CPR CONSULTANTS
TRAINING CENTER

PALS Review 2020 Guidelines

BLS CPR

BLS CPR changes 2020. Role of the CPR Coach and added a sixth link in the chain of survival- recovery and as a single rescuer compressions can be performed either two finger or two thumb encircling.

1. Scene Safety
2. Establish Unresponsiveness
3. Call for help – call "911"/code and request AED/Defibrillator
4. Check for breathing – if absent or agonal gasps and Check for Pulse (5-10 seconds)– simultaneously
    i. **If no pulse or pulse less than 60 with signs of poor perfusion despite adequate oxygenation**
    ii. Brachial Infant
    iii. Carotid Child
5. Start CPR
    i. Good depth – 1/3 anterior posterior diameter or 1 ½ inches for infant and about 2 inches for child.
    ii. 100 – 120 compressions per minute (average 110bpm)
    iii. Ensure great Recoil
    iv. Ratio of 30:2 if one rescuer, 15:2 if two rescuers
    v. Use 2 thumb encircling CPR technique for infant 2 rescuers; 2 finger technique or thumb encircling for 1 rescuer-- 1 finger below the nipple line
    vi. Child compressions use either one-hand or two-hand technique lower half of sternum depending on size of patient and rescuer
    vii. Avoid excessive ventilation, it decreases cardiac output
    viii. With Advanced Airway- 2 rescuer- continuous compressions asynchronous with 1 breath every 2-3 seconds
6. Use AED as it becomes available
    i. Steps
        1. Turn it on
        2. Follow Prompts
        3. Place the pads
            a. Pediatric pads for children under 8 y/o. If pediatric pads are unavailable, adult pads are used for all ages using anterior/posterior approach preferred; avoid pads touching
            b. Analyze Rhythm – Stand Clear
            c. Press shock button if indicated (while AED is charging compressions can be performed), followed by immediate CPR
7. Rotate Rescuers every two minutes or sooner if compressor is fatigued.

High Quality CPR includes:

1. Effective compressions at least 100 –120/min (average 110)
2. Minimal interruptions (<10secs)- ideally less than 5 seconds
3. Allow for recoil, monitor CPR quality via waveform capnography (End-tidal ETCO2) *maintain ETCO2 ≥ 10)

4. 1.5 inches for infants, 2 inches for children compression depth or 1/3 depth of chest
5. Rotate q2mins/10cycles or sooner if fatigued
6. Use of CPR coach to monitor BLS tasks & CPR quality

Defibrillate early (use AED-manual defibrillator preferred over AED)

1. Use pediatric pads or key for infants/children under the age 8 y/o
2. Use adult if >8 y/o or older

Airway

Pulse Oximetry to be between 94 – 99% to avoid hyperoxia (high oxygen tension can lead to increased tissue death)

Rescue breathing with Bag Valve Mask (BVM) – **1 breath every 2-3 sec (20-30 breaths per minute)**

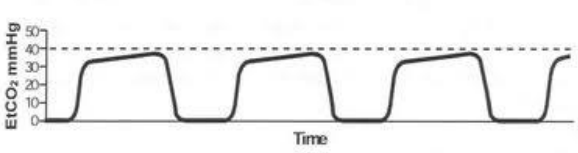
Rescue breathing with Advanced Airway – 1 breath every 2-3 sec (20-30 breaths per minute)- Ventilate once every 2-3 seconds for patient with advanced airway with continuous compressions

Advanced Airway

Advanced airway includes Endotracheal intubation and, supraglottic airways to include laryngeal mask airway and kings airway (esophageal tube)



Waveform Capnography (pETCO2)



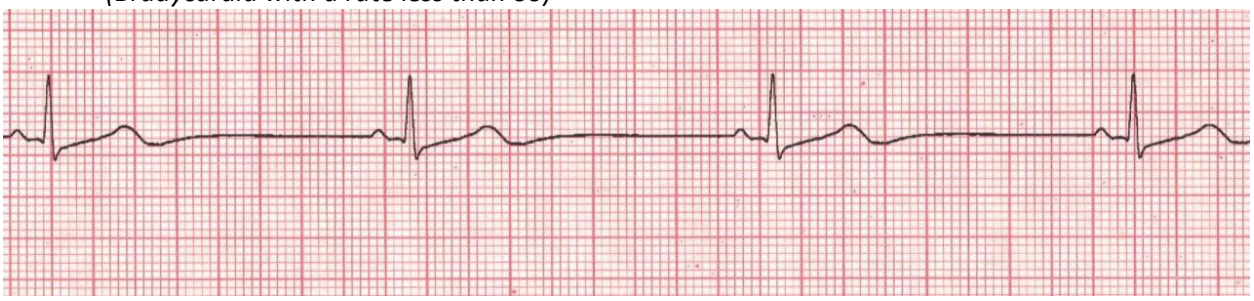
- Best way to evaluate and monitor advanced airway placement
- Can assist in measuring high quality CPR
  - ETCO2 reading must be ≥ 10 during CPR or ROSC may not be achieved
  - Normal readings for pETCO2 for patients with a perfusing rhythm (has a pulse) should be **35-40mm/Hg**

