by mask or blow by.

Stimulate

Reassess heart rate and respirations after 30 seconds. If heart rate is less than 100 begin assisted BVM ventilation with 100% oxygen.

Reassess heart rate after 30 seconds.

Accucheck - if BS less than 40 give D10W 3cc/kg IV (approx. 12cc)

Heart Rate greater than 100 min.

Check skin color. If peripheral cyanosis, give oxygen by mask or blow by.

Reassess heart rate and respirations en route.

Accucheck - if BS less than 40 give D10W 3cc/kg IV (approx. 12cc)

Contact Base

Considerations:

¹If thick meconium is present, or thin meconium with respiratory distress, perform deep ET suction, using appropriate suction adapter if available (ALS Only)

Refer to Broselow Tape for drug dosages.

Perform chest compressions with both thumbs (with hands encircling the back), at the nipple line, midsternum, at a depth of 1/3 the chest cavity.

Pediatric Respiratory Distress

Field Treatment - BLS

Field Primary Survey:

If basic airway cannot be established, consider foreign body obstruction and proceed with appropriate airway clearance maneuvers, based on patient age:

For patients less than 1 year of age, alternate 4 back blows and 4 chest thrusts.

For patients greater than 1 year of age, perform 4 abdominal thrusts.

Reassess and repeat basic airway maneuvers until obstruction is cleared or patient becomes unconscious.

Position of comfort. Enlist help of child's caretaker, if distress is mild-moderate.

O₂: for mild distress: 2L by NC or for severe distress: 15L by NRB or BVM if indicated

Field Treatment - ALS

OBSTRUCTION - Upper Airway (STRIDOR)

Advanced airway, PRN

Visualize airway using appropriate size laryngoscope blade and Pediatric Magill forceps prn. Intubate if object not visible or lodged beyond the cords. Use pulse oximeter and end-tidal CO₂ monitoring, if available

Cardiac monitor

Consider: Foreign body, croup. If epiglottitis suspected, leave alone (in parents arms) if possible

Epinephrine (1:1000) 0.01 mg/kg in 2.5cc NS nebulizer if moderate to severe distress.

If complete airway obstruction that cannot be cleared with basic maneuvers or direct visualization, perform TTJ.

OBSTRUCTION - Lower Airway (WHEEZING)

Advanced airway, PRN

Cardiac monitor

Inhaled albuterol (3 ml premixed) PRN

Epinephrine (1:1000), 0.01 mg/kg (0.01 ml/kg) SQ, if child unable to cooperate with inhaled albuterol or if in severe distress (maximum dose, ♦0.3 mg or 0.3 ml). May repeat once after 5 minutes

IV access if in severe distress or condition worsening

OTHER, NON-OBSTRUCTIVE CAUSES OF RESPIRATORY INSUFFICIENCY

Advanced Airway, PRN

IV Access, PRN:

Place IO PRN if unconscious, in severe distress, and unable to obtain IV within 90 seconds

Cardiac Monitor

Administer Naloxone, 1-2 mg IV, IM, IO or ET, titrate to correct for respiratory depression if signs of opiate poisoning are present, e.g. respiratory depression, altered mental status, meiosis, and access to opiate medication/drugs

Considerations:

Refer to Broselow Tape for drug dosage

Pediatric Bradycardia

Field Treatment - BLS

Field Primary Survey. Assure adequate oxygenation and ventilation (assisted ventilations PRN):

Most bradycardia in children is due to hypoxia. Apply 100% oxygen by non-rebreather mask.

Good BLS airway skills are essential to prevent cardiopulmonary arrest.

Shock position PRN for diminished perfusion.

Field Treatment - ALS

Normal Perfusion

Cardiac Monitor

Vascular Access

Reassess patient frequently.

Base Hospital Contact

Diminished Perfusion or Respiratory Distress

Cardiac monitor

Advanced airway, PRN

If unresponsive and heart rate is less than or equal to 80 than start compressions.

Vascular Access - may be performed enroute

Epinephrine (1:10,000) 0.01 mg/kg IV/IO ♦ 0.1 ml/kg; maximum initial dose ♦ 1 mg. or, Epinephrine (1:1000) 0.1 mg/kg ET ♦ 0.1 ml/kg, if no IV or IO. Epinephrine doses up to 0.2 mg/kg (1:1000) ♦ 0.2 ml/kg; repeat doses every 3-5 min.

