PALS

Pediatric Advanced Life Support

2015 Guidelines

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PLEASE READ FOLLOWING STATEMENT:

THIS PACKET IS A PRE-COURSE TOOL. ALL COURSE INFORMATION IS NOT INCLUDED WITHIN. DUE TO THE LACK OF EVIDENCE BASED STUDIES PALS IS A VERY SUBJECTIVE COURSE. ALSO DUE TO THE RAPID CHANGES THAT TAKE PLACE IN CHILDREN THEIR VITALS SIGNS AND BODIES CHANGE MONTHLY. THIS PACKET ADDRESSES AN AVERAGE AGED PATIENT AND IN CLASS WE WILL ADDRESS INDIVIDUAL SITUATIONS.

Table of Content

It is recommended that participants purchase the "PALS Textbook." The textbook has more specific information than what is provided in this study packet. It also lists all the algorithms in greater detail. The book is available by calling (888)322-8350.

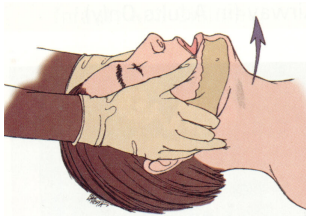
The information, instructions and algorithms within this packet are educational tools only to build a learning foundation to aid in successful completion of the course and should not be considered to be the standard of care for patient use. Algorithms in this packet are to assist learners to complete this course only. Healthcare professionals must follow their facilities/employers specific policies/procedures and algorithms. Patients may need care not included within this packet and when clinically appropriate, alterations in care giving is acceptable. This packet is intended as a study packet and/or review learning tool only. **This packet does not replace the need for the American Heart Association's "Textbook Pediatric Advanced Life Support Provider Manual." For AHA textbooks call (888)322-8350.** Any fees charged do not represent income to the American Heart Association.

References: EMTS staff (general knowledge), Mosby-Nursing Assessment, Para Emer Care Pharmacology)-Brady.

Airway Management

Opening the Airway

Basic airway management begins with opening and maintaining the airway. The main goal is to prevent the tongue from blocking the airway. For a non-trauma patient a head-tilt chin-lift method is preferred. For a trauma patient the jaw-thrust with spinal neutralization method is used. A towel placed under the shoulders of a young child (<3yrs) may assist in maintaining a neutral head position.



Head-tilt, Chin-Lift *Jaw Thrust*

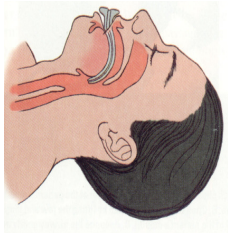
Evaluating the Airway

Evaluating the airway is always a top priority. Normal respirations should be quiet, effortless, and with equal chest rise. Ventilatory assistance may be required if rate is less than 25/min for infants and 15/min for children. A non-breathing patient should receive two slow and smooth breaths lasting 1 second in length to evaluate the airway passage for a blockage. Remember that the most common airway obstruction in pediatrics is the tongue.

Basic Airway Delivery Tools and Care

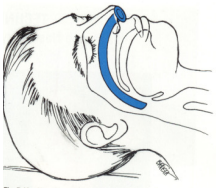
Oropharyngeal Airway (OPA)

An oropharyngeal (OPA) airway is used to help establish a patients airway when a gag reflex is not present. OPA's come in many sizes. To ensure proper size the rescuer should measure by placing one end of the device on the corner of the mouth and the other end to the earlobe. To insert an OPA in a pediatric there are two methods. One method is to rotate the OPA 90 degrees into position (older child). The other method is to depress the tongue and place directly into position. The flange should rest on the lips when properly inserted. Use of the OPA does not eliminate the need for maintaining proper head position.



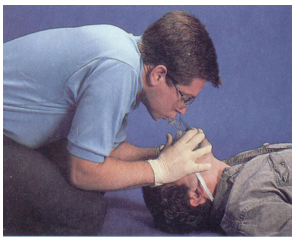
Nasopharyngeal Airway (NPA)

The NPA is used when the oral pharynx is not accessible or the patient has a gag reflex. The device is contraindicated in patients with facial fractures and used with caution if skull fractures are present. To ensure proper size the rescuer should measure from the corner of the nose to the earlobe. Lubricate the device prior to placement with a water based substance. When inserting the NPA in an emergency one should pick the largest and straightest nostril. Place the bevel of the NPA to the nasal septum. Hold the device like you would a pencil and slowly insert the NPA into the patient's nostril until the flange is flush with the nostril. Do not force the device. Use of the NPA does not eliminate the need for maintaining proper head position.