If advanced airway is compromised or patient change/decreasing SaO2 **THINK D O P E**

- **D** Dislodgement
- **O** Obstruction
- **P** Pneumothorax
- **E** Equipment

Bradycardia With signs of poor perfusion despite oxygenation

*(Bradycardia with a rate less than **60**)*



*** No. 1 cause of Sinus Bradycardia is Hypoxia***

START COMPRESSIONS

High quality CPR X 2 mins

Assign team roles

1. Team leader
2. Compressor
3. Airway
4. Medications
5. Monitor/Defibrillator
6. Recorder
7. CPR coach

If Bradycardia (HR <60) remains after 2 minutes of CPR---- consider Epinephrine – see below

Administer **Epinephrine 0.01mg/kg.** Continue CPR**.** Repeat Epinephrine every 3-5 minutes

A critical step to restoring a perfusing rhythm is to quickly identify one of the underlying/reversible causes that most frequently lead to bradycardia. The most common are known as the H's & T's! <u>As a team leader you should run through the list for consideration</u>.

H's & T's

Hypoxia	Toxins
Hypovolemia	Tension Pneumothorax -can be result of Trauma
Hypo/Hyperkalemia	Tamponade –(Cardiac)- can be result of Trauma
Hydrogen Ion (Acidosis)	Thrombus Cardiac
Hypothermia	Thrombus Pulmonary
Hypoglycemia	

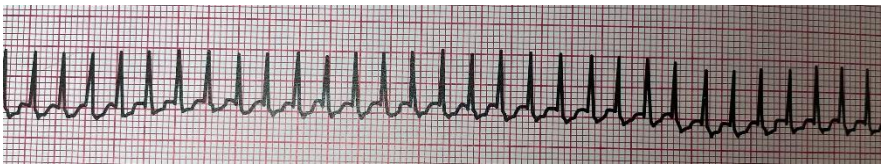
****Once HR 60 or above, stop CPR and ***reassess*****.

Tachycardia

Determine Hs & Ts.

1-Sinus Tachycardia
Child; HR ≤ 180
Infant; HR ≤ 220
- treat underlying cause

2-Supra Ventricular Tachycardia
- SVT - SUSTAINED rapid narrow complex tachycardia
Child; HR > 180
Infant; HR > 220



Is your patient **stable or unstable**?

Stable- Attempt vagal maneuvers like ice to the face for young children or blowing into occluded straw if child is old enough to follow commands.

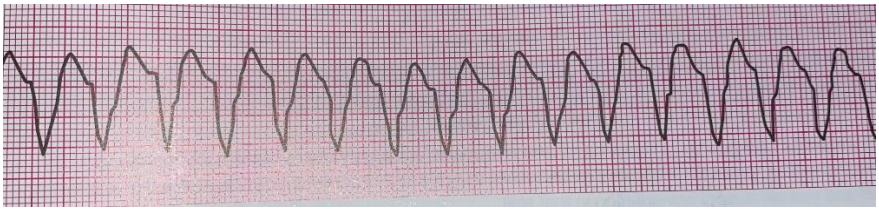
If vagal maneuvers aren't successful in slowing their heart rate, administer **Adenosine 0.1 mg/kg**. Followed by a fluid flush of 5- 10mL. Administering rapidly with flush. May cause up to 10 second asystole.

