Bridging the Gap: Pediatric Emergency Medicine and EMS

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I have no relevant financial conflicts to disclose

Objectives

• To define the gap between Pediatric Emergency Medicine (PEM) and EMS

• To highlight current disparities in care and research gaps in prehospital pediatrics

• To describe strategies for PEM and EMS professionals to collaboratively improve pediatric prehospital care
The Gap Between PEM and EMS

The Problem: Part 1

Training and Clinical Exposure:
Good News
• EMS does require pediatric training
  - EMS physicians in EM residency
  - Prehospital providers for initial certification
  - Continuing education for recertification through NREMT
• Children ARE little adults in many ways!

Training and Clinical Exposure:
Bad News
• Approximately 13% of EMS transports are pediatric
  - Injuries and poisonings most common
• In some ways, children are not little adults
• Lack of required training
  - Prehospital provider recertification at the state level
  - PEM training in EMS

### PEM Training

**2010 Match Applicant Statistics**

![Bar chart showing Matched Applicants and Unmatched Applicants](chart.png)

<table>
<thead>
<tr>
<th>Field</th>
<th>Matched Applicants</th>
<th>Unmatched Applicants</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEM Emergency Medicine</td>
<td>100</td>
<td>40</td>
</tr>
<tr>
<td>PEM Pediatrics</td>
<td>2</td>
<td>9</td>
</tr>
</tbody>
</table>

### PEM Training

**Approximate Percent in Applicants**

<table>
<thead>
<tr>
<th>Field</th>
<th>Approximate Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Resuscitation</td>
<td>100</td>
</tr>
<tr>
<td>2. Trauma Care</td>
<td>12.5</td>
</tr>
<tr>
<td>3. Emergencies Treated Medically</td>
<td>7.1</td>
</tr>
<tr>
<td>4. Emergencies Treated Surgically or Requiring Surgical Consultation</td>
<td>12.5</td>
</tr>
<tr>
<td>5. Toxicology</td>
<td>7.0</td>
</tr>
<tr>
<td>6. Environmental Emergencies</td>
<td>16.0</td>
</tr>
<tr>
<td>7. Psychosocial</td>
<td>6.0</td>
</tr>
<tr>
<td>8. Injuries and Symptoms</td>
<td>16.0</td>
</tr>
<tr>
<td>9. PEM</td>
<td>10.0</td>
</tr>
<tr>
<td>10. Epidemiology</td>
<td>2.0</td>
</tr>
<tr>
<td>11. Administrative Law/Ethical Issues</td>
<td>3.0</td>
</tr>
<tr>
<td>12. Procedures</td>
<td>6.0</td>
</tr>
<tr>
<td>13. Core Knowledge in Medical Actives</td>
<td>7.0</td>
</tr>
</tbody>
</table>

### PEM Training

For the pediatric emergency medicine graduate, reciprocal time must include four months spent in an adult emergency department that is part of an ACGME-accredited surgery residency program. One block month of that experience must be spent caring for adults with traumatic injuries, ideally on a trauma service. During the time spent in the adult emergency department, there must be structured educational experiences in EMS and toxicology. These should include both didactic and experiential components that may be longitudinally integrated into other parts of the curriculum or designed as block rotations.
A Culture Gap

Comments from PEM Colleagues

- 3 y/o with febrile seizure transported by BLS
  - "Why didn't they give IV lorazepam?"
- 6 y/o with asthma transported by 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. He's dead. Why was he transported?"

