

EM Resident

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Letter from the Editor



Abby Cosgrove, MD
Editor-in-Chief, EM Resident
Washington University in St. Louis
St. Louis, MO

Every year as interns don their long white coats for the first time ever, swipe their glossy name badges, and figure out where the bathrooms are, I have flashbacks to my first few shifts as a “real doctor” in the emergency department. For the most part, I knew what to expect: to constantly feel sick to my stomach and completely overwhelmed, while wondering what I had actually learned in medical school. And while I found it simultaneously liberating and terrifying to be able to write orders, make medical decisions, and perform procedures that I had only dreamt of as a medical student, I was disheartened to discover a much darker side to medicine.

No, it wasn't the endless administrative tasks, the nagging fear of litigation, or the waning empathy. It was surprisingly **the way physicians treat each other.**

One day I found myself fighting back tears in fluorescent bathroom lighting after having been mocked and berated by the chief of a consulting team. As I stared at myself in the mirror, desperately trying to wipe off what remained of my mascara (wasn't this stuff supposed to be waterproof?), a nurse was calling my phone for a medication order. My pager was beeping with another Level 1 trauma. Just 30 more seconds and I was expected to walk out looking fresh and eager, excited to rejoin the educational utopia that was the ED. More like a war zone, to me.

In that moment, I could not have felt more alone.

Yet over the years, instead of asking

why these attitudes exist, I found myself simply accepting them. It was easier to excuse rude or condescending behavior by rationalizing that these so-called “colleagues” were overworked, or sleep-deprived, or that their personal lives were falling apart. It was much more difficult to accept that certain behaviors might just be the result of inherent feelings of superiority.

Sometimes we *don't* see eye-to-eye with our colleagues. This can create an “us vs. them” mentality that stems from a more primal need to identify with and stay loyal to a certain social group or community. But emergency physicians interact with more physicians in more specialties on any given day than anyone else in the hospital. We simply cannot afford constant clashes between our “social” groups, or else we risk disgracing the entire profession.

What we too often forget is that **every single doctor provides an important aspect of patient care** that complements the work of others. We *need* our primary care colleagues to continue working hard to keep their patients out of the hospital. We *need* our surgical subspecialists to be able to take patients emergently to the operating room, something far beyond our own scope of knowledge or practice. And they need **us to care for their patients when they are not available, 24 hours a day, 365 days a year.** Like well-trained professional athletes on an Olympic crew team, every person is integral to the stroke of sound and safe clinical practice. In order to succeed,

we must truly believe that **we are all equally important.** We are all in the same boat, after all.

Last month, I delivered a very premature neonate in a community hospital that had neither pediatrics nor obstetrics. Like a brand-new intern, I was simultaneously exhilarated and terrified. At the end of the shift, however, the adrenaline rush had dissipated and it felt like just another day at work. That is, I had simply done what I was expected to do.

Three days later, I received a call from the neonatal ICU attending at the children's hospital, commending us on our work. Three specific words rung in my ears like the Liberty Bell: **“I appreciate you.”**

This recognition by a physician I had never met, but with whom I shared a very special patient, trumped every negative interaction from the preceding months — maybe even years. Unbeknownst to that physician, in that moment, those 3 words made *everything* seem worthwhile.

Each time I prepare another issue of *EM Resident*, I am astounded by the breadth of knowledge and experience of my colleagues. It saddens me to think that somewhere out there, hiding in a bathroom, is a resident who feels as though they have given so much of themselves for so long, yet seemingly for so little in return. **Whether s/he is a fellow EM resident or an orthopedic consultant, let that resident know how much you appreciate them.** I promise it will make their day. ★

