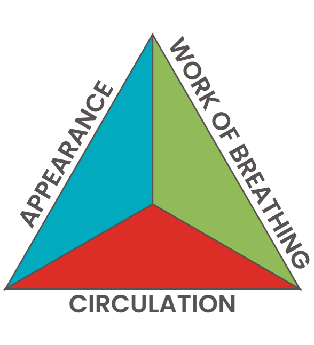
The Ultimate PALS Study Guide

Pediatric Advanced Life Support (PALS) is a systematic approach to pediatric emergencies. Its primary focus is on early recognition and to respond to pediatric medical emergencies.

Initial Assessment: Pediatric Assessment Triangle (PAT)



Appearance (TICLS):

- **T**one: Assess muscle tone and movement.
- **I**nteractivity: Evaluate the child's responsiveness to the environment and interactions with caregivers.
- **C**onsolability: Observe if the child can be comforted.
- **L**ook/Gaze: Note eye contact and attentiveness.
- **S**peech/Cry: Listen for normal speech or crying patterns

Key Insight: Changes in appearance may indicate neurological or metabolic issues.

Work of Breathing:

- Observe for abnormal breathing sounds (e.g., stridor, wheezing).
- Look for signs of increased effort, such as nasal flaring, retractions, or head bobbing.
- Note abnormal positioning like tripod posture or refusal to lie down.

Key Insight: Altered work of breathing suggests respiratory distress or failure.

Circulation:

- Assess skin color (e.g., pale, mottled, cyanotic).
- Look for signs of poor perfusion like delayed capillary refill.
- Observe temperature and moisture of the skin.

Key Insight: Abnormal circulation may indicate shock or circulatory compromise.

Primary Assessment: ABCDE Approach

A – Airway

- Assess for airway patency (open and maintainable vs. obstructed).
- Look for signs of obstruction (e.g., stridor, drooling, inability to speak or cry).
- Intervene with positioning, suctioning, or advanced airway management if needed.

B – Breathing

- Evaluate respiratory rate, effort, and adequacy (chest rise, breath sounds, accessory muscle use).
- Identify abnormal breathing patterns (e.g., grunting, nasal flaring, retractions).
- Provide oxygen or ventilation support as needed (e.g., bag-mask ventilation, intubation).

C – Circulation

- Assess heart rate, blood pressure, and pulses (central vs. peripheral).
- Check for skin signs (color, temperature, capillary refill time).
- Identify signs of shock (e.g., weak pulses, hypotension, altered mental status) and intervene with IV/IO access and fluid resuscitation.

D – Disability (Neurologic Status)

- Evaluate mental status using AVPU (Alert, Verbal, Pain, Unresponsive).
- Assess pupil response and muscle tone.
- Identify signs of increased intracranial pressure or neurologic compromise.

E – Exposure

- Expose the patient as needed to assess for trauma, rashes, burns, or other underlying conditions.
- Maintain normothermia and prevent heat loss, especially in infants and young children.

Pediatric Vital Signs Overview

Heart Rate		
Age	Awake Rate (beats/min)	Sleeping Rate (beats/min)
Neonate	100-205	90-160
Infant	100-180	90-160
Toddler	98-140	80-120
Preschooler	80-120	65-100
School-age Child	75-118	58-90
Adolescent	60-100	50-90

Respiratory Rate	
Age	Rate (breaths/min)
Infant	30-53
Toddler	22-37
Preschooler	20-28
School-age Child	18-25
Adolescent	12-20

Blood Pressure			
Age	Systolic Pressure (mm Hg)	Diastolic Pressure (mm Hg)	Mean Arterial Pressure (mm Hg)
Neonate	67-84	35-53	45-60
Infant	72-104	37-56	50-62
Toddler	86-106	42-63	49-62
Preschooler	89-112	46-72	58-69
School-age Child	97-115	57-76	66-72
Preadolescent	102-120	61-80	71-79
Adolescent	110-131	64-83	73-84