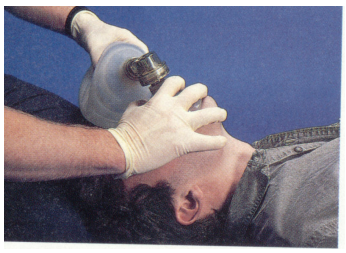


Mouth-to-Mask and Bag-Valve-Mask

Mouth-to-mask breathing is the preferred method of ventilating a nonbreathing patient. It is a simple one person device, and because of the two-handed mask seal it provides excellent ventilatory volumes. The device when not connected to supplemental oxygen will deliver 16% oxygen to the patient. When attached to >10 LPM of supplemental oxygen the device delivers approximately 50% oxygen.



The bag-valve-mask (BVM) consists of a one-way valve, self-inflating bag, oxygen reservoir, and a transparent mask. The device delivers 21% oxygen concentration with room air and once connected to high flow supplemental oxygen it can deliver up to 80 to 100% oxygen



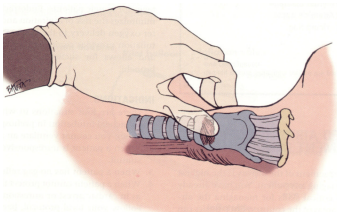
concentration. The BVM technique commonly creates a poor seal around the patient's mouth and is designed for two trained rescuers to use.

The BVM typically delivers less volume than mouth-to-mask technique. When using a BVM during a cardiac arrest the rescuer needs to be aware of the pop-off valve status because greater ventilatory pressure is usually required. The Bag-Valve device is most effective when used in conjunction with an advanced airway (ETT, LMA). Always remember than "room air" is better than "no air" and simple BVM and suction can save a life.

Tidal Volumes and Inspiratory Times

If supplemental oxygen is available, lower tidal volumes are recommended. The delivery of lower tidal volumes should reduce the risk of gastric inflation and its consequences as well as limiting increased thoracic pressure which interfere with good blood flow. AHA has no stance on volume per/kg in pediatric patients. The goal is to maintain a 94% to 99% oxygen saturation while maintaining acceptable CO2 levels. The length of deliver of each ventilation should be over 1 second and make the chest rise.

Sellick's Maneuver (Cricoid Pressure)



Sellick's maneuver reduces gastric inflation during ventilatory efforts. By placing downward pressure on the cricoid cartilage the diameter of the esophagus is decreased therefore restricting the flow of air into the stomach. This may also aid in visualization of the vocal cords during intubation. *Currently AHA does not recommend the use of Cricoid Pressure in any of its programs.*

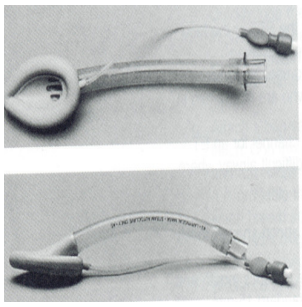
Suction

If a patient's airway is compromised by fluids, turn the victim head to one side and remove large particles. Once suction is available the remaining fluids and fine particles should be removed. For oral suctioning the pressure should be set at approximately 80 to 120mmHg and suction limited to 15 seconds. For tracheal suctioning the pressure should be around 80 to 120mmHg and suction time limited to 5 seconds. Only suction on the way out and always measure for proper advancement depth of the suction catheters. Monitor heart rate at all times. If heart rate drops stop suction and ventilate as needed.

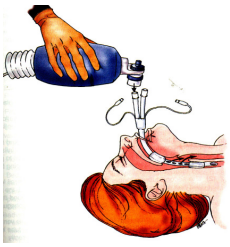
Advanced Airway Management

Laryngeal Mask Airway (LMA)

The LMA may be used as an alternative to either the endotracheal tube (ETT) or the face mask with either spontaneous or positive-pressure ventilation. The LMA may be used as the primary airway, as a channel for an ETT, or as an option in the management of a difficult airway when intubation is unsuccessful. The device consists of a tube that is fused to a elliptical, spoon-shaped mask at a 30-degree angle. When inserted, the tube protrudes from the patient's mouth and is connected to a ventilation device. The mask is advanced until resistance is felt. Then the mask is inflated, it provides a low-pressure seal around the laryngeal inlet. When the LMA is properly placed, the black line on the tube should rest in the midline against the patient's upper lip. The LMA is contraindicated if a risk of aspiration exists.



Endotracheal Tube (ETT) Intubation



ETT intubation is the airway of choice for all critical patients who cannot protect their own airway. Tube advancement is directly into the trachea. It is recommended to not inflate the cuff if adequate chest rise can be achieved. If the cuff us required then inflated with up to 5mL of air to secure the trachea.. Advantages to ETT intubation are isolation of the trachea, reduction in the risk of aspiration, eliminates the need to maintain a mask seal, direct route for tracheal suction and certain medications can be administered via the ETT. Disadvantages are that it takes more skill than other airway devices, ETT can be dislodged easily, and takes more equipment than other methods to secure an airway. It is also recommended to use a commercial grade tube tie device to secure the ETT.

