



Pediatric Advanced Life Support Overview 2006

Judy Haluka
BS, RCIS, EMT-P



General

- Our Database is lacking in pediatrics
- Pediatrics are DIFFERENT than Adults not just smaller
- The same procedure may require an entirely different skill set





Prevention

- Injuries are the leading cause of Death
 - Motor Vehicle Passenger Injuries
 - Pedestrian Injuries
 - Bicycle Injuries
 - Drowning
 - Burns
 - Firearm Injuries





Motor Vehicle

- 50% of Deaths are from
 - Failure to use proper restraints
 - Inexperienced Adolescent Drivers
 - Alcohol





Restraint Guidelines

- Rear Facing <20 lbs and 1 year of age
- Forward facing Children 1-4
- Booster seats for children 4-7 years
- ALL IN BACK SEAT
- Front seat not acceptable until 12 years of age





Sudden Infant Death

- Up to one year with Peak 2-4 months
- Etiology Unknown
- Risk factors include
 - Sleeping prone
 - Soft surface
 - Second hand smoke
- Decline 40% since change in sleeping position





Basic Cardiac Life Support

Age Definition

- Infant = less than one year
- Child = 1 year to beginning of puberty
 - Armpit hair in boys
 - Breast development in girls





BCLS

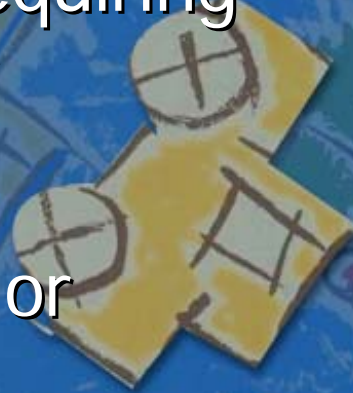
- Responsiveness
- Call for help and AED
- If alone begin CPR for 2 minutes
- Compression Rate 30:2
- If alone carry child with you to phone





BCLS

- Open Airway – jaw thrust if trauma
 - 2% of victims with blunt trauma requiring spinal imaging have a spinal injury
 - Do not sacrifice airway
 - Risk is tripled if craneiofacial injury or Glasgow coma scale of less than 8





BCLS

■ Breaths

- Effective defined as chest rise
- May have to adjust several time to achieve effective ventilation

- ## ■ Barrier devices have not reduced the risk of transmission of infections and some increase resistance to airflow





Bag Valve Mask

- As effective as intubation for short periods of time
- Requires training
- If anesthesia not available it is the preferred method of intubation – especially prehospital with short transport time





BVM - Precautions

- Avoid hyperventilation
- Pause after 30 compressions for ventilation or 15 compressions if two rescuers
- No pause once advanced airway in place
- Ventilation no more than 8-10/min
- If perfusing – 10-12/min





Hyperventilation

- Impedes venous return and decreases cardiac output
- Causes air trapping and baro trauma in patients with small airway obstruction
- Increases risk of regurgitation and aspiration





Defibrillation

- VF can be cause of sudden collapse or develop during resuscitation
- AEDs available for pediatrics 1-8





Respiratory Failure

- An increased respiratory rate, particularly with signs of distress
- An inadequate respiratory rate, effort or chest excursion





Shock

- Inadequate blood flow and oxygen delivery to meet tissue metabolic demands
- Compensated – this is where you want to be
- Decompensated





Compensated Shock

- Tachycardia
- Cool extremities
- Prolonged capillary refill
- Weak peripheral pulses compared with central pulses
- Normal blood pressure





Decompensated

- Compensated signs plus
- Depressed mental status
- Decreased urine output
- Metabolic acidosis
- Tachypnea
- Weak central pulses
- Hypotension





Shock

- Most Common is Hypovolemia
- Hypotension Defined
 - <60 in term neonates (<28 days)
 - <70 in infants (1 to 12 months)
 - $<70 + 2x$ age in years (1-10)
 - <90 in children older than 10 years





Laryngeal Mask Airway

- Insufficient evidence to recommend for or against the routine use of LMA during arrest
- If unable to Intubate it is acceptable but associated with high complications





Endotracheal Intubation

- When at all possible should be done by those specially trained – anesthesia personnel
- Success and low complication rates are directly related to length of training, supervised experience and number per year