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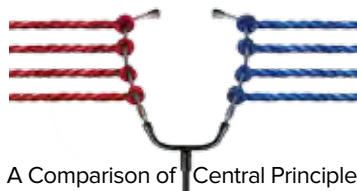
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- August 11**
SIMWars Call for Teams Due
- August 31**
EMF/GE Healthcare Grant Applications Due
- Month of September**
EM Day of Service
- September 1**
ACEP Section of Medical Humanities Writing & Visual Arts Awards Entries Due
- September 15**
NRMP Main Residency Match Registration Opens
- October 5**
EM Resident Magazine Articles Due
- October 14-17**
ABEM Fall Oral Certification Exam
- October 26-November 1**
EMRA Events @ ACEP Scientific Assembly, Washington, D.C.
- November 6-11**
ABEM Qualifying Exam



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KEEP ON ROCKIN'

Emergency Medicine



Alicia Kurtz, MD
EMRA President
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First and foremost, a huge welcome to all of our new members! We are so excited to have this year's interns up an at 'em in our departments already. While you may have years of training left ahead of you and a *ton* to learn, you bring such a great energy to work and are a palpable reminder of the excitement so many of us felt entering residency – an enthusiasm sometimes forgotten as our training drudges on over the years.

But **taking the occasional moment to remember why we love EM is imperative to our longevity as clinicians**, and perhaps we can use our newly minted co-residents as a reminder to ourselves to do just that.

The other day I found myself at a farewell party for a friend seated next to his parent who had a very negative impression of EM in general. It seems the high burnout rate of emergency physicians, long ED wait times, and other notorious features of our challenging medical system had left him under the impression that all ED doctors are overworked, under-appreciated, unemotional, and stuck dealing with the “mess” since we we “*have to see everyone*” who presents to the ED.

While it may seem like there is some truth in what he was saying, **we need to bind together as a specialty**

and offer the rest of the world a re-frame.

We don't “have to” see everyone; **we GET to.** We are privileged as providers to not have to worry about what a person's insurance is or if they have pre-authorization before we begin treatment. While fair coverage is extremely important, in EM, it does not impact our decision to deliver the highest quality care we can to *every* individual we see in the ED.

We aren't emotionally numb; **we are well-trained to compartmentalize in order to continue providing excellent care to all our patients**, putting their needs over even our own. Strangers present to our departments and trust *us* to be there for them in their most vulnerable moments, and we are proud to care for them with intellect and emotional depth whether in a crashing pediatric patient in one room or a viral URI in the next. We must continue to support each other through what is one of the most difficult to understand and unique emotional rollercoasters life could possibly muster, and foster a community of providers that believes in decompressing and supporting one another as fervently as we do being

willing to deal adeptly with this struggle in the first place.

We do not and will not simply suffer in a system with many broken parts; **we advocate for our patients every day** on the local, state, and national levels, and **we will work tirelessly to innovate solutions throughout our careers.** Emergency medicine is the gateway to the remainder of the healthcare system, and we must challenge ourselves to stay engaged and bring our perspectives to the table as our government and many systems re-evaluate our country's delivery of care.

We all have bad days, and it's easy to let them pile up and create a space for burnout to sneak in. But as we are reminded by our eager interns roaming our halls for the first time, what we do is special. And awesome. And something we fought like mad to be able to do. And that we should be grateful to have the opportunity to experience every day.

Remember: advocacy is an active process for each of you, your patients, and our collective communities.

Want to find out how to make a difference or get involved? E-mail me any time at president@emra.org.

Keep on rockin' in the free world! ★

SPRING 2017 RESOLUTIONS

The 16 resolutions adopted by the EMRA Representative Council in May 2017 include:

1. Inclusion of Electronic and Remote Voting in the EMRA Representative Council Procedures
2. Resolution in Support of Comprehensive Access to Quality Medical Care
3. Health Disparities
4. Coverage for Vulnerable Populations
5. Pharmaceutical Strengthening: Improving Delivery in the ED
6. Ensuring the Highest Level of Patient Care Within Our Countries' Hospital Emergency Departments, No Matter the Location
7. Support for Infrastructure and Regulations Related to Freestanding EDs and Care Coordination
8. Systems-Building for Critical Illness and Injury: Improving Bystander Intervention in Out-of-Hospital Critical Illness and Injury
9. Support for Telemedicine in EM
10. The Value of Electronic Health Information Exchange and Interoperability
11. Emergency Medicine Training to Address Social Determinants of Health
12. Emergency Medicine to Support Evidence-Based Policy Reforms of the Criminal Justice System
13. Support for International Physicians and Their Practice in the United States
14. EMRA Support for Paid Equal Maternity and Paternity Leave
15. Resolution in Support of Protecting Access to Women's Health, Reproductive Health, and Organizations that Provide Increased Health Access to Women
16. Mental Health and Emergency Medicine ★