Prior to Advanced Airway Placement

Patients should be hyperventilated and well oxygenated for 1 to 2 minutes before placement of an advance airway device. The attempt to establish the airway device should take no longer than 30 seconds to complete. If the device cannot be established within 30 seconds the patient should be hyperventilated again for 1 to 2 minutes before the next attempt.

Airway Placement Confirmation

Whenever airway assistance is being provided the rescuer should ensure proper ventilation of the patient two ways: primary confirmation techniques and secondary confirmation techniques. Primary confirmation techniques include 5-point auscultation, bilateral chest expansion, and mask or tube condensation. In secondary confirmation techniques, esophageal detector devices are preferred for intubation confirmation in pediatric cardiac arrests; end-tidal CO2 detectors (capnography, capnometry, capnometer) are preferred in non-cardiac arrest victims.

Defibrillation, Cardioversion, and AED

Defibrillation

Studies suggest that as many at 15% of pediatric cardiac arrests experience ventricular fibrillation (V-fib). V-fib and pulseless ventricular tachycardia (V-tach) should be defibrillated immediately at 2-4J/kg followed by immediate CPR for 2 minutes. Additional shocks will be at 4J/kg (or equivalent Biphasic defibrillation).

Transthoracic resistance to electrical current therapy is reduced with the use of a conductive medium, increased paddle pressure (or use of hands-free defibrillation pads), and successive shocks. When using a manual cardiac heart monitor the adult size paddles or electrode pads are used once the patient is greater than 10kg. - not the pediatric paddles or pads

Cardioversion

Cardioversion, also known as synchronized shocking, is indicated for lethal rhythms with a pulse, such as, V-tach with a pulse and supraventricular tachycardia (SVT). By using synchronized cardioversion on a patient, one is avoiding the R on T phenomenon that may result in V-fib. Cardioversion is delivered at .5 to 1J/kg then increased to 2J/kg (or equivalent Biphasic defibrillation). The rescuer should also evaluate for a pulse after each shock.

AED

Automated External Defibrillators (AED) are becoming very popular in both the healthcare and public settings. This device requires minimal training, easy to use, and is very safe to the rescuer. The defibrillation pads are placed on the chest which results in the AED analyzing the patient's cardiac rhythm. If V-fib or V-tach is present the machine will defibrillate at a predetermined energy setting. If the cardiac rhythm is not a shockable rhythm the machine will instruct the rescuer to reassess the patient.

Current Guidelines: When attempting AED defibrillation, all rescuers should deliver 1

shock followed by immediate CPR for 2 minutes if indicated.

AED use on pediatric patients: Pads/Electrodes - Adult pads are for 8 years of age and older. Pedi pads are from age 0 to 8 years. In the absence of pedi size pads it is permitted to use the adult size pads from the AED machine on a child (birth to 8 years).

Monphasic vs. Biphasic Energy

Many studies are now suggesting that Biphasic delivery of energy requires a lower energy setting and fewer shocks to convert. Energy is delivered in "waveforms" that flow between two electrodes or paddles. Monophasic means the energy flows one direction. Biphasic energy is delivered in two phases by passing through the heart and then back again. At this time the American Heart Association (AHA) still recommends Monophasic energy in the algorithms. Until more data is collected the AHA does support Biphasic use at this time, if available, at energy levels set by the manufactures.

Pacing (TCP)

Transcutaneous cardiac pacing (TCP) is the preferred initial PALS pacing method of choice as it can be established rapidly and is the least invasive technique. Pacing is indicated for unstable patients with bradycardias, asystole (as soon as possible), and high degree heart blocks (Mobitz 2 and 3rd degree AV blcoks). Override pacing to slow a cardiac rhythm is usually not recommended as an initial treatment for a tachyarrhythmia. The energy used to pace a patient is different than shocking a patient, therefore it is safe to touch a patient while pacing them. Pacing is included in PALS because there are no reliable studies on pediatrics and pacing.

Vascular Access

The largest and most accessible vein that does not interfere with resuscitation efforts is the best choice. The antecubital vein is the preferred IV site in most cardiac arrests for initial IV placement. Complications include extravasation, thrombosis and tissue trauma. An added concern with IV establishment is catheter shear. Under the current guidelines IO's are now acceptable on any aged patient, if needed as a last resort. Do not rule out umbilical access, scalp or feet. If all that can be accessed is a 25g use it.

Fluid replacement is 10-20mL/kg bolus for all pedi age groups. If fluid overload is a concern then 10ml/kg is given. May repeat twice.

