

EMS Physician Does Mission Work



“The patients came from homes with thatch roofs and no glass in the windows. Most still had outhouses. Walking was their most common form of transportation.”



By Charlene B. Irvin, M.D., F.A.C.E.P.

I recently stepped out of my comfort zone and went to South America on a medical mission trip. I accompanied 18 team members, and together we offered used eyeglasses, dental services, medical services, and medications. There might not be running water available, but bottled drinking water would be. The trip was not guaranteed to be safe. In a past trip, police with machine guns boarded the mission bus and pointed one at a nurse's face as they searched for illegal drugs. But, no one had ever really been injured. Our personal cost was our airfare. The sponsoring church provided financial

support for lodging (the worst conditions might include sleeping in tents) and meals, and they coordinated donations/purchases of medications and supplies.

I was surprised at the donations we received. I contacted Sonosite for a portable ultrasound machine, and they willingly offered to loan me one for the trip free. I also received a lifepak 12 (a portable monitor) on free loan from Medtronic Physio-control. This monitor did oxygen saturations, vital signs, telemetry, 12 lead EKG's, and could even externally pace. Both were a blessing to have.

Continued on page one

**Inside:
Heat Stroke**

Receive Category I CME Credit from our medical article in each EMS Journal at www.emspecialists.com



Continued from cover

The conditions turned out to be very hot, 110-112F in the sun and 102-103F in the shade. Because of the humidity (>90%) our skin was never dry. The trip was very physical. We needed to move bags of supplies (60-70 lbs each) daily. We used tables and desks pushed together as exam beds in classrooms transformed into clinics. The patients came from homes with thatch roofs and no glass in the windows. Most still had outhouses. Walking was their most common form of transportation.

I offered my 15 year old daughter, who in the past had expressed interest in becoming a missionary doctor, the chance to come with me. And she did. I did not make the decision to take her easily, but she would likely tell you it was the most important and moving thing she has ever done.

It was not easy, not comfortable, very buggy, and a little scary. I worked more physically, in hotter conditions, with fewer luxuries than ever before.

And not only did I survive, I enjoyed it. People waited hours, holding their babies in the hot morning sun, to see us. Some of the patients had tears when they thanked us, even when we only gave them worm medicine and vitamins. It was like I was offered the chance to play Santa for a day. I could give them something extremely valuable, and something so simple for me to give—my physician's opinion and some medications. In the end, it was a blessing that I was offered the opportunity to go. I was drawn to this mission by the faith that this was the right thing to do, but after going, I feel as though I received far more than I gave. I'm going next year, and I'm bringing my soon to be 14 year old son, too.

In emergency medicine, we understand the realities of death. Only we can decide how to use our time while alive. If you've ever thought about going on a medical mission trip, do it. You'll be glad you did. ♦



Express Care Unit Coming to Lapeer Regional Hospital Emergency Department

By Kenneth Parsons, M.D., M.P.H., F.A.C.C.P.

An Express care unit is coming to Lapeer Regional Hospital emergency department. As volume trends increase, the need to expand emergency services has come. Current planning is for at least seven beds that will be next to the ED proper. Physician extenders and ED personnel will staff the unit which will be open for service 12 hours per day. The emergency department currently renders care to approximately 40 % low acuity patients which makes express care an inviting venture. Current door to doctor time is 29 minutes and door to discharge time is just over 2 hours. Express care will increase bed availability, triage efficiency, and treat patients more efficiently, ultimately improving patient and staff satisfaction. . We are excited for this new service and I thank all involved for bringing this to fruition.

On another note we are adding an emergency department RN Case Manager. The role is broad with job descriptions involving taking orders from attending physicians, discharging ED patients, coordinating inpatient bed assignments, and lending a hand with patient care when needed. Case managers have been utilized at McLaren Regional Hospital with success and we are greatly anticipating their addition to our ED team. ♦

Proceeds from St. John Guild to Benefit Emergency Department

By Catherine Vretta, M.D.

The St. John Hospital and Medical Center Guild is a volunteer organization established in 1948. All money raised by the Guild is used to support the patient care programs and services at St. John Hospital and Medical Center. It operates under the leadership of the officers and board of directors. We are proud to announce that James Fox, M.D. is the Guild's new Vice President and acting treasurer.