Anatomy of an EMRA Resolution



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The EMRA Representative Council passed a whopping 16 resolutions at its spring meeting in Orlando, tackling topics ranging from electronic and remote voting (now approved for the EMRA Rep Council) to social medicine issues such as equitable coverage, prison reform, and more. (*Find the full language of all 16 resolutions online at emra.org/leadership/Representative-Council.*)

Let's keep the momentum going – write a resolution for the fall meeting! Resolutions are due Sept. 15 (unless you're proposing a bylaws change, in which case it's due Sept. 8).

A Powerful Privilege

Resolutions shape EMRA's policy direction – and writing them is among the most fundamental ways for members to affect the specialty. While the language of a resolution may seem stilted, it's a simple process when you understand the elements.

What is a Resolution?

A resolution is a directive for EMRA to take a certain action, form a policy, or embrace a stance. Any EMRA member can write a resolution on any topic related to emergency medicine. Resolutions can be submitted by individuals or groups.

How are Resolutions Structured?

Basic elements of every resolution include:

- ✓ Title
- ✓ "Whereas" clause(s)
- ✓ References
- ✓ Fiscal notes (noted by Speaker or by EMRA staff)
- ✓ Author(s)
- ✓ "Resolved" clause(s)
- ✓ Relevant EMRA policy (*noted by Speaker of the Council*)

"Whereas" clauses persuasively explain why EMRA should address your topic and support your "Resolved" clauses. Use "Whereas" statements to describe and quantify the problem you're addressing, or to justify why policy is needed. Back it up with facts!

"Resolved" clauses will be voted on by the Representative Council – making these the most important part of your resolution. Each "Resolved" clause must contain an actionable request and must make sense when read alone, since that's the part of your document that will become EMRA policy. Be as clear and direct as possible.

When's This Due?

Resolutions are due 45 days before each Representative Council meeting – so if you're writing one for the fall meeting, get it ready by Sept. 15. (*Note: EMRA accounts for emergency resolutions after the deadlines; please see emra.org/leadership/Representative-Council for specifics.*)

Send resolutions to speaker@emra.org and emra@emra.org. We're waiting to see what direction you want to go!

Questions?

Please contact speaker@emra.org or visit emra.org/leadership/Representative-Council for more details, links, and a resolution template. ★

