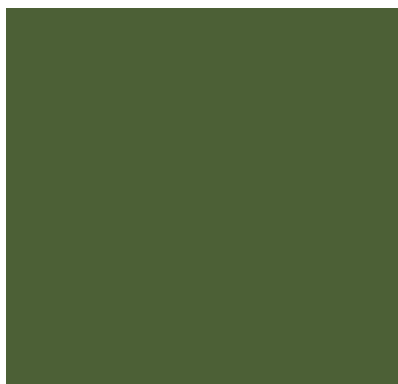
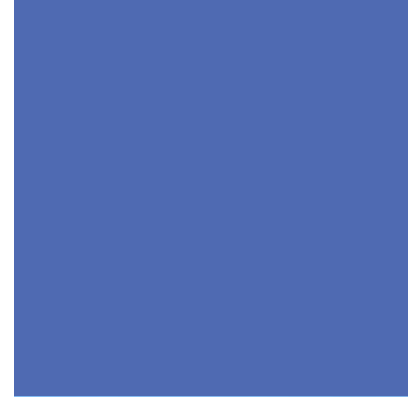


# *Pediatric* Regionalization of Care Primer





## Forward: Pediatric Regionalization

*Photo above and cover courtesy of Children's Hospital of Pittsburgh of UPMC.*

The Pediatric Regionalization of Care Primer is the first in a series of Emergency Medical Services for Children (EMSC) regionalization of care resources. Regionalization of healthcare can best be defined as a structured system of care to improve patient outcomes by directing patients to facilities with optimal capabilities for a given type of illness or injury.<sup>1</sup> For children, regionalization reaches beyond a special diagnosis or illness; it attempts to ensure that all seriously ill and injured children receive the care they need, regardless of the local availability of healthcare resources.

The Pediatric Regionalization of Care Primer is intended to assist those interested in improving access to pediatric specialty care through an organized sharing of resources, especially in regions where access to pediatric medical treatment is limited due to travel distances or jurisdictional borders. Few tools are available to assist state leaders, healthcare professionals, health organizations, and others in understanding the evolution, essential components, and current models of regionalization, as well as the unique considerations in the development of a regionalized pediatric care system. Therefore, this primer is designed to provide a fundamental understanding of regionalization.

The interactive design of this tool allows the reader to access general information regarding regionalization and pediatric specialty care, as well as more in-depth information if the reader chooses. Features of the interactive design include:

1. **Table of Contents (TOC).** The interactive TOC is available on the upper left or lower right side of each page. The TOC lists the major sections within the document. When a section button is clicked, the reader will be sent to the section's landing page. To navigate within each section, use the "Previous Page" and "Next Page" buttons. You can open and close the TOC by clicking the "Open TOC" and "Close TOC" buttons.
2. **Previous/Next Page.** Within the red bar at the top of each page and at the bottom of each page are "Previous Page" and "Next Page" buttons. Use each to navigate the pages within each section.
3. **More Information Icon.** Click the "More Information" icon (click example to the right) to reveal additionally, in-depth content about a particular topic. To close the box, click the "x" in the top right corner of each box.
4. **Download Document.** Click the "Download" button to automatically download and save the document in reference to your desktop.

More than 31 million children and adolescents access the emergency care system every year, many of which are three years of age or younger. Children enter the emergency care system for very different reasons than adults. They have different diseases, injuries, and unique physiological and emotional responses to illness and injury. Many

of them have special healthcare needs or chronic illnesses. They require different types and varying sizes of equipment or medication dosing processes; and often need pediatric specialists to treat their illness and injury. Unfortunately, the resources and staffing recognized as important in providing optimal care for children are not always readily available where children live, play, and attend school. A regionalized approach to care can mitigate these challenges. Regionalization provides opportunities for providers and facilities to organize and share resources within a given geographic area. Pediatric regionalization specifically facilitates the matching of appropriate resources to a child's healthcare needs,<sup>2</sup> increases access to healthcare specialists, and helps control healthcare costs while improving the quality of care across a population.<sup>3</sup>

The need for regionalized systems of care has been highlighted and supported by the Institute of Medicine (IOM), as well as numerous national organizations, such as the Society of Critical Care Medicine, the American Academy of Pediatrics' (AAP) Committee on Pediatric Emergency Medicine (COPEM), the American College of Emergency Physicians' (ACEP) Committee on Regionalization, and the National Association of State EMS Officials (NASEMSO), to name a few.<sup>4,5,6</sup>

The Primer contains the following sections:

**Section 1. An Introduction to the Concept of Regionalization.** This section discusses the evolution of regionalized systems of care for both adult and pediatric patients, and provides information on four existing models of regionalized systems of care: trauma, perinatal, ST-elevation myocardial infarction, and stroke.

**Section 2: EMSC: Building a Foundation for Regionalization.** This section discusses several EMSC Program initiatives supporting the development of regionalized care for children, including the EMSC performance measures, the National Pediatric Readiness quality improvement initiative, and the State

Partnership Regionalization of Care grants. Core concepts of regionalization and subcomponents specific to children are identified. A crosswalk is included to illustrate the interface between the EMSC performance measures and the core concepts.

**Section 3: Pediatric Regionalization: An Opportunity to Improve Access to Pediatric Specialized Resources.** This section addresses the types of specialty care sometimes needed by children, pediatric specialist/subspecialist

---

**Those engaging in pediatric regionalization activities may not need information covered in each of the individual sections. Sections are designed as individual resources; thus the reader is encouraged to focus on those sections needed to enhance their knowledge base and support their individual and collective efforts to develop regionalized systems of pediatric care. The Primer is also not a static comprehensive document covering all aspects of regionalization but rather includes key basic information for regionalization. The Primer is planned as a tool that may be added to as more information and best practices contributing to pediatric regionalization are identified.**

---



workforce challenges, hospital categorization, and the importance of prearranged transfer processes.

#### **Section 4: Hospital Regulations, Mandates, and Standards Influencing Regionalization.**

This section provides an overview of the many organizations that regulate, validate, or otherwise influence hospital services, essential resources, or specific capabilities.

Regulatory standards required by the Centers for Medicare and Medicaid Services, the Joint Commission, Indian Health Services, and state agencies are discussed; various hospital associations influencing hospital processes and resources are reviewed; and national organizations verifying hospital capabilities for provision of specialty care are briefly outlined.

**Summary-Footnotes-Glossary:** The last three sections contain information to assist the user further in planning pediatric regionalized systems of care.

After reviewing this resource, the reader should be able to:

- define important components of regionalization;



- identify existing models of regionalized systems of care;
- discuss essential considerations when planning for pediatric regionalized systems of care;
- discuss EMSC initiatives that position states to establish regionalized systems of care for children;
- define the relationship between existing EMSC performance measures and the core components of regionalization, as well as the foundational support the measures can provide to states planning to implement a pediatric regionalized system of care; and
- identify standards and regulatory processes, as well as agencies and organizations that can potentially influence the development of regionalized systems of pediatric care.





## Section 1: An Introduction to the Concept of Regionalization

### Regionalization of Care: From a Need Emerges a Concept

“Regionalization,” within the context of health-care, refers to the efficient use of resources. This is accomplished through the categorization of hospitals based on their individual capabilities to provide care; the identification, integration, and coordination of specialty services;<sup>7</sup> as well as the linking of prehospital and hospital resources into a unified system. The ultimate goal is to improve patient outcomes across the continuum of care. This concept supports the inclusiveness of communications for real-time awareness of the entire continuum of care; standardized clinical pathways and protocols within hospitals in the system; and, importantly, the funding for such efforts.<sup>8</sup> For children, regionalization ensures that the larger healthcare system, within a geographically defined area, is both efficient and can more effectively meet their unique needs.

*Consider the following scenario: A mother contacts the local volunteer EMS service having found her 3-year-old son, Brendon, on the garage floor with an empty bottle nearby that had at one time contained a cleaning agent. Mom states that Brendon is breathing fast and his breaths seem shallow. Upon arrival at the home, EMS providers find Brendon to be sleepy but aroused by voices. His breathing is shallow with notable retractions. There is an odor of gasoline on his breath. EMS applies a mask to administer oxygen and transports him to the nearest hospital emergency department.*

*Here his respiratory status continues to deteriorate, requiring emergency intubation. Concerns over suspected hydrocarbon ingestion, possible continued respiratory deterioration and lung disease, as well as the need for ventilator support and pediatric critical care pulmonary specialists prompt the community hospital to arrange transfer to the pediatric tertiary care center.*

The deliberate establishment of relationships between pediatric specialty centers, communities, and local hospitals help ensure appropriate health services, including pediatric critical care, are available to all children like Brendon. These relationships are a reflection of a facility’s recognition that needed services for the care of children are sometimes lacking, such as specialized radiology and micro blood sampling capabilities, as well as availability of pediatric pulmonary specialists, pediatric respiratory therapists, and a pediatric intensive care unit (PICU); all which will be needed to manage Brendon’s care.

To ensure resources are available to all community children serviced by the hospital, formal relationships through agreements or memorandums of understanding, are established proactively with facilities, such as the tertiary pediatric center where Brendon was transferred. Relationships, built on the sharing of pediatric specialty resources limited in availability, help facilities provide optimal care to children within the community while reducing costs associated with expensive resources infrequently used in smaller community hospitals.

The 1966 National Academy of Science (NAS)/National Research Council (NRC) report *Accidental Death and Disability* was the first report to suggest that regionalized emergency care systems could improve morbidity and mortality. Though the report addresses the magnitude of injury in general, it utilizes the incidence of motor vehicular trauma and the associated morbidity and mortality to illustrate the inability of the health-care system to respond and care adequately for the victims. An important recommendation from the report was to bring together emergency care providers and other important entities within emergency medical services, including public health, to ensure optimal emergency care on a daily basis and during a disaster.<sup>9</sup>

A few years later, the Departments of Transportation and Health, Education, and Welfare, now the Department of Health and Human Services (HHS) and the Department of Education, funded a grant program through the Emergency Medical Services (EMS) Systems Act to facilitate the development of regional EMS systems throughout the country.<sup>10</sup> This program emphasized the connectivity of EMS to the larger healthcare and public health systems and the greater impact each could have when working as one to address healthcare needs. This grant program helped to develop more than 300 EMS regions before being dissolved in the early 1980s. It also laid the groundwork for today's regional EMS systems. The State of Maryland EMS Systems (MIEMSS) was borne out of this grant program. MIEMSS has continued to grow despite elimination of the grant program.<sup>11</sup>

Regionalized systems of care for children were identified as important and first advocated in the 1993 Institute of Medicine (IOM) report *Emergency Medical Services for Children (EMSC)*. Experts concluded that categorization and re-

gionalization were “essential for full and effective operation of EMSC systems...”<sup>12</sup>

Since the early 2000s the IOM and multiple professional organizations have released reports and position statements highlighting the disparity in the delivery and lack of access to timely and appropriate emergency care. To help ensure that patients receive the “right care, at the right place, at the right time,” all have recommended regionalized systems based on the following components:

- lead agency/organization to ensure accountability of individual and collective system operations,
- categorization/designation of hospitals and resources,
- coordination of resources,
- standardized pathways and protocols,
- provider education,
- communication infrastructure for information flow, and
- quality assurance and improvement through data collection.

In 2006, the IOM report *Hospital-Based Emergency Care: At the Breaking Point* recommended “a demonstration program, administered by the Health Resources and Services Administration (HRSA), to promote regionalized, coordinated, and accountable emergency care systems throughout the country.”<sup>13</sup> The accompanying report on pediatric care, *Emergency Care for Children, Growing Pains*, also validated the need for all hospitals being linked to a broader regional system and the need for organized transfer processes for critically ill or injured children when specialized pediatric capabilities were unavailable at the receiving facility.<sup>14</sup>

In 2012, this key IOM recommendation was addressed when HRSA's EMSC Program provided \$1.2 million in grant funding to support [State](#)

### Partnership Regionalization of Care (SPROC)

projects. These initiatives were to “reach beyond state borders to overcome barriers to specialized pediatric medical and trauma services.” Proposed outcomes of these efforts include the:

- development of models for regionalized care adaptable to other areas, such as rural, frontier, and insular regions;
- development of partnerships that extend beyond state borders to improve the quality and access to specialized pediatric medical services for populations of focus in tribal, insular, or rural locales; and
- identification of technology and network infrastructure that will create integration of pediatric medical services.<sup>15</sup>

### Identification and Access to Facilities with Pediatric Capabilities

Attempts to regionalize pediatric care inherently involve the formation of partnerships to ensure access to specialty services. This does not mean, however, that healthcare services are centralized, but rather that cooperative relationships are established through agreements or memorandums of understanding linking needs of the pediatric patient to appropriate resources. Integrating local EMS services into evolving systems of regionalized care adds clarity and strengthens collaborative efforts.

