From the Editors:

The focus of the summer newsletter is on our front-line efforts in Pediatric Emergency Medicine. In our field, the training of our first responder colleagues and being “prepared for the worst” is crucial to smooth workday operation. With that in mind, we bring you highlights from disaster preparedness research, prehospital care training, and a review of the basics of prehospital care. We also provide a first-hand account of the Boston Marathon bombing rescue efforts by a physician who participated.

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The 1966 National Academy of Sciences report, “Accidental Death and Disability” and the subsequent passage of the Highway Safety Act laid the foundation for the current system of Emergency Medical Services (EMS). Initially designed to provide treatment and rapid transfer for victims of motor vehicle collisions and guided by the principles of Haddon’s matrix, EMS now addresses the full range of injury and medical illness as a primary access point to the healthcare system. Statistics from the National Association of State EMS Officials estimate that nearly 37 million EMS responses occurred in 2009; this translates to one EMS response for every nine Americans per year given the 2011 Census. Given that a significant number of EMS activations involve children, it is imperative that we as PEM providers recognize the strengths and weaknesses of EMS systems and that we understand the special scenarios where we may interact with EMS providers.

The primary regulations that drive EMS systems come from Federal and State bodies. The National Highway Traffic Safety Administration now is responsible for Federal oversight and defines the ‘scope of practice’ for each level of EMS provider. Current provider types described by NHTSA include first responder, EMT-Basic, EMT-Intermediate, EMT-Defibrillator, and EMT-Paramedic. The National Registry of Emergency Medical Technicians is a centralized, non-governmental agency that standardizes training and credentialing for emergency medical providers. A fundamental difference between EMS practices is apparent when state rules are examined. Many states allow EMS personnel to practice under their own license; these states follow the scope of practice model. The less common model is called ‘delegated practice,’ where EMS personnel practice under the license of their medical director - very similar to how a resident physician practices under an attending. In this model, a medical
director may decide that a particular skill, e.g. rapid sequence intubation, may or may not be part of that agency’s practice. Regardless of practice style, the medical director will provide a list of protocols that define how a provider approaches common medical complaints such as chest pain, breathing difficulty, or trauma. These “off-line” protocols are backed up by “on-line” medical direction which can be provided by radio or phone by the medical director or a designee.

Emergency Medical Services for Children (EMSC) is an entity housed under the Health Resources and Services Administration, an entirely different Federal body. EMSC provides funding on a state-by-state basis for stakeholders who are interested in improving pediatric emergency care. There is an extensive list of minimum standards that provide performance targets for providers in the field and the hospital setting. Targeted issues grants are available for providers or programs that have identified deficiencies within their service areas. Providers are also encouraged to advance current practices with innovative projects that improve upon the established standards of care.

EMS is typically activated by calling 911. According to the FCC there were over 240 million 911 calls in 2007, but this volume includes calls for non-medical problems such as crime and fire emergencies. 911 calls are routed to call centers where callers are connected to the proper operator and any necessary services are summoned. A critical shift has occurred with the proliferation of mobile phone use because callers may not be as readily located as a caller on a traditional landline. This problem is exacerbated by the so-called ‘cell phone samaritan’ who will witness an accident and call 911 even though they are no longer near the site of the emergency. Enhanced 911 services, known as e911, promise to provide better location of callers although this may still be limited by the technology available within the phone used for the call. Many states have enhanced 911 services designed for travelers using mobile phones providing direct access to highway patrolers.

Ground EMS providers respond to medical emergencies identified by 911 calls. The local agency, which may be a municipal or private service, determines which level of provider will respond to the call. Higher levels of provider may be activated due the nature of the complaint or if the patient needs a higher level of care. Ground transport is the rule, but exceptions may be made when a patient may benefit from rapid transport by helicopter. Regionalization protocols, first used to triage victims to trauma centers, can help determine which patients may need emergency helicopter transport. Regionalization protocols define facilities by the ability to care for specific conditions such as trauma, burns, myocardial infarction, and stroke. Further classification will identify facilities capable of pediatric, obstetric, psychiatric care. Trauma centers, as defined by the American College of Surgeons, provide the backbone of the regionalization system but facilities providing immediate interventions for stroke and myocardial infarctions may alter the landscape once their credentialing guidelines mature.

