



Pediatric Emergencies in the School Setting

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Objectives

- ✦ Have knowledge of common pediatric emergencies that may occur at school
- ✦ Be able to assess children for potentially life threatening conditions
- ✦ Be able to provide initial treatment for pediatric emergencies occurring at school

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Background

- ✦ Average school aged child spends 28% of the day and 14% of their total annual hours in school
- ✦ 72.3 million children younger than 18 in US
- ✦ 18 million children and adolescents have special health care needs or a chronic illness
- ✦ CSHCN or chronic illness account for 25% of the pediatric patients seen in emergency department visits

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Scope of School Emergencies

- ✦ Students, adult visitors and staff
- ✦ Trauma
- ✦ Medical
- ✦ Children with special healthcare needs (CSHCN)
- ✦ Mental health
- ✦ Disaster preparedness

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School preparedness

- ✦ Variable – In a study done in New Mexico (2001):
- ✦ Oxygen – 20%
- ✦ Epinephrine – 16%
- ✦ Artificial airways – 30%
- ✦ Cervical collars – 22%
- ✦ Splints – 69%

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EMS activation

- ✦ Annually 67% of schools call EMS for a student
- ✦ 37% of schools call EMS for adult staff or visitor
- ✦ National survey of 573 school nurses: 68% managed a life threatening illness requiring EMS in the previous year
- ✦ EMS dispatches:
 - 66% for injury
 - 25% for medical emergencies (respiratory distress and seizures)
- ✦ **Important that EMS activation process is clear to ALL staff.**

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Initial Physical Assessment

- ✦ ABCDE – Hands-on
 - ⊙ Airway
 - ⊙ Breathing
 - ⊙ Circulation
 - ⊙ Disability
 - ⊙ Exposure

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Assessing the ABCDEs

- ✦ Airway
 - ⊙ Jaw thrust in a trauma patient
 - ⊙ Maintain neutral neck position
 - ⊙ Suction frequently
 - ⊙ Determine if the airway is maintainable
 - ⊙ If unable to open airway, consider obstruction.



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Breathing

- ✦ RR – count for 30 seconds
- ✦ Red flags
 - ⊙ RR < 20/min in children < 6 years old
 - ⊙ RR < 12/min in children 6-15 years old
- ✦ Auscultation
- ✦ Oxygen saturation
- ✦ Apply oxygen is O2 sat < 90%
- ✦ BVM
- ✦ Nasal airway/ oral airway
- ✦ Endotracheal intubation

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Circulation

- ✦ Heart rate varies with age
 - ⊙ Hypoxia or low perfusion
 - ⊙ Anxiety
 - ⊙ Pain
 - ⊙ Fever
 - ⊙ Excitement
- ✦ HR > 180 need a cardiac monitor to accurately assess rate
- ✦ Bradycardia indicates critical hypoxia or ischemia
- ✦ Skin warm or cool
- ✦ Check capillary refill (normal < 2 seconds)



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Blood pressure

- ✦ Use a cuff 2/3 the length of the child's upper arm
- ✦ Hypotension
 - ⊙ < 60mmHg in newborns
 - ⊙ < 70mmHg in 1-12 months old
 - ⊙ < 70 + (2 x age) in 1-10 years old
 - ⊙ < 90mmHg if > 10 years old



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Disability

- ✦ AVPU to evaluate level of consciousness:
 - ⊙ Alertness
 - ⊙ Verbal stimuli response
 - ⊙ Painful stimuli response
 - ⊙ Unresponsive
- ✦ Evaluate pupils
- ✦ Evaluate motor activity
- ✦ Check glucose



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Exposure

- ✦ If child alert, maintain modesty.
- ✦ **Keep patient warm, especially toddlers.**
- ✦ **Begin first aid:**
 - **Pressure on bleeding.**
 - **Splint extremity injuries.**
 - **Ice pack to bruises.**
 - **Elevate injured extremity.**



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Medical Emergencies

- ✦ Respiratory distress
- ✦ Status asthmaticus
- ✦ Anaphylaxis
- ✦ Diabetes crisis
- ✦ Status epilepticus
- ✦ Sudden cardiac death



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Respiratory Distress

- ✦ Upper airway:
 - Choking/ foreign body
 - Croup
 - Bacterial tracheitis/ epiglottitis
 - Anaphylaxis
- ✦ Lower airway:
 - Asthma
 - Pneumonia
 - Pneumothorax
 - Pulmonary embolus



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CHOKING



- ✦ Universal sign:
 - Inability to talk, cough
 - High-pitched sounds
 - Cyanosis
 - Loss of consciousness
- ✦ Back blows
- ✦ Heimlich maneuver
- ✦ Unconscious: Begin CPR and call 911.



