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**PEDIATRIC TREATMENT GUIDELINES**
**PEDIATRIC PATIENT CARE**

Pediatric patient is defined as age 14 or less. Neonate is 0-1 month

*These basic treatment concepts should be considered in all pediatric patients*

<table>
<thead>
<tr>
<th>Scene Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body Substance Isolation</td>
</tr>
<tr>
<td>Use universal blood and body fluid precautions at all times</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Systematic Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management and support of ABC’s are a priority</td>
</tr>
<tr>
<td>Identify pre-arrest states</td>
</tr>
<tr>
<td>Assure open and adequate airway</td>
</tr>
<tr>
<td>Place in position of comfort unless condition mandates other position</td>
</tr>
<tr>
<td>Consider spinal immobilization if history or possibility of traumatic injury exists</td>
</tr>
<tr>
<td>Assess environment to consider possibility of intentional injury or maltreatment</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Determine Primary Impression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apply appropriate field treatment guidelines</td>
</tr>
<tr>
<td>Explain procedures to family and patient as appropriate</td>
</tr>
<tr>
<td>Provide appropriate family support on scene</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Base Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact base hospital if any questions arise concerning treatment or if additional medication beyond dosages listed in treatment guidelines is considered</td>
</tr>
<tr>
<td>Use SBAR to communicate with base</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transport</th>
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</thead>
<tbody>
<tr>
<td>Minimize scene time in pre-arrest patient, critical trauma, shock or respiratory failure</td>
</tr>
<tr>
<td>Transport patient medications or current list of patient medications to the hospital</td>
</tr>
<tr>
<td>Give report to receiving facility using SBAR</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Document</th>
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<tbody>
<tr>
<td>Document patient assessment and care per policy</td>
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</tbody>
</table>

**Key Treatment Considerations – Apparent Life-Threatening Event (ALTE)**

An Apparent Life-Threatening Event (ALTE) is an event that is frightening to the observer (may think the infant has died) and involves some combination of apnea, color change, marked change in muscle tone, choking, or gagging. It usually occurs in infants less than 12 months of age, though any child with symptoms described under 2 years of age may be considered an ALTE.

Most patients have a normal physical exam when assessed by responding personnel. Approximately half of the cases have no known cause, but the remainder of cases have a significant underlying cause such as infection, seizures, tumors, respiratory or airway problems, child abuse, or SIDS.

Because of the high incidence of problems and the normal assessment usually seen, there is potential for significant problems if the child's symptoms are not seriously addressed.

<table>
<thead>
<tr>
<th>OBTAIN DETAILED HISTORY</th>
</tr>
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<tbody>
<tr>
<td>Obtain history of event, including duration and severity, whether patient awake or asleep at time of episode, and what resuscitative measures were done by the parent or caretaker.</td>
</tr>
<tr>
<td>Obtain past medical history, including history of chronic diseases, seizure activity, current or recent infections, gastroesophageal reflux, recent trauma, medication history.</td>
</tr>
<tr>
<td>Obtain history with regard to mixing of formula if applicable.</td>
</tr>
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<table>
<thead>
<tr>
<th>ASSESSMENT</th>
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<tbody>
<tr>
<td>Perform comprehensive exam, including general appearance, skin color, interaction with environment, or evidence of trauma</td>
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<table>
<thead>
<tr>
<th>TREATMENT</th>
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<tbody>
<tr>
<td>Treat identifiable cause if appropriate</td>
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<tr>
<th>TRANSPORT</th>
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</thead>
<tbody>
<tr>
<td>If treatment/transport is refused by parent or guardian, contact base hospital to consult prior to leaving patient. Document refusal of care.</td>
</tr>
</tbody>
</table>
# PEDIATRIC

## CARDIAC ARREST – INITIAL CARE AND CPR

### COMPRESSIONS
- Begin compressions at a rate of at least 100 per minute
- Compress chest approximately 1/3 of AP diameter of chest:
  - In children (age 1-8) - around 2 inches
  - In infants (under age 1) – around 1 ½ inches
- Allow full chest recoil (lift heel of hand)
- Change compressors every 2 minutes
- Minimize any interruptions in compressions. If necessary to interrupt, limit to 10 seconds or less
- Do not stop compressions while defibrillator is charging
- Resume compressions immediately after any shock

