

EM Resident



Official Publication of the Emergency Medicine Residents' Association

October/November 2018

VOL 45 / ISSUE 5

Implicit Bias in Overcrowding

**Contrast-Induced
Nephropathy**

SMART Trial Overview

The Pediatric ECG

ENVISION PHYSICIAN SERVICES OFFERS ...

PROGRAMS THAT ALIGN PHYSICIANS TO BECOME LEADERS



MANSOOR KHAN, MD, MHA, FAAEM
EMERGENCY MEDICINE

Why EM Residents choose Envision Physician Services

- Professional Development and Career Advancement
- Employment Flexibility: Full-Time, Part-Time, moonlighting and travel team. Employed and Independent Contractor options
- Practice Variety: Coast-to-coast opportunities at well-recognized hospitals and health systems
- Unparalleled practice support
- Earn While You Learn Program: Provides senior residents with \$2,500/month while you complete your residency

For more information, contact:
877.226.6059
Success@evhc.net

■ ■ **Envision**
■ ■ PHYSICIAN SERVICES



Quality of Life-Saving Care in the ED

Tommy Eales, DO
@tommyeales

EM has come a long way from its humble beginnings as a specialty practiced in hospital basements with scarce resources and minimum hospital support. As emergency physicians fought for our place in the house of medicine, the expectations for the care we deliver in the ED grew exponentially.

In the modern era, emergency physicians maintain an ever-increasing scope of practice that often extends far beyond the initial resuscitation and diagnosis of life-threatening pathology.

With current trends toward increased boarding times in EDs across the country, emergency care has become a complex and multi-stage event that extends hours past the initial evaluation.

At its most basic definition, palliative care is the term given to describe the medical care provided for patients with serious illnesses. In a typical shift, this definition might apply to any number of patients receiving care in our crowded EDs. While the word *palliative* immediately calls to mind the idea of a patient in extremis, this represents just one of the many instances in which palliative care interventions have been shown to improve the quality of life for patients.¹

The Model of the Clinical Practice of Emergency Medicine (EM Model) is produced by the American Board of Emergency Medicine (ABEM) and serves as a content blueprint for ABEM examinations. The EM Model clearly identifies end-of-life and palliative care

(20.4.4.1) as a core competency of the practice of emergency medicine. Advance directives, coordination with hospice services, and organ donation are all specific topics that emergency physicians are expected to understand and apply while caring for patients.

But how can these individuals be identified quickly and efficiently in the fast-paced world of EM?

The ACEP Palliative Medicine section has created a toolkit² that can be used to rapidly screen patients for potential benefit from palliative care resources. Designed to function as a quick check list, the criteria include diagnosis of a non-survivable illness and any one of 5 additional elements. These can be summarized to provider-estimated life expectancy of less than 12 months (or anticipated death prior to adulthood, for children), multiple ED visits for the same condition in the past several months, uncontrolled symptoms (eg pain, dyspnea), functional decline, and complex care requiring increasing support. While this tool is intended for use in patients who already carry the diagnosis of a non-survivable illness, it also serves as a helpful reminder to identify high-risk features of other critically ill patients who may benefit from palliative care services.

During EM training, there is ample opportunity to develop skill in palliative care. While routine EM practice provides significant experience, there are multiple ways to hone palliative care skills outside of the ED. During ICU blocks, interaction and collaboration with palliative care specialists is a common occurrence and can provide

an excellent complement to the wealth of knowledge acquired during these rotations. In addition, many residency programs offer the ability to work directly with hospice and palliative medicine services during elective months. Fellowship in hospice and palliative medicine is increasing in popularity among EM graduates, and many residency programs have recruited emergency physicians with this background for the exact purpose of emphasizing this importance skill set on shift.

For EM residents interested in pursuing fellowship training in palliative care and hospice medicine, ABEM offers subspecialty certification to graduates of ACGME-accredited Hospice and Palliative Medicine fellowships. While there are currently 10 specialties including EM that offer subspecialty training in this discipline, the American Board of Internal Medicine (ABIM) creates the subspecialty certification exam that is currently held every 2 years.³

At the interface of the initial resuscitation and ultimate disposition of critically ill patients in the ED lies a dynamic period during which emergency physicians are the sole providers communicating life-changing diagnoses and prognoses to patients and their loved ones. It is during this time that this essential skill set of our craft can provide the key resources, support, and comfort needed during devastating disease processes. Just as we strive to perfect the art and science of resuscitation, so too should we strive to provide high-quality palliative care. ★

EDITORIAL STAFF

EDITOR-IN-CHIEF

Tommy Eales, DO
Indiana University

DEPUTY EDITOR

Brian Fromm, MD
Thomas Jefferson University

EDITORIAL TEAM

Whitney Johnson, MD
UCSF-Fresno

Jeremy Lacocque, DO
Midwestern University/CCOM

Leah McDonald, MD
NYU/Bellevue Medical Center

Clark Owyang, MD
Stanford Critical Care Medicine Fellow

Jayram Pai, MD
Mount Sinai

Yagnaram Ravichandran, MBBS, MD, FAAP
Children's Hospital of Michigan

Danny VanValkinburgh, MD
University of Tennessee
College of Medicine

ECG Editor

Jeremy Berberian, MD
Christiana Care Health System

MSC Editor

Morgan Bobb
University of Iowa Carver
College of Medicine

EM Resident (ISSN 2377-438X) is the bi-monthly magazine of the Emergency Medicine Residents' Association (EMRA). The opinions herein are those of the authors and not of EMRA or any institutions, organizations, or federal agencies. EMRA encourages readers to inform themselves fully about all issues presented. *EM Resident* reserves the right to edit all material and does not guarantee publication.

© Copyright 2018
Emergency Medicine Residents' Association

Categories

7 Implicit Bias and ED Overcrowding

It's clear that overcrowding impacts the quality of care in an ED. But does it also affect the equality of care?

COVER STORY



5 PRESIDENT'S MESSAGE

What Can We Accomplish in Our Next 45 Years?



16 TOXICOLOGY



Tackling Valproate Overdose

18 CARDIOLOGY/PEDIATRICS

The Pediatric ECG and Long QT Syndrome



10 CRITICAL CARE

Doubling Down on Re-Expansion Pulmonary Edema



Treatment Approach and Ventilator Management

20 TOXICOLOGY

Bleach Ingestion

To Scope or Not to Scope?



12 RISK MANAGEMENT

Falls in the Emergency Department



An Investigation

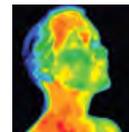
22 NEPHROLOGY

Catching Up with Contrast-Induced Nephropathy

14 CRITICAL CARE ALERT

Balanced Crystalloids versus Saline in Critically Ill Adults (the SMART trial)

23 SPORTS MEDICINE



Emergency Management of Heat-Related Illness

15 PEDIATRICS

When You Hear Hooves, Consider a Zebra

26 SPORTS MEDICINE

Berlin Concussion



Summary and Active Rehabilitation for Concussion Management

28 INTERNATIONAL MEDICINE

Small Bowel Obstruction Secondary to Ascariasis Infection

An Alarming Finding in the Remote Territory of Eastern Honduras



30 MEDICAL STUDENTS

Unraveling the Mystery of Dizziness in the ED



A Guide for the Student Clerkship

32 TRAUMA

The Use of Low Titer Group O Whole Blood in Emergency Medicine

34 PREHOSPITAL & DISASTER

Emerging Prehospital Protocols



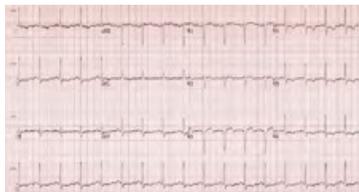
The More You Know

36 MEDICAL EDUCATION

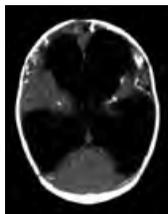
Understanding EMS Provider Education and How to Participate as a Resident

More Than a Powerpoint

39 ECG CHALLENGE



VISUAL DIAGNOSIS



What's the Diagnosis?

42 FINANCIAL

EM's Own Emergency: Financial Education



45 PRACTICE ENVIRONMENT



Locums Life

So Many Choices

46 EMRA-FIED PROGRAMS



These Programs Rock!

47 NEWS & NOTES

Do You Love Your Program Leaders?; National Leadership Opportunities; Annals of Emergency Medicine and more

49 BOARD REVIEW

Questions from PEER

UPCOMING EVENTS

Oct. 13–16: ABEM Fall Oral Certification Exam

Nov. 30: NRMP standard registration deadline

Nov. 30: CORD Abstract submissions due

Dec. 15: Regional Meeting funding applications due

Jan. 1: Medical Student Council applications due

Jan. 10: Committee chair-elect applications due

Jan. 15: EMRA Spring Awards nominations due

Jan. 30: NRMP rank order list entry opens @ noon ET

Feb. 20: NRMP rank order lists due

March 11-14: SOAP

March 15: NRMP Match Day

March 31–April 3: CORD Academic Assembly/EMRA Spring Meeting @ Hyatt Regency Seattle



First Thursday of every month

EMPOWER: STORIES FROM EM LEADERS



PRODUCED BY EMRA-CAST

EMRA-Cast:

Listen at your convenience

ADVERTISE WITH US

PRINT AND ONLINE MARKETING OPPORTUNITIES AVAILABLE

Contact **Cynthia Kucera** | 201-767-4170
advertising@emra.org

Download **EM Resident Media Kit**
emra.org/advertise

Be sure to check **EMResident.org** for exclusive online content!

Want to improve your CV?

Write for **EM Resident!**

Submit online at **emresident.org**.



EmBassador Travel Team

Seeking the Best and Brightest EM Physicians

Enjoy the flexibility to live where you want and practice where you are needed.

EMBASSADOR TRAVEL TEAM PHYSICIANS RECEIVE:



Practice variety



Paid travel and accommodations



Concierge support



Travel convenience package



Regional engagements, equitable scheduling and no mandatory long-term employment commitment



Paid medical staff dues, licenses, certifications and applications



Exceptional compensation package



Fast track to future leadership opportunities

For More Information:

Mansoor Khan, MD
National Director, EmBassador Program
917.656.6958 | mansoor.khan@emcare.com





What Can We Accomplish in Our Next 45 Years?

Omar Z. Maniya, MD, MBA

The Mount Sinai Hospital

@omarmaniya

“Anyone, anything, anytime.”

That offer — and pledge — of help is so embedded in our culture that nobody in residency today can remember a time before it. We don't recall when the emergency room was nothing more than ill-maintained storage space (typically in the hospital basement). We weren't around when emergency care was provided by unsupervised interns and off-hours dermatologists, if it was available at all. Or when they could turn patients away who did not have the ability to pay.

But as ACEP celebrates its 50th year and EMRA prepares for its 45th anniversary, we're proud to honor those roots. We are a product of the ingenuity and sheer determination of the physicians of that era who imagined a better way — and then made it happen. (*Watch our Emmy-winning documentary, “24/7/365” for an eye-opening look at how our specialty began.*)

They fought in the boardrooms and emergency rooms and lecture halls, steadily building up our credibility through research and policy and experience and results. After years of unwavering advocacy by the fledgling American College of Emergency

Physicians, emergency medicine became the 23rd medical specialty recognized in the United States.¹

In the years since that landmark event in 1979, EM has grown to include:

- 10 recognized subspecialties (plus fellowships in dozens more niches)²
- 240 EM residency programs³
- 53,000 board-certified emergency physicians⁴
- 137 million ED visits per year⁵ (and growing)
- EMTALA, the law that ensures we perform a medical screening exam on anyone who arrives in the ED

Emergency medicine has become the lifesaving safety net its pioneers wanted it to be. We keep the doors open 24/7, 365 days a year, for anyone, anything, anytime. But it's not easy standing in the gap between patient needs and public policy. Just read the Medicare Payment Advisory Commission (MedPAC) report⁷ and you'll get an idea of the weight of bureaucracy under which medicine now labors.

For a variety of reasons, hospital closures are on the rise.⁸ The emergency physician workforce is evolving.⁹ Physician burnout is being investigated as a contributing factor in medical errors.¹⁰ Our widespread use of ultrasound, procedural sedation, and trauma resuscitation are coming under fire from other specialties. Far too often, our specialty does not get the respect from patients, policy makers, and colleagues

that it deserves. And through it all, more and more patients arrive at the ED.

In response, we're finding more and more ways to meet their needs, through EMS advancements, ED-based ICUs, virtual health, freestanding EDs, urgent care, and ever-more-sophisticated training and education.

These challenges and others — government reimbursement, private insurance antics, internal strife — are not the same as the ones our specialty overcame merely to gain recognition. Yet at their core they still center on our pivotal point of unity: a desire to be the place people turn when they need help the most. Anyone, anything, anytime.

But we will only get there if we're united and we all play our part.

Learning emergency medicine isn't enough. We all need to find our leaders and blaze trails for those who will follow, whether it be in academia, community medicine, policy, business, or a subspecialty or niche of emergency medicine. That's why, in honor of ACEP's 50th and EMRA's 45th, I humbly ask you to continue your service to your patients by serving your profession and consider applying for an EMRA Committee, writing a book with EMRA, giving a talk at an EMRA event, or just showing up — so that 50 years from now we can look back and smile a little bit wider at how far we've come in reshaping emergency care for Americans. ★



Because your next step could be the biggest.

At Vituity, we're here to guide you, no matter where you're headed. Our ownership-based culture supports career development, mentorship, and leadership. Our real-world perspective offers clarity for the road ahead.



Take the next step and download our Women's Guide for Career Momentum at go.vituity.com/BigSteps

Vituity.
Acute Care Practice & Management.



Implicit Bias and ED Overcrowding IS THERE A CONNECTION?

Carly Loner, MD

University of Rochester

Jason Rotoli, MD

*Assistant Professor, Department
of Emergency Medicine
University of Rochester*

Overcrowding in the emergency department can be a significant barrier to delivering efficient and high-quality care, but the impact on delivering equitable health care is less commonly discussed. Literature demonstrates a connection between overcrowding and increased length of stay, mortality, and higher cost per admission.¹ Overcrowding negatively impacts clinical decision-making by increasing miscommunication, delaying recognition and treatment, and increasing physician cognitive load.^{2,3} A large contributor to overcrowding is inefficient hospital throughput, especially in hospitals operating at greater than 100% capacity resulting in patients boarding in the ED. An overwhelmed primary health care system also contributes to an increasing number of patients relying on the ED as their sole access to the health care system. EDs are challenged to meet the needs of increasingly complex and diverse patients while managing higher patient volumes within the confines of limited hospital throughput and bed availability.

Like many other specialties, emergency medicine has discrepancies in care outcomes in marginalized populations in comparison to the general population.⁴⁻⁶ However, emergency medicine is unique from other specialties in the high number of decisions made each shift based on limited patient information, while also subject to frequent work-flow interruptions and time constraints. Clinical decisions are made without a long-term doctor-patient relationship and are based on initial impression that can be influenced by extraneous factors. Physician fatigue and



cognitive stress, which are exacerbated by the overcrowded conditions of the ED, may amplify internal bias held by providers and have an increased role in clinical decision-making.^{3,7,8} These biases include subconscious attitudes and perpetuating generalizations/stereotypes of marginalized patients (ethnic/racial/linguistic minorities, those with poor social support, those with substance abuse or psychiatric disorders, ED “frequent flyers,” etc.). This is important to consider because EDs serve as safety

nets for vulnerable populations, providing access to care independent of income, insurance, gender, race, or ethnicity.⁵ The effects of overcrowding can influence biases from the time of ED triage, during ED provider evaluation, and throughout hospitalization.

Patient bias may begin in the prehospital setting or in ED triage and can be perpetuated by the patient’s location in the ED. It is standard of care that patients are triaged based on acuity and resource utilization. Thus,



Implicit biases during ED evaluation can negatively impact not only the ED evaluation but the entire hospitalization.

under normal circumstances without ED boarding, one could easily presume that a patient placed in the hallway is lower acuity, leading to a lower provider suspicion of acute pathology in comparison to a patient placed in a regular treatment room. For example, one could easily imagine the discrepant assessment and work up for a hallway patient triaged as “somnolent and intoxicated” in comparison to that of a patient who enters a critical care area for the same chief complaint.

However, with increasing ED volumes and overcrowding, this may be a dangerous mindset, as many of our hallways are now considered to be normal treatment areas and are filled with patients with varying levels of acuity. The triage provider is also making patient care decisions with even less information and time than the patient’s main ED provider, and these decisions can be influenced by prehospital personnel, patient behavior, appearance, and ability to express severity of illness. Multiple factors make patients susceptible to inaccurate triage and more

likely to end up placed in an ostensibly lower acuity area of the ED. Patients who face language barriers may be unable to communicate illness severity or have their primary complaints misunderstood, leading to inappropriate initial assessment. Patients with history of high ED utilization may have their medical concerns minimized, making them susceptible to limited clinical assessment and the potential to miss acute pathology. Thus, patient location in the ED in addition to inherent patient factors of vulnerability may lead to suboptimal care.

ED overcrowding can contribute to implicit bias during ED provider evaluation, especially if the patient has characteristics that are prone to stereotyping. One such factor is the stigma associated with mental illness. Patients with mental health disorders experience societal stigma, suboptimal social interaction and limited vocational opportunities.⁹ Many of them limit health care interactions due to their own self-stigma and fear of experiencing further negative interaction.¹⁰ Due to these

stigmas, mental health illness is often linked to homelessness and substance abuse. These patients have many risk factors for acute pathology and may be subjected to inaccurate assessment due to increased provider bias during the ED evaluation. Implicit biases may include attributing distress to mental illness instead of an acute medical process. Patients with mental health problems often require increased face to face provider time due to complicated social situations and, unfortunately, may receive a cursory evaluation due to the inability or aversion to dedicating large amounts of time in a busy emergency department.⁹ All these factors can set these patients up for suboptimal health care, especially within the time-pressured environment of the ED.

One of the most studied factors contributing to provider bias within health care is patient ethnicity. Previous research has shown that provider bias due to ethnicity has altered health care decisions in management of thrombolysis, chest pain, and treatment of acute pain.^{6,11,12} This implicit bias has been shown to be promoted by the heavy cognitive stressors and time pressures of the ED environment.^{13,14}

ED overcrowding may also increase provider reliance on heuristics and promote implicit stereotypes.¹⁵ In a study investigating ED provider ethnicity bias pre- and post-shift, it was found that ED overcrowding and higher patient volumes caused a greater pro-white implicit bias.⁵ In contrast, when cognitive burdens are reduced providers are more likely to individualize patients and employ strategies that reduce unconscious bias.^{16,17} As a result, reduced ED overcrowding can promote more equitable health care decisions for patients.

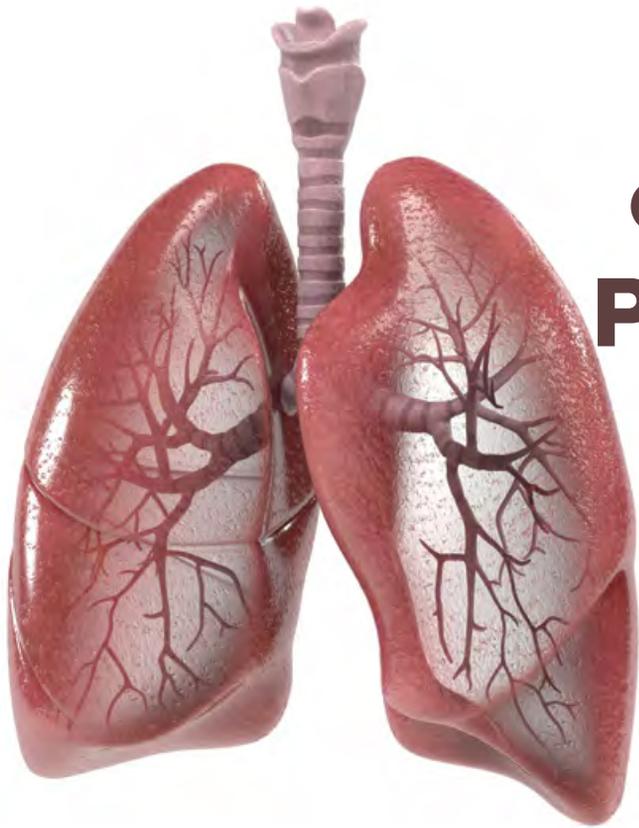
Implicit biases during ED evaluation can negatively impact not only the ED evaluation but the entire hospitalization. Under conditions of heavy workload and time constraint, unconscious bias may play an even greater role in the rapid decision-making and disposition planning by ED providers.¹⁷ It has also been reported that patient generalizations affect not only immediate treatment decisions, but also decisions of further specialist involvement and procedural intervention.^{11,18,19} If these first patient-provider interactions are compromised by implicit biases, they will contribute

to suboptimal downstream health care decisions. Unfortunately, ED overcrowding can promote these biases and may contribute to increased health care disparities in vulnerable patient populations.

The ED is the safety net for many vulnerable populations. Recognition of possible implicit biases and cognitive stressors that may promote these biases will assist providers in more accurately assessing at-risk patients and reduce health care disparities. Strategies to address ED overcrowding, hospital throughput, and provider fatigue can also reduce the extraneous stressors that can increase reliance on heuristics and patient stereotyping. Greater education in mental health disorders may also promote an improved interaction between providers and these patients — leading to improved access to emergency care. By becoming aware of what specific stressors can augment these biases and which patient characteristics increase vulnerability, ED providers can implement decision-making that is less influenced by unconscious bias and help improve the care of the marginalized patient. ★

emCareers.org
WHERE DO YOU WANT TO BE?

**ACEP and EMRAs official
online career center.**



Doubling Down on Re-Expansion Pulmonary Edema

Treatment Approach and Ventilator Management

Emergency physicians performing chest tube placement must understand the pathophysiology of REPE and its treatment.

Mark M. Ramzy, DO, EMT-P
Drexel University
@MarkRamzyDO

Case

A 39-year-old male presented to the emergency department with the chief complaint of difficulty breathing after being punched in the chest 3 days prior. On arrival, a chest x-ray (CXR) was obtained (**Figure 1**), revealing a left pneumothorax and associated lateral 6th rib fracture.

A small-bore chest tube (pig-tail catheter) was placed. After placement, the patient continued to complain of shortness of breath, developing new hypoxemia. Despite the confirmation of the pig-tail catheter on CXR (**Figure 2**), a large-bore chest tube was placed instead without any clinical improvement.

The patient demonstrated persistent hypoxia and worsening tachypnea subsequently requiring intubation for hypoxic respiratory failure. Repeat CXR to confirm endotracheal tube placement showed worsening fluid accumulation in the affected lung (**Figure 3**).

So, what happened? More important: How do we fix it? The treatment of choice for a pneumothorax is a chest tube; and,

when the small pig-tail catheter doesn't do the job, the answer is to replace it with a larger bore — right?

Diagnosis

The exact mechanism of REPE is not clear. The current theory is that lung expansion leads to increased vascular



FIGURE 1. Initial CXR at 18:32 showing a large pneumothorax in the left upper lobe along with a fracture of the lateral aspect of the sixth rib (white circular markings).

permeability. Rapid inflow of blood to atelectatic lung segments results in an increase in both pulmonary capillary and hydrostatic pressures.^{1,2} The increased flow and permeability in the setting of alveolar injury, contribute to the transudation of inflammatory mediators into the lung.³ Inflammatory molecules such as nitric oxide and free radicals alter capillary permeability leading to pulmonary edema and the clinical symptoms of hypoxia and tachypnea as seen in the aforementioned patient.⁴⁻⁶

The amount of time the lung remains collapsed is a major contributing factor of REPE. The timeline varies, with several cases reporting REPE's onset from hours after lung collapse to between 3 and 7 days.^{2-4, 6-8} REPE is often diagnosed on CXR; however, clinical symptoms of tachypnea and dyspnea generally develop within less than an hour of chest tube thoracostomy.⁹ In the aforementioned case, chest trauma in the preceding 3 days as well as the persistence of symptoms after appropriate chest tube placement offer strong supporting evidence for REPE.

How is REPE treated? The mainstay therapy for mild cases is well-described in the literature and consists of supplemental oxygen and cautious

diuresis. The mechanism of REPE is different from that of cardiogenic edema.^{3, 7, 10} Unlike cardiogenic edema, the rapid onset of fluid in REPE results from increased hydrostatic pressure because of alveolar and capillary inflammation.³ Therefore, treatment goals should focus on returning the vascular permeability, altered by this inflammation, to its original balanced state. Anti-inflammatory medications have proven to be beneficial once the diagnosis is suspected, Trachiotis et al. optimized on the cytoprotective actions of misoprostol and ibuprofen with resolution of REPE within 24-72 hours.¹⁰

For severe cases, where intubation and mechanical ventilation is necessary, there are several options described:

1. Position the patient in the lateral decubitus position with the affected side up to reduce intrapulmonary shunting secondary to edema.^{1,3,10}
2. Apply more positive end-expiratory pressure (PEEP) and decrease tidal volumes to prevent further alveolar injury and transudation.
3. Use of asynchronous differential lung ventilation. Described by Cho et al in a case report, this treatment method involves the use of a double lumen endobronchial tube and two

ventilators each connected to a lung. The second ventilator utilizes a PEEP of 5 cm H₂O for the REPE lung in order to assist its poor compliance and resolve the lung's overall state of hyperperfusion. Improvement in the patient's vital signs and arterial blood gas analysis were appreciated within 3 hours of asynchronous ventilation. This patient continued to improve over the next 6 days ultimately leading to extubation and eventually hospital discharge.