EMS often takes patients to the closest emergency department. The closest emergency department though may be the least prepared to provide care for children. Recent data collected through the National Pediatric Readiness Project found that hospital emergency departments report having an average of 89% of recommended equipment and supplies outlined in national guidelines to provide care for children.<sup>16</sup> If additional resources for care are anticipated,

the child is again transferred to another facility with additional capabilities. Secondary transfer to additional resources is common in inclusive models of regionalized care and a common method of accessing needed specialty care. All hospitals of a geographic area participate in care delivery in an inclusive model of regionalized care. Because most children are treated in local community emergency departments, the success of an inclusive system is dependent on facilities having a foundation of essential equipment, trained staff, and evidence-based care guidelines, as well as transfer agreements and guidelines between facilities to expedite and assure access to healthcare services that the transferring facility may not be able to provide for the child. Inclusive models of regionalized care can be costly in time expended to receiving definitive care and in resource utilization. Inclusive models of care though can also be beneficial in that while preparing for transfer the referring facility often has access to pediatric specialists at the receiving institution to:

- assist in initial resuscitation;
- aid in assuring safe transfer to the accepting facility; and
- reduce possible secondary over triage and transfer, which has been noted to be as high as 49% for children.<sup>17</sup>

As partnerships develop between hospitals, it is feasible that hospitals with advanced capabilities may be able to provide clinical support to lesser-equipped facilities through education and consultation and the use of telemedicine services. This could facilitate children remaining in local hospitals, close to their families, primary care providers, and other family support structures while also providing access to the needed specialists and consultants available at partnering institutions. An example of a well-developed pediatric



telemedicine program is [University of California–Davis](#).<sup>18</sup> This program reaches out to children in Northern California.

*Brendon, the young boy with suspected hydrocarbon ingestion, was stabilized and then transferred to a tertiary pediatric facility. A PICU and a pediatric pulmonary specialist were not available at the original destination hospital. Thus secondary transfer to appropriate care resources was important.*

An exclusive model of regionalization allows EMS to bypass those hospitals without appropriate resources for care. Informed of individual facility capabilities and resources, EMS is empowered to develop and establish destination protocols in collaboration with hospitals within their geographic transport areas. Destination protocols include patient triage processes, with defined clinical assessment findings, that direct transport and delivery

of patients to the right facility with the right resources. This often reduces the need for secondary transfer. Working in tangent, EMS, receiving facilities, and facilities with pediatric specialty care resources can match the child’s needs to appropriate resources. These measures should contribute to better coordinated care for the child, and potentially better patient outcomes, as well as reduced healthcare costs.

The diagrams below provide the common conceptual frameworks often utilized to illustrate regionalized systems of care.<sup>19</sup> The squares/rectangles represent facilities with specialist expertise and resources while the triangles represent facilities where specialists are often not available. The arrows represent transfer/transport/communication patterns based on resource availability. Numerous factors will influence the type of system development in any given geographic area, as well as its expansiveness in delivery.

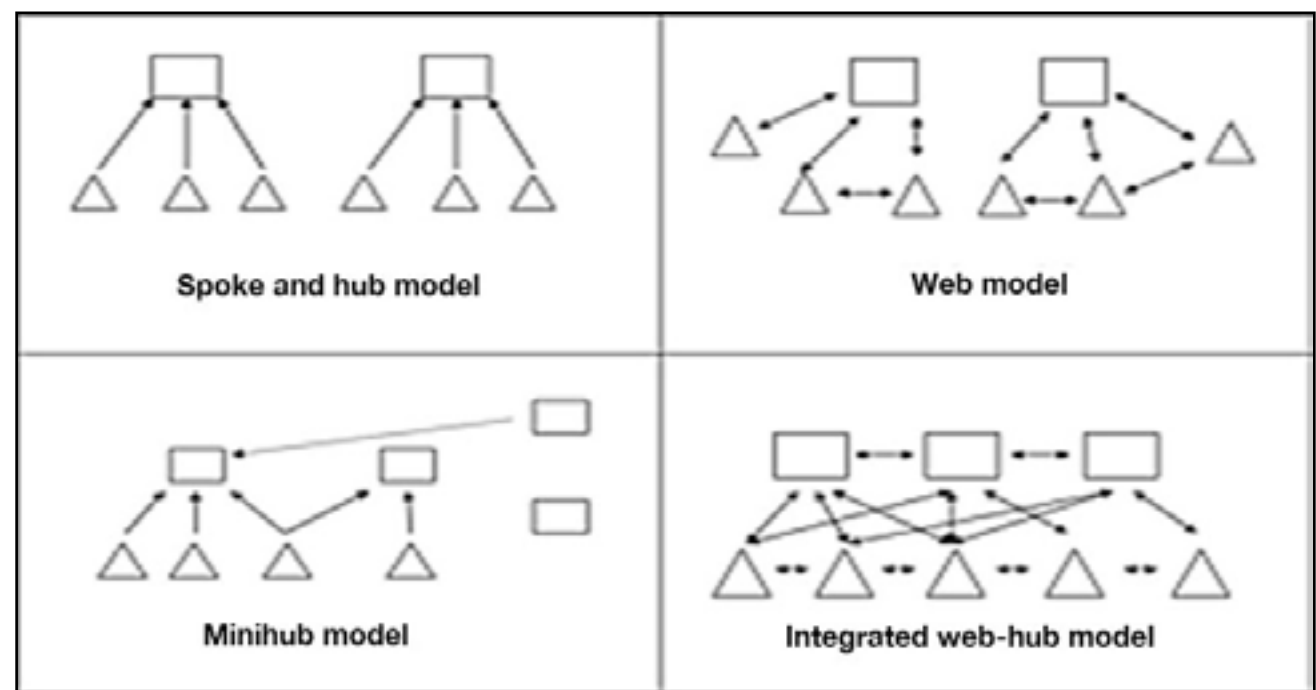


Diagram 1: Regionalized Systems of Care

Table A: Mechanisms of Regionalization		
Mechanism	Advantages	Disadvantages
High acuity patients receive care at facilities with necessary resources.	<ul style="list-style-type: none"> <li>• Patient needs are matched to facility resource capabilities.</li> <li>• High volumes of patients with complex needs provide increased opportunities for enhanced specialization and thus better patient outcomes.</li> </ul>	<ul style="list-style-type: none"> <li>• A possibility of diminished volume-outcome relationship exists if increased numbers of specialty hospitals are built.</li> <li>• Fixed costs and resources to develop a facility's capability may rise.</li> <li>• Patient/family travel time and costs to specialty centers may increase.</li> </ul>
Improved systems of care through an increase in care coordination and education.	<ul style="list-style-type: none"> <li>• Better care coordination during the acute phase of hospitalization.</li> <li>• Improved standardization of care within the network of non-specialty hospitals through the use of consistent evidence based care protocols.</li> </ul>	<ul style="list-style-type: none"> <li>• Cooperation between multiple centers beyond transfer of patients is required.</li> <li>• Typically requires state or regulatory intervention into the existing healthcare system.</li> <li>• Poor coordination of post discharge follow-up care can occur if not monitored.</li> </ul>
Off-site consultation and assistance in patient management.	<ul style="list-style-type: none"> <li>• Improves ability to provide scarce services in non- specialty hospitals.</li> <li>• Facilitates patients remaining at nearby hospitals, reducing travel time and costs.</li> </ul>	<ul style="list-style-type: none"> <li>• Medical conditions amenable to this method of treatment may be limited.</li> <li>• Limited evidence base exists to support this type of patient management.</li> <li>• Requires cooperation and collaboration between specialty and non-specialty facilities.</li> </ul>

Table A displays mechanisms of regionalization that can improve patient outcomes as well as the advantages and disadvantages of each.<sup>21</sup>

### Regionalized Systems of Care: Early Models of Coordinated Care

Despite recent emphasis on regionalization as a means of providing coordinated and accountable care, the organization of complex and high-risk diagnoses into integrated systems of care is not a new concept. Early models of regionalized systems of care – including trauma and perinatal, as well as the more recent models of ST-elevation myocardial infarction (STEMI) and stroke – address high-risk patient groups in which time-critical diagnosis and treatment are essential but for which the needed specialty physicians, care, and resources are not readily available.

**Regionalizing Trauma Care.** Trauma, the oldest model of regionalized care, can be traced back to the landmark report *Accidental Death and Disability: The Neglected Disease of Modern Society*. This report described EMS and trauma care in the United States in the 1960s and resulted in recommendations for further development

and enhancement of all aspects of emergency medical services, including ambulance design and the development of trauma centers.<sup>22</sup> Trauma is considered a surgical disease. Care for trauma patients is best delivered in centers where surgical expertise, emergency rooms, operating rooms, and staff are available and trained to care for the severely injured 24/7. Surgical expertise and 24/7 resource availability are costly and not readily available in every hospital.

Federal funding became available in the 1970s to facilitate creation of state trauma systems. In 1976, the first set of guidelines for the severely injured patient was published by the American College of Surgeons' (ACS) Committee on Trauma (COT): *Optimal Hospital Resources for Care of the Injured Patient*. This resource delineated criteria for categorizing hospitals as trauma centers while creating a tiered approach for triaging patients to appropriate trauma centers based on injury complexity.<sup>23</sup>

Integrating the needs of injured children into the overall adult trauma system has been slower and somewhat more arduous. In the 1980s, advocates from the pediatric surgical community began vocalizing the need for pediatric trauma regionalization using research data to support this position.<sup>24</sup>

The 1980s and 1990s sparked additional activities focused on standardizing resources and care needed to treat pediatric trauma patients. A chapter on pediatric trauma was added to the Advance Trauma Life Support course, and the ACS COT included a process to verify pediatric trauma centers based on standards outlined in the tool Resources for Optimal Care of the Injured Patient 1999.<sup>25</sup>

In 2005, the EMSC Program announced 10 specific performance measures to guide and assist states in improving the care of children. These measures have provided additional support to regionalizing pediatric trauma care by strengthening the pediatric care capabilities of the EMS system, emphasizing the need for pediatric transfer processes, as well as the categorization/recognition of pediatric trauma facilities. It took more than 30 years to incorporate the needs of injured children into the evolving trauma system.

Currently, almost every state has a trauma system and at least one state-designated or ACS-verified pediatric trauma center. More than 700 general trauma centers and an estimated 170 pediatric-specific trauma centers are reported to be available in the United States.<sup>26</sup> Studies have shown outcomes for the severely/critically injured are better when cared for in trauma centers where specialists and resources are readily available. For injured children, studies have shown improved morbidity outcomes when comparing children

treated at a pediatric trauma center to children cared for in general adult trauma centers. Pediatric trauma centers, unlike general adult trauma centers, include child-specific priorities of care, such as pediatric critical care units and specialists, family-centered care, child life specialists, pediatric specific rehabilitation, post-trauma educational assessments, and educational plans for community and school reintegration, as well as opportunities for an in-hospital school during prolonged hospitalization. Pediatric trauma centers are recognized by the medical community as essential for the care of injured children.<sup>27</sup>

Over the years, the ACS COT and HRSA have partnered to provide continued leadership for the development of regional trauma systems, as well as support to improve processes for the care of injured children. Other federal agencies have also collaborated on specific system components, i.e. field triage guidelines and safe transport of children in ambulances.

Though regionalized trauma systems are believed to positively impact the outcomes of injured patients, these systems face common challenges:

- **Trauma Center Misdistribution.** Multiple trauma centers can be found in most large cities and yet even lower level trauma centers are often lacking in rural or frontier areas. Inclusive regionalized systems of trauma care will evolve when hospitals have a foundation level of preparedness to provide trauma care to the injured patient, inclusive of organized transfer processes and a triage process to identify those patients/injuries to be considered for transfer.
- **Evidence-based Processes.** An evidence-based process is needed to determine the



appropriate number and levels of trauma centers needed in any one region to assure maintenance of provider clinical capabilities.

- **Data Collection and Analysis.** Consistent and timely data collection, submission, and evaluation, as it pertains to state trauma system and individual trauma center performance, is important for monitoring and identifying needed performance improvement initiatives.
- **Pediatric Competencies.** Assessing and ensuring pediatric competencies in Level I and Level II general adult centers is difficult.
- **Staffing.** Availability of general surgeons credentialed in trauma care, as well as pediatric trauma surgeons and pediatric specialists in emergency medicine, orthopedics, anesthesia, critical care, and physical medicine and rehabilitation is limited.
- **Funding.** Availability of trauma center funding to assist in reimbursement for resource availability and unreimbursed care is limited.

Despite challenges, comprehensive trauma systems, including recognized pediatric trauma centers, are available in almost every state. Trauma systems result in better patient outcomes and have been shown to be cost-effective.<sup>30,31</sup> Trauma care is recognized as the most successful and perhaps most widely-established regionalized system of care in the nation.