### AED or MONITOR/DEFIBRILLATOR
- Priority of second rescuer is to apply pads while compressions in progress
- Determine rhythm (or allow AED analysis) and shock if indicated
- Follow specific treatment guideline based on rhythm

### BASIC AIRWAY MANAGEMENT and VENTILATION
- Open airway – For 2-person CPR:
  - Provide 2 breaths:30 compressions for children over age 8
  - Provide 2 breaths:15 compressions for infants > 1 month and children to age 8
- **AVOID EXCESSIVE VENTILATION**
- Ventilations should last one second each, enough to cause visible chest rise
- Use two-person BLS Airway management (one holding mask and one squeezing bag).

### MEDICATIONS AND DEFIBRILLATION
- Use length-based tape to determine weight if not known
  - If child is obese and length-based tape used to determine weight, use next highest color to determine appropriate equipment and drug dosing
- See Pediatric Drug Chart for medication dose and defibrillation energy levels

### ADVANCED AIRWAY MANAGEMENT and END-TIDAL CO2 MONITORING
- **For patients 40 kg or greater only:**
  - Placement of advanced airway is not a priority during the first 5 minutes of resuscitation unless no ventilation is occurring with basic maneuvers.
  - Laryngoscopy for endotracheal tube placement must occur with CPR in progress and compressions should be halted only for advancement of tube through the cords.
  - Advanced airway placement should not interrupt compressions for a period of more than 10 seconds
- Continuous monitoring of End-Tidal CO2 with waveform capnography is **mandatory** for all patients with advanced airway device in place.

### BLOOD GLUCOSE
- Treat if indicated. Glucose may be rapidly depleted in pediatric arrest.

### PREVENT HYPOTHERMIA
- Move to warm environment and avoid unnecessary exposure
  - Pediatric arrest victims are at risk for hypothermia due to their increased body surface area, exposure and rapid administration of IV/IO fluids

### TRANSPORT
- Consider rapid transport to definitive care
### NEONATAL CARE AND RESUSCITATION

<table>
<thead>
<tr>
<th>WARM PATIENT</th>
<th>Provide warmth – move to warm environment immediately</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLEAR AIRWAY</td>
<td>If needed, position airway or suction. Rapidly suction secretions from mouth or nares.</td>
</tr>
<tr>
<td>DRY AND STIMULATE</td>
<td>Dry child thoroughly, stimulate, reposition if needed, place hat on infant</td>
</tr>
</tbody>
</table>

#### Evaluate Respirations, Heart Rate and Color

- If breathing, heart rate above 100 and pink, observational care only
- If breathing, heart rate above 100 and central cyanosis – **OXYGEN** 100% by mask – reassess in 30 seconds
  - If cyanosis resolves (skin pink) – observational care only
  - If persistent central cyanosis after oxygen, initiate bag mask ventilation at rate of 40-60/minute
- If apneic, gasping, or heart rate below 100 – initiate bag mask ventilation at a rate of 40-60/minute with **OXYGEN** 100% – reassess in 30 seconds
  - If heart rate increases to above 100 and patient ventilating adequately, discontinue bag mask ventilation and continue close observation
  - If heart rate persists below 100 continue bag mask ventilation

#### Reassess / Begin CPR If Indicated

- If heart rate less than 60 despite ventilation with oxygen for 30 seconds, begin CPR (3:1 ratio – 90 compressions and 30 ventilations/minute). Reassess in 30 seconds.

#### If heart rate remains less than 60 despite adequate ventilation and chest compressions:

- **IV/IO** TKO. 100-500 ml NS bag (use care to avoid inadvertent fluid administration). Do not delay transport for IV or IO access.
- **EPINEPHRINE** 1:10,000, 0.01 mg/kg IV or IO. Repeat every 3-5 minutes if heart rate remains below 60.
- Consider **FLUID BOLUS** 10 ml/kg NS IV or IO. May repeat once if needed.
- Consider **NALOXONE** 0.1 mg/kg IV or IO if depressed respiratory status despite efforts. Avoid use if long term use of opioids during pregnancy known or suspected.