While the recognition and treatment of a pneumothorax in the ED is vital and can be gratifying, it is equally important to beware of the complications of our interventions. It is vital that emergency physicians performing chest tube placement understand the pathophysiology of REPE and its treatment. Awareness of its occurrence in high-risk patients may allow for more immediate recognition of its presence and earlier intervention, potentially preventing deterioration and respiratory failure. Proper knowledge of ventilator management and the potential use of novel techniques such as asynchronous differential lung ventilation may improve treatment for this high-severity condition. ★

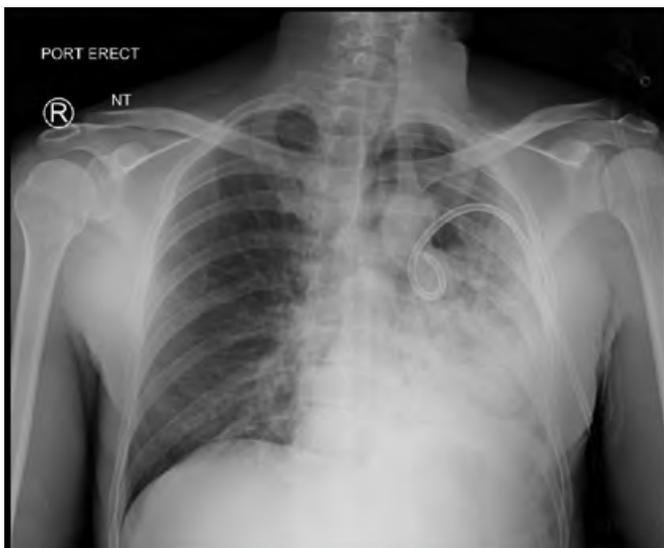


FIGURE 2. Second CXR at 20:01 confirming placement of a small caliber thoracostomy tube and new consolidation in the left lower lung.



FIGURE 3. Third CXR at 22:05 displaying an appropriately placed endotracheal tube, a large bore thoracostomy tube replacing the small caliber thoracostomy tube, and worsened opacification of the left thorax.

AN INVESTIGATION

Falls in the Emergency Department



Ashley Guthrie, DO

EMRA Board, 2016-2017

St. Joseph's Regional Medical Center

Steven Hochman, MD, FACEP

Medical Director of Research

Department of Emergency Medicine

St. Joseph's Regional Medical Center

Crowded, busy emergency departments seem susceptible to an increased risk of slip-and-fall accidents that keep administrators awak at night. But does the evidence bear out this assumption?

The literature reveals plenty of research on inpatient falls, outpatient falls, falls in geriatrics, and methods of preventing falls in geriatrics. However, there is little data on falls that actually occur in the *emergency department*. The vast majority of existing literature regarding falls in the ED has been developed and published in nursing journals, but corresponding articles have not filtered into the physician space.

As of 2013, between 700,000 to 1 million patients fall in U.S. hospitals each year.¹ Because most of the literature aggregates all falls occurring in the hospital as a whole, it is hard

to determine how many of these falls actually occur in the ED. A few studies have quoted fall rates anywhere from 0.15² to 0.288³ per 1000 patients, up to as high as 0.73⁴ per 1000, prior to interventions.

Clearly, falling is bad for patients. It places them at risk for a multitude of injuries, from abrasions or contusions to fractures, head injuries, and even severe disability and death. According to the Joint Commission, 30-50% of falls result in injuries, leading to an average of 6.3 days in increased length of stay and about \$14,000 in additional medical costs per admission.⁵

Analyzing falls in the ED can be a 2-step process. First, how do we identify who is at risk? Second, what do we do once we have identified them?

Identifying patients at risk for falls is harder than it sounds. Some patients are at risk in the short term, such as a patient who is intoxicated or influenced by mind-altering substances. Some patients, such as a demented elderly patient with gait disturbances, will always be considered a fall risk.

There are many fall risk assessment tools available; however, most were developed specifically for inpatient settings. Of all the studies, there are only two fall risk assessment tools that have been designed for the emergency department: the Memorial ED Fall Risk Assessment Tool (MEDFRAT)⁴ and the KINDER1 Fall Risk Assessment tool.⁶

The MEDFRAT tool was developed after a two-ED hospital system with a combined annual volume of 140,000 visits evaluated an inpatient tool called the Conley Fall Risk Assessment tool⁴. The researchers discovered that the inpatient tool identified a dismal 44% of patients who fell. This was consistent with the other inpatient assessment tool that has been evaluated for ED use, the Hendrich II Fall Risk Model evaluated by Terrell et al³ which identified 37% of patients at risk for falls in the ED.

MEDFRAT

The MEDFRAT tool was utilized to assess: confusion/disorientation, intoxication or sedation, impaired gait, use of assistive mobility devices, altered elimination, and history of fall in the



past 3 months. The investigators used MEDFRAT for a one-year period with a total sample population of 91,190 patients, 18 years and older, for 110 falls (0.73 per 1000 patient visits). MEDFRAT still only properly identified 43% of patients at risk for falls. The demographics of the patients who fell were similar to previous study statistics with an average of 46 years of age, 62% male and 40% intoxicated. Statistics show 77% of patients who fell had no injuries, while 15% required wound repair, splinting, or radiographs. No patient required casting, traction, surgery, or consults. There were no deaths as a result of the falls.

KINDER1

The second fall risk assessment tool developed for ED use and the better study was the KINDER1 study⁶. KINDER1 was developed at a Level 1 Trauma center with 96,000 patient visits per year. Risk factors assessed were age greater than 70 years, presentation to the ED for fall, altered mental status for any reason including substance use, impaired mobility, and nursing judgement that

patient is at risk for fall. If any one factor was present, the patient was considered a high risk for falls. Investigators retrospectively applied the tool to charts for an almost three-year period, during which time they had 150 reported falls. Of the 150 falls, only 35% had been identified as a fall risk by their previous inpatient tool. Applying KINDER1 retrospectively they identified an additional 49% of falls. In total, they were able to retrospectively identify 84% of the 150 patient falls. After implementation, the KINDER1 screening tool prospectively identified 73% of patients who subsequently fell.

The problem with fall risk assessment tools for the emergency department is the need to take into account that emergency departments are high volume with rapid through-put. Thus, tools should be short and easy to use. Physical Therapy and Physical Medicine and Rehabilitation have spent decades developing many different tests to determine fall risk, but they practice in very different environments from the emergency department, so their tools have been difficult to apply to patients in an ED setting.

Also of note, several fall risk tools give points for impaired gait but not necessarily enough points to automatically make them a fall risk in the emergency department. For example, another tool, which happens to be the one my department uses, is the Johns Hopkins Fall Risk Assessment Tool (JHFRAT)⁸. JHFRAT gives 2 points for unsteady gait and 2 points for needs supervision for mobility, transfer, or ambulation. It takes 6 points to make patients a moderate fall risk and 14 points to make them high risk. Logically, an impaired or unsteady gait should automatically place a patient at high risk for a fall.

It remains clear that existing tools are not optimal for identifying falls in the emergency department. While they seem to be improving with the development of emergency department focused tools, it remains that even the best study identified only 73% of falls when implemented prospectively. This leads me to believe we need more studies on how we can best identify fall risks in the emergency department.

The second component of our assessment shifts from identification of risk to management of it. At St. Joseph's University Medical Center, a bundle of items was created to easily identify fall risk patients to any employee working with the patient. All items in the bundle are bright yellow. The bundle includes socks, blanket, a star to hang on the wall and a fall risk wristband. It also includes a sign-out sheet that goes with the patient to other departments. The sign-out sheet alerts transport and employees in other departments that the patient is a fall risk.

The original plan for my study was to compare number of falls before and after implementation of this bundle. However, this was where the study fell apart. There is different software for reporting incidents than our ED Electronic Medical Records (EMR) software so when we checked the falls reports, the incident reports did not always match up with the EMR. Those that were a match had suboptimal reports, often just documenting a fall without specifying what happened or whether there were injuries. In the ED record, there was not always documentation of the fall. One could assume that if the fall resulted in injuries or required that the patient received extra care, it would have been documented, but such assumptions do not make for good research. Thus this project met its end.

From the available literature evaluated, many hospitals are also taking extra precautions and are implementing fall risk prevention protocols similar to our yellow fall risk bundle. However, from the available literature it is unclear if these bundles actually make a difference. So once again, further studies are needed. We need to know once we identify these patients that our interventions are actually minimizing the risk of falls.

Acknowledgements: I would like to thank Richard E. Schultz, RN, CEN, MICN, who originally conceived this project, Marianna Karounos, DO, MS, for the hours attempting to make this work, and Chris Carpenter, who steered us in the right direction and kindly pointed out its flaws. ★

Balanced Crystalloids versus Saline in Critically Ill Adults (the SMART trial)

Semler MW, Self WH, Wanderer JP, et al, for the SMART Investigators and the Pragmatic Critical Care Research Group. Balanced Crystalloids versus Saline in Critically Ill Adults. *N Engl J Med*. 2018;378(9):829-839.

Susannah Empson, MD
Harbor-UCLA Medical Center

Background

IV crystalloid solutions are commonly administered to critically ill patients. Normal saline (0.9% sodium chloride) is the most commonly administered IV fluid. However, many observational studies and experimental modes have suggested that normal saline administration might be associated with hyperchloremic metabolic acidosis, AKI, and death. This study investigated whether the administration of balanced crystalloids, compared with saline, reduced a 30-day composite outcome of death, new renal replacement therapy, or persistent renal dysfunction.

Study Design

- Pragmatic, non-blinded, cluster-randomized, multiple-crossover study
- 15,802 patients randomized in 5 ICUs at single academic center
- **Inclusion Criteria**
 - Adults 18 years of age and older
 - Admission to 1 of 5 participating ICUs during trial period
- **Exclusion Criteria**
 - Age < 18 years
 - Relative contraindications to balanced crystalloids: hyperkalemia and brain injury — administration by physician discretion
- **Randomization**
 - All patients admitted to 1 of 5 ICUs at one academic center were assigned to received saline (0.9% sodium chloride) or balanced crystalloids (lactated Ringers solution or Plasma-Lyte A)
 - ICUs were randomly assigned to use saline during and balanced crystalloids, alternatingly from month to month
 - The trial was coordinated with the emergency department and the operating rooms

Population Characteristics

- 15,802 patients from 5 ICUs – 7,942 received balanced crystalloids; 7,860 received normal saline – with no significant differences in baseline characteristics between the two groups
- **Median Age:** 58 years
- **Gender:** 57.6% male

Outcomes Measures

- **Primary**
 - **Major adverse kidney event in 30 days (MAKE-30)**
A composite of death from any cause, new renal-replacement therapy, or persistent renal dysfunction (elevation in sCr to $\geq 200\%$ of baseline). These were censored at 30 days or hospital discharge, whichever occurred first.

- **Secondary**

- **Clinical outcomes**

In-hospital death before ICU discharge or at 30 days or at 60 days; ICU free days; ventilator-free days; vasopressor-free days; days alive and free of renal-replacement therapy during the 28 days after enrollment

- **Renal outcomes**

New renal-replacement therapy; persistent renal dysfunction; acute kidney injury stage 2 or higher; highest creatinine level during hospital stay; change from baseline to the highest creatinine level; final creatinine level before hospital discharge

Results

- **Primary Outcome**

- **Major adverse kidney event in 30 days (MAKE-30)**

14.3% in balanced crystalloid group vs. 15.4% saline group (P=0.04)

The difference is more pronounced among patients receiving **larger volumes of crystalloids** and among patients with **sepsis**

- **Secondary Outcomes**

- **In-hospital mortality at 30 days:** 10.3% in balanced-crystalloid group vs. 11.1% in saline group (P=0.06)

- **Incidence of new renal-replacement therapy:** 2.5% in balanced-crystalloid group vs. 2.9% in saline group (P=0.08)

- **Incidence of persistent renal dysfunction:** 6.4% in balanced crystalloid group compared to 6.6% in normal saline group (P=0.60)

Conclusion

The study concludes that among critically ill adults, the use of balanced crystalloids resulted in a lower rate of composite outcome of death from any cause, new renal-replacement therapy, or persistent renal dysfunction with a NNT of 94. Given that the study was conducted at a single academic center, the generalizability of the findings might be limited. Furthermore, the treating physicians were unblinded, which may lead to conscious and unconscious biases. It is important to note that the patients in the study received relatively small volumes of fluid (median 1000 mL for balanced crystalloids group, 1020 mL for the saline group). As stated in the study, the difference in primary outcome was more prominent in the analysis of subgroup who received larger volume of fluid. The use of balanced crystalloids might be safer compared to saline in resuscitating critically ill patients who require massive amount of fluid resuscitation. ★

When You Hear Hooves, Consider a Zebra

Yagnaram Ravichandran, MBBS, MD, FAAP

*Fellow, Pediatric Emergency Medicine
Children's Hospital of Michigan*

Rajan Arora, MD

*Associate Director, Quality
Children's Hospital of Michigan*

Case

A 3-year-old African-American boy with autism spectrum disorder and global developmental delay presents to the ED with right “eye swelling” for 1 week. Review of systems is negative. Vitals are age appropriate. Parents attribute fussiness to pain on manipulation of his right eye. Exam, though limited, is significant for swelling of the right periorbital region, in the absence of erythema or discharge. It is not possible to assess pain with extraocular movements. The rest of his exam is unremarkable. Basic labs including CBC and CRP are unremarkable. Ophthalmology is consulted. Despite a limited exam, the suspicion for orbital cellulitis is low. Antibiotic treatment for presumed preseptal cellulitis is recommended. No imaging is recommended, and he is discharged home on oral antibiotics.

Patient returns the following week for progressive worsening swelling. Vitals are unremarkable. Exam is significant for right eye proptosis, chemosis, periorbital edema, and restricted eye opening without

skin changes. The rest of the exam is unremarkable. CBC shows a normal white count of 5500/mm³ with no abnormal (blasts/band) cells in the peripheral smear with elevated LDH and uric acid.

The posterior pole is not visualized on ophthalmologic evaluation under sedation. Emergent MRI shows an intracranial expansive, erosive mass within the sphenoid body extending into right orbital apex and its musculature. Signal characteristics of the mass (low T1 and T2 with significant diffusion restriction) and extension into the orbital musculature are highly suggestive of the tumor's lymphoid nature. (Images 1, 2). PET scan demonstrates sphenoid body mass, renal, hepatic lesions, and appendicular skeletal lesions with focal fluorodeoxyglucose uptake. Endoscopic nasal biopsy confirms Burkitt's lymphoma. Given the large tumor burden with multi-organ system involvement, the patient is classified as stage III, high-risk lymphoma and started on chemotherapy.

Discussion

Ocular swelling in children is a common complaint. Based on etiology and pathogenesis, it can be categorized as primary or secondary. Primary swellings arise from the globe and its orbital appendages, including the orbit. Secondary swellings are ocular manifestations of a

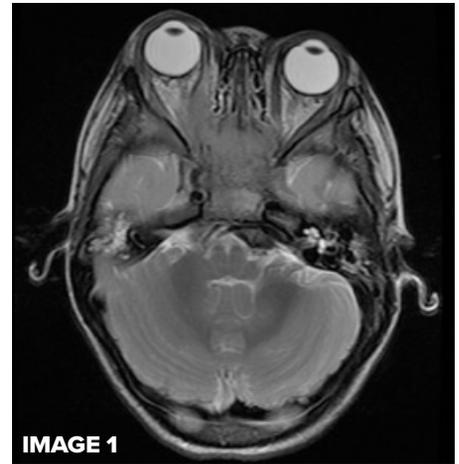


IMAGE 1

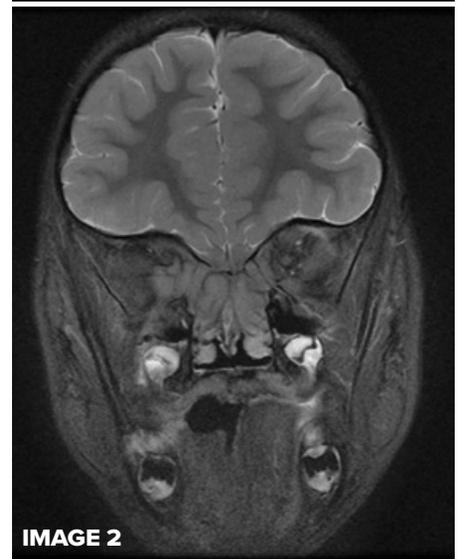


IMAGE 2

disease process originating elsewhere in the body (see Table 1).

Burkitt's lymphoma is a highly aggressive small B-cell non-Hodgkin lymphoma. Orbital involvement is rare; it usually involves extraocular muscles and adjacent paranasal sinuses with a predilection for medial and inferior rectus.

Key Teaching Points

- Know how to recognize orbital vs. periorbital swelling. Clues like proptosis, asymmetrical or restricted eye movements, pupillary abnormalities, decreased visual acuity and/or inability to visualize the fundus indicate orbital pathology and warrant urgent evaluation.
- Consider imaging all orbital swelling suspicious for malignancy, with systemic illness or inadequate ABx response.
- Procedural sedation is key to a comprehensive exam. ★

TABLE 1. Causes of Ocular Swelling

Category	Examples	Clinical Clues
Unilateral Eye Swelling		
Infection	Cellulitis, abscess, infectious granuloma	Acute onset, painful, local signs of inflammation, fever
Malignancy	Rhabdomyosarcoma, Glioma, Ewing's sarcoma, metastatic lesions (lymphoma, leukemic chloroma)	Insidious onset, painless/painful, systemic features of malignancy, hematological clues (elevated white count, low hemoglobin and platelet count, abnormal blood smear)
Miscellaneous	Trauma, Insect Bites	Inciting incident, punctum (insect bite), mechanism of injury
Bilateral Eye Swelling		
Allergic	Angioedema	Recurrent episodes, swelling of tongue, uvula, facial swelling, abdominal pain, precipitating factors like cold or specific allergens, features of systemic involvement with anaphylaxis
Systemic	Nephrotic syndrome, fluid retention, thyrotoxicosis	Painless, symptomatology and history of suggestive illnesses
Miscellaneous	Trauma (Raccoon eyes), Cavernous sinus thrombosis, optic nerve glioma, intracranial SOL, metastatic tumors (neuroblastoma)	Pertinent historical and clinical findings

Tackling Valproate Overdose

John Mark Sawyer, MSIV

Medical University of South Carolina

Nicholas J. Connors, MD

Assistant Professor, Division of Toxicology,

Department of Emergency Medicine

Medical University of South Carolina

A 53-year-old man with a history of bipolar affective disorder presents to the ED after a suicidal ingestion of approximately 30 tablets of valproic acid and 14 tablets of haloperidol. He is hemodynamically stable and somnolent, but easily arousable and able to answer questions appropriately. He has no signs or symptoms of anticholinergic toxicity or extrapyramidal symptoms.

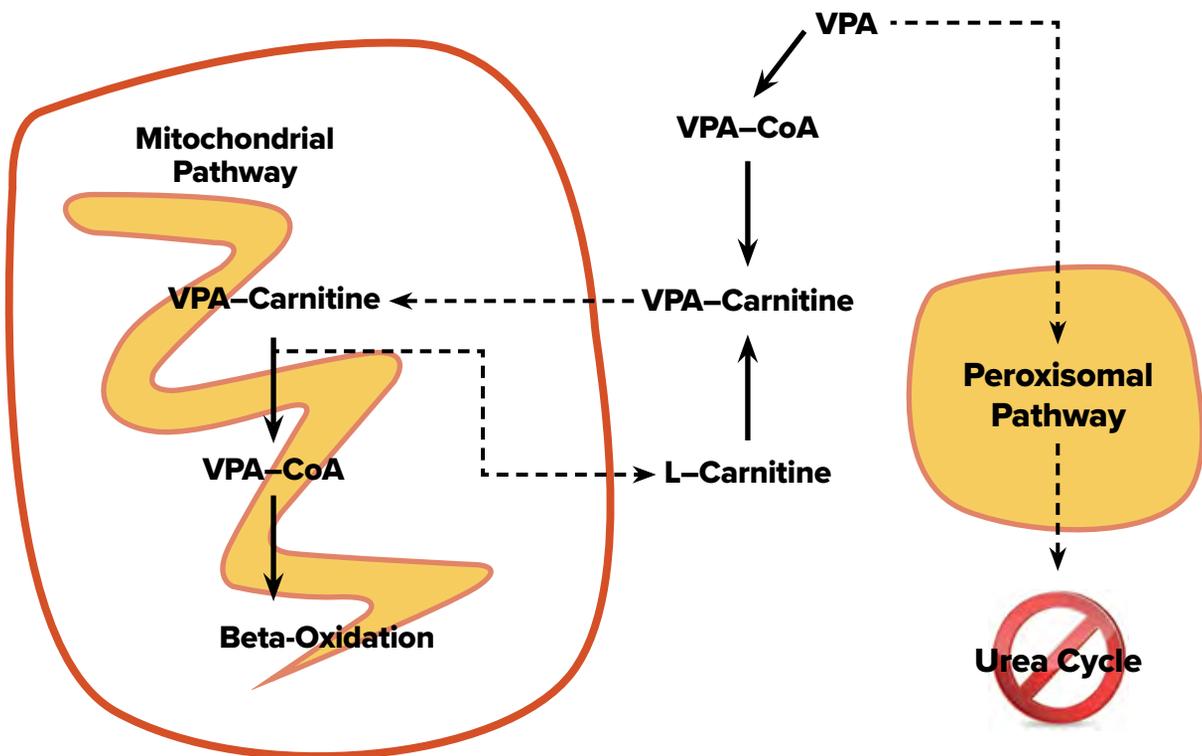
Background

Most physicians are well acquainted with the teratogenic potential of valproic acid (VPA) and have an intuitive understanding of its hepatotoxic potential. For the emergency physician, many cases of acute VPA overdose result in only mild impairment. However, recognition of severe toxicity is essential and an understanding of VPA pharmacokinetics can help guide treatment.¹

Pharmacology and Pharmacokinetics

VPA is a widely prescribed anticonvulsant and mood stabilizer that is also used for migraine prophylaxis and treatment of neuropathic pain.^{2,3} The described mechanism of action accounting for its anticonvulsant activity is prolonged inactivation of neuronal voltage-activated sodium channels similar to the action of carbamazepine and phenytoin.² Additionally, inhibition of GABA metabolism has been shown to increase

FIGURE 1. Simplified Diagram of Valproate Metabolism in Hepatocytes



this inhibitory neurotransmitter *in vitro* though the relationship of this effect to *in vivo* anticonvulsant activity is unclear. Oral absorption of VPA is rapid and complete, peak levels are reached 1-4 hours after ingestion, and the elimination half-life is approximately 15 hours. At therapeutic concentrations (50-100 mcg/dL), it is highly protein bound (90%) with an apparent volume of distribution of approximately 0.2 L/kg.² Hepatic metabolism via UDP-glucuronosyltransferases and beta-oxidation predominates.

Toxicity

CNS depression is common, ranging from somnolence and lethargy to severe coma.^{3,4} Respiratory depression, hypotension, metabolic acidosis, and electrolyte abnormalities (such as hypocalcemia, hypernatremia, and hypophosphatemia) are possible.³ Unique features of acute overdose include hepatitis, pancreatitis, thrombocytopenia, and leukopenia.⁵ Delayed symptoms and peak concentrations should be anticipated in cases of enteric coated formulations.^{6,7}

Management and Treatment

For the patient with a known or suspected ingestion, serum ammonia and VPA concentrations should be obtained in addition to liver function tests. A four-hour post-ingestion acetaminophen concentration should be obtained in all patients with intentional ingestions. Due to the delayed absorption of enteric-coated formulations, VPA and ammonia concentrations should be followed until they begin to downtrend.³

Supportive Measures

In addition to following serum drug concentrations, it is reasonable to consider multi-dose activated charcoal to reduce absorption in ingestions of enteric coated formulations. It is also recommended to review and discontinue medications which affect VPA metabolism.³

L-carnitine Supplementation

Within hepatocytes, VPA is metabolized as a fatty acid and is shuttled into mitochondria conjugated to carnitine. In overdose, the quantity of VPA overwhelms mitochondrial beta-oxidation. VPA and other fatty acids accumulate in the hepatocytes causing steatosis. Additionally, VPA in the cytoplasm is metabolized by an

alternate oxidation pathway. A byproduct is an inhibitor of the urea cycle ultimately raising serum ammonia concentrations. Administration of L-carnitine enhances movement of VPA into the mitochondria where it will eventually be metabolized.⁸ Clinical studies currently consist only of retrospective case reports and case series, but good clinical outcomes without adverse events are described.^{9,10} Figure 1 briefly outlines metabolic pathways, and dosing recommendations are outlined in Figure 2.

Hemodialysis

Typical VPA pharmacokinetics would preclude hemodialysis due to the high degree of protein binding. However, at extremely high serum concentrations the protein bound fraction decreases and provides a rationale for hemodialysis.⁴ For patients with manifestations of cerebral edema or shock, or serum VPA concentration >1300 mg/dL, intermittent hemodialysis is recommended.¹¹ Other considerations and treatment parameters are outlined in Figure 2.

Emerging Approaches

A recently published case series (n=5) proposes L-arginine supplementation as an additional therapeutic approach in VPA overdose patients to stimulate N-acetylglutamate synthetase, which is inhibited by VPA.¹² Although the case series shows a temporal relationship between declining ammonia concentrations and L-arginine supplementation, 2 of the 5 patients were also treated with hemodialysis, and further study of larger cohorts need to be undertaken.