**Regionalizing Perinatal Care.** Perinatal care systems, specific to high-risk pregnant women and newborns, also represent an early model of regionalized care. Patient populations requiring specialized care that could benefit from regionalization was a focus of the Emergency Medical Services Act of 1973. Conditions identified included cardiac, burns, trauma, and neonatal

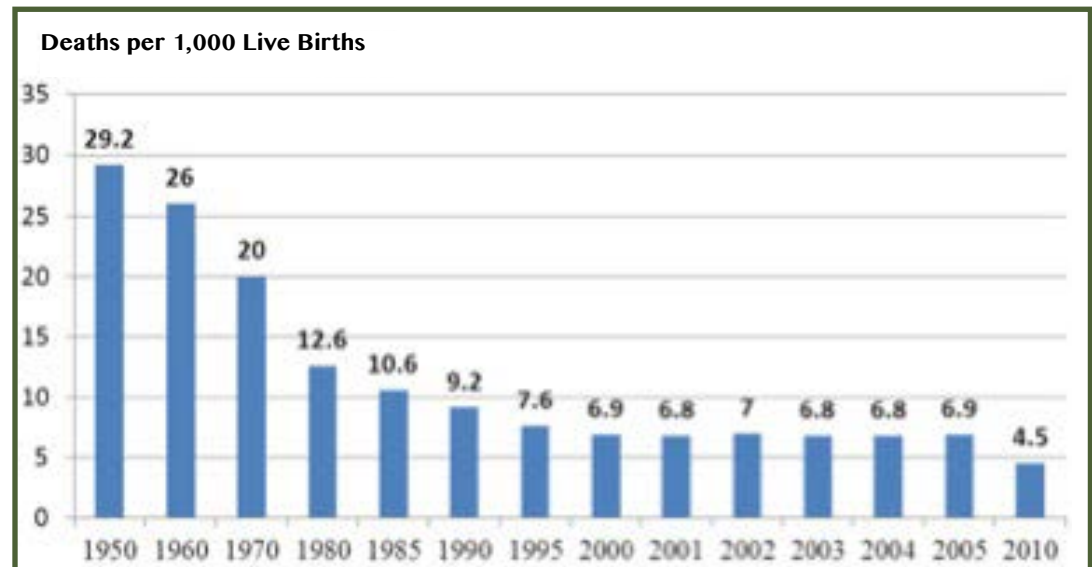
care. The need for regionalized systems of care for high-risk neonates and newborns in the United States was reiterated in the 1976 March of Dimes report *Toward Improving the Outcome of Pregnancy (TIOP)*.<sup>32</sup> The TIOP report advocated for the categorization of neonatal care, as well as for the practice of directing women with high-risk, complex pregnancy-related conditions to hospitals with appropriate personnel and neonatal resources to provide effective care for the mother-baby pair. Two subsequent TIOP reports have been issued.

The perinatal system provides an organized approach to assuring availability of high-risk obstetrical and neonatal care resources. Level III and Level IV neonatal intensive care units (NICUs) are generally located in tertiary care centers near high-risk delivery units. (For more specific information on levels of neonatal care units, read [Hospital with Emergency Departments: Types and Characteristics](#).) NICUs provide care to ill, pre-term, and at-risk infants and are under the direction of neonatologists. Neonatal care is complex and also resource expensive; and therefore is not readily available in every community. Transfer of the very sick infant is often required to gain access to these resources, though some nurseries have successfully utilized consultation via telemedicine for more stable infants or infants who cannot travel great distances to a NICU.

In the last decade, certified neonatal-perinatal medicine specialists have increased by more than 1,400; more streamlined definitions of levels of hospital care have become available; and national standardization of perinatal care activities, such as identification of high risk patients, neonatal transport, and the application of emerging technology,<sup>36</sup> have contributed to a 50% decrease in the national infant mortality rate (see Table B).<sup>37</sup>

**Table B: National Infant Mortality Rates, 1950-2010**

Table B displays the infant mortality rate from 1950 through 2010.



A deliberate push by public and private stakeholder organizations, clinical providers, healthcare administrators, researchers, and insurance companies to further regionalize neonatal care has since been underway. These efforts have also been supported with federal funding, such as the Title V Block Grants. The consensus among experts in this field is that perinatal regionalization – moving high-risk, complex patients to specialized hospitals – has improved both mother and baby outcomes.

Even though perinatal regionalized systems have demonstrated significant improvements in outcomes, common challenges continue to exist in these systems:

- Similar to regionalized trauma care, regionalized perinatal systems depend on specialist and resource availability and organizing systems to ensure access to these needed resources. Neonatal specialists are not typically available in rural/frontier communities. Critically ill infants will require transfer to access these services, yet stressed and compromised infants can be at risk during transfer.
- Specialty neonatal transfer teams have been developed to help reduce associated transfer risks, however, these teams have also added to the overall cost of care. Additionally, increased focus has been placed on early identification of high-risk pregnancies with delivery encouraged at a tertiary care medical facility with an associated NICU.
- Accessing designated neonatal care centers can require crossing state borders. This challenge is also common with trauma systems. Jurisdictional, professional licensure, and reimbursement issues can be challenges when patients cross borders.
- Uniformity in definition of levels of care does not exist across the country for neonatal centers. This is imperative for health outcome comparisons, helping parents select delivery services, and reducing the need for insurance companies to define care levels for reimbursement purposes.

***Regionalizing ST-elevation Myocardial Infarction (STEMI) Care.*** Regionalized systems of care typically facilitate the standardization and use of clinical pathways and protocols within geographical areas. With almost 500,000 annual occurrences and evidence regarding best practices for care of STEMI patients being published, the need for a consistent pathway for care of this time sensitive diagnosis became the driving force for STEMI regionalization efforts.

STEMI occurs when the coronary artery is completely blocked. Restoring blood flow for STEMI patients was recognized as time-sensitive and critical in the 1980s.<sup>39</sup> The preferred treatment is percutaneous coronary intervention (PCI). This intervention is to be performed within 90 minutes of EMS-patient encounter. PCI or balloon angioplasty capabilities are only available in approximately 25% of all hospitals. Local and rural capabilities for PCI intervention are extremely limited. The combination of time-critical diagnosis, treatment, and support for regionalized systems of care for time-critical diagnosis, as noted in the 2006 IOM report, provided the foundation for development of a regionalized system for care of STEMI patients and an opportunity for saving lives.

The first set of evidence-based guidelines for treatment of victims with STEMI were developed in 2004 under a collaborative of the American College of Cardiology Foundation, the American Heart Association (AHA), ACEP, and the Society of Cardiovascular Angiography and Interventions. Guidelines continue to be re-evaluated and updated as scientific evidence becomes available, most recently in 2012. The guidelines focus on an algorithm for reperfusion by percutaneous coronary intervention or the administration of fibrinolytic medication. The regionalized

system of care for STEMI is designed around this treatment algorithm. The algorithm focuses on EMS assessment by electrocardiogram, a destination protocol based on time to definitive medical intervention, and defined point-of-entry treatment protocols at receiving hospitals. This regionalized care system monitors both EMS performance and EMS adherence to the algorithm, as well as guideline compliance activities in the hospital setting.

Continuous performance improvement monitoring has been built into the system and is a focal point of STEMI regionalized care. In 2006, the American College of Cardiologists (ACA) launched the ‘[Door 2 Balloon, an Alliance for Quality](#)’ initiative.<sup>40</sup> This national alliance focuses on specific STEMI performance improvement processes, opportunities for improvement, and the sharing of best practices. The Joint Commission has made the “Door 2 Balloon” intervention a core measure in adult centers.

Additionally, the Centers for Medicare and Medicaid Services (CMS) has contracted with continuous quality improvement groups to develop and identify processes to improve myocardial infarction care. [Mission: Lifeline](#), an AHA initiative to improve the quality of STEMI care, was released as a national initiative in 2007.<sup>41</sup> This initiative included a public education piece emphasizing the need for patients with suspected heart attack to call 911. The education message went on to share that immediate patient assessment by an EMS provider was important in determining the best hospital destination for treatment.

As with the other regionalized systems of care defined earlier, regionalized STEMI care also has challenges:



- Rural geography may impact both EMS response time to the patient and transport times to definitive care.
- Limited availability of PCI capable facilities, especially in rural communities, may impact transfer times.
- STEMI is a revenue-generating diagnosis, unlike trauma care. Therefore, competition between hospitals and cardiology groups can impact algorithm development and implementation.
- Critical care transport/helicopter access and control can impact algorithm implementation.
- Needed data collection for performance improvement can impose additional unwanted costs on facilities.

STEMI regionalized systems of care evolved rather quickly in comparison to the earlier discussed regionalized care systems. The major contributors to the evolution the STEMI regionalized system of care can be attributed to the fact that STEMI is a high-risk diagnosis, impacts a large portion of the population, has a defined established evidence-based treatment plan, and treatment resource capabilities are limited..

The support of numerous national professional organizations and accrediting groups, such as the Joint Commission and CMS, provided additional impetus to the value and need for a regionalized approach for STEMI care.

### *Regionalizing Stroke Care.*

Regionalized stroke care is relatively new compared to trauma and STEMI regionalization. Each year, close

to 800,000 people suffer a stroke in the United States.<sup>42</sup> During the past 20 years, experts in the field identified lack of standardized stroke treatment protocols, lack of integration of the different phases of the continuum of care for stroke victims, and a lack of coordination between the prehospital and hospital system in caring for these patients.<sup>43</sup>

In 1996, the National Institute of Neurological Disorders and Stroke (NINDS) held a symposium to plan the ground work for use of tissue plasminogen activator (t-PA) as the treatment of choice for acute stroke nationally. Experts also pushed forward the concept of time sensitive evaluation and treatment for optimal outcomes in care of the victims of stroke. Six years later, clinicians found that the use of t-PA as the primary intervention still was not implemented nationally. Additionally, the majority of patients suffering from acute stroke were found not presenting to the hospital within the recommended time window.<sup>44</sup>

During a subsequent NINDS symposium in 2002, a task force made recommendations for the development of regionalized stroke systems. Many of the recommendations reflected core components of regionalization of care, such as the necessity of a lead entity or agency responsible for



organizing the stroke system and standardized treatment protocols. Another important feature of these early recommendations was the need for a communication infrastructure for consultation between stroke centers and those facilities not recognized as a stroke center, including centers that use telemedicine to coordinate care, especially in frontier and/or rural areas.<sup>45</sup>

The medical community advocating for a regionalized stroke system recognized that a regionalized system of care for individuals suffering a stroke could benefit from an important lesson learned from the development of trauma systems: the value of political support when developing the system at the state and local levels. This was reflected in the STOP (Stroke Treatment and Ongoing Prevention) Stroke Act passed by the United States Senate in 2002 and the House of Representatives in 2004.<sup>46</sup> Though bipartisan support was received for the Act, it was never passed in both congressional houses within the same year and thus has not become a federal law. The attention brought to this time sensitive diagnosis and the need for regionalizing care for stroke victims by the STOP Act led the way for many states to pursue legislated systems of care. Thus, regionalized systems of care for stroke victims exist in many states today.

### **Regionalized Systems of Care, A Summary**

While each of the four regionalized systems of care discussed in this section build on components of other systems, differences in the actual care of trauma, STEMI, and stroke patients necessitate differences in the design of each system. For example, the prevalence and time sensitivity of treatment for strokes requires receiving facilities be involved in initial patient evaluation

and treatment, including administration of t-PA, if appropriate. And while trauma systems encourage inclusivity of all hospitals and expect them to be prepared to initially assess and resuscitate the injured, not all hospitals are expected to have surgical expertise available for surgical management. Instead those hospitals without the required surgical expertise are expected to be prepared to expeditiously and safely transfer the injured patient to a trauma center with appropriate resources.

Additionally, it should be remembered that regionalized systems of care will evolve somewhat differently depending on the availability of community resources and differences in the geography. Trauma, stroke, and STEMI are diagnosis-specific driven systems; regionalized systems of care for infants and children are non-diagnosis specific. The perinatal system seeks to improve the care of all critically ill newborns and infants. A regionalized system of care for children is child specific and addresses the unique needs, considerations, and specialization sometimes required in providing care to children.

This section has reviewed the development of regionalized care systems and the evolution of the four most prevalent national models of regionalization. Though all but one of the highlighted models of regionalized care were developed specifically for adult patients, there are commonalities among the four systems of care that are important when considering regionalized care for children. These include:

- All systems were developed with the goal of improving the care of high-risk patient groups with time sensitive diagnoses when essential resources were scarce.
- State leadership was used to assist in the development of each system, including the

establishment of standards and monitoring implementation.

- Systems were organized across the continuum of care to facilitate access to resources not necessarily readily available in the patient's community.
- Trauma, stroke, and STEMI systems, as inclusive systems, include EMS and hospitals in the defined geographic regions.
- Defined, evidence-based care pathways exist in all four systems and have provided opportunities for performance monitoring and system improvement.

Children, due to differences in response to injury and illness, can also be considered a high-risk patient group that could benefit from regionalization. Regionalization of pediatric care could, like models of regionalization highlighted in this section, provide greater opportunities for accessing needed pediatric specialists and specialty resources. Unfortunately specialists and subspecialists sometimes needed by children, especially

those with special healthcare needs, are very few. Meanwhile evidence exists illustrating that mortality and morbidity are reduced and outcomes for pediatric care are improved when children have access to these essential resources.

