

Moderator:

Dan Kavanaugh, EMSC Project Officer

**Making Trauma Systems Work
for Injured Children – EMSC
Performance Measures Can
Make a Difference, An Internet
Webcast**

Wednesday, September 27, 2006
1:30-3:30pm Eastern

***Pediatric Trauma
EMSC Webcast***

Marianne Gausche-Hill, MD, FACEP, FAAP
Professor of Medicine, David Geffen School of Medicine at UCLA
Director, EMS and Pediatric Emergency Medicine Fellowships
Harbor-UCLA Medical Center
Department of Emergency Medicine
Torrance, CA

Objective

- Utilizing a case study methodology, provide states with background materials and examples illustrating delivery of essential pediatric trauma care utilizing four components of defined EMSC Performance Measures

Performance Measures

1. Prehospital provider agencies have on-line and off-line pediatric medical direction at the scene of an emergency.
2. Prehospital provider agencies have essential pediatric equipment and supplies as outlined by national guidelines.
3. Existence of a statewide, territorial or regional standardized system that recognizes hospital capable of stabilizing and/or managing pediatric emergencies.
4. Hospitals have written inter-facility transfer agreements that specify alternate care sites that have capabilities to meet the clinical needs of critically ill and injured pediatric patients.

The Scenario



- Monday, early September
- Parent car pool has just pick up its last rider
- Four children are seated in van and vehicle has come to a stop at the bottom of a hill
- An 18-wheeled truck trailer is coming down the hill when the driver realizes that the brakes are out
- The truck hits the back of the van full force

Damage and Patients

- Upon impact, the children in the last 2 rows are thrown forward
- The front of the truck has intruded into the back of the vehicle
- There are 5 persons in the vehicle. The driver is walking frantically and pointing at the van upon EMS arrival.
- There are 4 children in the van

Emergency Care Resources

- EMS system is fire-based with 1 paramedic and 1 EMT-basic staffing each rescue
- Paramedics contact a regional base hospital for destination and on-line medical oversight
- There is a community hospital within 10 minutes of the accident
- The nearest trauma center (Level III) is 15 minutes from the scene
- A Level I trauma center is 25 minutes away by ground; 10 minutes by air

The Patients

- The driver is ambulatory and appears unhurt
- Patient 1: unrestrained is thrown into the aisle striking her head but is alert and responsive
- Patient 2: has left upper leg deformity and he is alert

The Patients

- Patient 3: is apneic; with obvious skull deformity
- Patient 4: is noted to be pinned between back door of the van which has been pushed in by the truck bumper, and the back of the middle seat; his chest is compressed and respirations are slow and shallow; he is unresponsive and a large scalp laceration is actively bleeding

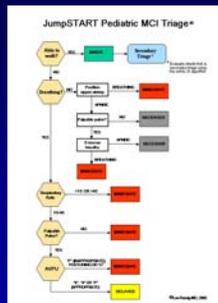
Trauma Triage

- Multicasualty incidents are incidents in which number of victims overwhelms the capabilities of an EMS service or EMS system
- Triage for pediatric patients in this setting is complex; balancing EMS resources with patient medical issues
- Emotions often run high



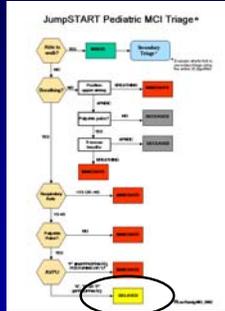
Jumpstart Triage

- Dr. Romig, a pediatric emergency physician from Florida has developed a modified trauma triage system for pediatric patients in multi-casualty incidents called JumpSTART
- <http://www.jumpstarttriage.com/>



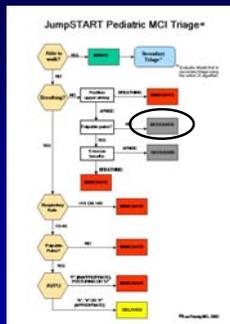
Triage Decisions

- Patients 1 and 2 using JumpSTART...are alert and breathing normally
- Patients 1 and 2 although have injuries and are not ambulatory, triage as delayed



