PASIG MONTHLY CITATION BLAST: No.12 **July 2006**

Dear PASIG members:

This month's Citation BLAST continues our special topic series: *emergency response*, contributed by past PASIG President Jeff Stenback. The format is an annotated bibliography of articles on the selected topic from 1996 – 2006. Special topics will be targeted periodically throughout the year. If you'd like to suggest a topic or create one, please let me know.

As a reminder, each month's citations will be added to specific EndNote libraries: 1) Ice Skating, 2) Gymnastics, 3) Music, and 4) Dance. This particular topic, which is more general, will be placed in an EndNote library of its own. The updated libraries will, in turn, be posted on the PASIG webpage for our members to access and download. (Information about EndNote referencing software can be found at http://www.endnote.com, including a 30-day free trial).

This fall, the PASIG is pleased to announce a course offering Red Cross Certification as an Emergency First Responder with a focus on the performing artist. The course will be taught at University of Delaware on September 15-17, 2006. For more information, please contact PASIG Vice President Tara Jo Manal at: Tarajo@udel.edu.

Don't forget, the PASIG sponsors an annual student research scholarship. This award is to recognize students, who have had an abstract accepted to CSM, for their contribution to performing arts medicine and research. For more information on the research award please check our webpage (www.orthopt.org/sig_pa.php).

As always, your comments and entry contributions to these Citation BLASTs are always welcome. Please drop me an e-mail anytime.

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SPECIAL TOPIC: EMERGENCY RESPONSE

As physical therapists who treat performing artists, we may be placed in a position where there is a need to assess a performer's capacity to perform or to be asked to offer some form of basic "triage". Since situations like this can, by their very nature, occur suddenly and in many varied situations including backstage coverage or during an involvement with a touring group, I thought that our membership might be interested in a few references that are applicable to emergency response in general and (perhaps) to the performing artist in particular. This citation blast is in no way intended to be exhaustive--if you take a look for yourselves, you will see that the topic of "emergency response" refers to a broad array of information that crosses several disciplines. Instead, I have tried to include material that helps to flush out what will be presented in the emergency responder course that the PASIG is offering in September (and being taught by our vice-president, Tara Jo Manal). This course is a basic emergency response course that is being tailored to include scenarios that directly apply to the performing artist, but will necessarily incorporate material for the emergency responder that is applicable to all populations. As such, the articles I reference below include material that is reflective of this focus. I suggest that you use this citation blast as a stepping stone to further personal searches in this area and/or to perhaps assist in preparing for the emergency response course itself. I admit that I expected to find this topic relatively easy to research, but I was mistaken. While there were many articles related to emergencies and various assessments, I was surprised to find it so difficult to locate good basic articles that covered any one aspect of emergency response. Eventually, incorporating the search words “emergency”, “assessment” and “prehospital”, I found many of the sources you find below. I hope you find the material useful."

Jeff Stenback, PT, OCS
Past President, PASIG

AIRWAY MANAGEMENT

Wang, HE, Kupas, DF, Greenwood, MJ, et al. (2005). An algorithmic approach to prehospital airway management. *Prehosp Emerg Care* 9(2): 145-55.

> Airway management, including endotracheal intubation, is considered one of the most important aspects of prehospital medical care. This concept paper proposes a systematic algorithm for performing prehospital airway management. The algorithm may be valuable as a tool for ensuring patient safety and reducing errors as well as for training rescuers in airway management.

AUTOMATIC DEFIBRILLATORS

Aufderheide, T, Hazinski, MF, Nichol, G, et al. (2006). Community lay rescuer automated external defibrillation programs: key state legislative components and implementation strategies: a summary of a decade of experience for healthcare providers, policymakers, legislators, employers, and community leaders from the American Heart Association Emergency Cardiovascular Care Committee, Council on Clinical Cardiology, and Office of State Advocacy. *Circulation* 113(9): 1260-70.

> Cardiovascular disease is a leading cause of death for adults > 40 years of age. The American Heart Association (AHA) estimates that sudden cardiac arrest is responsible for

about 250,000 out-of-hospital deaths annually in the United States. Since the early 1990s, the AHA has called for innovative approaches to reduce time to cardiopulmonary resuscitation (CPR) and defibrillation and improve survival from sudden cardiac arrest. In the mid-1990s, the AHA launched a public health initiative to promote early CPR and early use of automated external defibrillators (AEDs) by trained lay responders in community (lay rescuer) AED programs. Between 1995 and 2000, all 50 states passed laws and regulations concerning lay rescuer AED programs. In addition, the Cardiac Arrest Survival Act (CASA, Public Law 106-505) was passed and signed into federal law in 2000. The variations in state and federal legislation and regulations have complicated efforts to promote lay rescuer AED programs and in some cases have created impediments to such programs. Since 2000, most states have reexamined lay rescuer AED statutes, and many have passed legislation to remove impediments and encourage the development of lay rescuer AED programs. The purpose of this statement is to help policymakers develop new legislation or revise existing legislation to remove barriers to effective community lay rescuer AED programs. Important areas that should be considered in state legislation and regulations are highlighted, and sample legislation sections are included. Potential sources of controversy and the rationale for proposed legislative components are noted. This statement will not address legislation to support home AED programs. Such recommendations may be made after the conclusion of a large study of home AED use.

BLEEDING

Gallaspy, JG (1994). Management of traumatic injuries in the workplace. *AAOHN J* 42(1): 33-8; quiz 39-41.