There are important legal requirements that drive treatment and transport decisions; the concept of consent is central to this rules. Primarily, EMS providers practice under implied consent which states that a patient should receive emergency care when they have an emergency condition, whether or not they are able to consent. For a pediatric patient, the child’s caregiver need not be present to provide consent for treatment and transport. Another variation on this theme is the teenage patient who requires emergency care when the parent is not available. The mature minor and emancipated minor monikers may help clarify whether a child can provide their own consent. The legal requirements to obtain these designations vary from state to state, but often include living independently, a military enlistment, and/or giving birth to a child. This patient population is very likely to decline transport, which is perilous territory for EMS providers. Provided that the patient has no medical need for transport, the EMS provider should ensure that the patient or caregiver who declines transport is making a sound decision. Extensive documentation and, when there is medical uncertainty, consultation with medical control should be standard in these situations.

Final areas for consideration are mass gatherings and disasters. Mass gathering can be defined by a minimum number of participants, but it is better to identify those events likely to strain local EMS resources. During these events, it may be difficult to access the EMS system or hard to find the victim, and transport to the receiving hospital may be delayed. Large gatherings should include a contingency for pediatric patients that includes a method to keep an injured child and parent together when possible. Similarly, disasters will strain the EMS system and are likely to overload a pediatric facility. Careful planning and disaster triage using a child-friendly tool such as Jump-START should optimize care, but pediatric facilities should expect that a large number of patients may arrive by car in advance of the patients transported by EMS.

Resources:

http://www.ems.gov/faq.htm
National EMS Assessment_Final_Draft_12202011.pdf
NASEMSO 2011
Industry Snapshot
In partnership with the state governments who designate trauma centers, the American College of Surgeons verifies Pediatric trauma centers nationally. Today, there are roughly 50 verified centers, concentrated in the population centers of the Midwest and the East and West Coasts.

Though a single institution may house general and pediatric trauma facilities, trauma centers for children and adults are verified separately. Trauma centers are designated levels III, II, and I. Level III centers have resources for emergency resuscitation, surgery, and intensive care of most trauma patients. Such centers have transfer agreements with a level II or level I center. Levels I and II have similar clinical capabilities, offering 24-hour availability of all essential trauma specialties, personnel, and equipment. The level I centers have surgery residencies and trauma research programs. Daily, these centers serve as regional hubs for the prevention, treatment, and rehabilitation of injuries in children.

Disasters vary in many ways, including the number victims injured, the disaster's cause, and the duration of the event. When disasters strike, health care resources, including those of verified trauma centers, can be overwhelmed or compromised. Further, the number of patients who need care is balanced with the available capacity to deliver care. For example, a school bus crash that results in five students suffering critical injuries while 17 children sustain minor wounds can easily overwhelm a rural emergency medical service (EMS) system with a small critical access hospital. A pediatric trauma center would face such a crash with less difficulty.

Pediatric trauma centers have at least four distinct roles regarding disasters:
1) Advocacy, education, and prevention
2) Care delivery and coordination with referring hospitals
3) Communication with victim's families, departments of public health, and the public
4) Rehabilitation of injured patients during the recovery phase of the disaster

We will examine the first three roles in greater depth.

In recent years, a real increase in school violence, natural disasters, and other mass casualty events has underscored the importance of community preparation for disasters. Trauma

Preparing for the Worst

Simulation is an excellent method to train trauma center staff in disaster response.
center personnel can advocate for and participate in school and home readiness for disasters, including family disaster plans, lockdown drills, and first responder and EMS training. Trauma centers may perform regional hazard vulnerability analyses, a process that considers the past impact of local disasters. Such an analysis can improve the trauma center’s staffing and care delivery in a disaster. A final, key role of trauma centers in disasters is to establish agreements with local hospitals and the trauma centers of adjacent regions, thus facilitating the transfer of disaster victims and optimizing resource utilization. (cont.)

