Abstract:
Emergency medical care for children has evolved immensely over the past 30 years. During this period, much has been accomplished to improve the quality of care delivered to injured children in the United States. In this article, we will highlight specific examples of how trauma care of children has changed and improved in recent decades. Beginning with the importance of injury prevention, the article will also discuss the specific management of traumatic brain injury, blast injury, and field triage of mass casualty situations before concluding with highlights of other changes and advances that have occurred.

Keywords:
trauma care; children; injury prevention

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Trauma Care for Children in the Field

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Emergency medical service (EMS) systems developed rapidly in the 1970s following the 1966 National Academy of Sciences report on accidental death and disability in the United States.[1] Emphasis on pediatric emergency care, however, was not observed until the 1980s, when it was noted that children not only represented a significant proportion of ambulance transports but also experienced increased mortality from preventable trauma. Studies at that time also showed that children were twice as likely to die from traumatic injuries as were adults and that most emergency medical systems lacked the equipment necessary to adequately care for children.[2]

Since this early, influential period in the history of emergency care for children, much has been accomplished to improve the quality of care delivered to injured children in the United States. Development and certification of pediatric trauma centers, the study and dissemination of trauma outcome data and research, injury prevention efforts, and the development of pediatric-specific resuscitation and critical care training courses such as Pediatric Advanced Life Support, Advanced Pediatric Life Support, Pediatric Emergency Medical Services Training Program, Advanced Trauma Life Support, National Association of Emergency Medical Technicians Prehospital Trauma Life Support, and the American Academy of Pediatrics Pediatric Education for Prehospital Professionals have improved outcomes of

traumatic injury in children.[2] Despite still being the leading cause of morbidity and mortality in children, overall mortality rates from pediatric trauma declined in the first decade of the 21st century.[3] Although there are many factors responsible for improving trauma care in children, the creation of Emergency Medical Services for Children (EMSC) is heralded as the beginning of a true focus on the emergency needs of children.

INJURY PREVENTION

Background

The Centers for Disease Control and Prevention (CDC) report, "Vital signs: unintentional injury deaths among persons aged 0-19 years—United States, 2000-2009," provides a synopsis of the current state of unintentional injury and the importance of injury prevention.[3] From 2000 to 2009, there was a decline in the overall death rate from unintentional injury. The largest areas of decline in mortality have been in traffic-related deaths and are likely attributable to successful injury prevention improvements, such as changes in car design and increased use of seatbelts and safety seats. Despite these successes, both pedestrian and occupant motor vehicle traffic–related injuries are still responsible for most injury deaths among children. Furthermore, unintentional injury as a whole continues to be the leading cause of death in persons aged 1 to 19 years and a significant burden to society as a source of medical expenses and lost productivity.[3,4] The report also highlights burgeoning areas of concern including increases in infant suffocation and teenage poisoning.[3]

Success of injury prevention can be attributed to the development of this area as an identified scientific field with its own principles and body of evidence. Much of the early work upon which current injury prevention principles and programs are built was conducted by William Haddon. He initially proposed the general concept of injury resulting from energy transfer to a person. This concept led to the development of 10 countermeasure strategies to prevent this transfer of energy and, ultimately, to the Haddon Factor Phase Matrix.[5] The "Haddon Matrix" is a framework that divides an injury into preevent, event, and postevent phases. As part of the current Haddon Matrix, 4 epidemiologic factors—the host or person at risk of injury, the agent of injury, the physical environment, and the larger social environment—are studied at each phase to determine if there are possible injury prevention interventions.[6] Haddon also developed the concept of passive (ie, pasteurizing milk and air bags) vs active (ie, fastening seat belts and wearing helmets) approaches and the importance of understanding the difference between the 2 approaches in designing injury prevention interventions.[7]

These concepts developed by Haddon are particularly important to the pediatric population and continue to impact pediatric injury prevention efforts. Because the Haddon Matrix specifically examines the host, it accounts for the developmental and physical attributes of the pediatric patient in order to design prevention strategies specifically tailored to children. In addition, understanding the difference between active and passive approaches to injury prevention has specific implications for the pediatric population. Although passive strategies are generally more effective, they are not always available or feasible. Because the younger pediatric population cannot participate in active strategies on their own, there is often the need for additional interventions to support active prevention strategies. One example is motor vehicle safety through the use of car seats. The design of car seats to decrease injuries in motor vehicle collisions needs to be supported by safety seat laws because infants and young children do not have the ability to actively engage in this injury prevention measure solely by themselves.

EMS and EMSC Role in Injury Prevention

The role of EMS in injury prevention was formally described in a consensus statement in 1997.[8] The statement describes the duties of the out-of-hospital EMS provider to encompass individual health care, public safety, and public health. These duties and the fact that EMS providers are often visible, respected members of the communities they serve places them in a unique position to lead successful injury prevention initiatives. Similarly, the American College of Emergency Physicians Pediatric Emergency Medicine Committee published an article in 2001 outlining the emergency physician's role in pediatric injury control.[6] Both articles describe common principles to guide providers in pediatric injury prevention efforts. Specifically, they stress the need for leadership, education for health care providers and the general population, advocacy and involvement in the legislative process, integration with other agencies and programs, research to analyze the effectiveness of current programs, and establishing the future direction of pediatric injury prevention.

With this charge from these 2 statements, EMS and EMSC have played critical roles in the