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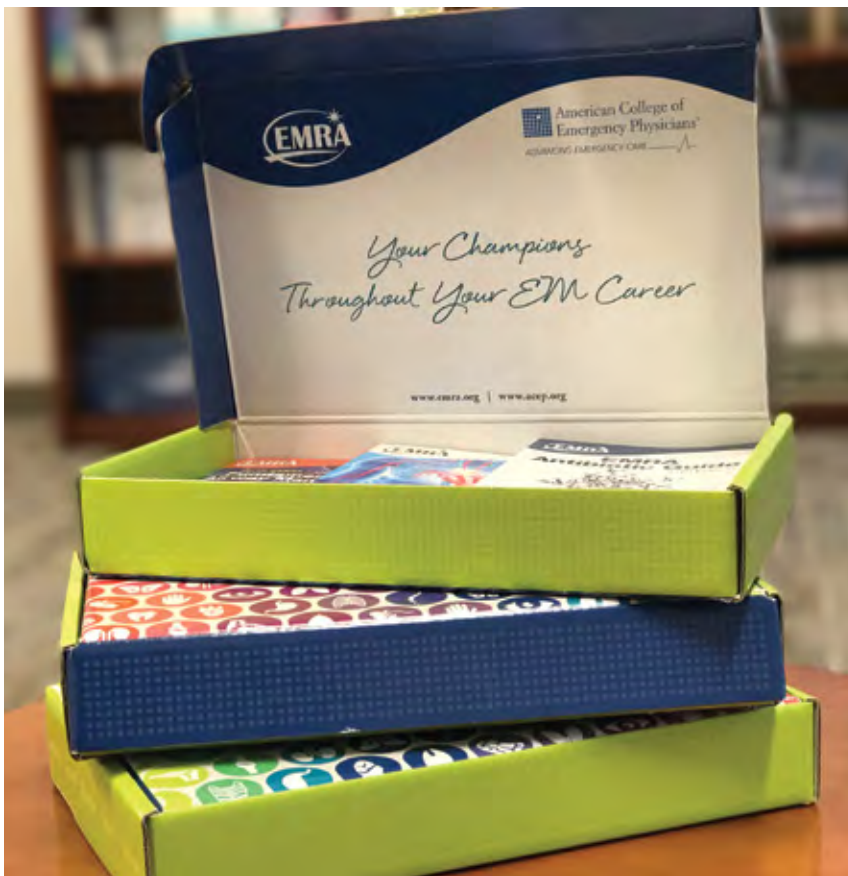
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We're Your People – Throughout Your Career!

EMRA members are uniquely talented individuals who shape the face of emergency medicine. We want to enable you to continue being rock stars and to continue saving lives — so we have tailored the **EMRA Alumni Membership** for that very purpose.

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As an EMRA alumni member, you will receive your own membership box unique to your level of membership — with the many valuable resources you have come to know and love, such as each new edition of the *EMRA Antibiotic Guide*, *EMRA PressorDex*, and other clinical resources. Also, for those wishing to brush up on their airway essentials, our alumni kit includes Dr. Rich Levitan's *EMRA and Airway•CAM Fundamentals of Airway Management*, with a comprehensive range of full-color images illustrating the fine points of emergency airway management in various scenarios.

Saving \$\$\$

Looking to brush up a bit with Board Review or just stay current with podcasts such as EM:RAP? You receive alumni discounts from HippoEM, RoshReview, and EM:RAP (your first year after residency). This is especially awesome for new graduates looking for deals! You can also save a ton on CME credits with alumni membership using EMedHome.com.

Developing Your Network

Emergency medicine is an incredibly small field, and we are your people! As an attending physician, you have the opportunity to mentor residents, meet rising stars in the field, and get your name out there amongst other faculty. This is a great way to develop your reputation and your brand within emergency medicine. It also affords you the opportunity to develop niche interests shared by other emergency doctors or to simply make a great group of friends.

In a nutshell, whether you are a newly minted attending physician or you have a number of years under your belt, we hope you will sign up for EMRA alumni membership! For only \$99 annually, you receive the amazing benefits EMRA builds for you, while supporting your “younger siblings” coming up in emergency medicine! You are the reason EMRA is what it is today, and we hope you will continue to help shape the face of emergency medicine for years to come.

As always, please reach out to let me know how I can best serve you and make any level of membership meaningful to you. I want your honest feedback and am dedicated to making your experience amazing! Drop a line to membershipcoord@emra.org. ★

Affordable Care Act vs. American Health Care Act



A COMPARISON OF CENTRAL PRINCIPLES



Nathan Vafaie, MD, MBA
EMRA Health Policy Committee Chair
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The CBO estimates that the Republican proposal would increase the number of people who are uninsured by 24 million in 2026.

The elections of November 2016, which left the Republican Party in control of Congress and the Executive Branch, have led to a dynamic period in federal health policy. The content of the proposed reforms and how EMRA should best represent EM residents is worth investigating.

Individual Mandate

Rather than requiring that Americans have health insurance or pay a tax penalty of the greater of \$695 per year (indexed to inflation) or 2.5% of household income, the American Health Care Act would mandate a 30% surcharge penalty on the applicable premium for those buying coverage who have not previously maintained continuous health insurance.

