






Emergency Medical Services: More Than Just a Ride to the Hospital

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Conflicts and Funding

I have no relevant financial conflicts of interest to disclose

FUNDING

- ***Integrating Evidence-Based Pediatric Prehospital Protocols into Practice***
- Health Resources and Services Administration (HRSA) EMS for Children (EMSC) Targeted Issues Grant (09/10-08/14) – PI
- ***Pediatric Evidence-Based Guidelines: Assessment of EMS System Utilization in States (PEGASUS)***
- HRSA EMSC Targeted Issues Grant (09/13-08/17) – PI
- ***Charlotte, Houston, and Milwaukee Prehospital (CHaMP) Research Node***
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- ***EMSC Innovation and Improvement Center (EIIC)***
- HRSA EMSC Grant (07/16-06/20) – Co-I (PI: Macias)

Objectives

- To explain how prehospital care is a vital component in the health care delivery system
- To define current disparities, needs and controversies in prehospital care for children
- To describe regional and national initiatives to improve the quality of pediatric prehospital care



Accessing Emergency Care



All EMS systems must be ready to care for children

GENERAL HOSPITAL

Emergency



CHILDREN'S HOSPITAL



Every ED must be ready to care for children

2 million people= 😊

CHILD= ●

Shah MN, *Prehosp Emerg Care*. 2008

ADULT= 😊

Burt CW, *Ann Emerg Med*. 2006



Case Example

- A 3 month old girl is co-sleeping with her mother
- The mother wakes up and notes that her baby is not breathing
- The mother calls 911

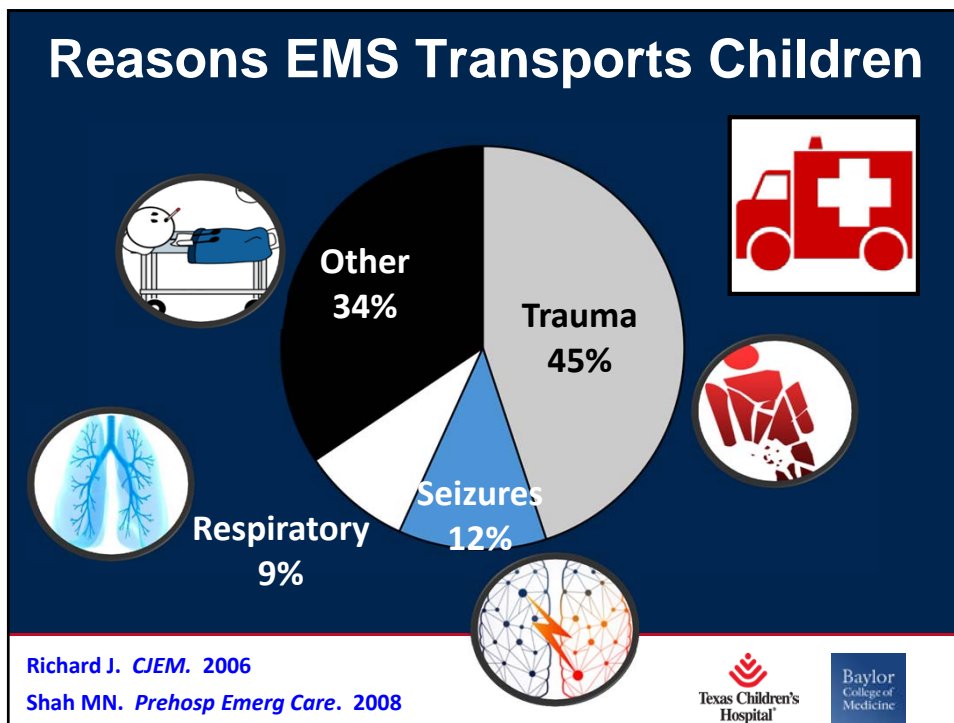
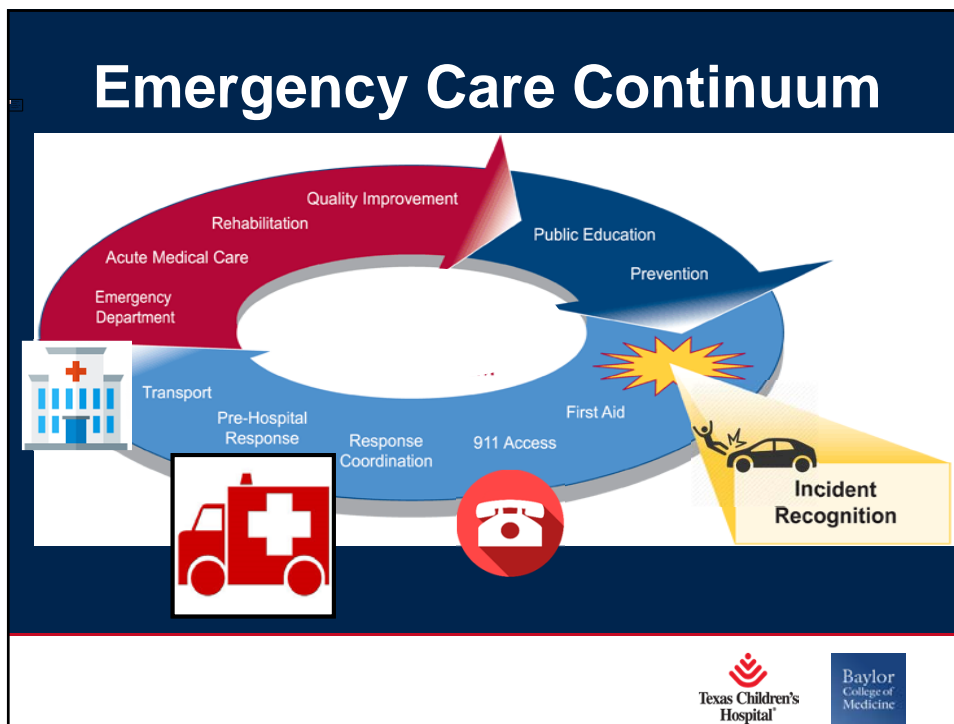


Case Example

- At what point does emergency care begin for this child?
 - In the Intensive Care Unit (ICU)?
 - In the Emergency Department (ED)?
 - When Emergency Medical Services (EMS) arrives?
 - When the dispatcher provides CPR instructions?
 - When the mother recognizes the emergency**

EARLIER!





