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
Information Gaps Remain

- 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

- Real-time biosurveillance
- Evaluation of head trauma
- C-Spine immobilization
- Steroids in acute bronchiolitis
- The burden of mental illness and psychiatric emergencies in PED

- Therapeutic hypothermia in pediatric cardiopulmonary arrest
- Diagnostic categorization of illnesses and injuries in the PED
- Management of status epilepticus
- Medical error reduction
- Creation and sharing of pre-hospital data set
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!