IF NO RESPONSE TO EPINEPHRINE: Atropine: 0.02 mg/kg IV/IO/ET; minimum single dose ♦ 0.1 mg; maximum single dose ♦ 0.5 mg for child; 1 mg for age greater than 10 years. May repeat once five minutes after infusion.

Base Hospital Contact

Reassess patient frequently.

Considerations:

Refer to Broselow Tape for drug dosage

Pediatric Tachycardia

Field Treatment - BLS

Field Primary Survey.

Oxygen Administration. Apply 100% oxygen by non-rebreather mask. Use pulse oximeter, if available.

Shock Position, PRN.

Field Treatment - ALS

Narrow Complex (QRS less than .08 sec)
SINUS TACHYCARDIA
SVT rate less than 220/min.

Cardiac monitor.

Venous access PRN.

Fluid bolus at 20 ml/kg IV. Reassess. Repeat twice prn.

Consider fever or occult injury

SVT - Rate greater than 220/min.

Cardiac monitor.

Venous Access.

20 cc/kg fluid bolus and reassess

Unstable

If perfusion is diminished and child is poorly responsive or unconscious, administer synchronized cardioversion at 0.5 joule/kg. If no response, repeat at 1 joule/kg; then defibrillate at 2 joules/kg; repeat at 4 joules/kg or biphasic equivalent

If cardioversion appears painful, administer Versed 0.1 mg/kg IV if blood pressure normal.

Stable

If child has diminished perfusion, but is responsive, administer adenosine, 0.1 mg/kg rapid IV, or IO. Max dose 6 mg. Repeat dose in 1 minute at 0.2 mg/kg IV. Maximum dose 12 mg.

If child has normal perfusion, attempt Valsalva maneuver.

VENTRICULAR TACHYCARDIA

rate greater than 150/min.

Wide Complex (QRS greater than 0.08 secs)

Cardiac Monitor & Venous Access.

If child has normal perfusion do not cardiovert.

If child is responsive, administer 0.1 mg/kg of Versed IV slowly (4 mg max) prior to electrical shock. If IV route not available, 0.2 mg/kg Versed IM (8 mg max).

If perfusion is diminished and child is poorly responsive or unconscious, administer synchronized cardioversion at 1 joule/kg. If no response, repeat at 2 joules/kg; then defibrillate at 4 joules/kg (or biphasic equivalent)

Proper airway management

Base Hospital Orders

After electrical cardioversion in child with diminished perfusion, administer lidocaine 1mg/kg. May repeat q 5 minutes to 3 mg/kg maximum.

If no cardioversion consider administration Lidocaine 1-mg/kg IVP. May repeat q 5 minutes to 3-mg/kg maximum. Consider Adenosine.

If Ventricular Tachycardia is converted successfully, start Lidocaine infusion @ 20 - 50 ug/kg/min.

Considerations:

Refer to Broselow Tape for drug dosage

Pediatric Shock

Field Treatment - BLS

Field Primary Survey.

Oxygen Administration. Apply 100% oxygen by non-rebreather mask.

Shock Position, PRN.

Field Treatment - ALS

Good Airway Management. Advanced Airway PRN

Cardiac monitor.

Venous access

Obtain blood for rapid glucose test if less than 60 mg/dl or less than 40 mg/dl if newborn:

a) If IV established give:

- D₅₀W 1 ml/kg IV for greater than 2 years
- D₂₅W 2 ml/kg IV for less than 2 years
- D₁₀W 3 ml/kg IV for neonates

b) If no IV access, give Glucagon 1 mg IM

Consider rhythm disturbance. Treat per protocol.

Fluid bolus at 20 ml/kg IV. Reassess. Repeat twice prn. If history of fever or suspected infection, give additional boluses of 20 ml/kg up to 60 ml/kg

If suspected allergic reaction, follow Anaphylaxis protocol.

Base Hospital Orders

Consider Dopamine 5 - 20 ug/kg/min. after 60 ml/kg of fluids.

Considerations:

Refer to Broselow Tape for drug dosage

Pediatric Toxic Exposure

Field Treatment - BLS

Assess Scene. Consider hazardous material exposure and consultation with appropriate advisory agency, before decontamination or patient contact procedures.

Field Primary Survey - consider etiology & appropriate protocols: Shock, Toxic exposure, Head Trauma, Seizure, Hypoxia.