Secondary Assessment: SAMPLE & Focused Physical Exam

Focused History (SAMPLE)

A structured approach to gathering patient history using the SAMPLE mnemonic:

- **S** – Signs & Symptoms: What is the child experiencing? (e.g., difficulty breathing, altered mental status)
- **A** – Allergies: Any known allergies to medications, foods, or environmental triggers?
- **M** – Medications: Any prescription or over-the-counter medications the child is taking?
- **P** – Past Medical History: Any chronic illnesses, recent hospitalizations, surgeries, or birth history (for infants)?
- **L** – Last Meal/Oral Intake: When and what was the last food or fluid intake? (important for airway management or potential surgery)
- **E** – Events Leading to Illness/Injury: What happened before symptoms started? (e.g., trauma, choking, fever, seizure)

Focused Physical Exam

A more detailed, head-to-toe examination based on the child's condition and findings from the Primary Assessment. Key areas of focus include:

- Head & Neck: Look for trauma, swelling, or signs of infection.
- Chest: Assess breath sounds, symmetry, retractions, or abnormal heart sounds.
- Abdomen: Check for distension, tenderness, or rigidity.
- Extremities: Assess for signs of poor perfusion (capillary refill, temperature, pulses) or neurological deficits.
- Skin: Look for rashes, petechiae, cyanosis, or signs of dehydration.

Diagnostic Tests & Monitoring

Based on findings, additional tests and monitoring may be necessary:

- ECG for arrhythmias
- Pulse oximetry & capnography for oxygenation and ventilation status
- Blood tests (glucose, electrolytes, blood gases, lactate)
- Imaging (X-ray, ultrasound, CT scan) if needed

Respiratory Emergencies

Category	Causes	Signs/Symptoms	Management
Upper Airway Obstruction	Foreign Body Airway Obstruction Croup Anaphylaxis Congenital Abnormalities	Stridor, hoarseness, barking cough Increased work of breathing (retractions, nasal flaring) Drooling (in epiglottitis)	Positioning & suctioning Nebulized epinephrine for croup Epinephrine & antihistamines for anaphylaxis Immediate foreign body removal
Lower Airway Obstruction	Asthma Bronchiolitis	Wheezing, prolonged expiratory phase Tachypnea, retractions, nasal flaring Hypoxemia if severe	Bronchodilators (albuterol) for asthma Corticosteroids for inflammation Oxygen & suctioning for bronchiolitis
Lung Tissue Disease	Pneumonia Pulmonary Edema	Crackles, decreased breath sounds Hypoxia, increased work of breathing Fever (if infection-related)	Antibiotics for pneumonia Diuretics for pulmonary edema High-flow oxygen or ventilation for severe cases
Disordered Control of Breathing	Increased ICP Poisoning/Overdose Diabetic Keto Acidosis (DKA) Seizures	Irregular or absent breathing Altered mental status Hypoventilation & CO_2 retention	Airway protection & ventilatory support Reversal agents if applicable (e.g., naloxone for opioids) Treat underlying neurological causes

Key Interventions:

- **Oxygen therapy** (nasal cannula, non-rebreather, high-flow)
- **Bag-mask ventilation (BMV)** for inadequate breathing
- **Endotracheal intubation** for respiratory failure
- **Continuous monitoring** (pulse oximetry, capnography, blood gases)