Case Resolution

*The patient had an initially elevated VPA concentration that peaked 8 hours post-ingestion at 437 mg/dL. Prior to starting L-carnitine, this patient also had a peak ammonia level of 133 micromol/L. Liver transaminases and INR in the ED were within normal limits. The patient was admitted to the MICU and L-carnitine was continued for 48 hours. Subsequently deemed medically stable, the patient was transferred to inpatient psychiatry. **

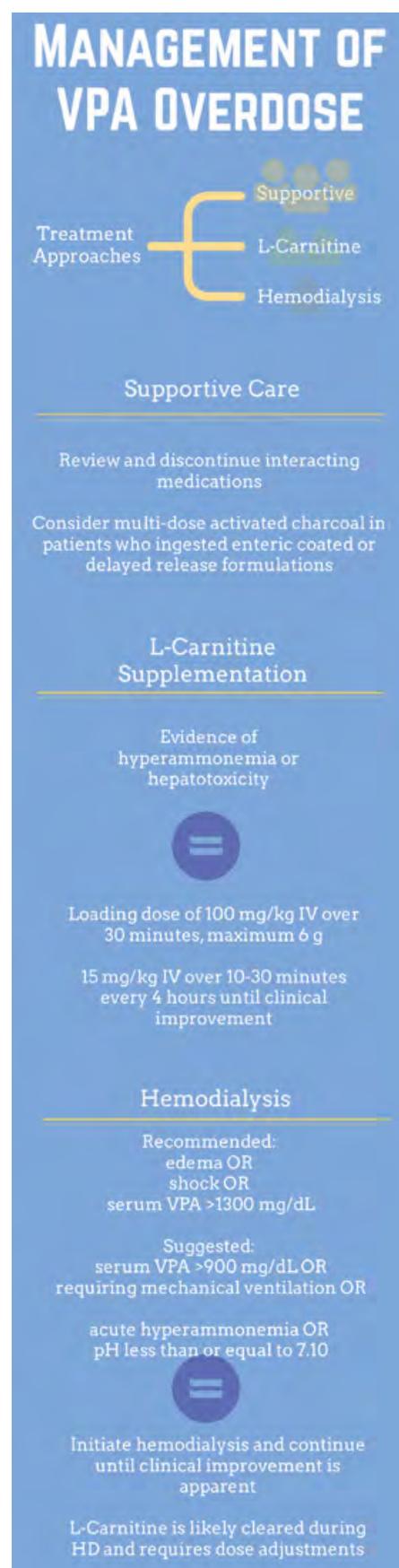


FIGURE 2. Summary of Management Approaches

The Pediatric ECG and Long QT Syndrome

Cullen Clark, MD

*LSU Emergency Medicine/
Pediatrics Residency Program*

The pediatric ECG has numerous subtle and not-so-subtle differences when compared to the average adult ECG. Detecting these differences can focus your differential, impact your treatment, and most importantly provide you with solid footing in making a relevant consultation to pediatric cardiology. This review will focus on the key differences in rate, axis, and intervals.

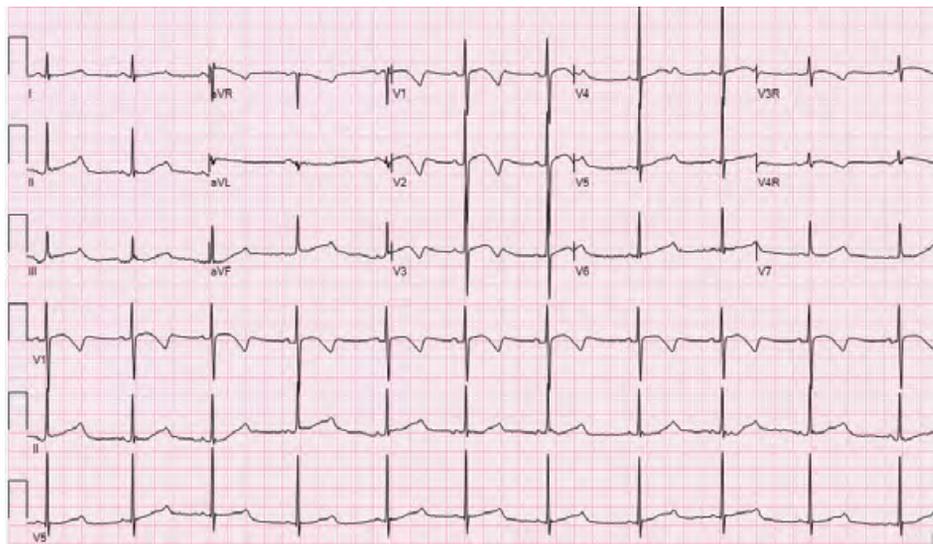
Rate

The foremost difference is rate. Unlike adults, children not only tolerate a much higher heart rate but depend on an increase in heart rate alone to increase cardiac output. The resting heart rate does not coincide with adult range until at least age 5 years.

Children can also have wider variation in heart rate associated with the respiratory cycle and changes in P-P interval. This phenomenon is termed sinus arrhythmia. Up to 50% of infants can have sudden prolongation of the P-P interval with no symptomatic or long-term effects.⁴

Axis

At birth, all neonates have a rightward axis because of relative right ventricular hypertrophy. Most pronounced at 1-2 months of age, the axis slowly migrates from right to left as the left ventricular myocardium hypertrophies to account for the postnatal increase in systemic vascular resistance and a concomitant decrease in pulmonary vasculature pressures. The normal adult ratio of right-to-left ventricle mass — and thus a normal axis — is expected to be seen by age 6 months. A persistent rightward axis can be indicative of congenital heart disease. Similarly, as the left ventricle



grows during the first years of life, a decrease in the amplitude of the R waves and corresponding increase in the amplitude of S waves is seen in the right precordial leads.^{1,2,3}

Precordial T waves

A pediatric norm that can initially seem alarming to an adult practitioner is the “juvenile T-wave pattern.” The precordial leads have T-wave inversions that normally persists until age 10-12 years. Occasionally, this pattern can last later into adolescence and young adulthood. Presence of a positive T wave in V₁-V₃ past the first week of life is pathologic and warrants further investigation.² The T waves in V₅ and V₆ should always be positive after the first 3 days of life.¹

Q waves

Young children can have a significant Q wave in the inferior and lateral leads from birth until age 3-5 years, when they recede. They can be as deep as 8 mm in lead III during childhood. These Q waves are expected, so much so that their absence in the lateral leads can be an indication of congenital heart disease.

Other characteristics that would raise concern would be right precordial Q waves, wide Q waves, abnormally deep Q waves.^{1,3}

Intervals

Children have shortened PR intervals and QRS complexes compared with adults. This is often overlooked as most of us have committed normal adult wavelength ranges to memory. It is important to remember that what may be a normal PR interval in an adult can be a manifestation of 1st degree block in a young child. Additionally, a normal adult QRS could be a bundle branch block in a young child. The PR interval initially shortens in the first year of life before gradually widening to the adult range through childhood.² Both P wave and QRS slowly widen to adult ranges as the child ages. Age-based charts are available and should be referenced when determining appropriate PR interval and QRS complex duration.

Of note, healthy teenagers can have significant abnormalities on ECG that are normal variants. Bradycardia at rest is often seen in young, healthy and

mostly athletic teenagers. Additionally, these adolescents can have a prolonged PR interval at rest — some to the extent they have ongoing 1st degree block while sleeping. Around 10% can develop transient, asymptomatic Mobitz Type I 2nd degree AV block at rest. This percentage was shown to be higher when a group of teenagers in intensive physical training were analyzed.^{5,6}

Long QT

Identification of differences in the pediatric and adult ECG aid in distinguishing potentially life-threatening abnormalities from a normal ECG, with one of the most notable and vastly overlooked conditions being prolonged QT interval.

Prolonged QT is perceived as a clinical specter that is transiently considered on an academic basis when we approach a patient with syncope or order one of the many medications that can elongate the interval. While seemingly rare, it is an important clinical consideration given the correct circumstances and should not be overlooked in the emergency department.⁸ What makes assessment for prolonged QT especially important in children is symptoms may not manifest until they progress to life-threatening dysrhythmia, torsades de pointes, or sudden cardiac death.⁷

The identification of prolonged QT syndrome requires an index of suspicion enough to warrant a workup with ECG. Often symptomatic patients will present with syncope or presyncope manifesting as dizziness or lightheadedness. A small percentage of patients will present with seizure activity. In many cases, exercise, emotional stress, swimming/diving, and startle responses elicit these symptoms.

Prolonged QT is identified via ECG. A good way to screen for a prolonged QT is to draw a line in the middle of an R-R interval. If the T wave occurs after the dividing line or that line bisects part of the T wave, investigate the QT interval further. The most reliable measurement

is the QTc or the corrected QT interval, which reflects the QT interval corrected for heart rate. Normal range for the QTc is generally accepted as <0.44 sec or 440msec. QTc from 0.44-0.46 sec is considered borderline and only significant if symptomatic. Anything greater than 0.46 sec is prolonged QT. Most ECG machines provide a QTc on the computer interpretation. The machines use the default Bazett formula, which is useful when the heart rate is within the normal adult range but is inaccurate when the rate is <60 or >100. There are several other formulas that are more accurate for calculating QTc for heart rates outside of normal adult range (eg, Fredericia, Framingham,

Knowing the differences between the pediatric and adult ECG will help you distinguish potentially life-threatening abnormalities from a normal ECG.

Hodges). The ECG computer tends to overestimate the QTc, especially if the heart rate is outside the normal range. When you receive an ECG that lists the QTc as borderline or prolonged, the first step should be to look at the heart rate and calculate the QTc manually using a formula that accounts for heart rate <60 or >100 if applicable. The computer-generated QT and RR measurement has been found to be consistently accurate in most ECG computers and thus can be used to manually calculate the QTc.⁹

Prolonged QT interval can be caused by numerous factors. The most concerning in an otherwise healthy child is congenital Long QT syndrome. Family history is one of the most important aspects of the patient's history because inherited conduction

abnormalities are the leading causes of persistently prolonged QT interval.⁷ There are numerous inherited mutations that fall under the classification of long QT syndrome; luckily, they tend to present similarly and treatment is often uniform. Other causes include electrolyte abnormalities (hypocalcemia, hypomagnesemia, hypokalemia), hypothermia, increased ICP, and medications. While these other causes typically have additional findings on exam and ECG, familial long QT syndromes and medications often manifest as prolonged QT alone.

Symptomatic prolonged QT syndrome may require emergent cardiology assessment and intervention depending on degree of prolonged QT.

In severe cases, rate control either by medication or pacing can be initiated in the emergency department. Prolonged QT with mild or no symptoms requires a more extensive outpatient workup by a cardiologist, but identification in the ED can be life-saving. These patients should be counseled to avoid certain medications and strenuous activity until they can be evaluated by a cardiologist; this includes exemption for sports (especially swimming or diving) and PE in school. The extended workup includes serial ECGs, stress testing, and potential genetic testing for familial long QT.

Conclusion

Being familiar with measuring the QT interval and identifying a prolonged QT is important for the ED provider because outcomes are good if long QT is detected early. These patients can lead normal lives with appropriate treatment, which may include pharmacologic rate control, AICD placement, or operative sympathetic ganglionectomy.

Acknowledgments

Special thanks to Dr. Bianca Castellanos and Dr. Kelly Gajewski from the LSUHSC Department of Pediatric Cardiology for their contributions. ★

BLEACH INGESTION

To Scope or Not to Scope?

Darren Cuthbert, MD, MPH

Rutgers Robert Wood Johnson
darrencut@gmail.com

Guillermo Ortega, MD

Rutgers Robert Wood Johnson
Eric Levy, DO

Rutgers Robert Wood Johnson

Ann-Jeannette Geib, MD, FACEP

Director of Toxicology
Rutgers Robert Wood Johnson

A 32-year-old Spanish-speaking male presents to your ED via EMS after coworkers caught him drinking bleach. The incident occurred approximately 45 minutes prior to his arrival in the ED, shortly after he had been reprimanded by his supervisor at the factory where he works. He states he was angry at work but refuses to provide further details or answer additional questions regarding the incident. EMS reports that it was an "industrial bleach" of unknown concentration, and that his coworkers stated that half the contents were missing from the 1-gallon bottle, although they did not know whether it was full prior to ingestion.

The patient admits to a psychiatric history of bipolar disorder and depression. He denies significant nonpsychiatric past medical/surgical history, has no allergies, and took unknown medications in the past for his psychiatric disease but has been noncompliant for years. His vital signs are within normal limits. He is awake, alert, and oriented. Physical exam is unremarkable, revealing clear breath sounds, no signs of caustic injury to oropharynx, and an abdomen that is soft, nontender, and nondistended.

Background

Sodium hypochlorite, commonly known as bleach, is an oxidizing agent that can be found in most homes and workplaces across America, regularly used as a disinfectant and whitening agent.^{1,2} The use of bleach for these purposes dates back to the early 1800s

but became more commonplace in the US in the 1980s.² Due to its easy accessibility, it is commonly involved in potentially toxic ingestions.

Bleach comes in various concentrations, which carry a difference in potential sequelae. Typical household bleach comes in concentrations ranging from 3 to 5 percent and usually does not cause injury beyond local irritation, with minimal gastroenterological effects.¹ Large ingestions, or ingestion of higher-concentration bleach (up to 35 percent), carries a small potential risk for caustic injury.^{1,3,4} One human study of bleach ingestion done on 393 patients revealed zero cases of perforation, strictures, or long-term sequelae, with the majority of serious adverse outcomes limited to case reports and animal studies.¹

Though the risk is low, bleach ingestion has been shown in rare cases to cause severe complications, including strictures, perforation, hypernatremia, hyperchloremic acidosis, and even death. A canine model study showed a single case of perforation following long term contact.¹

For typical household bleach ingestions, most poison centers recommend only conservative home management or supportive care.^{1,5} We look to provide recommendations for emergency providers as to when it's

important to assess for structural damage after bleach ingestion. This is a task that is always completed by consultants, typically otolaryngology or gastroenterology; though toxicologists and poison centers can also provide recommendations.

Mechanism

Bleach is toxic by direct contact of the hypochlorite moiety of sodium hypochlorite causing damage via liquefactive necrosis.^{1,4} Saponification of tissue proteins and fats causes cellular damage. Extent of tissue destruction is dependent upon concentration, pH, and degree of exposure.^{1,4} Due to route of exposure, ingestion of bleach has the potential to cause corrosive or caustic injury to oropharynx, esophagus, or stomach. Symptoms usually present as odynophagia, drooling, stridor,



dysphagia, sore throat, vomiting, abdominal pain, or chest pain.^{1,4} If aspirated, severe respiratory distress and shock can occur due to pulmonary parenchymal damage.^{1,4}

Management

No specific antidote for bleach toxicity or exposure currently exists. In the initial triage, patients should be undressed and decontaminated due to potential risk of secondary exposures. Irrigate any areas potentially exposed with normal saline, D5W, or lactated Ringer's solution. Airway and breathing should also be immediately evaluated and managed appropriately.^{1,4}

Activated charcoal, or anything that can induce emesis is contraindicated, due to risk of aspiration and secondary pulmonary injury. Non-critical patients who have a normal mental status, a patent airway, and the ability to swallow can be provided 4 to 8 ounces of milk or water for dilution of the substance.⁴

If a bleach ingestion patient presents acutely ill, the patient should immediately be placed on a cardiac monitor and venous access should be obtained. Careful attention should be paid to the ABCs,

which must be managed accordingly. If the patient is suffering from a hyperchloremic metabolic acidosis, IV bicarbonate or buffer solutions can be started.⁴

To Scope or Not to Scope?

Upper endoscopy is a vital tool of prognostic value to determine the extent of injury in a patient suffering from a corrosive ingestion.¹⁻⁹ Direct visualization of the esophagus via flexible endoscope is the most commonly used method for diagnosis due to the minimal risk of perforation. Endoscopic evaluation is not limited to the esophagus, as there is no correlation between injury to the esophagus and whether the stomach or duodenum are also affected.⁴ Endoscopy is contraindicated in unstable patients or if there is signs of perforation or airway compromise.⁴

As emergency providers, we should always assume the worst. If the patient is symptomatic, details are not available regarding the concentration of ingested bleach, or the history is unreliable, then get consultants on board early. Approach symptomatology loosely, as these patients are often unable to provide a reliable

history. A study done in the *European Journal of Gastroenterology and Hepatology* in 2014 reported that clinical signs and symptoms are a poor indicator of severe injury in potential caustic ingestions (sensitivity: 75%), while also recommending early flexible endoscopy in almost all potential cases.⁹ Though bleach itself is usually not harmful, it is important to keep in mind that there have been cases reported of severe complications, where it would be vital evaluate the extent of injury via endoscopy.^{1,5,7,9} The timeline of when to initiate this process is highly variable among providers.

Emergency Management Recommendations

While using clinical judgment, contact gastroenterology or otolaryngology early following initial stabilization of the patient, as there is a high level of variability among when flexible endoscopy should be used to look for caustic injury. Literature from toxicology, otolaryngology, and gastroenterology ranges from recommending endoscopy from 4 to 72 hours, with most sources in agreement that patients should be evaluated for endoscopy within 24 hours.¹⁻⁹ Due to the multi-speciality discord, reach out to consultants immediately if corrosive or caustic injury is suspected.

KEY POINTS

- Toxic ingestion patients are often unreliable historians, so approach clinical symptomatology with a grain of salt.
- Key portions of history-taking are:
 - Concentration of product
 - Volume of ingestant
 - Duration of exposure
 - Potential co-ingestants
- Symptoms vary widely, but usually presents as:
 - Odynophagia
 - Drooling
 - Stridor
 - Dysphagia
 - Sore throat
 - Vomiting
 - Abdominal or chest pain
- Management:
 - ABCs
 - Expose and decontaminate
 - Can give milk/water if the patient is stable and airway patent
 - If critical manage accordingly and keep in mind potential need for bicarbonate infusion
- Get consultants on board early:
 - Contact local poison center, consult hospital toxicology team, ENT, or GI ★



Catching Up with Contrast-Induced Nephropathy

Rebecca Lee

University of Maryland

@BeckyLeeEM

Rebecca.lee@som.umaryland.edu

Gentry Wilkerson, MD

University of Maryland

@GentryWMD

Introduction

Contrast-induced nephropathy (CIN) is the development of acute kidney injury (AKI) as a direct result of the administration of iodinated contrast media (CM). This is a causative diagnosis with a direct cause-and-effect relationship. Post-contrast AKI is a correlative diagnosis in that it is the development of AKI after administration of CM. This correlation does not equate to causation. The American College of Radiology (ACR) Manual on Contrast Media states that these terms are neither synonymous nor interchangeable.¹

Past studies have not used a standard diagnostic criterion for CIN and PC-AKI. Most use both an absolute and relative increase in serum creatinine levels to make the diagnosis. According to the Acute Kidney Injury Network (AKIN), AKI is present when there is an increase in serum creatinine of more than 0.3mg/dL, an increase of more than 50% from the patient's baseline creatinine level, or the presence of oliguria (< 0.5 mL/hr urine output) for more than 6 hours within 48 hours.²

Intravascular CM are concentrated solutions containing monomeric or dimeric tri-iodobenzene with differing side chains. Iodine, with a high atomic number (Z=53), imparts an increased density to the solution, which allows for visual contrast versus anatomic structures.³ CM can be classified as ionic or nonionic as well as high-, low-, and iso-osmolar. First generation CM were high osmolar agents (> 1200 mosm/kg) compared to plasma osmolarity of 280-290 mosm/kg. Low osmolar contrast media (LOCM) and iso-osmolar contrast media (IOCM) have largely replaced the use of high osmolar

contrast media (HOCM). The mechanism by which CIN is thought to occur is due to 3 potential causes:

1. Medullary ischemia
2. The creation of reactive oxygen species
3. Direct tubular cell toxicity⁴

The degree to which CM is directly responsible for the development of AKI is a matter of considerable debate. Published studies measuring the incidence of CIN are composed entirely of observational trials, and recent studies suggest that the risk of CIN is overestimated. A randomized control trial (RCT) would provide the best level of evidence to determine whether there is a causal relationship between contrast and AKI, but designing such an RCT would not be possible given the ethical issues associated with such a trial. Consequently, there have not been any RCTs to date evaluating the risk of developing CIN.

The Evidence

The first report of CIN was published in 1954 describing the case of a 69-year-old male, posthumously diagnosed with multiple myeloma, who underwent intravenous pyelography and subsequently developed anuria.⁵ Older studies of CIN were performed when most contrast imaging studies utilized HOCM. Some conclusions regarding the association of CM with the development of AKI were extrapolated from patients who underwent cardiac angiography procedures, which greatly overestimates its risk compared to that of intravenous administration commonly encountered in emergency department settings.⁶

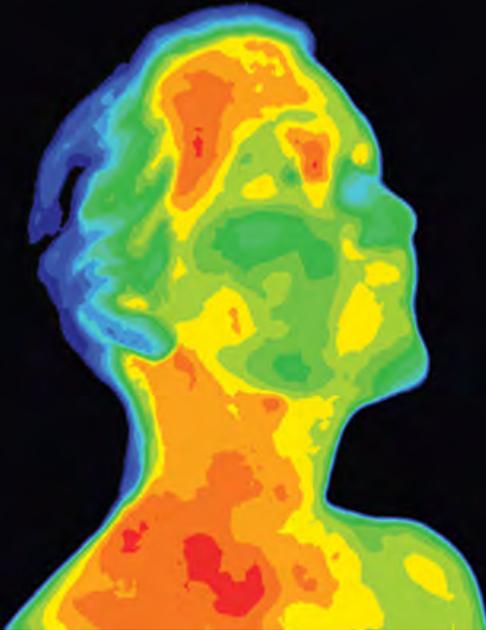
Calculating the risk of CIN is difficult to determine due also to a lack of standardization used in prior studies regarding the definition of CIN. A recent meta-analysis found 28 studies, all observational, with many using an absolute rise in serum creatinine of 0.3 to 0.5 mg/dL or a relative increase of 25% from baseline within three days of contrast administration.⁷ A common limitation among these observational studies is that without randomization, there may be

confounding variables that influence the selection of patients who receive IV contrast and those who do not. This has been addressed with the use of propensity scoring, which takes into account the likelihood that a patient would be assigned to either group based on known confounders that can cause AKI other than CM.⁶

There have been multiple single-center, retrospective comparisons of contrast-exposed versus contrast-unexposed patients that have failed to demonstrate a statistically significant increase in the risk of developing AKI after exposure to CM.^{8,9} A subgroup analysis in a study by Davenport et al. did find an association of CM with AKI in patients having an elevated baseline creatinine of ≥ 1.6 mg/dL;¹⁰ however, a recently published study by Hinson et al. did not find this same association.¹¹ The meta-analysis by Aycock et al. included more than 100,000 patients from 28 observational studies. They found the risk of AKI from contrast-enhanced CT compared to non-contrast CT was not increased (odds ratio [OR] 0.94; 95% confidence interval [CI] 0.83 to 1.07). No risk was also seen in the 6 studies that used matching techniques (OR 0.98; 95% CI 0.92 to 1.05).⁷

Conclusion

Despite being widely feared by the medical community for decades, the risk of CIN has been seriously challenged by recent studies. Ultimately, RCT-based evidence is necessary to reveal an accurate incidence of CIN as well as to elucidate whether causality is present. Previous observational studies, though limited by the effect of potential confounding, strongly suggest that the risk of CIN, at the very least, has been highly overestimated. The impact this common-belief has on physician diagnostic behavior has not been quantified. Given the importance that CM has in the diagnosis of multiple life-threatening diseases, it is essential that policies and guidelines provide a realistic and evidence-based calculation of the risk of AKI due to use of these agents. ★



Emergency Management of Heat-Related Illness

The best treatment for heat-related illnesses is public education and prevention.

Wes Troyer, DO

Physical Medicine and Rehabilitation Residency Program
University of Kentucky

John Kiel, DO, MPH

Assistant Professor of Emergency Medicine
Assistant Professor of Sports Medicine
University of Florida—
Jacksonville College of Medicine

Heat-related illness is classically taught to represent a spectrum of hyperthermic disease ranging from heat cramps, heat syncope, heat exhaustion, and – in extreme cases – heat stroke. Symptoms present when the body is exposed to heat with inability to properly cool core body temperature. Normal core temperature ranges between 36–38° Celsius. Below 35° C, radiation represents 60% of heat dissipation with an additional 30% from evaporation; above 35° C, this native process becomes overwhelmed and insufficient to maintain adequately cooled core body temperature. Subsequently, thermoregulatory failure occurs and the body is unable to release heat quickly, leading to elevated core temperatures.

Incidence and Risk Factors

Between 1999 and 2010, 8081 heat-related deaths were reported in the United States, with 94% of deaths occurring between May in September.¹ Because reporting of heat-related illness is not mandatory, the incidence is likely underestimated. A heat wave is defined as >3 consecutive days of

sustained temperatures > 32.2° C or 90° Fahrenheit.

Non-environmental risk factors include heavy clothing or equipment, children younger than 4 years of age, adults older than age 65, obesity, and underlying medical conditions such as diabetes, heart, and pulmonary disease. Young individuals participating in strenuous activity during warm weather increases their risk of heat-related illness. Environmental risk factors include warm temperatures and humidity, especially in populations not acclimated to them, and can be exacerbated by lack of access to transportation, medical care, and cooling centers.

Types of Heat Illness

Heat-related illness may be classified as **exertional** or **non-exertional** (classic). Exertional type is related to the endogenous heat production of physical activity and generally occurs in young, healthy individuals. Non-exertional type tends to be environmentally related and occurs insidiously in children and the elderly.

Classic heat-related illness occurs during periods of high environmental heat stress, and physical exertion is not required. In non-exertional heat illness, the increase in core temperature is generally slow, occurring over hours to days. Subsequently, these individuals are likely to develop volume or electrolyte disturbances.

Exertional heat injuries tend to occur in young, physically fit individuals performing under conditions of high heat, including sports, recreational physical activity, firefighting, and military training.

Treatment

The best treatment for heat-related illnesses is public education and prevention. Air-conditioning is the No. 1 protective factor against developing heat-related illness and death.² During a heat wave, public facilities with air conditioning should be made available. In mass participation events, several measures can be taken by organizers and medical staff to reduce the risk of developing heat-related illness. Care should be taken to avoid scheduling during hot and humid months, and events should be held during the cooler hours of the day. If possible, athletes should prepare with heat acclimatization; a process of increasing activity duration and intensity during the preceding 10–14 days. Athletes should have fluid intake, diet, and whole-body sodium levels monitored, wear lightweight, light-colored and loose-fitting clothing, and have shaded areas available for rest and recovery. Finally, coaches, athletes, administrators, and medical providers should be educated on prevention, recognition, and treatment of heat-related illness.

Heat edema is a self-limited process defined as dependent pretibial edema of the lower extremities and/or hands

during the first few days of exposure to increased temperature. Although it usually resolves within days of onset, patients may be symptomatic for up to 6 weeks. No specific treatment is necessary; elevation and compression stockings may accelerate recovery and aid in symptomatic relief. Diuretics are not indicated and may precipitate more severe heat-related illness.