O₂, as indicated

Bring substance containers to hospital, whenever possible and safe to do so.

Field Treatment - ALS

Good Airway Management. Advanced Airway PRN.

Cardiac monitor.

Venous access, PRN

If ALOC, obtain blood for rapid glucose test and follow ALOC protocol, as indicated.

Base Hospital may provide specific information about individual toxic exposures and treatments.

Assess for other potential toxic exposures.

Reassess patient frequently

Base Hospital Order:

Examples of other treatable exposures and antidotes are:

- Organophosphates, with high dose atropine,
- Cyclic antidepressants, with sodium bicarbonate,
- Opiates, with naloxone,
- Beta-blockers, with glucagon,
- Calcium channel blockers, with calcium,
- Aspirin, with sodium bicarbonate.

Pediatric Burns

Field Treatment - BLS

Field Primary Survey

Stop the burning process. Remove and secure jewelry and clothing from around affected area

O₂, as tolerated. Apply 100% oxygen by non-rebreather mask for potential inhalation injury or partial/full thickness burns greater than 10% TBS

If chemical is dry, brush off, then flush with copious water. If liquid, flush with copious water

If eye involvement, flush continuously with normal saline

Apply clean, dry wound dressings and/or sheet to involved areas

Shock position PRN

Field Treatment - ALS

Thermal Injury/ Chemical/ Electrical Burns

Good airway management. Advanced airway, PRN

Cardiac monitor

Venous access if partial/full thickness burns greater than 20% of TBS or id source greater than 120 volts

See Hypovolemic Shock protocol if signs of shock

Do not apply cool dressings or allow environmental exposure, since hypothermia will result in a young child. Transport immediately to receiving hospital.

Treat dysrhythmia by appropriate protocol.

Morphine Sulfate 0.05 - 0.1 mg/kg for pain

Considerations:

Refer to Broselow Tape for drug dosage

Pediatric Trauma

Field Treatment - BLS

Field Primary Survey

O₂ PRN. For serious injury, high flow via NRM

Spinal immobilization PRN

Control external hemorrhage with direct pressure.

If extremity amputation, place amputated part in dry gauze in sterile container and place container on ice, if available

For head trauma, elevate head of backboard 15 - 20°, if no signs of shock

If avulsed tooth, transport tooth in milk or normal saline

Field Treatment - ALS

SECURE AIRWAY: As appropriate while maintaining c-spine. Consider intubating while enroute. Ensure adequate ventilation.

OXYGEN: As indicated

CONTROL BLEEDING: Stop excessive(exsanguinating) hemorrhage

C-SPINE: Protect if indicated by algorithm

TRANSPORT: ASAP. Attempt to limit scene time to 10 minutes unless using air evacuation

IV ACCESS (ALS): Fluid bolus at 20 ml/kg IV. Reassess. Repeat additional boluses of 20 ml/kg up to 60 ml/kg as needed

SECONDARY SURVEY: Obtain full set of vital signs

DRESS & SPLINT: Dress only those wounds with excessive hemorrhage (unless time allows attention to minor wounds). Splint as needed for stabilization of extremities.

CARDIAC MONITOR (ALS): Treat rhythm as indicated

MORPHINE (ALS): Isolated extremity trauma only. Consider Morphine 0.05-0.1 mg/kg (max. 5 mg) increments slow IVP for pain control. Contact base for repeated doses.

Considerations:

POSITION: If head injury is suspect place HOB up 30 degrees.

NEEDLE THORACOSTOMY(ALS): Relieve the tension pneumothorax by performing a needle thoracostomy or by removing the occlusive dressing covering an open chestwound.

IMPALED OBJECT: Immobilize and leave in place. Only remove object upon Base Physician order. Exception: May remove an impaled object from the face, cheek or neck if unable to ventilate due to object.

OPEN CHEST WOUND: Cover wound with 3-sided occlusive dressing (do not seal). Continuously re-evaluate patient for a developing tension pneumothorax.

EVISCERATING TRAUMA: Cover eviscerated organs or bowel with saline soaked gauze. Do not attempt to replace organs or bowel into abdominal cavity.

AMPUTATIONS: If partial amputation, splint in anatomic position and elevate the extremity. Place complete amputated parts in a sealed clean and dry container or bag. Place container or bag in ice, if possible.

EXTREMITY TRAUMA: Check neuro-vascular status before and after each extremity manipulation.