Cuffed Versus Uncuffed

- In hospital setting a cuffed endotracheal tube is as safe as an uncuffed tube for infants beyond newly born and children





Tube Size

- Roughly equal to the size of the child's little finger
- Estimation, may be difficult or unreliable





Deterioration

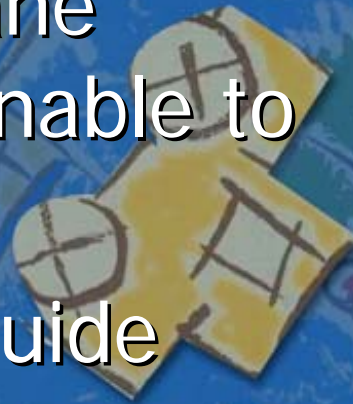
- Displacement
- Obstruction
- Pneumothorax
- Equipment





Circulation

- Backboard – or hard surface
- Consider Extracorporeal Membrane oxygenation if reversible or amenable to heart transplant
- If arterial line present – use to guide compression technique





Vascular Access

- In arrest – immediate IO if IV not in place
- Limit time in unstable patients – if not easy stick go to IO
- Central line following resuscitation for more secure long term access
 - Does not offer better drug availability





Emergency Fluids and Meds

- Estimating weight
 - Use a tape or in hospital document weight and emergency doses and have them readily available
- Fluids
 - Isotonic solutions to treat shock
 - No benefit to colloids
 - Do not use glucose containing unless for hypoglycemia







Emergency Medications



■ Adenosine

- Causes temporary AV nodal conduction block
 - Wide margin of safety because of short half-life
 - Higher dose may be required for peripheral administration
 - Use stopcock method
- 
- 



Emergency Meds

■ Amiodarone

- Slows AV conduction
- Prolongs refractory period
- Slows ventricular conduction
- Caution – monitor BP and administer as slowly as patient's condition allows
- Give rapidly in arrest





Atropine

- Accelerates sinus or atrial pacemakers and increases AV conduction
- Small doses $<0.1\text{mg}$ may produce Bradycardia
- Larger than recommended doses may be required in special circumstances (organophosphate poisoning)





Emergency Meds

■ Calcium

- Routine administration does not improve outcome

■ Epinephrine

- Increases aortic diastolic pressure thus coronary perfusion pressure, critical determinant of successful resuscitation





Emergency Meds

■ Glucose

- Infants have high glucose requirements
- Low glycogen stores
- Develop hypoglycemia when energy requirements rise

■ Magnesium



- Indeterminate during arrest
- Useful for Torsades or prolonged QT





Emergency Medications

■ Sodium Bicarbonate

- Routine administration does not improve outcome
 - During arrest or shock, arterial blood gases may not accurately reflect tissue and venous acidosis
- 
- 



Emergency Medications

- Vasopressin
 - Limited experience with pediatric patients
 - Remains indeterminate





Pulseless Arrest

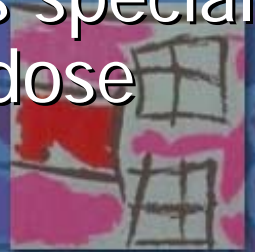
- Ventricular Fibrillation 5% - 15% of out of hospital arrests; 20% of hospital arrests; incidence increases with age





Pulseless Arrest

- Start CPR – get defibrillator
- Determine rhythm and defibrillate if indicated
- Immediately perform CPR for 2 minutes
- Perform rhythm check and administer Epinephrine if still indicated
 - High dose not recommended unless special situation such as Beta Blocker overdose





Pulseless Arrest

- After two minutes of CPR – Defibrillate
- After two minutes of CPR
 - Amiodarone
- Search for reversible causes





Defibrillation

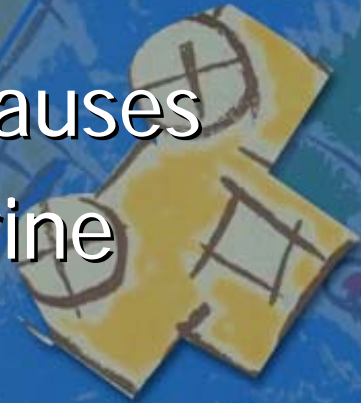
- Adult paddles after 1 year or 1-kg
- Anterior lateral or anterior-posterior placement is acceptable
- 2 joules per kg – doubled to 4 joules per kg