All training and preparation are tested when a disaster occurs. To examine the pediatric trauma center in a disaster, let’s consider a level I center’s response to a fictitious mass casualty shooting at a grade school. During the event, emergency department personnel will communicate with EMS, determining which patients should be transported to the pediatric trauma center, and which patients have injuries that may be addressed by other hospitals. Trauma centers will generate surge capacity for the incoming shooting victims by rapidly discharging non-urgent emergency department patients, and inpatients who do not strictly require inpatient care. Further, non-emergent surgeries are cancelled during disaster response. Staff whose shifts are ending may be retained, and mass texting and other means of communication is used to summon additional health care workers.

Few events generate as much anxiety as disasters with pediatric victims. Communicating with patients’ families is a crucial role of pediatric trauma centers in mass casualty events. During the peak of disaster response, predesignated staff members, such as chaplains, social workers, or child life specialists are well suited to this role, and free physicians and other providers to focus on patient care and coordination. Hospital spokespeople who interact with the media should communicate factually, avoiding conjecture, providing information about the number of victims cared for at the facility and nature of the event, and refraining from providing information about the deceased until an official statement is prepared and families have been notified.

Modern pediatric trauma centers impact the lives and safety of children far beyond their home cities. Before, during, and after multiple casualty events, trauma centers play key roles in disaster education, planning, response, and recovery.

References:

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**EKG Feature: Long Qtc**

The long QT ECG has many causes: electrolyte abnormalities including hypo-K, hypo-Mg, and hypo- Ca; drugs including type I anti arrhythmics; CNS injury; and hereditary syndromes. Ventricular arrhythmias are thought to be caused by afterdepolarization’s or triggered automaticity.

Though traditionally classified as congenital and acquired prolonged QT syndrome, it is now thought that acquired cases occur in patients with subtle underlying ion channel dysfunction.
What’s Wrong with Variation?

Prehospital care is usually standardized within an Emergency Medical Services (EMS) system through the use of guidelines or protocols, also known as offline medical direction. Offline medical direction exists in the form of patient care guidelines or protocols, which prehospital providers follow under the delegated practice of a physician medical director. These protocols provide Emergency Medical Technicians (EMTs) and paramedics with practice guidelines to assess and manage common emergency medical conditions when delivering prehospital care. Offline protocols facilitate rapid and effective treatment, standardize management actions for prehospital providers and provide a reference for EMS practice standards. The use of patient care protocols has also been shown to be an effective way of monitoring processes in medical care and providing a mechanism to provide feedback to health care providers. However, protocols vary from one EMS agency to another, making standardization of care across EMS agencies challenging.

Minimizing variation in practice is inherent to the equitable component of quality health care. Evidence suggests that the integration of standardized prehospital interventions in the continuum of prehospital-hospital-community care improves outcomes. In addition, evidence also suggests that translating knowledge into practice improves quality by addressing issues of effectiveness, safety, and timeliness of care.

A Brief History

The concept of standardized pediatric prehospital protocols is not new. The Pediatrics Committee of the National Association of EMS Physicians (NAEMSP) created model pediatric protocols in 1998, and published a revision to them in 2004. This important work by the Pediatrics Committee of the NAEMSP, though standardized, was not necessarily evidence-based and is due for an update.

In 2001, the National EMS Research Agenda recommended that EMS professionals apply the evidence from scientific research to improve patient care. In response to this, the Institute of Medicine (IOM) released a report on EMS in the United States (US), which recommended several strategies to improve prehospital emergency care. One recommendation was for the National Highway Traffic Safety Administration (NHTSA) to convene a panel of multidisciplinary experts to develop prehospital evidence-based guidelines (EBGs) for the treatment, triage, and transport of patients, including children. The pediatric prehospital importance of translating knowledge into practice is highlighted in national surveys of EMTs and paramedics, which demonstrate that prehospital providers feel less prepared to care for children than adults, especially those in the youngest age groups. Therefore, standardizing practice with the use of pediatric prehospital EBGs not only equips providers with the guidance they need to care for children, but it does so by implementing the best available science. With evidence to support them, offline use of prehospital guidelines has significant potential to enhance knowledge translation and standardization of care for children in the prehospital setting.

