



Pediatric Ventricular Fibrillation Pulseless Ventricular Tachycardia



History

- Events leading to arrest
- Estimated downtime
- Past medical history
- Medications
- Existence of terminal illness
- Airway obstruction
- Hypothermia

Signs and Symptoms

- Unresponsive
- Cardiac Arrest

Differential

- Respiratory failure / Airway obstruction
- Hyper / hypokalemia, Hypovolemia
- Hypothermia, Hypoglycemia, Acidosis
- Tension pneumothorax, Tamponade
- Toxin or medication
- Thrombosis: Coronary / Pulmonary Embolism
- Congenital heart disease

Pediatric Pulseless
Arrest Protocol PC 4

Begin Continuous CPR Compressions
Push Hard ($\geq 1/3$ AP Diameter of Chest)
(1.5 inches Infant / 2 inches in Children)
Push Fast (120 / min)
Change Compressors every 200 compressions
(sooner if fatigued)
(Limit changes / pulse checks ≤ 5 seconds)
Pulse checks only when EtCO₂ not available

Ventilation rate:
Ventilate 1 breath every 10th compressions
Monitor EtCO₂ when available

Automated Defibrillation Procedure

P

Defibrillation Manual Procedure

- First shock: 2 J/Kg
- Second shock: 4 J/Kg
- Subsequent shocks ≥ 4 J/kg
- Maximum 10 J/kg or adult dose



IV or IO Access Protocol UP 6

A

Epinephrine 1:10,000
0.01 mg/kg IV / IO Maximum 1mg
Or
Epinephrine 1:1000 0.1 mg / kg ETT
Maximum 2.5 mg
Repeat every 3 – 5 minutes

If Rhythm Refractory to defibrillation

- Continue CPR and give Agency specific Anti-arrhythmic(s) in a drug-shock-drug-shock pattern.
- Continue CPR up to point where you are ready to defibrillate with device charged.

Repeat pattern during resuscitation.

P

Lidocaine 1 mg/kg IV / IO
Repeat every 5 minutes as needed
Maximum single dose 100 mg
Maximum 3 mg/kg total
Or
Amiodarone 5 mg / kg IV / IO
Repeat every 5 minutes as needed
Maximum single dose 150 mg
Maximum 300 mg / kg

**Notify Destination or
Contact Medical Control**

AT ANY TIME

**Return of
Spontaneous
Circulation**



**Go to
Post Resuscitation
Protocol**

Reversible Causes

Hypovolemia
Hypoxia
Hydrogen ion (acidosis)
Hypothermia
Hypo / Hyperkalemia
Hypoglycemia

Tension pneumothorax
Tamponade; cardiac
Toxins
Thrombosis; pulmonary
(PE)
Thrombosis; coronary (MI)



Pediatric Ventricular Fibrillation Pulseless Ventricular Tachycardia



PRIMARY FOCUS IS ON HIGH-QUALITY, CONTINUOUS AND UNINTERRUPTED COMPRESSIONS AT A RATE OF:

Compressor Responsibilities:

- Compress at rate of 120/ minute
- Push ≥ 2 inches depth of compression
- Allow complete recoil of chest on upstroke
- **Call out every 10th compression**
- Next compressor moves into ready position at compression 180
- Do not interrupt compressions > 5 seconds

ALS Responsibility:

- Ensure adequate compressions and ventilations
- Establish IV or IO access and administer first epinephrine
- Charge defibrillator every sequence at the 180th compression

Ventilator Responsibilities:

- **Ventilate ONLY at every 10th compressions**
- Same rate with BVM, BIAD, or ETT
- May help compressor count
- **DO NOT HYPERVENTILATE**

LUCAS Mechanical CPR:

- Ventilate **ONLY** every 6 seconds (GREEN LIGHT FLASHES)
- Charge defibrillator at the 2-minute mark (3-BEEP)
- When fully charged, pause LUCAS for rhythm check

Airway takes precedence if cardiac event or a primary respiratory event, drug overdose, drowning, hanging, suffocation, or trauma.

