Emergency Medical Services for Children (EMSC)
PROJECT ABSTRACT

Project Title: Maryland Systems Enhancement for EMSC Programs
Organization Name: Maryland Institute for Emergency Medical Services Systems (MIEMSS)
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Project Period: ____ Years From ___/___/___ to ___/___/___

PROBLEM: We propose to construct an enhanced system of Emergency Medical Services for Children (EMSC) to focus on life-threatening illness which will be integrated into the established statewide Emergency Medical Services System of Maryland. This enhancement within the State EMS system is a logical progression since the system already includes a statewide pediatric trauma system, a neonatal transport program, and specialty care components (burn, cardiac, eye, hand, hyperbaric medicine, neurotrauma, and high risk perinatal). These components are all part of the state funded Maryland Institute for Emergency Medical Services Systems (MIEMSS). MIEMSS is responsible for the designation of trauma and specialty centers, the training and certification of over 31,000 prehospital providers, the operation of a Statewide EMS communications system, and the coordination of transportation, planning, and system evaluation. The addition of a component to address life threatening illnesses in children is a much needed evolution of the EMS system and one that should be easily integrated into the existing structure.

Over 30 years, MIEMSS has evolved into a coordinated, well accepted program for all adult and pediatric trauma, with a clear delineation of echelons of care for injured children. Since an adult and pediatric trauma system within a comprehensive EMS system are already operational in Maryland, we believe that medically valid decisions regarding pediatric patient categorizations and improvements of the present transport mechanisms for **all** pediatric emergencies can be rapidly developed through the enhancement grant proposal and thus be quickly added to the present EMS system for pediatric emergency care. The model provided by the comprehensive nature of the Maryland State EMS System contains a tested structure which should allow an enhanced pediatric emergency system to be rapidly exported to other states and regions as well. On the basis of our experience and in keeping with the conclusions of the report from the Institute of Medicine on Emergency Medical Services for Children, we believe that this enhancement project will integrate Emergency Medical Care for Children within the larger state EMS system. This Maryland EMSC already has two university pediatric hospitals and a third university teaching hospital with a large tertiary pediatric clinical service. State support is demonstrated by the designation of an Associate EMS Medical Director for Children's Programs.

GOALS and OBJECTIVES:Goal I: To create a forum for ongoing communication to identify the issues related to pediatric emergency care services and the strengths and weakness within each of the five EMS regions and the State of Maryland.
Obj 1: To establish a Regional Pediatric Advisory Committee in each of the 5 EMS regions in the State of Maryland, consisting of professional and community members with a strong commitment to emergency care of children. These Committees will be chaired by the Regional Pediatric Emergency Medical Directors.
Obj 2: To perform an assessment of the regional resources and strengths for pediatrics to include

educational programs that are successful, potential pediatric faculty, injury prevention activities for children and families, quality management systems, available data on childhood illness and injury within each prehospital jurisdiction, and emergency departments.

Obj 3: To identify and prioritize the current pediatric issues in the delivery of quality pediatric EMS care along the continuum in each of the five EMS regions. To delineate common issues and problems between regions as well as the unique concerns within a specific region and/or jurisdiction.

Goal II: Define the Pediatric Capabilities in Emergency Departments in each of the 5 EMS Regions to include professional resources, education, quality improvement, databases and data management systems, as well as reevaluate the equipment and pharmacologic resources surveyed in the first Maryland EMSC grant period.

Obj 1: To establish a steering group to select the Emergency Department Survey tool, based upon the experiences of other EMSC grant projects and to recommend the format for the survey to be conducted in Maryland. Conduct the survey of all 49 emergency departments within Maryland.

Obj 2: To review the existing guidelines for pediatric emergency care along the continuum and develop with the steering group for review in each of the 5 EMS Regions Maryland Pediatric Guidelines. Guidelines will include prehospital BLS and ALS equipment, Emergency Department equipment, prehospital pediatric emergency triage system, pediatric education and training for both prehospital and hospital professionals, Emergency Department personnel resources for all levels of pediatric commitment, and public education programs directed towards children and families.

Obj 3: During the second year of the project, make available resources and guidelines for Pediatric Capabilities for Emergency Departments through the MIEMSS Children's Programs office. It is anticipated that the identification of facilities appropriate for pediatrics on a regional and state wide basis will begin during the second year of the grant period and continue within the overall mandate of MIEMSS.