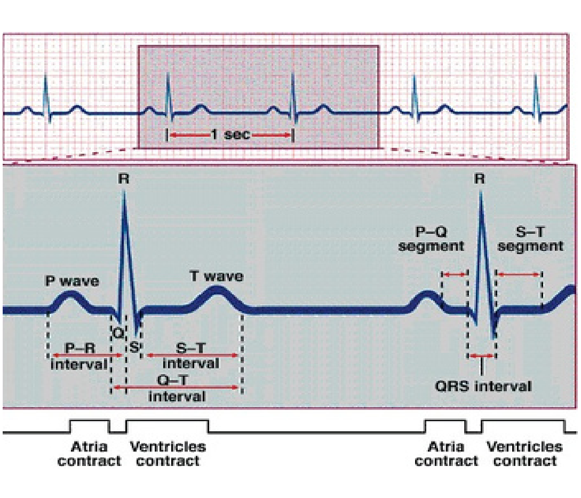
Shock Emergencies

Category	Causes	Signs/Symptoms	Management
Hypovolemic Shock	Hemorrhagic vs. Non-hemorrhagic Dehydration (vomiting, diarrhea)	Tachycardia, weak pulses Delayed capillary refill Cool, pale skin Decreased urine output	IV/IO access Rapid fluid resuscitation (isotonic crystalloids) Control bleeding if applicable
Obstructive Shock	Cardiac tamponade Tension pneumothorax Pulmonary embolism	Distended neck veins (JVD) Muffled heart sounds (tamponade) Absent breath sounds on one side (pneumothorax)	Immediate intervention based on cause: Needle decompression for tension pneumothorax Pericardiocentesis for tamponade
Distributive Shock	Sepsis Anaphylaxis Neurogenic shock (spinal cord injury)	Warm, flushed skin (early sepsis) Hypotension with wide pulse pressure Altered mental status Urticaria, wheezing (in anaphylaxis)	IV/IO access & fluid resuscitation Treat underlying cause (antibiotics for sepsis, epinephrine for anaphylaxis) Vasopressors if fluids are inadequate
Cardiogenic Shock	Congenital heart disease Myocarditis Arrhythmias Severe heart failure	Tachycardia, weak pulses Cool, mottled skin Signs of heart failure (respiratory distress, hepatomegaly)	Supportive oxygen & ventilation Careful fluid administration (avoid overload) Inotropes (e.g., epinephrine, dopamine)

Key Interventions in Shock Management

- Early recognition using vital signs & perfusion assessment
- Rapid vascular access (IV/IO) for fluid and medication administration
- Fluid resuscitation (except in cardiogenic shock, where fluids are given cautiously)
- Use of vasopressors and inotropes if fluids are not sufficient
- Definitive treatment based on the type of shock

The Heart Anatomy

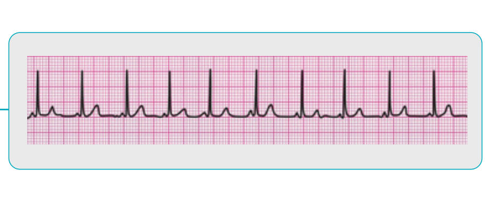


To understand various heart rhythms, it is critical to have a comprehensive understanding of heart anatomy and how electrical pathways are illustrated by an ECG.

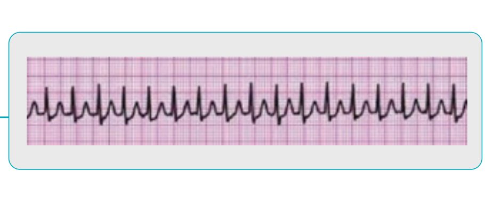
ECG Rhythms

Sinus Bradycardia
Heart rate is less than 60 beats/minute. Pharmacology if symptomatic.

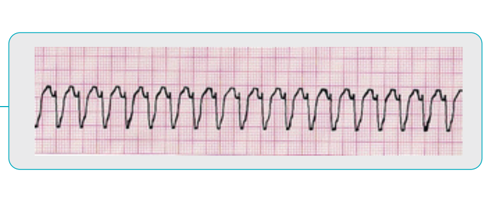
Sinus Tachycardia
Increased heart rate of 101-150 beats per minute. Typically caused by external factors.



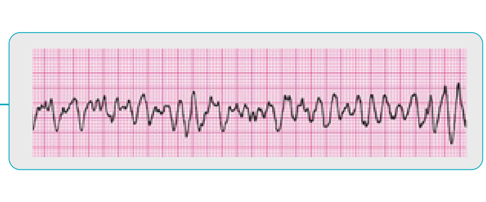
Supraventricular Tachycardia
Indistinguishable P waves run into T waves with a narrow QRS complex. Vagal maneuvers or pharmacology for stable patients. Immediate cardioversion for unstable patients.



