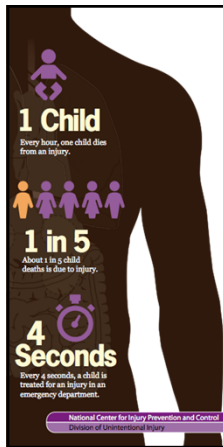


Pediatric Trauma

Trauma REACH Workshop
May 5th, 2015

Tamer A. Ahmed, MD
Pediatric Trauma Medical Director
Upstate's Golisano Children's Hospital






1 Child
Every hour, one child dies from an injury.

1 in 5
About 1 in 5 child deaths is due to injury.

4 Seconds
Every 4 seconds, a child is treated for an injury in an emergency department.

UPSTATE Golisano Children's Hospital Pediatric Trauma Center



Problem >> INJURY
The #1 killer of children in the US

For every **1** child that dies there are...

- 25** hospitalizations
- 925** treated in ER
- Many** more treated in doctors' offices

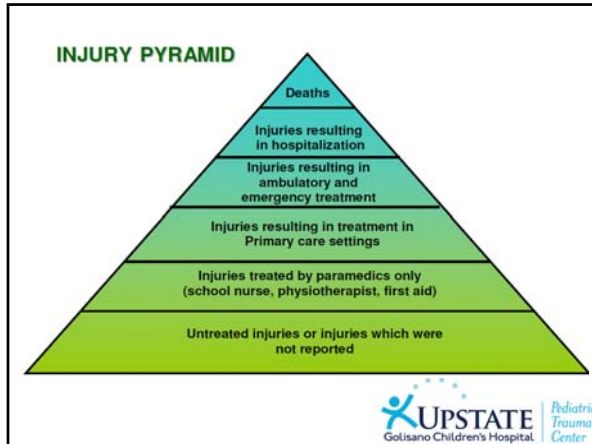
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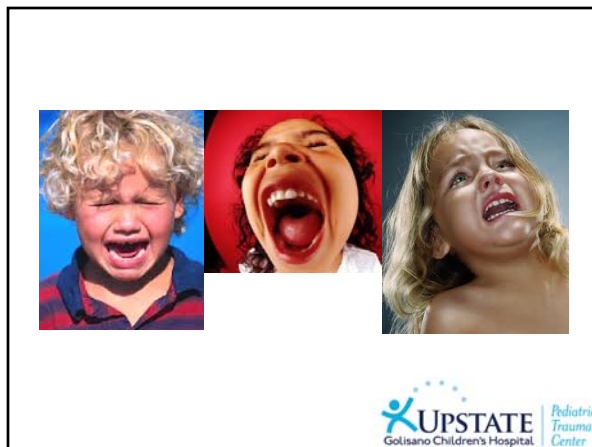
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In 2005, injuries that resulted in death, hospitalization or an ER visit cost nearly \$11.5 billion in medical expenses.

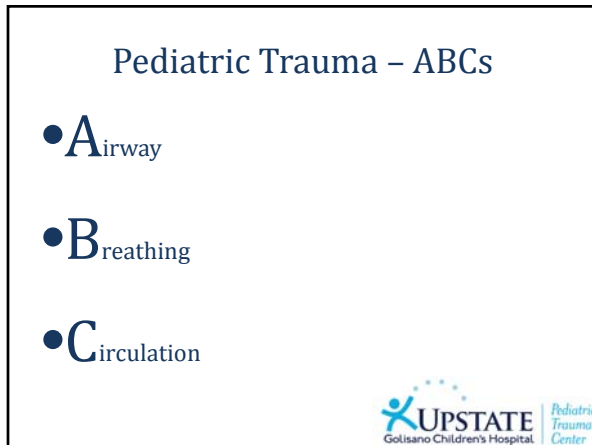
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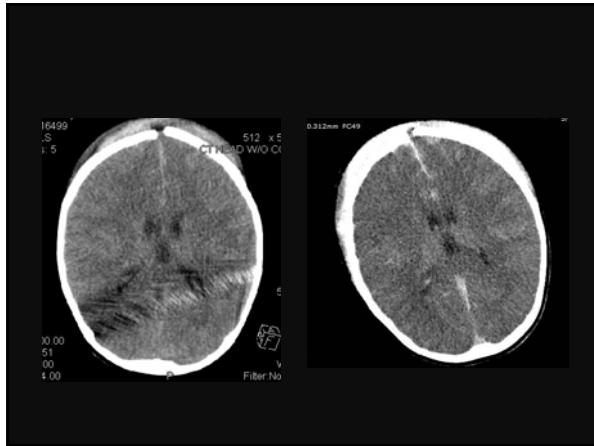










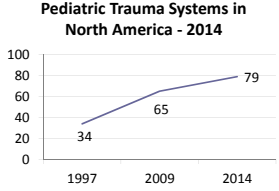


What can we do better?