METHODOLOGY: The processes of delineation of the needs for pediatric emergency care and then translation to a state-wide enhancement program has been facilitated by the appointment of a Pediatric Emergency Medical Directors Advisory Group (PEMAG). This PEMAG has had organizational meetings and consists of designated leaders in pediatric emergency care in all 5 regions of the state EMS System. They have been actively involved in the planning and development of this enhancement grant. This PEMAG has identified the need for the establishment of pediatric guidelines for emergency care in the prehospital and hospital environments. They also plan to form regional pediatric committees that will be interdisciplinary and reflect the specific issues in each region. The last component of the proposal is to formulate and distribute a comprehensive survey of current pediatric emergency medical services to the 49 emergency departments throughout the state of Maryland.

EVALUATION: This material from the survey will be collated and analyzed by the Pediatric Emergency Medical Advisory Group. This survey will be used as a base line to implement programs for identifying emergency departments which are appropriate for pediatric emergency care (so called EDAPs) throughout the state. Furthermore, this survey information will be used to enhance educational programs and to help establish appropriate standards for care including facilities, personnel resources, prehospital triage and equipment for emergency care for children with life threatening illnesses and injuries throughout the state.

The Surgeon's Role in the Development of Emergency Medical Services for Children

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Emergency Medical Services for Children (EMS-C) is an idea whose time has come. A comprehensive system of emergency care for children with multiple organ injuries or life threatening illness is long overdue in America and in Europe. Our children are too precious and the future of our society is too fragile for us to leave to chance a child's access to the best emergency facility and hospital for treatment of a potentially lethal disease - for trauma is as much a disease of modern society as is overwhelming infection or malignancy.

What then is the surgeon's role - especially the pediatric surgeon's role - in organizing systems of emergency care? In the first place, we must continue to learn about the special needs of children from our closest colleagues, the pediatricians. Pediatrics as a specialty differs from Internal Medicine and Surgery because it addresses prevention first and cure second. The history of advances in child health focuses on vaccination against diseases: rabies, poliomyelitis, rubella and a host of other infections. Less dramatic but perhaps more fundamental is the fight against worldwide malnutrition, in which your own Professor Franconi played such an enormous role. To these ingredients in child health has more recently been added maternal health in the new discipline of Perinatology.

From The Johns Hopkins Children's Center, Baltimore, Md.

In most children's hospitals, the first patient transport system and inter hospital referral was for babies with extreme prematurity, a major killer of the early 20th century. Pediatric surgeons have participated in the development of Newborn Intensive Care Units (NICU), and their success attests to the value of the integration of specialists for newborn care. Hand in glove with the obstetricians, the perinatal team organized a system for high risk pregnancies, prenatal diagnosis and treatment to supplement these newborn intensive care units. As surgeons, we joined our colleagues and learned about intensive care of these very small neonates. As a result of our collaborative experience we are better prepared for the surgical management of these newborn patients.

We incorporated the pediatric concepts of disease prevention, neonatal transport, and intensive care into our developing discipline of Pediatric Surgery. We were pleased with the evolution of our specialty when we suddenly realized in the 1970's that more children were dying from major injuries than from infection, malnutrition and malignancies combined! (Fig. 1)

As we look back, in the 1945-1950 era, after the Second World War, our general surgery colleagues in America realized that pre-hospital care on the battlefield (military paramedics), rapid transport (helicopter) and trauma surgeons at field hospitals had formed a system which had greatly decreased battle casualty deaths. They could see that such a system was also applicable to highway and inner city trauma. In the United States, a few trauma surgeons stepped forward through the Committee on Trauma of the American College of Surgeons to establish graded echelons of trauma care and guidelines for training of emergency medical technicians, and to generate an Advanced Trauma Life Support course (ATLS) as a body of knowledge with accompanying skills for treating the injured in America. In Germany and Austria, a similar system was evolving.

Building upon their wartime experience and the availability of incompletely trained physicians who had been rushed through medical school as trauma technicians because of the urgency of warfare, German trauma surgeons established hospitals and systems for regional trauma care in the 1950's. Using both transport vehicles and emergency medical skills which had been developed for high alpine rescues, the remarkable Swiss adult oriented emergency system reached perfection in the 1970's.