### Key Treatment Considerations

- For uncomplicated deliveries, treatment priorities are to warm, dry, and stimulate the infant
- Anticipate complex resuscitation if not term gestation, amniotic fluid not clear, if newborn is not breathing or crying or if newborn does not have good muscle tone
- Use length-based tape for pediatric weight determination. See Pediatric Drug Chart for dose.
# Pediatric Ventricular Fibrillation

## Initial Care
See Cardiac Arrest - Initial Care and CPR (P3)

## Defibrillation
- **2-4 joules/kg**
  - **AED** can be used if patient over 1 year and pediatric electrodes available (age 1-8) or if adult electrodes can be applied without touching each other
  - Use infant paddles and manual defibrillator up to 1 year of age or 10 kg

## CPR
- For 2 minutes or 5 cycles between rhythm check

## BVM Ventilation
- For patients 40 kg and over, defer advanced airway unless BLS airway inadequate

## IO or IV
- TKO. Should not delay defibrillation or interrupt CPR

## Defibrillation
- 4 joules/kg
  - Higher energy levels may be considered – not to exceed 10 joules/kg or the adult maximum.

## Epinephrine
- 1:10,000 - 0.01 mg/kg IV or IO every 3-5 minutes - See Pediatric Drug Chart

## Amiodarone
- 5 mg/kg IV or IO (see Pediatric Drug Chart for dosage)

## Transport
If Return of Spontaneous Circulation – see guidelines for Shock (P8) if treatment indicated

## Key Treatment Considerations
- Uninterrupted CPR and timely defibrillations are the keys to successful resuscitation. Their performance takes precedence over advanced airway management and administration of medications.
- To minimize CPR interruptions, perform CPR during charging, and immediately resume CPR after shock administered (no pulse or rhythm check)
- Avoid excessive ventilation with BLS airway management, which may cause gastric distention and limit chest expansion. Provide breaths over one second, with movement of chest wall as guide for volume needed.
- If advanced airway placed (40 kg and over), perform CPR continuously without pauses for ventilation
- Confirm placement of advanced airway with end-tidal carbon dioxide measurement. Continuous monitoring with ETCO2 is mandatory – if values less than 10 mm Hg seen, assess quality of compressions for adequate rate and depth. Rapid rise in ETCO2 may be the earliest indicator of return of circulation.
- Prepare drugs before rhythm check and administer during CPR
- Give drugs as soon as possible after rhythm check confirms VF/pulseless VT (before or after shock)
- Follow each drug with 5-10 ml NS flush (minimum). Increase accordingly for patient size (20 ml in adolescents).
- **Use length-based tape for pediatric weight determination.** See Pediatric Drug Chart for medication dose and defibrillation energy levels.
P5
PEDiatric

PULSELESS ELECTRICAL ACTIVITY / ASYSTOLE

INITIAL CARE
See Cardiac Arrest – Initial Care and CPR (P3)

BVM VENTILATION
Defer advanced airway (for patients 40 kg and over) unless BLS airway inadequate

IV or IO
TKO

EPINEPHRINE
1:10,000 - 0.01 mg/kg IV or IO every 3-5 minutes

Consider treatable causes – treat if applicable:
- FLUID BOLUS
  20 ml/kg NS – may repeat X 2 for hypovolemia

VENTILATION
Ensure adequate ventilation (8-10 breaths per minute) for hypoxia

WARMING MEASURES
For hypothermia

Consider NEEDLE THORACOSTOMY
For tension pneumothorax

BASE CONTACT
To determine treatment for other identified potentially treatable causes - Hydrogen Ion (Acidosis), Hyperkalemia, Toxins

Safety Warning: Unlike adult resuscitation, atropine is not used in treatment of asystole or PEA in the pediatric patient

If Return of Spontaneous Circulation – see guidelines for Shock (P8) if treatment indicated