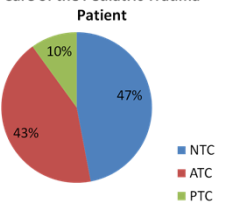
Pediatric Trauma

Pediatric Trauma Systems in North America - 2014




Year	Number of Systems
1997	34
2009	65
2014	79

Care of the Pediatric Trauma Patient



Category	Percentage
NTC	47%
ATC	43%
PTC	10%



Pediatric Trauma


Why are kids different?


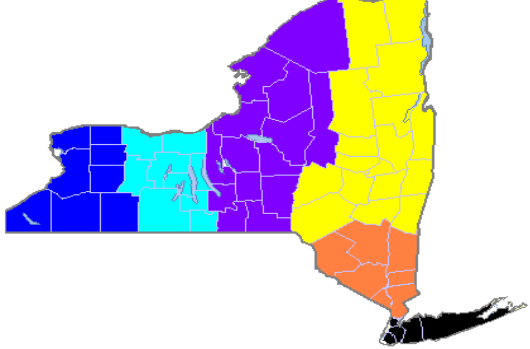


Pediatric Trauma System

New York State


- 21% of Prehospital trauma care
- 5-10% Prehospital transports
- 30% ED visits
- 12% in Hospital trauma care
- 50% of hospitals see less than 10 pediatric patients per year





Pediatric Trauma Center

- Mortality
 - Improved mortality
 - Improved outcome
- Traumatic Brain Injury
 - Lower mortality rates in PTC compared to ATC
- Solid organ injuries
 - Incidence of operative intervention lower in PTC
- Decreased Mortality in multisystem injured patients





Pediatric Trauma Center - Resources

- Pediatric Trauma Service
- Pediatric Emergency Physician
- Pediatric Critical Care Physician & PICU
- Pediatric Specialists
 - ENT
 - Orthopedics
 - Neurosurgery
- Pediatric Radiology
- Pediatric Nursing
- Pediatric Trauma system
- Child Life and Family Support Systems
- Pediatric Social Work
- Pediatric injury prevention and education



Pediatric Trauma System

- Availability of Resources
- Communication
- Feedback
- Pediatric Specific

Pediatric Trauma

- 50% of pediatric trauma deaths occur in the field before the victim even reaches a trauma center
- National Pediatric Trauma Registry showed that about 70% of the deaths were caused by central nervous system (CNS) injury
- Areas of improvement?



No quick answers

- Resources
- Geography



"The truth is: the better they take care of trauma...period...the better they will take care of kids."

- Todd Maxson, MD



ORIGINAL CONTRIBUTIONS

Characteristics of Pediatric Trauma Transfers to a Level I Trauma Center: Implications for Developing a Regionalized Pediatric Trauma System in California

Colleen D. Acosta, MPE, M. Kit Delgado, MD, Michael A. Gisoni, MD, Amritha Raghunathan, MD, Peter A. D'Souza, MD, Gregory Gilbert, MD, David A. Spain, MD, Patrice Christensen, RN, and N. Ewen Wang, MD



Seven horizontal lines for notes.

Assessment and Reassessment

- ABC's
- Immobilization
- Transfer?
- Scan?
- Operate?



Seven horizontal lines for notes.

Pediatric Trauma – ABCs

- **A**irway
- **B**reathing
- **C**irculation




Seven horizontal lines for notes.

Pediatric Trauma – ABCs

● **A**irway

- Inadequate oxygenation and ventilation
- Two major causes of early death
 - Airway compromise
 - Inadequate volume resuscitation




Pediatric Trauma – ABCs

● **B**reathing

- Rapid shallow breaths


- Infants are obligate nasal breathers



Pediatric Trauma – ABCs

● **B**reathing

- Respiratory Rate
- Respiratory Effort
- Breath sounds
- Skin color, capillary refill, pulse oximetry




Pediatric Trauma – ABCs

● Circulation

Table 5 Normal Vital Signs by Age

Age	Weight (kg)	Heart rate (beats/min)	Pressure* (mmHg)	Respirations (breaths/min)	Urine output (mL/kg/hr)
0-6 months	3-6	160-180	60-80	60	2
Infant	12	160	80	40	1.5
Preschool	16	120	90	30	1
Adolescent	35	100	100	20	0.5

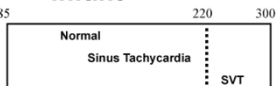
*Systolic blood pressure should be 80 + 2 age (yrs).
Source: Taken from Advanced Trauma Life Support® for Doctors Instructor Manual.



