Advancing Pediatric Emergency Care: Report of the IOM Committee on the Future of Emergency Care in the United States Health System

Research in Emergency Medical Services for Children (EMSC)

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Objectives

- IOM EMSC research recommendations from 1993
- IOM EMSC research recommendations from 2006
- Suggest implementation of select topics
Clinical aspects of emergencies and emergency care
Indices of injury / illness severity
Patient outcomes / outcome measures
Costs of illness/injury and care
System organization, configuration, and operation
Education and training, retraining, and skill retention
Prevention of illness and injury
Many gaps in knowledge about pediatric emerg. care remain.

Compared to adults, much less is known in children about treatment of life threatening injuries and illnesses:

• cardiac arrest, shock, respiratory failure, multisystem trauma...

Globally, what we need to know is (following the IOM quality domains) how...

• Safe, effective, patient-centered, timely, efficient, and equitable is pediatric emergency care?
Barriers to EMSC Research

- Inadequate funding
- Limited data: especially pre-hospital and trauma registries
- Few trained investigators
- Epidemiology of pediatric emergency events
- Sufficient number and diversity of study patients
- Pressure for clinical productivity and chaotic environment
- Complexity of obtaining informed consent
- Lack of infrastructure/data linkages for collaboration between pre-hospital, ED, and PICU settings
DHHS should define a strategy for research organization and funding

Considerations include:

• Training investigators
• Standard pediatric-specific data elements in registries
• Development of multi-center research networks
• Involvement in the grant review and research advisory process
• Improved research coordination through a dedicated institute
Potential EMSC Research Domains

**Basic Science**
- EM requires basic discovery, then translation to the clinical setting
  - e.g. molecular events surrounding ischemia, pathophysiology of acute lung injury, hypothermia and gene expression after arrest

**Translational Research**
- Translation of basic science to application in the clinical setting
  - e.g. resuscitation, ventilator settings for resp. failure, artificial blood substitutes

**Health Services Research**
- Impact of organization and mode of delivery on quality/outcomes
  - e.g. translation of research into practice, ED overcrowding, cost effectiveness of trauma systems, preventing missed diagnoses of child abuse
Implementation:
A Case for EMSC Multicenter Research Networks

- Low incidence rates of pediatric emergency events
- Large numbers and diversity of needed study samples
- An infrastructure is needed to test the efficacy of treatments
- An infrastructure is needed to test the efficacy of transport and prehospital care
- An infrastructure is needed to promote collaboration
- A mechanism is needed to study the process of transferring research results to treatment settings

Capabilities of multicenter research in EMSC should be expanded
Implementation:
Challenges Facing Multicenter Research Networks

- **Funding**
  - **Potential solutions:** advocate Congress, dedicated institute for EM research

- **Sharing of information and IRB coordination**
  - **Potential solutions:** collaboration between IRBs regarding interpretation of federal regulations, consideration for centralized IRB

- **Generalizability**
  - **Potential solutions:** research training for community practitioners, funding and incentives for hospitals

- **Need to enhance pre-hospital collaborative research**
  - **Potential solutions:** Training investigators, better funding for pre-hospital research, better data linkages
Pediatric Emergency Care Applied Research Network (PECARN)

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PECARN Research and Development

- Evaluation of head trauma
- C-Spine immobilization
- Steroids in acute bronchiolitis
- The burden of mental illness and psychiatric emergencies in PED
- Creation/sharing of pre-hospital data
- Therapeutic hypothermia in pediatric cardiopulmonary arrest
- Diagnostic categorization of illnesses and injuries in the PED
- Management of status epilepticus
- Medical error reduction
Implementation:
Mitigating inequities in access to pediatric emergency care

27% of all ED visits are by children
> 90% of children seen in general/community EDs
Substantial variation in care
Only 6% of hospitals have all the supplies needed; ½ have > 85%
Regionalization of pediatric services improves outcomes
Implementation:
Mitigating inequities in access to pediatric emergency care

Research goals:
Identify factors associated with, and potential solutions to, inequities

For centers lacking access to expert PEM care, consider research in:

- Telemedicine to provide PEM expertise/consultation
- Dissemination of evidence-based guidelines, decision support tools
- Protocols / guidelines for patient transfer
- Skill development/maintenance of practitioners with little PEM expertise
Implementation:

Improve safety, decrease errors in pediatric emerg. care

Emergency care is delivered in an environment prone to errors
Children at greatest risk because of physical/developmental vulnerabilities, inexperienced providers
Many medications need study of efficacy and safety
Skill maintenance of pre-hospital and ED providers is critical
Implementation:
Improve safety, decrease errors in pediatric emerg. care

Research goals:
Identify and quantify the most important and most common types of medical errors in EDs caring for children; identify factors that contribute to a “safe climate” in the ED

Consider research in:
• Medical error reporting systems
• Interventions to improve reporting
• Interventions to mitigate errors
Final Thoughts

- EMSC research has progressed substantially since 1993
- 2006 IOM report lays important roadmap for the work ahead
- Many other topics need further study
- Much work yet to be done!