Richard J. *CJEM*. 2006

Shah MN. *Prehosp Emerg Care*. 2008



Immature blood/brain barrier

Higher respiratory rates

Larger body surface area

BSA vs Age graph

Thinner skin

Rapidly dividing cells

MR vs Age graph

Higher metabolic rate

Immature immune system

Interpreter

Texas Children's Hospital
Baylor College of Medicine

What EMS Can and Cannot Do

- 3 y/o with febrile seizure transported by Basic Life Support (BLS)
 - "Why didn't they give IV lorazepam?"
- 6 y/o with asthma transported by Advanced Life Support (ALS)
 - "They gave albuterol, but why didn't they give ipratropium?"
- 12 y/o with a deformed forearm after a fall, transported from 1 mile away
 - "Why didn't he get any pain medicine?"
- 3 month old found apneic and pulseless in crib
 - "They already gave 6 rounds of epi. Why didn't they terminate resuscitation in the field?"

Scope of practice

Protocol-based care

Transport time

Agency-specific policies



The Formation of the Emergency Medical Services System



Shah MN, Am J Pub Health, 2006



EMS Systems Act of 1973

Public Law 93-154

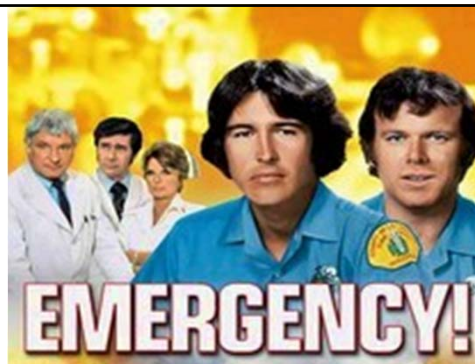
93rd Congress, S. 2410

November 16, 1973

An Act

To amend the Public Health Service Act to provide assistance and encouragement for the development of comprehensive area emergency medical services systems.

Be it enacted by the Senate and House of Representatives of the United States of America



Shah MN, Am J Pub Health, 2006



EMS for Children



Department of Health and Human Services (DHHS)



Health Resources and Services Administration (HRSA)



Maternal Child Health Bureau (MCHB)



Emergency Medical Services for Children (EMSC)

1984: Federally Legislated



EMS for Children Program

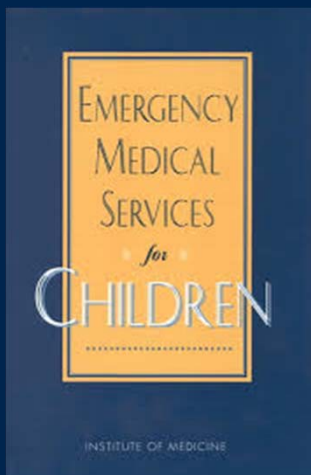
- To ensure state of the art emergency medical care for ill/injured children is available when needed
- To ensure that pediatric services are well integrated in the existing state EMS system and backed by optimal resources
- To ensure that the entire spectrum of emergency services is provided to children at the same level as adults



www.emscimprovement.center

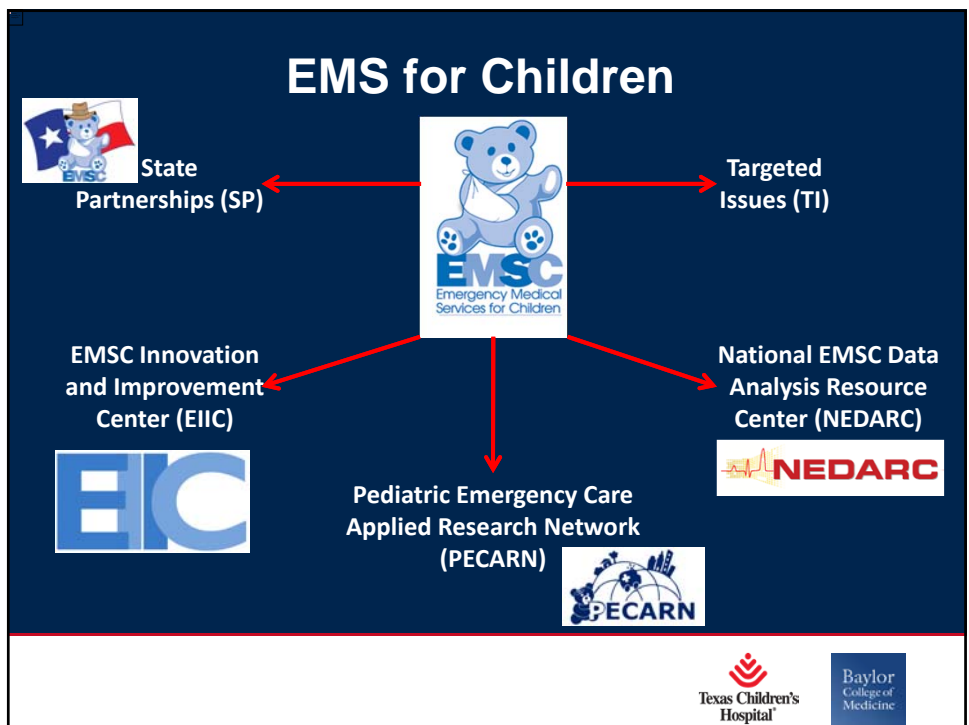
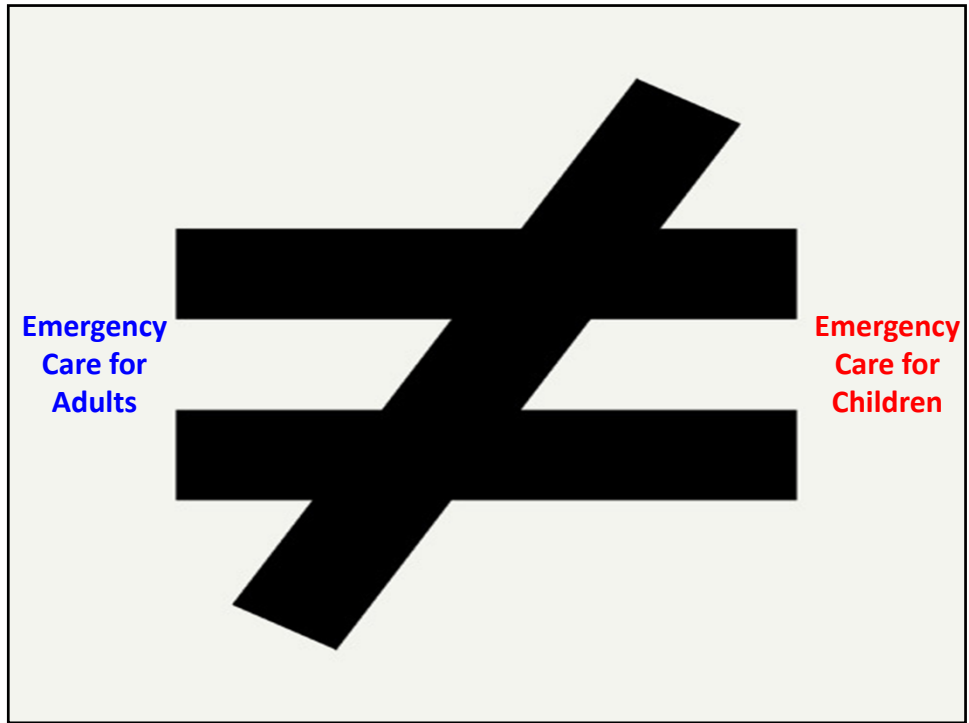