Fluid maintenance is as follows: Infants 4mL/kg/hr. Child is 40mL/hr plus 2mL/kg per hour for each kg between 10 and 20kg. Children over 20kg is 60mL/hr plus 1mL/kg for each kg over 20kg.

Emergency Pharmacology

Many PALS drugs are delivered based on body weight when possible. Unlike ACLS that uses more standard doses.

The acronym LEAN is used to identify medications that can be delivered via the ETT or other device that allows isolation and direct access to the lungs.

L - Lidocaine (last option - not preferred)
A - Atropine
E - Epinephrine (last option - not preferred)
N - Narcan

Drugs delivered via the ETT should be a higher dose than the IV amount and in a total solution of 3-5mL. The exception is Epinephrine which is delivered as a standard 0.1mg/kg of 1:1000.

Oxygen

The highest oxygen concentration should be administered as soon as possible to all patients in respiratory or cardiac arrest and patients suspected of hypoxemia regardless of cause.

The administration of enriched oxygen increases the oxygen concentration in the alveoli, which subsequently increases the oxygen saturation of available hemoglobin. Indications: Hypoxia. Dose: Oxygen administration should be monitored by use of pulse oximetry. Goal is 94 to 99% oxygen for critical patients and titrate to effect on others, but when in doubt give high flow oxygen. When using a BVM for blow-by delivery the bag must be squeezed with a resuscitation BVM.

Epinephrine 1:10,000 or 1:1000

Epinephrine is a naturally occurring catecholamine. It is a potent alpha and beta adrenergic stimulant, however its effect on beta receptors is more profound. Epinephrine can stimulate spontaneous firing of myocardial conduction cells. In the emergency setting, it is used to convert fine ventricular fibrillation to coarse ventricular fibrillation. In asystole, it is used to initiate electrical activity in the myocardium. The effects of epinephrine usually appear within 90 seconds of administration and they are usually of short durations. Therefore, it must be administered every 3-5 minutes to maintain therapeutic levels. The effects of epinephrine include increased heart rate, increased cardiac contractile force, increased electrical activity in myocardium, increased blood pressure, and increased automaticity. Indications: Symptomatic bradycardia's or cardiac arrest (asystole, ventricular fibrillation, pulseless ventricular tachycardia, pulseless electrical activity). Dose: Symptomatic brady is IV 0.01mg/kg 1:10000. Pulseless is IV 0.01mg/kg 1:10000. High dose Epi not a standard recommendation. All ET doses are always 0.1mg/kg 1:1000 in 3-5ml. Epinephrine can be administered IV, IO, and ETT. Epi is not well absorbed via the ETT therefore alternate routes should be considered first. The American Heart Association recommends doses every 3-5

Atropine Sulfate

Atropine is a parasympatholytic that is derived from parts of the Atropa Belladonna plant. Atropine is a potent parasympatholytic and is used to increase the heart rate in hemodynamically significant bradycardias. Hemodynamically significant bradycardias are those slow heart rates accompanied by hypotension, shortness of breath, chest pain, altered mental status, congestive heart failure, and shock. Atropine acts by blocking acetylcholine receptors thus inhibiting parasympathetic stimulation. Atropine has been shown to be of some use in asystole, presumably because some cases of asystole may be caused by a sudden and tremendous increase in parasympathetic tone. The mechanism by which atropine is effective in asystole is not clear.

However, despite no definite proof of its value in asystole, there is little evidence that its use is harmful in this setting. Indications: Hemodynamically significant bradycardias. Dose: Atropine can be administered IV, IO and ETT. The American Heart Association recommends a minimum of 0.1mg be given to avoid paradoxical bradycardia. For bradycardia the doses is 0.02mg/kg every 3-5 minutes repeated once. For a child a single dose should not exceed 0.5mg. Precautions: Atropine may actually worsen the bradycardias associated with second-degree type II and third degree AV blocks. In these cases, go straight to transcutaneous pacing when available instead of trying atropine.

Adenosine (Adenocard)

Adenosine is a naturally occurring nucleoside that slows AV conduction through the AV node. It has an exceptionally short half-life and a relatively good safety profile. Adenosine decreases conduction of the electrical impulses thought the AV node and interrupts AV re-entry pathways in supraventricular arrhythmias such as PSVT. The half-life of adenosine is approximately 5 seconds. Due to its short half-life the administration of adenosine is sometimes referred to as "chemical cardioversion." Adenosine does not appear to cause hypotension to the same degree as does verapamil (described below). Indications: SVT

(including that associated with Wolff Parkinson-White syndrome) refractory to common vagal maneuvers. Dose: The initial dose of adenosine is 0.1mg/kg given as a rapid IV bolus over a 1-2 second period with a flush. To be certain that the drug rapidly reaches the central circulation, it should be given directly into a vein or into a proximal medication port of a functioning IV line. If the initial dose does not result in conversion of the SVT within 1 to 2 minutes, a 0.2mg/kg dose may be given and repeated once.