Prickly heat, also known as miliaria rubra or heat rash, is a pruritic, maculopapular, erythematous rash due to inflammation, dilation, and rupture of the sweat glands, producing small vesicles that presents over clothed areas of the body. Patients generally complain of itching, which responds well to antihistamines. Wearing light, loose-fitting clothing will reduce likelihood of developing heat rash. Talc and baby powder do not help; chlorhexidine lotion may provide relief.

Heat cramps are painful, involuntary muscle contractions, typically of the calves, occurring in sweating individuals with inadequate volume replacement or who are hydrating with hypotonic fluids. Cramps may occur during exercise or commonly during a rest period following physical activity. Although self-limited, patients may present to the emergency department due to persistent myalgias. Cramping is usually isolated to a specific muscle group and rarely leads to the development of rhabdomyolysis. Electrolyte disturbances include hyponatremia and hypochloremia. Primary treatment is with oral isotonic fluid replacement and rest in a cool environment. Oral hydration with 0.1% saline solution or with commercially available electrolyte drinks are adequate for most patients. Patients with severe symptoms may require IV rehydration. Prevention is directed at maintaining sufficient hydration with either water and salt tablets or commercial electrolyte drink.

Heat tetany is caused by hyperventilation and subsequent respiratory alkalosis, presenting as paresthesias of the extremities, perioral area, and carpedal spasm. It is often confused with heat cramps; however, it is a separate clinical entity typically not accompanied by muscle cramps. Treatment is directed at moving the patient to a cooler area and reducing their respiratory rate.

Heat syncope is due to a combination of volume depletion, peripheral vasodilation, and decreased vasomotor tone resulting in postural hypotension. Evaluation includes workup of other causes of syncope including cardiac, metabolic, and neurologic etiologies, and treatment is directed at rehydration, rest, and removing the patient from the area of heat exposure. Hospitalization is often unnecessary.

Heat exhaustion is the result of both hypovolemia and hyponatremia. **Hypovolemia** occurs in individuals in warm environments with inadequate water replacement; hyponatremia occurs when individuals replace fluid losses with water or other hypotonic fluids. Symptoms include headache, nausea and vomiting, malaise, dizziness, muscle cramps, and other clinical indicators of hypovolemia. Notably, patients do not have altered mentation. Patients are tachycardic and may have positional hypotension, temperature is elevated but typically below 40° C. Laboratory evaluation reflects hemoconcentration; patients may have hypotonic or isotonic hypovolemia. Treatment is directed at fluid replacement, electrolyte correction, removal from warm environment and rest. These patients may require active cooling, especially if not responding to the first 30–60 minutes of therapy.

Traditionally heat-related illness has been presented as a spectrum of hyperthermic disease; however, there is a lack of consensus in the literature that heat cramps, heat syncope, and heat exhaustion progress to or increase the risk of heat stroke. While many of these previously described phenomena can occur in the presence of increased temperatures, they can also occur in its absence. Alternative pathophysiologic mechanisms independent of heat have been proposed; such as neuromuscular control theory for exercise induced muscle cramps⁸ or heat syncope explained as exercise associated collapse in the presence of heat by the Edholm-Barcroft reflex as described by Noakes.⁹

While investigation into the pathophysiology of these disease states continues, the risk of referring to them as a spectrum of hyperthermic illness may overstate their clinical significance as it relates to the most important diagnosis caused by increased temperature: heat stroke.

True Medical Emergency

Heat stroke, whether classical or exertional, is the most serious presentation of heat-related illness. Mortality rates range from 30–80% and is universally fatal if left untreated. The diagnosis is generally clinical and defined by encephalopathy and hyperthermia > 40° C, although temperature less than 40° C should not be exclusive criteria for treatment.

The presence of mental status changes in a hot and/or humid environment should be considered heat stroke until proven otherwise. Anhidrosis is not diagnostically reliable. Ataxia is an early symptom due to sensitivity of the cerebellum; patients may also have irritability, confusion, behavior changes, combativeness, hallucinations, decorticate and decerebrate posturing, hemiplegia, and coma. Seizures are common. Neurologic injury is a function of duration of exposure and maximum temperature. The patient may be tachycardic, tachypneic, and/or hypotensive.

Heat Stroke Management

Initial treatment of exertional heat stroke is directed at removing the patient from the offending environment and immediate cooling with cold-water immersion, as it has been shown to be the fastest cooling modality.⁷ If cold water immersion is not available, cold water dousing and wet ice towel rotation may be used, but these have not been found to be as efficient.

The length of time that core body temperature is elevated has been linked with increased morbidity and mortality, with practitioners aiming to lower body temperature below 39° C within 30 minutes to decrease these risks.⁵ Because external thermometry is unreliable, accurate temperature measurement with a core temperature is essential; regardless, cold-water immersion should be initiated as soon as the diagnosis is suspected.⁴ Rapid cooling should be discontinued once temperature reaches 39° C to avoid rebound hypothermia. Heat stroke is a medical emergency and patient should be transported to hospital for further evaluation.

In the ED, treatment is directed at addressing the ABCs of airway,

breathing, and circulation, along with volume resuscitation and continued active cooling of the patient. Cold water immersion of body up to torso or diffuse application of ice and cold packs provide the most rapid decrease in temperature and the lowest morbidity and mortality. The disadvantage of these methods is it is more difficult to provide other resuscitative measures.

The United States military has developed an Arm Immersion Cooling System (AICS), which involves submerging one of the patient's arms in ice water and may be as effective as full body immersion.⁶ Spraying cool water on patients with a fan directed at them is easy to initiate in the emergency department but provides slower cooling than immersion techniques. There is inadequate data to recommend invasive cold water lavage or ECMO. Antipyretics and dantrolene are not indicated for temperature reduction. Intravenous fluid resuscitation should be isotonic fluids with a target urine output of 2-3 mL/kg/hr.

It is important for the provider to consider other causes of altered mentation and to assess for end organ damage. Diagnostic studies include complete blood count, metabolic panel, blood gas, creatine phosphokinase, myoglobin, coagulation panel, urinalysis. An electrocardiogram and chest radiograph should be obtained. Lumbar puncture and head CT should be considered.

In the first 24-72 hours following heat stroke, organ system damage becomes evident, including ARDS, metabolic acidosis, respiratory alkalosis, electrolyte imbalance, hypoglycemia, increased CPK, rhabdomyolysis, leukocytosis, coagulation disorder, and hepatic dysfunction. Late complications include acute renal failure, pulmonary edema, stroke and hepatic failure. **All patients presenting with heat stroke require admission to the hospital.**

Return to Play

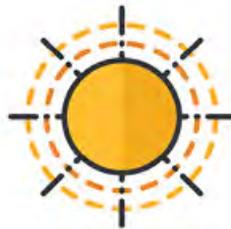
Individuals who experience exertional heat stroke should consult their physician prior to return to physical activity, as heat stroke itself can be a risk factor for repeat incidence. The 2007 American College of Sports Medicine guidelines suggest that

those who suffered exertional heat stroke should be held from exercise for at least 7 days with follow up laboratory testing prior to return to any physical exertion.³

When cleared, a progression from exercise in cool environments indoors can be initiated with gradual increase in

duration, intensity, and heat exposure if patients remain asymptomatic.

A progressive heat tolerance test is frequently employed prior to granting clearance for return to full activity if a patient experiences difficulty with the ACSM guidelines. *



Heat Stroke Recognition

Be suspicious of these symptoms

The two main criteria for diagnosing exertional heat stroke are rectal temperature >104-105°F (40.5°C) immediately post-collapse and central nervous system dysfunction (eg, irrational behavior, irritability, emotional instability, altered consciousness, collapse, coma, dizziness etc).

When observing athletes, look for other signs and symptoms that may indicate they are suffering from exertional heat stroke.

- Rectal temperature > 104-105°F (40°C)
- Irrational behavior, irritability, emotional instability
- Altered consciousness, coma
- Disorientation or dizziness
- Headache
- Confusion or just look "out of it"
- Nausea or vomiting
- Diarrhea
- Muscle cramps, loss of muscle function/balance, inability to walk
- Collapse, staggering or sluggish feeling
- Profuse sweating
- Decreasing performance or weakness
- Dehydration, dry mouth, thirst
- Rapid pulse, low blood pressure, quick breathing

Other outside factors may include:

- Lack of fitness and/or obesity
- Hot, humid weather
- Activity is near the start of the season, and symptoms occur near the end of the session
- First full day in sports equipment/gear

NOT EXERTIONAL HEAT STROKE?
Other potential diagnoses

Be suspicious for:

- Heat exhaustion
- Exertional hyponatremia
- Concussion
- Cardiac arrest

Korey Stringer Institute. Heat Stroke Recognition.
<https://ksiuconn.edu/emergency-conditions/heat-illnesses/exertional-heat-stroke/heat-stroke-recognition/>

BERLIN CONCUSSION

Summary and Active Rehabilitation for Concussion Management



An important question still being researched is how much rest to prescribe after a concussion prior to starting activity.

Dustin Harris, MD

Chair-Elect, EMRA Sports Medicine Committee

Concussion has a wide variety of definitions in health care today. The term has sometimes been used interchangeably with traumatic brain injury. The Concussion in Sport Group (CSIG), who recently held the 5th International Conference on Concussion in Berlin, defines sport-related concussion as “a traumatic brain injury induced by biomechanical forces” (McCroory et al.). They then go on to break down the features of a sport-related concussion to include:

- Force applied to the body that then applies force to the head, whether that be a direct or indirect head injury¹
- Neurologic impairment that could

result from structural or functional damage to the brain¹

This article touches on some of the new recommendations produced by the most recent Concussion in Sport International Conference, along with research suggesting an active rehabilitation program.

When an athlete suffers an injury during a sport, one should include concussion in the differential diagnosis if the athlete displays any of the following: headache, variable emotions, memory loss, loss of consciousness or trouble with balance.¹ The most widely accepted test to evaluate for concussion is the Sport Concussion Assessment Tool 5th Edition (SCAT5). It is important to be thorough with your evaluation because early return to play resulting

in a subsequent injury could increase the athlete's risk for post-concussion syndrome. Along with the SCAT5, athletes should have their vision, gait, balance, and reaction time tested for abnormalities post-injury.¹

If concussion is suspected after the initial assessment, the patient must be completely removed from play. The past consensus was to prescribe a period of physical and cognitive rest after a concussion injury until the patient was asymptomatic. Now providers are starting to prescribe "subthreshold exercise" (Leddy et al.) after the acute phase of injury, 24-48 hours.^{1,4} This includes activity that is below the threshold of causing concussion-related symptoms. Studies have shown that this may lead to improved outcomes and faster recovery.

An important question still being researched is how much rest to prescribe after a concussion prior to starting activity. When athletes were not instructed how much rest to take, those who participated in a medium amount of physical activity performed superiorly

on neurocognitive testing as opposed to those who chose to perform no activity or even those who participated in a high level of activity after their injury.³

Physiologically, concussion causes alteration in the autonomic nervous system, leading to impairment of cerebral blood flow.³ Increasing blood flow through subthreshold exercise could lead to improvements in recovery. Studies have shown greater levels of neuronal repair and cortical connectivity through aerobic exercise.³

Another theoretical detriment caused by concussions is the body's response to CO₂. Athletes with prolonged symptoms leading to post-concussion syndrome, in one study, showed an abnormal rise in CO₂ during exercise, which subsequently led to increase blood flow to the brain — exacerbating concussion symptoms.³ Subthreshold exercise was able to restore their sensitivity to CO₂.

If a patient is still experiencing concussion-related symptoms weeks to months after the initial injury, they may be suffering from post-concussion syndrome (PCS). PCS rates are higher in

younger, female athletes as well as those with previously diagnosed depression or migraines.^{1,2} It is very important to perform a thorough physical and neurologic exam after the injury and at subsequent clinic visits.

Cervical and vestibular injuries can lead to dizziness, headaches, and vision changes.² Cervical, vestibular and psychological rehabilitation are some examples of why the approach to the management of concussions needs to include multiple facets.

Lastly, another new recommendation from CSIG was to involve neuro-psychologists in the assessment and management of patients who have suffered a concussion.¹

Conclusion

Research continues to advance our knowledge of concussion and lead to improved ways of managing this condition. With the advent of active rehabilitation, along with the other concepts outlined above, we can better manage our concussion patients on the field and in the clinic. ★

When seconds count, education makes a difference.

Strengthen your practice and boost your confidence for the Boards and beyond.

✓ **ERcast: Free for all EMRA members.**

Down-to-earth clinical topics in easily digestible episodes from the legendary Rob Orman. Keep up on what's current in EM, plus practice-changing information from Essentials of Emergency Medicine.

✓ **EM Board Review Resident Package: \$189 for PGY2 and up; 20% off for alumni.**

High-yield, laugh-out-loud video lectures and an adaptive Qbank that attacks your weakest topic areas.

✓ **EEM On-Demand: \$189 for medical students, residents and fellows; 20% off for alumni.**

Practice-changing education that you'll use on your next shift. Over one hundred 5-10 minute lectures from the best EM educators across the country.

✓ **Foundations: Pediatric Acute Care & Emergency Medicine: 20% off for all EMRA members.**

A quick clinical refresher, with a focus on quick. Be prepared for critical, acutely ill and injured pediatric patients.

HIPPO
EDUCATION



EM Board Review

hippoed.com

Small Bowel Obstruction Secondary to Ascariasis Infection



FIGURE 3. The transfer up-river is prepped for a 15-year-old female with an acute bowel obstruction secondary to an ascariasis infection.

An Alarming Finding in the Remote Territory of Eastern Honduras

The etiologies of small bowel obstructions may vary between underdeveloped and developed nations, but the presenting signs and symptoms of an acute bowel obstruction are similar. A bowel obstruction is a gastrointestinal condition in which digested material is prevented from passing through the bowel normally. Patients may present with abdominal bloating, constipation, inability to pass stool, nausea, vomiting, or diffuse abdominal pain, typically with guarding.

Jett MacPherson, MSII

Marshall University

Saundra Jackson, MD, RDMS, FACEP

Ultrasound Director,

Emergency Resources Group

Wesley Wallace, MD, FACEP

Associate Professor, Department of EM
UNC Chapel Hill

Introduction

Small bowel obstruction (SBO) is a common gastrointestinal condition often warranting acute surgical intervention in developed nations. It is estimated that over 300,000 laparotomies per year are performed in the United States alone for adhesion-related obstructions.¹ Common risk factors for SBO in developed countries include prior abdominal/pelvic surgeries, abdominal wall or groin hernias, intestinal inflammation, prior radiation, or history of foreign body ingestion.

In underdeveloped countries, where

access to surgical capabilities and other modern health care technologies are limited, the risks for acute intra-abdominal pathologies are shifted towards environmental exposures, such as parasitic infections.

Case Report

A 15-year-old indigenous female presented to a medical missionary clinic in the remote territory of La Moskitia in eastern Honduras with a 3-month history of poor appetite, nausea, worsening epigastric pain, and new onset of vomiting. The patient had been seen recently at a health clinic in her local village, where she was diagnosed with gastritis. After achieving no relief with antacids, her mother brought her to the transient medical clinic established by a team of health care professionals from the United States.

On initial examination, the patient had diffuse abdominal tenderness with

generalized guarding. She appeared weak and uncomfortable. Further investigation with a portable ultrasound revealed a small bowel obstruction of unknown etiology (Figure 1).

The patient had not had any previous abdominal surgeries and the cause of her evident bowel obstruction remained unknown. With a quick urge to vomit, the patient quickly ran outside and began expelling roundworms that were greater than a foot in length within her emesis (Figure 2). It was logically assumed that the cause of this patient's SBO was a parasitic infection.

In such a remote area, this patient was at best 2 hours by boat and 4 hours by car to the nearest hospital with surgical capabilities, located in La Ceiba, Honduras. Her transfer was prepped and she was quickly sent on a long journey to reach the medical care she required (Figure 3).

Discussion

Ascariasis is a common parasitic infection in underdeveloped nations. It is caused by the roundworm *Ascaris lumbricoides*, which lives in the intestines of its infected hosts and transmits eggs through the feces of its hosts.²

The most common routes of entry for roundworms include oral ingestion from drinking water in which the parasite's eggs are present, or subcutaneously through bare feet that come in contact with infected feces. Ascariasis is common in locations where there is poor hand hygiene, poor sanitization, and use of human feces as soil.

The eggs of the parasite first hatch in the intestines of its infected host and the larvae move into the bloodstream, where it establishes residency in the lungs.³ After a process of maturing, the roundworms leave the lungs and travel into the trachea, where they are expectorated or swallowed into the esophagus. The worms that are ingested travel back into the intestines, where they continue to grow, mate, and produce additional eggs. The cycle continues as eggs are either excreted through the feces or hatch in the intestines and travel to the lungs via the bloodstream.

An uninterrupted progression of the parasitic infection can lead to small bowel obstruction as the roundworms reproduce in the intestines to a level that impedes the normal flow of digestive material through the GI tract.

As the digestive tract becomes obstructed, the patient will begin to experience generalized abdominal pain, nausea, vomiting, and poor appetite. If left untreated, the condition can lead to death as the patient becomes dehydrated or the bowels are perforated by a worsening obstruction.

Treatment

Ascariasis infections can typically be treated by common anthelmintic drugs, such as albendazole, ivermectin, and mebendazole.⁴ In advanced cases causing SBO, surgical intervention requiring enterotomy or resection may be necessary if the complete obstruction does not improve within 24–48 hours.⁵

Case Conclusion

Although our patient was young, she lived in an undeveloped location where hand hygiene and sanitization are poor, and exposure to human feces is common. There has also been a well-established relationship between malnutrition and intestinal helminth infection, which is common in such a remote area.²

The medical capabilities available within her surrounding location were minimal, and our medical missionary teams' yearly travel to this territory is the only access that many of these individuals have to modern health care. Given the widespread prevalence

of helminthic infections, our team treats all patients empirically with albendazole during our visit.

However, in the case of this 15-year-old girl with a small bowel obstruction, her infection was too advanced for this treatment. She was transferred to the closest hospital with modern health care capabilities in La Ceiba, Honduras, where she was admitted and monitored closely. Her ascariasis-associated intestinal obstruction was managed conservatively with appropriate anthelmintic therapy and did not require enterotomy or resection. *

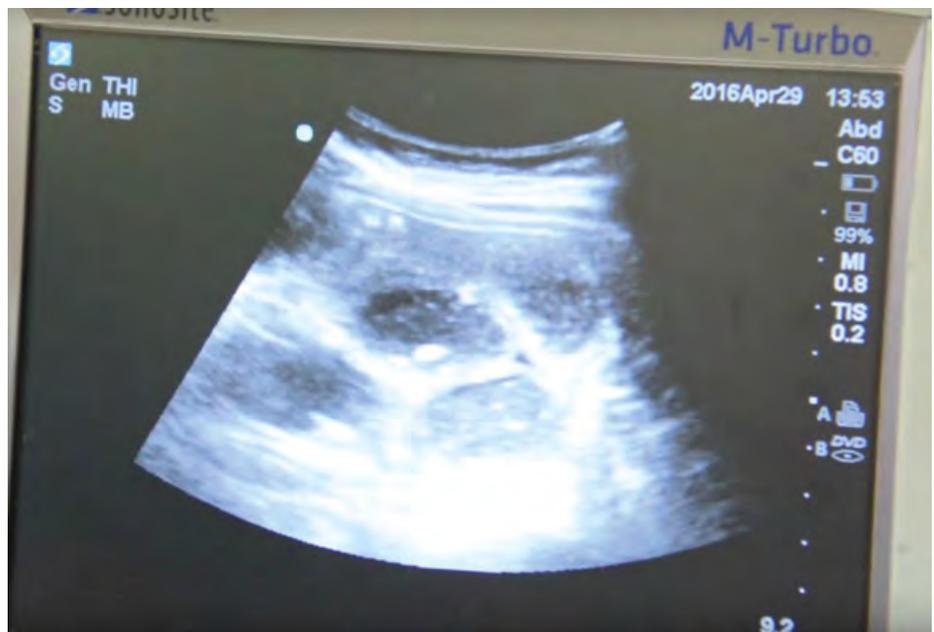


FIGURE 1. Portable ultrasound was used to diagnose a small bowel obstruction.



FIGURE 2. A roundworm retrieved from the emesis of a female with a SBO secondary to ascariasis infection appears next to a Honduran lempira, roughly the same size as a dollar bill.



Unraveling the Mystery of Dizziness in the ED

A Guide for the Student Clerkship

Kevin Wilcox, OMS-IV

WellSpan York Hospital Emergency Department

Krystle Shafer, MD

WellSpan York Hospital Emergency Department

Dizziness is the third most common complaint reported in the ED, responsible for 5% of presentations to the ED and outpatient clinics with a 30% lifetime prevalence. Asking the right questions and teasing out the details of this vague complaint can

lead to proper management and reduced negative outcomes.

While there are many potential causes for dizziness, let's look at how to differentiate between 4 common causes: syncope vs. vertigo vs. disequilibrium vs. non-specific dizziness.

As a medical student, it can be difficult to determine which questions to ask to determine emergent, "can't miss" (Table 1) vs. benign processes and

TABLE 1. Red Flags of Dizziness

Presenting Symptoms	Potential Cause
Deadly Ds: Diplopia, Dysphagia, Dysarthria, Dysmetria)	Ischemic Stroke Hemorrhagic Stroke Posterior Fossa Mass
New onset headache	Ischemic Stroke Hemorrhagic Stroke Subarachnoid Hemorrhage
New onset neck pain or recent trauma	Vertebral Artery Dissection
Fever and headache	Meningitis Encephalitis

TABLE 2. Syncopal Episodes

Suspected Cause	History of Syncope	Underlying Etiology
Vasovagal	Prodrome of nausea, dizziness, and increased sweating followed by syncopal episode	Stimulus-Induced (Blood, Injury, Fear) Autonomics (Coughing, Micturition, Defecation) Carotid Sinus Hypersensitivity
Orthostatic	Sudden change in posture after prolonged period, ie, "I stood up, suddenly felt dizzy, then must have passed out."	Volume Depletion Autonomic Dysfunction
Cardiac	Sudden onset of syncopal episode without prodrome	Tachydysrhythmias Young: Hypertrophic Cardiomyopathy Elderly: Aortic Stenosis

how you will work-up and potentially treat this patient, but the key to success all starts with a detailed history and physical exam.

Syncope/Near Syncope

Syncope is defined as a transient loss of consciousness with accompanying loss of postural tone, followed by complete resolution and return to baseline. The syncopal patient will often describe a feeling of lost consciousness or blacking out. Determining syncope as a possible diagnosis for your patient requires appropriate questioning when eliciting a detailed history, capturing key data such as is noted in Table 2.

Vertigo

The patient with signs and symptoms of vertigo will classically present with the complaint of "the room is spinning," due to mismatches in the perception of movement. The challenge in this diagnosis is identifying any potential "red flags" in the history and physical exam and differentiating between peripheral and central causes. Medical students should be capable of discerning between the two with in-depth questions regarding onset, severity, and associated symptoms, as well as a detailed physical exam as described in Table 3.

HINTS

Additional physical examination testing in the form of the HINTS (Head Impulse, Nystagmus, Test-of-Skew) exam can distinguish between central and peripheral causes as described in Table 4.

Disequilibrium

Disequilibrium is characterized by a sense of imbalance with physical activity. The patient with suspected disequilibrium might describe a sensation they are "going to fall if I don't have something to hold on to," or "I feel like I'm floating," or even that "the world feels tilted." These descriptors have been documented in the ED encounter for disequilibrium and can be your initial cue directing your H&P exam.

In most cases, these patients will present with past complaints of gait and/or visual disturbances leading to

their sense of dizziness, which can then be attributed to significant past medical history of conditions such as peripheral neuropathy, musculoskeletal disorders, cerebellar disorders, and neurologic disorders.

Non-Specific Dizziness

This diagnosis should remain lower on your differential and only be utilized as a diagnosis of exclusion. Most patients are healthy and young without underlying comorbidities of the cardiovascular, pulmonary, or neurologic systems that could account for their symptoms. In a prospective study of 100 patients with chronic dizziness in ambulatory care conducted by Kroenke, et al, roughly 50 percent of the study population had a history of major depression/generalized anxiety/panic disorder, suggesting underlying psychiatric disorders as a potential cause of dizziness.

Conclusion

Dizziness is a common complaint and a challenge to the medical student during clerkships. Utilizing this approach can help you obtain a detailed history and physical exam, leading to a more appropriate differential diagnosis and treatment plan. ★

TABLE 3. Vertigo

	Peripheral Vertigo	Central Vertigo
Onset and Severity	Sudden and More Intense	Gradual and Less Intense
Duration	Intermittent	Constant
Worse with Movement	Yes	No
Nausea/Vomiting	Yes	No
Nystagmus	Mixed Horizontal-Rotational	Vertical, Horizontal, Rotational
Hearing Loss/Tinnitus	May Occur	No
CNS Symptoms	Usually Absent	Usually Present

TABLE 4. HINTS Exam

	Peripheral Vertigo	Central Vertigo
Head Impulse	Negative (No catch up saccade)	Positive (Catch up saccade)
Nystagmus	Unidirectional	Direction Changing
Test of Skew	Negative	Positive (Vertical saccade)

The Use of Low Titer Group O Whole Blood in Emergency Medicine

Christa A.L. Arefieva, MS, MSIV

Texas A&M College of Medicine

Bryan Chen, MSIV

Texas A&M College of Medicine

Theodore T. Redman, MD, MPH

Uniformed Services University
Prehospital Research in Military and
Expeditionary Environments (PRIME2)

Andrew D. Fisher, MPAS, PA-C, LP

Texas A&M College of Medicine

PRIME2

@FisherAD1

Introduction

Trauma is the leading cause of death for ages 46 and under in the U.S. — yet up to 20% of trauma deaths are potentially survivable.¹ Aside from surgical intervention, these deaths are best mitigated through early hemorrhage control with tourniquets, hemostatic dressings, and an aggressive approach to damage control resuscitation (DCR).