1993 Institute of Medicine Report



- **Educate the public** on injury prevention, CPR, and the appropriate use of EMS
- **Train prehospital providers**, nurses, and physicians to care for children in emergencies
- **Maintain equipment and supplies** to care for children in EDs and on ambulances
- Address issues of **facility categorization and regionalization** of care for children
- **Enhance 911 capabilities** everywhere in the country
- Collect, analyze and report information from a **uniform EMS dataset**
- **Expand research** for pediatric emergency care






Role of the EMSC State Partnership

Availability of
medical
direction





Availability of
equipment +
supplies

Regionalized
care – medical +
trauma



Pediatric
prehospital
education

Permanence of
the EMSC
program

=

2007 Institute of Medicine Reports

FUTURE OF EMERGENCY CARE

**EMERGENCY
MEDICAL SERVICES
AT THE CROSSROADS**



COORDINATION

FUTURE OF EMERGENCY CARE

**HOSPITAL-BASED
EMERGENCY CARE
AT THE BREAKING POINT**



REGIONALIZATION


FUTURE OF EMERGENCY CARE

**EMERGENCY CARE
FOR CHILDREN
GROWING PAINS**





COORDINATION



Limited communication with receiving hospitals

Lack of access to the patient's medical history



Disconnected communication between dispatch, EMS, ED, and public health systems

Few interfacility transfer guidelines and agreements

Independent planning for adult and pediatric care

Lack of common radio frequencies and protocols

Institute of Medicine. *Emergency Care for Children: Growing Pains*. 2007

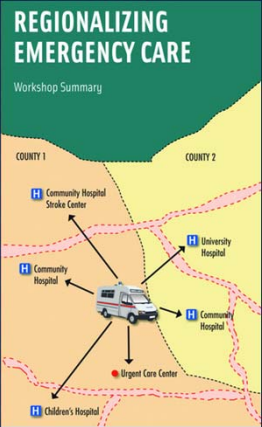



REGIONALIZATION

Goal: To direct critically ill and injured patients to facilities within a community with the personnel and resources to deliver high-level emergency care



Adult successes:

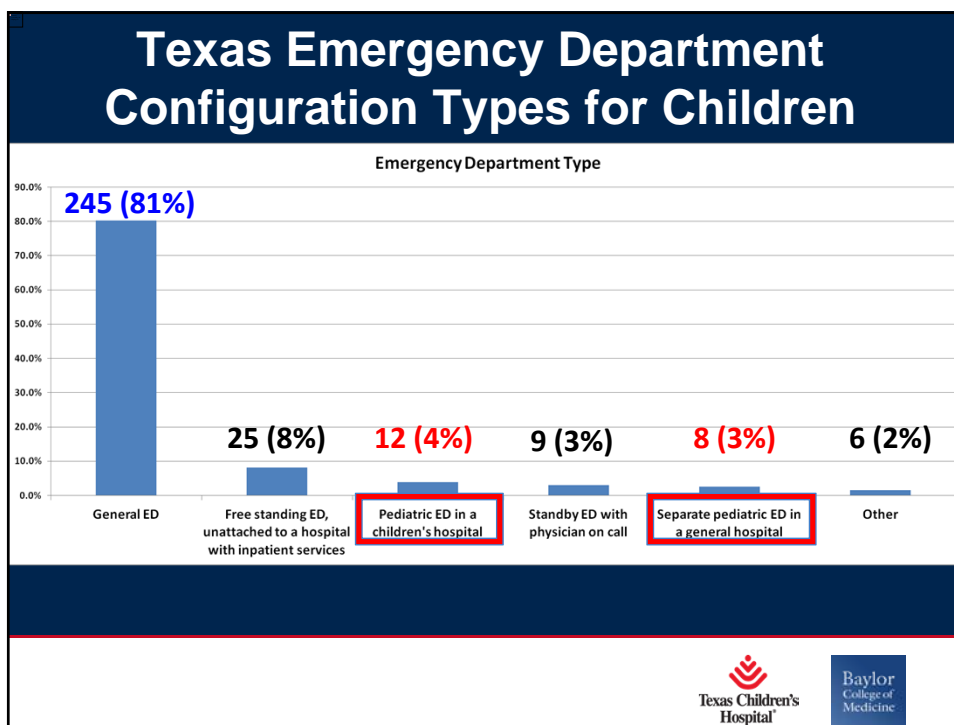
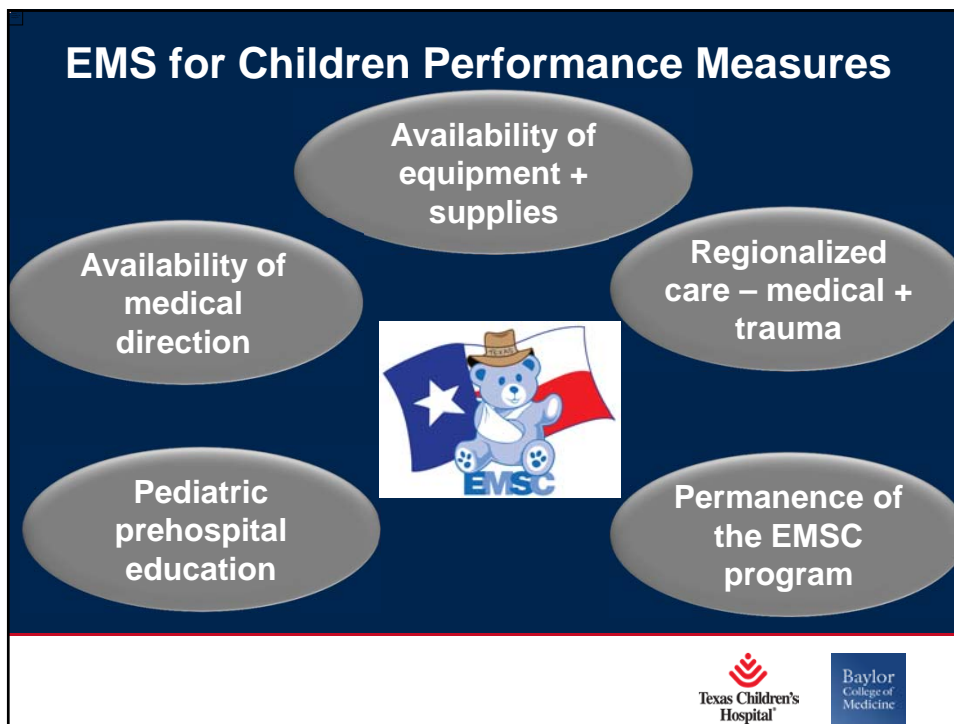
- Cardiac care
- Stroke
- Trauma