Piloting the National Prehospital EBG Model Process

With funding from NHTSA, the Federal Interagency Committee on EMS (FICEMS) and the National EMS Advisory Council (NEMSAC) created a National Prehospital EBG Model Process. In 2009, NHTSA and the EMSC National Resource Center (NRC) convened a working group to pilot the use of this Model Process in developing a pediatric prehospital seizure protocol. The Model Process recommends using a method to rate the quality of evidence when developing recommendations for the EBG. One such method suggested by the Model Process is the GRADE (Grades of Recommendation, Assessment, Development, and Evaluation) approach. The GRADE approach involves evaluation of both the quality of evidence and the strength of its subsequent recommendation. It involves upgrading or downgrading evidence quality based on an appraisal of criteria such as the study design, quality, consistency, directness,
potential bias and precision of the findings.\textsuperscript{13-15} In addition, the GRADE approach considers the importance of specified values and preferences in determining the strength of the recommendations, and many organizations have endorsed it.\textsuperscript{13}

Since 2009, NHTSA and EMSC have further tested the Model Process with the creation of a helicopter EMS and pain management protocol, using GRADE.\textsuperscript{12} In addition, in 2010 the EMSC program awarded a targeted issues grant to use the Model Process to develop and implement a pediatric prehospital respiratory distress EBG in Houston, Dallas, and Austin; this is now in the phase of post-implementation evaluation.\textsuperscript{16} Use of the Model Process on a national level is still a work in progress, however, those who collaborated on one or more of these projects have identified ways to optimize how the Model Process could be used.\textsuperscript{17}

**Future Directions**

NHTSA has also funded a project for the National Association of State EMS Officials (NASEMSO) to develop a resource of model EMS clinical guidelines for prehospital care.\textsuperscript{18} The Model Guidelines project will be complete in September 2014, and its purpose is to develop a NASEMSO resource of consensus-based prehospital guidelines, with reference to evidence, when available. The scope, however, is not to create EBGs using the Model Process.

In addition, the EMS for Children program is currently reviewing proposals for Targeted Issues grants focused on prehospital care. At least one of these awards will be devoted to creating an EMS Research Node Center (E-RNC) composed of 3 sites to conduct prehospital research. Many of the other awards will focus on pediatric prehospital care in general. Both of these are great opportunities to pursue multi-center research in evaluating the creation, implementation and outcomes measurement associated with guideline development.

**REFERENCES**

I’m writing this seven days after the Boston Marathon. The longest week of my life has gone by in a blink.

As an emergency room doctor, I was volunteering at the finish line when the bombs went off. My survival instinct told me to run as fast as I could in the other direction. Instead, I ran toward the devastation.

I saw the carnage—there is no better word—and helped tend to the wounded. I and many others became first responders, first on the scene, members of a special club that I’m sure none of us had wished to join.

I heard the cacophony of sirens; the drone of noise and activity; the shouts for medical supplies, anything . . . belts, ripped sheets. What I didn’t hear was the pain. You could see the shock, the anguish, the fear. But the screams never came. It was like a horror movie with the sound turned down.

That night, at home, I hugged my wife and toddler and cried. Then the nightmares came: the sound of the bombs, the visions of missing limbs. The scenes that were playing out on the news over and over became the film reel in my mind.

New scenes came to me over the following days and haunted me more than the gruesome injuries. I remembered using finish-line medals as tourniquets. I recalled the couple lying together, horribly injured.

Waves of guilt hit me. Why couldn’t I have done more? Isn’t this what I do for a living: save people, swoop in like a superhero and snatch life from the jaws of death?

There were more questions. Why would someone do this? The runners and the people in the crowd were celebrating the joy of accomplishment, the joy of finishing the Boston Marathon. The joy of watching family and friends—my friends—crown months, maybe years, of hard work to go right on Hereford and left on Boylston. The joy of raising money for charities. The joy of earning that medal and wearing it proudly.

Why would someone want to destroy such a triumph of humanity—so many people from around the world, all with the same goal?

And of course, there was anger. How dare they—whoever they were—take such wonderful moments away from so many? How dare they change the lives of innocent people who came together simply to celebrate life? What gave them the right to play God with human lives?

The next days were a fog. I was on edge. At a restaurant, someone asked me to keep an eye on his computer for a moment. Was he the guy? The sirens of the ambulances bringing patients to me in the emergency room spooked me. Had there been another bombing?

My link to reality was the others who had been there, those who had knelt in the glass and blood without regard to themselves. We shared hugs and tears that only those in that club would understand.

