Critical Concepts:

RECOGNITION AND INITIAL MANAGEMENT OF PEDIATRIC SHOCK AND RESPIRATORY FAILURE
Shock

- Inadequate peripheral perfusion where oxygen delivery does not meet metabolic demand
- Adult vs Pediatric Shock - Same causes/different frequencies
Pediatric Shock

- Hypovolemia
  - Most common cause of pediatric shock
  - Small blood volumes (80cc/kg)

- Sepsis
  - Second most common cause of pediatric shock
  - Immature immune system
Pediatric Shock

- Cardiogenic
  - Primary pump failure – congenital heart disease
  - Secondary failure from:
    - Hypoxia
    - Acidosis
    - Hypoglycemia
    - Hypothermia
    - Drug toxicity
Pediatric Shock

- Neurogenic
  - Rare
  - Low incidence associated with low pediatric spinal cord trauma rates
Pediatric Shock

- Early shock - Very difficult to detect
- Pediatric cardiovascular system compensates well

Early Signs/Symptoms
- Tachycardia - carry chart of normals
- Slow capillary refill ( > 2 seconds)
- Pale or mottled skin, cool extremities
- Tachypnea
Pediatric Shock

- Late Signs/Symptoms
  - Weak or absent peripheral pulses
  - Decreasing level of consciousness
  - Hypotension

- Hypotension = Pre-arrest State
Pediatric Shock Management

- Initial assessment may detect shock, but not its cause
- When in doubt, treat for hypovolemia
Shock Management

- Airway
  - Open, clear, maintain
  - Non-invasive (chin lift, jaw thrust)
  - Invasive (endotracheal intubation)
  - Trauma patient - ? C-spine injury
Shock Management

- Breathing
  - 100% oxygen indicated for all shock
  - Ventilation
    - Reduce work of breathing
    - Do not “fight” patient
Shock Management

 Circulation
  • Apply cardiac monitor
  • Control obvious hemorrhage
  • Elevate lower extremities
Shock Management

- **Fluid Resuscitation**
  - Obtain Access quickly
  - Consider intraosseous access
  - Fluid bolus: 20 ml/kg isotonic fluid
  - Most common error--Too LITTLE fluid
  - Reassess for:
    - Improved perfusion
    - Respiratory distress
  - Check blood glucose
    Give D25W if D-stick < 40 - 60
Respiratory Distress and Failure

- **Respiratory Distress** – severe difficulty breathing. If untreated can lead to respiratory failure. A very common presenting symptom in children.

- **Respiratory Failure** - inadequate gas exchange by the respiratory system, with resulting disturbance of arterial oxygen and/or carbon dioxide levels.
Why Are Kids At High Risk?

- Obligate nose-breathers
- Tongue relatively larger
- Higher larynx (C3-C4 versus C6)
- Narrowing of airway causes exponential rise of airway resistance
- Less elasticity of alveoli
- Lower FRC
- Diaphragm
  - Flatter
  - Muscle fibers more vulnerable to fatigue
- Chest wall
  - More compliant
  - Ribs more horizontal
Typical Causes of Distress

- **Upper airway**
  - Croup
  - Retropharyngeal abscess
  - Epiglottitis
  - Foreign body aspiration

- **Lower airway**
  - Reactive airway disease / asthma
  - Bronchiolitis
  - Pneumonia
  - Pneumothorax
Signs & Symptoms of Distress

- Nasal flaring
- Hypoventilation, apnea
- Stridor
- Grunting
- Wheezing
- Pallor, ashen color
- ↑ WOB
- Tachypnea
- Cyanosis
- Head bobbing
- Tripod positioning
- Retractions
- ↓ Level of consciousness
- ↓ Air movement
- Acidosis
- Hypercapnea
Initial Management

- ABCs, Oxygen, Monitor
  - Give 100% O2 initially
  - Are they maintaining a safe/adequate airway?
  - Are they moving air?
  - Do they have good hemodynamics?

- Failure vs Distress
  - Failure requires immediate action! Bag mask ventilation, possible intubation
  - Distress – supportive care while further evaluating
Initial Management - Upper Airway

- Upper
  - May see stridor, drooling
  - Consider nebulized epinephrine or steroids
  - If suspect retropharyngeal abscess or epiglottitis
    Call ENT or anesthesia
    Keep child calm
    Hold off on xrays, IV, full exam until airway expert arrives
Initial Management - Upper vs Lower Airway

- Lower
  - May hear wheezing, focal rhonci/crackles, decreased breath sounds
  - Consider beta agonist
Other Considerations

- Inability to maintain airway – not all respiratory failure comes from the trachea or lungs
  - Decreased level of consciousness
    - Head trauma
    - Increased ICP
    - Ingestion/sedation
    - Seizure
  - Face/Chest Trauma