But what happened to the child? We finally recognized in 1970 that in the United States, the main cause of death in children between 1-14 years of age was multiple systems trauma. Who would be the child's advocate in this Emergency Medical System? A handful of pediatric surgeons stood up and demanded a role within the adult trauma system to address the special needs of children. In 1971, in Baltimore, we originated the concept of a regional pediatric trauma center as a component of a statewide Emergency Medical System. This regional trauma center for children was organized in the Johns Hopkins Children's Center and became a model for the development of similar designated regional trauma centers for children within adult emergency systems in the United States and Canada.(Fig. 2) From our adult colleagues we had learned the concept of the "Golden Hour" emphasizing the importance of rapid transport to an appropriate resuscitation center for trauma if we were to have a successful outcome. This idea was quickly modified to emphasize the special needs of children and the "Platinum Half Hour" concept came into being. Airway management in the field, including tracheal intubation of small children by paramedics, quickly evolved because of the critical importance of good oxygenation during transport of children with head injuries. Because all Maryland children under 14 years of age were concentrated in one pediatric trauma center, we were able to document prospectively the superiority of head and abdominal CAT scans in the evaluation

and management of children with multiple systems injury.

At about the same time, reports were coming from the Hospital for Sick Children in Toronto of their important observations on techniques of splenic salvage in children with ruptured spleens. Soon thereafter came their remarkable, even heretical, recommendation that children with documented ruptured spleens could be treated non-operatively with certain important precautions and with careful monitoring in a pediatric intensive care unit.(Fig. 3) Other designated pediatric trauma centers developed quickly in Boston, in San Diego, and most recently in the state systems of Pennsylvania and Washington.

Because we pediatric surgeons had learned to work together with our pediatric colleagues in neonatal transport and in newborn intensive care units, critical care pediatricians in turn easily began working with pediatric surgeons in the 1980's in the management of children with multiple systems injuries. These emergency pediatricians learned the skills of airway management, breathing and circulation resuscitation from the Advanced Trauma Life Support course which had been originated by the American College of Surgeons. This mix of pediatric surgeon and emergency pediatrician suggested an extension of the concept of ATLS to Advanced Pediatric Life Support courses which were first given at Johns Hopkins in 1982. The curriculum for the 1991 Advanced Pediatric Life Support Course (APLS) is shown in Figure 4.

The continuing critical care input of the pediatricians into the management of trauma serves to remind us surgeons of their time honored pediatric credo: prevention first! A pediatrician in Tennessee introduced in 1977 the important concept of child restraints in automobiles and over the next 10 years a 50 percent decrease in mortality for children was documented from the state of Tennessee. With accumulating experience and data, legislative action resulted in the requirement that all 50 states must have child restraints up through age

4 years; and thereafter seat belts are mandatory. Injury control became a discipline of pediatric preventive medicine and the strong programs in the American Academy of Pediatrics for bicycle helmets and smoke alarms followed. An important area of recent pediatric activity is focused on the major problem of handgun injuries to children in the United States, especially in our inner cities. This will become a higher priority over the next few years.

Pediatric surgeons must now provide the leadership and the catalytic influence to expand these trauma systems into a truly comprehensive emergency medical system for children which will include all types of life threatening illness and trauma in children, for example, overwhelming infection, prematurity, thermal injuries, drowning, multiple systems trauma, epiglottitis, Reye's syndrome, etc.

Our clinical research group has recently shown that it is possible to identify in the doctor's office or in the general hospital emergency room, children with early onset of illness which may proceed to life threatening complications. These early warning criteria are referred to as the Pediatric Severity Assessment Tool (PSAT) scores and are similar to the Pediatric Trauma Scores which have been so useful in identifying severity of injury. These trauma scores have lead to appropriate triage of children in our trauma systems. We must further define severity of illness at its earliest source whether in the home, office, or the emergency room and then provide rapid triage to the best resuscitation centers for our children.

A truly comprehensive and integrated emergency medical system for children will include education of parents in prevention of illness and injury, easy access of patients and family to emergency care, designation of pediatric critical care centers and incontinuity programs in rehabilitation.(Fig. 5) Surgeons have led in the development of comprehensive trauma systems, now

pediatric surgeons must speak up for children. For parents, pediatricians, and surgeons, emergency medical systems for children is our challenge of the 1990's! This truly means that surgeons must sharpen their critical care skills and continue to work with their pediatric intensivist colleagues. Emergency pediatricians must continue to learn from pediatric surgeons the ABCs of trauma management and the skills which are necessary for resuscitation of children with life threatening injuries.

Such a system must naturally include injury control and illness prevention. Parents and parents-to-be as teenagers must be taught Basic Life Support skills because they are usually the first responders. This BLS instruction should be repeated during pregnancy when there is a captive mother and father-to-be. Pediatricians must continue their time honored role in illness and injury prevention by anticipatory guidance of parents and constant refresher courses in safety for their growing patients.