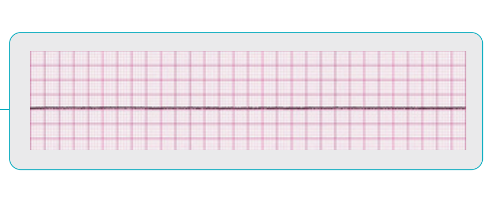
Monomorphic Ventricular Tachycardia
QRS complexes are all the same size. Pharmacology for stable patients. Immediate cardioversion for unstable patients.



Ventricular Fibrillation
Ventricles can't pump blood. Immediate defibrillation.



Asystole
No activity on EKG. If leads are all connected, begin CPR immediately.



Pulseless Electrical Activity
Heart is beating but no pulse is detected. Immediate CPR.

Medications & Dosing

Drug	Indications/Dosages
Adenosine	**SVT** 1st Dose: 0.1 mg/kg rapid IV/IO push (max 6 mg) 2nd Dose: 0.2 mg/kg rapid IV/IO push (max 12 mg)
Albuterol	**Asthma, anaphylaxis (bronchospasm), hyperkalemia** Nebulizer: 2.5 mg/dose or 5 mg/dose via inhalation q 20 min PRN Continuous nebulizer: 0.5 mg/kg/hour via inhalation (max 20 mg/h)
Amiodarone	**SVT, VT (with pulses)** 5 mg/kg IV/IO load over 20 to 60 minutes (max 300 mg), repeat ot daily max 15 mg/kg (2.2 g in adolescents) **Pulseless arrest (ie, VF/pulseless VT)** 5 mg/kg IV/IO bolus (max 300 mg), repeat to daily max 15 mg/kg (2.2 g in adolescents)
Epinephrine	**Pulseless Arrest** 0.01 mg/kg (1:10,000 concentration) IV/IO q 3 to 5 minutes (max single dose 1 mg) **Anaphylaxis** 0.01 mg/kg (1:1,000 concentration) IM q 15 minutes PRN (max single dose 0.3 mg)
Lidocaine	**VF/pulseless VT** 1 mg/kg IV/IO bolus **VT (with pulse)** Maintenance: 20 to 50 mcg/kg/min IV/IO infusion (repeat dose if infusion initiated >15 minutes after initial bolus)
Fluid Bolus	20 mL/kg NS or LR over 5-10 minutes (except in cardiogenic shock: 5-10 mL/kg over 10-20 minutes)

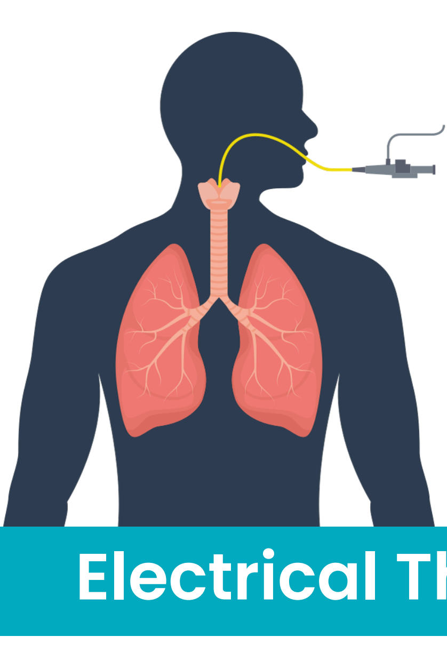
Airway Management

Adjuncts

- **Oropharyngeal (OP) airway -** use for unconscious patients with no gag reflex
- **Nasopharyngeal (NP) airway -** use for semi-conscious patients, NEVER USE WITH A HEAD INJURY

Advanced Airways

- **Endotracheal tube** - recommended method, use with continuous waveform capnography
- **Laryngeal mask airway (LMA)** - use if unfamiliar with endotracheal tube