The Guild has raised millions of dollars to help St. John Hospital and Medical Center meet the health care needs of the community. Its major fund-raising event is the annual Guild dinner, first held in 1961. This year the 44th annual Guild dinner was held June 9th at Penna's of Sterling Heights to benefit St John Hospital's emergency department. The proceeds have been designated to purchase a patient tracking system. The emergency department treats over 80,000 patients a year, therefore the benefits of a centralized database within the department are enormous. ♦

McLaren's Emergency Department Receives Governor's Award

By Raymond Rudoni M.D., F.A.C.E.P.

On May 20th, Cheryl Ellegood (Vice President of Clinical Services), Joan Maten (Director of Clinical Information Systems), and I traveled to Lansing, Michigan to receive the Governor's Award of Excellence in Emergency Care. McLaren Regional Medical Center's emergency department is the only one in Genesee County to receive this distinguished award and it will be prominently displayed in the emergency department waiting room.

Emergency departments are chosen to receive this award based on quality data which describes process improvements designed to streamline emergency department diagnoses and improve care. This award summarized process improvement initiatives relative to community acquired pneumonia and acute MI.

The Governor's Award is a reflection of the continued teamwork which occurs in our department on a daily basis. McLaren Regional Medical Center hopes to continue its involvement in quality improvement initiatives with hopes of further refining emergency care and improving patient outcomes. ♦

Research Update

By T.I. Wayne MacGregor, M.D.

St. John Hospital and Medical Center had eight presentations at the New York Regional SAEM meeting, six at the Western SAEM Regional Conference in Oakland, California, and two at the SAEM Annual research conference in Orlando, Florida. Dr. Dennis Bishop presented his project on the outcome of pneumonia patients treated in less than and greater than four hours at the St. John Hospital Resident Research day, and won best poster. He deserves congratulations on a job well done. We are currently getting geared up for the summer research projects and anticipate an exciting fall as we complete several projects. ♦

Dr. Charlene Irvin Elected Representative for Undesignated Departments

By Catherine Vretta, M.D.

Emergency Medicine Specialists, P.C. is proud to announce that Dr. Charlene Irvin was recently elected as the At-Large Representative for undesignated departments at St. John Hospital and Medical Center. This position serves to increase the visibility of the emergency department throughout the hospital as a whole. Dr. Irvin will be a valuable addition to the medical staff officers and will continue to promote the emergency department in the future. ♦

HYPERTHERMIA AND HEAT STROKE - A REVIEW

By Carter Starr, M.D.

Heat stroke is a life-threatening illness characterized by an elevated core body temperature that rises above 40 degrees C, hot, dry skin, and central nervous system dysfunction that results in delirium, convulsions, or coma. It is often fatal despite adequate lowering of the body temperature and aggressive treatment. Survivors may suffer permanent neurologic damage. 7,000 deaths from 1979 to 1997 were attributable to excessive heat according to the CDC. Global warming and the predicted worldwide increase in the frequency and intensity of heat waves may lead to an increased incidence of such deaths.

Research from the past decade shows that heat stroke results from thermoregulatory failure along with an exaggerated acute-phase response and possibly with altered expression of heat-shock proteins. Multiorgan injury results from a combination of the cytotoxic effects of the heat and the inflammatory and coagulation responses of the host.

Classic, or nonexertional, heat stroke is caused by exposure to a high environmental temperature.

Exertional heat stroke is caused by strenuous exercise. The authors propose an alternative definition of this condition based upon its pathophysiology, and call it a form of hyperthermia associated with a systemic inflammatory response leading to a syndrome of multiorgan dysfunction in which encephalopathy predominates. The definition of heat-related death varies and the illness is underdiagnosed. Incidence during heat waves in urban areas has been shown to be 17.6-26.5 cases per 100,000 population. Most people affected by classic heat stroke are very young or old, poor, socially isolated, and do not have access to air conditioning. Heat exhaustion is a lesser degree of illness and it is thought that genetic factors may determine the susceptibility to heat stroke.

Body heat is gained from the environment and is produced by metabolism and must be dissipated to maintain a body temperature of 37 degrees C. This is thermoregulation. An increase in blood temperature by less than 1 degree C activates peripheral and hypothalamic heat receptors that signal the hypothalamic thermoregulatory center which causes an increase in the delivery of blood to the body's surface where active sympathetic cutaneous vasodilation increases blood flow in the skin by up to 8L/min. Sweat will vaporize and cool the body surface if the surrounding air is not saturated with water.