Calcium Chloride

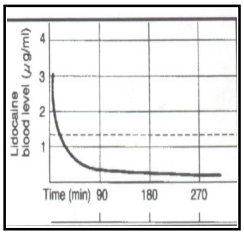
Calcium chloride replaces calcium in cases of hypocalcemia. Calcium chloride causes a significant increase in the myocardium contractile force and appears to increase ventricular automaticity. Indications: Hyperkalemia, hypocalcemia, calcium channel blocker toxicity. Dose: Standard dose is 20mg/kg slow IV.

Amiodarone (Cordarone)

Blocks sodium channels, inhibits sympathetic stimulation, and blocks potassium channels as well as calcium channels. Slows conduction through the His-Purkinje system and in patients with Wolff-Parkinson-White syndrome. Inhibits both alpha and beta receptors and possesses both vagolytic and calcium channel blocking properties. Indications: Shock-refractory pulseless V-tach/V-fib, Polymorphic V-tach, wide complex tachycardia of uncertain origin, stable V-tach when cardioversion unsuccessful, and conversion of atrial fibrillation. Dose: Pulseless V-tach/V-fib - 5mg/kg IV bolus. If defibrillation successful, follow with 1mg/kg IV infusion over 5 minutes. Other protocol doses if patient has a pulse is 5mg/kg over 20-60 minutes IV.

Lidocaine (Xylocaine)

Lidocaine is an amide-type local anesthetic. It is frequently used to treat life-threatening ventricular dysrhythmias. Lidocaine is probably the most frequently used antiarrhythmic



agent in the treatment if life threatening cardiac emergencies. Moreover, it has been shown to be effective in suppressing premature ventricular contractions, treating ventricular tachycardia and some cases of ventricular fibrillation, and inincreasing the fibrillation threshold in acute myocardial infarction. Lidocaine depresses depolarization and automaticity in the ventricles. It has very little effect on atrial tissues. Once a ventricular arrhythmia is suppressed, a lidocaine bolus should be followed by a 20-50mcg/kg/min infusion to maintain therapeutic blood levels. Indications: Ventricular tachycardia, ventricular fibrillation and premature ventricular contraction (malignant; more than six unifocal PVC's per minute, multifocal PVC's, couplets, runs of PVC's, and R on T phenomena). Dose: Lidocaine can be given IV, IO and ETT. Ventricular fibrillation and pulseless ventricular tachycardia is 1mg/kg every 3-5 minutes. Ventricular tachycardia with a pulse and malignant PVC's is 1mg/kg initial dose every 5-10 minutes and repeat doses are half the initial dose. The maximum dose of this drug is 3mg/kg.

Procainamide (Pronestyl)

Procainamide is an ester-type local anesthetic. It is frequently uses to treat life-threatening ventricular dysrhythmias. Procainamide is effective in suppressing ventricular ectopy. It may be effective in cases where lidocaine and/or amiodarone has not suppressed the ventricular arrhythmia. Procainamide reduces the automaticity of the various pacemaker sites in the heart. Procainamide slows intraventricular conduction to a much greater degree than lidocaine. Indications: Persistent cardiac arrest due to ventricular fibrillation, premature ventricular contractions, and ventricular tachycardias. Dose: In treating PVC's or ventricular tachycardia, drug should be administered at a rate of 15mg/kg over 30 to 60 minutes. This should be discontinued if any of the following occur; arrhythmia is suppressed, hypotension ensues, QRS has widened by 50%

of its original width and the total maximum dose is reached.

Magnesium Sulfate

Magnesium is the treatment of choice for Torsades de Pointes and it may be used in refractory ventricular tachycardia and ventricular fibrillation. Indication: Ventricular fibrillation, ventricular tachycardia and Torsades de Pointes. Dose: 25-50mg/kg over 10 minutes given IV.

Sodium Bicarbonate

Ventilation is the initial treatment priority to acid-base balance during early cardiac arrests. Hyperventilation influences respiratory acidosis by removing CO2. Sodium bicarbonate is indicated for metabolic acidosis (DKA), hyperkalemia, and overdoses (tricyclic, phenobarbital). Sodium bicarbonate may be beneficial after prolonged hypoperfusion or cardiac arrest situations. It is generally not used within the first 10-15 minutes of arrest unless diagnostic tools and/or history supports metabolic acidosis is present. Indications: Tricyclic overdose, phenobarbital overdose, and severe acidosis refractory to hyperventilation. Dose: Usual dose of sodium bicarbonate varies by age. Child is 1mEq/kg of 4.2% and adolescent is 1mEq/kg of 8.4%. Most catecholamines and vasopressors (i.e. dopamine, epinephrine) can be deactivated by alkalotic solutions. Make sure that IV lines are flushed before and after administering sodium bicarbonate.