Traumatic injuries in the workplace occur from a variety of mechanisms and may produce a wide range of injuries. Critical to the management of these injuries is the knowledge that life saving interventions for airway, breathing, and circulation must take priority. Controlling external bleeding and managing circulation is imperative in the traumatically injured worker. Inadequate control of hemorrhage leads to cellular shock from which the client may never recover. Extremities should be managed appropriate to the specific injury. Careful monitoring of neurovascular status is significant in limb preservation. Amputated parts must be meticulously cared for, with the vision of replantation in mind. Electrical burns are unique burn injuries, as the complete area of damage is not visible. Monitoring cardiac and respiratory function is essential to detect any life threatening abnormalities in all injuries, but is especially important in the electrically injured client. The occupational health nurse can make a significant difference in the outcome of a traumatically injured client in the workplace. Adequate knowledge of treatment modalities, as well as transfer to the most appropriate trauma care facility, can make the difference in obtaining the best possible outcome.

Naimer, SA, Chemla, F (2000). Elastic adhesive dressing treatment of bleeding wounds in trauma victims. *Am J Emerg Med* 18(7): 816-9.

Conventional methods for hemorrhage control in the trauma patient fall short of providing a full solution for the life-threatening bleeding injury. The tourniquet is limited specifically to injuries of the distal limbs. Local pressure or tight bandaging with military bandages is cumbersome and often insufficient. Therefore, we sought a superior method to stop bleeding in emergency situations. Our objective is report and description of our experience with this method. Since 1992 our trauma team repeatedly encountered multiple trauma victims presenting with bleeding wounds. We achieved hemorrhage control by means of an adhesive elastic bandage applied directly over a collection of 4 x 4 gauze pads placed on the wound surface. The roll is then wrapped around the body surface, over the bleeding site, until sufficient pressure is reached to terminate ongoing hemorrhage. Three typical cases are described in detail. Adhesive elastic dressing compression was successful in fully controlling bleeding without compromise of distal blood flow. Our method corresponded to the demand for an immediate, effective and lasting form of hemorrhage control without complications. Furthermore, this technique proved successful even over body surfaces normally recognized as difficult to compress. We experienced equal favorable success while

working during transit by either ambulance or helicopter transportation. We find our preliminary experience using elastic adhesive dressing for bleeding control encouraging and suggest that this may substitute existing practices as the selected treatment when indicated. This method is presently underrecognized for this purpose. Development of a single unit bandage may further enhance success in the future.

Soudry, E, Stein, M (2004). Prehospital management of uncontrolled bleeding in trauma patients: nearing the light at the end of the tunnel. *Isr Med Assoc J* 6(8): 485-9.

The management of uncontrolled bleeding in trauma patients is difficult in the prehospital setting, especially when transfer time to a care facility is prolonged. The goal of treatment is to stabilize the patient until surgery can be performed. In modem practice, the major aspects of optimal patient stabilization are the timing and volume of resuscitation and the use of blood products. The main problems are the logistics of handling the blood products as well as achieving the appropriate endpoint of resuscitation, while balancing the need to maintain blood pressure with the need to avoid deleterious coagulopathy. This work reviews current therapeutic modalities for prehospital management of uncontrolled bleeding trauma patients, namely low volume resuscitation, packed red blood cells, hemoglobin solutions, perfluorocarbons, hypertonic saline solutions, and recombinant activated factor VII.

BURNS

Allison, K, Porter, K (2004). Consensus on the prehospital approach to burns patient management. *Emerg Med J* 21(1):112-4.

Burn patients form a large group of trauma patients cared for by first aiders, ambulance staff, nurses, and doctors before reaching specialist care in hospital. Guidance for these important carers is often poor or confused and this engenders anxiety and detracts from optimal patient care. This paper outlines nine key steps in the initial management of burn patients in the prehospital environment based on current available evidence and a consensus of specialists from all disciplines caring for burns patients. The basis of care should be that simple things should always be performed well.

Crawford, ME, Rask H (1996). Prehospital care of the burned patient. *Eur J Emerg Med* 3(4):247-51.

For optimal treatment of burns an understanding of the pathophysiological changes occurring locally and systemically after injury is necessary. Accurate estimation of burn size and depth as well as early treatment is essential. Knowledge of the circumstances of the accident and experience in diagnosing physical signs are required in terms of the need for intubation, treatment of poisoning and the occurrence of other trauma.

CARDIAC EMERGENCIES

2005 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation* 112(24 Suppl): IV1-203.

Aghababian, RV, Mears, G, Ornato, JP, et al. (2001). Cardiac arrest management. *Prehosp Emerg Care* 5(3):237-46.

Approximately 1,000 people in the United States suffer cardiac arrest each day, most often as a complication of acute myocardial infarction (AMI) with accompanying ventricular fibrillation or unstable ventricular tachycardia. Increasing the number of patients who survive cardiac arrest and minimizing the clinical sequelae associated with cardiac arrest in those who do survive are the objectives of emergency medical personnel. In 1990, the American Heart Association (AHA) suggested the chain of survival concept, with four links--early access, cardiopulmonary resuscitation (CPR), defibrillation, and advanced care--as the way to approach cardiac arrest. The recently published International Resuscitation Guidelines 2000 of the AHA have addressed advances in our understanding of the chain of survival. While the chain of survival concept has withstood a decade of scrutiny, there are only a few

scientifically rigorous research studies that support changes in prehospital patient care. Additional research efforts carried out in the prehospital setting are needed to support the concepts included in the chain of survival for cardiac arrest patients. Participants at the second Turtle Creek Conference, a meeting of experts in the field of emergency medicine held in Dallas, Texas, on March 29-31, 2000, discussed these and other issues associated with prehospital emergency care in the cardiac arrest patient. This paper addresses a number of the issues associated with each of the links of the chain of survival, the evidence that exists, and what should be done to achieve the clinical evidence needed for true clinical significance. Also included in this paper are the consensus statements developed from small discussion groups held after the main presentation. These comments provide another perspective to the problems and to possible approaches to deal with them.