For many years, the standard for DCR consisted of crystalloid solutions and red blood cells (RBCs). This standard in trauma resuscitation has evolved to include the use of balanced fluids and massive transfusion protocols (MTP) utilizing RBCs, fresh frozen plasma (FFP) and platelets (PLTs) in a 1:1:1 ratio (>10 units of RBCs in 24 hours).² The use of 1:1:1 ratio protocols attempts to mimic the benefits of whole blood (WB) with individual components.

WB has been used on a mass scale for resuscitation of trauma patients since World War I.³ The US Army documented the safety of group O WB as a universal product as early as 1917.⁴ While plasma and albumin were first favored by the US forces in World War II, eventually WB was sent to the European and Pacific theaters.⁵ Military units also established walking blood banks at far forward settings through larger surgical hospitals. These efforts resulted in almost all transfusions being group O WB.⁶ Near the end of World War II, the Army Blood Program noted mild transfusion reactions in WB with IgM anti-A and anti-B



titers >512 with one severe transfusion reaction of an IgM anti-A titer of 8000.⁴ In response, the Army Blood Program defined low titer group O whole blood (LTOWB) to help mitigate and eliminate further severe reactions. LTOWB is defined as with IgM anti-A and anti-B <250.⁴ This program was carried over to Korea, where over 400,000 units of LTOWB were shipped from the U.S. and transfused to casualties.⁴

As blood fractionalization was developed, civilian blood banks shifted away from WB and towards component-based therapy due to risk of transfusion transmitted diseases (TTD), requirements for specific component therapy, and logistical issues.⁶ With this development, the use of crystalloids solutions for trauma resuscitation became more prevalent, especially in the prehospital setting. The consequence of mixing components and crystalloids in trauma resuscitation was an unbalanced approach, leading to iatrogenic coagulopathy, acidosis, and hypothermia, more commonly known as the “Lethal Triad.”⁷ In 2004, the concept of DCR was developed and implemented by the

Department of Defense (DoD).⁸ This attempt to reconstitute whole blood using the 1:1:1 ratios in military trauma was aimed at the prevention and correction of trauma induced coagulopathy with minimal use of crystalloids.²

The conflicts in Iraq and Afghanistan revived an interest in fresh whole blood (FWB) for DCR during hemorrhagic shock. The use of FWB in combat demonstrated superior outcomes over component therapy.⁹⁻¹¹ In 2014, the Committee on Tactical Combat Casualty Care recommended FWB as the preferred resuscitative product for DCR in hemorrhagic shock.¹² In an effort to seamlessly provide FWB at the point-of-injury (POI), the U.S. Army’s 75th Ranger Regiment developed a LTOWB program in 2015.¹³ In 2016, due to the collection difficulties that can occur with FWB at the POI, the Armed Services Blood Program (ASBP) began collecting and shipping cold-stored LTOWB from Joint Base Lewis-McCord to units in Afghanistan.¹⁴ The use of cold-stored LTOWB is now being used in civilian sector emergency services, to include prehospital use.^{6,15-17} The AABB now recommends the emergency release and use of LTOWB in the setting of life-threatening hemorrhagic shock because of its advantages.¹⁸

What is Low-Titer Group O Whole Blood?

LTOWB is unseparated blood, collected from a donor with “low” IgM and/or IgG anti-A and anti-B and can either be stored or given fresh (within 8-24 hours). There is no universally accepted definition of LTOWB and the AABB states that low titer may be defined by institutions. The DoD and University of Texas San Antonio Health Sciences Center University Hospital define LTOWB as IgM anti-A and anti-B <256. Cypress Creek EMS uses IgM anti-A and anti-B <150. Finally, the University of Pittsburgh Medical Center used IgM anti-A and anti-B < 50.¹⁵⁻¹⁷

Internationally, in addition to IgM, IgG is often used to define low titer status. The presence or absence of the Rhesus (Rh) (D) antigen is much less relevant during hemorrhagic shock resuscitation, therefore, LTOWB is not defined by its Rh factor status. Rh negative patients do not develop sensitivity to Rh positive blood until weeks after exposure.¹⁶ Therefore, in the acute trauma setting, Rh positive blood can be administered to Rh negative patients without significant risk of transfusion reaction. Still, Rh negative is optimal for females of child-bearing age out of concern for sensitization that can cause hemolytic anemia of the newborn.

Advantages

Simplicity and less error

Evidence suggests that early (<34 min from time of injury) administration of any blood product to severely injured patients has early survival benefit.¹⁹ It is important that clinicians understand that this statistic defines the time from initial trauma, not the time that the patient arrives to the hospital. Using blood products in the prehospital setting can therefore significantly reduce the lag time to WB infusion, which in turn can decrease mortality from trauma. When using LTOWB, one bag is delivered versus a separate bag for each component for equivalent resuscitation efforts.²⁰ When compared to ABO group-specific WB in emergent situations, LTOWB may expedite treatment due to reduction in time necessary for ABO typing and reduce the under-resuscitation that may happen when specific ABO groups are not available.²¹ Also, LTOWB use over group-specific WB reduces the likelihood of human error as well as the probability of severe blood cell and plasma-related transfusion reactions. The ease of administering one product, especially in the prehospital setting, therefore decreasing confusion in decision-making and tracking may facilitate resuscitation efforts in the field and emergency room, which could in turn translate to improved clinical outcomes.^{22,23}

Savings

When preparing and storing components, whole blood is centrifuged to separate the red blood cells, plasma

and platelets. RBCs are washed to remove proteins that did not remain with the plasma after centrifugation. Plasma is frozen but can be also be processed to make cryoprecipitate. This process can be costly, which is passed onto the patient.^{24,25} All blood is pre-tested for TTDs. LTOWB requires minimal interventions, but does require TTD, titer testing, and leukocyte reduction before use or storage. LTOWB has the potential to reduce logistical concerns regarding cost. There has been concern about the short shelf life of LTOWB and increase waste of the WB product, but these concerns can be mitigated as LTOWB is able to be separated into RBCs after a predetermined date to maximize use and eliminate waste.

Avoiding excess fluid

Additives and anticoagulants are required for any blood collection. However, when components are used for MTP, they contain three times the additives and anticoagulants in terms of volume compared to whole blood.²⁰ This excess anticoagulant and additives may cause a dilutional coagulopathy in patients receiving components. In situations where surgery might not be readily available, this additional fluid can raise a patient's blood pressure to a level where it may cause previous formed clots to break, resulting in re-bleeding. Citrate, an anticoagulant added to blood collection bags, is metabolized by the liver and can lead to acidosis and hypocalcemia.²⁶

Disadvantages

Shelf life

Probably the greatest disadvantage of LTOWB is the shelf life. LTOWB is usually anticoagulated with citrate phosphate dextrose (CPD) and has a shelf life of 21 days. When citrate phosphate dextrose adenine (CPDA-1) is used in lieu of CPD, the shelf life is extended to 35 days. However, platelet function drops after 14 days and significantly after 21 days.²⁷ This is shorter than the shelf lives of PRBCs and FFP which are 42 days and a year, respectively.²

Future research

There is significant data from the past 70 years on the use of WB and LTOWB for trauma resuscitation. Currently, the

skepticism about the safety of LTOWB has resulted in new research. The most significant remaining issue is shelf-life extension. CPDA-1 can extend WB out to 35 days but does nothing for extending PLT function viability. Development of new anticoagulants and additives that will preserve WB functionality would greatly enhance this shortcoming.

The debate over safe titer levels is ongoing. At this time, among civilian hospitals utilizing LTOWB, there is a range of critical antibody titer thresholds varying from <50 to <256.^{15-17,28} Concerns with setting an antibody titer threshold that is too high may result in the increased possibility of transfusion reactions. Whereas, a threshold set too low may exclude many safe donors. International consensus of a scientifically-demonstrated safe threshold is needed.

In smaller communities or the military, there is concern over a change in donor titer status over time. Current literature shows there is no change in titer status with vaccinations and minimal variability titer levels.^{29,30} Unpublished data from the US military shows titer changes do often occur, but there is a trend towards low titer. The question remains, should blood banks require titer testing on a regular basis?

Conclusion

While RBCs and FFP have longer shelf lives and are useful in specific conditions, LTOWB use in trauma and hemorrhagic shock has proven advantages over component therapy. It is less likely to cause a severe transfusion reaction, contains less anticoagulants and additives, causes less dilutional coagulopathy, is faster and easier to deliver, and is more cost effective to produce. Efforts should be made to implement LTOWB in prehospital medicine and for DCR in the emergency room.

Acknowledgments

The authors would like to thank Brandon M. Carius, MPAS, PA-C, for reviewing the manuscript and his valuable comments. ★

The More You Know

Emerging Prehospital Protocols

Noah Bernhardson, MD, MS, NRP
University of Mississippi Medical Center
@nbernie

Cameron B. Justice, AEMT, OMSIII
Pacific Northwest University
College of Osteopathic Medicine

Jared L. Ross, DO, FF/EMT-T
EMS and Tactical Medicine Fellow
Washington University of St Louis
@JaredEMS

Over the course of the past 5 decades, EMS has undergone drastic changes. The use of pneumatic, military anti-shock trousers (MAST Pants) has all but disappeared, and gone are the days of atropine in asystole and “bite block” insertion in seizing patients. The field has expanded to include multiple levels of training, ranging from medical first responders with 80 hours of training to paramedics who often hold associates or even bachelor’s degrees in prehospital care. Evolving EMS protocols impact the care that patients receive before they present to the ED. Therefore, it is crucial for emergency physicians to understand these changes to continue to provide a higher level of integrated care. This article will dive into several of these evolving protocols, including cervical collar and backboard utilization, airway management, ketamine, and the expanding role of EMS.

Cervical Collars/Backboards

The utilization of the rigid cervical collar and backboard date back to the EMT-Ambulance national standard curriculum developed in 1984. Providers were trained to immobilize the spine if there was even the slightest possibility of spinal cord injury. This training became the standard of care, and was further reinforced by courses such as Advanced Trauma Life Support and Prehospital Trauma Life Support.¹

It is now widely accepted that rigid backboards still allow for significant movement of the spine and that

ambulance gurneys provide a similar level of motion restriction without the risks of respiratory compromise, skin breakdown, and pain caused by backboards. In addition, the use of cervical collars is now being questioned.

Many EMS agencies are implementing “selective spinal motion restriction” using evidence-based guidelines based on NEXUS and Canadian C-Spine rules to determine which patients need spinal precautions based on mechanism of injury, age, and exam findings. Updated clinical decision pathways and protocols allow for more individualized implementation of spinal motion restriction in the prehospital environment and are better patient outcomes.

Non-Invasive Positive Pressure Ventilation (NIPPV) in EMS

Several studies have shown that early institution of CPAP in the prehospital environment has decreased the need for intubation by up to 60%, thereby reducing associated complications.² CPAP and BiPAP have been available on Advanced Life Support units for some time, but CPAP is now being included on Basic Life Support and First Responder units.³ Early use of CPAP has been shown to significantly reduce mortality rates not only in rural areas with longer transport times, but also in urban systems with shorter transport times. In



a retrospective study of Kansas City Fire Department patients, early use of NIPPV showed a more than 50% decrease in mortality rate with no increase in scene or transport times.⁴ With a simpler and more cost-effective product design, prehospital NIPPV is becoming nearly universal and is changing the way that care is delivered in the prehospital setting.⁵

Prehospital Airways

The gold standard for definitive airway management remains endotracheal intubation. However, with effective alternatives and higher prehospital intubation failure rates,⁶ many systems have moved away from



endotracheal intubation.

While there is little debate regarding the importance of airway management, continued debate exists over prehospital endotracheal intubation. Many publications support the notion that prehospital intubation correlates

with higher incidence of mortality. One prospective study by Cobas *et al.* showed a 31% incidence of failed prehospital intubation, but found no difference in mortality between patients who were properly intubated and those who were not.⁷ Still other studies would suggest that intubation in the field is a vital component to patient survival. Mirafior *et al.* demonstrated early intubation of initially stable, moderately injured trauma patients reduces mortality by up to 85%.⁸ Intubation is a highly perishable skill, and with the advent of prehospital CPAP/BiPAP, fewer patients are being intubated and providers have less opportunity to maintain their skills. Additionally, intubation in the prehospital setting is usually performed in non-ideal conditions (low light, poor ergonomics) and without the use of paralytic agents.

Alternatives to endotracheal intubation originated in anesthesia, with the Laryngeal Mask Airway (LMA) developed

in 1981. The dual-lumen Combitube was the first to have wide adoption into EMS beginning in 1986. While these were often viewed by many providers as “back-up” devices, studies performed over several decades have shown that successful placement rates are significantly higher for these devices than for endotracheal intubation.⁹ With improvements in both device design and technology, there is strong literature support for supraglottic devices¹⁰ including the King Tube and iGel, with studies demonstrating equal ventilation to that provided via ET tube.

Ketamine

Ketamine is being implemented in the prehospital setting for multiple indications intubation, behavioral emergencies, pain management, and procedural sedation.¹¹ Ketamine provides both dissociative anesthesia and analgesic effects and has a long history of use, established safety record, and low cost. Ketamine is being used in low doses as an alternative to opioid pain medications. Moderate doses are used for intubation or supraglottic airway induction with or without paralytic agents. High dose intramuscular ketamine is being used for excited delirium and violent patients. Ketamine has a positive side effect of increasing bronchodilation and MAP and is also being used for patients with severe asthma. Recent studies suggest it may also be helpful in septic shock.^{12,13}

Expanding Role of EMS

In many EMS systems, new and specialized roles of prehospital providers are being explored. There has been an effort to increase the education of paramedics beyond the NREMT standard to include specialty certification in air and ground critical care transport and community paramedicine. Many states have critical care paramedic certification with further education on ventilator management, IABPs, sedation medications, and vasopressors. Community paramedics focus on public health and proactively visit patients to manage chronic medical conditions and prevent future 911 calls. The changes currently underway in prehospital medicine mirror the growth and development of emergency medicine itself. ★

The changes currently underway in prehospital medicine mirror the growth and development of emergency medicine itself.



MORE THAN A POWERPOINT

Understanding EMS Provider Education and How to Participate as a Resident

Geoff B. Comp, DO, FAWM

*Doctors Hospital/OhioHealth
@gbcomp*

Rachel Munn, DO

Doctors Hospital/OhioHealth

Vishnu Mudrakola, MD

Doctors Hospital/OhioHealth

Eric Cortez, MD, FACEP

*Associate Medical Director,
Columbus Division of Fire*

*Clinical Assistant Professor, Emergency
Medicine, Doctors Hospital/OhioHealth*

Health care providers are attracted to their specialties for a variety of reasons. Like EM residents, emergency medical services (EMS) providers don't particularly enjoy learning via hours of PowerPoint lecture. EM residents did not choose the busy and chaotic practice environments of the emergency department (ED) or the back of an ambulance because we enjoy warming chairs. To understand how to create educational and fun events in residency it is important to understand the training process of EMS providers.

Background of EMS Education

EMS education requirements were first laid out in 1993 with a document called "the Blueprint" and further delineated in 2005 with the "EMS Education Agenda." This consensus document itemizes the five tenets of EMS education, their respective associated goals, and a game-plan for achieving them. These tenets include: Core Content, Scope of Practice, Education Standards, Education Program Accreditation, and EMS Certification. We now have a national scope of practice model which defines the different types of providers: Emergency Medical Technician (EMT),

Advanced EMT (AEMT), and paramedic as well as a national credentialing body, the National Registry of Emergency Medical Technicians (NREMT).

EMT, AEMT, and paramedic training courses are typically sequential with increasing hour requirements ranging from 100 to up to 1300 hours of classroom, clinical, and simulation (SIM). Additionally, providers must pass the NREMT exam for their respective level of certification. Recertification is typically completed every 2 years and requirements can be met with courses, conferences, research, online resources.

As there is significant state and local variation in the educational methods used and the requirements themselves, identifying exactly what teaching modalities are most commonly used would be quite difficult. For example, Seattle Fire requires considerably more classroom, SIM, and actually cadaver lab and operating room (OR) time for intubations than the national guidelines¹. This extra education, as well as their greater-than-average number of intubations per year may contribute to their higher success rates.¹

Things to Consider

1. EMS providers treat a lot of people! That is 25-30 million patients per year, to be exact.²
2. Not all EMS providers have the same skill set. The scope of practice varies greatly between first responders, EMTs, and paramedics.
3. There are national guidelines. The EMS Education Agenda lays the foundations governing EMS education.

4. State lines actually matter. The state-to-state variation regarding educational requirements and scope of practice is huge!
5. Everyone loves airways. Everyone also loves a good, old fashioned competition.

There are undeniable similarities both in the education and practice of EMS providers and EM residents. Airway management is one such critical clinical skill shared by both sets of providers. Intubations performed in the field or the ED are often challenging for a variety of reasons: austere environments, trauma, critically ill patients, or the recent ingestion of cheeseburger to name a few.

Historically, EM resident involvement in EMS education has been limited to going on ride-alongs and possibly giving lectures. Only 89% of residencies in a recent survey had a designated EMS rotation and only 64% noted a requirement for education of EMS providers by residents.³ Contrary to this, 92% had a requirement for direct medical control.³

After learning all this (and more), Doctors Hospital decided to shake it up with an event meant to be both fun and educational for everyone involved: an airway competition.

This contest consisted of sequential stations meant to simulate different difficult airway scenarios. The 23 competing EMS providers from several local agencies performed the challenges in a head-to-head race for time.

Seeking to repair potentially bruised relationships caused by the individual competition, we then paired providers for a team-based challenge in which they, literally, had to be each other's eyes and hands to intubate a "victim" trapped in a building collapse.

The stellar EM residents involved either served as race officiators or performed a debrief with discussion of difficult airway techniques, equipment, indications, and trouble-shooting with the EMS providers after their competition.

Overall, participating EMS providers said they enjoyed the competition and found the debriefing sessions to be valuable. We aim to continue pioneering future educational ventures and promise

to put more than bragging rights on the table next time.

This event not only helped us as EM residents gain insight into how EMS education is structured, but additionally improved our camaraderie

and relationships with the EMS providers we take signout from each shift. Resident instruction of our EMS and prehospital colleagues can be a valuable experience for both parties and helps to strengthen the acute care team. ★



EMRA SPONSORS



Flipping out over our 2018 sponsors!
Thank you for a great year!

PLATINUM SPONSORS



GOLD SPONSORS



FRIEND SPONSORS



SEE YOU IN DENVER AT ACEP19!

ECG Challenge

Gregory Taylor, DO

Beaumont Hospital

Robert W. Mathews, DO, FACOEP

*Assistant Clinical Professor,
Dept. of Emergency Medicine
Beaumont Hospital*

Scott Sikorski, DO

Ascension St. John

Jeremy Berberian, MD

*Associate Director of Resident Education, Dept. of
Emergency Medicine
Christiana Care Health System*

CASE.

A 44-year-old male presents to the ED with intermittent chest pain for 2 weeks, worse with exertion, and resolves with rest. He is currently symptom free.

What is your interpretation of her EKG?



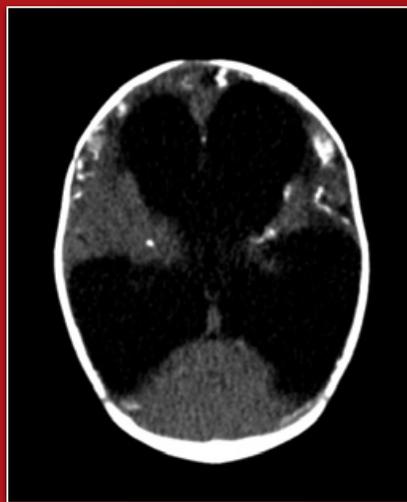
See the ANSWER on page 40

Matin Shah, MD

*Medical Education Chief Resident,
Emergency Medicine
Alpert Medical School of Brown University*

A 3-month-old female born at 37 weeks via vacuum-assisted vaginal delivery presented as a referral to the emergency department from an outpatient imaging center after obtaining a computed tomography (CT) scan of the brain to evaluate a misshapen head. On examination, she was active and had a full anterior fontanelle with a cranial deformity most prominent at the occiput, bilateral horizontal nystagmus, and globally increased muscle tone. CT brain demonstrated marked hydrocephalus with a preserved fourth ventricle, extensive cerebral atrophy, and scattered calcifications along the gray-white matter junction.

Visual Diagnosis



What's the Diagnosis?

See the ANSWER on page 41

ECG Challenge



ANSWER

Pseudo-Wellen's Syndrome

The EKG shows a normal sinus rhythm, biphasic T-waves in V2 and V3, STD and TWI in the lateral leads, increased S-wave amplitude in aVR and V1-V3, and poor R-wave progression. The EKG was initially interpreted as concerning for Type A Wellen's Syndrome, but after further discussion it was determined that the EKG abnormalities are more likely caused by LVH (also called Pseudo-Wellen's). In particular, Wellen's syndrome is associated with a preserved R-wave progression, whereas LVH is a common cause of poor R-wave progression.

Wellen's syndrome, also called "coronary T-wave syndrome" or "the widow maker sign," consists of characteristic EKG findings that suggest critical LAD stenosis. If untreated, approximately 75% of patients will develop an anterior myocardial infarction, usually within a few days. The classic EKG findings are biphasic T waves in V2-V3 (Type A, 25% of cases) or deeply inverted T waves in V2-V3 (Type B, 75% of cases). This EKG pattern is associated with a pain-free state and the T-wave abnormalities are result of reperfusion. Other EKG findings include a preserved R-wave progression and the absence of any significant STE or precordial Q-waves.

Pseudo-Wellen's syndrome has a similar pattern of abnormal precordial T-waves that are the result of LVH repolarization abnormalities. There are multiple voltage criteria for LVH, but echocardiography is the superior diagnostic modality. While the EKG above does not meet any of the common voltage criteria, the repolarization abnormalities, often called "strain pattern," are typical for LVH. The presence of LVH can make EKG interpretation more challenging as the strain pattern can mimic ischemic findings and confound an EKG's ability to detect ACS, particularly an anteroseptal MI.

LEARNING POINTS

General Features

- Abnormal T-wave pattern present in pain-free state with recent history of angina
 - EKG changes are sometimes called "Wellen's waves" if patient is having pain
- Normal or minimally elevated cardiac biomarkers
- LVH or high voltage can make diagnosis more difficult

EKG Features

- Deeply inverted or biphasic T-waves in precordial leads, typically V2-V3
- Isoelectric or minimally elevated ST-segment (< 1 mm)
- No precordial Q-waves
- Preserved precordial R-wave progression

Clinical Significance

- Suggestive of proximal LAD lesion
- Not currently an indication for emergent cardiac catheterization but requires admission
 - Coronary angiography is most appropriate testing modality (avoid exercise stress testing)
 - T-wave abnormalities resolve with PCI or CABG
- Type A (less common):
 - Biphasic T-waves
 - Seen immediately upon reperfusion
- Type B (more common):
 - Deeply inverted T-waves

LVH

General Features

- EKG is only suggestive of LVH
- Echocardiography is superior diagnostic modality
- Often demonstrates ST and T-wave abnormalities, termed "LVH with strain pattern"
- Numerous diagnostic EKG criteria with limited sensitivity
- No criteria are recommended for use exclusive of other validated criteria

EKG Features

- Commonly used criteria include:
 - Sokolow-Lyon- S in V1 + R in V5 or V6 > 35 mm
 - Cornell- R in aVL + S in V3 > 28 mm in males or 20 mm in females
- STE in V1-V3
- STD and TWI in I, aVL and V4-V6
- Increased S-wave depth in III, aVR, and V1-V3
- Increased R-wave peak time > 50 ms in V5 or V6
- Increased R-wave amplitude in I, aVL and V4-V6
- Left axis deviation typical, but can occur with any axis
- Can see increased QRS and QT duration

Clinical Significance

- Confounds EKG's ability to detect ACS, particularly anteroseptal MI, and mimics ACS findings

- Marker of increased risk of adverse outcome in the chest pain patient
- Diagnosis of LVH in the presence of intraventricular conduction abnormalities (e.g., fascicular blocks, bundle branch blocks) should be made with caution as they may impact the accuracy of the EKG criteria for LVH

DDx for T-wave Inversions

- Bundle Branch Blocks
- CNS Injury
- Digitalis Effect
- Intra-abdominal Disorders
- Juvenile T-wave Pattern
- Left Ventricular Hypertrophy
- Metabolic Abnormalities
- Pericarditis
- Pre-excitation Syndromes
- Pulmonary Embolism
- Toxicologic Abnormalities
- Ventricular Paced Rhythms

Causes of poor R-wave progression (< 3 mm R-wave by lead V3)

- Dilated cardiomyopathy
- LAFB
- LBFB
- LVH
- Misplaced precordial leads
- Normal variant
- Pre-excitation syndromes
- Prior anterior myocardial infarction
- RVH

Assessment

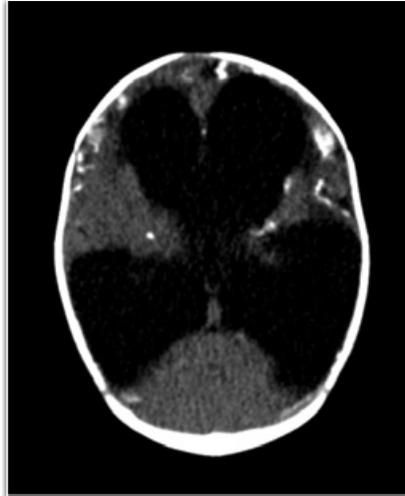
References available online

Congenital Toxoplasmosis

Congenital toxoplasmosis is an infection acquired *in utero* by transmission of the protozoan parasite *Toxoplasma gondii*. Transmission occurs across the placenta from mothers exposed to cat feces; those who consume raw or undercooked meats, fruits, or vegetables; or those who are immunosuppressed.¹ The prevalence in the United States based on neonatal serologic screening is approximately 1 in 10,000 live births.²

The parasite causes necrosis within all parts of the central nervous system, including the cerebrum, cerebellum, brainstem, and spinal cord. Regions of necrosis often undergo calcification from an immature immune system and the resulting impaired phagocytic ability of macrophages.³

The classic triad of signs are chorioretinitis, intracranial calcifications, and hydrocephalus causing profound visual and neurodevelopmental abnormalities.¹ The patient was admitted for ventriculoperitoneal shunt placement. She was started on a regimen of drugs that inhibit the synthesis of tetrahydrofolate (pyrimethamine and sulfadiazine), as well as folinic acid, which prevents bone marrow suppression from pyrimethamine.¹



EMedHome.com

A Benefit For All EMRA Residents



Alumni Members – Save 15% - ACT NOW!
Use discount code **EMRALUM**

Graduating Residents – Sign Up Now So You Don't Miss Anything!