The evaporation of 1.7ml of sweat consumes 1 kcal of heat energy. Sweating can dissipate 600 kcal/hr at maximal efficiency in a dry environment. The thermal gradient established by the evaporation of sweat is critical for the transfer of heat from the body to the environment. An elevated blood temperature causes tachycardia, increased cardiac output, and increased minute ventilation. Shunting of blood to the muscles and skin decreases visceral perfusion, especially to the intestines and kidneys. Loss of salt and water by sweating (up to 2+L/hr) must be balanced by generous salt supplementation to prevent dehydration and impairment of thermoregulation.

Acclimitization may occur over several weeks if a person gradually increases his level of exertion performed in a hot environment. This allows one to work safely at levels that were previously intolerable. Acclimitization involves enhancing cardiac performance, activating the renin-angiotensin-aldosterone axis, salt conservation by the sweat glands and kidneys, increasing the capacity to secrete sweat increasing the glomerular filtration rate and the ability to resist exertional rhabdomyolysis, and expanding the plasma volume.



The acute-phase response to heat stress protects against tissue injury, promotes repair, and is a coordinated reaction that involves endothelial and epithelial cells, leukocytes, and cytokines (especially interleukin-1 and -6). Inflammation begins locally and progresses systemically, similar to sepsis, and nearly all cells respond to sudden heating by producing heat-shock or stress proteins that are cardioprotective and allow a transient state of tolerance that permits the cell to survive and also decreases hypotension and bradycardia. Exaggeration of this response, changes in the expression of heat-shock proteins, and thermoregulatory failure may all contribute to the progression of heat stroke. The relative shunting of blood from the mesenteric circulation during strenuous exercise or hyperthermia causes gut ischemia and increased permeability and the release of endotoxins which can cause increased production of inflammatory cytokines and release of endothelial vasodilators such as nitric oxide that can lead to hemodynamic instability and death. Increased levels of heat-shock proteins are an adaptive response that protect cells from damage by heat, ischemia, hypoxia, endotoxin, and inflammatory cytokines.

CME Questions

Studies in cell lines and animal models suggest that heat directly induces tissue injury. The severity of the injury depends on the critical thermal maximum, a term that attempts to quantify the level and duration of heating that will initiate tissue injury. In humans this appears to be 41.6-42 degrees C for 45 minutes to 8 hours. Plasma levels of inflammatory cytokines are elevated in people with heat stroke and are not suppressed by cooling. Levels correlate with severity of heat stroke. Endothelial-cell injury and diffuse microvascular thrombosis are prominent features of heat stroke. Disseminated intravascular coagulation and alterations in the vascular endothelium may be important pathologic mechanisms. The onset of heat stroke coincides with the activation of coagulation. Fibrinolysis is also highly activated. Hyperthermia appears to promote a prothrombotic state.

Both hyperthermia and CNS dysfunction must be present for a diagnosis of heat stroke. Core temperature can range from 40-47 degrees C. Brain dysfunction is usually severe but may be subtle, manifesting only as inappropriate behavior or impaired judgment. Typically patients have delirium or coma. Seizures may occur, especially during cooling. All patients are tachycardic and hyperventilate with PaCO₂ often less than 20mmHg. 25% are hypotensive. Nonexertional heat stroke usually causes only respiratory alkalosis, while exertional also has lactic acidosis. Electrolyte abnormalities and hemoconcentration are common. Multiorgan dysfunction is the most serious complication and can include encephalopathy, rhabdomyolysis, acute renal failure, acute respiratory distress syndrome, myocardial injury, hepatocellular injury, intestinal ischemia or infarction, pancreatic injury, and hemorrhagic complications, especially DIC with pronounced thrombocytopenia. Treatment objectives are immediate cooling and support of organ system dysfunction.