CERVICAL SPINE INJURY

Akau, CK, Press, JM, Gooch, JL (1993). Sports medicine. 4. Spine and head injuries. *Arch Phys Med Rehabil* 74(5-S):S443-6.

This self-directed learning module highlights important aspects of athletic spine and head injuries. It is part of the chapter on sports medicine in the Self-Directed Medical Knowledge Program for practitioners and trainees in physical medicine and rehabilitation. This article covers the presentation, pathomechanics, and classification of common and important cervical and lumbar injuries. Sports participation criteria for children with spine deformities are discussed. In addition, a description of the degrees of concussion, the general guidelines for return to play after a sports-related head injury, and postconcussion sequelae are reviewed.

Cantu, RC (2000). Cervical spine injuries in the athlete. *Semin Neurol* 20(2):173-8.

Special considerations must be brought into play when the physician is consulted about when to allow an athlete to return to play following injury. This is especially true for brain and spinal cord injury. Although it is generally best to be on the conservative side, being too reticent about allowing any athlete to return may be very detrimental to the athlete and/or the entire team. Therefore, it behooves the sports physician to be circumspect with regard to not only the type of injury the athlete has suffered but also the nature, duration, and the repetitive aspects of the trauma along with the inherent strengths of any player. This article will provide the sports physician with criteria for making sound decisions regarding return to competition after cervical spine injury and "functional" cervical spinal stenosis.

Cantu, RC, Bailes, JE, Wilberger,JE Jr (1998). Guidelines for return to contact or collision sport after a cervical spine injury. *Clin Sports Med 17(1):137-46.*

Pro football is a violent, dangerous sport. To play it other than violently would be "imbecilic," according to the late Vince Lombardi. Many sports hold the potential for serious permanent spine and spinal cord injury. Fortunately, the incidence of catastrophic spine and spinal cord injuries has dramatically declined in the past 10 to 15 years. This decline is, in part, attributable to the development of sports-related spine injury registries, the education of the pathomechanics of these injuries, and the implementation of appropriate preventive measures. This article focuses on sports-related spinal cord and nerve injuries, ranging from the mild "stinger" syndrome to complete quadriplegia, with emphasis on recommendations for return to competition.

Waninger, KN (2004). Management of the helmeted athlete with suspected cervical spine injury. Am J Sports Med 32(5):1331-50.

Improper handling of an unstable neck injury may result in iatrogenic neurologic injury. A review of published evidence on cervical management in the helmeted athlete with a suspected spinal injury is discussed. The approach to the neck-injured helmeted athlete and the algorithms for on-field and emergency department evaluations are reviewed. The characteristics of the fitted football helmet allow safe access for airway management, and

helmets and shoulder pads should not be initially removed unless absolutely necessary. Prehospital and emergency personnel should be trained in the indications for removal and in proper helmet, shoulder pad, and facemask removal techniques. If required, both helmet and shoulder pads should be removed simultaneously. Radiographs with equipment in place may be inadequate, and the value of computed tomography and magnetic resonance imaging in these helmeted patients has been studied. If adequate films cannot be obtained with equipment in place, helmet and shoulder pads may need to be removed before radiographic clearance. A plan should be formulated to prepare for such unexpected clinical scenarios as cervical spine injuries, and skills should be practiced. Airway and cervical spine management in these helmeted athletes is an area of ongoing research.

Warren, WL Jr, Bailes, JE (1998). On the field evaluation of athletic neck injury. *Clin Sports Med*17(1):99-110.

This article reviews the on the field management of athletic cervical spine and spinal cord injury. The various types of injuries are discussed, as well as the team approach to evaluation, immobilization, and transport of the injured athlete. An overview of treatment rationale and decisions regarding the return of the spine-injured or spinal cord-injured player to competition is given. Emphasis is placed on the prevention of further injury by mishandling the injured athlete.

Weinstein, SM (1998). Assessment and rehabilitation of the athlete with a "stinger". A model for the management of noncatastrophic athletic cervical spine injury. *Clin Sports Med* 17(1):127-35.

Stingers are the most common athletically induced nerve injury of the cervical spine, but often underdiagnosed or inadequately assessed. In addition to neurologic dysfunction, biomechanical and postural faults are frequently associated with stingers. This article addresses the pathomechanics of the stinger, comprehensive clinical assessment, appropriate diagnostic testing, and a thorough review of rehabilitation techniques to allow return to competition. The principles and practical suggestions can be applied to most cervical spine injuries.

CHILDBIRTH

Verdile, VP, Tutsock, G, Paris, PM, et al. (1995). Out-of-hospital deliveries: a five-year experience. *Prehospital Disaster Med* 10(1): 10-3.