A Continuum of Care
Disparities in Care: Coordination

- Not just a pediatric problem, but the gap is wider
- Limited communication with receiving hospital
- Lack of access to patient’s medical history
- Few interfacility transfer guidelines
- Independent planning for adult and pediatric care

Disparities in Care: Regionalization

- Regionalized cardiac and stroke care has improved adult outcomes
- Need for better regionalization:
  - Pediatric trauma
  - Critical care (neonatal and pediatric)
  - Pediatric emergency care
Disparities in Care: Education

<table>
<thead>
<tr>
<th>Barrier</th>
<th>EMT-B</th>
<th>EMT-I</th>
<th>EMT-P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs too much</td>
<td>886 (6)</td>
<td>100 (1)</td>
<td>1,375 (20)</td>
</tr>
<tr>
<td>Costs my employer too much</td>
<td>622 (8)</td>
<td>76 (8)</td>
<td>657 (7)</td>
</tr>
<tr>
<td>Travel distance in too far</td>
<td>1,327 (13)</td>
<td>200 (16)</td>
<td>1,954 (17)</td>
</tr>
<tr>
<td>Pediatric facilities not cooperative</td>
<td>140 (5)</td>
<td>37 (5)</td>
<td>365 (5)</td>
</tr>
<tr>
<td>Medical director not available</td>
<td>130 (5)</td>
<td>31 (2)</td>
<td>120 (5)</td>
</tr>
<tr>
<td>No barriers</td>
<td>4,882 (49)</td>
<td>560 (45)</td>
<td>3,778 (49)</td>
</tr>
<tr>
<td>Not available</td>
<td>2,362 (23)</td>
<td>270 (17)</td>
<td>967 (17)</td>
</tr>
<tr>
<td>Other</td>
<td>759 (6)</td>
<td>110 (8)</td>
<td>674 (8)</td>
</tr>
<tr>
<td>Total</td>
<td>11,176 (110)</td>
<td>1,501 (100)</td>
<td>8,132 (110)</td>
</tr>
</tbody>
</table>

*No data answers across both responders.

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Disparities in Care: Equipment

**Policy Statement—Equipment for Ambulances**

Disparities in Care: BLS Equipment

- Items Least Often Carried (% Carried)
  - Pulse oximeter with adult probes (76.9%)
  - Neonate size mask for a bag-valve mask (76.2%)
  - Child size lower extremity (femur) traction device (59.3%)
  - Length/weight based tape or appropriate reference material for pediatric equipment sizing and drug dosing (55.1%)
Disparities in Care: ALS Equipment

- Items Least Often Carried (% Carried)
  - Child size nasal cannula (87.2%)
  - Pediatric size Magill forceps (86.0%)
  - Neonate size mask for a bag-valve mask (82.4%)
  - Meconium aspirator adaptor (76.7%)
  - Child size lower extremity (femur) traction device (73.9%)

Disparities in Care: Condition Specific Variation

- Pain is under-assessed and under-treated

Research Gaps in Prehospital Pediatrics

The Problem: Part 3
Research Gaps

- Limited evidence base for interventions
- Extrapolation from adult ED-based or prehospital retrospective observations studies
- Safety and appropriateness unknown
- Most studies are retrospective

Challenges in pediatric prehospital research:
- Consent from guardians
- IRB restrictions for “vulnerable” populations

Research Priorities

- Pediatric Emergency Care Applied Research Network (PECARN) EMS Research Summit
- Developed a pediatric-specific prehospital research agenda
- Defined by PECARN representatives, EMS agency leaders, and prehospital researchers

Strategies for Collaboration

The Solutions
Education

- Partner with local PEM training programs
  - EMS rotation
  - EMS didactics
  - Existing protocols and policies
- Local provider training
- Simulation training
- Regional EMS conferences
- Online educational resources

Education: Local PEM Training

www.pemnetwork.org

http://www.bcm.edu/pediatrics/emergencymedicine
Education: Local Provider Training

- Michigan EMSC
  - Partnership with the University of Michigan, the Michigan Society of EMS Instructor Coordinators, and the EMS Coordination Committee
  - One-day pediatric education with performance evaluations using patient simulations
- Recruit PEM physicians to give pediatric lectures for your EMS providers

