Pediatric Assessment

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Pediatric Resuscitation:
Facts and Stats

- Children fare worse than adults in the out-of-hospital phase of resuscitation.
- 70% of all pediatric trauma deaths occur in the field.
- Survival rate for out-of-hospital cardiac arrest is half that of adults.
- Failure rate for resuscitative interventions in field is 2x that of adults.
- Failure rates for prehospital ET intubation for injured children is near 50%.
Pediatric Resuscitation:
Facts and Stats

- Injury: leading cause of death 1-14
- 8% of kids die prior to EMS arrival
- 10% of all calls for kids
- Optimal pre-hospital management is of major importance to reduce M & M

Most common errors in peds management:
- Failure to manage the Airway
- Failure to provide fluid resuscitation
- Failure to recognize and treat internal bleeding
Overview

- Trauma is leading cause of death and disability in children
- Blunt injury represents 80-90%
- Penetrating injury less common
Mechanisms of Injury

- Most common for peds:
  - Falls
  - MVCs
  - Car –vs- ped
  - Drownings and near-drownings
  - Burns
  - Physical abuse
Concerns due to MOI

- Shock
- Musculoskeletal Injuries
- Blunt Trauma
- Burns
  - Thermal
  - Electrical
  - Chemical
Peds vs Auto

Single Injury
- Lower extremity

Multiple Injury
- Head / neck
- Internal chest / abdomen
- Lower extremity fractures
Blunt Trauma

- Number one cause of death in infants and children
- 50% of pediatric deaths occur within the first hour
- Most injuries result from blunt trauma
  - Thinner body walls allow greater energy transfer
- Higher incidence of penetrating injuries in urban areas
Falls

Low height
- Upper extremity fracture

Medium height
- Head/neck injury
- Face/scalp injury
- Upper extremity fracture
Falls

High height
- Head / neck injury
- Scalp / facial laceration
- Internal chest / abdominal injury
- Upper / lower extremity fracture
Bicycle Injuries

Helmeted
- Upper extremity fractures

Unhelmeted
- Head/neck injuries
- Scalp/facial lacerations
- Upper extremity fractures

Handlebar
- Internal abdominal injury
Motor Vehicle Crashes
Occupant

Restrained
- Internal abdominal Injuries
- Lower spine fractures
  - Especially if restraints are not size appropriate

Unrestrained
- Head/neck injuries
- Scalp/facial lacerations
Spinal Injuries
Specific Injuries: Head

Head and brain

- Involved in 60% of blunt injuries

Head, face and neck

- Head injuries: #1 cause of trauma death in peds
- Soft skull
- 60-70% of pediatric cervical fractures occur at C1-C3
Head and Neck Injuries
Concussion

- **Mechanics**: direct blow to head/face/neck or indirect force transmission (body blow)
- **Timecourse**: rapid onset, short-lived impairment, spontaneous resolution
- **Pathophysiology**: function > structure
- **Symptoms**: graded syndromes, may or may not include LOC, sequential resolution
Postconcussion Symptom Scale

- Headache
- Nausea
- Vomiting
- Balance problems
- Dizziness
- Fatigue
- Trouble falling asleep
- Sleeping more than usual
- Sleeping less than usual
- Drowsiness
- Sensitivity to light
- Sensitivity to noise
- Irritability
- Sadness
- Nervousness
- Feeling more emotional
- Numbness or tingling
- Feeling slowed down
- Feeling mentally “foggy”
- Difficulty concentrating
- Difficulty remembering
- Visual problems
Clinical Signs of Concussion

- Consciousness (LOC) – not required
- Memory – post-traumatic/retrograde amnesia
- Cognition
- Neurological (physical)
- Personality (emotional)
Specific Injuries: Chest

- Softer, more flexible ribs
- Soft, pliant airways
- Greater mobility of heart and great vessels
Specific Injuries: Abdomen

- Small abdominal cavity size concentrates injury forces
- Softer, more flexible ribs allow upper abdominal organs to be injured
- Thinner muscles of abdominal wall transmit injury forces directly to internal organs
- Internal organs - Involved in 10% of blunt injuries
Musculoskeletal Injuries

- Connective tissues are stronger than bones
  - Fractures at growing ends more common
- Softer bones
  - Greenstick fractures
- Force required to cause a clean break is significant and cause for concern
Forearm Fracture
Greenstick Fracture
Give Comfort...Give Pain Meds
General Pediatric Assessment

- Scene Assessment
- Initial Assessment
  - General Impression
  - Transport Decision
- Additional Assessment
  - Focused History and Exam
  - Detailed Physical Exam
  - Ongoing Assessment
First Impressions