To compensate for limited specialist and subspecialist availability, organized care processes as afforded in regionalized systems of care, that either include transferring the patient to the specialist or bringing the specialist to the patient via consultation or telemedicine, could be essential. The next section in the Primer will focus on specific EMSC initiatives that are helping to lay a foundation for regionalized systems of pediatric emergency care.







## Section 2: Building the Foundation for Regionalization

The EMSC Program is committed to integrating the needs of children into existing emergency care systems across the nation. Local emergency care systems do not always have pediatric-specific resources or specialists needed for children. Implementing regionalized systems of pediatric care ensures that these resources are available to all children regardless of where they live. Ensuring that the emergency care system is prepared for children facilitates meeting the Program's mission of reducing morbidity and mortality resulting from pediatric illness and injury.

### Case Scenario

The following scenario illustrates what often occurs to a child living in a rural or frontier area who experiences a critical illness or injury.

*Julie, a 7-year-old, lives in a small rural farming community with her family. One day while at school, Julie falls from the top of the jungle-gym hitting her head on the surface below. Upon finding Julie, school authorities identify a small head laceration and report she is non-respondent and moaning. The local volunteer ambulance service arrives to transport Julie to the nearest community hospital which is 45 minutes away. On arrival at the hospital, a quick assessment by emergency department staff determine that Julie is still not responding, her moaning has ceased, and her breathing has become more labored and irregular. The receiving hospital staff stabilize Julie's airway, provide oxygen, and*

*establish intravenous lines. After consulting with pediatric trauma specialists at a trauma center within the region, Julie is transferred to the center where pediatric specialists, including a neurosurgeon, and resources for continued care are available. The trauma center is an additional 90 minutes away.*

Literature states that the majority, 92%, of pediatric emergencies such as Julie's, are seen in non-children's hospitals or local community emergency departments.<sup>48</sup> Communities best prepared to handle childhood emergencies are those with properly trained emergency personnel; appropriately equipped ambulances and emergency departments; and well-defined, evidence-based pediatric treatment protocols, including established transfer agreements and guidelines.

To ensure foundational readiness of the emergency care system for all children – regardless of where children live, go to school, or travel – the EMSC Program has embarked on several national initiatives to reduce existing disparities and gaps in the provision of pediatric emergency care.

### EMSC Performance Measures

In response to the Government Performance and Result Act (GPRA), the first of these initiatives, the development and establishment of national performance measures for all states, began in 2004.

In collaboration with pediatric leaders across the country, the EMSC Program defined 10

performance measures for benchmarking and assessing progress in integrating the needs of children into existing emergency care systems nationwide. Quality measures typically include structures or processes of care that have a relationship to positive health outcomes and are controlled by the healthcare system.<sup>50</sup>

The process for developing the 10 performance measures was comprehensive and examined more than 110 elements impacting emergency care across the continuum of care. It included a review of the best available published evidence, was consensus driven by national emergency care leaders, and included interviews with EMSC grantees and stakeholders.

To best understand the significance and magnitude of the performance measures and how they contribute to better emergency care outcomes for children, it is helpful to return to the scenario of Julie and her injury.

*To ensure optimal outcomes for Julie, it is important that the local ambulance staff, responding to the 911 call, have pediatric training and appropriate pediatric equipment to begin resuscitation efforts in route to the hospital. However, the challenges to ensuring local community EMS providers have both appropriate skills and equipment to provide care to children are many, especially in small rural communities. Because the responding ambulance staff is in a community with a population of less than 1000, there are no paid EMS providers but committed community members who volunteer on time off from work to staff the ambulances. Therefore, time for additional training to provide care for children is often*

*difficult to find. Additionally, there is no large tax base within the community to support the ambulance service or to support expenses associated with equipment needs. Limited financial resources of the ambulance service are often spent on equipment needed to transfer the largest volumes of patients: adult cardiac and trauma patients, often leaving little financial reserve to support pediatric equipment needs.*

*The hospital treating Julie also needs to have pediatric equipment and protocols in place, as well as staff with pediatric training to provide at least initial patient care. It is essential that hospitals self-assess availability of pediatric resources, specialists, and subspecialists. If lacking in one or more areas, agreements with facilities that have needed pediatric resources and specialists, i.e. neurosurgeon, should be established proactively. Additionally, guidelines for inter-facility transfer need to be available and staff knowledgeable regarding their use. These processes ensure that Julie can be moved safely and expeditiously to a facility with a neurosurgeon and a pediatric critical care unit.*

The EMSC performance measures assist states in implementing all of the required processes so that Julie can receive optimal initial care while ensuring access to needed specialty services and resources.

Tables depicting the EMSC performance measures and aggregate national data<sup>51</sup> are depicted on page 19.

Table C: Prehospital-Based Performance Measures		2010 Results	
Performance Measure	Indicator	BLS	ALS
On-line Medical Direction	% of EMS agencies that report on-line medical direction being available when treating a pediatric patient	87%	91%
Off-line Medical Direction	% of EMS agencies that report having pediatric patient protocols physically available during an emergency call	63%	90%
Pediatric Equipment	Average % of essential pediatric equipment outlined in national guidelines that is carried by EMS transporting vehicles	91%	96%
Continuing Education	% of states/territories requiring pediatric education for EMS provider licensure renewal	75%	82%

Table C depicts aggregate national data for EMSC prehospital performance measures.<sup>51</sup>

Table D: Hospital Based Performance Measures		2010 Results
Performance Measure	Indicator	
Hospital Recognition Systems - Medical	Progress made in states towards development of a standardized system to stabilize and/or manage pediatric medical emergencies (based on 0-5 scale)	2.1*
Hospital Recognition Systems - Trauma	Progress made in states towards development of a standardized system to stabilize and/or manage pediatric traumatic emergencies (based on 0-5 scale)	4.4*
Interfacility Transfer Guidelines	% of hospitals that report having written guidelines with specific components that cover the transfer of pediatric patients to other facilities	38%
Interfacility Transfer Agreements	% of hospitals that report having written agreements covering the transfer of pediatric patients to other facilities	59%

Table D depicts aggregate national data for EMSC hospital performance measures.<sup>51</sup>

\*States were to score their progress on these measures using a scoring scale in which 0 represented no progress toward development of a system; 1 indicated research had been conducted on a system by the EMSC program; 2 indicated criteria had been defined to facilitate recognition levels of facilities; 3 - a facility recognition implementation plan has been developed; 4 - facility recognition plan has been piloted; and 5 - at least one facility has been formally recognized through the recognition program.

Table E: Permanence/Sustainability Performance Measures		2010 Results	
Performance Measure	Indicator	BLS	ALS
State EMS for Children Advisory Committee	% of states/territories with an EMSC advisory committee that contains the required members and that meets at least four times a year	87%	91%
Pediatric Representation on the State EMS Board	% of states/territories that both have and require pediatric representation on the state EMS advisory board	63%	90%
State EMS for Children Program Manager	% of states/territories that have a full-time EMSC program manager	91%	96%
Statutory Integration	Average # of 8 EMS for Children performance measure areas that have been integrated into state statute or regulation	75%	82%

Table E depicts aggregate national data on EMSC performance measures related to State program permanence or sustainability.<sup>51</sup>

### National Pediatric Readiness Project

In 2012, the EMSC Program embarked on another national initiative to strengthen the emergency care system for children and support future pediatric regionalized systems. The National Pediatric Readiness Project (Peds Ready) is a multi-phased pediatric quality improvement project. Its goal is to ensure a basic level of pediatric readiness in every hospital emergency department across the nation. This initiative may also assist states in achieving the pediatric facility recognition/ categorization performance measures that are essential for regionalized efforts.

The 2010 IOM report Regionalizing Emergency Care stated “ongoing, dynamic, real time assessment mechanisms that provide information on hospital resources, as well as all other emergency care resources is essential.”<sup>52</sup>

The Peds Ready project is a collaborative project of the EMSC Program, AAP, ACEP, and the Emergency Nurse Association (ENA). Phase one of the project consisted of an assessment of emergency department pediatric readiness. More than 5,000 facilities were invited to participate. The assessment was based on the following areas of the Joint Policy Statement: Guidelines for the Care of Children in the Emergency Department (published in *Pediatrics*, October 2009 and *Annals of Emergency Medicine*, October 2009):

- Administration and Coordination;
- Physicians, Nurses, and Other ED Staff;
- QI/PI in the Emergency Department (ED);
- Pediatric Patient Safety;
- Policies, Procedures, and Protocols; and
- Equipment, Supplies, and Medications

As emergency departments completed their individual assessments, they were automatically directed to an internet accessible tool kit to

assist them as they correct identified voids of the Guidelines. For more information on Peds Ready, visit: [www.pediatricreadiness.org](http://www.pediatricreadiness.org).

Participation in the Peds Ready project helps to ensure essential foundation components are available to provide initial emergency care to all children. Critically ill and injured children though often need access to pediatric specialists and resources not readily available in every community and every hospital.

*Julie needed a neurosurgeon for evaluation and treatment, and possibly the resources available in a pediatric critical care unit for continued care. To access these specialty services Julie needed to be transferred to a trauma center; transfer agreements and guidelines to facilitate transfer to additional resources helped to facilitate safe transfer and access to additional expertise and resources.*

For more information on planning processes for inter facility transfer, refer to the [Inter Facility Transfer Toolkit for the Pediatric Patient](#).

### State Partnership Regionalization of Care Grant Program

As illustrated in the scenario involving Julie, limited pediatric specialty resources and specialists make the structuring or regionalization of pediatric resources in any given location<sup>53</sup> essential to ensuring all critically ill and injured children have access to needed specialty resources and thus validating the need for regionalization. It is this structuring of pediatric expertise and resources that led to a second 2012 initiative to support pediatric regionalization efforts. In June 2012, \$1.2 million in EMSC State Partnership Regionalization of Care (SPROC) grant awards were announced to support regionalization efforts of pediatric



care. A fact sheet providing a synopsis of each SPROC grant is available for [download](#).

These four-year projects are to: (1) work with state governments and/or accredited schools of medicine to develop regionalized systems that encompass the sharing of resources and improve access to pediatric healthcare services for children and families in tribal, territorial, insular, and rural areas of the United States; and (2) develop “Models of Inclusive Care” that may be replicated in other regions where access to specialized pediatric medical treatment is limited due to geographical distances or jurisdictional borders.

All three EMSC initiatives support the seven core components of regionalized systems of care

The document “A Crosswalk of EMSC Performance Measures and Regionalization Core Components” provides a graphic illustration of the relationship between each of the performance measures and the core components of regionalization. EMSC performance measures have a direct relationship to and can assist in building the foundation for achievement of the various core components of regionalization.

Over the years, the EMSC Program has invested in projects that strengthen and support improvements in pediatric emergency care and pediatric regionalization efforts. To view some additional EMSC projects linked to regionalized core concepts, read [A Sampling of EMSC Projects Contributing to Regionalization Core Concepts](#).

A Crosswalk of Regionalization Core Concepts to the EMSC Performance Measures

EMSC for Children Performance Measures* (below)	Regionalization of Care Core Concepts					
	Lead agency for implementation, monitoring, and oversight	Hospital & Resource Categorization/Designation	Standard Pathways and Protocols	Provider Education	Communication Infrastructure	Quality Assurance and Improvement
Availability of on-line pediatric medical direction	X		X		X	
Availability of offline pediatric medical direction	X		X	X	X	X
Availability of pediatric equipment/supplies (per national guidelines)	X		X	X		X
Hospital recognition for ability to manage pediatric medical emergencies	X	X	X	X	X	X
Hospital recognition for ability to manage pediatric traumatic emergencies	X	X	X	X	X	X
Availability of interfacility transfer guidelines that cover pediatric patients and include components of transfer		X	X	X	X	X
Availability of interfacility transfer agreements that cover pediatric patients		X	X	X	X	X
Adoption of pediatric emergency education requirements for BLS/ALS license renewal	X		X	X		
Establishment of an EMSC Advisory Committee, pediatric representation on the EMS Board, and employment of full-time EMSC manager	X		X		X	X
Integration of EMSC priorities into statutes/regulations	X				X	



Click here to download “A Crosswalk of EMSC Performance Measures and Regionalization Core Components” to your desktop.



## Section 3: Pediatric Regionalization - An Opportunity to Improve Access to Specialized Pediatric Resources

Regionalization provides an organized approach for states, communities, and the emergency care continuum within geographic and jurisdictional confines to partner and share existing pediatric resources. Ensuring processes and transfer agreements and guidelines are in place for moving critically ill and injured children to needed resources or bringing the resources to the child are essential if outcomes for critically ill and injured children are to improve. Pediatric regionalization facilitates matching appropriate resources to a child's care needs.<sup>54</sup>

This section explores factors impacting access to pediatric specialty resources, including medical specialization and sub-specialization, as well as hospitals and transfer processes.