Residents & Students: You Get Free Access!

www.EMedHome.com

The Home page of Emergency Medicine

EM's Own Emergency Financial Education

Peter Patitsas, MD, MBA

Geisinger

I never trusted the “good old days.” We idealize the past and assume the future will always progressively get worse and worse until the apocalypse hits, but maybe this attitude or perspective is more a reflection of human nature than an accurate comparison of today vs. yesterday. Speaking of yesteryear, can you guess which “modern-day” figure spoke the following quote?

“The children now love luxury; they have bad manners, contempt for authority; they show disrespect for elders and love chatter in place of exercise. Children are now tyrants, not the servants of their households. They no longer rise when elders enter the room. They contradict their parents, chatter before company, gobble up dainties at the table, cross their legs, and tyrannize their teachers.”

This was actually a quote from Socrates, who lived in 400 BC. So when were the “good old days,” anyway? Is yesterday always better than today? I am not sure. However, when it comes to student loans, I can objectively say today has never been worse.

Student Debt: Grim Picture

According to an analysis completed by the Federal Reserve Bank of St Louis at the beginning of 2018, 44 million Americans owe a collective \$1.5 trillion in student loan debt.¹ That is more money than the entire national debt of Greece and Spain combined!² Americans hold more student loan debt than credit card debt, making it the second largest expense behind owning a home.³ We all know credit card debt is bad, but student loan debt has got it beat by about \$620 billion.⁴

There was a time when the ethos in America was that you could never go wrong with spending more money on your education. Keep in mind that was probably advice given to you by an

older generation who lived in a different economic world when the cost of education was far less and the American economy was growing as much as 5% each year. However, the cost of education has been growing at an unprecedented rate, nearly 8% per year. This is beginning to literally change the culture of the United States and the futures of millions of Americans in a very negative way as people forego buying homes, starting business, getting married, having children, and spending time with family and friends – all to keep up with student loan payments.

The average college graduate owes \$37,172 in student loans. That might just sound like the price of a fancy, brand-new car you probably don't need, but the debt is substantial in comparison to average household income. According to 2015 data from the U.S. Census, the median household income in the United States is \$56,516. But remember, household income represents all people living in a single household contributing to taxable income.⁵ So conceivably, a nice new married couple with a child or two may only be making around \$56,516 a year. Having student loans from both mom and dad may represent more than they make annually.

But as physicians, why should we care? Are we average? Are we mortal? There has got to be a reason that everyone's mom and dad wanted them to become a doctor. We are surely immune from the financial trouble — right? Wrong. The numbers show otherwise, especially when considering the financial woes of student loans for medical students.

According to an analysis of medical student debt published in 2012 by the AAMC, the student loan burden

for an American medical student is currently worse than it was 40 years ago. The average medical student in 1978 graduated with about \$13,500 in debt, or \$46,500 in 2011 dollars, while the average medical student in 2011 graduated with \$161,300 in debt. Even after accounting for inflation of the U.S. dollar, that is a nearly 350% increase in medical school debt. This means that from 1978 to 2011, medical student debt has grown at an average rate of 7.8% per year, twice the rate of inflation (which the Bureau of Labor Statistics shows has been lower than 2.5% per year for the past decade).⁶⁻⁷ At its best, the U.S. economy grows about 5% per year; although it's been a while since we hit those numbers, GDP for 2018 is at 4.2% and has trended near 3% for the past 2 years.⁸

Personally, I now have nearly \$300,000 in student loan debt after going through 4 years of college and 4 years of medical school. Bear in mind, I had paid off my overpriced liberal arts undergraduate education before starting medical school. Here is a little math: Let's imagine that I pay 6% per year in interest on my student loans. I have been told I have a “good” rate.

$\$300,000$ (principal, the total loan money received) \times 0.06 (interest rate) = $\$18,000$ (annual interest owed in Year 1)

Therefore, each year, just to keep my loans from compounding (gaining interest on prior interest), I need to come up with \$18,000 to stay even. In 2015, 13.5% of the U.S. population, or 43.1 million people, lived in poverty.³ Depending on family size, if your household comprises fewer than 4 people and your household made less than \$18,871, you are in poverty. This means

TABLE 1. Compounding Debt

Year	Starting Debt	Interest Rate	Interest Gained	Ending Debt
Year 1	\$300,000	0.06	\$18,000	\$318,000
Year 2	\$318,000	0.06	\$19,080	\$337,080
Year 3	\$337,080	0.06	\$20,245	\$357,305

TABLE 2. Your “Real Salary” Budget

Annual Salary	\$340,000
Tax Rate	36% (Federal, FICA, State, Local) ¹⁰
Annual After-Tax Income	\$217,242
Monthly After-Tax Income	\$18,103
Monthly Student Loan Payment (\$357,304.80) for 5-year repayment at 6%	\$6907.70
Monthly after tax income and after student loan payment income	\$11,195.30

TABLE 3. Cost of Living Comparison

Monthly Cost	Boston, MA	Harrisburg, PA
Food	\$877	\$766
Child Care	\$2,225	\$1,542
Transportation	\$1,103	\$1,169
Health Care	\$837	\$1,512
Other Necessities (utilities, etc.)	\$1,056	\$728
Housing (3 bedroom, two bathroom home)	\$4,541 * Housing (monthly mortgage payment for \$700k home with 0% down) with Property and School Tax and PMI in an average school district	\$3,121 * Housing (monthly mortgage payment for \$400k home with 0% down) with Property and School Tax and PMI in an average school district
Total	\$10,639	\$8,838

EPI calculator¹¹

millions of families across America find it difficult to even generate the amount of money I owe on interest payments alone. The government recognizes this and so assists these families, rightfully so, with many programs and benefits. What does the government do for the young student?

Well, there are flexible debt repayment programs that allow us to forego making any payments on our student loans while in residency, which is at least 3 years for any physician. What a nice thing, right? No payments, no worries. But the interest is compounding. Let's calculate what I would owe at the end of a 3-year residency if I were to take advantage of the flexible debt repayment program.

Table 1 should make anyone's jaw clench! So, for me to put my head in the sand for 3 years and have the flexibility of foregoing payments increases my debt an extra \$57,000. Thank you, Uncle Sam!

Why not make some payments during residency? According to a survey completed by more than 1,500 residents, the average resident in the U.S. earned about \$57,200 in 2017. The average resident simply doesn't have money to spare to put toward loans. This was not a problem for the average physician a generation or two ago who owed far less in loans than we do now.

Okay, so another round of calculation. Once we start making attending salaries and we have to start making payments on our student loans, how does the budget look then? The average annual salary of an EM doc in the mid-Atlantic was quoted to be \$340,000 annually.⁹ Six figures, baby! Sounds great, but let's break it down (see Table 2).

So \$11,000 per month take-home salary is the long story short. Is that enough? Consider the EPI calculator, a free online tool that estimates costs of living for many metropolitan areas across the United States.¹¹ Compare the annual cost of living for a family of 4 in Harrisburg, Pennsylvania vs. annual cost of living for an urban center like Boston (see Table 3).

There isn't much money left over. Where are the savings for retirement, your deductible on health insurance, your kid's college fund, or a vacation? If you weren't paying nearly \$7,000 a month for years on student loans, there would be a lot more room for that.

The next generation is beginning to feel the negative financial pressure of this system, and it may begin to scare away good future physicians. Of course, with the aging of the Baby Boomers, there is a need for more physicians than

ever before. For example, one AAMC study predicts that by 2025, the U.S. will have a shortage of more than 35,600 primary care physicians.¹² This will only get worse under the current economic conditions and trends.

So, what's the point?

The truth is those in other professions are working very hard, too. People are often working multiple jobs, picking up side work, and not taking vacations. And outside the house of medicine, job predictably is not always stable.

Possible Solutions

Student loans are truly burdensome and have never been worse; therefore, we must call for policy changes to improve our financial reality. Although physicians cannot unionize, why can't we use basic principles of economics to lower our interest rates? Why can't we collectively consolidate our loans, with one private company, at a low interest rate? Imagine thousands of physicians approaching one bank with hundreds of millions of dollars of loans requesting a 2% annual interest rate. They make money, we save money. Everyone wins.

With a bit more delayed gratification, your loans can be paid off within 5 years. You may be in your mid- to late 30s when that happens, but the math suddenly gets better after the loans are gone. ★

EMRA RESOURCES

EMRA members!

Don't forget you have access to special benefits through Doctors Without Quarters, Laurel Road, and Integrated Wealthcare. Check out your benefits page at emra.org!





EMF Resident VIP Club

Your residency program directly benefits from EMF-funded research. Make your mark on emergency medicine today.

A \$120 tax-deductible gift (you can make quarterly installments of only \$30) will place you in the prestigious **Resident VIP Club**. Resident VIP Club members* receive:

- ✓ Two Invitations to EMF VIP event
- ✓ Special Resident Donor ribbon distributed at the annual ACEP *Scientific Assembly*
- ✓ One All-Access Pass to the EMF Donor Lounge during the annual ACEP *Scientific Assembly*

*Emergency medicine resident or medical student who contributes \$120 **annually**.

GIVE TODAY
and Pay it Forward!

emfoundation.org • 469-499-0296

EMF Emergency
Medicine
Foundation
research → education → patient care



Exclusive Webinar

Student Loan Best Practices for EMRA Members

Unsure how to repay your student loans? EMRA has teamed with Laurel Road to provide guidance on student loan refinancing.

EMRA members get an additional 0.25% rate discount when refinancing.

October 16th | 8pm EST

Sign up at
laurelroad.com/EMRA-Webinar

Laurel Road Bank is a Connecticut-chartered bank, Member FDIC, and Equal Housing/Opportunity Lender. 1001 Post Road, Darien, CT 06820 APAD1018A-13



Better
TOGETHER
CORD Academic Assembly
SEATTLE, WASHINGTON

Save the Date

MARCH 31 -
APRIL 3
2019

We welcome EMRA back to the Academic Assembly for the second year!

Bringing the best that CORD & EMRA have to offer, including the Quiz Show, Rep Council, EMRA Party, Chief Resident Track & so much more.

Enjoy the "Emerald City" of Seattle, Washington with an afternoon to explore and closing party at one the best spots in Seattle. You don't want to miss getting Better Together!

Registration opens mid-November

For #CORDAA19 Registration and Travel Information
www.cordem.org/aa

Locums Life

So Many Choices

Editor's note: After early ABEM certification in the late 1970s, Paul Weinberg of *ER Doc Tips* was drawn to the intense but fulfilling practice at a high-volume, high-acuity urban trauma center in Orange County, California, from 1976-2006. For Dr. Weinberg, retirement is just a phase. Now he travels the country, continuing his career in EDs, large and small, quiet and busy.

Paul Weinberg, MD

Freelance Locum Tenens Provider

The practice of emergency medicine is awesome: it is broad, intense, knowledge-based, and packed with emotion – and all of that eventually can be exhausting. After so many years of effort to achieve an EM position, the thought of leaving the field can be discouraging and filled with social and economic dread.

Rough Road of Burnout

The early symptoms of burnout, once identified, should create some questions about what is next on the path. One suggestion that can work is to enter the *locum tenens* circuit. Locums allow for choices in your practice life; choices that are so needed to avoid the emotional damage often created by the daily and nightly old-school practice in a single site.

After a brief trial of not practicing medicine, I returned to a locums-only practice. My time away from medicine was used to develop non-medical income sources, read novels, and re-bond with my middle-school aged children.

The overarching concept was one of sustainability. I had many years of productive life ahead, and one of my self-discoveries during my time away from medicine was that, despite my varied and many business interests, at my core I am a doctor. This insight was slow in recognition but deep in emotion.

Its acceptance allowed me to continue along the medical path with a sense of contentment. I needed to find a way to achieve longevity and satisfaction within the practice of emergency medicine. I chose to go the locums path.

Smooth Sailing with Locum Tenens

Entering the locums practice is a bit like the first day on a new rotation. You know the nuts and bolts of the practice, but the details are to be learned. Procedural components are important to getting the job done, and you do not yet know the system. That procedural knowledge, once learned, allows you to work in an efficient manner and not feel frustrated with the delay between knowledge of what you want to do and its completion. **Do not underestimate the power of the electronic medical record to make you feel like chewing the eraser off a pencil.**

So, it worked for me. Here are a few areas of workplace-specific improvements to consider:

Shift length: You can find positions that have shift lengths from 8 hours to 24/7.

Shift time: Yes, you can work the shift time you want to work. The democratic group-share requirement or required buy-in times can be avoided by being a locums provider. For me, it was the overnight shift (too old, enzyme systems worn out). I would decline the

locum position if it required overnights. This did reduce some opportunity, but it allowed for longevity.

Schedule: The children's school vacation schedule ruled. I wanted time off with them! I was able to control my work availability to allow for that pleasure.

Income: Almost always you will be paid an hourly rate, open to some negotiation. You can choose a production model of more charges per patient or patients per hour. i.e. earn through intensity of service or duration on duty.

Committee Service: Gone! You are not on any Committee.

Location: Limited by the effort required to get licensed in different states. Allows a chance to see different regions and explore their offerings.

Impediments of locums include burdensome applications and paperwork for each hospital. Remember from high school geometry, "Things equal to the same thing are equal to one another"? Well, the hospital credentialing community does not believe in that corollary, so electronically save all your required documentation (health records, practice history, malpractice, immunizations, licensing, CME, identification, certifications, etc.) so it can be easily found and emailed to those who ask for it. And remember, as you work in more sites and for a longer time you have a more complicated history to share with those who require the information. ★



These Programs Rock!

When a program pays dues for all of its EM residents, that is 100% EMRAfied! Designating your residency as “100% EMRAfied” is our way of recognizing a program as one that supports its residents, advocates for its patients, and contributes to the specialty of emergency medicine day in and day out. We are proud to be your colleagues!

Programs paid as of September 11, 2018.

- | | | | |
|---|---|---|--|
| Advocate Christ Medical Center | HealthPartners Institute/Regions Hospital | Ohio Valley Medical Center | University of Florida – Jacksonville |
| Akron General Medical Center | Hennepin County Medical Center | Oregon Health and Science University | University of Illinois Hospital – Chicago |
| Albany Medical Center | Henry Ford Hospital | Orlando Regional Medical Center | University of Iowa Hospital & Clinics |
| Albert Einstein Medical Center | Henry Ford Macomb Hospital | OUCOM Grandview Hospital (CORE) | University of Kansas School of Medicine |
| Allegheny General Hospital | Hofstra North Shore – LJ at Long Island Jewish Medical Center | Palmetto Health Richland | University of Kentucky |
| Alpert Medical School of Brown University | Hofstra Northwell SOM at North Shore/ LJ | Penn State Health Milton S Hershey | University of Louisville – Kentucky |
| Arnot Ogden Medical Center | Hospital of University of Pennsylvania | Presence Resurrection Medical Center | University of Maryland |
| Aventura Hospital & Medical Center | Indiana University School of Medicine | Queens Univ/Kingston Hosp – FRCP | University of Massachusetts |
| Baylor College of Medicine | INTEGRIS Health | Reading Health System | University of Michigan |
| Baystate Medical Center | Jackson Memorial Hospital | Ronald Reagan UCLA Medical Center/ Olive View UCLA Medical Center | University of Mississippi Medical Center |
| Beaumont Hospital Trenton | Johns Hopkins University | Rowan University School of Osteopathic Medicine/Jefferson Health | University of Missouri – Columbia School of Medicine |
| Boston Medical Center | Kaiser Permanente San Diego Medical Center | Rush University Medical Center | University of Nebraska Medical Center |
| Brookdale University Medical Center | Kaweah Delta Health Care District | Rutgers New Jersey Medical School | University of Nevada – Las Vegas |
| Brooklyn Hospital Center | Kendall Regional Medical Center | Rutgers Robert Wood Johnson Medical School | University of New Mexico |
| Cape Fear Valley Medical Center | LAC+USC Medical Center | Southern Illinois University | University of North Carolina |
| Carilion Clinic – Virginia Tech Carilion | Lakeland Health | Spectrum Health/Michigan State University | University of Oklahoma College of Medicine/Tulsa |
| Carolinas Medical Center | Lehigh Valley Health Network | St. John Hospital and Medical Center | University of Pittsburgh Medical Center |
| Case Western Reserve University/Metro Health Medical Center | Loma Linda University School of Medicine | St. John’s Riverside Hospital | University of Puerto Rico |
| Case Western Reserve University/ University Hospital Cleveland Medical Center | Louisiana State University – Baton Rouge | St. Louis University School of Medicine | University of Rochester |
| Central Michigan University College of Medicine | Louisiana State University – New Orleans | St. Luke’s University Health Network | University of South Florida |
| Charleston Area Medical Center | Louisiana State University – Shreveport | St. Mary Mercy Hospital | University of Tennessee – Nashville |
| Christiana Care Health Services | Maimonides Medical Center | Stanford University Medical Center/ Kaiser Permanente Medical Center | University of Tennessee College of Medicine at Memphis |
| CHRISTUS Health/Texas A&M | Maine Medical Center | SUNY – Stony Brook | University of Tennessee COM at Chattanooga |
| Conemaugh Memorial Medical Center | Maricopa Medical Center | SUNY Downstate/Kings County Hospital | University of Texas at Austin Dell Medical School |
| Coney Island Hospital | McGovern Medical School at UTHealth | SUNY University at Buffalo | University of Texas Health Science Center at San Antonio |
| Cooper Hospital | McLaren Macomb Medical Center | SUNY Upstate – Syracuse | University of Texas Southwestern Medical Center – Dallas |
| Crozer Chester Medical Center | McLaren Oakland Hospital | Tawam Hospital | University of Toledo Medical Center |
| Dartmouth-Hitchcock Medical Center | Medical College of Georgia at Augusta University | Texas A&M/Scott & White Medical Center – Temple | University of Utah Hospitals & Clinics |
| Denver Health Medical Center | Medical College of Wisconsin | Texas Tech Health Science Center | University of Virginia Health System |
| Detroit Medical Center/Wayne State University | Memorial University of South Carolina | Thomas Jefferson University | University of Wisconsin |
| Doctors Hospital–Ohio Health | Memorial Health System Program | UNECOM – Kent Hospital | UPMC Hamot Medical Center |
| Duke University Medical Center | Mercy St. Vincent Medical Center | Unity Health – White County Medical Center | Vanderbilt University |
| East Carolina University/Vidant Medical Center | Merit Health Wesley | University of Alabama | Virginia Commonwealth University – Medical College of Virginia |
| Eastern Virginia Medical School | Michigan State University/Sparrow Hospital – Lansing | University of Arizona | Wake Forest University |
| Emory University School of Medicine | Midwestern University – CCOM | University of Arizona COM at South Campus | Washington University St Louis/ Barnes-Jewish Hospital |
| Florida Atlantic University | Morristown Memorial Hospital | University of Arkansas | Wayne State University/Detroit Medical Center Sinai-Grace Hospital |
| Florida Hospital Medical Center Orlando | Mount Sinai School of Medicine – New York | University of CA – Irvine | Wellspring York Hospital |
| Freeman Health System | Mount Sinai St. Luke’s Roosevelt Hospital Center | University of California – Davis | West Virginia University |
| Genesys Regional Medical Center | Mount Sinai: Beth Israel | University of California – San Diego | Western Michigan University Homer Stryker MD School of Medicine |
| George Washington University | MSUCOM/ProMedica Monroe Regional Hospital | University of California San Francisco – Fresno | William Beaumont Hospital |
| Georgetown University Hospital/ Washington Hospital Center | Nassau University Medical Center | University of California San Francisco – San Francisco General Hospital | Wright State University |
| Good Samaritan Hospital Medical Center | New York Methodist Hospital | University of Chicago | Yale New Haven Medical Center |
| Grand Strand Medical Center | New York Presbyterian Queens | University of Cincinnati College of Medicine | Zucker School of Medicine at Hofstra/ Northwell at Staten Island University Hospital Program |
| Greenville Health System | Newark Beth Israel Medical Center | University of Connecticut | |
| Hackensack University Medical Center | Norman Regional Health System | University of Florida – Gainesville | |
| Harvard Affiliated Emergency Medicine Residency at Beth Israel Deaconess | NYU/Bellevue Medical Center | | |
| Harvard Affiliated Emergency Medicine Residency at Brigham and Women’s | Ohio State University Medical Center | | |

Do You Love Your Program Leaders?

EMRA honors outstanding EM program leaders each year — including \$1,000 for Program Coordinator of the Year, plus honors for Program Director of the Year, Associate PD of the Year, and Chief Resident(s) of the Year.

Help put your program in the national spotlight by nominating someone for these awards, plus all our other travel scholarships, merit honors, project grants, educational courses and more!

The following awards are now open for nominations:

- Critical Care Medicine Conference Scholarship
- Academic Excellence Award
- Dr. Alexandra Greene Medical Student(s) of the Year Award
- Jean Hollister Contribution to Prehospital Care Award
- Resident of the Year
- Fellow of the Year
- Program Coordinator of the Year
- Associate Residency Director of the Year
- Residency Director of the Year
- Rosh Review “One Step Further” Award
- Be the Change Project Grant
- ACEP Scientific Review Subcommittee Appointment
- EMRA Congressional Health Policy Fellowship in Washington, D.C.
- EDDA Travel Scholarship
- EMBRS Scholarship
- ACEP Teaching Fellowship
- SAEM Travel Scholarship

Apply by Jan. 15 through our online application at emra.org/be-involved/awards. ★

National Leadership Opportunities

Each year, EMRA appoints chairs-elect and vice chairs for each of our 16 committees.

These positions offer a chance to grow your passion for a subspecialty while building your name as an EM leader.

The positions include travel reimbursement for in-person meetings during CORD Academic Assembly in the spring and ACEP Scientific Assembly in the fall. In addition, committee leaders are invited to participate in the EMRA Leadership Academy, with yearlong networking and project development opportunities.

Apply online at emra.org/committee-application. Deadline is Jan. 10. ★

ABEM Online ITE

The 2019 In-training Examination (ITE) begins on the last Tuesday of February and can be administered on a single day or over the



course of 5 days. The online testing targets the expected knowledge and experience of a PGY3 EM resident; results should not be used to compare programs or residents within programs. All 225 multiple choice questions are drawn from EM Model, with these topics weighted as shown.

Medical Knowledge, Patient Care, and Procedural Skills

- 1.0 Signs, Symptoms and Presentations: 9%
- 2.0 Abdominal & Gastrointestinal Disorders: 8%
- 3.0 Cardiovascular Disorders: 10%
- 4.0 Cutaneous Disorders: 1%
- 5.0 Endocrine, Metabolic & Nutritional Disorders: 2%
- 6.0 Environmental Disorders: 3%
- 7.0 Head, Ear, Eye, Nose & Throat Disorders: 5%
- 8.0 Hematologic Disorders: 2%
- 9.0 Immune System Disorders: 2%
- 10.0 Systemic Infectious Disorders: 5%
- 11.0 Musculoskeletal Disorders (Non-traumatic): 3%
- 12.0 Nervous System Disorders: 5%
- 13.0 Obstetrics and Gynecology: 4%
- 14.0 Psychobehavioral Disorders: 4%
- 15.0 Renal and Urogenital Disorders: 3%
- 16.0 Thoracic-Respiratory Disorders: 8%
- 17.0 Toxicologic Disorders: 5%
- 18.0 Traumatic Disorders: 10%
- Appendix I: Procedures & Skills: 8%
- Appendix II: Other Components: 3%
- **Total: 100%**

Acuity Frames: Target (± 5%)

- Critical: 30%
- Emergent: 40%
- Lower Acuity: 21%
- None: 9%

Physician Tasks

For this dimension, the Board has assigned the following specific percentage weights to the Modifying Factor of age:

- Pediatrics: 8% minimum
- Geriatrics: 6% minimum ★

Annals of Emergency Medicine Names New Resident Fellow

Each year, *Annals of Emergency Medicine* selects a Resident Fellow (formerly the Resident Editor) to serve on the Editorial Board.

Mariam Fofana, MD, PhD, of BWH/MGH Harvard-Affiliated Emergency Medicine Residency has been selected to serve as the new Editorial Board Resident Fellow for the coming year. Dr. Fofana received her MD and a PhD in epidemiology from Johns Hopkins.



If you have an idea, an issue, or an experience about which you would like to write, submit an abstract (limit 250 words, double-spaced) through Annals' online submission system, Editorial Manager, at www.editorialmanager.com/annemergmed (use the “Residents’ Perspective” article type). If your abstract is approved, you will be asked to write the full-length article for the “Residents’ Perspective” section. If you have any other questions for Dr. Fofana, contact her at annalsfellow@acep.org. ★

PEER

Physician's Evaluation and Educational Review in Emergency Medicine

Bring the power of PEER assessments to your residency training program



PEER for Residency Programs!

Sign up your program, buy memberships for your residents and faculty at a discounted annual fee, then assign and monitor tests to augment your program curriculum.