Penalties for not maintaining continuous health insurance are an important part of any sensible health system. Five percent of Americans

account for 49% of overall health care dollars spent. Without a penalty, it would be fiscally rational to wait until you became sick to buy insurance.

Premium Subsidies

Republicans proposed refundable tax credits that vary with age and phase out for those with higher incomes. Each member of the family would be allowed credits ranging from \$2,000 for an individual under 30 to \$4,000 for people age 60 and older. The tax credits would begin to decrease for individuals with an income at or above \$75,000, with less credit for those making more. Concurrently, the GOP proposal would change the age rating of current law. Presently, health insurers can charge older individuals (who often have higher health care costs), 3 times as much as younger individuals. The GOP planned to loosen age rating restrictions by allowing insurers to charge older individuals up

to 5 times as much as younger people or allow states to waive the restrictions on age rating.

Current law provides a sliding scale of tax credits based on family income, where people live, and age. Subsidies increase as the cost of the health plan increases, indexed to the second lowest silver plan (middle tier plan) in that geographic area. Subsidies are provided for individuals with incomes between 100% and 400% of the Federal Poverty Limit.

The differences in the insurance premium assistance between the proposals have important implications for American consumers. Since the subsidies for the ACA are linked to income on a sliding scale, the subsidies are more generous for those with lower incomes. Reformers wanted flat tax credits for incomes up to \$75,000, which would provide more assistance than the ACA for those with incomes just under \$75,000. Further, the tax credits were not linked to

the price of a plan in a specific geographic area, meaning that if the premiums in a region grow faster than inflation the tax credits would cover a smaller proportion of the premium cost than would be covered under the ACA.

Because of differences in the premium assistance and Medicaid coverage, the Congressional Budget Office, a non-partisan government body, estimates that enacting the American Health Care Act would reduce federal deficits by \$337 billion over the coming decade.

Medicaid Coverage

The ACA expanded Medicaid eligibility to all non-elderly adults with incomes up to 138% of the Federal Poverty Limit. The GOP proposal would have limited federal funding of state Medicaid programs to what the federal government spent this fiscal year, indexed to the state's aggregate enrollment and medical inflation. It also would have cut off the expanded Medicaid eligibility for those who do not maintain continuous Medicaid coverage starting in 2020.

The Congressional Budget Office

estimates that the Republican proposal would increase the number of people who are uninsured by 24 million in 2026 relative to current law.

June 2017 Update

An amended version of the American Health Care Act passed the House in May 2017. House members altered elements of the bill concerning pre-existing conditions, essential health benefits, and age rating restrictions. The CBO estimates that the bill passed by the House would reduce the cumulative federal deficit over the 2017-2026 period by \$119 billion, which is \$32 billion less than the estimated net savings for the original version of the American Health Care Act. The CBO also projects that if this bill were to become law, 23 million people would lose health insurance coverage by 2026, leaving a total of 51 million people under the age of 65 uninsured. Congressional debate regarding the future of the American Health Care system continues as the Senate debates how best to move forward.

Staying Involved

In our continuing efforts to accurately and effectively represent the interests of emergency medicine residents on legislative matters, the EMRA Health Policy Committee continues to closely follow legislative activity related to the health system. Our success in advocating for our peers comes largely as a function of resident engagement. Those interested in becoming further involved in health policy and advocacy are encouraged to reach out to members of the EMRA Health Policy Committee, attend meetings, and provide feedback regarding how we can better represent you.

*Editor's note: In July, the Senate Republican leadership unveiled a revised "Better Care Reconciliation Act" (BCRA) to repeal and replace the ACA. The bill did not have enough support to pass in the Senate. On July 18, Senator Majority Leader Mitch McConnell announced the Senate will focus less on replacing the ACA altogether and instead vote on legislation to repeal the law within the next 2 years. **

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Bridging the Gap Between the Emergency Department and the Intensive Care Unit

Post-Intubation Sedation



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The practice of endotracheal intubation is often executed as follows: the endotracheal tube is placed; propofol/benzodiazepine drips are started; and the intensive care unit (ICU) consultant is called while the emergency department (ED) team addresses the continued influx of patients. As the boundaries between intensivist, resuscitation leader, and emergency physician continue to blur in the era of ED-ICUs and inpatient boarding, the crucial tenets of post-intubation sedation and analgesia can be overlooked. However, their importance is reflected by continued research showing effects on mortality and ICU length of stay.