Key Treatment Considerations
- Uninterrupted CPR is key to successful resuscitation. This takes precedence over advanced airway management and administration of medications.
- If advanced airway placed in patients 40 kg and over, perform CPR continuously without pauses for ventilation
- Avoid hyperventilation. If intubated, give 8 to 10 ventilations per minute, administered over one second.
- Prepare drugs before rhythm check and administer during CPR
- Follow each drug with 5-10 ml NS flush (minimum). Increase accordingly for patient size (20 ml in adolescents).
- Use length-based tape for pediatric weight determination. See Pediatric Drug Chart for dose.
### PEDIATRIC SYMPTOMATIC BRADYCARDIA

- 90% of pediatric bradycardias are related to respiratory depression and respond to support of ventilation
- Only unstable, severe bradycardia causing cardiorespiratory compromise will require further treatment
- Signs of severe cardiorespiratory compromise are poor perfusion, delayed capillary refill, hypotension, respiratory difficulty, altered level of consciousness

<table>
<thead>
<tr>
<th><strong>OXYGEN</strong></th>
<th>High flow. Be prepared to support ventilation.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IV or IO</strong></td>
<td>TKO. Use IO only if patient unstable and requires medication. Use 100-500 ml NS bag.</td>
</tr>
<tr>
<td><strong>Consider CPR</strong></td>
<td>If heart rate remains less than 60 with poor perfusion despite oxygenation and ventilation, perform CPR.</td>
</tr>
<tr>
<td><strong>EPINEPHRINE</strong></td>
<td>1:10,000 - 0.01 mg/kg IV or IO. Repeat every 3-5 minutes.</td>
</tr>
</tbody>
</table>

**SAFETY WARNING:**
Atropine should be considered only after adequate oxygenation/ventilation has been assured

<table>
<thead>
<tr>
<th><strong>Consider ATROPINE</strong></th>
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</thead>
<tbody>
<tr>
<td>0.02 mg/kg IV, IO (0.1 mg minimum dose)</td>
</tr>
<tr>
<td>Child (1-8 years): Maximum single dose 0.5 mg. Maximum total dose 1 mg</td>
</tr>
<tr>
<td>Adolescent (9-14 years): Maximum single dose 1 mg. Maximum total dose 2 mg.</td>
</tr>
<tr>
<td>If continued heart rate less than 60, repeat 0.02 mg/kg IV or IO</td>
</tr>
</tbody>
</table>

### Key Treatment Considerations

- Use length-based tape for pediatric weight determination. See Pediatric Drug Chart for dose.
Sinus tachycardia is by far the most common pediatric rhythm disturbance.

**UNSTABLE SINUS TACHYCARDIA (narrow QRS less than 0.08)**
- 'P' waves present/normal, variable R-R interval with constant P-R interval
- Unstable sinus tachycardia is usually associated with shock and may be pre-arrest

**UNSTABLE SUPRAVENTRICAL TACHYCARDIA (SVT) (narrow QRS less than 0.08)**
- 'P' waves absent/abnormal, heart rate not variable
- History generally vague, non-specific and/or history of abrupt heart rate changes
- Infants' rate usually greater than 220 bpm, Children (ages 1 – 8) rate usually greater than 180 bpm

**UNSTABLE – POSSIBLE VENTRICULAR TACHYCARDIA - Wide QRS (greater than 0.08 sec)**
- In some cases, wide QRS can represent supraventricular rhythm

### INITIAL THERAPY – ALL TACHYCARDIA RHYTHMS

**OXYGEN**
Low flow. If increased work of breathing – high flow. Be prepared to support ventilation.

**CHECK PULSE AND PERFUSION**
Determine stability:
- **Stable** - Normal perfusion: Palpable pulses, normal LOC, normal capillary refill, and normal BP for age
- **Unstable** - Poor perfusion: ALOC, abnormal pulses, delayed cap. refill, difficult/unable to palpate BP. If unstable, transport early and treat as below.