If the first dose of 0.1 mg/kg is ineffective, give second dose of **Adenosine 0.2 mg/kg**

Unstable/ Symptomatic – if the patient is showing signs of poor perfusion, prepare for synchronized cardioversion. Provide synchronized cardioversion of 0.5 - 1 joules/kg. 1st shock, 2nd shock and thereafter 2 joules/kg

3-Monomorphic Ventricular Tachycardia with Pulse (VT w/ pulse)

***** Wide complex tachycardia (same pattern)



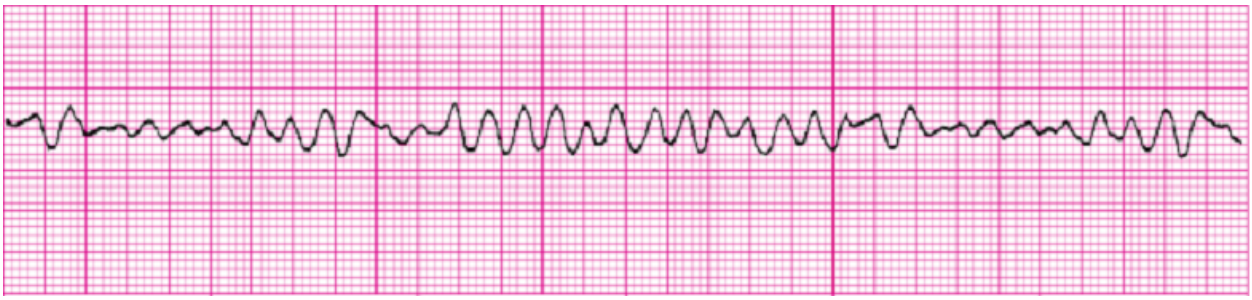
Stable- Administer **Amiodarone** 5mg/kg over 20-60 minutes; can be repeated for a maximum of 3 doses.

Unstable/ Symptomatic – if the patient is Hemodynamically compromised, prepare for synchronized cardioversion. Provide synchronized cardioversion of 0.5 - 1 joules/kg. 1st shock, 2nd shock and thereafter 2 joules/kg

4-Pulseless Ventricular Tachycardia (pVT) (Shockable Rhythm)**

- treat like Ventricular Fibrillation, with **defibrillation**

VENTRICULAR FIBRILLATION- (**Shockable Rhythm)



VFib is a chaotic and disorganized rhythm that generates absolutely no perfusion! The sooner the heart in VFib can be defibrillated, the higher the chances of successfully converting to an organized rhythm.

1. Rapidly assemble your team
2. Start CPR
3. As soon as defibrillator is available, deliver 1st shock **2 – 4 J/kg.** When clearing to shock ensure oxygen sources are not directed at the patient
4. Resume CPR x 2 minutes
5. Deliver 2nd shock **4J/kg**
6. Resume CPR x 2 minutes, also prepare and administer **Epinephrine 0.01mg/kg followed by a 5-10 mL flush;** can be given every 3-5 minutes (4 minutes average)
7. Deliver 3rd shock **4 – 10 J/kg**
8. Resume CPR x 2 minutes, also prepare and administer **Amiodarone 5 mg/kg followed by a 5-10 mL flush; (Amiodarone can be repeated;** if still resuscitating patient and continuing cycles of 2 minutes of CPR, reanalyze and shock)
9. Continue CPR x 2 minutes, then defibrillate

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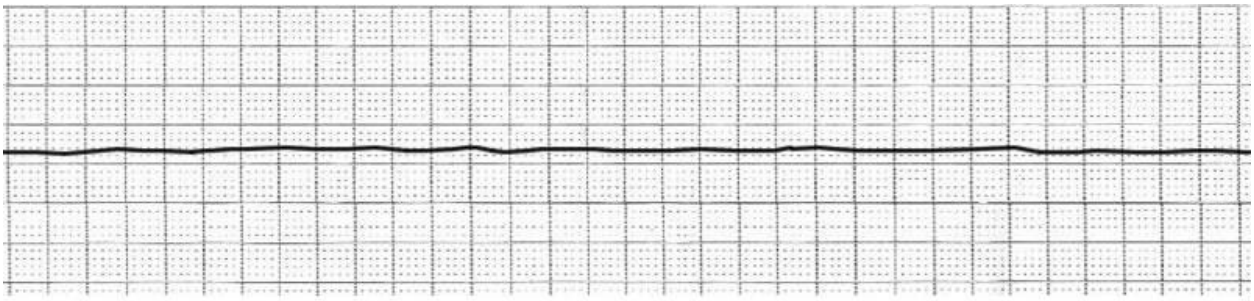
Consider H & Ts