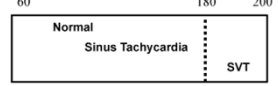
Pediatric Trauma – ABCs


● Circulation

Infant



Child





Pediatric Trauma – ABCs

● Circulation

Blood pressure

{

Cardiac output

{

Stroke volume

Heart rate

}


Systemic vascular resistance

}

Preload

Myocardial contractility

Afterload




Pediatric Trauma – ABCs

Disability

Table 14.1 Glasgow Coma Scale revised for use in pediatric population


Best response	Pediatric GCS	Score
Eye	No eye opening	1
	Eye opening to pain	2
	Eye opening to speech	3
	Eyes open spontaneously	4
Verbal	No vocal response	1
	Incomprehensible, agitated	2
	Inconsistently consolable, moaning	3
	Cries, but is consolable, inappropriate interactions	4
	Smiles, oriented to sounds, follows objects, interacts	5
Motor	No motor response	1
	Extension to pain	2
	Flexion to pain	3
	Withdrawal from pain	4
	Localizing to pain	5
	Obeys commands	6



How Sick is this Kid?


Anatomic Injuries

- Combined system injury
- Penetrating injury of the groin or neck
- Three or more long-bone fractures
- Fractures of the axial skeleton
- Amputation (other than digits)
- Persistent hypotension
- Severe head trauma
- Maxillofacial or upper airway injury
- Central nervous system injury with prolonged loss of consciousness, posturing, or paralysis
- Spinal cord injury with neurologic deficit
- Unstable chest injury
- Blunt or penetrating trauma to the chest or abdomen
- Burns, flame, or inhalation



How Sick is this Kid?

	PEDIATRIC TRAUMA SCORE		
	+2	+1	-1
Size (kg)	>20	10-20	<10
Airway	Normal	Maintained	Unmaintained
Systolic blood pressure (mm Hg)	>90	50-90	<50
Central nervous system	Awake	Obtunded	Coma
Open wound	None	Minor	Major
Skeletal trauma	None	Closed	Open-multiple



How Sick is this Kid?

REVISED TRAUMA SCORE			
Glasgow Coma Scale	Systolic Blood Pressure (mm Hg)	Respiratory Rate (breaths/min)	Code Value
13-15	>89	10-29	4
9-12	76-89	>29	3
6-8	50-75	6-9	2
4-5	1-49	1-5	1
3	0	0	0



What do you need?

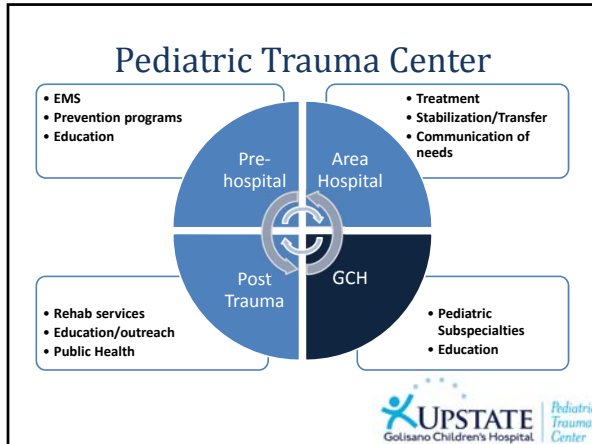
- EMS
- Local hospital
- Pediatric Trauma Center



Call to Action

- Establishment of Regional Pediatric Trauma Transfer Protocols
- Collaboration
- YOUR HELP!





Resources

VRC VERIFICATION REVIEW CONSULTATION
for excellence in trauma centers

EMSC Emergency Medical Services for Children

NATIONAL EMS for Children Day
MAY 21, 2014

PTS pediatric trauma society
A Voice for the Injured Child

UPSTATE Golisano Children's Hospital Pediatric Trauma Center

Pediatric Trauma

- Tamer Ahmed
 - Pediatric Trauma Medical Director
 - Office: 315-464-2878
 - Cell: 315-200-7538
 - Email: ahmedt@upstate.edu
- Steve Adkisson
 - Pediatric Trauma Program Coordinator
 - Office: 315-464-4773
 - Cell: 315-396-1038
 - Email: adkissos@upstate.edu

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