INTRODUCTION: Prehospital providers regularly encounter patients with obstetrical emergencies. This study determined the frequency and outcome of out-of-hospital deliveries in an urban, all advanced life support (ALS) emergency medical services (EMS) system. METHODS: Retrospective review of all out-of-hospital records that involved women delivering babies in the care of prehospital providers from 1984-1988. The EMS system answered an average of 62,000 calls during the study period. The records of these patients were identified through a computer database. RESULTS: A total of 81 out-of-hospital deliveries (1.4/month) occurred during the study years. The average age of the mothers was 24 years, and the average gestation period was 30 weeks. The women had an average of three previous pregnancies and two previous deliveries, and 10 were primagravida. Seventy-two (89%) of the deliveries occurred in the home. The paramedics encountered a variety of obstetrical and neonatal complications in 34% of the patient encounters. Nine neonates were delivered prior to the arrival of the paramedic team. Twenty-four neonates had Apgar scores calculated, and the one- and five-minute scores averaged eight and nine respectively. Five of the mothers had no prenatal care. Maternal complications included four patients noted to be hypertensive with the delivery, nine patients had some degree of vaginal bleeding, and in 33 patients, the prehospital providers did not deliver the placenta in the field. An EMS physician was in attendance for only two of the out-of-hospital deliveries. DISCUSSION: In this urban EMS system, out-of-hospital deliveries, especially pre-term deliveries, are a common event. There appears to be a significant number of neonatal complications that confront paramedics. Generally, the paramedics were deficient in their documentation of the neonatal assessment. Continuing educational programs for

paramedics should include reviewing normal and complicated vaginal deliveries as well as ALS measures for neonates. Protocols for obstetrical emergencies need to be developed and subjected to quality improvement measures. CONCLUSIONS: Paramedics, especially those in urban settings, are likely to encounter obstetrical and neonatal emergencies and a significant number of associated complications. Emergency medical services systems and medical directors should have in place continuing educational programs, patient-care protocols, and continuous quality improvement measures to evaluate the care rendered to patients having out-of-hospital deliveries.

CONCUSSION

McCrory P, Johnston K, Meeuwisse W, et al. (2005). Summary and agreement of the 2nd International Conference on Concussion in Sport, Prague 2004. *Physician Sportsmed* 33 (4): 29-36, 41-44.

In November 2001, the First International Symposium on Concussion in Sport was held in Vienna, Austria. This meeting was organized by the International Ice Hockey Federation (IIHF) in partnership with the Federation Internationale de Football (FIFA) and the International Olympic Committee (IOC) Medical Commission. As part of the resulting mandate for the future, the need for leadership and updates was identified. To meet that mandate, the Second International Symposium on Concussion in Sport was organized by the same group and held in Prague, Czech Republic, in November 2004.

The original aims of the symposia were to provide recommendations for the improvement of safety and health of athletes who suffer concussive injuries in ice hockey, football (soccer), as well as other sports. To this end, a range of experts were invited to both meetings in order to address specific issues of epidemiology, basic and clinical science, injury grading systems, cognitive assessment, new research methods, protective equipment, management, prevention, and long-term outcome. At the conclusion of the initial conference, a small group of experts was given a mandate by the conference delegates and organizing bodies to draft a document describing the agreement position reached by those in attendance at that meeting. That document was co-published in the British Journal of Sports Medicine, the Clinical Journal of Sport Medicine, and The Physician and Sportsmedicine.

The wider interest base resulting from the first meeting and document was reflected by the expanded representation. New groups at the second meeting included trauma surgeons, sport psychologists, and others. The Concussion in Sport Group has produced the current document as an update of the original Vienna consensus document and includes a sideline assessment form with a pocket-sized summary card for use by clinicians.

This protocol represents a work in progress and, as with all other recommendations or proposals, it must be updated as new information is added to the current state of the literature and understanding of this injury.

Notebaert AJ; Guskiewicz KM (2005). Current trends in athletic training practice for concussion assessment and management. *J Athletic Train* 40(4): 320-5.

Athletic trainers surveyed in 1999 demonstrated little consensus on the use of concussion grading scales and return-to-play criteria. Most relied on clinical examination or symptom checklists to evaluate athletes with concussion. Objective: To investigate the current trends of certified athletic trainers in concussion assessment and management. Design: Subjects were invited to participate in a 32-question Internet survey. Setting: An Internet link to the survey was e-mailed to the subjects. Patients or Other Participants: A total of 2750 certified athletic trainers and members of the National Athletic Trainers' Association were randomly e-mailed and invited to participate. Main Outcome Measure(s): Survey questions addressed topics including years of certification, number of concussions evaluated each year, methods of assessing concussion, and guidelines used for return to play. Compliance with the recent position statement of the National Athletic Trainers' Association on sport-related concussion was also evaluated. Results: Certified athletic trainers averaged 9.9 +/- 7.3 years of

certification and evaluated an average of 8.2 +/- 6.5 concussions per year. To assess concussion, 95% reported using the clinical examination, 85% used symptom checklists, 48% used the Standardized Assessment of Concussion, 18% used neuropsychological testing, and 16% used the Balance Error Scoring System. The most frequently used concussion grading scale and return-to-play guideline belonged to the American Academy of Neurology (30%). When deciding whether to return an athlete to play, certified athletic trainers most often used the clinical examination (95%), return-to-play guidelines (88%), symptom checklists (80%), and player self-report (62%). The most important tools for making a return-to-play decision were the Clinical examination (59%), symptom checklists (13%), and return-to-play guidelines (12%). Only 3% of certified athletic trainers surveyed complied with the recent position statement, which advocated using symptom checklists, neuropsychological testing, and balance testing for managing sport-related concussion. Conclusions: Our findings suggest that only a small percentage of certified athletic trainers currently follow the guidelines proposed by the National Athletic Trainers' Association. Various assessment methods and tools are currently being used, but clinicians must continue to implement a combination of methods and tools in order to comply with the position statement.

DIABETIC EMERGENCIES

Lewis, R (1999). Diabetic emergencies: Part 1. Hypoglycaemia. *Accid Emerg Nurs* 7(4): 190-6.