Medication Dosing:

- **If EtCO₂ falls below 30 mmHg during the first 30 minutes of the resuscitation give the additional 1 mg of Epinephrine.**
- Atropine not likely beneficial and no longer indicated with PEA or Asystole (can give at discretion of team leader to max of 3 mg.)
- **Hyperkalemia: Unknown in field setting.** End stage renal dialysis patient is at risk and **Sodium bicarbonate 1 mEq/kg IV / IO and Calcium gluconate 60 mg/kg IV / IO** should be given. ECG findings may not reflect common teaching such as peaked T waves. PEA with a bizarre or widened complex may indeed be hyperkalemia.
- **Toxicology:** Consider Calcium Channel Blocker (CCB) and Beta Blocker (BB) overdose with PEA and asystole. If suspected BB overdose give **Glucagon 0.1 mg/kg IV / IO**. If you see ECG improvement you may repeat and then contact medical control. Large doses of Glucagon may be needed. Calcium Chloride (or Ca gluconate - preferred) may be beneficial in BB overdose. If suspected CCB overdose administer **Calcium gluconate 60 mg/kg (Calcium Chloride 20m mg/kg)** over 3 minutes. If you see ECG improvement you may repeat and then contact medical control.

Pearls

- **Team Focused Approach / Pit-Crew Approach recommended; assigning responders to predetermined tasks. Refer to optional protocol or development of local agency protocol.**
- **Efforts should be directed at high quality and continuous compressions with limited interruptions and early defibrillation when indicated. Compress $\geq 1/3$ anterior-posterior diameter of chest, in infants 1.5 inches and in children 2 inches.**
- **Majority of pediatric arrests stem from a respiratory insult or hypoxic event. Compressions should be coupled with ventilations.**
- **When advanced airway not in place perform 15 compressions with 2 ventilations.**
- **Use length-based or weight-based pediatric resuscitation system for medication, equipment, cardioversion, and defibrillation guidance. Pediatric paddles should be used in children < 10 kg.**
- **DO NOT HYPERVENTILATE:**
- **Patient survival is often dependent on proper ventilation and oxygenation / airway Interventions.**
- **Do not interrupt compressions to place endotracheal tube. Consider BIAD first to limit interruptions.**
- **High-Quality CPR:**
 - Make sure chest compressions are being delivered at 120 / min.
 - Make sure chest compressions are adequate depth for age and body habitus.
 - Make sure you allow full chest recoil with each compression to provide maximum perfusion.
 - Minimize all interruptions in chest compressions to < 5 seconds.
 - Use AED or apply ECG monitor / defibrillator as soon as available.
- **Defibrillation:**
 - Follow manufacture's recommendations concerning defibrillation / cardioversion energy when specified.
 - Charge defibrillator during chest compressions, near the end of 2-minute cycle, to decrease peri-shock pause.
 - Following defibrillation, provider should immediately restart chest compressions with no pulse check until end of next cycle.
- **End Tidal CO₂ (EtCO₂)**
 - If EtCO₂ is < 10 mmHg, improve chest compressions. Goal is ≥ 20 mmHg.
 - If EtCO₂ spikes, typically > 40 mmHg, consider Return of Spontaneous Circulation (ROSC)
- **IV / IO access and drug delivery are secondary to high-quality chest compressions and early defibrillation.**
- **IV access is preferred route. Follow IV or IO Access Protocol UP 6.**
- **Special Considerations**
 - **Maternal Arrest** - Treat mother per appropriate protocol with immediate notification to Medical Control and rapid transport preferably to obstetrical center if available and proximate. Place mother supine and perform Manual Left Uterine Displacement moving uterus to the patient's left side. IV/IO access preferably above diaphragm. Defibrillation is safe at all energy levels.
 - **Renal Dialysis / Renal Failure** - Refer to Dialysis / Renal Failure Protocol AM 3 caveats when faced with dialysis / renal failure patient experiencing cardiac arrest.
 - **Opioid Overdose** - If suspected, administer Naloxone per Overdose / Toxic Ingestion Protocol UP 7 while ensuring airway, oxygenation, ventilations, and high-quality chest compressions.
 - **Drowning / Suffocation / Asphyxiation / Hanging / Lightning Strike** - Hypoxic associated cardiac arrest and prompt attention to airway and ventilation is priority followed by high-quality and continuous chest compressions and early defibrillation.
- **Success is based on proper planning and execution. Procedures require space and patient access. Make room to work.**