And we shared the joy of life, life that sometimes ends too quickly and without warning.

Many have asked how the experience has changed me. I am still learning. I find myself cherishing every moment with my family and friends. Emails and phone calls can wait; if the grass gets a little higher than I like, that’s okay. Little slights don’t bother me as much; I don’t take things as personally as I would have just a week earlier.

As the “new normal” takes hold, the sirens fade from my mind. I am forever changed by the cowardly acts of others. But what I endured is nothing next to what those who lost limbs and the families of those who died are suffering.

I have been called a hero. I am nothing of the sort. The true heroes are those who will survive, determined to go on. Perhaps next April a runner with a prosthesis will pass the site where her leg was taken from her, triumphant as she finishes the Boston Marathon. And I will be there, cheering her on.

Bryan Canterbury ’94 earned his medical degree from Flinders University in Adelaide, Australia, and works at Whidden Hospital in Everett, Mass. Canterbury has run in half and full marathons as well as triathlons, including the Ironman. While he has never run in the Boston Marathon, he says about 20 friends of his participated this year. All escaped injury.
A 9 year old previously healthy male presented to the emergency department (ED) after being involved in a high speed motor vehicle collision (MVC). The patient had been taken to an outside hospital prior to arrival in our ED. At the referring facility CT scans of the head, chest, abdomen, pelvis, cervical, thoracic, and lumbar spine were performed. The referring facility had concern of lumbar fractures as well as free fluid in the abdomen. A trauma alert was activated due to the patient’s injuries.

Presenting vital signs are as follows: BP 118/79, HR 74, Temp 36.6 degrees, Resp 20, Wt 31.05 kg, O2 sat 99% on room air.

On primary survey, the patient’s airway was intact and trachea midline. His breath sounds were clear to auscultation and symmetric. He had strong and equal palpable pulses of all extremities. Glasgow coma score was 15 on arrival and patient was fully exposed.

Secondary survey revealed c-collar and backboard in place. Pupils were 3mm to 2mm and brisk bilaterally. Extraocular movement was intact and conjunctivae were clear. Tympanic membranes were clear bilaterally and the midface was stable with no crepitus, no loose teeth, and no oral abrasions. A large hematoma was present on the right side of the patient’s forehead and he had an abrasion on his right cheek. Heart rate was regular with no murmur. Abdomen was soft with generalized tenderness, but nondistended. Bowel sounds were present in all quadrants. No blood was noted at the patient’s meatus.

He had no step off on examination of his cervical spine and no paraspinal
muscular tenderness of cervical spine. He did not complain of tenderness to the thoracic spine. Swelling and bogginess was noted at L1-L5 and the area was tender to palpation. Rectal tone was normal on exam. The patient was neurovasculally intact in upper and lower extremities. He had full strength, normal sensation and tone, and normal deep tendon reflexes of bilateral lower extremities.

Review of CT scans showed L3 Chance fracture with associated L1 and L2 spinous process fractures and a retroperitoneal hematoma. A mild compression fracture of L4 was also present. No evidence of solid organ or vascular injury was noted on review of CT scan. A small amount of free fluid was seen in the pelvic cul-de-sac and right paracolic gutter. Orthopedics was consulted for evaluation of the lumbar spine. He was taken to the operating room by trauma surgery for exploratory laparotomy due to mechanism of injury, free fluid in pelvis, and accompanying Chance fracture.

Exploratory laparotomy revealed jejunal perforation, jejunal serosal tear with mesenteric tear, and descending colon serosal injury. Orthopedics recommended that the patient have a thoracolumbaosacral orthosis (TLSO) in place at all times when in upright position. The patient was provided with occupational and physical therapy. He was allowed to bear weight as tolerated with lower extremities.