**CARDIAC MONITOR**
Run strip to evaluate QRS Duration

**IV or IO**
TKO. Use 100-500 ml bag NS

**FLUID BOLUS**
20 ml/kg NS if hypovolemia suspected. May repeat X 1.

### UNSTABLE SUPRAVENTRICAL TACHYCARDIA (narrow QRS less than 0.08)

**VAGAL MANEUVERS**
Consider if will not result in treatment delays. ICE PACK to face of infant/child.

**BASE CONTACT**
☎️ For all treatments listed below:

**ADENOSINE**
0.1 mg/kg rapid IV push followed by 10-20 ml NS flush (maximum dose 6 mg)
If not converted, 0.2 mg/kg rapid IV push followed by 10-20 ml NS flush (maximum dose 12 mg)

**SYNCHRONIZED CARDIOVERSION**
If unable to obtain IV access, prepare for Synchronized Cardioversion. Do NOT delay cardioversion to obtain IV or IO access or sedation.

Consider **SEDATION**
Consider **MIDAZOLAM** 0.1 mg/kg IV or IO, titrated in 1 mg maximum increments (maximum dose 5 mg)

**SYNCHRONIZED CARDIOVERSION**
0.5-1 joule/kg. If not effective, repeat at 2 joules/kg.

### UNSTABLE – POSSIBLE VENTRICULAR TACHYCARDIA ( Wide QRS greater than 0.08 sec)

**BASE CONTACT**
☎️ For all treatments listed below:

**SYNCHRONIZED CARDIOVERSION**
Prepare for CARDIOVERSION while attempting IV/IO access, but do not unduly delay care for IV access or medications

Consider **SEDATION**
If IV/IO access has been obtained, consider **MIDAZOLAM** 0.1 mg/kg IV or IO, titrated in 1 mg maximum increments (maximum dose 5 mg)

**SYNCHRONIZED CARDIOVERSION**
0.5-1 joule/kg. If not effective, repeat at 2 joules/kg.

- Early transport appropriate in unstable patients.
- ⭐️ Use length-based tape for pediatric weight determination. See Pediatric Drug Chart for dose.
**PEDIATRIC SHOCK**

- **Altered level of consciousness; cool, clammy, mottled skin; capillary refill greater than 2 seconds; tachycardia; blood pressure less than 70 systolic**
- **Listless infant or child with poor skin turgor, dry mucous membranes, history of fever may indicate sepsis, meningitis**

<table>
<thead>
<tr>
<th><strong>OXYGEN</strong></th>
<th>High flow. Be prepared to support ventilations as needed.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Keep patient warm</strong></td>
<td></td>
</tr>
<tr>
<td><strong>CARDIAC MONITOR</strong></td>
<td></td>
</tr>
<tr>
<td><strong>EARLY TRANSPORT</strong></td>
<td>CODE 3</td>
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<tr>
<td><strong>IV or IO</strong></td>
<td></td>
</tr>
<tr>
<td><strong>FLUID BOLUS</strong></td>
<td>20 ml/kg NS – may repeat X 2</td>
</tr>
<tr>
<td><strong>BLOOD GLUCOSE</strong></td>
<td>Check and treat if indicated</td>
</tr>
<tr>
<td><strong>PREVENT HYPOTHERMIA</strong></td>
<td>Move to warm environment. Avoid unnecessary exposure.</td>
</tr>
</tbody>
</table>

**Related guidelines:** Altered level of consciousness (G2), Tachycardia (P7)

### Key Treatment Considerations

**Successful pediatric resuscitation relies on early identification of the pre-arrest state**

- Normal blood pressure, delayed capillary refill, diminished peripheral pulses and tachycardia indicates **compensated shock** in children
- Hypotension and delayed capillary refill > 4 seconds indicates **impending circulatory failure**
- Systolic blood pressure in children may not drop until the patient is 25-30% volume depleted. This may occur through dehydration, blood loss or an increase in vascular capacity (e.g. anaphylaxis).
- Decompensated shock (Hypotension with > 5 seconds capillary refill) may present as PEA in children

- Sinus tachycardia is the most common cardiac rhythm encountered
- Supraventricular tachycardia should be suspected if heart rate greater than 180 in children (ages 1-8) or greater than 220 in infants

Hypoglycemia may be found in pediatric shock, especially in infants

Pediatric shock victims are at risk for hypothermia due to their increased body surface area, exposure and rapid administration of IV/OI fluids

- Use length-based tape for pediatric weight determination. See Pediatric Drug Chart for dose.