Diabetes mellitus is a chronic, lifelong condition which can affect people of all ages, and is increasing in prevalence. Hypoglycaemia is probably the most common acute problem suffered by patients with diabetes. It is also a serious medical emergency with potentially fatal outcomes, and is the most common reason for patients with diabetes attending an accident and emergency (A&E) department. It is also a major source of anxiety for diabetics, particularly those controlled on insulin, and unfortunately, in the move towards ever tighter glycaemic control, it is inevitable that diabetics will continue to suffer from hypoglycaemia. This article examines the pathophysiology of hypoglycaemia and some of its main causes, and will look at the clinical management of the patient with hypoglycaemia, both in the community and in the A&E department. The importance of the recognition and prompt treatment of hypoglycaemia, and of the investigation of hypoglycaemia with no obvious cause are also discussed. Part 2 of the series will explore the pathophysiology and clinical management of diabetic emergencies involving hyperglycaemia, including both diabetic ketoacidosis and the rarer hypernatremic, non-ketotic coma.

Lewis, R (2000). Diabetic emergencies: Part 2. Hyperglycaemia. *Accid Emerg Nurs* 8(1): 24-30.

Part 2 of this series explores the pathophysiology and clinical management of diabetic emergencies involving hyperglycaemia, including both diabetic ketoacidosis and the rarer hypernatremic, non-ketotic coma. Part 1 (Hypoglycaemia) was published in Accident and Emergency Nursing 7(4): 190-196.

EMERGENCY RESPONSE (GENERAL)

Clements, R, Mackenzie, R (2005). Competence in prehospital care: evolving concepts. *Emerg Med J* 22(7): 516-9.

Competence based training and assessment has become central to education and training for healthcare professionals. There continues to be uncertainty about the meaning of competence and how the principles underpinning competence based training and assessment can be applied to evolving subspecialty and multidisciplinary areas such as prehospital care. Considerable development work has been undertaken on a national level with the creation of a Competence Framework for Emergency Care. This article explores the concepts of competence, defines the terminology, and describes the role of a competence framework in education and training.

Jacobs, LM, Berrizbeitia, LD (1984). Prehospital trauma care. *Emerg Med Clin North Am* 2(4):717-32.

The past two decades have been a period of increased concern over the improvement of prehospital emergency medical care. Training of basic and advanced EMTs to a level of professionalism that includes a distinct body of knowledge and the use of assessment and management skills is only one component of the prehospital system. Communications systems, transportation deployment plans, and improved links with hospitals have contributed to the refinement of emergency medical systems. The management of the trauma victim is an organized plan of controlling the airway, restoring breathing, and supporting ventilation, followed by a secondary survey of the less life-threatening problems. The role of EMTs or paramedics, therefore, is to assess, manage, extricate, and transport.

Olympia RP, Wan E, Avner JR (2005). The preparedness of schools to respond to emergencies in children: a national survey of school nurses. *Pediatrics* 116(6): e738-45.

Because children spend a significant proportion of their day in school, pediatric emergencies such as the exacerbation of medical conditions, behavioral crises, and accidental/intentional injuries are likely to occur. Recently, both the American Academy of Pediatrics and the American Heart Association have published guidelines stressing the need for school leaders to establish emergency-response plans to deal with life-threatening medical emergencies in children. The goals include developing an efficient and effective campus-wide communication system for each school with local emergency medical services (EMS); establishing and practicing a medical emergency-response plan (MERP) involving school nurses, physicians, athletic trainers, and the EMS system; identifying students at risk for life-threatening emergencies and ensuring the presence of individual emergency care plans; training staff and students in first aid and cardiopulmonary resuscitation (CPR); equipping the school for potential life-threatening emergencies; and implementing lay rescuer automated external defibrillator (AED) programs. The objective of this study was to use published guidelines by the American Academy of Pediatrics and the American Heart Association to examine the preparedness of schools to respond to pediatric emergencies, including those involving children with special care needs, and potential mass disasters. METHODS: A 2-part questionnaire was mailed to 1000 randomly selected members of the National Association of School Nurses. The first part included 20 questions focusing on: (1) the clinical background of the school nurse (highest level of education, years practicing as a school health provider, CPR training); (2) demographic features of the school (student attendance, grades represented, inner-city or rural/suburban setting, private or public funding, presence of children with special needs); (3) self-reported frequency of medical and psychiatric emergencies (most common reported school emergencies encountered over the past school year, weekly number of visits to school nurses, annual number of "life-threatening" emergencies requiring activation of EMS); and (4) the preparedness of schools to manage life-threatening emergencies (presence of an MERP, presence of emergency care plans for asthmatics, diabetics, and children with special needs, presence of a school nurse during all school hours, CPR training of staff and students, availability of athletic trainers during all athletic events , presence of an MERP for potential mass disasters). The second part included 10 clinical scenarios measuring the availability of emergency equipment and the confidence level of the school nurse to manage potential life-threatening emergencies. RESULTS: Of the 675 questionnaires returned, 573 were eligible for analysis. A majority of responses were from registered nurses who have been practicing for >5 years in a rural or suburban setting. The most common reported school emergencies were extremity sprains and shortness of breath. Sixty-eight percent (391 of 573 [95% confidence interval (CI): 64-72%]) of school nurses have managed a life-threatening emergency requiring EMS activation during the past school year. Eighty-six percent (95% CI: 84-90%) of schools have an MERP, although 35% (95% CI: 31-39%) of schools do not practice the plan. Thirteen percent (95% CI: 10-16%) of schools do not identify authorized personnel to make emergency medical decisions. When stratified by mean student attendance, school setting, and funding classification, schools with and without an MERP did not differ significantly. Of the 205 schools that do not have a school nurse present on campus during