To achieve faster cooling the objective is to accelerate the transfer of heat from the skin to the environment without compromising blood flow to the skin. To cool the patient apply cold water or ice to the skin and use fans. To overcome shivering the patient may be massaged, sprayed with tepid water, or have hot air blown on him. The two approaches may be done simultaneously or in alternating fashion. No pharmacologic agents are currently thought to be helpful in treating heat stroke. Residual brain damage occurs in approximately 20% of patients and is associated with a high mortality. With global warming heat stroke is likely to become more of a problem in the future. While efforts should be made to avoid heat stroke, we need to be ready to deal with its many potential complications. ♦

1. People affected by classic heat stroke include all of the following except:

- A) extremes of age
- B) poor
- C) in good physical condition
- D) socially isolated
- E) those who do not have access to air conditioning

2. Acclimitization involves which of the following?

- A) enhancing cardiac performance
- B) decreasing the renin-angiotensin-aldosterone axis
- C) salt wasting by the sweat glands and kidneys
- D) decreasing the glomerular filtration rate
- E) shrinking the plasma volume

3. Plasma levels of inflammatory cytokines:

- A) are suppressed by cooling
- B) correlate with severity of heat stroke
- C) are not associated with thrombosis
- D) all of the above
- E) none of the above

4. Multiorgan dysfunction is the most serious complication of heat stroke and can include:

- A) encephalopathy
- B) rhabdomyolysis
- C) acute respiratory distress syndrome
- D) hemorrhagic complications
- E) all of the above

5. Brain dysfunction in heat stroke may be manifested by all except:

- A) subtle personality changes
- B) delirium
- C) seizures immediately following exertion
- D) blown pupils

References:

Heat Stroke by A. Bouchama, M.D. and J.P. Knochel, M.D.
See <http://content.nejm.org/cgi/content/full/346/25/1978> for full article and references (Summarized by C.L. Starr, M.D.)

St. John Hospital and Medical Center, an organization accredited by the MSMS Committee on Continuing Medical Education Accreditation, certifies that this activity meets the criteria for a maximum of one credit hour in Category I towards the requirements for Michigan licensure and of the Physician's Recognition award of the AMA provided it is completed as designated.

Questions & Comments

Emergency Medicine Specialists, P.C. is comprised of health care professionals who are committed to providing the highest level of medical care. EMS has specialized in emergency medicine, urgent care and after hours care for over thirty years. As a self-reliant professional corporation, EMS has become one of the industry leaders in southeast Michigan.

If you have any questions or comments regarding this publication or suggestions, please contact us at:

Editor: Cathy Vretta, M.D., M.P.H.

C/O Ms. Nancy Atkinson

18161 W. 13 Mile Road, Suite A-2

Southfield, Michigan 48076

www.emspecialists.com

Telephone: 248.642.9893

Fax: 248.642.5075

July Calendar

- 1)** Lapeer ER Section *7:30 AM Conference Room A&B*
- 6)** McLaren Regional Medical Center, Department Meeting *8:00 PM, Board Room*
- 15)** EM/Surgery Trauma Conference,
St. John Hospital *7:00 Lower Level Conference Room*
- 18-21)** MCEP, 30th Michigan EM Assembly, Grand Hotel, Mackinac Island, Michigan
- 28)** St. John Hospital EM Staff Meeting *8:00 Classroom C*
- 28)** St. John Hospital EM Faculty Meeting *10:00 Classroom C*

August Calendar

- 19)** EM/Surgery Trauma Conference,
St. John Hospital *7:00 Lower Level Conference Room*
- 24)** MCEP, Resident's Assembly, Sheraton Hotel, Lansing, Michigan
- 25)** St. John Hospital EM Staff Meeting *8:00 Classroom C*
- 25)** St. John Hospital EM Faculty Meeting *10:00 Classroom C*

September Calendar

- 1)** MCEP, Board of Directors, Chapter Office, Lansing, Michigan
- 7)** McLaren Regional Medical Center, Department Meeting *8:00*
- 9)** McLaren Regional Medical Center, Staff Meeting *6:00 PM, Ballenger Auditorium*
- 16)** EM/Surgery Trauma Conference,
St. John Hospital *7:00 Lower Level Conference Room*
- 22)** St. John Hospital EM Staff Meeting *8:00 Classroom C*
- 22)** St. John Hospital EM Faculty Meeting *10:00 Classroom C*
- 27)** Lapeer Quarterly Medical Staff Meeting *7:00 PM ACR 415*
- 24)** Lapeer Department of Family Medicine Meeting *6:00 PM ACR 415 A&B*
- 28)** St. John Hospital Quarterly Staff Meeting *6:30 Hospital Auditorium*



18161 W. 13 Mile Road, Suite A-2
Southfield, Michigan 48076

Presorted
First-Class Mail
U.S. Postage
PAID
Plymouth, MI
Permit #174