H's & T's

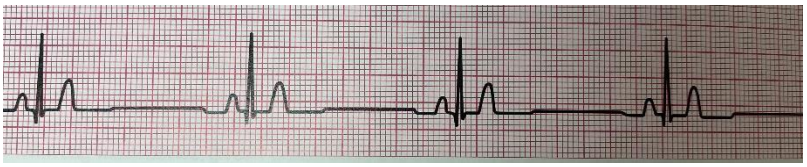
Hypoxia	Toxins
Hypovolemia	Tension Pneumothorax- can be result of Trauma
Hypo/Hyperkalemia	Tamponade- (Cardiac)- can be result of Trauma
Hydrogen Ion (Acidosis)	Thrombus Cardiac
Hypothermia	Thrombus Pulmonary
Hypoglycemia	

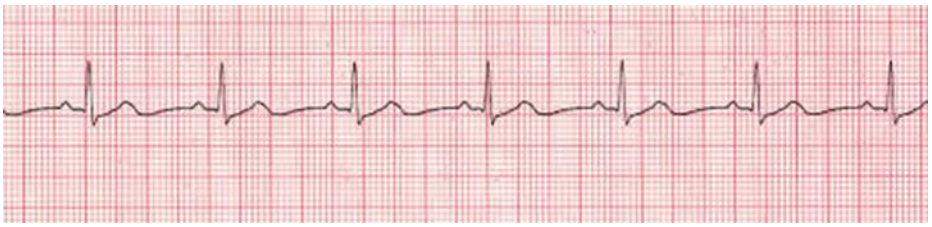
**Most common cause of cardiac arrest in Children is Hypoxia or Hypotensive Shock--- they usually go into non-shockable rhythms.

Asystole/PEA



– Electrical Activity without mechanical contractility – organized rhythm without a pulse
(it may look like sinus rhythm, sinus bradycardia, sinus tachycardia but NO PULSE)





Asystole/PEA requires immediate intervention

1. Rapidly assemble your team
2. Start CPR
3. Administer **Epinephrine 0.01mg/kg;** can be repeated every 3-5 minutes (average 4 minutes)

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***Determine reversible causes*- H's & T's**

Hypoxia	Toxins
Hypovolemia	Tension Pneumothorax- can be result of Trauma
Hypo/Hyperkalemia	Tamponade- (Cardiac)- can be result of Trauma
Hydrogen Ion (Acidosis)	Thrombus Cardiac
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Hypoglycemia	

SHOCK

Definition – Inadequate tissue delivery of oxygen and nutrients to meet metabolic demand, characterized by inadequate peripheral and end organ perfusion.

Shock can result from:

Inadequate volume or blood (**hypovolemic/hemorrhagic shock**)

- Diarrhea
- Hemorrhage (internal and external)
- Vomiting
- Inadequate fluid intake
- Osmotic diuresis (e.g., DKA)
- Third space losses (fluid leak into tissues)
- Burns

Inappropriate distribution of blood volume and/or flow (**distributive shock**)

*"Relative hypovolemic"- Blood vessels dilate "not enough volume to fill up tank"

- septic shock
- anaphylactic shock
- neurogenic shock

Obstructed blood flow (**obstructive shock**)

- cardiac Tamponade
- tension pneumothorax
- massive pulmonary embolism (very rare)
- Ductal dependent lesions

Impaired cardiac function (**cardiogenic shock**)

- congenital defects
- myocarditis
- cardiomyopathy
- arrhythmias
- myocardial injury (trauma)

Signs and symptoms for shock:

Changes in mental status

Subtle changes (uncomfortable, crying) in early shock and severe (lethargic or unconscious) in late shock

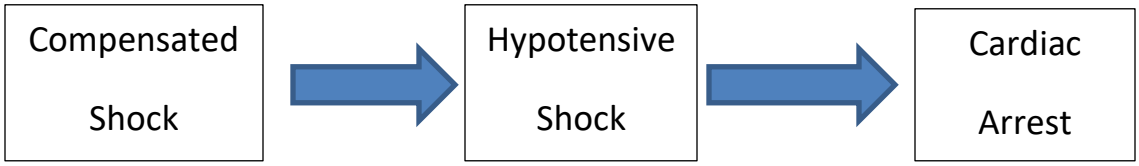
Changes in breathing

Tachypnea – compensatory mechanism

Signs and symptoms for shock (continued):

Changes in circulation and end organ perfusion:

- Tachycardia
- Normal blood pressure (compensated) or hypotension (hypotensive)
- Weak or absent peripheral pulses
- Delayed capillary refill
- Cool, pale, and diaphoretic skin



Hypotension Formula

Newborn – 1 month < 60 Systolic

1 month – 1 year < 70 Systolic

1 year – 10 years < 70 + [2 x age] = Systolic (e.g., 4 y.o. - (4x2) + 70= 78 Systolic- if less than 78 they are Hypotensive; if 78 or above they are Compensated)

- If the child has a systolic blood pressure **less than the Hypotension Formula**, the child is in **Hypotensive Shock**.
- If the child is exhibiting signs of shock with a systolic blood pressure **greater than the Hypotension Formula**, the child is in **Compensated Shock**.