- “Across the room” assessment
- Pediatric assessment triangle
  * Unstable vs stable
  * Sick vs not sick
  * Urgent vs non-urgent
PAT....Appearance

- TICLS.....pronounced Tickles
- Tone
- Interactivity
- Consolability
- Look
- Speech
PAT....Breathing

- Body position
- Visible movement of chest and abdomen
- Respiratory rate and effort
- Audible airway sounds
Assessment: Breathing

- Increased rate and effort
- Ensure oxygenation and ventilation
- Hypoxia can cause hypoperfusion
- Chest trauma can cause obstructive shock
- Treat any cause of respiratory distress
PAT....Circulation

- Skin Temperature
- Pulse strength
- Capillary refill time
Primary Survey

- Assessment and management occur simultaneously
- Determine any life-threatening conditions
Primary Survey

A - Airway
B - Breathing
C - Circulation
D - Da Brain
E - Exposure
Any Airway Red Flags?

- Vocalization
- Drooling
- Abnormal airway sounds
- Preferred posture
- Tongue obstruction
- Loose teeth or foreign objects
- Bleeding/vomitus
Initial Assessment: Airway

- **Patent and maintainable?**
  - Position
    - Occipital region until 4 years
    - Neutral in-line position
  - Suction
    - Infants < 6 months are nose-breathers
      - Suctioning nasopharynx improves breathing significantly
      - Small enough catheter
      - Do not insert too deeply
      - As briefly as possible

- **Airway adjuncts**
  - OPA
  - NPA
Any Breathing Red Flags?

- Level of consciousness
- Rate and depth of respirations
- Breath sounds
- Symmetric chest rise and fall
- Work of breathing
  - Nasal flaring
  - Retractions
  - Accessory muscle use
  - Head bobbing
  - Grunting
Any Circulation Red Flags?

- Central and peripheral pulse rate and quality
- Skin color, temperature, and moisture (most reliable indicator of perfusion)
- Capillary refill <2
- Mental status
- External bleeding
Hypoperfusion

- Second major cause of pediatric cardiopulmonary arrest
- Unusual because of efficient pediatric vessel constriction
- Fast decompensation
Causes

- Heat loss (newborns, neonates)
- Dehydration
- Infection, sepsis, anaphylaxis
- Trauma
- Blood loss

EMS care focuses on suspecting shock before it develop
Bleeding and Shock

- The total blood volume is smaller (80 mL/kg)
  - 1 y/o ~ 10 kg: Blood volume
    800 mL = 27 oz = 2 cans of soda
  - 6 y/o ~ 20 kg: Blood volume
    1,600 mL = 54 oz = 4.5 cans of soda
- Child’s loss is proportionally greater
Compensated Shock

- Irritability or anxiety
- Tachycardia
- Tachypnea
- Weak peripheral pulses, full central pulses
- Delayed capillary refill (>2 sec in <6 y/o)
- Cool, pale extremities
- Systolic BP within normal limits
- Decreased urinary output
Decompensated Shock

- Lethargy or coma
- Marked tachycardia or bradycardia
- Absent peripheral pulses, weak central pulses
- Markedly delayed capillary refill
- Cool, pale, dusky, mottled extremities
- Hypotension
- Markedly decreased urinary output
- Absence of tears
Reminder...... First Impression

- Ill-appearing children *are* in decompensated shock
- Compensated shock presents with more subtle findings
Assessment: Mental Status

Key indicator of perfusion
Treatment Plan

- High flow O₂
- Aggressive airway/ventilation management
- Volume replacement (20 ml/kg boluses)
- Rapid transport to definitive care
Secondary Survey

F – Full set of vitals and family
G – Give comfort
H – Head to toe and history
I – Inspect
  “It ain’t over until the patient is over”
Memorize their vitals
Transport Decision

- All patients with shock require immediate transport
  - Further assessment en-route
  - Continue treatments
Immobilization and Transport

- **Immobilize small children**
  - C-collar
  - Layer of padding
  - KED
  - Other devices

- **Keep warm**
  - Blankets
  - Head coverings
  - Cold weather
  - Near drowning
Summary

- Maintain Airway, Breathing, and C-spine control
- Give high-flow, high concentration \( O_2 \)
- Assist ventilations if child demonstrates altered mental status or respiratory distress
Summary

- Consider length-based resuscitation tape
- Immobilize as appropriate
- Transport to pediatric tertiary care if possible
- Keep the child warm
And finally……………

Boys will be boys 😊