

Pediatric Trauma Management For EMS

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LEVEL I TRAUMA CENTER FOR CHILDREN

Objectives

- Discuss important concepts in initial pediatric trauma care, including sports and head injuries
- Review several pediatric trauma cases
- Describe the pediatric trauma care landscape in the Upper Midwest



Pediatric Trauma

- Leading cause of death 0-14
 - 20 million injuries
 - 13,000 deaths
 - 1 million temporarily disabled
 - 75,000 permanently disabled
 - 15 billion USD

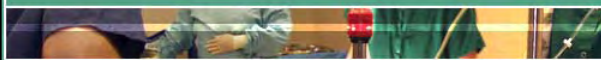


Pediatric Trauma

Major Causes of Death, Ages 1-14 Years, United States, 2006

□ Injury	7388
□ Cancer	1571
□ Congenital	1148
□ Infection	707
□ Cardiovascular	612

National Center for Injury Prevention and Control, 2006



Regions Hospital
HealthPartners Family of Care

Gillette Children's
Specialty Institute

LEVEL I TRAUMA CENTER FOR CHILDREN

What is so different about kids?



Adults vs. Peds

- Infants and children have proportionally larger heads
 - Fall due to “top heavy”
 - Body habitus of Alien Greys



Adults vs. Peds

- Children may generalize pain, not indicate the point of origin
- Blood volumes, though well compensated, are significantly less



Adults vs. Peds

- Ability to compensate for shock
- Children can maintain systolic B/P until as much as 30% fluid loss
- Once a child starts to deteriorate:
 - decompensation happens quickly
- Adults maintain a more gradual decline before quick decompensation



Peds Trauma

- Priorities same as in adults
 - ABCDE
- Remember different normal values for vitals



Airway Assessment

- Crying or screaming indicates an open airway
- Airway smaller – easier to obstruct
- Apnea
- Stridor
- Agonal respirations



Airway

- Large tongue – posteriorly placed
- Short neck and trachea
- Smaller airway diameter
- Obligatory nose breathers (infants)
- Large cranium



Airway Assessment

- Determine responsiveness
 - AVPU (alert/verbal/pain/unresponsive)
- Is the airway patent?
 - Clear of secretions, FB, tongue obstruction
- Interventions to clear/open an airway
 - Reposition head, neutral position
 - Place an oral airway

Breathing

- Compensatory measures are less effective
- Higher metabolic rate
- Normal respiratory rate varies with age

Infant (birth–1 year) 30–60

Toddler (1–3 years) 24–40

Preschooler (3–6 years) 22–34

School-age (6–12 years) 18–30

Adolescent (12–18 years) 12–16



Breathing – Assessment

- Rate
 - Tachypnea – initially in shock
 - As shock progresses – rate slows
- Oxygenation
 - Lips and nailbeds – should be pink
 - If not, aggressive oxygenation required
- Greater oxygen demands – especially in trauma



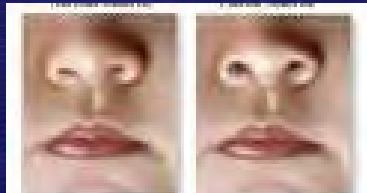
How to assess Breathing?

- Spontaneous respirations
- Equal rise and fall of the chest
- Color
- Rate and depth of breathing



How to assess Breathing?

- Work of breathing
 - Nasal flaring, grunting, retracting



Circulation

- Decreased circulating blood volume
- Rapid heart rate
- Strong compensatory mechanism
- High oxygen demand



Age Related Heart rate and Blood Pressure

Infant (birth–1 year):	P=130	SBP=80
Toddler (1–3 years)	P=110	SBP=90
Preschooler (3–6 years)	P=100	SBP=100
School-age (6–12 years)	P=90	SBP=110
Adolescent (12–18 years)	P=80	SBP=120



Level of Consciousness

- Friends or family may indicate if child is acting normal
 - Especially around strangers
- Is the child acting normally for given age
- Are the child's cries appropriate
- Is the child interacting with parents and EMS properly



More things to assess...

- Capillary refill
- Peripheral and central pulses
- Skin color and temperature
- Vital signs-Hypotension is a LATE sign of poor circulation (shock) in children



What is so different about kids?