### **Children, Emergency Departments, and Pediatric Specialization**

More than 31 million children are seen in hospital emergency departments each year. They comprise 27% of all emergency department visits.<sup>55</sup> Most of these children are treated locally by community physicians. These children are a testament of the existing system's capabilities to successfully treat a child and return him or her home. As mentioned earlier though, the differences in providing care for children underscore the need for all emergency departments to be pediatric ready in order to successfully manage and treat children.

But even pediatric-prepared emergency departments cannot always provide sufficient

and appropriate resources to ensure optimal outcomes for critically ill or injured children, or for children with special healthcare needs or chronic illnesses. Children with special healthcare needs often require additional support and hospitalization where pediatric specialists and resources specific to condition are available.

Studies have shown morbidity and mortality rise for critically ill or injured children when care is not managed by pediatric specialists.<sup>56</sup> Geography and jurisdictional boundaries, though, often impose community isolation from the very pediatric centers and specialists that critically ill or injured children and those with special healthcare conditions may need. Pediatric specialists are few in number in comparison to the general pediatric population, and are often described as being maldistributed and not readily available in every community. Pediatric specialty centers and specialists are primarily found in urban, tertiary, academic medical centers. Thus, children needing access to specialists will need to be transferred to these centers or the resources/specialists will need to be brought to them.

### ***Pediatric Specialization and Workforce Limitations Validate Need for Regionalization.***

Pediatric specialization and sub-specialization has evolved because of the unique differences in caring for pediatric patients. Multiple clinical focus areas, the increased survival of children with chronic illness, and the explosion of technology and its application in the care of patients have all contributed to and reinforced the need for

specialization. Board certified/eligible pediatricians, as defined by the American Board of Pediatrics (ABP), have completed medical school and three years of additional pediatric training in a program accredited by the Council for Graduate Medical Education. The workforce of pediatric specialists and sub-specialists is tracked and studied by ABP.<sup>57</sup>

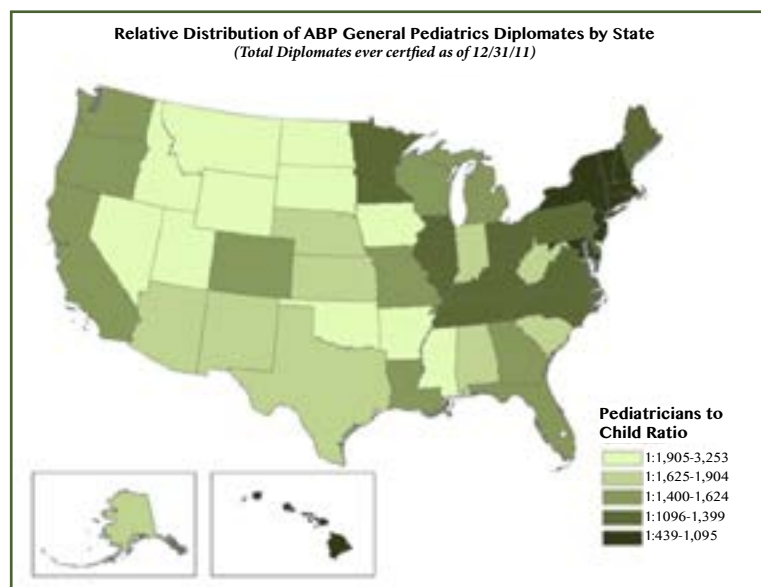
In 2011, the ABP reported the availability of 52,844 board-certified pediatricians in the United States. They also noted that more than half of these individuals were certified within the last 10 years. With a pediatric population of 74,195,760, the ratio of board certified pediatricians to children is 1:1,404. Pediatricians often serve as the primary care physicians for most children. But more than 970,000 children living in 47 states still do not have access to a primary care pediatrician. Underserved areas for pediatric specialization are typically more rural, less populous, and have a greater proportion of persons living below poverty.<sup>58</sup>

Contributing factors to the limited number of pediatricians often sighted in the literature include:

- additional required training after medical school and licensure,
- limited number of pediatric training programs,
- natural attrition,
- physician lifestyle determinants, and
- pediatricians seeking sub-specialization certification.

Note that the portal for acceptance into ABP sub-specialization programs is pediatrician certification. More than a third of the 27,582 pediatricians certified in the last 10 years have gone on to further train as a sub-specialist. Sub-specialization contributes to reducing the pediatrician workforce.

**Not All Specialists are Alike.** Understanding processes guiding medical specialization and limited availability of pediatric specialists validates the need for a regionalized system of pediatric care. A medical specialty is defined as an area of medical practice connoting special knowledge and ability resulting from specialized effort and training.<sup>60</sup> The American Board of Medical Specialties (ABMS) is the oversight body for all specialty certification.



Source: American Board of Pediatrics. Workforce Data 2011-2012.<sup>59</sup>

Medical licensure defines the minimum competency requirements to diagnose and treat patients, but is not specialty specific. Medical specialty certification is voluntary. It is achieved by completing specialty pathways defined by the individual specialty boards that have been approved by ABMS. ABP defines the pathway for pediatric certification.

Multiple member boards of ABMS can also define similar areas of specialization. For instance, both ABP and emergency medicine specialty boards define pathways for pediatric emergency care

sub-specialization. Pediatric sub-specialty tracts typically follow pathways for certification in the specialty area and include components of additional training focused in specialty diagnosis, treatment, education, and research of children. This will vary among the specialties.

Table F displays recognized ABMS specialty member certification boards.<sup>61</sup> The table also identifies those boards offering a pediatric-specific tract and the number of pediatric-specific certifications that have been issued for each specialty during the last decade. The paucity of pediatric subspecialists having earned certification from the

specialty boards helps in understanding the limited pediatric workforce.

ABMS defines a sub-specialty as an identifiable component of a specialty to which a practicing physician devotes a significant proportion of time. The portal for entry into specialist training for most pediatric sub-specialists is having certification as a pediatrician. Sub-specialists, as a result of training and experience, are qualified to provide pediatric patient care and education, and to conduct research in the defined area of pediatric medical or surgical care.<sup>62</sup> Certification in most pediatric sub-specialty areas requires special

Table F: Recognized ABMS Specialty Member Certification Boards								
Certification Board	Pediatric Sub-specialist Tract	Number of Pediatric Certificates Issued in Last 10 Years	Certification Board	Pediatric Sub-specialist Tract	Number of Pediatric Certificates Issued in Last 10 Years	Certification Board	Pediatric Sub-specialist Tract	Number of Pediatric Certificates Issued in Last 10 Years
Allergy and Immunology	No		Female Pelvic Medicine	No		Pediatrics (ABP)	Multiple sub-specialty tracts	Total number of all sub-specialists 8,079
Anesthesiology	Yes	New certification	Internal Medicine	Yes Adolescent	17	Physical Medicine & Rehab	Yes	167
Brain Injury Medicine	No		Medical Genetics	No		Plastic Surgery	No	
Clinical Informatics	No		Nuclear Medicine	No		Preventive Medicine	No	
Colon/Rectal Surgery	No		Neurological Surgery	No		Psychiatry & Neurology	Yes	2,243
Complex General Surgery	No		Obstetrics and Gynecology	No		Radiology	Yes	285
Dermatology	Yes	195	Ophthalmology	No		Reconstructive Surgery	No	
Emergency Medicine	Yes	83	Orthopedic Surgery	No		Surgery	Yes	313
Epilepsy	No		Otolaryngology	Yes		Thoracic Surgery	No	
Family Medicine	Yes Adolescent	135	Pathology	Yes	118	Urology	Yes	267

Table F displays recognized ABMS specialty member certification boards.<sup>63</sup>

education experience as defined by the various specialty boards of ABP.

Table G illustrates ABP-recognized sub-specialty tracts and the number of pediatric sub-specialists certified in each of the specialty areas during the past decade.<sup>63</sup> The low numbers indicate that pediatric specialists may not readily be available in all regions. Identifying sub-specialist consultants for children living in remote locations, similar to the existing stroke model employed across most states, could provide access to specialty care while preventing unnecessary transfer in some instances. Telemedicine could also serve as an important conduit to facilitate such consultation.

Additional information on specific pediatric sub-specialists, including geographic distribution or availability of each of the pediatric sub-specialists in a specific local, is available for [download](#).

**Hospitals and Regionalized Systems of Care**  
Access to pediatric-specific resources and

specialty care is the overall goal of pediatric regionalization. With only 90 freestanding children’s hospitals available in the country, it is important for all pediatric-prepared hospitals to participate in the emergency care of children regardless of size or location.<sup>64</sup> An inclusive regionalized system of care recognizes the inherent value of having a foundation of pediatric care available in every community, but also encourages recognition or categorization of facilities to denote availability of specialty resources and pediatric specialists that may be needed for the critically ill or injured child.

Pediatric medical specialist recruitment can be a challenge for many hospitals. Additionally, the need for pediatric-trained staff and pediatric-specific diagnostic and treatment capabilities can also serve as a stimulus to planning regionalized systems that encourage facilities to partner, share resources, and control costs while ensuring access to pediatric specialty care.

Table G: ABP-recognized Sub-Specialty Tracts			
Sub-specialist Tract	Number Certified in Last 10 Years	Sub-specialist Tract	Number certified in Last 10 Years
Adolescent Medicine	190	Infectious Disease	438
Cardiology	816	Medicine Toxicology	17
Child Abuse	191	Neonatal Perinatal Medicine	1,434
Critical Care Medicine	887	Nephrology	205
Developmental – Behavioral Medicine	598	Neurodevelopmental Disabilities	255
Emergency Medicine	556	Pediatric Transplant Hepatology	81
Endocrinology	458	Pulmonology	346
Gastroenterology	465	Rheumatology	91
Hematology-Oncology	674	Sleep Medicine	158
Hospice and Palliative Medicine	100	Sports Medicine	119

Table G illustrates ABP-recognized sub-specialty tracts and the number of pediatric sub-specialists certified in each of the specialty areas during the past decade.<sup>64</sup>



## Regionalized Systems of Care and Hospital Categorization

Planning regionalized systems of care for children necessitates a broad understanding of healthcare, political forces, and control within the area where pediatric regionalization is proposed, as well as knowledge regarding hospital categorization. For additional information on hospital categorization and defining characteristics, read [Considerations When Planning for Pediatric Regionalization](#).

Categorization of the 5,000+ hospitals in the U.S. is based on federal, state, or local rules and regulations. These will vary based on the type of care provided, available resources, and patients that are seen.

Table H illustrates the various hospital types and categorization processes.<sup>65,66,67</sup> For a definition of Level 1 through Level IV trauma centers and Pedi-

atric Trauma Centers, read [Hospital with Emergency Departments: Types and Characteristics](#).

Existing healthcare networks and systems can present additional challenges that may impact access to pediatric specialty care, as well as planning for pediatric regionalized systems of care. It is important to identify established networks and existing systems and their potential impact on accessing pediatric resources.

- A network is composed of a group of hospitals, physicians, other providers, insurers, and/or community agencies that work together to coordinate and deliver a broad spectrum of services to a community. Hospitals may be in both a network and a system of care.<sup>68</sup> Healthcare plans or insurers often develop networks via contracts with both providers and care facilities.

Hospital Type	Number in U.S	Categorization Responsibilities	Care Provided to Critical Access Hospitals (CAH)
Primary hospital provider in rural/frontier locations and are at least 35 miles from closest hospital. Available 24/7 but have a bed limit of 25.	1331	Centers for Medicare/Medicaid Services	Community constituents, average length of stay less than 96 hours. Transfer agreements are required of CAH.
Trauma Centers – tiered system which includes: Levels I, II, III and IV. Level	Level I = 190 Level II = 255 Level III = 258 Level IV number not available Pediatric Trauma Centers - 170	States primarily regulate. Some states do not have state standards but prefer to utilize a voluntary process. American College of Surgeons may partner with states to verify trauma center capabilities.	Severely injured patients.  Transfer agreements are part of the essential criteria for all trauma centers.
Perinatal Centers – tiered system includes: Level I – low risk Level II – Specialty Care Level III – Subspecialty Care Level IV – Regional Resource Center	Specialty Centers = 148 Subspecialty Care = 809 Resource Centers (NA)	States regulate	Newborns and Premature infants
Burn Centers (May be stand-alone centers or part of a medical center.)	127	American Burn Federation designates.	Severely burned adults and children.

Table H illustrates the various hospital types and categorization processes.<sup>65,66,67</sup>

- A healthcare system, as defined by the American Hospital Association, is a multi-hospital group where two or more hospitals are owned, leased, sponsored, or contract managed by a central organization, i.e. Kaiser Permanente or HealthCare Corporation of America. Being affiliated with a specific healthcare system does not prevent a hospital from participating in a network.<sup>69</sup> However, being part of an organized system may define alliances between hospitals. These alliances can influence transfer patterns and policies in an effort to keep patients within the system when additional care is needed.
- Regionalized systems already in place can also influence planning processes for a regionalized system for children. These systems often address high mortality/morbidity and time sensitive diagnoses, such as trauma, stroke, and perinatal patients. Care capability and resources required of facilities participating in organized systems that include children, for instance trauma or perinatal, often will mirror capabilities desired in a regionalized pediatric system. This may provide opportunities to build on existing systems that are already in place within the region.