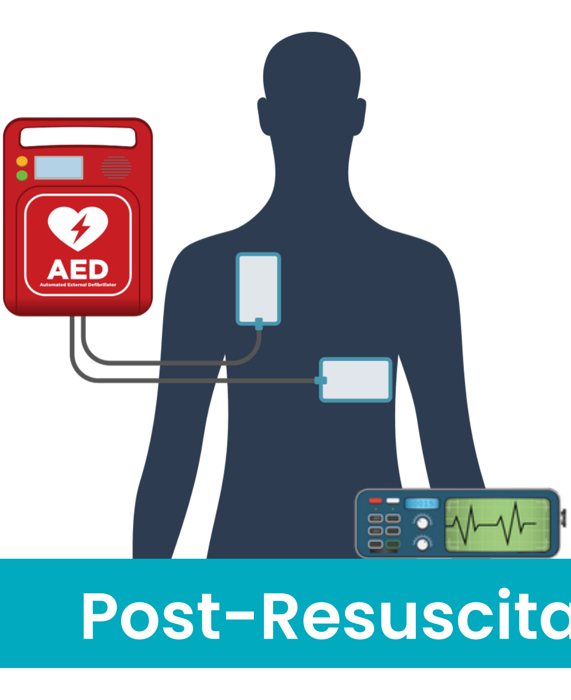
Oxygen Delivery

- Maintain between 94-99% oxygenation after cardiac arrest
  - Use capnography or pulse oximetry to measure oxygenation whenever available.
  - To maintain this level through a non-rebreather or bag valve mask, devices should be set at 10-15LPM.
  - If using rescue breaths, deliver at a rate of 1 breath every 2-3 seconds.

Choking Management

- **For infants** - 5 back slaps and 5 chest thrusts
- **For children** - abdominal thrusts
- In both cases, if the patient becomes unresponsive begin, then begin CPR starting with chest compressions and add the modification of looking in the airway before each breath for the foreign object.

Electrical Therapy Basics



Defibrillation
Uses an automated external defibrillator (AED)
The AED will analyze the heart rhythm and instruct you whether or not to shock the victim.

- 1st Dose: 2 J/kg
- Subsequent doses: 4 J/kg

Synchronized Cardioversion
Low-energy shock is synchronized to a specific point in the QRS complex.

- 1st Dose: 0.5 - 1 J/kg
- 2nd Dose: 2 J/kg

Transcutaneous Pacing
Regulating heart rhythm via pads placed on the patient's chest
Treats abnormally slow heart rate

Post-Resuscitation Care

Patients may respond differently to resuscitation. While some may be awake and alert, others may remain comatose

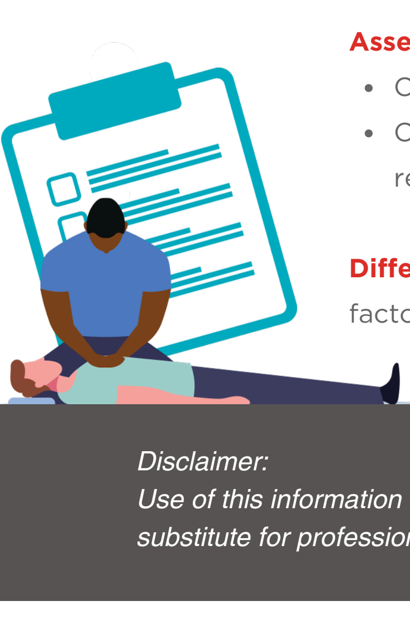
Optimize Ventilation and Oxygenation

- Titrate FIO2 to maintain oxyhemoglobin saturation 94%-99%
- Consider advanced airway placement and waveform capnography
- Target a PCO2 that is appropriate for the patient's condition

Assess for and Treat Persistent Shock

- Consider fluid bolus
- Consider need for inotropic and/or vasopressor support for fluid refractory shock

Differential Diagnosis – H's and T's provide clues to the contributing factors of cardiac arrest



SureFire CPR