Dopamine (Intropin)

Dopamine is a naturally occurring catecholamine. It is a chemical precursor of norepinephrine. It acts on alpha, beta and dopaminergic adrenergic receptors. Its affects on alpha receptors is dose-dependent. Indications: Hemodynamically significant hypotension not resulting from hypovolemia and is also indicated for cardiogenic shock. 2 to 20 ug/kg/min

Norepinephrine (Levophed)

A natural occurring alpha and beta agonist. It is indicated in patients with severe hypotension (less than 70mmHg) otherwise dopamine should be used. Norepinephrine should be used cautiously due to its potent alpha stimulation. Dose: IV infusion 0.1 to 2mcg/kg/min.

Dobutamine (Dobutrex)

A synthetic catecholamine and a potent inotropic agent used in treating heart failure patients. Dobutamine increases the force of the systolic contraction (positive inotropic effect) with little chronotropic activity. Dose: 5-10mcg/kg/min.

Morphine Sulfate

Morphine is a central nervous system depressant that acts on opiate receptors in the brain, providing both analgesia and sedation. It increases peripheral venous capacitance and decreases venous return. This effect is sometimes called a "chemical phlebotomy." Morphine also decreases myocardial oxygen demand. Indications: Severe pain associated (monitor for hypotension). Dose: There are many different approaches to the administration of morphine. An initial dose of 0.1mg/kg IV is standard. This can be augmented with additional doses of 0.1mg/kg every few minutes until pain is relieved, respiratory depression occurs, or hypotension is noted.

Miscellaneous PALS Information
Whenever a patient is moved the airway should be re-evaluated.

One Rescuer CPR is 30 compressions to 2 ventilations. Two Rescuer CPR is 15 compressions to 2 ventilations. The rate is 100 compressions per minute for children and infants.

Neonate CPR is 3 compressions to 1 ventilation at a rate of 120 "tasks" per minute (90 compression "tasks" and 30 ventilation "tasks"). Depth of compression is 1/2 to 3/4 inches.

If heart rate of pediatric is less than 60 beats per minute with poor perfusion start CPR compressiosn.

Rescue breathing is at a rate of about 20 per minute (1 every 3 to 5 seconds) and hyperventilation is about 32 per minute. (Depends on age). Newborn is at a rate of 40-60 ventilations/minute.

Estimating Tracheal Tube Size and Depth
Size is age divided by 4 plus 4. Another way to say it is 16 plus age divided by 4.

Depth of insertion is age divided by 2 plus 12. Or just use 3 times the diameter of the tube used.

Estimating Weight by Age
2 times their age plus 8 equals weight in kg.

Blood Pressure
For lower 5th percentile age 1 year or older. 70 plus 2 times age

For lower 5th percentile age 1 month to 1 year. 70 mmHg.

For lower 5th percentile age less than 1 month is 60 mmHg.

Capillary Refill is most accurate under the age of 6. Skin color/blood should return in under 2 seconds.

Ventricular Fibrillation & Pulseless Ventricular Tachycardia

Primary Assessment
Airway (basic) - Breathing - Circulation (CPR)
Defibrillate (immediately)
2J/kg or equivalent Biphasic energy. Followed by immediate CPR for 2 minutes. Additional shocks are at 4J/kg.

Secondary Assessment
Airway (basic or advanced)
Breathing (confirm by at least 2 methods)
Circulation (IV access)
Differential (search for and treat causes)

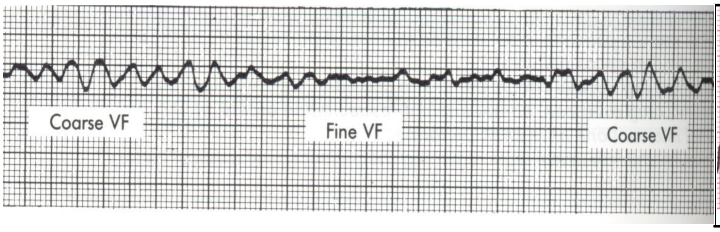
Epinephrine 0.01mg/kg IV (1:10000) or 0.1mg/kg ETT (1:1000) every 3-5 minutes

Antiarrhythmics
Amiodarone - 5mg/kg IV bolus.
If defibrillation successful start 5 to 10mcg/kg/min infusion.
or
Lidocaine - 1mg/kg bolus. Repeat at 1mg/kg 3-5 minutes after first dose.
If defibrillation successful start 20 to 50mcg/kg/min infusion.
or
Magnesium - 25 to 50mg/kg IV if Torsades de Pointes or hypomagnesemia.
or
Procainamide - 15mg/kg over 30 minutes.