### **Regionalization and Access to Pediatric Specialty Resources, Laws, and Standards Influencing Transfer**

Although research has shown outcomes for critically ill and injured children are optimized at hospitals with specific pediatric resources and expertise,<sup>70,71</sup> pediatric-specific critical care areas are only available in 10% of all hospitals.<sup>72</sup> Under regionalization of care models, not all hospitals have to provide the same level or type of care. Instead, facilities can establish cooperative

relationships to share staff, equipment, and other expertise and resources. This may be accomplished through agreements for consultation or interfacility transfer of pediatric patients. Early consultation between specialists and emergency providers can aide in initial resuscitation of children; determination of need for transfer; and, when transfer is warranted, assist in ensuring safe transfer. Evidence-based practice suggests that rapid triage and transfer of critically ill and injured pediatric patients is crucial to reducing overall mortality and morbidity. Organized processes for patient movement may also be paramount when mass casualty incidents quickly overwhelm existing standard operating procedures.<sup>73</sup>

Existing federal and state laws address transfer of emergency care patients. Perhaps the most important of these is the Emergency Medical Treatment and Labor Act (EMTALA, 42 U.S.C. 1395dd). EMTALA requires healthcare providers to stabilize or transfer any patient who presents to a hospital seeking treatment for a diagnosed medical emergency or traumatic injury. If the receiving facility is unable to stabilize a patient, it may certify that the benefits of transferring the patient outweigh the risks and transport the patient to a hospital with more advanced capabilities. Hospitals, however, only have an obligation under EMTALA if a patient has yet to be admitted to the hospital. The law does not apply to hospital inpatients developing emergency conditions during the course of their hospital stay. Therefore, hospitals seeking to transfer inpatients could not invoke their stabilization and appropriate transfer rights under EMTALA. In addition, while a receiving hospital has an obligation to accept an appropriate transfer of an emergency department or ambulance patient, such a hospital does not have an obligation to accept an appropriate transfer of an inpatient.

Community and specialty hospitals can address this situation proactively by developing protocols governing patient transfers both before and after inpatient admission. Advance triage decision protocols addressing certain common types of pediatric emergency situations – such as respiratory illnesses, traumatic injury, and other conditions requiring surgical intervention – would seem highly warranted so that community hospitals can be better guided in their medical judgments as to whether to attempt an inpatient admission and stabilization prior to transfer or, alternatively, to allow the transfer to rapidly take place prior to admission.<sup>74</sup> Such advance protocols and transfer agreements are a direct application of the resource sharing that is encouraged under regionalization of care models.

It should be noted though that the IOM has suggested that EMTALA obligations may not conform to coordinated systems of care. First, EMTALA establishes a legal obligation between a receiving facility and an individual patient.<sup>75</sup> It does not, however, create any binding responsibility between an integrated network of care and an individual patient. Second, under the law, each patient is transferred as needed and allowed, following conventional arrangements established by each hospital. It is also unclear how EMTALA would apply to the potentially innovative design of regionalized systems of care that could allow, as the IOM suggests, patients to be directly transported to non-acute care centers and clinics. Interfacility transfer agreements, however, can mitigate these concerns by establishing clear transport

and transfer patterns that adhere to a regionalized system's structure of care.<sup>76</sup>

Liability of physicians and hospitals for patient care in transfer situations varies widely based on state law and individual case circumstances. For example, the point at which the sending hospital gives up legal responsibility for the patient and the receiving hospital assumes responsibility may not be clear. In some cases, the sending hospital may send a patient with EMS personnel to the receiving hospital; in other cases, the receiving hospital may effectuate the transfer with its own staff to ensure a seamless transition. Transfers can also involve periods of joint consultation among staff at both hospitals over diagnostic, treatment and transfer decisions. In particular, interfacility transfer agreements can help establish the terms of the transfer in order to clarify respective duties and methods for assuring the proper execution of those duties.<sup>77</sup>

Recognizing the benefit of agreements to improving standards of care and patient outcomes, several professional organizations and credentialing bodies have also supported their use in general or established their own standards for transferring patients. In 2009, AAP, ACEP, and ENA issued



the Joint Policy Statement: Guidelines for the Care of Children in the Emergency Department, which states that hospitals lacking higher levels of pediatric care should have guidelines and agreements for the transfer of children to pediatric specialty facilities. Looking at clinical practice issues, both the American Nurses Association and ENA have included content on transfers in their scope and standards of care documents. The Joint Commission's accreditation standards also contains several provisions related to executing interfacility transfers; and CMS includes information on patients transfers under its [hospital Condition of Participation on discharge planning](#).<sup>78</sup>

Realizing the importance and need for interfacility transfer, ensuring that facilities have organized processes for transfer as well as an accurate understanding of EMTALA and its application to the transfer process of the pediatric patient, is critical. Last, the use of telemedicine can be a major help in providing needed consultation while limiting the need for unnecessary transfers. Planners need to be astute to the existing challenges related to telemedicine implementation – i.e.

credentialing of the consultant, liability concerns, and reimbursement issues. All of these are being tackled on the federal level and individually by some states, but have yet to be resolved.

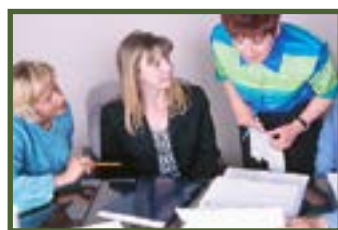
This section has addressed major challenges in the provision of optimal pediatric care – availability of pediatric specialists and sub-specialists, as well as the few number of pediatric specialty hospitals. A review of the factors contributing to limited specialist availability assists in validating the need for regionalized processes of care for children. Additionally, as regionalized systems of care are designed to ensure that children have access to pediatric specialty care and resources, both interfacility transfer and telemedicine processes should be considered essential parts of developing systems of care.

It is important to understand which standards may or may not apply in emergency care situations, as well as their inherent impact on regionalization efforts. Regionalized models of care encourage hospital collaboration and establishment of cooperative relationships between facilities to

link pediatric patients to needed care. To facilitate linkage of hospitals with one another, those planning regionalization activities can benefit from knowing typical facility to facility transfer patterns, as well as having an awareness of the standards and regulatory bodies of individual hospitals.



Photo courtesy of UC Davis Children's Hospital.



## Section 4: Hospital Regulations, Mandates, and Standards Influencing Regionalization

### The Regulation of Hospitals

Given the many different types of hospital networks, systems, and services, enacting policies related to hospital participation in regionalized systems of care is not a straightforward task and can be somewhat of a challenge in different states. Many organizations and entities have a role in hospital regulation, licensing, and accreditation depending on the type and level(s) of service(s) provided. All will have a stake in any effort to coordinate patient treatment and pediatric regionalization efforts.

A list of organizations and entities with descriptors of their role in hospital regulation or administration follows. Understanding established standards and engaging these groups early in planning processes can be helpful in gaining support for pediatric regionalization.

### Federal Agencies Regulating and Establishing Standards for Hospitals

#### *Centers for Medicare and Medicaid Services.*

CMS administers both the Medicare and Medicaid programs, as well as the Children's Health Insurance Program. Healthcare facilities participating in federal health insurance programs must meet health and safety standards, known as [Conditions of Participation \(CoPs\)](#).

CMS works with state agencies to conduct [surveys and inspections](#) of hospitals to ensure compliance with the Medicare standards. Hospitals

meeting certain voluntary, CMS-approved [accreditation](#) standards, such as those set by the Joint Commission, are exempt from the routine survey and inspection processes. CMS-approved national accreditation organizations must meet or exceed Medicare CoPs to achieve "deemed" status.

**Indian Health Service.** The [Indian Health Service](#) provides comprehensive community health programs and medical services to federally-recognized American Indian and Native Alaskan populations. The agency accomplishes this mission through the direct provision of care, as well as by funding tribally-operated programs and services. The latter respects the right of tribal self governance and recognizes that native populations best understand both the healthcare needs and cultural norms and values of their own communities. As such, efforts to include these hospitals in regionalized systems of care must take into account their independent status. It is imperative that individuals seeking to improve tribal healthcare, such as including tribes in regionalized systems of care, understand each tribe's governing principles and how those principles apply to their hospitals before engaging in these efforts. Identifying a cultural broker or liaison as part of the planning team, if appropriate, may help to better understand and overcome potential jurisdictional challenges.

### Organizations Accrediting Hospitals

**The Joint Commission.** The [Joint Commission](#), formerly known as the Joint Commission on Accreditation of Healthcare Organizations (JCA-



HO) is an independent, non-profit organization. It accredits healthcare facilities, including hospitals, and certifies staffing services or clinical programs within the facilities. The Joint Commission [accredited](#) hospitals must be licensed by the state, if applicable; employ a quality assessment and improvement process; and meet certain service standards.

While both Joint Commission accreditation and certification are voluntary efforts, accredited hospitals may be exempt from certain Medicare survey requirements. According to the Commission, facilities can also improve extrinsic factors, such as quality, safety, and standing in the community, by undergoing Joint Commission evaluation and approval.

The Joint Commission, however, is not the only accrediting body to have received deemed status from CMS. For example, many smaller hospitals follow the standards set by Det Norske Veritas Healthcare, Inc., another deemed organization. These two accreditation processes and their facility standards may have different advantages or disadvantages for different types of hospitals.

### Individual State Agency Hospital Regulations

States are generally responsible for the oversight of hospitals within their own jurisdiction, which includes setting standards and issuing licenses for general hospital operations. In some states, hospitals need to meet CMS and/or Joint Commission standards to be licensed. Other states have established their own rules governing hospital operations. The Joint Commission has compiled [a list of state mandates governing healthcare facility operations](#) specifically focusing on those relying on Joint Commission accreditation standards. It will be helpful and important to determine how hospitals are licensed in your state and how this complements the CMS and Joint Commission processes as one plans pediatric regionalization.

### Organizations Influencing Hospitals

**American Hospital Association.** The [American Hospital Association \(AHA\)](#) is a national membership organization that represents the interests of hospital and healthcare facilities, systems, and related educational programs, as well as community health professionals, patient advocates, and other healthcare services administrators, managers,

and professionals. AHA registers both member and non-member hospitals. Registered hospital facilities must meet operational requirements of AHA, be accredited by the Joint Commission, and certified by CMS as an acute care hospital or licensed by an authorized state agency.



It is important to realize that state chapters of AHA exist in most states and will be interested in all regionalization efforts.

***Allied Hospital Associations.*** Allied Hospital Associations have a strategic alliance with state, regional, and metropolitan hospital associations that represent the local interests of facilities within a defined geographic area. Given that every state and every healthcare or hospital system is different, a jurisdiction's hospital association may serve as a point of contact to learn more about existing hospital licensing mandates, accreditation standards, and cooperative healthcare networks in a given area. For contact information, please view the [State, Regional, and Metropolitan Hospital Association map](#).

### **National Organizations Verifying Hospitals as Providing Specialized Care**

Some national organizations are also involved in efforts to recognize or verify hospitals as being able to provide an optimal level of a certain type of care. For example, ASC COT verifies hospitals that have the resources to provide optimal trauma care to patients. The verification process is based on the guide Resources for Optimal Care of the Injured Patient. In turn, some state governments designate as trauma centers those facilities that have met the ACS' verification standards.

While developing regionalized systems of care involves more than designating hospitals, it still will be a key component of such systems. Therefore, those involved in regionalization efforts must be aware of what kinds of hospitals should be involved in a system of care and engage the appropriate organizations that are responsible for verifying or designating such facilities.



## Summary: Pediatric Regionalization

# SUMMARY

The 2001 IOM report *Crossing the Quality Chasm: A New Health System for the 21st Century*<sup>79</sup> addresses quality of care differences in America. The quality chasm for children, in particular, is real and the gaps expansive and deep. Studies have shown gaps in the preparedness of providers and facilities to provide pediatric care. Appropriate pediatric equipment; administrative practices, including availability of transfer agreements and protocols to ensure safe transfer of children to additional resources; pediatric-specific disaster plans; and/or pediatric specific quality improvement processes are often missing.<sup>80,81</sup>

Children and adolescents access the emergency care system for different reasons than do adults. Pediatric patients have different diseases, injuries, and unique physiologic and emotional responses to illness and injury. Many have special healthcare needs or chronic illness. They require different kinds and sizes of equipment, medication dosing processes, and pediatric specialists to treat their illness and injuries. Unfortunately, pediatric-specific resources and providers, though recognized as important in providing optimal care for children, are not always readily available. Therefore, the needs of children are often inadvertently overlooked or lost in the gaps that exist in our nation's emergency care system.