Asystole - PEA

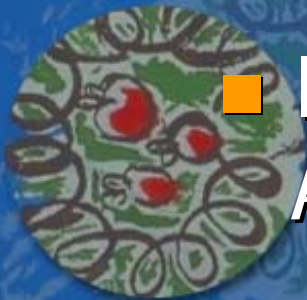
- CPR with as few interruptions as possible
- Search for and treat reversible causes
- Use a standard dose of epinephrine
- Pacing not indicated





Bradycardia

- Bradycardia causing cardiorespiratory compromise
- Support airway, breathing and circulation
- If $HR < 60$ with adequate ventilation, begin compressions
- If due to vagal stimuli administer Atropine





Bradycardia

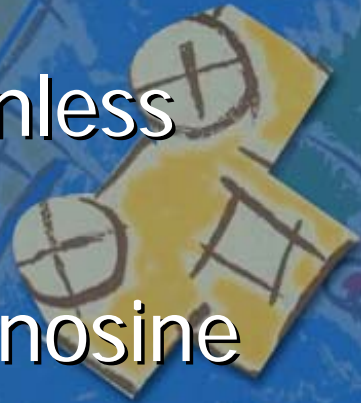
- Pacing may be lifesaving if 3rd degree block or sinus node dysfunction.
 - Especially true if congenital or acquired heart disease
- Pacing not useful in asystole or Bradycardia post arrest





Narrow Complex Tachycardia

- Evaluation of 12 lead and patient's clinical presentation
- Attempt vagal maneuvers first unless patient is unstable
- Chemical cardioversion with Adenosine is effective





Narrow Complex Tachycardia

- If patient unstable or no IV access, electrical cardioversion
 - 0.5 joules/kg to 1 joule/kg
- Consider Amiodarone if unresponsive to vagal maneuvers and adenosine
- Do not use Verapamil; it may cause refractory hypotension





Wide Complex Tachycardia

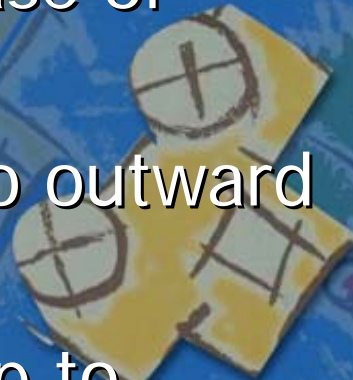
- Treat with cardioversion
 - If it does not delay cardioversion acceptable to try Adenosine
- If 2nd shock unsuccessful; or recurs quickly consider Amiodarone before third shock



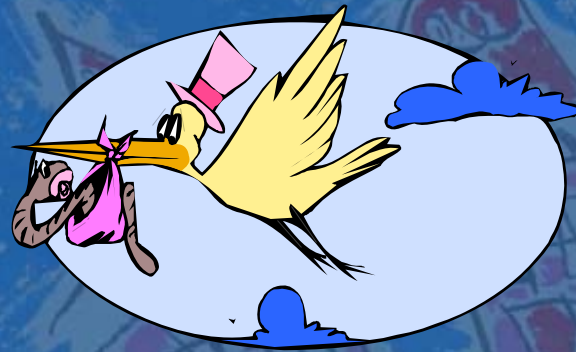


Trauma

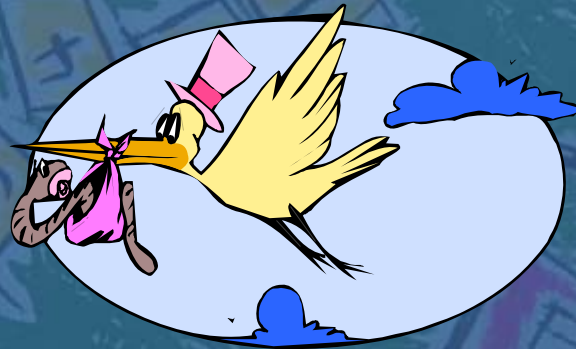
- Immobilize if consistent with mechanism
- Do not over ventilate even in the case of head injury
- Suspect thoracic injury even with no outward signs
- Treat shock with volume 20ml/kg up to 60ml/kg
- After 60ml/kg switch to O-negative blood