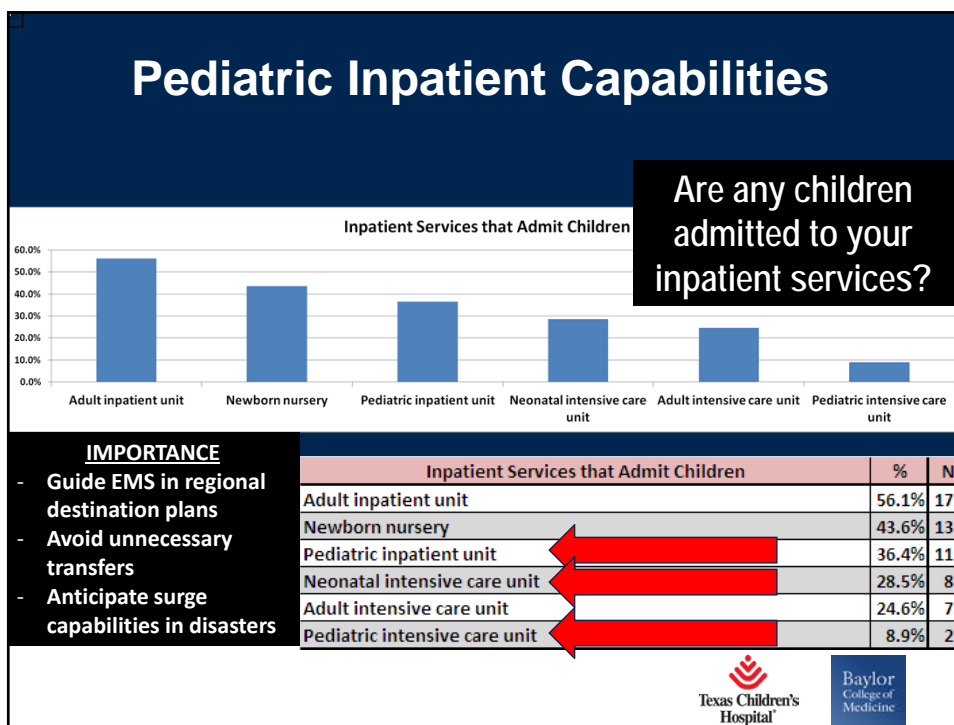
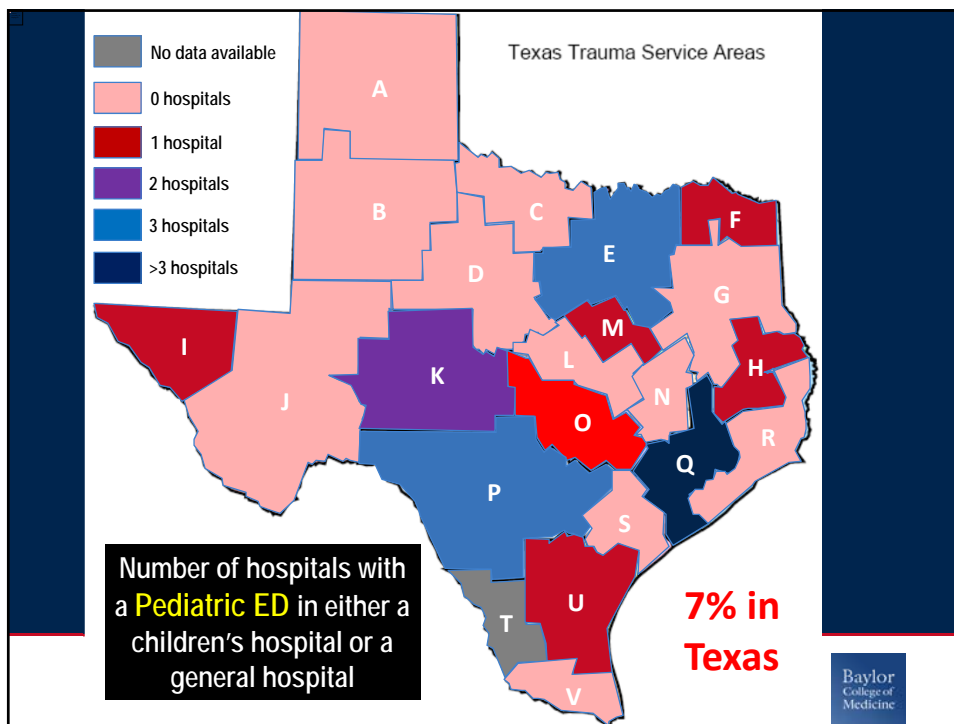