\$95 each seat
OR LESS

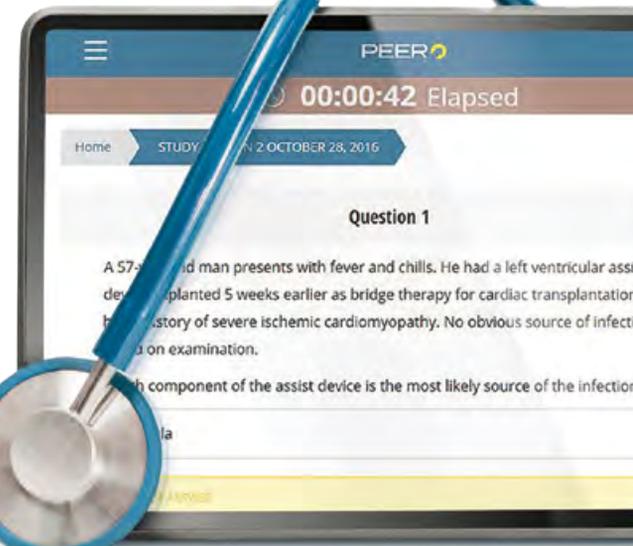
Three Program Director Seats FREE!

Learn more at acep.org/PEER

First. Best. Transformed.

Tens of Thousands of Emergency Medicine Physicians Have Turned First to PEER for Content Review and Self-Assessment

Find out why at acep.org/PEER



Board Review Questions



PEER (Physician's Evaluation and Educational Review in Emergency Medicine) is ACEP's gold standard in self-assessment and educational review.

For complete answers and explanations, visit the [Board Review Questions](#) page at [emresident.org](#), under "Test Your Knowledge."

1. A 31-year-old woman presents with severe pelvic pain 1 week after delivering a healthy baby. She passed a large, foul-smelling clot just before arrival. She reports chills. Vital signs include BP 115/74, P 84, T 38°C (100.4°F). Which of the following is a risk factor for the development of this condition?
 - A. Advanced maternal age
 - B. Cesarean delivery
 - C. External fetal monitoring
 - D. Precipitous delivery
2. Which of the following conditions can falsely lower a B-type natriuretic peptide level?
 - A. Advanced age
 - B. Obesity
 - C. Pulmonary disease
 - D. Renal disease
3. A 56-year-old woman presents after an episode of near syncope. Vital signs are BP 93/40, P 104, R 20, T 36.1°C (97°F); Spo₂ is 95% on room air. Blood glucose is 94. She recently received a diagnosis of idiopathic pulmonary hypertension; an ECG is unchanged from her most recent one. She denies fever, chest pain, and recent illness. Her dyspnea is slightly increased from baseline. Auscultation of the chest yields a loud split S₁ but no murmurs. There is no jugular venous distention, hepatomegaly, or lower extremity swelling. Lungs are clear. Chest x-ray shows moderate cardiomegaly. After placing the patient on supplemental oxygen, what is the next treatment goal?
 - A. Decrease left ventricular afterload
 - B. Decrease pulmonary artery pressures
 - C. Maintain adequate right ventricular filling pressure
 - D. Maintain pulmonary vascular resistance
4. In the setting of chronic digoxin poisoning, which of the following findings is the best indication for administering digoxin-specific antibody fragments?
 - A. Bidirectional ventricular tachycardia
 - B. Serum digoxin concentration 2.4 ng/mL
 - C. Serum potassium 5.6 mEq/L
 - D. Vomiting
5. A 26-year-old man presents with pain, swelling, and ecchymosis of the right eye. He says he was attacked the night before and struck in the face with an unknown object. On examination, his orbital rim is tender to palpation. Which of the following additional signs would be most concerning for an orbital blowout fracture?
 - A. Ecchymosis
 - B. Enophthalmos
 - C. Exophthalmos
 - D. Photophobia ★

ANSWERS
1. B; 2. B; 3. C; 4. A; 5. B

Opportunities in Pennsylvania's Busiest ED!

Advancing Health. Transforming Lives.

Tower Health is seeking Emergency Medicine physicians across its six acute-care hospitals to help serve a population of more than 2.5 million with comprehensive services and technology!



Spotlight: Reading Hospital in West Reading, PA

- #1 Busiest Emergency Department in Pennsylvania
- #8 Busiest Emergency Department in the US in 2017
- Over 50 physicians treating 135,000+ patients annually
- Adult Fast Track
- Opening Fall 2018: 16-bed self-contained Pediatric Emergency Unit
- 120 Beds; 100+ specialty and multi-purpose treatment rooms



CURRENTLY HIRING:

Emergency Medicine Physicians
Pediatric Emergency Medicine Physicians

For more information, contact:
Carrie Moore, MBA
484-628-8153
Carrie.Moore@towerhealth.org

Visit our websites:
towerhealth.org
careers.towerhealth.org

The Reading Hospital Emergency Medicine Residency

With 120 ED beds, Reading Hospital's EM residents practice in an outstanding clinical environment with a large variation of patient conditions and populations. The curriculum has been designed to expose residents to a multitude of experiences throughout their training to ensure they're equipped to practice Emergency Medicine in any setting. **Energetic and forward-thinking residents are sought to join our team!**

Equal Opportunity Employer



EMERGENCY MEDICINE

UPMC and University of Pittsburgh

UPMC has a long history of emergency medicine excellence, with a deep and diverse EM faculty also a part of the University of Pittsburgh. We are internationally recognized for superiority in research, teaching and clinical care. With a large integrated insurance division and over 25 hospitals in Pennsylvania and growing, UPMC is one of the nation's leading health care systems. We do what others dream - cutting edge emergency care inside a thriving top-tier academic health system.

We can match opportunities with growth in pure clinical or mixed careers with teaching, research, and administration/ leadership in all settings - urban, suburban and rural, with both community and teaching hospitals. Our outstanding compensation and benefits package includes malpractice without the need for tail coverage, and employer-funded retirement plan, generous CME allowance and more.

To discuss joining our large and successful physician group, email emcareers@upmc.edu or call 412-432-7400.

UPMC | EMERGENCY MEDICINE

EOE Minority/Female/Vet/Disabled

72714C HR1&E 02/17

CLASSIFIED ADVERTISING**ALABAMA**

Mobile — ACADEMIC EMERGENCY MEDICINE POSITIONS ON THE GEORGEOUS GULF COAST — The University of South Alabama, is seeking faculty for growing EM academic programs at both hospital ED's (level 1 University Medical Center and the Children's Hospital). Must be EM or Peds EM trained and board eligible/certified. Fellowship in PEM, EMS, education/admin or research is a plus. Opportunities to lead, initiate or contribute to new programs and services. Also recruiting for Chief, Division of Peds EM and Research Director. Applicants are invited to submit CV and letter of interest to: Edward A. Panacek, MD, MPH, Chair of Emergency Medicine, USA-COM, Mobile, AL (eapanacek@health.southalabama.edu). Further information at <https://www.southalabama.edu/departments/academicaffairs/healthsciences.html>.

ALASKA

Fairbanks — New full-time position for a BC/BE Emergency Medicine physician to join a stable, democratic group of 10 physicians. This is a hospital practice based at Fairbanks Memorial Hospital. Annual visits exceed 36,000. Fairbanks Memorial Hospital is a JCAHO accredited 159-bed hospital that is the primary referral center for the 100,000 citizens of Alaska's interior. Fairbanks is a truly unique university community with unmatched accessibility to both wilderness recreation and urban culture. We aim to strike a balance between life and medicine, offering excellent compensation and benefits with a 2-year partnership track. 10 hour shifts with excellent mid-level coverage. For additional information please contact: Michael Burton MD, President (907) 460-0902 mrb5w@hotmail.com or Art Strauss MD, Medical Director (907) 388-2470 art@ghepak.com.

CALIFORNIA

Ventura — New hospital under construction and scheduled to open in the spring of 2018 with a state-of-the-art Emergency Department. Practice with a stable ER group on the central coast of California and only 70 miles from LAX. Positions available in two facilities for BC/BE emergency physician. Main facility is a STEMI Center, Stroke Center with on-call coverage of all specialties. This is a teaching facility with residents in Family Practice, Surgery, Orthopedics and Internal Medicine. Admitting hospital teams for Medicine and Pediatrics. 24-hour OB coverage in house and a well-established NICU. Annual volume is 48K patients with nearly 70 hours of coverage daily and 12 hours of PA/NP coverage. All shifts and providers have scribe services 24/7. Affiliated hospital is a smaller rural facility 20 minutes from Ventura in Ojai. Malpractice and tail coverage is provided. New hires will work days, nights, weekends and weekdays. Come work with a well-established high caliber group with expected volume growth potential at our new facility. Enjoy the life style of a beach community yet outside the hustle of the LA area. Please send a resume to Alex Kowblansky, MD, FACEP, at kowblansky@cox.net.

FLORIDA**EMERGENCY MEDICINE PHYSICIANS BC/BE**

Full-time, Part-time or Per diem Needed in Coastal Central Florida
Steward Health Care a physician-led organization is seeking Emergency Medicine physicians to join our rapidly expanding system in Eastern Florida. Steward Health Care is a fully integrated community care organization and community hospital network operating 39 hospitals in the US, across 10 states and the country of Malta. Our Emergency Medicine departments offer excellent support staff, EMR, midlevel coverage, flexible scheduling, and more. Full-time, part-time, and per diem opportunities available. Our practices are located in beautiful beachfront communities on the East Coast of Central Florida and border seventy-two miles of white sand beaches which lie in wait of sunbathers, surfers, families, and fishermen year-round. The area is home to numerous top notch private, charter and public A-rated schools. One



University Hospitals
Department of Emergency Medicine

**Global Emergency Medicine
Humanitarian Training Fellowship**

- ✓ 5 months mandatory field-work and mentorship under expert leaders within internationally renown *International Medical Corps*.
- ✓ Develop the expertise **YOU** want to focus on with over 30 IMC field sites to choose from.
- ✓ 1 and 2 year tracks available.
- ✓ MPH degree from Case Western Reserve University offered for 2-year fellowship track.
- ✓ Join as Junior Faculty at a thriving residency with a Level-1 Trauma Center



Questions about applying?

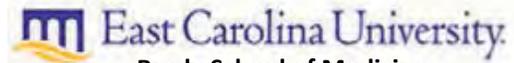
Please email Sorapat.Vijitakula@UHhospitals.org
Visit our website at www.cwruiemfellowship.com



A BETTER CHOICE a better career

Join our Emergency Medicine program in beautiful northern Wisconsin STAT!

Contact, Stephanie Luedke
stephanie.luedke@aurora.org
414.389.2668
aurora.org/doctor



EMERGENCY MEDICINE FACULTY

◊ Clinician-Educator ◊ Clinical-Researcher ◊ Critical Care Medicine ◊

◊ Pediatric Emergency Medicine ◊ Ultrasound ◊

The Department of Emergency Medicine at East Carolina University Brody School of Medicine seeks BC/BP emergency physicians and pediatric emergency physicians for tenure or clinical track positions at the rank of assistant professor or above, depending on qualifications. We are expanding our faculty to increase our cadre of clinician-educators and further develop programs in pediatric EM, ultrasound, clinical research, and critical care. Our current faculty members possess diverse interests and expertise leading to extensive state and national-level involvement. The emergency medicine residency is well-established and includes 12 EM and 2 EM/IM residents per year. We treat more than 130,000 patients per year in a state-of-the-art ED at Vidant Medical Center. VMC is a 960+ bed level 1 trauma center and regional referral center. Our tertiary care catchment area includes more than 1.5 million people in eastern North Carolina, many of whom arrive via our integrated mobile critical care and air medical service. Our new children's ED opened in July 2012, and a new children's hospital open in June 2013. Greenville, NC is a fast-growing university community located near beautiful North Carolina beaches. Cultural and recreational opportunities are abundant. Compensation is competitive and commensurate with qualifications; excellent fringe benefits are provided. Successful applicants will be board certified or prepared in Emergency Medicine or Pediatrics Emergency Medicine. They will possess outstanding clinical and teaching skills and qualify for appropriate privileges from ECU Physicians and VMC.

Confidential inquiry may be made to:
Theodore Delbridge, MD, MPH
Chair, Department of Emergency Medicine
delbridget@ecu.edu

ECU is an EEO/AA employer and accommodates individuals with disabilities. Applicants must comply with the Immigration Reform and Control Act. Proper documentation of identity and employability required at the time of employment. Current references must be provided upon request.

www.ecu.edu/ecuem/ 252-744-1418

CoxHealth opportunity

BE/BC emergency medicine

- Newly renovated eight-bed emergency department.
- More than 14,000 patients annually.
- Schedule is 12, 12-hour shifts a month.
- Competitive salary and sign-on bonus.
- Cox Monett Hospital named one of Modern Healthcare's 150 Best Places to Work in Healthcare



210 DAYS OF SUNSHINE

10% LOWER COST OF LIVING

11 NONSTOP FLIGHTS

IT'S NOT A JOB,
IT'S A WAY OF LIFE.



1-800-869-4201
Paula.Johnson@coxhealth.com



CLASSIFIED ADVERTISING

of the many other advantages of living in this beautiful area is its close proximity to the area attractions and theme parks like Universal Studios, Epcot, Sea World, Islands of Adventure, Walt Disney World, Aquatica and Kennedy Space Center! Fine dining, golf, camping, fishing, water sports, outlet/ mall & specialty shopping, MLB spring training, NBA team within distance and night life also a bonus!

Other Steward Florida Emergency Medicine highlights include:

- Join a large group of Emergency Medicine physicians
- Newly constructed state-of-the-art Emergency Departments
- Provides 24 x 7 x 365 quality emergency care
- One-hour drive to Orlando

If you are interested in learning more about this opportunity, or would like to apply, please contact: Dave Rezendes, Senior Physician Recruitment Specialist, Steward Health Care at 781-551-5640 or email: david.rezendes@steward.org.

All inquiries will remain confidential. Steward Health Care is an equal opportunity/affirmative action employer.

Jacksonville — St. Luke's Emergency Care Group, LLC in Jacksonville, Florida. Independent Physician-run group at St. Vincent's Medical Center-Southside in beautiful Northeast FL. Great area/community with river and ocean access, good schools, sports, and entertainment. Emergency Medicine residency trained BC/BE physicians with PAs providing MLP coverage. FT/PT available. Low physician turnover. Flexible scheduling with overlapping shifts. Holiday pay, shift differential, competitive base salary, and quarterly RVU bonus pool. Sign-on bonus and moving stipend available. Cerner EMR. Supportive medical staff with hospitalists and intensive care coverage, L&D/Neonatal ICU. 39,500 ED visits/year. Please contact us directly and send CV to: Katherine Considine, MD, Medical Director at Katherine.considine@ascension.org; (904) 296-3885.

INDIANA

Richmond — Long standing Emergency Medicine group of 12 — recruiting 3 BE/BC residency trained EM physician. Partnership day one! Excellent compensation package including \$50K signing bonus, \$100K student loan repayment and \$10K relocation. 401(k) with match and profit sharing! Community hospital with annual volume of 48,000 emergency room visits. New 217-bed hospital featuring 33-bed ER designated as Level 3 trauma. Epic EMR, no admitting orders, and strong specialty support. Richmond is a college community of 40,000 with draw area of 150,000. Three major metro cities within one hour — Indianapolis, Dayton and Cincinnati. Family oriented community with relaxed lifestyle and excellent schools. Outdoor Recreational activities abound. Great place to live and practice medicine. **Contact Amy Powell, Recruiter, Reid Health, PhysicianRecruitment@ReidHealth.org or 765-983-3104.**

South Bend — Memorial Hospital. Very stable, Democratic, single hospital, 24-member group seeks additional Emergency Physicians. 60K visits, Level II Trauma Center, double, triple and quad physician coverage. Equal pay, schedule and vote from day one. Over 375K total package with qualified retirement plan; group health and disability insurance; medical, dental and CME reimbursement, etc. Very favorable Indiana malpractice environment. University town, low cost of living, good schools, 90 minutes to Chicago, 40 minutes to Lake Michigan. Teaching opportunities at four year medical school and with FP residency program. Contact Joseph D'Haenens MD at southbendemergency@gmail.com.



Contact us at
recruitment@umem.org
or 410-328-8025

UMEM is an EOE/AEE



UNIVERSITY of MARYLAND EMERGENCY MEDICINE

Academic and Community Openings for BE/BC Emergency Physicians

Vibrant and varied career possibilities in academic and community settings in the Baltimore metropolitan area as well as near Washington, Philadelphia and Maryland's coastline.

Live and work in an urban, suburban or rural community, in an atmosphere that encourages work/life balance.

Current EM Practice Opportunities

Downtown Baltimore – Volumes from 21 to 66K

North of Baltimore – Volumes from 32 to 65K

Eastern Shore – Volumes from 15 to 37K

DC Suburbs – Volumes from 34 to 60K

Our supportive team approach in the delivery of high quality patient care features:

- Dedicated fast track and intake units staffed by Family Practice physicians and PAs
 - ED scribes and medical information systems
 - Stoke centers & STEMI programs
- Ultrasound programs with bedside US machines
- Advanced airway equipment including GlideScope®

Generous Compensation and Benefit Package

- Additional incentive compensation
- Medical, dental, vision and life insurance
- Employer-paid CME, PTO and 401K safe harbor retirement plan
- Employer-paid malpractice insurance with full tail coverage



When you become an owner in one of the largest, fastest-growing physician-owned and led groups in the nation, you get the support you need, and the culture and benefits you want.

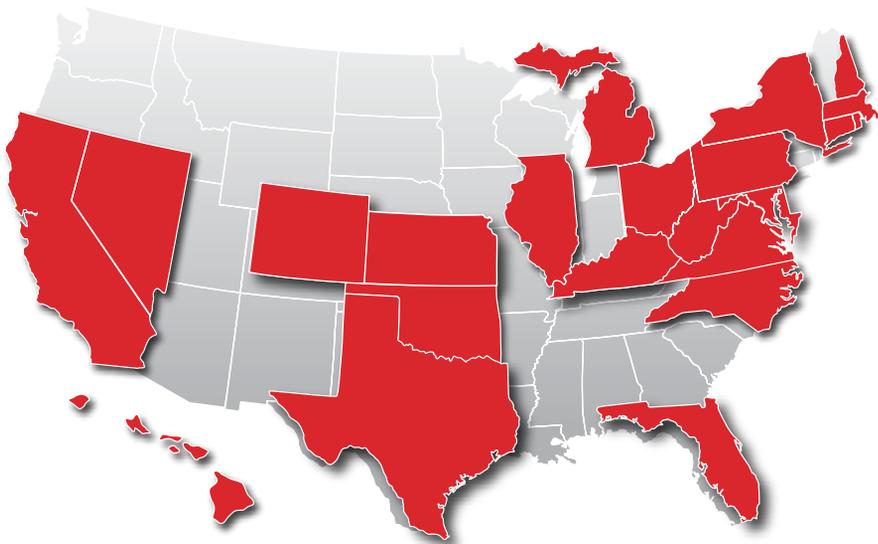
- Highly competitive financial/benefits package
- Physician equity ownership for all full-time physicians
- Industry-leading and company funded 401(k) (an additional 10%)
- Yearly CME/BEA (Business Expense Account)
- Student loan refinancing as low as 2.99%
- Groundbreaking Paid Parental Leave
- Pioneering Paid Military Leave
- Short- and long-term disability (own occupation)
- Comprehensive medical, dental, vision and Rx coverage
- The best medical malpractice including tail coverage
- Professional development programs
- Location flexibility and career stability of a national group

\$ SIGN ON BONUS FOR SELECT LOCATIONS!

To learn more about our opportunities contact:

Darrin P. Grella | VP of Recruiting
careers@usacs.com or 844-863-6797

**WORK WHERE YOU WANT TO LIVE.
LOCATIONS NATIONWIDE!**



FEATURED OPPORTUNITIES

Visit usacs.com to view a complete list of locations.

Catholic Medical Center

Manchester, NH | 32,000 pts./yr.

Lawrence & Memorial Hospital

New London, CT | 47,000 pts./yr.

Marshall Medical Center

Placerville, CA | 33,000 pts./yr.

Doctors Hospital

Columbus, OH | 79,000 pts./yr.

Valley Children's Hospital

Madera, CA | 124,000 pts./yr.

Albany Memorial Hospital

Albany, NY | 42,000 pts./yr.

Allegheny Health Network Emergency Medicine Management

Western PA | 12-55,000 pts./yr.

Saint Francis Hospital

Tulsa, OK | 104,000 pts./yr.

Frederick Memorial Hospital

Frederick, MD | 61,000 pts./yr.

Providence Health Center

Waco, TX | 69,000 pts./yr.

Valley Baptist Medical Center

Harlingen, TX | 49,000 pts./yr.

Peterson Regional Medical Center

Kerrville, TX | 29,000 pts./yr.

CHI St. Joseph Health Regional Hospital

Bryan, TX | 50,000 pts./yr.

Meritus Medical Center

Hagerstown, MD | 71,000 pts./yr.

Lake Health System

Eastern Cleveland, OH | 12-35,000 pts./yr.

Summa Health System

Akron, OH | 10-84,000 pts./yr.

Mercy Health

Cincinnati, OH region | 14-60,000 pts./yr.

Florida Hospital System

Florida Heartlands | 13-45,000 pts./yr.

Dignity Health Micro-Hospitals (4)

Las Vegas, NV | 17,000 pts./yr.

Carolinas HealthCare System

Charlotte, NC | 17-69,000 pts./yr.

CarolinaEast Medical Center

New Bern, NC | 67,000 pts./yr.

HIRING Emergency Medicine Physicians

Kettering Health Network is seeking a BC/BE Emergency Medicine physician to join a highly regarded, regional private group located in **Dayton, OH.**

- Strong group of 70+ physicians and advanced practice providers
- Provide care at six of Kettering Health Network's Emergency Departments, including 4 hospitals and 2 freestanding Emergency Centers
- Trauma Level II and III options
- Competitive salary, generous benefits package
- Sign-on bonus up to \$40,000 matched by group and hospital
- Epic EMR utilized across the network
- Warmth and charm of the Midwest

Site visits are being scheduled now!

Contact Cindy Corson
Physician Recruitment Manager
cindy.corson@ketteringhealth.org
(937) 558-3475 (office)
(503) 201-8588 (cell)



CLASSIFIED ADVERTISING

MASSACHUSETTS

EMERGENCY MEDICINE — GREATER BOSTON

Steward Health Care is seeking Emergency Medicine physicians to join our rapidly expanding system. Full and part-time opportunities are available throughout Eastern Massachusetts. Full-time, part-time or per diem opportunities are available for qualified candidates. Must Be Board Certified/ Board Eligible in Emergency Medicine.

Steward Health Care System Emergency Medicine highlights:

- Locations in and around Boston
- More than 90 Emergency Medicine physicians
- Provides quality care to 400,000 patients annually
- Recently opened 4 newly constructed Emergency Departments
- 3 of our EDs have resident rotations, including 2 with Emergency Medicine

Benefits of joining the Steward physician-governed dedicated EM group:

- Competitive compensation package
- Attractive year-end incentive bonus
- Comprehensive benefits package
- 401K and deferred compensation
- and more!

Steward Health Care, the largest private hospital operator in the United States, is a physician-led health care services organization committed to providing the highest quality of care in the communities where patients live. Steward operates 39 community hospitals in the United States and the country of Malta, that regularly receive top awards for quality and safety. For additional information, please contact: Catrina Morgan, Physician Recruitment Specialist, E: Catrina.Morgan@Steward.org P: 781-551-5629.

OHIO

EMERGENCY MEDICINE PHYSICIANS BC/BE

Full-time, Part-time or Per diem Needed in Northeast OH

Trumbull Regional Medical Center, a Steward Family teaching Hospital, is currently seeking a BC/BE Emergency Medicine Physician with excellent clinical acumen, strong interpersonal skills, and a commitment to providing outstanding patient centered care. We are also looking for a leadership candidate to assist the current ED Chair. The ED is a Level 3 trauma center averaging approximately 32,000 patients annually treating a full range of acuity. Our department is staffed by 15 dedicated EM physicians and seasoned advanced practitioners, along with a newly established IM/FM residency. Benefits of joining our physician-governed EM group include:

- Competitive Salary
- Comprehensive benefits package
- Attractive year-end incentive bonus
- Attractive CME/professional reimbursement
- 401K and deferred compensation
- Transparent financial monthly statements
- Tuition reimbursement
- Full-time, Part-Time and Per Diem Physicians Needed

Conveniently located 1 hour between Pittsburgh and Cleveland, Trumbull Regional Medical Center, a 346 bed facility in Northeastern Ohio, serves the health care needs of residents of Trumbull County and nearby communities, and has been providing quality care for over a century. The hospital has residents in IM and Family Medicine and is the first in Ohio to achieve Chest Pain v5 accreditation, which is the highest level accreditation from the Society of Cardiovascular Patient Care. Steward Health Care, the largest private hospital operator in the U.S., is a physician-led health care services organization committed to providing the highest quality of care in



Actively Recruiting:

BC/BE Emergency Physician

- Democratic, Physician-Owned Group
- 50,000 Annual Volume Community Hospital
- Dedicated Night Physicians & MLP Staff
- Medical, Dental, 401K, Disability, CME
- Generous Compensation
- Epic EMR with Scribes
- Annual Profit Sharing
- Partnership Track (No Buy-In)
- Value Work/Life Balance



Contact: Myles Jen Kin, DO FAAEM

Wachusett Emergency Physicians
60 Hospital Road, Leominster, MA 01453
Call: (978) 660-9221 Email: mjenkin@wepdocs.com

Emergency medicine physician opportunities at Geisinger

Geisinger, a national leader in healthcare innovation and technology, is seeking BC/BE Emergency Medicine trained physicians for opportunities throughout central, south central and northeast Pennsylvania.

Join Geisinger's growing team of Emergency Medicine staff physicians in practicing state-of-the-art medicine in one, or a variety of settings.

With Geisinger, you can take advantage of:

- Competitive compensation package
- Exceptional work life balance, defined clinical hours
- Support from a full range of dedicated specialists and subspecialists
- Scribes, pharmacists and Advance Practice support
- Ongoing enhancements to our fully-integrated Electronic Health Record (EHR) – Epic
- \$150,000 medical school loan repayment
- \$100,000 forgivable loan
- \$2,000 monthly stipend available to current residents upon signature of an offer letter

Locations throughout PA include:

- Geisinger Bloomsburg Hospital (GBH)
Bloomsburg
- Geisinger Wyoming Valley Medical Center (GWV)
Wilkes-Barre
- Geisinger South Wilkes-Barre (GSWB)
Wilkes-Barre
- Geisinger Holy Spirit (GHS)
Camp Hill
- Geisinger Shamokin Area Community Hospital (GSACH)
Coal Township

Geisinger is nationally recognized for our innovative practices and quality care.