Finally, pediatric surgeons must continue their important leadership role in aggressive expansion of the trauma systems and the careful collection of data which make it possible to organize cost effective facilities and personnel. The EMS-C managers must provide constant surveillance of the system to detect any weaknesses which can be corrected and to provide innovations on line for better care of children with life threatening conditions. Finally, as parents, pediatricians, and surgeons, we must constantly remind ourselves that children can't vote! We are their advocates in all aspects of the democratic process, political and medical. Their lives are truly in our hands.

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Field Update

A Bulletin of Current Information for Providers of Emergency Medicine

Emergency Medical Services for Children

Preface

The United States Congress acknowledged the special needs of children when it authorized the Emergency Medical Services for Children (EMSC) program in 1985. Congress recognized that many health professionals were not trained adequately to care for children and that special pediatric equipment was not available universally. It further was realized that prompt emergency transportation and medical services could reduce the rates of death and disability among children.

This issue of Field Update, developed by Susan M. Fuchs, MD, a pediatric emergency physician and EMSI's associate regional medical director, discusses the EMSC program and the objectives of EMSC in Pennsylvania.

Goals of EMSC

The national-level EMSC program is designed to:

- focus on the impact of pediatric emergencies on children and their families;
- develop and implement a body of knowledge concerning types, frequencies, and characteristics of pediatric emergencies and how existing EMS systems address them;
- develop comprehensive EMSC systems ranging from prevention to identification, acute care, and rehabilitation related to severe illness and injury of children;
- train and educate EMS personnel to deal with pediatric emergencies; and
- develop and maintain state and local support for EMSC.

EMSC is a joint program of the Maternal and Child Health Bureau and the National Highway Traffic Safety Administration (NHTSA). Through demonstration, implementation, and targeted issue grants, the EMSC program has assisted 36 states, including Pennsylvania, in incorporating pediatric components into their EMS programs.

NOTE: Only state governments and accredited schools of medicine are eligible to receive EMSC grants.

EMSC in Pennsylvania

Pennsylvania's Department of Health received an EMSC implementation grant in 1994 and will contract with the Pennsylvania Emergency Health Services Council (PEHSC) to implement it.

PEHSC formed an EMSC advisory committee at the beginning of fiscal year 1994-95 to provide recommendations on any issues related to EMSC in Pennsylvania. Membership on the advisory committee comprises a broad range of health care professions and specialties, including pediatric emergency medicine and surgery, general emergency medicine, emergency nursing, pediatric nursing, EMS medical directors, paramedics, EMTs, pediatric ICU nurses and physicians, as well as injury prevention groups from across the Commonwealth.

The advisory committee plays a leading role in developing and integrating EMSC into Pennsylvania's EMS system. Because of its diverse membership, the committee has the expertise to assist the Department of Health, the Maternal Child Health Bureau, the community, and other organizations in identifying needs and seeking solutions on issues related to EMSC in the Commonwealth.

Additional information on the advisory committee, its objectives, and how to be considered for membership, is available from PEHSC, 1-800/243-2EMS.

As part of the EMSC program, staff at PEHSC is working to create a database which will link available databases related to EMSC, eg, trip sheet, trauma registry, hospital discharge, Fatal Accident Report System, and the crash database from the Department of Transportation. Once established, the EMSC database will be used to assess needs and to facilitate research on areas such as degree of injury, medical treatment, outcome, costs, etc.

Another goal of Pennsylvania's EMSC program is to provide pediatric educational programs and materials for prehospital personnel and others. This will be accomplished through the presentation of pediatric topics at PEHSC's annual conference and other meetings held statewide and the enhancement of existing materials published by organizations such as The American Heart Association, The American Red Cross, The American Academy of Pediatrics, and the American College of Emergency Physicians.

The final objective of the EMSC program is to establish a resource center on pediatric injury prevention. This resource center will provide a link between those interested in safety issues and/or prevention programs and the existing materials and programs on injury prevention education.

Get Involved

It takes teamwork to reduce pediatric injuries, assure better outcomes for ill and injured children, coordinate resources, and prevent duplication of efforts.

The prehospital care of children can be improved with training, protocols, reviewing and setting standards, and data collection. Hospital care can be improved by using a systemwide approach and improving education and communication between healthcare professionals and organizations.

If you know about EMSC, communicate with your colleagues and your community. If you would like to get involved with EMSC, contact the Pennsylvania Emergency Health Services Council, 5012 Lenker Street, Suite 210, Mechanicsburg, PA 17055-2427, 1/800-243-2EMS.

Special thanks to Susan M. Fuchs, MD, for her contributions to this article.