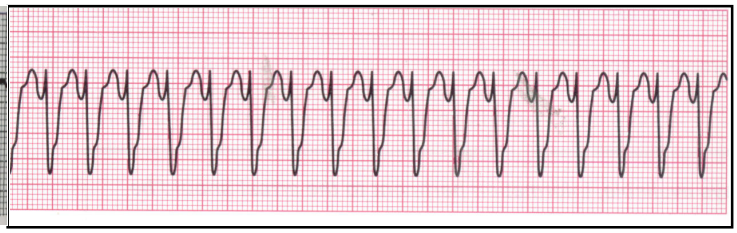
Sodium Bicarbonate - 1mEq/kg may repeat in 10 minutes at 0.5mEq/kg.
Given if known metabolic acidosis.

Note: Do not interupt CPR for longer than 10 seconds at a time.
Note: ETT drugs - double dose in 5mL.
Note: Epinephrine is given on its own time schedule.

V-Fib



V-Tach



Asystole

Primary Assessment
Airway (basic) - Breathing - Circulation (CPR)

Secondary Assessment
Airway (basic and advanced)
Breathing (confirm by at least 2 methods)
Circulation (IV access)
Differential (search for and treat causes) **PATCH-4-MD**

Epinephrine 0.01mg/kg IV (1:10000) or 0.1mg/kg ETT (1:1000) every 3-5 minutes.

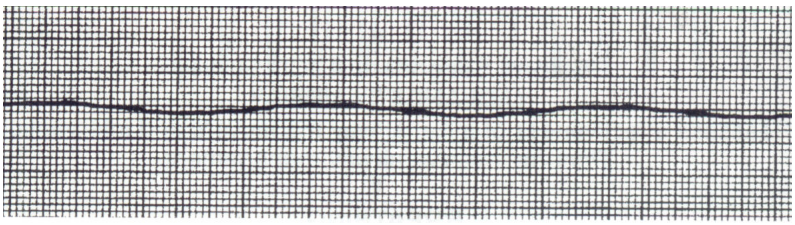
Consider termination of efforts

Consider **Sodium Bicarbonate** 1mEq/kg may repeat in 10 minutes at .5mEq/kg.
Known hyperkalemia, Cyclic antidepressant overdose, or long down time

Note: ETT drugs - double dose in 5mL.
Note: Epinephrine is given on its own time schedule.

P	pulmonary embolism
A	acidosis
T	tension pneumo
C	cardiac tamponade
H	hypovolemia
H	hypoxia
H	heat/cold
H	hyper/hypokalemia
H	hypoglycemia (new for 2005)
M	Myocardial abnormalities
D	drug overdose

Asystole



Pulseless Electrical Activity

Primary Assessment
Airway (basic) - Breathing - Circulation (CPR)

Secondary Assessment
Airway (basic and advanced)
Breathing (confirm by at least 2 methods)
Circulation (IV access)
Differential (search for and treat causes) **PATCH-4-MD**

Epinephrine 0.01mg/kg IV (1:10000) or 0.1mg/kg ETT (1:1000) every 3-5 minutes.

Consider **Sodium Bicarbonate** 1mEq/kg may repeat in 10 minutes at .5mEq/kg.
Known hyperkalemia, Cyclic antidepressant overdose, or long down time

Consider termination of efforts

Note:
ETT drugs - double dose in 5mL.
Note: Epinephrine is given on its own time schedule.
Note: PEA is any pulseless rhythm other than asystole, V-tach, or V-Fib

P	pulmonary embolism
A	acidosis
T	tension pneumo
C	cardiac tamponade
H	hypovolemia
H	hypoxia
H	heat/cold
H	hyper/hypokalemia
H	hypoglycemia (new for 2005)
M	Myocardial abnormalities
D	drug overdose

Bradycardia

Primary Assessment
Airway (basic) - Breathing - Circulation

Secondary Assessment
Airway (basic and advanced)
Breathing (confirm by at least 2 methods)
Circulation (IV access)
Differential (search for and treat causes)

Determine if **STABLE** or **UNSTABLE**
If stable continue work-up.
If unstable continue with algorithm.