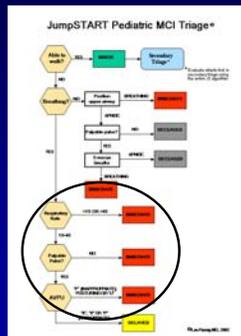
Triage Decisions

- Patient 3 remains apneic after airway positioning using jaw thrust maneuver; no pulse is present
- Patient 3 is triaged as Deceased
- Triage of last patient should proceed



Triage Decisions

- Patient 4: has a respiratory rate of <15 breaths per minute and remains unresponsive
- Patient 4 is triaged as immediate
- Extrication and treatment should proceed rapidly

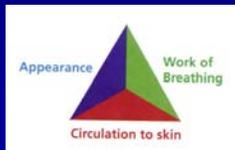


Assessment and Treatment

- After extrication of Patient 4 assessment and treatment proceeds in a logical sequence.

Assessment

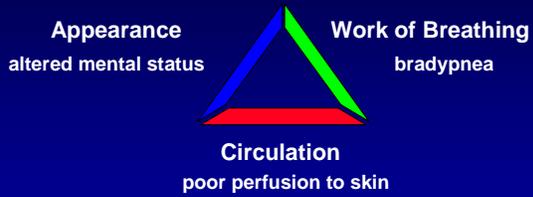
- Proceeds in a logical sequence to evaluate and treat life and limb threatening injury
 - Initial assessment (primary survey)
 - Pediatric Assessment Triangle (PAT)
 - ABCDE's (F- family)



Prehospital Phase

- Pediatric Assessment Triangle
 - Appearance: unconscious, not responsive to surroundings
 - Work of Breathing: bradypneic, no retractions
 - Circulation: color - pale

Pediatric Assessment Triangle



General Impression

- Stable
- Respiratory distress
- Respiratory failure
- Shock
- CNS/Metabolic
- Cardiopulmonary failure

General Impression

- Stable
- Respiratory distress
- **Respiratory failure**
- **Shock**
- CNS/Metabolic
- Cardiopulmonary failure

Prehospital Airway Management

- Bag-mask ventilation preferred method of ventilation support in out-of-hospital setting
- Use "squeeze, release, release" technique to avoid excessive hyperventilation

Gausche M, et al: Effect of out-of-hospital pediatric endotracheal intubation on survival and neurological outcome: A controlled clinical trial. *JAMA* 2000;283:6:783-790

Prehospital Airway Management

- Recent guidelines published *Pediatric Critical Care Medicine* July 2003
 - Standards: Insufficient data
 - Guidelines: Administer oxygen as hypoxia is to be avoided; no evidence to support use of ETI in out-of-hospital setting

Patient 4

- Spinal stabilization
- Direct pressure on bleeding scalp LAC
- IV placement en route with infusion of Normal Saline
- Patients 1 and 2 are treated by additional rescues arriving at scene

Patient Assessment/Treatment

- Local/regional EMS agencies establish protocols for assessment and treatment
- National resources available for pediatric patients;
 - NAEMSP Model Pediatric Protocols 2003
www.naemsp.org
 - Educational courses:
 - PHTLS, BTLS, ATLS, TRIPP basic and paramedic, PEPP

Medical Direction/Oversight

- Off-line medical direction/oversight:
 - Protocols/policies/treatment guidelines established prior to patient interaction
 - Pediatric equipment for ambulances
 - Role for pediatric expertise within EMS systems – Pediatric Coordinator
 - Critical for initial triage and medical management of patients in this scenario

Equipment for Ambulances

- National Guidelines available:
 - American College of Emergency Physicians and American College of Surgeons
www.acep.org
 - Seidel JSS, et al: Guidelines for pediatric equipment and supplies for basic and advanced life support ambulances. *Ann Emerg Med* 1996;28:6:699-701.

Medical Direction/Oversight

- On-line medical direction/oversight:
 - Real-time interaction of physician or designee with EMS provider caring for a patient
 - Local protocols and resources will dictate use of on-line medical direction/oversight
 - Variable use of on-line medical direction/oversight
 - May assist with complex medical issues and destination decisions

Transport Decisions

- One patient will be left at scene - pronounced
- Three patients require transport from the scene
 - *What are special issues in transport decision for these patients?*
 - *Should all patients go to closest receiving facility/local community hospital?*
 - *Which patients should be transported to Level III versus Level I trauma center?*

What are special issues in transport decision for these patients?