all school hours, 17% (95% CI: 12-23%) do not have an MERP, 17% (95% CI: 12-23%) do not identify an authorized person to make medical decisions when faced with a life-threatening emergency, and 72% (95% CI: 65-78%) do not have an effective campus-wide communication system. CPR training is offered to 76% (95% CI: 70-81%) of the teachers, 68% (95% CI: 61-74%) of the administrative staff, and 28% (95% CI: 22-35%) of the students. School nurses reported the availability of a bronchodilator meter-dosed inhaler (78% [95% CI: 74-81%]), AED (32% [95% CI: 28-36%]), and epinephrine autoinjector (76% [95% CI: 68-79%]) in their school. When stratified by inner-city and rural/suburban school setting, the availability of emergency equipment did not differ significantly except for the availability of an oxygen source, which was higher in rural/suburban schools (15% vs 5%). School-nurse responders self-reported more confidence in managing respiratory distress, airway obstruction, profuse bleeding/extremity fracture, anaphylaxis, and shock in a diabetic child and comparatively less confidence in managing cardiac arrest, overdose, seizure, heat illness, and head injury. When analyzing schools with at least 1 child with special care needs, 90% (95% CI: 86-93%) have an MERP, 64% (95% CI: 58-69%) have a nurse available during all school hours, and 32% (95% CI: 27-38%) have an efficient and effective campus-wide communication system linked with EMS. There are no identified authorized personnel to make medical decisions when the school nurse is not present on campus in 12% (95% CI: 9-16%) of the schools with children with special care needs. When analyzing the confidence level of school nurses to respond to common potential life-threatening emergencies in children with special care needs, 67% (95% CI: 61-72%) of school nurses felt confident in managing seizures, 88% (95% CI: 84-91%) felt confident in managing respiratory distress, and 83% (95% CI: 78-87%) felt confident in managing airway obstruction. School nurses reported having the following emergency equipment available in the event of an emergency in a child with special care needs: glucose source (94% [95% CI: 91-96%]), bronchodilator (79% [95% CI: 74-83%]), suction (22% [95% CI: 18-27%]), bag-valve-mask device (16% [95% CI: 12-21%]), and oxygen (12% [95% CI: 9-16%]). An MERP designed specifically for potential mass disasters was present in 418 (74%) of 573 schools (95% CI: 70-77%). When stratified by mean student attendance, school setting, and funding classification, schools with and without an MERP for mass disasters did not differ significantly. CONCLUSIONS: Although schools are in compliance with many of the recommendations for emergency preparedness, specific areas for improvement include practicing the MERP several times per year, linking all areas of the school directly with EMS, identifying authorized personnel to make emergency medical decisions, and increasing the availability of AED in schools. Efforts should be made to increase the education of school nurses in the assessment and management of life-threatening emergencies for which they have less confidence, particularly cardiac arrest, overdose, seizures, heat illness, and head injury.

FRACTURES

Culver, JE, Anderson, TE (1992). Fractures of the hand and wrist in the athlete. *Clin Sports Med* 11(1):101-28.

The challenge of treating fractures of the hand and wrist in the athlete is finding innovative ways of internal and external fixation that will allow the athlete to continue participation while the fracture is healing. The challenge is to provide enough immobilization or restriction to allow optimal fracture healing while providing enough freedom to allow the athlete to participate in his sport.

Hutchinson, M, Tansey, J (2003). Sideline management of fractures. *Curr Sports Med Rep* 2(3):125-35.

Athletes have the potential to sustain a myriad of injuries, ranging from muscle strains and overuse to fractures and dislocations. The team physician and sideline medical professionals must be keenly aware of the risk potential, and have an emergency plan in place to address any potential injuries. Bone injury can range from unstable, open fractures to overuse and stress fractures. Coaches and players may challenge recommendations

regarding not only treatment, but also return-to-play issues. The fundamental guideline must always be what is safe for the athlete. Decisions must be individualized for each athlete, anatomic site, and injury. If the athlete is not at significant risk to himself, the fracture is healed or can be protected, and the athlete can function at his previous level with a protective device, he may be able to return to sport.

Lee, C, Porter, KM (2005). Prehospital management of lower limb fractures. *Emerg Med J* 22(9): 660-3.

Lower limb fractures are common injuries in prehospital care. Untreated fractures can lead to hypovolaemic shock especially if open, and should be treated with effective haemorrhage control and splintage. A brief assessment for open fractures, deformity, and neurovascular compromise should be followed by effective analgesia, wound management, reduction (if needed), splintage, and packaging of the patient. Early appropriate management reduces the morbidity and mortality of lower limb fractures.

GENERAL

Nadler, SF, Chou, LH, Toledo, SD, et al. (2004). Sports and performing arts medicine. 1. General considerations for sports and performing arts medicine. *Arch Phys Med Rehabil* 85(3 Suppl 1):S48-51.

This self-directed learning module highlights general considerations in sports and performing arts medicine. It is part of the study guide on sports and performing arts medicine in the Self-Directed Physiatric Education Program for practitioners and trainees in physical medicine and rehabilitation. OVERALL ARTICLE OBJECTIVE: To discuss similarities and differences of injuries sustained in sports and performing arts using case vignettes.

HEAT-RELATED ILLNESS

Casa, DJ, Armstrong, LE, Ganio, MS, et al. (2005). Exertional heat stroke in competitive athletes. *Curr Sports Med Rep* 4(6):309-17.