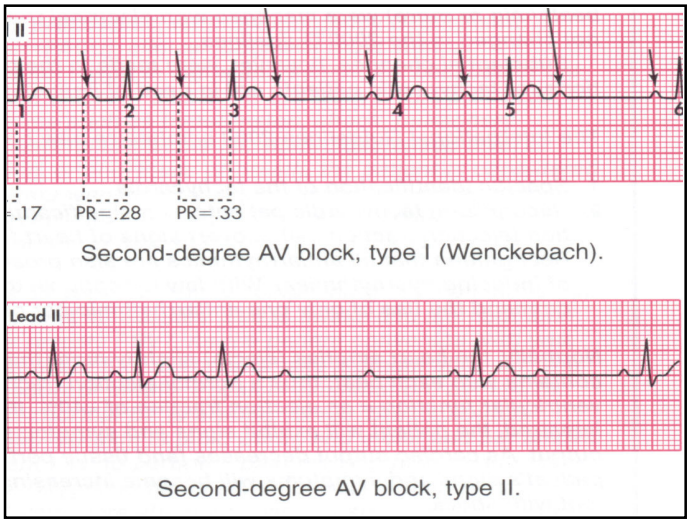
If Severe Cardiorespiratory Compromise and heart rate less than 60 per minute start CPR.

Epinephrine 0.01mg/kg IV (1:10000) or 0.1mg/kg ETT (1:1000) every 3-5 minutes.

Atropine 0.02mg/kg IV every 3-5 minutes to max dose of 1mg for a child and 2mg for an adolescent.
Minium single does 0.1mg maximum single dose 0.5mg.

TCP as soon as possible

Epinephrine Drip - 0.1-1ug/kg/min
and/or
Dopamine 2-20mcg/kg/min



Narrow Complex Tachycardia

Primary Assessment
Airway (basic) - Breathing - Circulation

Secondary Assessment
Airway (basic and advanced)
Breathing (confirm by at least 2 methods)
Circulation (IV access)
Differential (search for and treat causes)

If **Stable** continue with algorithm.
If **Unstable** go to bottom box.
Infant HR >220
Child HR >180

Attempt therapeutic diagnostic maneuver

· Vagal stimulation
· Adenosine 0.1mg/kg rapid push IV, may repeat in 1-2 minutes at 0.2mg/kg. Max dose 3 times given

If hemodynamically **unstable**, synchronize cardioversion at .5-1J/kg then 2J/kg (or equivalent Biphasic energy). Remember to check for a pulse after each shock.

Ventricular Tachycardia

Primary Assessment
Airway (basic) - Breathing - Circulation

Secondary Assessment
Airway (basic and advanced)
Breathing (confirm by at least 2 methods)
Circulation (IV access)
Differential (search for and treat causes)

If **Stable** continue with algorithm.
If **Unstable** go to bottom box.

Note!!!!!
May go directly to cardioversion

Antiarrhythmics

Amiodarone - 5mg/kg IV bolus over 20 to 60 minutes.
If defibrillation successful start 5 to 10mcg/kg/min infusion.
or
Lidocaine - 1mg/kg over 5 to 10 minutes.
If defibrillation successful start 20 to 50mcg/kg/min infusion.
or
Procainamide - 15mg/kg over 30 to 60 minutes.

If hemodynamically **unstable**, synchronize cardioversion at .5-1J/kg then 2J/kg
(or equivalent Biphasic energy) Remember to check for a pulse after each shock.

Note: To determine the QT Interval measure two consecutive R-R waves. Then measure the QT Interval from the Q wave to the start of the T wave. If the QT Interval is less than half the R-R measurement the QT Interval is considered normal. If the QT Interval measurement of more than half of the R-R measurement it is considered long.

Note: Once a patient has received electrical therapy all ventricular drugs should then be followed by another shock.

Acute Pulmonary Edema, Hypotension, Shock

Clinical signs:
Shock, Hypoperfusion, CHF, Acute Pulmonary Edema
Most likely the problem?

Hypotensive (Decompensated Shock)	**Volume Problem**	**Normotensive (Compensated Shock)**	**Rate Problem**
Epinephrine Drip - 0.1-1ug/kg/min and/or **Dopamine** 2-20mcg/kg/min and/or **Norepinephrine** 0.1 to 2 mcg/kg/min.	Administer · Fluids 20mL/kg · Blood transfusions · Cause-specific interventions	**Dobutamine** 2 to 20mcg/kg/min and/or **Dopamine** 2-20mcg/kg/min and/or **Epinephrine** Drip - .05-.3ug/kg/min	Go to **Bradycardia** or **Tachycardia** algorithms

Inverted Pyramid

In the remaining space on this page we will draw the inverted pyramid on neonatal resuscitation efforts. It is an upside down triangle that has layers that get smaller on the way down. The larger layers are most likely to work the best and as you go down the levels the less effective the results. First Level is at the top and Fifth Level is at the bottom.

First level - warm, position, suction.
Second level - Oxygen delivery by basic methods.
Third level - Oxygen delivery with advance methods.
Fourth level - Compressions
Fifth level - Drugs