Current Trends in Pediatric Trauma Surgery

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Speakers Disclosure Statement

Dr. Gates discloses that he has no relevant financial relationships with commercial interests.

Dr. Gates does not anticipate discussing unlabeled uses of any commercial products or any investigational products.
Objectives

- Increased awareness of the advances in the treatment strategies in pediatric trauma
- Understand the importance of early intervention and education in pediatric trauma
Children are NOT Little Adults

- William Ladd – Father of Pediatric Surgery
- 1977 – Non-operative management of solid organ injury
- Beginning of changes on a number of fronts
  - Development of the Broselow system
  - Specialized transport services
  - Pediatric rehabilitation
  - Establishment of pediatric trauma centers
  - Injury prevention
Pediatric Trauma Centers

- Lower mortality when care is delivered in a pediatric trauma center compared to adult trauma center (Notrica 2012, Peng 2015)

- Lower imaging rates
  (Mannix 2011, Adelgais 2014)
  - Lower radiation dose rates (Brinkman 2014)

- Lower operative rates for solid organ injury
  (Polites 2015)
Focus on Education

- EMS
  - Increased familiarity with pediatric patients
  - Simulation scenarios
  - Pediatric Response Bags
    - Rural counties
    - Distribution – March 4
- PEPP Course
  - February 23-24
Focus on Education

• Trauma Resuscitation
  – Expansion of ATLS
  – TRIK Course (Canada)
    • Intense course involving lectures, high fidelity simulation, on-line learning modules, small group discussions
Critical Care

- Pediatric Shock Index (Acker, 2015)
  - Heart rate/Systolic blood pressure
  - Age adjusted
    - Age 4-6: SI > 1.22
    - Age 7-12: SI > 1.0
    - Age 13-16: SI > 0.9
  - Greater likelihood of having an intra-abdominal injury, highest risk of death
• Pre-hospital use of blood products (Potter, 2015)
  – Rural trauma center
  – Indications
    • Severe anemia
    • Known blood loss
    • Non-responder to intravenous fluid
  – Increase Hemoglobin, decreased acidosis, unexpected survivors
Traumatic Brain Injury

- Leading cause of death in children
- Over 3000 deaths annually in children less than 14 years of age
- Over 3 million children suffer concussions
- Consensus guidelines developed in 2003 and revised in 2012
  - No class I evidence to support recommendations
  - Research agendas currently being established
Traumatic Brain Injury - Severe

- Adherence to guidelines decreases mortality

- Guidelines (Vavilava 2014)
  - Early correction of hypoxia
  - Hyperosmolar therapy
  - Cerebral Perfusion Pressure > 40
  - Nutrition initiated in the PICU
  - Ventilation strategies to maintain PaCO2 > 30 (in the absence of cerebral herniation)
Traumatic Brain Injury
- Mild

• Persistent behavior problems following MILD traumatic brain injury (Taylor, 2015)
  – Incident at younger age
  – Monitor behavior long after injury
• Concussion awareness (Caskey, 2014)
  – Referral to TBI center
  – Focus on prevention of secondary brain injury
• State mandated medical clearance (Mackenzie, 2015)
  – Increased vigilance w/o increase in diagnostic CT
Imaging Standards

• Indications and numbers of scans increasing dramatically
  – 11% of all CT scans performed on children
  – Estimated 7 million scans/year

• Guidelines
  – Avoid protocoled scanning (pan scans)
  – Use dose minimization strategies
  – Defer imaging if a child is to be transferred, unless the accepting institution requests it
  – Pediatric trauma centers should avoid rescanning children unless absolutely necessary
Imaging Standards

• Cervical Spine Injury
  – Potential increased risk for development of thyroid cancer when CT scan is used for evaluation in children under age 8 (Muchow 2012)
  – CT scan effective for C-spine clearance in obtunded patients (Panczykowski 2011)
  – For low risk of injury, clinical exam and plain radiographs (lateral and AP) are sufficient to screen for injury (Rosatti 2014)
C-Spine Immobilization

- Head positioned relative to the body
- Appropriately sized collar
  - Immobilize without the collar
- Remove backboard early
Non-Accidental Trauma

- Standardized screening program (Escobar 2014)
  - Social history missing in 41-73% of patients
  - Findings
    - 88% had undiagnosed healing fractures
    - 77% male
    - 77% under age 6 months
    - 54% had extremity fractures
    - 50% had ISS > 16 (severe)

- Conclusion – Standardized screening enhances awareness and leads to NAT diagnosis prior to repeat injury
Pediatric Trauma Society

- Multidisciplinary
- Low cost membership
- Next annual meeting
  - November 5-7, 2015
  - Scottsdale, Arizona