With the seminal pain, agitation, and delirium (PAD) guidelines published by the Society of Critical Care Medicine (SCCM) in 2013, the care of the critically ill patient requires facility with sedation and analgesia practice standards.¹ Overall ED visits have increased over the past decade, and recent studies have shown that ED management and boarding time affects the ICU course.^{2,3} Furthermore, initiatives such as those of the ICU Liberation Collaborative validate the importance of implementing the PAD guidelines during the early

ICU course (and thus, the ED course).⁴ Implementation of appropriate pharmacologic interventions by emergency physicians have downstream effects on the inpatient course and long-term outcomes for critically ill patients.⁵

The Concept of Analgesia-first Sedation

As a departure from prior SCCM guidelines, **the 2013 SCCM PAD guidelines recommend prioritizing analgesia over sedation in the mechanically ventilated patient.**¹ Analgesia-first sedation or “analgo-sedation” is the concept of controlling pain prior to implementing sedation medications.⁶ This concept was first introduced in 2010 by Strøm et al.⁷ Randomizing patients to a protocol of no-sedation/analgesia-only vs. sedation with daily interruption, the study was able to find analgesia-only strategies to have significant reductions in length of stay and mechanical ventilation.⁷ From the Tanaka et al study in 2014, the depth of sedation in the first 48 hours of ICU stay was strongly and independently associated with increased hospital mortality.⁵ As a secondary analysis of 45 Brazilian ICUs, this group used GCS as a surrogate for the Richmond Agitation-Sedation

Scale (RASS), independently associating deeper sedation with higher mortality.⁵ The importance of minimizing sedation depth and prioritizing analgesia is further reflected in the recent work by Faust et al, which implemented the analgesosedation paradigm in a medical intensive care unit, showing improved length of stay and duration of mechanical ventilation.⁸

While departmental flow and logistical demands of the ED often require deep initial sedation in the post-paralytic period, the subsequent, more stable post-intubation period is an appropriate time to target the analgesia-first, benzodiazepine-sparing strategies of the first 48 hours. **The avoidance of benzodiazepines and the prioritization of opioid medications are consistent with the PAD guidelines as well as with recent evidence showing benefits of addressing analgesia-first in the sedation strategy.**

Assessment of Pain

The emergency physician should be familiar with quantification methods for analgesia titration. The pain experienced by the critically ill patient is quantified by the Critical Care Pain Observation Tool (CPOT) and the Behavior Pain Score (BPS), both of which have been validated against

the gold standard of communicative patients' pain reports.⁹ Quantifying pain using scales like the CPOT (Figure 1) or BPS (Figure 2) provides objective data for post-intubation pharmacologic interventions. The CPOT is particularly valuable in that it has been tested and validated in patient populations both with and without delirium.¹⁰

Assessment of Agitation

Frequently referenced in intensive care literature, the RASS is often the common denominator upon which sedation interventions are based. As one of the initial steps in assessing delirium via the CAM-ICU score, the RASS level quantifies the depth of sedation, providing structure in employing contemporary protocols.

To define the movement toward lighter sedation protocols, a RASS of 0 to -1 is often used as a benchmark. Another way of defining a RASS of -1 is asking, "Does the patient open eyes to verbal stimuli and maintain eye contact for >10 seconds?" Using the RASS to titrate sedation, Shehabi et al examined medical and surgical units from a number of countries to investigate the correlation between deep sedation (RASS \leq -3) within the first 48 hours of ICU stay and increased time

to extubation and mortality.¹¹ Both in Australian and New Zealand ICUs as well as in subsequent studies in Malaysian ICUs, the group found a consistent association.^{11,12}

The concept of lighter sedation protocols was further addressed in seminal literature by Mehta et al in 2012, which investigated daily sedation interruption in the setting of protocolized, targeted light sedation.¹³ By showing that daily sedation interruptions added to protocolized sedation did not produce clinically important outcomes, the study group further supported the importance of targeting lighter sedation protocols once the patient has been stabilized on the ventilator.