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PAT: Respiratory Distress

Appearance
Normal



Work of Breathing
Increased

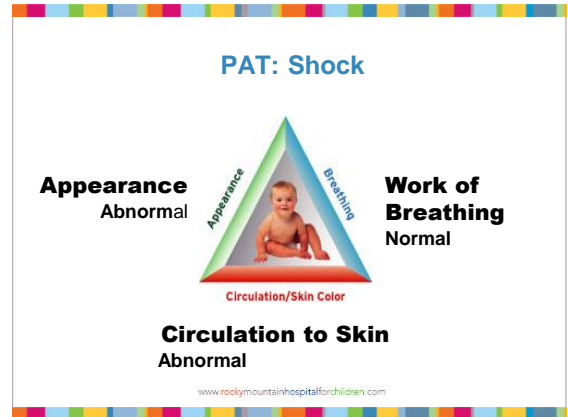
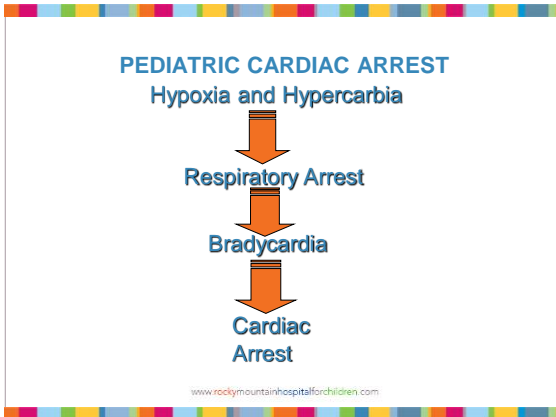
Circulation to Skin
Normal

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Pediatric Assessment Triangle

- ✦ Appearance:
 - Restlessness, anxiety, combative – hypoxia
 - Somnolence, lethargy – hypercarbia, severe hypoxia, respiratory fatigue
- ✦ Breathing:
 - Tachypnea, abnormal airway sounds, retractions, sniffing or tripod position
 - Bradypnea, irregular breaths – ominous
- ✦ Circulation:
 - Pallor, ashen, cyanosis – hypoxemia or shock

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Basic airway management

TECHNIQUE HEAD POSITION

- Sniffing position
- Slight anterior displacement of neck (pulling chin up)
- Small infants may require elevation of shoulders with a towel to counteract a large occiput flexing head
- Older children may require a towel under the head
- Goal is to align ear canal anterior to shoulders
- Head tilt chin lift or Jaw thrust (trauma patients)

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Asthma

- 7 million children have asthma
- Asthma is a chronic lung disease that inflames and narrows the airways. Asthma causes recurring periods of wheezing (a whistling sound when you breathe), chest tightness, shortness of breath, and coughing.
- Known asthmatics should have an asthma action plan.

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Pulmonary Index Score

SCORE	Respiratory Rate		WHEEZING	Inspiratory: expiratory ratio	Accessory muscle use	Oxygen saturation
	< 6 yrs	≥ 6 yrs				
0	≤30	≤20	None*	2:1	None	97-100
1	31-45	21-35	End expiratory	1:1	+	93-96
2	46-60	36-50	Entire expiration	1:2	++	90-93
3	>60	>50	Inspiratory and expiratory	1:3	+++	<90

Score < 7 = mild; 7-11 = moderately severe; ≥12 = severe attack. May underestimate attack in older child. *If no wheezing secondary to decreased air entry; score 3.

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Anaphylaxis – call 911

- ✦ Epinephrine, epinephrine, epinephrine – SQ, IM, IV
- ✦ Diphenhydramine – PO, IM, IV
- ✦ Albuterol inhalation



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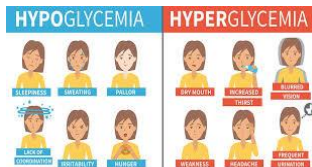
Diabetes

- ✦ Type 1 caused by insulin deficiency after destruction of insulin producing pancreatic islet cells – most common in children
- ✦ Type 2 – characterized by hyperglycemia, insulin resistance and impairment of insulin secretion – increasing in children since the 1990s

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Diabetes mellitus

- ✦ Dexcom G5 & G6 – continuous glucose monitor
- ✦ Use child's diabetic management plan to manage glucose <80 or over 250.
- ✦ 911 if child has labored breathing, altered mental status and/or may be dehydrated.