**Birthin' Babies Should Take
Place in the Delivery Room
Whenever Possible**





Need for Resuscitation

- 10% of newborns require some assistance to begin breathing
- 1% require extensive resuscitation





Need for Resuscitation

- Was the baby born full term?
- Is the amniotic fluid clear of meconium and evidence of infection?
- Is the baby breathing or crying?
- Does the baby have good muscle tone?
- If all answers are yes, no resuscitation is needed





Need for Resuscitation

- If one answer is no the infant should receive one of the following
 - Initial steps of stabilization (warmth, position, clear airway, dry, stimulate)
 - Ventilation
 - Chest Compressions
 - Administration of Epinephrine and/or volume expansion





Resuscitation

- Decision to progress to next step is based on assessment of 3 vital signs: heart rate, color and respirations
- Approximately 30 seconds is allotted to complete each step





Anticipate

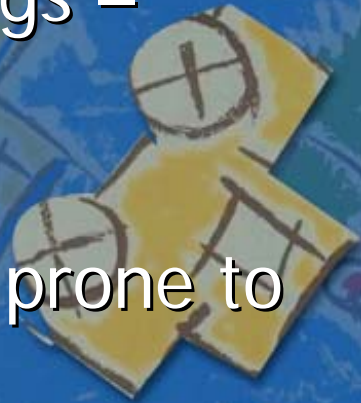
- There should be at least one person whose primary responsibility is the newly born
- Either that person or someone capable of intubation and medication administration





Require Resuscitation

- <37 weeks gestation
 - Preterm babies have immature lungs – more difficult to ventilate – more vulnerable to injury
 - Immature blood vessels in brain – prone to hemorrhage
 - Thin skin, large surface area – heat loss
 - Increased infection
 - Increased risk of hypovolemia





Initial Steps

- Provide warmth – place under radiant heat
- Position head in “sniffing” position
- Clear airway with bulb syringe
- Dry baby and stimulate





Clearing Airway

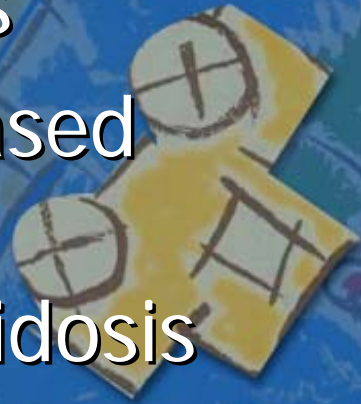
- No longer recommended to intubate prior to body delivery
 - If depressed infant with meconium – intubate and suction following complete birth
 - A vigorous infant does not require intubation





Assessment

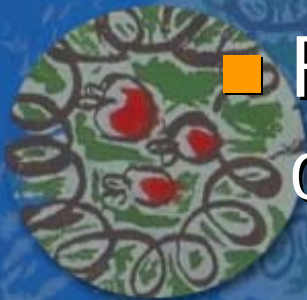
- Not unusual to have blue hands or feet
- Should not have central cyanosis
- Pallor or mottling may be decreased cardiac output, severe anemia, hypovolemia, hypothermia or acidosis





Oxygen Administration

- Possible adverse effects of 100% on respiratory and cerebral circulation and potential tissue damage from oxygen free radicals
- Reasonable to begin resuscitation with room air
- Free flow oxygen if patients is centrally cyanotic – breathing patient





Ventilation

- Apneic or gasping
- Heart rate < 100 ; 30 seconds after initial steps
- Careful not to over expand
- Do not hyperventilate





Intubation

- Tracheal suctioning for meconium
- BVM is ineffective or prolonged
- Chest compressions are performed
- Endotracheal meds are required
- Special resuscitation situations





Medications

- Rarely required
- Epinephrine is the only drug (should be given IV)
- Volume Expansion – 10ml/kg if blood loss is suspected or infant in shock
- Narcan – no longer recommended during delivery of depressed infant
 - Only after heart rate and color are restored