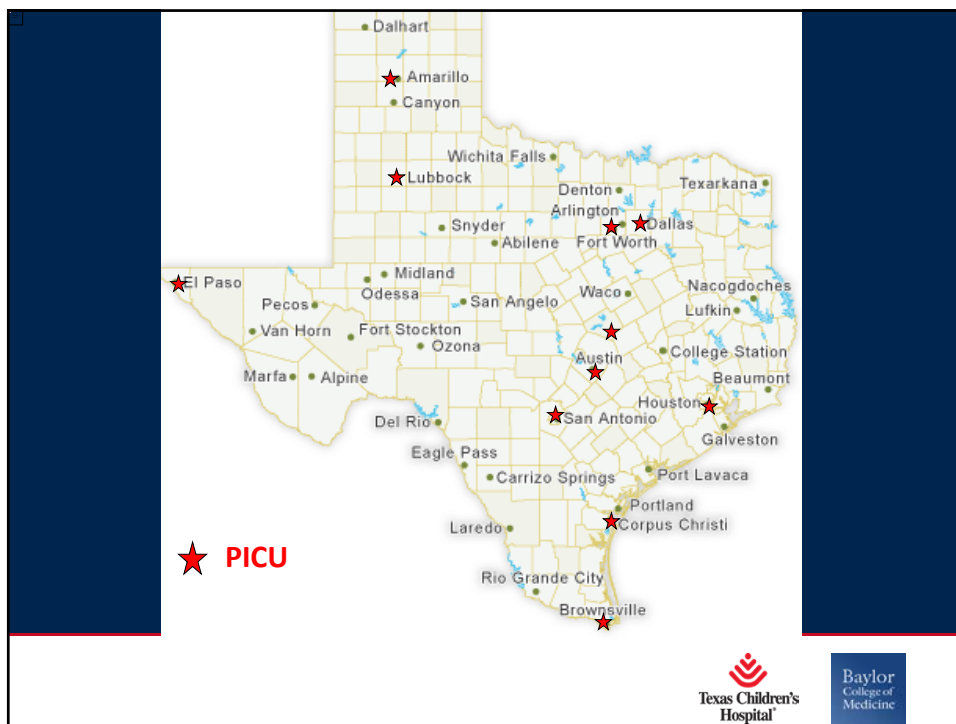
Pediatric opportunities:

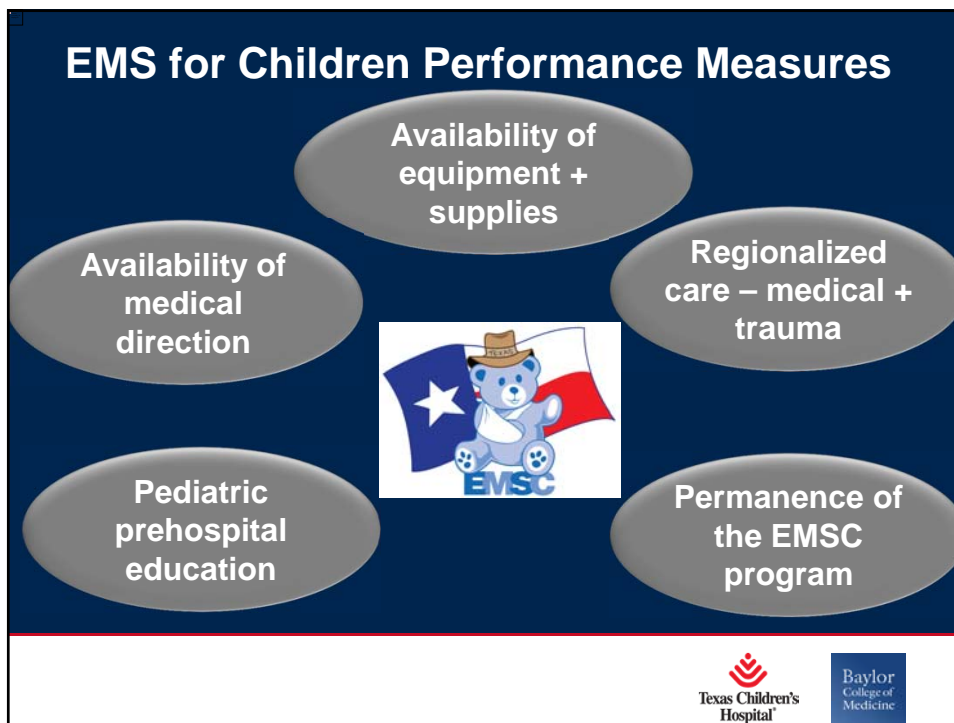
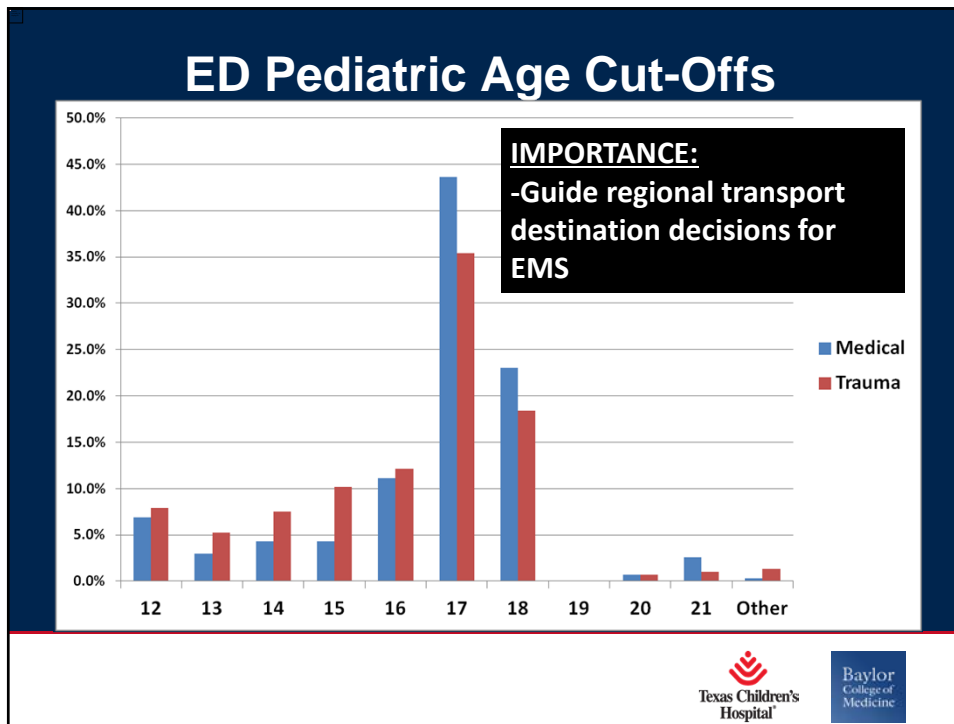
- Trauma
- Critical care
- Emergency care