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Seizures

- ✦ Emergency if:
 - Tonic-clonic seizure lasts longer than 5 minutes
 - Repeated seizures without regaining consciousness
 - First time seizure
 - Occurs after injury
 - Student has diabetes
 - Student has breathing difficulties
 - Student has a seizure in the water
- ✦ Status epilepticus defined as single seizure or series of seizures >30 minutes; clinically will treat after 5-10 minutes.

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Seizures

- ✦ Stay calm and track time.
- ✦ Do not restrain or put anything in mouth.
- ✦ Protect head and open airway.
- ✦ Watch breathing.
- ✦ Turn child on side.
- ✦ Stay with child until consciousness regained.
- ✦ Refer to the seizure action plan.

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Sudden Cardiac Arrest

- ✦ 0.5-2.5 per 100,000 person years
- ✦ Causes:
 - Arrhythmia (long QT, WPW, Brugada)
 - Myocarditis
 - Cardiomyopathy
 - Congenital heart disease
 - Coronary arteritis, anomalous origin of coronary arteries, aortic dissection, pulmonary hypertension, mitral valve prolapse

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Sudden collapse

- ✦ Check for unresponsiveness and no breathing
- ✦ Send someone to activate 911 and get AED
- ✦ Checks for pulse no more than 10 seconds
- ✦ Begin immediate compressions at 100/minute:
 - 30 compressions in 18 seconds or less.
 - Approximately 2 inches deep.
 - Complete chest recoil after each compression.
 - 1 rescuer: 30 compression: 2 breaths
 - Less than 10 seconds between last compression and next cycle.
 - Compressions not interrupted until AED analyzing rhythm.
 - Compressions resumed immediately after shock/ no shock indicated.



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Automated External Defibrillators (AEDs)



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AED

- ✦ Turn on AED
- ✦ Place pads on student (pediatric size for < 8 yrs old).
- ✦ Clears rescuer from student to allow AED to analyze rhythm.
- ✦ Clears victim and delivers shock if indicated.
- ✦ Resume chest compressions immediately after delivery of shock.
- ✦ Do not turn off AED during CPR.

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Children with special health care needs

- ✦ Wide range of needs
- ✦ May require:
 - Special equipment
 - Training of personnel
 - Medications and supplies
 - Transport decisions and arrangements

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Special Considerations

- ✦ Treat the ABC's first.
- ✦ Treat the child, not the equipment.
- ✦ If the equipment is not working, manage the child appropriately using your own equipment.
- ✦ CSHCN have many allergies.
- ✦ Baseline VS may differ from normal parameters – ask the parent.
- ✦ Do not assume that a CSHCN is cognitively impaired. Remember to communicate with the child.
- ✦ Before leaving ask the caregivers if they have a "go bag" with needed supplies and equipment.
- ✦ Caregivers often will prefer that the child is transported to the "home" hospital.

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Disaster preparedness

- ✦ Fundamental link between emergency readiness and disaster preparedness
- ✦ Knowledge of first aid and CPR is critical for school nurses staff and students
- ✦ Critical for emergency preparedness:
 - Resources
 - Links with EMS
 - Staff training
 - Development of campus wide communication strategy

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Disaster preparedness

- ✦ No federal laws requiring all school districts to have emergency management plans
- ✦ 32 states report having laws or policies requiring plans
- ✦ 95% of school districts report they have a plan

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AHA Medical Emergency Response Plan for Schools

- ✦ 5 core elements:
 1. Effective and efficient communication throughout the school campus
 2. Coordinated and practiced response plan
 3. Risk reduction
 4. Training and equipment for first aid and CPR
 5. Implementation of a lay-rescuer AED program
 - a) Medical/ HCP oversight
 - b) Training of anticipated rescuers in CPR and use of AED
 - c) Coordination with the EMS system
 - d) Appropriate device maintenance
 - e) Ongoing quality improvement

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SUMMARY

- ✦ Assess using pediatric assessment triangle
- ✦ Use AVPU for head injury
- ✦ Begin initial injury/ illness treatment.
- ✦ Have a plan to call EMS.
- ✦ Practice the emergency plan at the start of the year and several times during the year.

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