Grossly angulated long bone fractures may be reduced with gentle unidirectional traction for splinting.

Base Hospital Order:

MORPHINE (ALS): 0.05-0.1 mg/kg (max. 5 mg) increments slow IVP for pain control.

Pediatric Traumatic Arrest

Field Treatment - BLS

Field Primary Survey

CPR

Supplemental O₂ high flow

Spinal immobilization PRN

Control external hemorrhage with direct pressure. Shock position PRN

Field Treatment - ALS

Good airway management. Consider simplest effective method. Ventilate with bag-valve with 100% oxygen. Consider intubation while enroute.

Cardiac monitor:

! Asystole - Contact Base Hospital for Declaration of Death (see below)

! Defibrillate V-FIB or V-TACH. Complete Traumatic Arrest Protocol before referring to other cardiac protocols

Transport via Ground unless ROSC

Bilateral Needle Thoracostomy

Vascular Access IV / IO

Fluid Bolus - 20 ml/kg. Repeat twice

Contact Base Hospital for further orders

Traumatic Asystole (particularly in children) is not a survivable condition, and in the absence of the obvious signs listed above, the presence of traumatic asystole is enough to immediately contact the base hospital for a declaration of death.

Weights in kilograms, age-adjusted vital signs, ET Tube sizes for children and
Systolic blood pressure = $70 + 2 \times (\text{age in years})$

AGE	MEAN WEIGHT IN KG.	MINIMUM SYSTOLIC BP	NORMAL HR	NORMAL RR	ET TUBE SIZE
Premature	< 2.5	40	120-170	40-60	2.5-3.0
Term	3.5	60	100-170	40-60	3.0-3.5
3 months	6	60	100-170	30-50	3.5
6 months	8	60	100-170	30-50	4.0
1 year	10	72	100-170	30-40	4.0
2 years	13	74	100-160	20-30	4.5
4 years	15	78	80-130	20	5.0
6 years	20	82	70-115	16	5.5
8 years	25	86	70-110	16	6.0
10 years	30	90	60-105	16	6.5
12 years	40	94	60-100	16	7.0

Sign	Scoring Value		
	0	1	2
Appearance	Blue, pale	Body pink, hands/feet blue	All pink
Pulse	Absent	< 100	≥ 100
Grimace	No Response	Some motion, cry	Vigorous cry
Activity	Flaccid, limp	Some flexion of extremities	Active motion
Respiration	Absent	Slow, irregular	Active crying

Pediatric Dopamine Drip Chart

For a concentration of 800 ug of Dopamine per milliliter of solution

One 5 ml ampule of Dopamine (200 mg of Dopamine per ampule) mixed in 250 ml of NS

Patient Age	Newborn	Newborn	3 mos.	6 mos.	1 yr.	2 yr.	4 yr.	6 yr.	8 yr.	10 yr.	12 yr.
Body Length Range (cm)	0-53	54-58	59-65	66-74	75-80	81-86	87-99	100-113	114-132	133-158	159-189
Average Body Weight (kg)	2	4	6	7	10	12	16	20	25	34	41
ug I min	2ug	0	1	1	1	2	2	3	4	5	6
	3ug	0	1	1	2	2	3	4	6	8	9
	4ug	1	1	2	2	3	4	5	7	10	12
	5ug	1	1	2	3	4	4	6	7	9	13
	6ug	1	2	3	3	4	5	7	9	11	15
	7ug	1	2	3	4	5	6	8	10	13	18
	8ug	1	2	4	4	6	7	10	12	15	20
	9ug	1	3	4	5	7	8	11	13	17	23
	10ug	1	3	4	5	7	9	12	15	19	25
	11ug	2	3	5	6	8	10	13	16	21	28
	12ug	2	4	5	6	9	11	14	18	22	31
	13ug	2	4	6	7	10	12	16	19	24	33
	14ug	2	4	6	7	10	13	17	21	26	36
	15ug	2	4	7	8	11	13	18	22	28	38
	16ug	2	5	7	8	12	14	19	24	30	41
	17ug	3	5	8	9	13	15	20	25	32	43
	18ug	3	5	8	9	13	16	22	27	34	46
	19ug	3	6	9	10	14	17	23	28	36	48
	20ug	3	6	9	10	15	18	24	30	37	51

Flow rate in Drops* per Minute

* based on a microdrip calibration of 60 drops to 1 milliliter