Education: Simulation Training

- Chicago Fire Department
  - EMS Simulation Training Center with 7 mock rooms
- Michigan
  - Pediatric-specific simulation with paramedics
  - Identified common performance deficiencies
- Houston
  - Collaboration between HFD and Texas Children’s

www.houstontx.gov
Education: Regional EMS Conferences

New Jersey Statewide Conference on EMS

Education: Online Resources

• New Mexico EMSC
  - Developed on-line pediatric education courses
  - Free to New Mexico EMS providers
  - Data gathered being used to determine efficacy of online education for EMS

http://hsc.unm.edu/emermed/EMSC/training/training.shtml

Education: Online Resources

EMS Education for the Pediatric Emergency Physician

EMS Education for the Pediatric Emergency Physician: Modules
1. Introduction, History of EMS and EMSC: Evolutions of Pediatric Care of Children
2. EMT, Enhanced and Medical Dispatch
3. EMT Perspectives, Education and Scope of Practice
4. Pediatric Prehospital, EMS Equipment for Intubation and Transport
5. Medical Direction
6. EMSC Organization and Administration
7. Legal Considerations
8. Disasters and Mass Gatherings

Shah MS and Gauvreau-Khilli (Eds.), 2011.
http://www.mosby.com/em-emergency
Patient Care and Advocacy

- Protocol feedback and development
- Evidence summaries
- Feedback from patient care in ED
- Pediatric medical directors
- Regionalization
- EMSC Program

Patient Care: Protocol Development

- Illinois EMSC
  - Developed statewide pediatric prehospital protocols in 1997
  - Multidisciplinary group of physicians, nurses, EMS and fire professionals, and laypeople developed/revised protocols

Patient Care: Evidence Summaries

- Dalhousie University
  - Contains many pediatric protocols/evidence summaries
  - Resource for the development of local EMS protocols
  - Recognition of opportunities for prehospital research

- Texas EMSC
  - Shock
  - C-spine immobilization
  - Post-resuscitation care
  - Nontransport

http://emergency.medicine.dal.ca/ehsprotocols/protocols/index.cfm

http://www.luhs.org/depts/emsc/awards.htm
Patient Care: Feedback from Care

- From ED providers
  - At time of patient hand off
  - Follow-up after care
- From pediatric medical directors
  - Online direction
  - Incident review
  - Quality improvement projects
  - Creation of offline protocols

Patient Care: Regionalization

- Awareness of hospital designation for pediatric medical emergencies and trauma for transport
- States with recognition system for Emergency Departments Approved for Pediatrics (EDAP)
  - Illinois
  - Oklahoma
  - Tennessee
  - Louisiana
  - Arizona

Advocacy: EMSC Program

- Federally-funded since 1984
- Online publications and resources
- State Partnerships in every State/Territory in the U.S.
  - Point of contact for local projects
  - Stakeholder in EMS at statewide level
Research

• Partner with local investigators
• Established pediatric emergency care networks:
  - PECARN
  - PEM-CRC
• EMSC Targeted Issues Grants

Development of Research Partnerships with EMS Agencies and Descriptive Study of EMS Pediatric Population within PECARN:

The objective of this protocol is to study pediatric emergency medical services (EMS) within the PECARN network and establish the network's capability to collect pre-hospital data. This is a descriptive study that will facilitate data collection from these agencies. We plan to do this using methodology similar to the PECARN Core Data Project (PCDP). The project aims to demonstrate that pediatric EMS research is possible within PECARN and that data transmission from EMS agencies to the data center is feasible. This study will establish research relationships with respective EMS agencies and gather data on age and disease/etiology patterns of the sample in the network. The data collected will be invaluable for generating hypotheses for pediatric EMS studies and collaborations. Similar to the PECARN Core Data Project, above, this proposal will provide the groundwork for hospital research within the network.

www.pecarn.org
www.pemcrc.org
SUMMARY

• PEM physicians have limited understanding of EMS, but are an underutilized resource for EMS
• Need exists for improved coordination, regionalization, education, and equipment availability
• Opportunity remains to address existing research gaps by focusing on defined priorities
• Numerous ways exist for PEM and EMS to strategically collaborate in multiple domains
  - Education - Research
  - Patient Care - Advocacy