Cautious Use of Benzodiazepines

In addition to analgesia and lighter sedation goals, post-intubation sedation pharmacology has been evaluated at the meta-analysis level to show correlation between specific drug classes, namely benzodiazepines, and outcomes like increased length of ICU and hospital stays, and duration of mechanical ventilation.^{11,12,14} Directly relevant to the ED, new research in both medical and surgical units has focused on preventing deep sedation by specifically avoiding benzodiazepine-centered approaches

FIGURE 1. Critical-Care Pain Observation Tool (CPOT)

INDICATOR	DESCRIPTION	SCORE
Facial Expression	No muscular tension observed	Relaxed, neutral = 0
	Presence of frowning, brow lowering, orbit tightening, and levator contraction	Tense = 1
	All of the above facial movements plus eyelids tightly closed	Grimacing = 2
Body Movements	Does not move at all (does not necessarily indicate absence of pain)	Absence of movements = 0
	Slow, cautious movements, touching or rubbing the pain site, seeking attention through movements	Protection = 1
	Pulling tube, attempting to sit up, moving limbs/thrashing, not following commands, striking at staff, trying to climb out of bed	Restlessness = 2
Muscle Tension Evaluation by passive flexion and extension of upper extremities	No resistance to passive movements	Relaxed = 0
	Resistance to passive movements	Tense, rigid = 1
	Strong resistance to passive movements, inability to complete them	Very tense or rigid = 2
Compliance with the ventilator (intubated patients)	Alarms not activated, early ventilation	Tolerating ventilation or movement = 0
	Alarms stop spontaneously	Coughing but tolerating = 1
	Asynchrony; blocking ventilation, alarms frequently activated	Fighting ventilator = 2
Vocalization (extubated patients)	Talking in normal tone or no sound	Talking in normal tone or no sound = 0
	Sighing, moaning	Sighing, moaning = 1
	Crying out, sobbing	Crying out, sobbing = 2
TOTAL RANGE	Sum each category	0-8

as a means to improve length of stay outcomes.^{14,15} The GABA mechanisms of benzodiazepines have been regarded as a contributor towards increased time on mechanical ventilation and in the ICU.

Fraser et al, in 2013, examined six randomized controlled trials made up of 1,235 patients to compare benzodiazepine versus non-benzodiazepine sedation strategies.¹⁴ With benzodiazepines showing negative effects on ICU length of stay and duration of mechanical ventilation, the authors of the meta-analysis recommended that non-benzodiazepines like dexmedetomidine or propofol be utilized. Furthermore, sedation with benzodiazepines has been shown to have negative physiological and psychiatric effects that persist after the patient's hospital stay.¹⁵ Increased duration of mechanical ventilation, post-traumatic stress disorder, and depression are among the sequelae of benzodiazepine sedation detailed in a number of other studies.^{14,15} For the emergency physician, the sequelae of benzodiazepine use should translate into considerations in bedside decision-making.

Given the potential disadvantages with traditional combinations of propofol/

FIGURE 2. Behavioral Pain Scale

ITEM	DESCRIPTION	SCORE
Facial Expression	Relaxed	1
	Partially tightened (eg, brow lowering)	2
	Fully tightened (eg, eyelid closing)	3
	Grimacing	4
Upper Limbs	No movement	1
	Partially bent	2
	Fully bent with finger flexion	3
	Permanently retracted	4
Compliance with ventilation	Tolerating movement	1
	Coughing with movement	2
	Fighting ventilator	3
	Unable to control ventilation	4

midazolam or fentanyl/midazolam, ongoing research and experience with ketamine, remifentanyl, or alpha-2 agonists like dexmedetomidine and clonidine may provide effective alternative strategies. The improved outcomes in the Faust 2016 study were in context of statistically significant increased utilization of propofol, dexmedetomidine, or fentanyl compared to benzodiazepines.⁸ Broadening the pharmacologic arsenal provides alternative options in achieving goals of adequate, yet targeted light sedation.