Treatment for Shock

General management of Hypovolemic shock:

- Positioning
- Oxygen (94 – 99% SaO2)
- Vascular Access (IV or intraosseous)
- Fluid Resuscitation (20 mc/kg isotonic crystalloid NS or LR given rapidly over 10-20 min)
    - Repeat as necessary to ensure adequate perfusion

    - Vasopressor consideration after fluid resuscitation (usually consider 3 boluses prior to vasopressor, certain distributive and cardiogenic shock may require early vasopressor support)
- Monitoring
- Frequent Reassessment

General management of Septic (Distributive) shock:

- Positioning
- Oxygen (94 – 99% SaO2)
- Vascular Access (IV or intraosseous)
- Fluid Resuscitation (10-20 ml per kg NS, LR over 5-10 min)
    - Repeat as necessary to ensure adequate perfusion
    - Vasopressor consideration after fluid resuscitation (usually consider 3 boluses prior to vasopressor, certain distributive and cardiogenic shock may require early vasopressor support)
    - If Fluid Boluses are ineffective, vasopressor drip (norepinephrine or epinephrine drip)
        - Treat hyperthermia
- Cultures- depending on infection site/s (e.g., if respiratory- sputum, if urinary- urine)
- Blood Cultures
- Monitoring
- Frequent Reassessment

Respiratory Distress and Failure

The main role of the respiratory system is to exchange gases. Oxygen is taken in through the upper airway into the lower airway (lungs) where the lung tissue (alveoli) exchange oxygen and CO2 gases with the blood cells. This is all controlled by the child's mechanism to breath.

The pediatric patient has a high metabolic rate; therefore, oxygen demand is much higher than that in adults. If there is a complication with respiration and or ventilation, potential hypoxia/hypoxemia can develop more rapidly in the child than the adult.

Respiratory Distress is characterized by increased respiratory rate and increased effort but is still able to meet the minimal oxygen demands of the body. Maintaining O2 Sat 94-99%
Sinus Tachycardia & tachypnea are common.
Respiratory Failure is a clinical state of inadequate oxygenation, ventilation, or both. Failure to meet the oxygen demands of the body. – Late sign is cyanosis,
Sinus Bradycardia & decreased level of consciousness

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Respiratory Distress and Failure can result from:

Upper Respiratory Emergencies

Causes	Clinical Signs
• Foreign body aspiration • Anaphylaxis • Croup • Epiglottitis	• Tachypnea • Increased respiratory effort • Change in voice or cry • Seal bark like cough • Stridor (inspiration noise) • Poor chest rise

Lower Respiratory Emergencies

Causes	Clinical Signs
• Reactive Airway Disease (RAD)/Asthma • Bronchioitis	• Tachypnea • Wheezing (expiratory noise) • Increased respiratory effort • Prolonged expiratory phase

Lung Tissue Disease

Causes	Clinical Signs
• Pneumonia (bacterial, viral, or chemical) • Pulmonary Edema • Acute Respiratory Distress Syndrome (ARDS) • Pulmonary contusion	• Tachypnea • Tachycardia • Increased respiratory effort • Grunting (Auto PEEP) • Hypoxemia • Crackles • Diminished breath sounds

Disorder of Breathing

Causes	Clinical Signs
• Neurological Disorders (seizure, head injury) • Toxin • Drug overdose • Drug reaction	• Variable respiratory rate • Variable respiratory effort • Shallow breathing • Apnea

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Initial Management of Respiratory Distress or Failure

Airway

- Support the airway or open the airway
  - If possible, allow the child to remain in a position of comfort
- Clear the airway
- Insert oropharengeal airway(OPA) or nasopharengeal airway (NPA)

Breathing

- Assist ventilation as needed (BVM)- 1 breath every 2-3 seconds
- Provide oxygen (humidified if possible)
- Continuously monitor oxygen saturation by pulse oximetry 94-99%
- Prepare for advanced airway (ie, intubation) as necessary
- Administer medication as needed for the clinical condition

Circulation

- Monitor heart rate and rhythm
- Establish vascular access as indicated