EMSC Data Enhancement Project Underway

In conjunction with the Center for Injury Research and Control (CIRCL) at the University of Pittsburgh, EMSI is participating in an EMSC (Emergency Medical Services for Children) data enhancement project that will access the EMS trip sheet database through Natural Language, a commercial software package.

A goal of the national EMSC project is being able to access data to conduct planning, evaluation and research necessary to determine if children receive appropriate emergency care. However, in Pennsylvania, as well as other states, many researchers discover that extracting data can be difficult and slow due to inflexible, unfriendly data systems.

The EMSC data enhancement project hopes to correct the problems associated with accessing data by creating, testing and evaluating a prototype to Pennsylvania's trip sheet database using Natural Language software. Natural Language allows the user of a properly-configured PC running Windows to ask questions in conversational English. For example, the user may type on a remote keyboard, "How many children under 10 received ALS care for bicycle accidents in Armstrong County in 1993?" The Natural Language software, which is programmed to understand EMS terminology, will interpret the question and provide the relevant data from a centralized database server running at the University of Pittsburgh.

This summer, the data enhancement project using Natural Language will undergo Beta testing. The testers, selected from across the Commonwealth, are required complete an application to the Department of Health and sign an agreement with CIRCL. Additionally, beta testers must have the appropriate PC hardware, software and networking requirements. Beta testing will conclude this fall, and users will be asked to evaluate the project.

Queries about the project may be addressed to David Nicholas, EMSI director of prehospital services, 412/351-6604.

Support for the EMSC data enhancement project was received from the EMSC Program, Health Resources and Services Administration, Department of Health & Human Services, and the National Highway Traffic Safety Administration.

Look Beyond the Obvious

Early results of research now underway by the National Highway Traffic Safety Administration (NHTSA) show the emergence of changing patterns of motor vehicle injury in crashes where the air bag has deployed.

Prior to air bags, drivers often had visible injuries such as lacerations, abrasions, or bruises. Preliminary results of recent research show that some drivers protected by air bags may lack these traditional, visible injuries while continuing to suffer serious internal injuries.

Based on the recent research, NHTSA is advising that emergency personnel not be deceived by the lack of external injury signs. Instead, they should look for tell-tale signs in the vehicle that would indicate the possibility of internal injury. These vehicle signs would indicate the need to check the patient more fully and to do so promptly.

One tell-tale sign is steering wheel deformation, which should be regarded as an indicator of potentially serious internal injury. The patient may look fine, may even feel fine initially, and be ambulatory at the crash scene. In cases such as steering wheel deformation, internal injuries are often survivable but can be fatal if not detected and treated immediately and appropriately.

To promote this important message, NHTSA has a poster, "Look Beyond he Obvious," for display in ambulance bases and emergency departments. The 11" x 17" poster illustrates vehicle crash characteristics that should trigger an immediate check for potential internal injuries.

Quantities of up to 10 posters can be ordered **free of charge** by sending a request to NHTSA/NTS-13, 400 Seventh Street SW, Washington, DC 20590. Orders also can be sent by FAX to either 202/366-2766 or 202/493-2062.

Ambulance Drivers Given Additional Time to Complete EVOC

Section 1005.10 (d)(3)(vii) of the rules and regulations for Act 45 requires that all ambulance drivers must have completed a course of instruction, approved by the Department of Health, within three years of course approval. The first Emergency Vehicle Operators Course (EVOC) was approved April 23, 1992, so the deadline was April 23, 1995.

While this requirement was not suspended, the Department is allowing EMS providers more time to complete EVO courses. For ambulance services with licenses that expire October 1, 1995, completion of EVOCs is a mandatory requirement if the relicensing occurs during July through September 1995.

The Department has approved the following EVO courses:

Ambulance Insurance Services
contact: Steve Forry
183 Leader Hoths Road
York, PA 17402
800/233-1957

Emergency Vehicle Awareness
contact: Darrin Drwal
816 Perry Highway
Pittsburgh, PA 15209
412/369-1331

Indiana University of PA
contact: RichardHornfeck
Highway Safety Center
Indiana, PA 15705
412/357-4052

The type of vehicle used during the driving portion of the course should be consistent with the vehicle the personnel drive for the ambulance services.

EVO courses are held at locations throughout the EMSI region. Call Kurt J. Henkel, EMSI training specialist, 412/351-6604, for a list of training sites and contact persons.

Report Available

The Institute's twentieth anniversary report, covering the 1993-94 program year, is available at no cost to interested persons and organizations. Call Mary Lou Green, 412/351-6604, to request a copy.