Regionalization of pediatric care is a potential solution to a geographic-based lack of available pediatric specialty resources and specialists. Both the 1993 IOM report *Emergency Medical Care for Children* and the 2006 IOM report *The Future of Emergency Care: Emergency Care for*

*Children, Growing Pains*<sup>83</sup> advocate for such regionalized systems. Regionalization provides opportunities to organize and share resources within the communities where children live, play, and go to school. Pediatric regionalization specifically:

- facilitates matching appropriate resources to a child's healthcare needs;<sup>84</sup>
- increases access to healthcare specialists and pediatric specific resources, such as pediatric critical care; and
- helps to control healthcare costs and improve quality of care across a population.<sup>85</sup>

The EMSC Program has done much over the years to reduce existing inequities for children across the continuum of care. Data is beginning to reflect progress in the integration of pediatric-specific priorities into the overall emergency care system. EMSC priorities also support a foundation for systems of regionalized pediatric care.

Regionalizing systems of care is complex. This tool has shared information on the importance of regionalization as a mechanism to accessing limited pediatric resources, shared essential components of regionalized care systems, and discussed the evolution of regionalized care systems in the U.S. Existing models of regionalization, such as trauma, perinatal, STEMI, and stroke, were covered along with common challenges to regionalized systems. [A Sampling of EMSC Projects Contributing to Regionalization Core Concepts](#) contains additional resources and information on EMSC projects supporting regionalized systems of care for children.



## Footnotes: Pediatric Regionalization

<sup>1</sup>Lorch S, Myers S, et al. The regionalization of pediatric healthcare. *Pediatrics*. 2010;126(11):1184.

<sup>2</sup>American Academy of Pediatrics, Committee on Pediatric Emergency Medicine Pediatric Section American College of Critical Care Medicine and Society of Critical Care Medicine, Pediatric Section, Task Force on Regionalization Pediatric Care. Consensus Report for the Regionalization of Services for Critically Ill or Injured Children. *Pediatrics*. 2000;105(1):152.

<sup>3</sup>Carr B, Asplin B. Regionalization and Emergency Care: Institute of Medicine Reports and Federal Government Update. *Society of Academic Emergency Medicine*. 2010; 17(12):1351-1353.

<sup>4</sup>Institute of Medicine (IOM). Hospital-Based Emergency Care at the Breaking Point (Future of Emergency Care Series). Washington, DC: National Academies Press; 2006.

<sup>5</sup>American Academy of Pediatrics, Committee on Pediatric Emergency Medicine Pediatric Section American College of Critical Care Medicine and Society of Critical Care Medicine, Pediatric Section, Task Force on Regionalization Pediatric Care. Consensus Report for the Regionalization of Services for Critically Ill or Injured Children. *Pediatrics*. 2000;105(1):152.

<sup>6</sup>National Association of State EMS Officials. Regionalization of Care: Position Statement of the National Association of State EMS Officials. *Prehospital Emergency Care*. 2010;14(3):403.

<sup>7</sup>National Association of State EMS Officials. Regionalization of Care: Position Statement of the National Association of State EMS Officials. *Prehospital Emergency Care*. 2010;14(3):403.

<sup>8</sup>IOM. Regionalizing Emergency Care: Workshop Summary. Washington, DC: National Academies Press; 2010.

<sup>9</sup>National Academy of Sciences, National Research Council. Accidental Death and Disability: The Neglected Disease of Modern Society. Washington, DC: National Academies Press; 1966.

<sup>10</sup>IOM. Hospital-Based Emergency at the Breaking Point (Future of Emergency Care Series). Washington, DC: National Academies Press; 2006.

<sup>11</sup>IOM. Emergency Medical Services at the Cross Roads (Future of Emergency Care Series). Washington, DC: National Academies Press; 2006.

<sup>12</sup>IOM. Emergency Medical Services for Children. Washington, DC: National Academies Press; 1993.

<sup>13</sup>IOM. Hospital-Based Emergency at the Breaking Point (Future of Emergency Care Series). Washington, DC: National Academy Press; 2006.

<sup>14</sup>IOM. Emergency Care for Children, Growing Pains (Future of Emergency Care Series). Washington, DC: National Academies Press; 2006.

<sup>15</sup>Health Resources and Services Administration, Maternal Child Health Bureau, Emergency Medical Services for Children Program. EMSC State Partnership Regionalization of Care Funding Opportunity Announcement; 2012.

<sup>16</sup>National EMSC Data Analysis Resource Center. Pediatric Readiness aggregate data report. 2013; November.

<sup>17</sup>Sorensen MJ, vonRecklinghouse FM, et al. Secondary Overtriage: The Burden of Unnecessary Interfacility Transfers in a Rural Trauma System. *JAMA Surgery*. 2013; 6(19):1-6.

<sup>18</sup>[http://journals.lww.com/ccmjjournal/Abstract/2013/10000/Impact\\_of\\_Critical\\_Care\\_Telemedicine\\_Consultations.15.aspx](http://journals.lww.com/ccmjjournal/Abstract/2013/10000/Impact_of_Critical_Care_Telemedicine_Consultations.15.aspx)

<sup>19</sup>Lorch S, Myers S, et al. The regionalization of pediatric healthcare. *Pediatrics*. 2010;126(11):1184.

<sup>20</sup>Lorch S, Myers S, et al. The regionalization of pediatric healthcare. *Pediatrics*. 2010;126(11):1184.

<sup>21</sup>Lorch S, Myers S, et al. The regionalization of pediatric healthcare. *Pediatrics*. 2010;126(11):1184.

<sup>22</sup>Morison W, Wright J, and Paidas, C. Pediatric Trauma Systems. *Critical Care Medicine*. 2002;30(11).

<sup>23</sup>IOM. Hospital-Based Emergency at the Breaking Point (Future of Emergency Care Series). Washington, DC: National Academies Press; 2006.

<sup>24</sup>IOM. Emergency Care for Children Growing Pains (Future of Emergency Care Series). Washington, DC: National Academies Press; 2006.

<sup>25</sup>Committee on Trauma. Resources for Optimal Care of the Injured Patient: 1999. Chicago, Illinois. American College of Surgeons; 1998:39-42.

<sup>26</sup>Nance ML, Carr BG, Branas CC. Access to Pediatric Trauma Care in the United States. *Archives Pediatric Adolescent Medicine*. 2009; 163(6):512-518.

<sup>27</sup>Jenkins EP, O'Connell KJ, Mann, CN. Pediatric Trauma Systems in the United States: Do they make a difference? *Clinical Pediatric Emergency Medicine*. 2006; 7:76-81.

<sup>28</sup>IOM. Hospital-Based Emergency at the Breaking Point (Future of Emergency Care Series). Washington, DC: National Academies Press; 2006.

<sup>29</sup>Department of Health and Human Services. Model Trauma System Planning and Evaluation. Rockville, Maryland: Health Resources and Services Administration; 2006.

<sup>30</sup>MacKenzie EJ, Rivara FP, Jurkovicj GJ, et al: A national evaluation of the effect of trauma center on mortality. *New England Journal of Medicine*. 2006;354 (1):366-378.

<sup>31</sup>Carr B. Regionalization and Emergency Care: IOM Reports and Federal Government Update. Washington, DC: 2009.

<sup>32</sup>Committee on Perinatal Health. Toward Improving the Outcome of Pregnancy: Recommendations for the Regional Development of Maternal and Perinatal Health Services. White Plains, NY: March of Dimes National Foundation; 1976.

<sup>33</sup>Little GA and Merenstein GB. Toward Improving the Outcome of Pregnancy, Perinatal Regionalization Revisited. *Pediatrics*. 1993;92(10).

<sup>34</sup>TIOPIII Steering Committee. Toward Improving the Outcome of Pregnancy III: Enhancing Perinatal Health Through Quality, Safety and Performance Initiatives. White Plains, NY: March of Dimes National Foundation; 2010.

<sup>35</sup>Blackmon, L. R., Barfield, W, Stark R. Hospital Neonatal Services in the United States: Variation in Definitions, Criteria, and Regulatory Status, 2008. *Journal of Perinatology*. 2009.

<sup>36</sup>Morison, W; Wright J, Paidas, C. Pediatric Trauma Systems. *Critical Care Medicine*. 2002;30(11 supplement):448-56.

<sup>37</sup>Perinatal Data Center. Maternal, Infant, and Child Health in the United States 2010. White Plains, NY: March of Dimes National Foundation; 2011.

<sup>38</sup>Perinatal Data Center. Maternal, Infant, and Child Health in the United States 2010. White Plains, NY: March of Dimes National Foundation; 2011.

<sup>39</sup>IOM. Regionalizing Emergency Care: Workshop Summary. Washington, DC: National Academies Press; 2010

<sup>40</sup><http://www.d2balliance.org/D2BSustaintheGain/WhatisD2B/tabid/217/Default.aspx> Accessed 8-2013.

<sup>41</sup><http://www.d2balliance.org/D2BSustaintheGain/WhatisD2B/tabid/217/Default.aspx> Accessed 8-2013.

<sup>42</sup>Roger VL, Go AS, Lloyd-Jones DM, Benjamin EJ, Berry JD, Borden WB, et al. Heart disease and stroke statistics - 2012 update: a report from the American Heart Association. *Circulation*. 2012;125(1):e2-220.

<sup>43</sup>Schwamm LH, Pancioli A, Acker JE, et al. Recommendations for the establishment of stroke systems of care: recommendations from the American Stroke Association's task force on the development of stroke systems. *Stroke*. 2005; 36:690-703.

<sup>44</sup>National Institutes of Health. A National Institute of Neurological Disorders and Stroke Symposium-Improving the Chain of Recovery for Acute Stroke in your Community. Task Force Reports. 2002. [http://www.ninds.nih.gov/news\\_and\\_events/proceedings/acute\\_stroke\\_workshop.pdf](http://www.ninds.nih.gov/news_and_events/proceedings/acute_stroke_workshop.pdf).

<sup>45</sup>National Institutes of Health. A National Institute of Neurological Disorders and Stroke Symposium-Improving the Chain of Recovery for Acute Stroke in your Community. Task Force Reports. 2002. [http://www.ninds.nih.gov/news\\_and\\_events/proceedings/acute\\_stroke\\_workshop.pdf](http://www.ninds.nih.gov/news_and_events/proceedings/acute_stroke_workshop.pdf).

<sup>46</sup>Schwamm LH, Pancioli A, Acker JE, et al. Recommendations for the establishment of stroke systems of care: recommendations from the American Stroke Association's task force on the development of stroke systems. *Stroke*. 2005; 36:690-703.

<sup>47</sup>Schwamm LH, Pancioli A, Acker JE, et al. Recommendations for the establishment of stroke systems of care: recommendations from the American Stroke Association's task force on the development of stroke systems. *Stroke*. 2005; 36: 690-703.

<sup>48</sup>Gausche-Hill M, Lewis R, Schmitz C. Survey of US Emergency Departments for Pediatric Preparedness - Implementation and Evaluation of Care of Children in the Emergency Department: Guidelines for Preparedness. Emergency Medical Services for Children Partnership for Information and Communication Grant #IU93 MC00184. Unpublished Results. 2004.