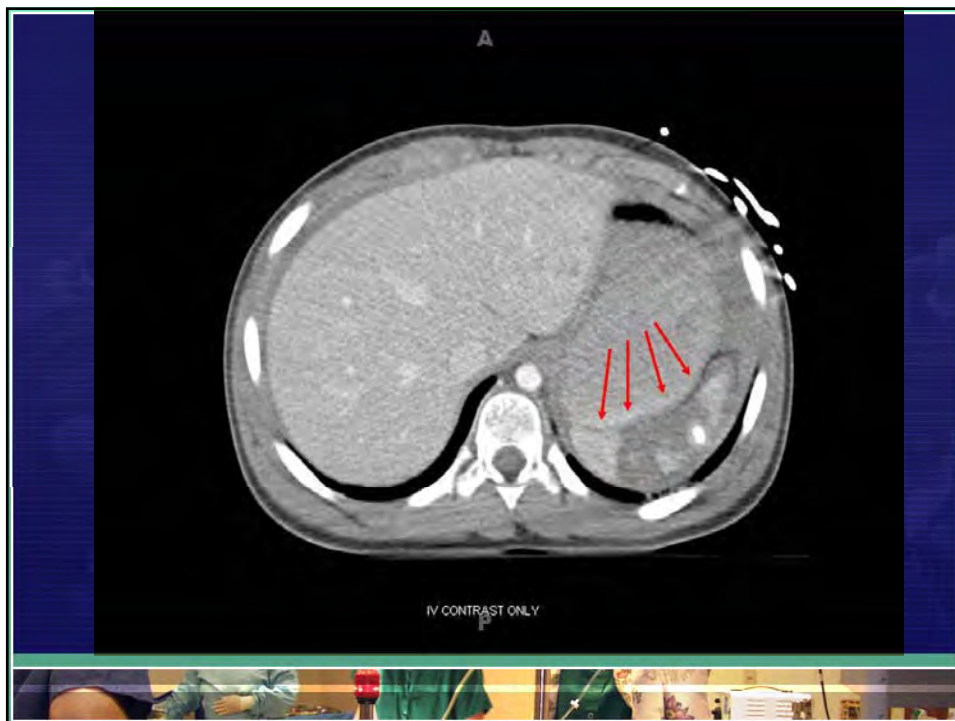
Case 1 – Sports Injury

- 17 year old soccer player
- Collided with another player
- Complains of L flank pain
- EMS management???



Case 1 – Sports Injury

- Basic evaluation – ABC
- Protect c-spine and torso
- Evaluate abdomen
- Suspect solid organ injury



Sports Injuries

- Concussion
- Solid organ injury
- Fracture
- Sprains / strains



Concussion

- It's a brain injury!
- EMS management
 - Oxygenate
 - Maintain volume
 - Monitor neuro status
 - Transfer to appropriate hospital



Concussion

- When to return to play?
 - Many different sets of recommendations
 - No LOC, no amnesia – 1-2 weeks
 - LOC or amnesia – 2-3 weeks
 - Multiple concussions with concentration or memory problems – NEVER
- IMPACT testing is very helpful



Solid Organ Injury

- Typically liver or spleen
- Side / flank impact
- Immediate pain
 - Abdomen
 - Shoulder



Solid Organ Injury (suspected)

- EMS Management
 - IV access
 - Monitor vital signs
 - Watch abdominal exam
 - Transport to trauma center



Fractures

- Can happen in any sport
- EMS management
 - IV access
 - Splint / immobilize
 - Pain control
 - Transport to appropriate hospital



Case 2 – Found Down

- 2 year old girl playing by herself
- Parent notices that the house is “too quiet”
- Finds child lying in play room, not breathing and blue. No pulse
- ???