Exertional heat stroke (EHS) is a serious medical condition that can have a tragic outcome if proper assessment and treatment are not initiated rapidly. This article focuses on critical misconceptions that pertain to the prevention, recognition, and treatment of EHS, including 1) the randomness of EHS cases, 2) the role of nutritional supplements in EHS, 3) temperature assessment, 4) onset of EHS and the possible lucid interval, 5) rapid cooling, and 6) return to play. Exploration of these topics will enhance the medical care regarding EHS.

Drake, DK, Nettina, SM (1994). Recognition and management of heat-related illness. *Nurse Pract* 19(8):43-7.

Health care providers are challenged to recognize heat-related illness in a variety of settings--episodic office visits, acute emergency room visits, telephone advice calls, and in the community at local sporting events and social functions. In order to determine the cause and initiate appropriate management, the provider must realize the spectrum of heat-related illness, understand normal and abnormal thermoregulation, identify populations at risk, and identify treatment. The spectrum includes heat rash, heat edema, heat cramps, heat exhaustion, and heatstroke. Heatstroke is a medical emergency with a body temperature elevation of 40.5 degrees C or greater and cardiovascular and neurologic compromise that can result in death. Patient education is aimed at preventative measures to ward off recurrent heat-related illness, especially heat exhaustion.

SEIZURES

Abarbanell, NR (1993). Prehospital seizure management: triage criteria for the advanced life support rescue team. *Am J Emerg Med* 11(3):210-2.

The present study was completed to establish advanced life support (ALS) versus non-ALS triage criteria for use by ALS prehospital personnel when faced with the seizure patient, in the hope of more efficient use of ALS rescue teams. Preselected triage criteria for acuity of care based on neurological condition, vital signs, and concomitant illness/injury were tested against retrospective data (paramedic run reports) collected on 230 patients. Triage criteria sensitivity (SENS), specificity (SPEC), positive predictive value (PPV), and negative predictive value (NPV) were determined with a 95% confidence interval (CI). Point estimate of use/need of care was noted. ALS interventions were instituted in 58 patients (25%). In 57 of these cases, indication for and ALS intervention, were established on initial patient assessment (SENS, 98.28; 95% CI, 90.76 to 99.96). Of 173 patients requiring no ALS intervention on initial assessment, only 1 (0.58%) developed complications warranting ALS therapy during the course of prehospital care (SPEC, 100.00; 95% CI, 100.00 to 99.99; PPV, 100.00; 95% CI, 100.00 to 94.63; NPV, 99.42; 95% CI, 96.82 to 99.99). No inappropriate use, point estimate (PE) [(0)/(172) (0.00% to 0.01%)] or unmet need, PE [(0)/(58) (0.00% to 5.16%)] of care was noted. The data presented in this study suggest that given similar field times, after initial patient assessment by ALS personnel, it is reasonable and safe to triage seizure patients who do not require ALS intervention to non-ALS rescue teams for continuation of care and transportation.

TRAUMA/INJURIES (GENERAL)

Cales, RH (1986). Injury severity determination: requirements, approaches, and applications. *Ann Emerg Med* 15(12): 1427-33.

Injury severity determination serves multiple purposes in trauma care systems by aiding prehospital triage, assisting clinical management, and facilitating outcome evaluation. Numerous authors have described methods for quantifying injury severity, most of which use physiologic status or anatomic injury. For prehospital triage, such determination assists decisions regarding patient priority, disposition, and destination. For clinical management, it provides essential information on initial condition and eventual course, including response to therapy. Finally, for outcome evaluation, it enables objective assessment of care quality, using techniques that determine appropriateness of disability, morbidity, mortality, and reimbursement, based on case mix.

Drake, DF, Nadler, SF, Chou, LH, et al. (2004). Sports and performing arts medicine. 4. Traumatic injuries in sports. *Arch Phys Med Rehabil* 85(3 Suppl 1):S67-71.

This self-directed learning module focuses on injuries often seen in contact sports. It includes information on trauma to the cervical spine, wrist, shoulder, knee, ankle, foot, and chest and also discusses concussion in sport. It is part of the study guide on sports and performing arts medicine in the Self-Directed Physiatric Education Program for practitioners and trainees in physical medicine and rehabilitation. This article specifically focuses on the etiology, differential diagnoses, treatment, and return-to-play criteria for traumatic sports injuries. OVERALL ARTICLE OBJECTIVE: To summarize the approach to common traumatic sports injuries.

Gardiner, JR, Madaleno, JA and Johnson, DL (2004). Sideline management of acute knee injuries. *Orthopedics* 27(12):1250-4.

Sideline management of acute knee injuries requires medical personnel to have knowledge multiple-ligament injured knees need to be rapidly diagnosed and stabilized to allow for timely transfer to a location where further evaluation and definitive treatment can be of injury patterns, mechanisms, physical findings, and treatment strategies. ractures and multiple-ligament injured knees need to be rapidly diagnosed and stabilized to allow for timely transfer to a location where further evaluation and definitive treatment can be provided.

McGeehan, J, Shields, BJ, Smith, GA (2004). Children should wear helmets while ice-skating: A comparison of skating-related injuries. *Pediatrics* 114:124-128.