A mature electronic health record connects a comprehensive network of 13 hospital campuses, two research centers and nearly 1,600 Geisinger primary and specialty care physicians.

For more information, visit geisinger.org/careers or contact Miranda Grace, Talent Management, at 717-899-0131 or migrace@geisinger.edu

Geisinger



AA/EOE: disability/vet

geisinger.org/careers



LEMA



**PRIVATE INDEPENDENT
GROUP
Top Texas Jobs**

**WE BUILD
EM LEADERS**

TAKE THE LEAD, CONTACT US TODAY: SUZY MEEK, MD CAREERS@LEMA-EM.COM LEMAMD.COM



New Jersey Medical School

Academic Emergency Physician

Rutgers New Jersey Medical School, Newark, NJ

The Department of Emergency Medicine at Rutgers New Jersey Medical School in Newark, NJ, is recruiting highly qualified, full-time BC/BE Emergency Medicine Faculty at the Assistant or Associate Professor level.

Join a diverse, enthusiastic faculty of academic Emergency Physicians in an expanding and dynamic department committed to scholarship, education, research, and outstanding clinical care. Clinical services are provided at University Hospital in Newark, NJ, a Level I trauma center.

Optimal candidates will have a desire for clinical, academic, or administrative excellence. Subspecialty of other training desired, but anyone with clinical and academic aspirations is strongly encouraged to begin or enhance your career at Rutgers NJMS. The salaries are competitive, the institutions and leadership are very supportive, and the patient population is highly in need of quality healthcare.

Live nearby in beautiful suburban or urban New Jersey or within a short commute from New York City. The medical school is blocks from the New Jersey Institute of Technology and the Rutgers Newark Campus, as well as the rejuvenating downtown Newark area, and is close to Newark Liberty Airport and Newark Penn Station Amtrak.

For more information or to submit a CV/cover letter please contact:

Lewis S. Nelson, MD
Chair, Department of Emergency Medicine
185 South Orange Avenue, MSB 609
Newark, NJ 07103 E-609
Email: Lewis.Nelson@njms.rutgers.edu

Rutgers University is an AA/EEO employer. All applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, citizenship, disability or protected veteran status.



ST. BARNABAS HOSPITAL DEPARTMENT OF EMERGENCY MEDICINE

FELLOWSHIP IN SOCIAL EMERGENCY MEDICINE

A one-year fellowship designed to train and educate the fellow in the field of Social Emergency Medicine. The fellowship will emphasize research and innovation around focused and systemic interventions promoting health equity along with operational, policy and legislative interventions.

CORE FACULTY POSITIONS

We seek EM faculty dedicated to advancing the specialty and practice of emergency medicine, and contributing to our missions of clinical, educational and research excellence.

St. Barnabas Hospital is a 461-bed safety-net hospital in the Bronx. St. Barnabas Hospital is the principal teaching affiliate of CUNY's School of Medicine, and is also affiliated with Albert Einstein and NYCOM. Our ED provides critical emergency care to over 90,000 patients/year and we are home to a well-established four year EM residency program.

For more information, please contact:
Daniel G. Murphy, MD, MBA, ED Chair
dmurphy@sbhny.org, 718.960.6103

CLASSIFIED ADVERTISING

the communities where patients live. Steward operates 38 community hospitals nationwide that employ approximately 37,000 people and regularly receive top awards for quality and safety. The Steward network includes more than 26 urgent care centers, 42 preferred skilled nursing facilities, substantial behavioral health services, over 7,300 beds under management, and more than 1.1 million covered lives through the company's managed care and health insurance services. Steward's unique health care service delivery model leverages technology, innovation, and care coordination to keep patients healthier. With a culture that prioritizes agility, resourcefulness, and continuous improvement, Steward is recognized as one of the nation's leading accountable care organizations. The Steward Health Care Network includes thousands of physicians who care for approximately 2 million patients annually. Steward Medical Group, the company's employed physician group, provides more than 1 million patient encounters per year. The Steward Hospital Group operates hospitals in Arizona, Arkansas, Colorado, Florida, Louisiana, Massachusetts, Ohio, Pennsylvania, Texas, Utah and the country of Malta.

If you are interested in learning more about this opportunity, or would like to apply, please contact Dave Rezendes, Senior Physician Recruitment Specialist, Steward Health Care at 781-551-5640 or email david.rezendes@steward.org.

All inquiries will remain confidential. Steward Health Care is an equal opportunity/affirmative action employer.

OREGON

Salem — Outstanding BC/BE EM physician partnership opportunity at Salem Health Emergency Department (SEPS). Well-established, independent, democratic group with 37 physicians and 6 APPs who staff 110K annual visit, Level II trauma center, with excellent specialty backup. Competitive pay and benefits including scribes, flexible scheduling, malpractice, 401k, and more. We structure our practice to minimize turnover through maximizing work-life balance. We love living in Salem, the heart of Oregon wine country, as it is convenient to the bounty of Oregon's recreational opportunities, and is a safe and affordable community. See what we're about at sepspc.com, then send your CV, cover letter, and a recent photo to sepspc@salemhealth.org or call us at 503-814-1278.

TEXAS



Leading Edge Medical Associates is a one-of-a-kind, private, independent group of all board-certified EM physicians in northeast Texas, offering a full range of clinical opportunities in EM. Our physicians enjoy shifts in a tertiary care trauma center as well as in nearby, lower volume clinical settings, all with high compensation and excellent full benefits. We are known for innovation in the industry and for developing strong EM leaders through LEMA's Leadership Development Institute. Almost half our physicians are former chief residents. LEMA is unique in its ability to offer physicians the best of both worlds, hospital-based and freestanding, academic and community medicine. LEMA is a group of exemplary physicians who work together as a team, value each member's input, and have a level of integrity, honesty, and trust that makes this innovative group truly one-of-a-kind. Interested in joining Texas's premier private group? Contact: SUZY MEEK, MD, CAREERS@LEMA-EM.COM.

{ Job Opportunities }

Division Chief, Pediatric Emergency Medicine
EMS Fellowship Director
Medical Director/Asst Medical Director
PEM/EM Core Faculty
Vice Chair Research Emergency Medicine

What We're Offering:

- We'll foster your passion for patient care and cultivate a collaborative environment rich with diversity
- Salaries commensurate with qualifications
- Sign-on bonus
- Relocation assistance
- Retirement options
- Penn State University Tuition Discount
- On-campus fitness center, daycare, credit union, and so much more!

What We're Seeking:

- Experienced leaders with a passion to inspire a team
- Ability to work collaboratively within diverse academic and clinical environments
- Demonstrate a spark for innovation and research opportunities for Department
- Completion of an accredited Emergency Medicine Residency Program
- BE/BC by ABEM or ABOEM
- Observation experience is a plus

What the Area Offers:

We welcome you to a community that emulates the values Milton Hershey instilled in a town that holds his name. Located in a safe family-friendly setting, Hershey, PA, our local neighborhoods boast a reasonable cost of living whether you prefer a more suburban setting or thriving city rich in theater, arts, and culture. Known as the home of the Hershey chocolate bar, Hershey's community is rich in history and offers an abundant range of outdoor activities, arts, and diverse experiences. We're conveniently located within a short distance to major cities such as Philadelphia, Pittsburgh, NYC, Baltimore, and Washington DC.



FOR ADDITIONAL INFORMATION PLEASE CONTACT:



Susan B. Promes, Professor and Chair, Department of Emergency Medicine c/o Heather Peffley,
Physician Recruiter, Penn State Health Milton S. Hershey Medical Center
500 University Drive, MC A595, P O Box 855, Hershey PA 17033
Email: hpeffley@pennstatehealth.psu.edu
or apply online at: hmc.pennstatehealth.org/careers/physicians

Penn State Health is committed to affirmative action, equal opportunity and the diversity of its workforce. Equal Opportunity Employer – Minorities/Women/Protected Veterans/Disabled.



NORTH SHORE MEDICAL CENTER

EMERGENCY MEDICINE OPPORTUNITY NEAR BOSTON, MA

ONE TEAM.
ONE FOCUS.

One thing sets North Shore Medical Center apart—our team based model of care which is founded on the principle that physicians, nurses, and other care providers working together will provide higher quality and a better patient experience. Today, that team focus drives our providers to be leaders of quality of care, patient safety and process improvement initiatives throughout NSMC.

While practicing as an Emergency Medicine physician at NSMC you will enjoy:

- working at one of the top hospitals in Boston with a new Emergency Department opening in October 2019
- the benefits of NSMC's membership in the Partners Healthcare System, founded by Massachusetts General Hospital and Brigham and Women's Hospital
- our combined annual adult ED volume of 80,000 visits provides an array of pathology with a fast track and PA program in place and excellent multispecialty back up
- a culture focused on communication, growth, and work/life balance
- excellent compensation and comprehensive fringe benefits
- being an active contributor to quality of care, patient safety and process improvement initiatives

Let's work together.

Interested candidates should send their CV to: Louis Caligiuri, Director of Physician Services at lcaligiuri@partners.org



Emergency Medicine Faculty Position

University Health Physicians, the physician group practice for **Truman Medical Centers**, is recruiting faculty at the Assistant or Associate Professor level in the Department of Emergency Medicine at the **University of Missouri-Kansas City School of Medicine**. Candidates must be board-certified/board-eligible emergency physicians. All qualified candidates will be considered, but preference will be given to candidates with EMS, Research or Ultrasound expertise. The department supports one of the nation's oldest fully-accredited three-year residency programs, with 33 residents. Truman Medical Center is a level I trauma center and the ED has an annual volume of 62,000 adult patients in a modern, state-of-the-art facility with 48 beds.

Kansas City offers an attractive lifestyle with low cost-of-living and affordable housing, renowned suburbs with top-ranked schools, and numerous outdoor activities.

Interested candidates should e-mail a letter of interest and CV in confidence to:

Matthew Gratton, MD

*Professor and Chair, Department of Emergency Medicine
2310 Holmes Street, Ste. 800
Kansas City, Missouri 64108*

matthew.gratton@tmcmed.org

EOE – M/F/Vet/Disabled

EPT EMERGENCY PHYSICIANS OF TIDEWATER, PLC

7 Distinct Locations in Norfolk, Virginia Beach, and Suffolk

Since 1972, Emergency Physicians of Tidewater has delivered emergency care to Southeastern Virginia EDs. Our seven locations allow our physicians to choose a location based on patient acuity, ED flow, resident coverage, and trauma designation. EPT employees enjoy the coastal living in Virginia Beach and Norfolk as well as the perks of having plenty US history, quaint towns, and mountains just a short drive away.

Opportunities:

- Flexible Schedule
- Leadership & resident teaching (bedside teaching, SIM lab, mock oral boards, lectures)
- Many options of involvement within the group (board representation, committee membership, etc.)
- Employees have the option to pursue our 2-year track to partnership
- Top Ranked Regional Retirement Plan

7 Hospital Democratic Group | Partnership Track | Teaching & Leadership Opportunities

Please send your CV to EPTrecruiter@gmail.com

EMERGENCY PHYSICIANS of St. Petersburg, PA



**Located in St. Petersburg, Florida
Seeking Fulltime BC/BE Emergency Physicians
at a Level II Trauma Center with 48,000 volume.**

We are a rapidly expanding, well-established, independent, democratic group.

Bayfront Health broke ground for a new 37,000 sq ft state-of-the-art Emergency Department.

480-bed hospital with:

- Primary Stroke Center
- Chest Pain Center with PCI
- Level IV Epilepsy Center
- Aero-Medical Flight Program
- Regional Flagship hospital with a network of six hospitals along the Florida Gulf Coast
- 48-hour physician coverage
- 36-hour PA/ARNP coverage

A free-standing ED is also slated to open November 1, 2018. We offer a comprehensive benefit package including health, dental, vision, LTC, CME allowance, 401K, profit-sharing, along with a partnership track.

Requirements: residency trained, ACLS, ATLS and PALS certified.

For more information, contact the Emergency Physicians of St. Petersburg, PA at (727)-553-7300, fax (727)-553-7395 or email: aaepsp360@gmail.com Our web site is EpspBayfront.com

Exciting Emergency Medicine Opportunities with Steward Health Care!

STEWARD HEALTH CARE, the largest private hospital operator in the United States, is a physician-led health care services organization committed to providing the highest quality of care in the communities where patients live.

EXPLORE THE EXCITING OPPORTUNITIES AT OUR NUMEROUS HOSPITALS:

FLORIDA

Melbourne Regional Medical Center, Melbourne, FL
 Rockledge Regional Medical Center, Rockledge, FL
 Sebastian River Medical Center, Sebastian, FL

MASSACHUSETTS

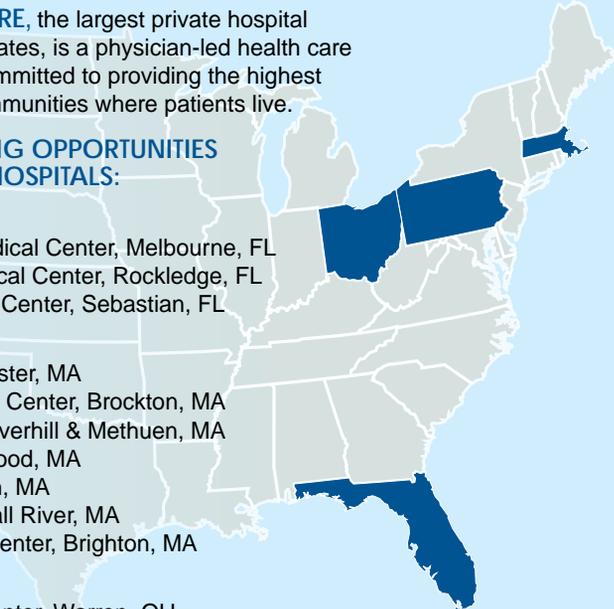
Carney Hospital, Dorchester, MA
 Good Samaritan Medical Center, Brockton, MA
 Holy Family Hospital, Haverhill & Methuen, MA
 Norwood Hospital, Norwood, MA
 Morton Hospital, Taunton, MA
 Saint Anne's Hospital, Fall River, MA
 St. Elizabeth's Medical Center, Brighton, MA

OHIO

Hillside Rehabilitation Center, Warren, OH
 Trumbull Regional Medical Center, Warren, OH

PENNSYLVANIA

Easton Hospital, Easton, PA
 Sharon Regional Medical Center, Sharon, PA



Our Emergency Medicine departments offer excellent support staff, EMR, midlevel coverage, scribes, flexible scheduling, and more.

- Newly constructed state-of-the-art EDs
- Multiple Teaching Hospitals
- Highly competitive compensation and benefits packages
- Productivity based incentive programs
- Sign On Bonus for select locations
- Part of a large national network of Hospitals and Physicians

For more information please contact:
Catrina Morgan | Physician Recruitment Specialist
 Network Development | Steward Health Care
 O:781-551-5629 | C:781-635-9703
 Email: Catrina.Morgan@Steward.org

Steward



The Emergency Group, Inc.

Honolulu, Hawaii

The Emergency Group, Inc. (TEG) is a growing, independent, democratic group that has been providing emergency services at The Queen's Medical Center (QMC) in Honolulu, Hawaii since 1973. QMC is the largest and only Level 1 Trauma Hospital in the state and cares for more than 65,000 ED patients per year. QMC opened an additional medical center in the community of West Oahu in 2014, which currently sees 60,000 ED patients annually.

Due to the vastly growing community in the West Oahu area, TEG is actively recruiting for EM Physicians BC/BE, EM physicians with Pediatric Fellowship who are BE/BC and an Ultrasound Director. Physicians will be credentialed at both facilities and will work the majority of the shifts at the West Oahu facility in Ewa Beach, Hawaii.

We offer competitive compensation, benefits and an opportunity to share in the ownership and profits of the company. Our physicians enjoy working in QMC's excellent facilities and experience the wonderful surroundings of living in Hawaii.

For more information, visit us at teghi.com/careers or submit your CV to the Operations Manager at tegrecruiter@gmail.com.

Own your tomorrow, today!
 Practice with us.



Rewarding opportunities available in:
 California, Kansas, North Carolina, Ohio,
 Tennessee, Texas & West Virginia!

Ask us about our:

- Sign-on Bonus
- Residency Stipend
- Leadership Development

Founded in 1981, VEP Healthcare is a democratic, provider owned and led physician organization. VEP provides flexibility and a path to ownership after just 150 hours of service.

For more information, contact:
recruiting@vephealthcare.com
 925- Call VEP (225-5837)
www.vephealthcare.com



Tufts Medical Center

BOSTON EMERGENCY MEDICINE OPPORTUNITY

The Department of Emergency Medicine at Tufts Medical Center, the principal teaching hospital for Tufts University School of Medicine in Boston, is seeking an ABEM/AOBEM BP/BC Emergency Physician to join our dynamic, independent group of residency trained, board certified emergency physicians. The Department currently offers a variety of clinical and educational programs with emphasis on resident and medical student education. Research opportunities within the Tufts Clinical and Translational Science Institute abound. Personal growth is guaranteed.

At Tufts Medical Center you will experience the following:

- ACS Level I Pediatric and Adult Trauma Center
- JC Accredited Comprehensive Stroke Center
- Dedicated Pediatric Emergency Department
- Volume of 50,000 diverse patients/year
- Outstanding Pediatric, EMS, Ultrasound and Geriatric Programs
- Students and Residents who will stimulate you
- Colleagues and Nursing Staff who you will enjoy working with side by side
- An excellent compensation package

Please contact or forward CV to:
Brien A. Barnewolt, M.D., F.A.C.E.P.
 Phone: 617-636-4721
 Email: bbarnewolt@tuftsmedicalcenter.org

Where Quality of Life and Quality of Care Come Together



Big City Medicine, Hometown Feel.

We understand the importance of balancing work with a healthy personal lifestyle.

- Berkshires, a 4-season resort community
- Endless cultural opportunities
- World-renowned music, art, theater, and museums
- Year-round recreational activities from skiing to kayaking
- Excellent public and private schools make this an ideal family location
- **Just 2.5 hours from both Boston and New York City.**

Berkshire Health Systems Opportunity

- BC/BE Emergency Medicine Physician
- Annual Volume 60,000
- Regional referral center and Trauma center
- Hospitalist Support and Sub-Specialty support
- Patient-focused practice
- Teaching Affiliate with UMASS Medical School and UNE Osteopathic Medical School
- **Competitive compensation** and benefits package, including productivity option and relocation

Berkshire Medical Center, BHS's 302-bed community teaching hospital and Trauma Center, is the region's leading provider of comprehensive healthcare services.

Interested candidates are invited to contact:
 Shelly Sweet, Physician Recruitment Specialist
msweet@bhs1.org or
 Apply online: www.berkshirehealthsystems.org



**Berkshire
Health Systems**

LIFE IS MORE FUN IN THE DRIVER'S SEAT

We're putting you in
control of your emergency
medicine career.



Your Career. Your Decision.

Connect with us to map
out your journey.

careers.soundphysicians.com



SOUND

EMERGENCY MEDICINE

SEEKING EMERGENCY DEPARTMENT PHYSICIANS

The busiest ED in North Carolina, and one of the top 15 busiest in the nation, treats 95k adult and 35k pediatric cases annually in its 92 beds. We are currently seeking residency trained BC/BE emergency physicians to work in the 75 bed adult ED. This ED serves a high acuity patient population with 28% annual admission rate. There are over 90 hours of adult physician coverage daily and over 110 hours mid-level coverage daily. It is a Level III Trauma Center with robust hospitalist service, interventional cardiology 24/7, cardiac surgery, neurosurgery, etc. The facility is Chest Pain and Stroke accredited. The EMS system is hospital owned and managed with an award winning paramedic program. Of note, the Pediatric ED is separate and has 17 dedicated beds with an additional 24 hours of physician coverage and 20 hours of mid-level coverage. We welcomed our inaugural class of Emergency Medicine Residents in July 2017. Opportunities exist for both clinical and academic emergency physicians.



EXPECTING TO BE EXCITED AND CHALLENGED?

Come join our team today!

TOP TIER COMPENSATION

The cash compensation package is valued at over \$250/hour, including evening, night, and holiday differentials, as well as a quarterly incentive bonus. We offer a generous sign-on bonus plus moving stipend. The comprehensive benefits package includes Malpractice Insurance Paid; CME Time and Allowance; 403(b) match and 457(b); and health, dental, and other desirable benefits.

THE AREA

Cape Fear Valley Health is located in the thriving and diverse community of Fayetteville, NC which consists of more than 319,000 residents. Fayetteville has received the prestigious All-America City Award three times from the National Civic League.

Known for its many golf courses (Pinehurst is located only 30 minutes away), our central location provides easy access to beautiful beaches to our east and to the majestic Blue Ridge Mountains to our west. Our mild climate, low cost of living, and patriotic spirit makes our location ideal for rising healthcare professionals and families.



CAPE FEAR VALLEY HEALTH

Please contact Ashley Dowless, Corporate Director, Physician Recruitment
at 910-615-1888

or adowl@capefearvalley.com for additional information.



Exceptional Emergency Medicine Opportunities with EMMC and Affiliates in Maine!

Eastern Maine Medical Center is seeking BC/BE Emergency Medicine physicians for full-time permanent positions at primary locations in Bangor, Blue Hill, Waterville and Ellsworth

- Dynamic physician-led collaborative Emergency Medicine Model
- Supportive hospital administration
- Join well-established team at a primary site, with options to work at other sites within our system
- Flexible schedule/no call
- Medical student teaching options
- Full Spectrum of Sub-specialty backup and consultation
- In-house collaborative Radiology and Night Hawk Services
- In-System LifeFlight of Maine Air/Ground Critical Care Transport Program
- In-System ACS-Verified Level II Trauma Center <1 hr away
 - Trauma Service: on call consult
 - Critical Care Intensivists: on call consult
 - Pediatric Intensivists: on call consult



EMMC and affiliates are located in highly desirable, family-centered locations throughout Maine! Enjoy year-round access to Maine's unmatched coastline, mountains and lakes with limitless outdoor recreational opportunities and unspoiled natural beauty!

J-1 Visa candidates welcome to apply!

For more information, please contact:

Amanda L. Klausing, AASPR, Physician Recruiter

Email: ProviderJobs@emhs.org

Phone: (207) 973-5358



**EASTERN MAINE
MEDICAL CENTER**

EMHS MEMBER

Health System

BC/BE EMERGENCY PHYSICIANS NEEDED to join current staff of 40+ physicians

- **Level I Trauma Center with 75 beds and fast track**
- **Medical Observation Unit with 16 beds**
- **Pediatric ED with 16 beds**
- **Community hospital ED with 21 beds**

EXCELLENT COMPENSATION PACKAGE!

- **Competitive salary with RVU-based incentives, CME, paid vacation, health/life/malpractice, 401k**

Huntsville Hospital is looking for additional coverage for our progressive Emergency Department. We see approximately 150,000 patient visits per year across our 4 different units (Level I Trauma Center, Medical Observation Unit, Pediatric ED at Children's hospital, community hospital in Madison - plus an OB ED staffed by our OBGYN Hospitalist team. Our physicians work an average of 14-15 shifts per month (9-10 hours per shift), allowing for an excellent work/life balance. Teaching opportunities with 3rd/4th year medical students from UAB and Family Medicine and Internal Medicine residents at UAB-Huntsville rotate through our ED.

Qualified candidates include: Emergency Medicine and Family Medicine physicians. Huntsville Hospital is a Level I Trauma Center and the Regional Referral Center for North Alabama and Southern Tennessee. Huntsville Hospital is Alabama's only Top 50 Heart Hospital by Truven Health Analytics and one of America's 50 Best Cardiac Surgery Programs by HealthGrades.

Huntsville is situated in the fastest growing major metropolitan area of Alabama, and with the highest per-capita income in the Southeast, Huntsville is the best place to live, learn, and work. We are a community on the move, rich with values and creative talents. These unique characteristics will certainly provide a place for you and your family to flourish. With a population of 385K, we are a high-tech, family-oriented, multicultural community with excellent schools, dining, and entertainment - all nestled in the foothills of the beautiful Appalachian Mountains.

**For further information, please contact Suzanne LeCroix
at (256) 265-9639 or suzanne.lecroix@hhsys.org**



huntsvillehospital.org

Practice
made
perfect

Live where
you want.
Practice where
you're needed.



BE THE BEST PHYSICIAN POSSIBLE AS A MEMBER OF TEAMHEALTH'S SPECIAL OPS PHYSICIAN TEAM.

- First-class experience with first-class pay
- Practice across your region but live where you want
- Independent Contractor status
- Preferred scheduling
- Work 120 hours per month
- Leadership training and opportunities
- ABEM or AOBEM certified/prepared
- EM residency trained
- Enjoy the opportunity to travel to different areas
- Reimbursement for licensure, certifications and travel

Join our team
teamhealth.com/join or call **877.709.4638**

TEAMHealth®





Emergency Medicine Residents' Association

4950 W. Royal Lane

Irving, TX 75063

972.550.0920

emra.org

PRSR STD
U.S. POSTAGE PAID
BOLINGBROOK, IL
PERMIT NO. 467

**Where you live is a reflection of who you are.
Over 200 locations and growing.**



So is where you work. If you want to be part of a large, stable group, take a look at US Acute Care Solutions. We are the largest, physician-owned group in the country, with over 200 locations, each chosen to appeal to the different tastes and lifestyles of our clinicians. Best of all? Every USACS physician becomes an owner in our group, creating unbeatable camaraderie. Our commitment to physician ownership is a reflection of who we are and what we care about most: our patients, and living the lives we've always dreamed of.

Visit USACS.com and discover why more than 3,000 providers serving over 6 million patients a year are proud to call US Acute Care Solutions home.



Own your future now. Visit usacs.com
or call Darrin Grella at 844-863-6797 careers@usacs.com