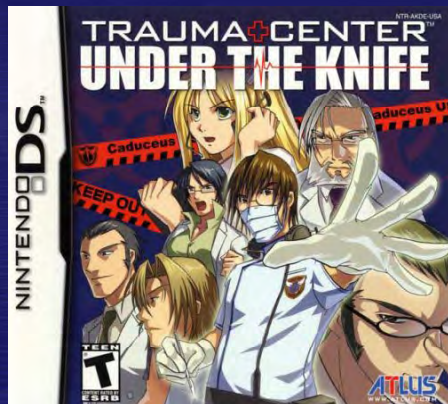


Case 2 – Found Down



Overview

- Trauma Centers
- Pediatric Trauma

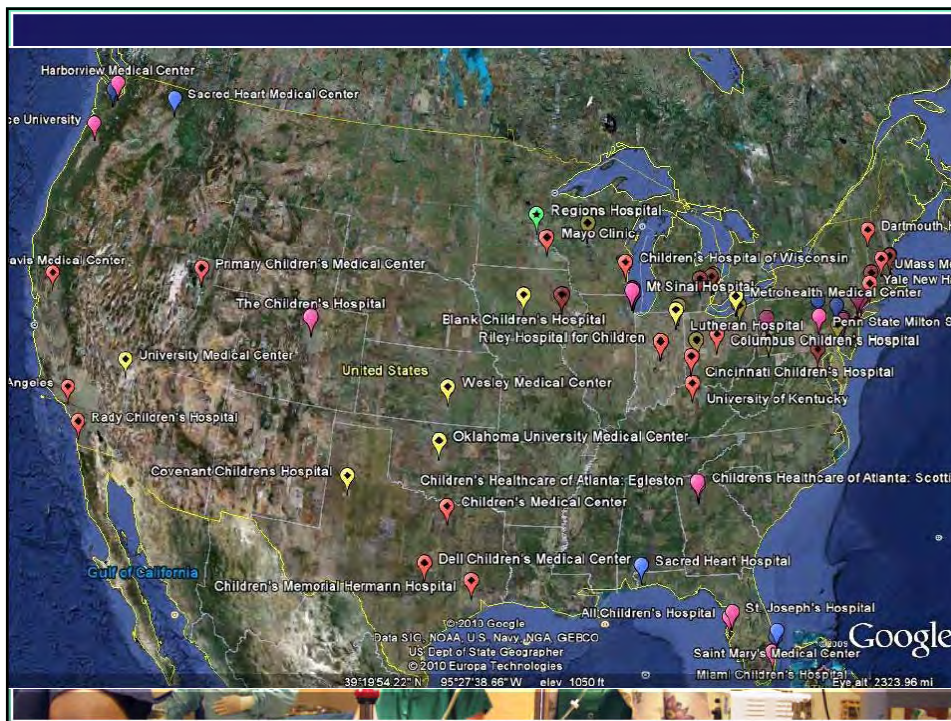


Trauma Centers

- Approximately 500 Level I/II centers nationwide
 - Half verified by the ACS
 - Half designated by state/local authority or self-designated
- All Level I and II centers in Minnesota are ACS verified
 - All Level III and IV centers are state designated

Pediatric Trauma

- ACS definition – age 0-14
- Pediatric Trauma Centers are scarce
 - Most are in dedicated children’s hospitals or university hospitals



Pediatric Trauma


- What do we do?
 - Only about 40 pediatric centers in the country!
 - Responsibility falls on adult trauma centers
 - If more than 100 injured children treated, must meet certain extra requirements



	Pediatric Commitment	Level II	Level I
Pediatric resuscitation equipment	✓	✓	✓
Blood microsampling	✓	✓	✓
Pediatric trauma CME for surgeons	✓	✓	✓
Pediatric PI	✓	✓	✓
PICU	✓	✓	✓
Pediatric Critical Care Physicians	✓	✓	✓
Pediatric ED area	✓	✓	✓
Pediatric Social Work		✓	✓
Pediatric Rehab		✓	✓
Child Life		✓	✓
Pediatric Orthopedic Surgeon #1		✓	✓
Pediatric Neurosurgeon #1		✓	✓
Pediatric Injury Prevention and outreach		✓	✓
Pediatric Trauma education programs		✓	✓
Pediatric volume > 100 / year		✓	✓