OBJECTIVE. This study compares injuries, especially head injuries, among ice-skaters with those among skateboarders, rollerskaters, and in-line skaters, to determine the need for helmet use during recreational ice-skating by children. DESIGN. A comparative study of a consecutive series of patients. SETTING. The emergency department of a large, urban, academic, children's hospital. PARTICIPANTS. Children treated for injuries related to recreational ice-skating, skateboarding, rollerskating, and in-line skating. RESULTS. During a 31-month period, 419 consecutive children were evaluated in the emergency department for skating-related injuries. Children were predominately male (53.9%), with a mean age of 10.0 years (SD: 3.0 years; median: 10.0 years; range: 1–18 years). The most frequent mechanism of injury was a fall. Overall, 76.5% of children (215 of 281 children) were reported to be wearing no protective equipment, such as a helmet or padding on the elbows or knees, at the time of injury. Ice-skaters were more likely to have adult supervision than were skateboarders (relative risk [RR]: 5.16; 95% confidence interval [CI]: 2.13–12.46), rollerskaters (RR: 1.21; 95% CI: 1.09 – 1.35), and in-line skaters (RR: 2.08; 95% CI: 1.72–2.51). Ice-skaters were at greater risk of injury to the head (20.0%) than were in-line skaters (4.9%) (RR: 4.09; 95% CI: 1.81–9.23); a weak difference was noted between ice-skaters and rollerskaters (9.9%) (RR: 2.18; 95% CI: 1.04 –4.57), with no significant difference in head injuries between ice-skaters and skateboarders (15.9%) (RR: 1.60; 95% CI: 0.54–2.93). Ice-skaters demonstrated lacerations to the head in 68.8% of abnormal head examinations, compared with 37.0% for rollerskaters (RR: 1.86; 95% CI: 1.08–3.20) and 50.0% for in-line skaters (RR: 2.06; 95% CI: 1.35–3.16); however, there was no significant difference in lacerations to the head between ice-skaters and skateboarders (53.3%) (RR: 1.29; 95% CI: 0.76–2.19). Injuries to ice-skaters occurred more often in an indoor skating facility (92.9%, 52 of 56 cases), compared with injuries to skateboarders (3.6%, 1 of 28 cases) (RR: 13.96; 95% CI: 2.01–96.76), rollerskaters (63.4%, 59 of 93 cases) (RR: 1.46; 95% CI: 1.23–1.74), and in-line skaters (10.9%, 15 of 137 cases) (RR: 8.48; 95% CI: 5.23–13.75). CONCLUSIONS. The proportion of head injuries among ice-skaters in this study was greater than that observed for participants in other types of skating, for which helmet use is recommended and often required. Children should wear a helmet during recreational ice-skating. Mandatory helmet use by pediatric ice-skaters at indoor rinks should be implemented. Use of other types of protective equipment, such as wrist guards, knee pads, and elbow pads, should be considered for prevention of injuries to the extremities during ice-skating. Caution should be used when allowing young children to participate in recreational ice-skating. Additional research should be conducted in other populations, to corroborate these findings and to evaluate ice-skating safety recommendations for children.

Pamerneckas, A, Macas, A, Blazgys, A, et al. (2006). The treatment of multiple injuries: prehospital emergency aid. *Medicina (Kaunas)* 42(5):395-400.

OBJECTIVE: To evaluate initial (prehospital) assessment and management of high-energy blunt polytrauma patients. MATERIAL AND METHODS: Prehospital assessment and management of high-energy blunt polytrauma patients was analyzed. The extent of initial assessment and management was compared with Advanced Trauma Life Support recommendations. RESULTS: Altogether, 101 (63.05%) of 159 polytrauma patients (mean Injury Severity Score was 28.04) were admitted to Kaunas University of Medicine Hospital by the Emergency Aid Service after motor vehicle traffic accidents. In comparison with Advanced Trauma Life Support recommendations initial assessment (ABCDE) reached 14% and management reached 10.6%. CONCLUSIONS: Initial assessment of high-energy blunt polytrauma patients reached 14% and management reached 10.6% of that recommended by Advanced Trauma Life Support.

Worsing, RA Jr (1984). Principles of prehospital care of musculoskeletal injuries. *Emerg Med Clin North Am* 2(2): 205-17.

Prehospital management of musculoskeletal injuries in the traumatized patient is based on the application of a few basic principles in an orderly but expeditious manner. The patient must be assessed for immediate life-threatening conditions involving airway, respiratory, and circulatory functions while the cervical spine is protected. Resuscitative efforts to reestablish

and preserve an adequate circulating volume of oxygenated blood must follow, using airways, oxygen therapy, and fluid replacement through MAST trousers and intravenous fluids. Cardiac function must be maintained as well. Respiratory function must be monitored and assisted as required. Finally, neurologic status must be assessed and monitored. Secondary assessment of all pertinent history and physical findings is made to delineate all other injuries that do not pose an immediate threat to the life or limb of the patient. Definitive care follows but is limited to basic resuscitation, stabilization, and immobilization techniques under medical control through telemetry and radio communication. Immediate definitive care of the traumatized patient requires the expeditious intervention of the trauma team in a hospital setting with surgical, blood banking, radiographic, laboratory, and other hospital-based capabilities available. Field management of the traumatized patient is directed at the expeditious delivery of the viable patient to the trauma team. In the multiply traumatized patient with severe injuries to several organ systems, prehospital care may need to be expedited to provide this patient the in-hospital care required to save his or her life. Appropriate treatment in such life-threatening trauma situations will consist of a rapid primary assessment, airway and cervical spine control, appropriate respiratory and cardiovascular assistance, gross whole body fracture immobilization using a backboard, and immediate transport. For less severely injured patients, primary assessment, resuscitation, stabilization, full secondary assessment, initial definitive care, and immobilization should be completed before transport begins.