- 2 patients with mild/moderate injury – potential for deterioration
- 1 critical patient in respiratory failure/shock
- On scene resources are limited

Should all patients go to closest receiving facility/local community hospital?

- No.
- Three injured pediatric patients may overwhelm a small community ED
- Community EDs which see influx of visitors in their region should plan for possibility of surge of adult/pediatric patients

Which patients should be transported to Level III versus Level I trauma center?

- Trauma triage criteria based on mechanism/physiology and varies between systems
- Pediatric issues should be addressed in trauma triage and in destination decisions
- Patients in extremis/airway obstruction who may deteriorate with additional transport time...Level III

Where should these children be transported?

- Recent guidelines published *Pediatric Critical Care Medicine* July 2003
Standards: Insufficient data.
Guidelines: Pediatric patients with severe TBI should be treated in a pediatric trauma center or adult trauma center with added pediatric qualifications
- Patient 4/Immediate to Trauma Center

Goal

- Regionalized, coordinated, and accountable system that seamlessly triages and transports patients to appropriate level of care
- All receiving facilities should have staff, equipment, medications and supplies
 - ACEP/AAP Joint Policy Statement: *Care of Children in the Emergency Department: Guidelines for Preparedness* (2001 *Ann Emerg Med* and *Pediatrics*)

EMSC Pediatric Trauma Web cast September 27, 2006 Emergency Department Preparedness



Evelyn Lyons, RN, MPH
EMSC Manager
Illinois Department of Public
Health
Division of EMS & Highway Safety

Children and Emergency Care



- Nearly 30% of all ED visits are made by children.
- Over 29 million children/adolescents visited an ED in 2002
- The majority of pediatric ED visits (92%) are made to general hospitals that treat adults and children in the same department.
- EDs that treat both children and adults
 - Unlikely to have a pediatric emergency medicine MD on staff
 - Many lack basic pediatric equipment and supplies

How Prepared are EDs for Children?

■ Pediatric equipment/supplies

- Approximately 6% of hospitals have all the pediatric supplies outlined by AAP/ACEP recommendations
- Approximately 50% of hospitals have at least 85% of supplies

■ Transfer agreements

- Of hospitals without a separate pediatric inpatient ward, only about half have written transfer agreements

■ Disaster preparedness

- Plans largely overlook the needs of children

How Prepared are EDs for Children?

Literature on pediatric practice patterns indicate shortcomings

- *High rates of pediatric medication errors*
- *Low rates of pain management for pediatric patients*
- *Wide variation in practice patterns in the care of children*
- *Undertreatment of children in comparison with adults*
- *Many missed cases of child abuse*

How Prepared are EDs for Children?

Mock trauma simulations conducted in 35 North Carolina EDs (including 5 trauma centers) indicated need to improve in :

- Estimating a child's weight
- Preparing for intraosseous (IO) placement
- Ordering dextrose properly in a hypoglycemic child
- Correctly warming a hypothermic child
- Ordering proper administration of IV fluid boluses

Hunt et al. Pediatrics, March 2006



Institute of Medicine Report (2006)

- Supports **further regionalization** of emergency care services
- “.....recommends that the Dept of Health & Human Services and National Highway Traffic Safety Administration, in partnership with professional organizations, **convene a panel of individuals with multidisciplinary expertise to develop an evidence-based categorization system for EMS, EDs and trauma centers** based on adult and pediatric service capabilities.”



National EMSC Performance Measures

- **66c - Facility Recognition/Categorization System**
- **66d - Interfacility Transfer Guidelines**
- **66e - Interfacility Transfer Agreements**



EMSC Performance Measure # 66c

The existence of a statewide, territorial, or regional standardized system that recognizes hospitals that are able to stabilize and/or manage pediatric medical emergencies and trauma

EMSC Performance Measure

#66d

Percentage of hospitals in the State/Territory with written pediatric **inter-facility transfer guidelines** that specify:

- Roles/responsibilities of referring facility and referral center
- Consultation and transfer process
- Patient medical record transmission
- Informed consent by parent or legal guardian
- Selection of transport service based on patient acuity
- Level of care provision during transfer

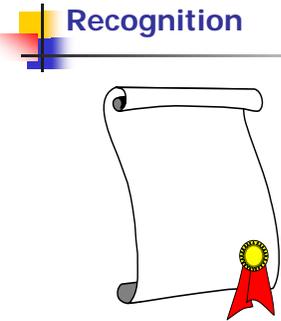
EMSC Performance Measure

#66e

Percentage of hospitals in the State/Territory with written **pediatric inter-facility transfer agreements** that specify:

- Inter-facility communication between physicians
- Transport to facility that matches level of care needed
- Transfer of patient information and personal belongings
- Return transfer to referring facility as appropriate

Illinois Pediatric Facility Recognition



Process to identify the readiness and capability of a hospital and its staff to provide optimal pediatric emergency and critical care

Facility Categorization/Designation

- Trauma Centers
- EMS Resource Hospitals
- Burn Centers
- Perinatal System
- Others



Emergency Care Facility

Steps in the Illinois EMSC Facility Recognition Program

- Facility Recognition Task Force
- Development of criteria
- Development of an implementation process
 - Voluntary process
 - Tiered recognition
 - SEDP - Standby Emergency Department for Pediatrics
 - EDAP - Emergency Department for Pediatrics
 - PCCC - Pediatric Critical Care Center
- 1998 - Piloted the process in select EMS regions
- 1999 - Statewide implementation began
- 2005 - Mandatory participation by EMS Resource Hospitals



Facility Recognition Task Force Membership

- Illinois Chapter, American Academy of Pediatrics
- Illinois College of Emergency Physicians
- Illinois Academy of Family Physicians
- Illinois Council, Emergency Nurses Association
- Illinois Hospital Association
- Metropolitan Chicago Healthcare Council
- Illinois Perinatal System
- ED Nurse, ED Physician, EMS Coordinator, Pediatric Nurse Practitioner, Physician Assistant, Pediatric Intensivist, PICU Nurse, Pediatric Nurse Manager, Transport Team reps

Pediatric Facility Recognition Levels

SEDP	EDAP	PCCC
<ul style="list-style-type: none"> ■ Standby or Basic ED ■ May not have 24 hour physician coverage in the ED ■ Typically does not have inpatient pediatric capabilities ■ Criteria aims to assure capabilities to initially manage/resuscitate patient ■ Transfer agreements 	<ul style="list-style-type: none"> ■ Comprehensive ED ■ 24 hour ED physician coverage ■ Able to provide more specialized pediatric services ■ May have inpatient pediatric capabilities ■ Transfer agreements 	<ul style="list-style-type: none"> ● Comprehensive ED that is an EDAP ● Dedicated PICU ● Range of pediatric specialty services and inpatient resources ● Coordinate transfer agreements with referral facilities ● Transport team or affiliation with transport system

Facility Recognition Criteria

- Facility requirements
- Physician, Nursing and Mid-Level Practitioner requirements
- Interfacility Transfer/Transport requirements

Facility Recognition Criteria

- Pediatric policies/procedures
- Treatment guidelines
- Pediatric Continuous Quality Improvement (CQI)
- Equipment, supplies and medication requirements

Initial Application and Renewal Process

- Conduction of regional educational sessions
- Application submission by hospitals
- Application review conducted by EMSC staff
- Conduction of site survey by 3-4 member survey team
- Approval/disapproval of recognition
- Formal recognition of hospital pediatric recognition level by state health department
- Renewal process every 3 years

Pediatric Facility Recognition Status in Illinois' 11 EMS Regions



- Over 100 hospitals (~60%) recognized as a PCCC, EDAP or SEDP
- List of recognized hospitals on Illinois EMSC & Illinois Department of Public Health websites
- Initial step in pediatric disaster/terrorism preparedness

Pediatric Facility Recognition/ Categorization

- What is Needed
 - State level support
 - Commitment by stakeholders
 - Availability of technical assistance, educational or other resources as appropriate
 - Perseverance
 - Patience



Facility Recognition Goal

To decrease childhood morbidity and mortality by ensuring the availability of appropriately trained personnel, along with appropriate emergency department resources and capabilities in order to effectively manage the critically ill and injured child.