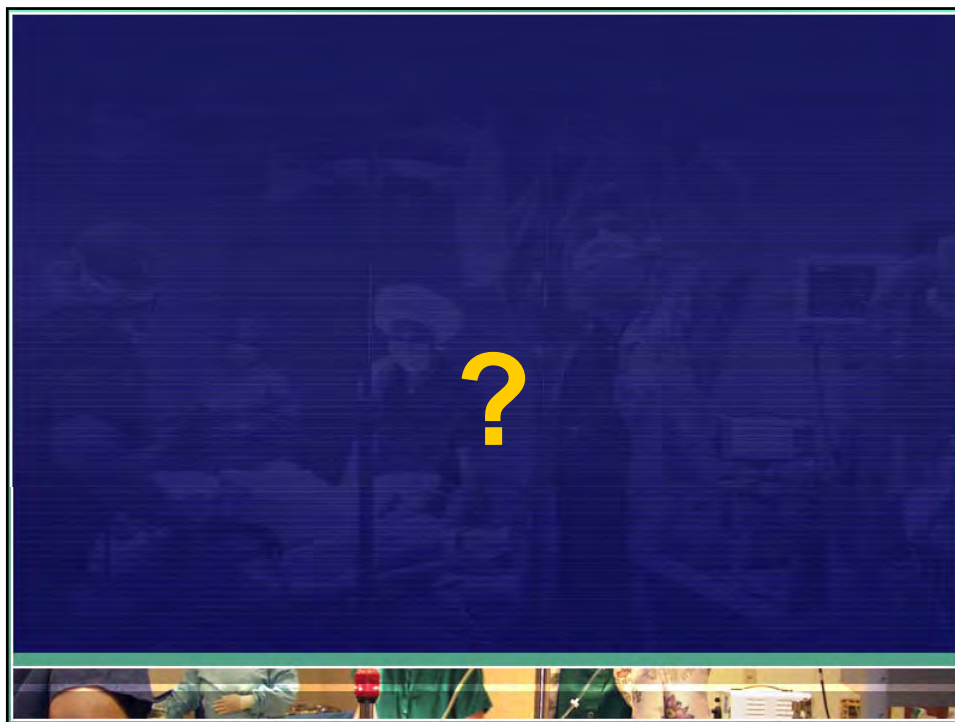
	Pediatric Commitment	Level II	Level I
Pediatric Trauma Service		✓	✓
Pediatric CME for Trauma Med Dir and liaisons		✓	✓
Pediatric Trauma Program Manager		✓	✓
Adult trauma surgeons credentialed for Peds		✓	✓
Pediatric Surgeon #1		✓	✓
Pediatric Trauma Registrar		✓	✓
Pediatric research			✓
Pediatric Neurosurgeon #2			✓
Pediatric Orthopedic Surgeon #2			✓
Children's Hospital within organization			✓
Pediatric Surgeon #2			✓
Pediatric Surgeon Trauma Med Dir			✓
Pediatric Volume > 200 / year			✓
Pediatric EM Physicians (2)			✓



What To Do With Kids?

- Most seriously injured children should be taken to the nearest Level I Trauma Center
- Children with injuries that will require aftercare should be taken to the nearest Level I Pediatric Trauma Center
 - Severe head injury
 - Complex pelvis or other complex ortho
 - Complex soft tissue injuries









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The Trauma Professional's Blog

3 results for "ems"

EMS: Which Field Airways Work The Best?

Oral endotracheal intubation is the gold standard when a field airway is needed. However, they are not always possible due to protocol, training, patient anatomy or specific injuries. To allow airway support in these situations, a number of techniques and devices have been developed. The problem is, **do we really know which one(s) are best?**


To try to answer this question, a huge meta-analysis of all the English literature with information on success rates for these techniques was carried out. Over 2000 papers were identified, and they were narrowed down to 35 studies involving over 10,000 patients.

The success rates that they identified were as follows:

- King LT airway - 96.5%
- Esophageal Obturator / Esophageal Gastric Tube Airway - 92.6%
- Surgical cricothyroidotomy - 90.5%
- Laryngeal mask airway (LMA) 87.4%
- Combitube - 85.4%
- Pharyngeotracheal laryngeal airway (PTLA) - 82.1%
- Needle cricothyroidotomy - 65.8%

The Bottom Line: The **King airway** has the highest success rate of the alternative airway devices, although there was less data available and the effectiveness of ventilation has not been worked out yet. The best percutaneous rescue airway was the **surgical crich**.

Reference: A Meta-Analysis of Prehospital Airway Control Techniques Part II: Alternative Airway Devices and Cricothyrotomy Success Rates. Prehospital Emergency Care 14(4):515-530, Oct-Dec 2010.



The Trauma Professional's Blog provides information on injury-related topics to trauma professionals. It is written by Michael McGonigal MD, the Director of Trauma Services at Regions Hospital in St. Paul, MN. Regions is a Level I Adult Trauma Center, and has partnered with Gillette Children's Specialty Hospital to become the first Level I Pediatric Trauma Center in the Upper Midwest.

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