Equipment on Ground Ambulances

JOINT POLICY STATEMENT

EQUIPMENT FOR GROUND AMBULANCES



American Academy of Pediatrics
 American College of Emergency Physicians
 American College of Surgeons Committee on Trauma
 Emergency Medical Services for Children
 Emergency Nurses Association
 National Association of EMS Physicians
 National Association of State EMS Officials

Only 34% of ambulances in the U.S. have ALL of the recommended equipment


ACS-COT, et al. *Prehosp Emerg Care.* 2014. 18 (1): 92-97.




76% BLS (adult)
53% BLS (child)

76% BLS (neonatal) **82% ALS**




2014 **76% ALS**

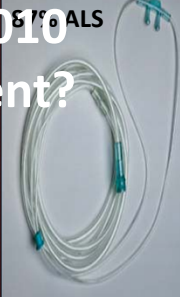


2014 **73% ALS**
59% BLS (child)

What's missing based on the 2010 assessment?





85% ALS

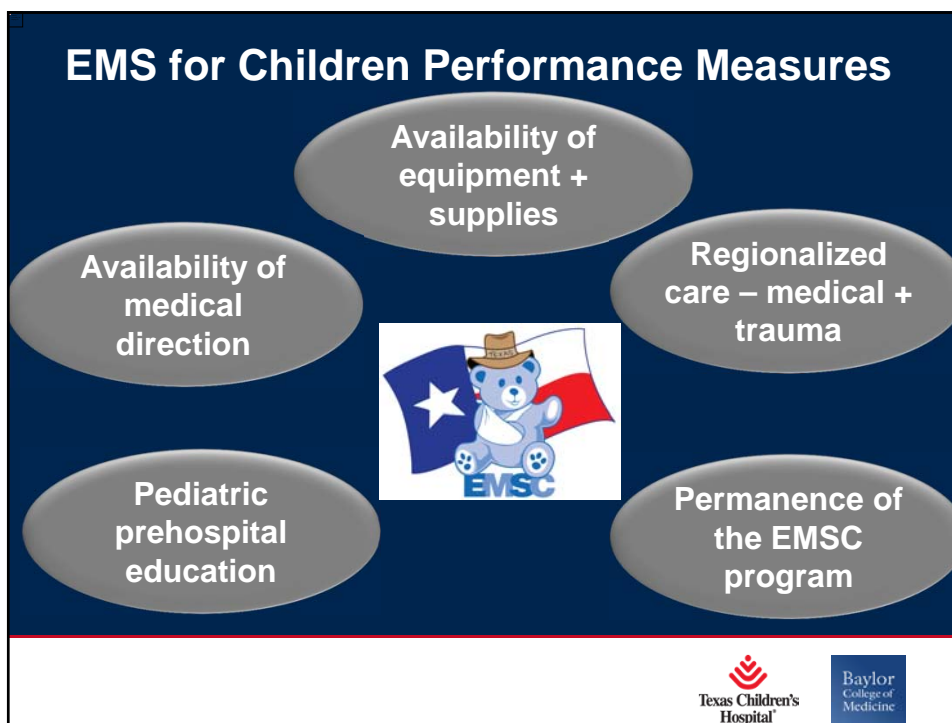


81% ALS

| | Pink 6-7 | Red 8-9 | Purple 10-11 | Yellow 12-14 | White 15-18 | Blue 19-23 | 24-28 |
|----|-------------|------------|-----------------|-----------------|----------------|----------------|---------|
| 58 | 59-65 | 66-75 | 76-83 | 84-96 | 97-109 | 110-121 | 122-134 |
| 57 | 58-64 | 65-72 | 73-80 | 81-93 | 94-106 | 107-118 | 119-130 |
| | 57-63 | 64-69 | 70-77 | 78-88 | 89-101 | 55% BLS | |