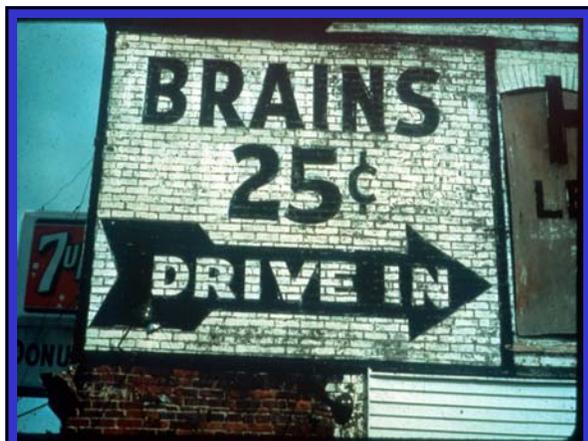


Children in Trauma Systems

EMSC Web cast
September 27, 2006

David P. Mooney, MD, MPH
Children's Hospital Boston





Children in Trauma Systems

- Scenario
- Trauma Systems
- Trauma Centers
- Emergency Departments
- Additional Considerations



Scenario

- One child DOA
- One critically injured
- 2 mild-moderately injured



Scenario

- One DOA
- One to the Trauma Center
- 2 to the community hospital



Children in Trauma Systems

- Communication system
- EMS
- Triage and transfer
- Emergency Department care
- Inpatient Care
- Rehabilitation
- System evaluation

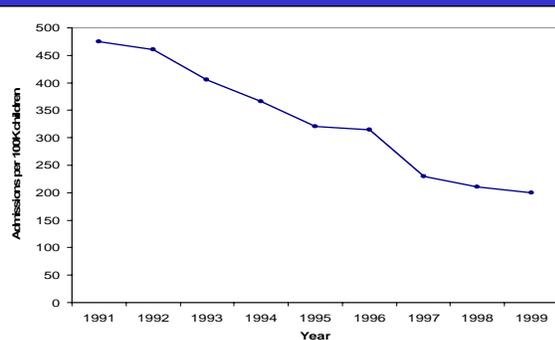


Why triage children?

- Resources
- Experience
- Preparation
- Attitude
- Follow-up
- Distribute patients



NE Pediatric Injury Admissions



Trauma Center Levels

- ACS: I, II, III, IV adult trauma centers
- I and II pediatric trauma center
- PA and others: Added Qualifications
- Non trauma hospitals



Trauma Center Levels

- Highest level has most resources
- Highest level has most experience
- Any level dedicated personnel and resources to focus on the care of the injured
- Pediatric centers have a focus on children
- Does it matter?



Adult Trauma Center Outcome

- McKenzie et al, 2006
 - Prospective analysis of outcome
 - Mortality decreased 25%
 - Possible to extrapolate to children?
- Pediatric study in planning phase



Hospital Type and Outcome

- Henri Ford, et al, 2000
 - PA Trauma Outcome Study
 - PTC versus AQ Center versus Adult
 - PTC had lowest mortality rate, AQ second, Adult centers worst



Hospital Type and Outcome

- Densmore, et al 2006
 - KID database
 - Mortality decreased 10.7% in children's centers
 - Length of stay shorter, costs less
 - Freestanding hospitals better than unit



Hospital Type and Spleen Outcome

- Stylianos et al, 2006
 - CA, FL, NJ, NY 2000-2002
 - Lower operative rates at trauma centers
- Mooney and Forbes, 2006
 - KID database
 - Lower operative rates at children's hospitals



ED Designation and Outcome

- Emerg. Dept Approved for Peds. facilities
- Mortality evaluation before and after EDAP process
- Improved mortality after designation



EDAP Process and Outcome

- ISS 1-9: Mortality decreased 22%
- ISS \geq 10: Mortality decreased 18%
- Multifactorial





Children in Trauma Centers

- Improved mortality at trauma centers
- More appropriate care
- Shorter length of stay
- EDAP makes a difference



Trauma System Hurdles

- Triage/Transfer and Turf
 - Loss of Patients
 - Money
 - Pride
- Advocate, continuing presence
- Data



Additional Pediatric Considerations

- Psychological issues
 - Parental presence
 - Coping counseling
- Pediatric Rehabilitation
- School reintegration
- Developmental issues



Trauma System Components

- Continuous performance improvement
- Injury prevention
- Education
- Research



Inclusive versus Exclusive

- Densmore et al
 - 90% of injured children at non-Children's hospitals
- Pediatric Trauma Centers are few
- All hospitals must be prepared



Children in Trauma Systems

- Considered at every step
- Work begins prior to the event
- Continuum of care from scene through return to community
- Constant evaluation
- Inclusive-education
- Injury prevention