A Chance fracture is defined as a pure bony injury progressing from spinous process to pedicles to vertebral body in a posterior to anterior injury pattern. It occurs with a high-impact flexion-distraction impact, most commonly in patients involved in MVCs while wearing lap belts only. As seen in our patient, Chance fractures have a high rate of associated intraabdominal injuries, approaching 50% in the general population. The incidence may be even greater in the pediatric population. Treatment of Chance fractures may be done with external fixation only, as they are pure bony injuries that are amenable to nonsurgical interventions.
1. Major burn injuries can result in which of the following?
   a. Cardiac depression
   b. Intravascular hypovolemia
   c. Adrenal suppression
   d. Shock
   e. All of the above

2. All of the following are characteristics of superficial partial-thickness burns EXCEPT?
   a. Blister formation
   b. They are not included in TBSA calculations
   c. Healing occurs within 1 to 2 weeks
   d. They are painful
   e. Scarring does not occur after healing

3. A 12-year-old child is a victim of a house fire. He is brought to the emergency department unconscious, with stridor. The first step in management of this patient is to:
   a. Order a head computed tomography (CT) scan to evaluate for head injury
   b. Order an immediate chest radiograph
   c. Endotracheal intubation and ventilation with 100% FiO2
   d. Administer a 20 mL/kg normal saline bolus intravenously
   e. Administer a nebulizer treatment with racemic epinephrine and 100% FiO2

4. All of the following laboratory tests are helpful in the initial evaluation of a severely burned child except:
   a. Complete blood count
   b. Blood glucose level
   c. Urinalysis
   d. BUN and creatinine level
   e. Hepatic panel (AST, ALT, alkaline phosphate, bilirubin)

5. According to the Parkland formula, what is the initial rate of lactated Ringer’s infusion for an 8-year-old, 35 kg child with a 30% TBSA partial-thickness burn presenting 3 hours after her injury?
   a. 263 mL/hour
   b. 420 mL/hr
   c. 210 mL/hour
   d. 175 mL/hour
   e. 525 mL/hour

6. Exposure to which substance requires treatment with calcium gluconate?
   a. Sulfuric acid
   b. Hydrofluoric acid
   c. Hydrochloric acid
   d. Silver nitrate
   e. Lye

7. The evaluation of a child with an electrical burn should include all of the following EXCEPT:
   a. Electrocardiogram
   b. Cardiac monitoring
   c. Cardiac enzymes (CK, CKMB, and troponin)
   d. Basic metabolic panel including BUN and creatinine
   e. Urinalysis with microscopy

8. A 16-year-old male is injured in a motor vehicle crash with severe burns to his upper body and face. He is intubated at the scene. He arrives to your ED with 2 large bore IV’s with lactated Ringer’s infusion. Your assessment reveals adequate airway control, bilateral breath sounds, and normal pulses and blood pressure. What is the next appropriate step in this patient’s care?
   a. Calculate the appropriate fluid volume using the Parkland formula
   b. Cleanse his burns with a mild soap and water
   c. Perform a thorough head-to-toe examination to evaluate him for associated injuries
   d. Infuse a 1 liter normal saline bolus

9. Which of the following patients should be evaluated by a burn center specialist?
   a. A 6-year-old girl with a 5% TBSA partial-thickness burn to her right hand
   b. A 12-year-old boy with a history of cystic fibrosis with a 5% TBSA partial-thickness burn to his chest
   c. A 4-year-old with a 15% TBSA superficial partial-thickness burn of his legs
   d. A 16-year-old with a 4% full-thickness burn to his right arm
   e. All of the above
1. **e. All of the Above**
   The systemic release of inflammatory mediators and systemic edema seen in large (>20% TBSA) burns can cause decreased cardiac output, tissue ischemia, hypovolemia, and shock. Major burns can cause left ventricular dysfunction and myocardial depression, for reasons that are poorly understood.

2. **b. They are not included in TBSA calculation**
   Superficial burns (epidermis only) are the only burn classification not to be included in TBSA calculation. Superficial partial-thickness injuries involve the epidermis and superficial layers of the dermis. They blister and are very painful but heal within 1-2 weeks without scarring.

3. **c. Endotracheal intubation and ventilation with 100% FiO2**
   Airway compromise from airway and pulmonary edema is a feared complication of inhalational injuries. Facial burns, singed nasal hairs, or carbonaceous sputum may signal inhalational injury and should prompt rapid securing of the airway. If inhalational injury is suspected, 100% oxygen administration will help to dissociate CO from Hb and improve oxygenation. This patient already shows evidence of airway compromise and should undergo immediate intubation.