www.nedarc.org

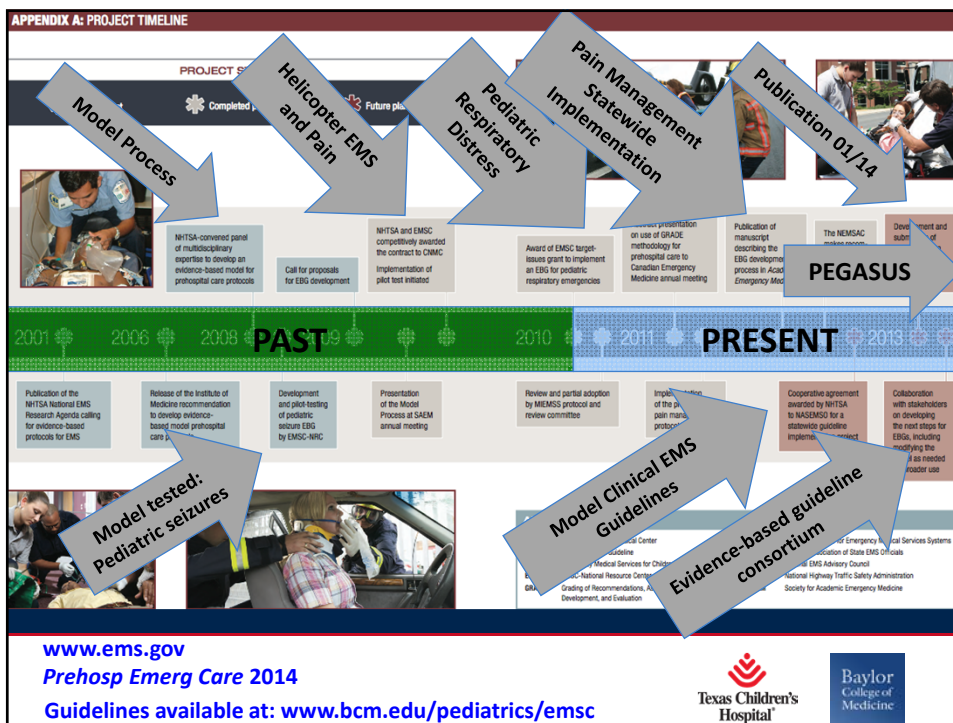
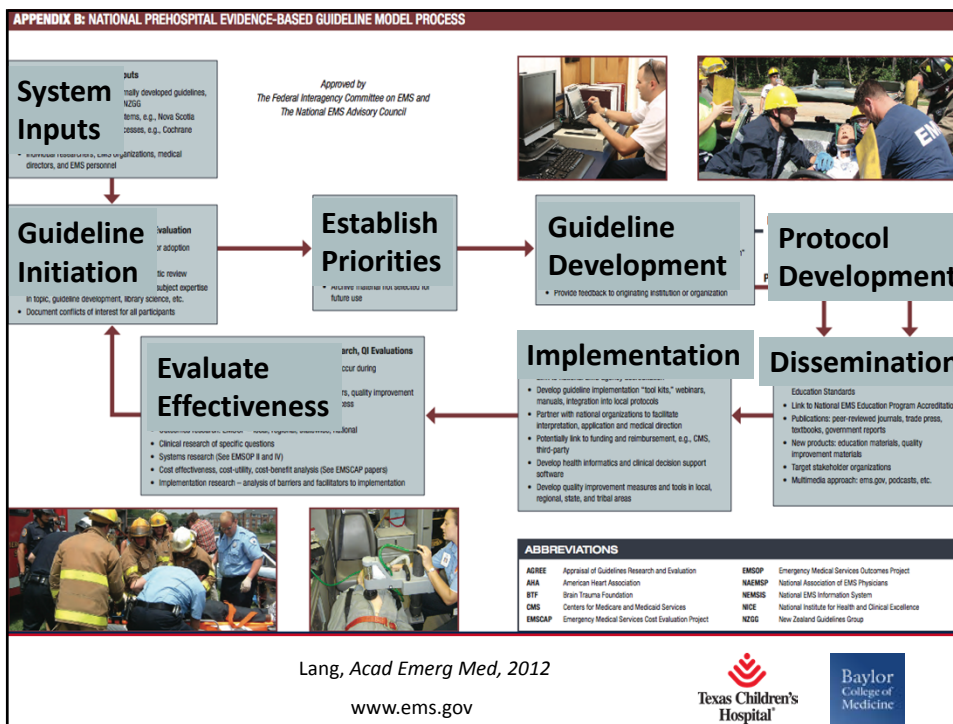



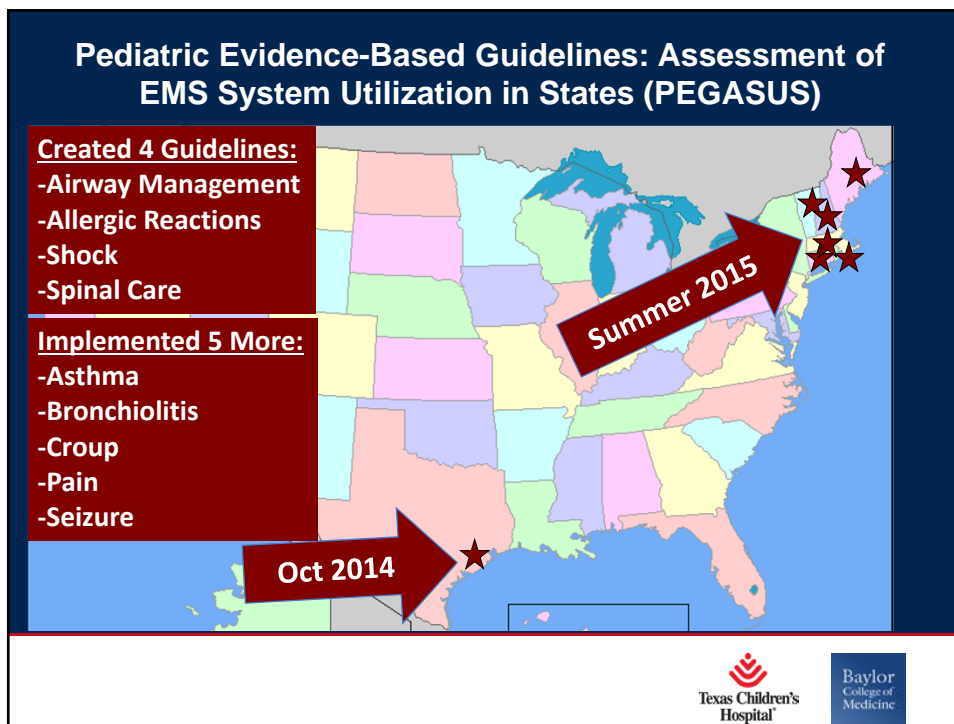


Case Example

- An ambulance in **Houston** is dispatched to a home for a 5 year old with a seizure
- The providers administer **IN midazolam 0.2 mg/kg** to stop the seizure → **the seizure continues**
- An ambulance in **Boston** is dispatched to a home for a 5 year old with a seizure
- The providers try to administer **IV lorazepam 0.1 mg/kg** to stop the seizure → **unable to get IV access**
- An ambulance in **Los Angeles** is dispatched to a home for a 5 year old with a seizure
- The providers administer **rectal diazepam 0.5 mg/kg** to stop the seizure → the patient becomes **apneic**, is **intubated**, and **aspirates**