- <sup>49</sup>Child Health toolbox. Understanding performance measurement. Retrieved May 17, 2013 from <http://www.ahrq.gov/professionals/quality-patient-safety/quality-resources/tools/chttoolbx/understand/index.html>
- <sup>50</sup>Child Health toolbox. Understanding performance measurement. Retrieved May 17, 2013 from <http://www.ahrq.gov/professionals/quality-patient-safety/quality-resources/tools/chttoolbx/understand/index.html>
- <sup>51</sup>Ely, Michael. Aggregate National 2010 EMSC Performance Measure Data. Salt Lake City, Utah: National EMSC Data Analysis Resource Center; October: 2013.
- <sup>52</sup>IOM. Regionalizing Emergency Care: Workshop Summary. Washington, DC: National Academies Press; 2010;(22):22.
- <sup>53</sup>IOM. Regionalizing Emergency Care: Workshop Summary. Washington, DC: National Academies Press; 2010; (22):22.
- <sup>54</sup>American Academy of Pediatrics, Committee on Pediatric Emergency Medicine Pediatric Section American College of Critical Care Medicine and Society of Critical Care Medicine, Pediatric Section, Task Force on Regionalization Pediatric Care. Consensus Report for the Regionalization of Services for Critically Ill or Injured Children. *Pediatrics*. 2000;105(1):152.
- <sup>55</sup>IOM. Emergency Care for Children, Growing Pains (Future of Emergency Care Series). Washington, DC: National Academies Press; 2006:1.
- <sup>56</sup>Kanter R. Regional variation in child mortality at hospitals lacking a pediatric intensive care unit. *Critical Care Medicine*. 2002;30:94Y99.94.
- <sup>57</sup><http://www.aap.org/en-us/professional-resources/Pediatric-Careers/Documents/Peds101book.pdf> accessed 2/13/2013.
- <sup>58</sup><http://www.aap.org/en-us/professional-resources/Pediatric-Careers/Documents/Peds101book.pdf> accessed 2/13/2013.
- <sup>59</sup><http://www.aap.org/en-us/professional-resources/Pediatric-Careers/Documents/Peds101book.pdf> accessed 2/13/2013.
- <sup>60</sup>American Board of Medical Specialties. American Board of Medical Specialties, 2011 Certification Statistics. Chicago, Illinois: 2011.
- <sup>61</sup>American Board of Medical Specialties. American Board of Medical Specialties, 2011 Certification Statistics. Chicago, Illinois: 2011.
- <sup>62</sup>American Board of Medical Specialties. American Board of Medical Specialties, 2011 Certification Statistics. Chicago, Illinois: 2011.
- <sup>63</sup>American Board Medical of Specialties. American Board of Medical Specialties, 2011 Certificate Statistics. Chicago, Illinois: 2011;28.
- <sup>64</sup>American Academy of Pediatrics Committee on Pediatric Emergency Medicine, American College of Emergency Physicians Pediatric Committee, and Emergency Nurse Association Pediatric Committee. Joint Policy Statement – Guidelines for Care of Children in the Emergency Department. *Pediatrics*. 2009; 124:1233Y1243.
- <sup>65</sup><http://www.raconline.org/topics/critical-access-hospitals/faqs/#howmany> accessed 6/19/2013.
- <sup>66</sup><http://ameriburn.org/BCRDPublic.pdf> accessed 6/19/2013
- <sup>67</sup>Nance ML, Carr BG, Branas CC. Access to Pediatric Trauma Care in the United States. *Archives Pediatric Adolescent Medicine*. 2009; 163(6):512-518.
- <sup>68</sup><http://www.aha.org/research/rc/stat-studies/fast-facts.shtml> accessed 2/19/2013.
- <sup>69</sup><http://www.aha.org/research/rc/stat-studies/fast-facts.shtml> accessed 2/19/2013.
- <sup>70</sup>Kanter RK. Regional variation in child mortality at hospitals lacking a pediatric intensive care unit. *Critical Care Medicine*. 2002;30:94Y99.
- <sup>71</sup>Pracht EE, Tepas JJ 3rd, Langland-Orban B, et al. Do pediatric patients with trauma in Florida have reduced mortality rates when treated in designated trauma centers? *Journal of Pediatric Surgery*. 2008;43:212Y221.
- <sup>72</sup>Kimberly Middleton. Advance Data “Availability of Pediatric Services and Equipment in Emergency Departments: United States, 2002-03.” US Department of Health and Human Services. 2006.
- <sup>73</sup>EMSC National Resource Center. Interfacility Transfer Tool Kit. Accessed at: [http://emscnrc.org/files/PDF/EMSC\\_Resources/Inter\\_Facility\\_TransferTool\\_Kit.zip](http://emscnrc.org/files/PDF/EMSC_Resources/Inter_Facility_TransferTool_Kit.zip).
- <sup>74</sup>Cartwright-Smith L, Rosenbaum S, Belli K, et al. Issue Brief “The Application of the Emergency Medical Treatment and Labor Act (EMTALA) to Hospital Inpatients”. 2009. Accessed at: [http://emscnrc.org/files/PDF/EMSC\\_Resources/EMTALAIssueBrief.pdf](http://emscnrc.org/files/PDF/EMSC_Resources/EMTALAIssueBrief.pdf)

<sup>75</sup>Rosenbaum S, Kamoie B. Finding a Way Through the Hospital Door: The Role of EMTALA in Public Health Emergencies. *Journal of Law, Medicine & Ethics*. 2003;31(4):590-601.

<sup>76</sup>IOM. Hospital-Based Emergency Care: At the Breaking Point (Future of Emergency Care Series). Washington, DC: National Academies Press; 2006.

<sup>77</sup>Cartwright-Smith L, Rosenbaum S, Belli K, et al. Legal Issues in Interfacility Transfer. 2010. Accessed at: [http://emscnrc.org/files/PDF/EMSC\\_Resources/EMTALAissueBriefLegalIssues.pdf](http://emscnrc.org/files/PDF/EMSC_Resources/EMTALAissueBriefLegalIssues.pdf)

<sup>78</sup>EMSC National Resource Center. Interfacility Transfer Tool Kit. Accessed at: [http://emscnrc.org/files/PDF/EMSC\\_Resources/Inter\\_Facility\\_TransferTool\\_Kit.zip](http://emscnrc.org/files/PDF/EMSC_Resources/Inter_Facility_TransferTool_Kit.zip).

<sup>79</sup>IOM. Crossing the Quality Chasm: A New Health System for the 21st Century. National Academies Press; 2001.

<sup>80</sup>Kimberly Middleton. Advance Data “Availability of Pediatric Services and Equipment in Emergency Departments: United States, 2002-03.” US Department of Health and Human Services. 2006.

<sup>81</sup>Athey J, Dean M, et al. Ability of hospitals to care for pediatric emergency patients. *Pediatric Emergency Care*. 2001;17:170-174.

<sup>82</sup>IOM, Committee on Pediatric Emergency Medical Services. Emergency Medical Services for Children. Division of Healthcare Services. National Academies Press. Washington, D.C: 1993.

<sup>83</sup>IOM. Emergency Care for Children, Growing Pains (Future of Emergency Care Series). Washington, DC: National Academies Press; 2006.

<sup>84</sup>American Academy of Pediatrics, Committee on Pediatric Emergency Medicine Pediatric Section American College of Critical Care Medicine and Society of Critical Care Medicine, Pediatric Section, Task Force on Regionalization Pediatric Care. Consensus Report for the Regionalization of Services for Critically Ill or Injured Children. *Pediatrics*. 2000;105(1):152.

<sup>85</sup>Carr B, Asplin B. Regionalization and Emergency Care: Institute of Medicine Reports and Federal Government Update. *Society of Academic Emergency Medicine*. 2010; 17(12):1351-1353.



## Glossary and Acronyms: Pediatric Regionalization

### A

AAP: American Academy of Pediatrics

ABA: American Burn Association

ABEM: American Board of Emergency Medicine

ABMS: American Board of Medical Specialties

ABP: American Board of Pediatrics

ABPEM: American Board of Pediatric Emergency Medicine

**Academic Medical Center/ Teaching Hospital:** A hospital associated with a medical school that provides a full spectrum of clinical care; trains medical and other health care provider students, fellows, and junior faculty; and conducts innovative research. An academic medical center may consist of clinics, libraries, administrative facilities, and other research- or clinical-based units.

ACS: American College of Surgeons

ACS-COT: American College of Surgeons Committee on Trauma

AHA: American Hospital Association

APSA: American Pediatric Surgical Association

### C

CAH: Critical Access Hospital

**Cardiogenic Shock:** Failure of the ventricles of the heart causing shock, or the condition in which the tissues of the body are not receiving sufficient oxygen and nutrients in order to function properly.

CMS: Centers for Medicare and Medicaid Services

**Continuum of Care:** A “seamless” system of care that includes prevention, prehospital care, emergency department care, inpatient and critical care, and all follow-up care, including rehabilitation.

**CoPs: Conditions of Participation.** Federal health and safety standards that any health care facility must meet to participate in the Medicare, Medicaid, or Children’s Health Insurance Program.

**Cost-based Reimbursement:** Medicare’s system of retrospective payments to Critical Access Hospitals that is based on the cost of care provided. While Medicare no longer offers this type of reimbursement to other types of hospitals due to increasing healthcare costs, Critical Access Hospitals qualify in order to aide their financial performance and prevent closures.

### D

**Definitive Care:** Patient care that offers conclusive treatment including or following stabilization that may have been provided by prehospital care.

DHEW: Departments of Health, Education, and Welfare

DNVHC: Det Norsk Veritas Healthcare Inc.

DOT: Department of Transportation

### E

EMS: Emergency Medical Services

EMSC: Emergency Medical Services for Children

EMTALA: Emergency Medical Treatment and Labor Act

**Evidence-based:** The conscientious, explicit, and judicious use of current best evidence in making decisions about the care of the individual patient. Using this method of practice, a clinician may first consult with the patient; investigate and appraise the validity of relevant, external research; and then combine research results with his or her clinical expertise and patient preferences to determine the best treatment plan.

### F

**Fibrinolytic Drug:** A blood-clot-dissolving medication given after a patient experiences a heart attack, pulmonary embolism, or stroke.

**Frontier:** A geographically remote and sparsely-populated area that is isolated in terms of the distance or travel time to a population center and services.

### G

**Government Performance and Results Act:** A law enacted in 1993 that requires federal agencies to adopt

certain business management tactics such as setting goals, developing routine strategic plans, defining performance measures, reporting on performance, and conducting gap analyses.

## H

HFAP: Healthcare Facilities Accreditation Program

HRSA: Health Resources and Services Administration

## I

IHS: Indian Health Service

Intensivist: A critical care physician who guides and delivers care in an Intensive Care Unit.

IOM: Institute of Medicine

## M

Morbidity: A measure of disease incidence or prevalence in a given population, location, or other grouping of interest.

## N

NAS: National Academy of Sciences

NICU: Neonatal Intensive Care Unit

NRC: National Research Council

## P

PCI: Percutaneous Coronary Intervention. A non-surgical method to expand narrowed arteries leading to the heart.

PEM: Pediatric Emergency Medicine

PICU: Pediatric Intensive Care Unit

Position Statement: A document produced by an organization or other entity that expresses their opinion on a given topic.

## Q

Quality Assurance Program: A program that incorporates routine checks on an entity's products or services so as to verify that the entity is meeting certain quality requirements.

## S

SPROC: State Partnership Regionalization of Care

STelevation: An abnormally high reading of the activity of the heart's ventricles on an electrocardiogram—a diagnostic procedure that depicts the electrical activity of the heart. This may indicate that the patient is experiencing a myocardial infarction, or heart attack.

STEMI: ST-elevation Myocardial Infarction

## T

Telehealth: The use of electronic information and telecommunications technologies to support long-distance clinical health care, patient and professional health-related education, public health, and health administration .

Territorial: An unincorporated United States insular area, of which there are currently thirteen, three in the Caribbean (Navassa Island, Puerto Rico and the United States Virgin Islands) and ten in the Pacific (American Samoa, Baker Island, Guam, Howland Island, Jarvis Island, Johnston Atoll, Kingman Reef, Midway Atoll, the Northern Mariana Islands and Wake Atoll).

TIOP: Toward Improving the Outcome of Pregnancy

Title V Block Grants: A federal block grant names after the section of law under which it is authorized - Title V of the Social Security Act – and that supports activities intended to improve the health of all mothers and children..

TJC: The Joint Commission

## V

VLBW: Very Low Birth Weight



## Pediatric Regionalization Primer Acknowledgements

This resource tool was developed by the Emergency Medical Services for Children (EMSC) National Resource Center (NRC) in collaboration with federal EMSC Program leaders and assistance from the National EMSC Data Analysis Resource Center (NEDARC).

Project contributors included:

- Diana Fendya, MSN (R), RN, Trauma/Acute Care Specialist, EMSC NRC
- Karen Belli, Senior Public Policy Specialist, EMSC NRC
- Suzanne Sellman, MA, Senior Communication Specialist, EMSC NRC
- Elizabeth Edgerton, MD, MPH, Branch Chief: EMSC and Injury and Violence Prevention Branch, MCHB/HRSA
- Theresa Morrison-Quinata, EMT, Director, EMSC and Injury Prevention Branch, MCHB/HRSA
- Diane Pilkey, MPH, RN, Nursing Consultant, EMSC and Injury Prevention Branch, MCHB/HRSA
- Ellen Schenk, MPH, EMSC and Injury Prevention Branch, MCHB/HRSA
- Michael Ely, MHRM, Director, NEDARC

The authors extend a special thank you to the following organizations and reviewers of this tool. These individuals provided many helpful sugges-

tions to enhance resource content and hopefully usefulness.

National Association of EMS State  
Officials Representative:

Tomi St. Mars, RN, MSN, CEN, FAEN  
Program Manager

Arizona EMS for Children

Chief, Office of Injury Prevention

Arizona Department of Health Services

American College of Emergency  
Physicians Representative:

Isabel Barrata, MD

Scripps Mercy Hospital

San Diego, California

Jeremy Kahn, MD, MS,

EMSC SPROC Grant Project Director

Director of Critical Care Medicine and Health  
Policy and Research Program

University of Pittsburgh

Pittsburgh, Pennsylvania

Kassie Runsabove,

Montana Child Ready

EMSC SPROC Program Manager and  
Cultural Liaison

Emily Sullivan, MS, MPH

Senior Research Analyst, NEDARC

*Funding for the EMSC NRC is provided by the Health Resources and Services Administration, Maternal and Child Health Bureau, Emergency Medical Services for Children Program through grant number U07MC09174."*