4. **e. Hepatic panel (AST, ALT, alkaline phosphate, bilirubin)***
   In the absence of associated abdominal trauma, LFTs are not a necessary component of the initial lab evaluation of a burn victim. A CBC is needed to assess for anemia, as full-thickness burns may result in >10% erythrocyte loss in the first 6 hours. A type and screen is also indicated. UA and BUN/Creatinine are also necessary, as patients may develop myoglobinuria and/or renal injury from hypovolemia and shock. Children with burns are at risk of hypoglycemia due to low glycogen stores.

5. **a. 263mL/hour**
   Patients with burns >20% of TBSA will become intravascularly depleted and should receive isotonic crystalloid resuscitation. The Parkland formula provides 4mL/kg/%TBSA burned, with the first half given over the first 8 hours after the time of the burn, and the remainder over the next 16 hours. This should be added to maintenance fluid requirements in very small children. For this patient, the calculation would be \((4 \text{mL} \times 35 \text{kg} \times 30\%)/2/8\text{hrs} = 262.5\text{mL/hr}\)

6. **b. Hydrofluoric acid**
   Hydrofluoric acid has an ability to cause continuous penetration and severe injury after exposure, and is the only acid that requires a topical treatment (Calcium gluconate) after irrigation. It can also cause profound hypo-calcemia, -kalemia, and – magnesemia. Therefore, laboratory evaluation and consultation with a Toxicologist is warranted. Other chemical burns are treated with copious irrigation.

7. **c. Cardiac enzymes**
   Cardiac enzymes are not typically helpful in managing electrical injuries, but lab workup should include UA and chemistries to evaluate for rhabdomyolysis and renal injury, and an ECG and cardiac monitoring given the risk of arrhythmias from electrical current.

8. **c. Perform a thorough head-to-toe examination to evaluate him for associated injuries**
   In all burn patients, as in all trauma victims, the patients should be exposed and assessed for associated injuries after the primary survey is completed and airway, breathing, and circulation have been addressed.

9. **e. All of the above**
   The American Burn Association recommends that the following patients be transferred to a burn center:
   - Partial-thickness burns of >10% TBSA
   - Burns of the face, hands, feet, perineum, genitalia, or over major joints
   - Full-thickness burns
   - Electrical and Chemical Burns
   - Inhalational Injuries
   - Patients with potentially complicating pre-existing medical conditions
Hello everyone!

First and foremost, we would like to welcome and congratulate all of the new PEM fellows who started in July. We hope you are all having a wonderful start to fellowship!

We would also like to introduce the newly updated Applicant’s Corner. We have updated this section with a revised application timeline for 2013-2014 and even more application tips. We also hope to have a list of Fellows’ Research Projects uploaded to the site very soon so that fellows around the country can find others with similar research interests. Please feel free to email us updates if we do not have your project listed or if your research project has changed.

Finally, we are always looking for fellows to submit cases, photographs or other interesting educational materials for our newsletters. Please contact us at pemfellows.com@gmail.com if you are interested in submitting. We look forward to hearing from you!

Saranya Srinivasan
Applicant’s Corner Administrator

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**Case Reports:** May include presentation of uncommon diagnoses or of unusual presentation or complications of common diagnoses seen in the Pediatric Acute Care setting. Should consist of a brief, 1-2 paragraph description of the case, followed by a discussion of diagnosis and management of the disease process reported. Inclusion of images, either of physical exam findings or radiographic studies, are recommended. A minimum of 3 references for the discussion section is requested.

**EKG Submissions:** Classic EKG findings of disease processes found in the acute care setting are welcome. Please include an image of the EKG, description of the EKG findings, 1-2 sentences describing the case, and a brief discussion of the disease process being shown. References are requested but not required.

**Image Highlights:** May include an image of an interesting physical exam finding, or a radiologic image of significant teaching value. Please include a brief description of the case, followed by 1-2 paragraph discussion of the disease process being highlighted and the characteristic features of the image. References are requested but not required.

**Literature Review:** May be in case report format, or topical only. Reviews of current or new AAP subcommittee recommendations or of specific disease processes are desired. Please limit to one page, references required.

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Send Us Your Cases!

We are currently accepting case reports, interesting photos, radiographic images, and EKGs for our fall newsletter (PEMFellows.com@gmail.com). The focus of the fall newsletter will be work-life balance.