EBG Development

- **Initial EMSC and NHTSA Collaboration**
 - Seizure
 - Pain Assessment + Management
 - Helicopter EMS
- **Integrating Evidence-Based Pediatric Prehospital Protocols into Practice**
 - Asthma
 - Bronchiolitis
 - Croup
- **Pediatric Evidence-Based Guidelines: Assessment of EMS System Utilization in States (PEGASUS)**
 - Allergic Reactions
 - Airway Management
 - Spinal Care
 - Shock

Foltin GL, et al. *Pediatr Emer Care.* 2010; 26: 773-777
Prehospital Emerg Care. 2014; 18 (Suppl 1).
www.bcm.edu/pediatrics/emsc

TABLE 1. Final Clinical and System Topics in Priority Rank Order

| Clinical Topics | | System Topics | |
|-----------------|-----------------------------|---------------|--|
| Rank | Topic | Rank | Topic |
| 1 | Airway management | 1 | Effectiveness of out-of-hospital interventions |
| 2 | Respiratory distress | 2 | Knowledge and skill deterioration |
| 3 | Trauma | 3 | Patient outcomes |
| 4 | Asthma | 4 | Evaluation of the impact of overall EMS system changes on children |
| 5 | Head trauma | 5 | Training effectiveness |
| 6 | Shock | | |
| 7 | Pain | | |
| 8 | Seizures | | |
| 9 | Respiratory arrest | | |
| 10 | C-spine immobilization | | |
| 11 | Cardiac arrest | | |
| 12 | Injury prevention | | |
| 13 | Children with special needs | | |
| 14 | Poisoning | | |
| 15 | Abuse and neglect | | |

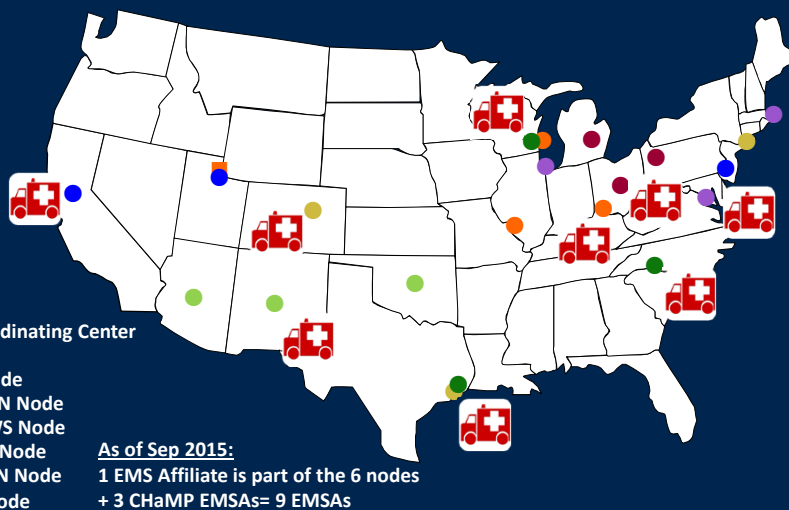
Charlotte, Houston, and Milwaukee Prehospital (CHaMP) EMS Research Node



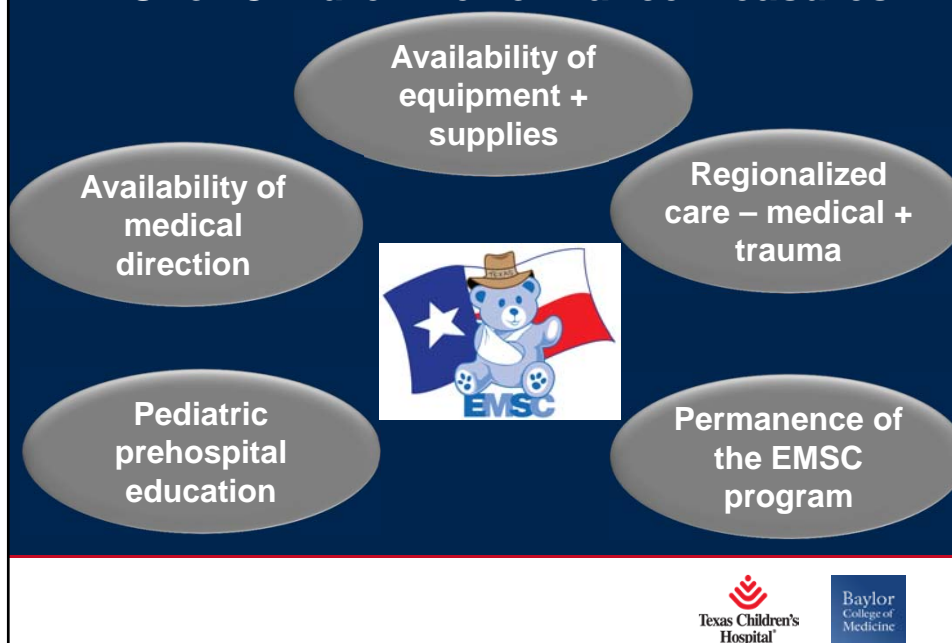
www.mcw.edu/champ
www.facebook.com/champernc



PECARN's EMS Affiliates



EMS for Children Performance Measures



Pediatric Simulation Training for Emergency Prehospital Providers (PediSTEPs)

- BLS and ALS providers in the Houston Fire Department (HFD) – 13 each class
- 2 courses/month since Feb '12
- >800 providers trained (>10% of HFD)
- Combination of skills stations and high-fidelity simulation scenarios



EMS for Children Performance Measures

Availability of
medical
direction

Availability of
equipment +
supplies

Regionalized
care – medical +
trauma

Pediatric
prehospital
education



Permanence of
the EMSC
program



EMS for Children Permanence in Virginia

- Full-time Program Manager
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- Program Director
 - Camela Crittendon, RN
- Family Advisory Network Rep
 - Petra Connell, PhD, MPH



Summary

- Emergency care begins well before arrival at the hospital
- EMS agencies and local hospitals need to collaborate
- Numerous ways exist to optimize emergency care through EMS
- Every ambulance and ED must be ready to care for children**