Conclusion

Though the majority of the aforementioned data comes from ICU populations, the tenets of sedation and analgesia from recent SCCM guidelines are relevant to the current state of emergency medicine. There continues to be a growing overlap both in thought paradigm and in geographic location between the ED and the ICU. The creation of ED-ICU practice spheres and the ever-expanding utilization of critical care-trained physicians in the ED reflect the need for enhanced practices for sedation and analgesia in the mechanically-ventilated patient. ★



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Improvised Medicine

Lessons from The Wilderness



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Charles Duke, MD, PhD
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Improvised medicine might be viewed as a skill reserved for the wilderness — for the people who can whittle an entire trauma bay out of a few sticks. Indeed, someone is occasionally pressed to use a hydration bladder tube to perform a cricothyroidotomy on the side of a mountain. However, emergency medicine is a specialty of improvisation, and the same techniques and ingenuity used in the wilderness setting have a direct benefit in the emergency department (ED).

Many of us were drawn to the emergency department because we have all of the toys. The modern emergency department contains a dizzying array of tools and techniques to resuscitate and treat a variety of conditions as safely as possible. However, situations often demand something that doesn't fit into a neat box, and we have to get crafty. Consider the humble Foley catheter that has been employed by generations of physicians to remove peanuts from noses, tamponade bleeding, and preserve g-tube tracts. That is a lot of mileage out of something simply designed to deliver fluid from one place to another. Another example, the safety pin, has hundreds of applications both in the wilderness backcountry as well as in the pocket of a creative emergency medicine physician during a busy shift in the department.

A core idea of improvised medicine is to identify the problem and find a solution with the materials directly at hand. It is important to think of an object not only for its intended use, but also as a sum of many other useful parts. A suture package doesn't just contain the material for wound closure (or backpacker repair). It can also serve as a plastic backing to splint a finger, or as a wrapper to hold a patient's easily misplaced jewelry.

Weight and space considerations limit the amount of specialized tools a physician may have in low-resource situations, but even a minimal wilderness medicine tool kit generally includes a knife, parachute cord, space blanket, and heavy tape. These items, along with other readily available materials, can help manage a variety of medical conditions. This type of common-sense problem solving is only limited by the physician's imagination.

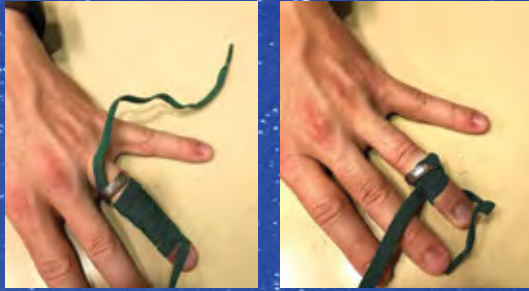
We wondered how some well-known physicians in wilderness and emergency medicine might apply their favorite improvised medicine techniques. What follows are their favorite tips and tricks for situations in either the wilderness or a busy ED.



Wound management in the backcountry

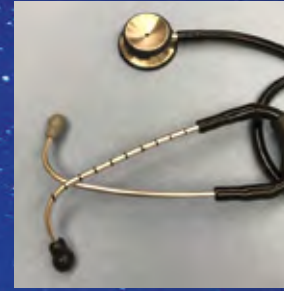
Cut two strips of adhesive tape 1" longer than the wound. Fold one-quarter of each strip of tape over lengthwise (sticky to sticky) to create a long non-sticky edge on each piece. Attach one strip of the tape on each side of the wound with the non-sticky edge toward the wound. Using a needle and thread, sew the folded edges together, cinching them tightly enough to bind the wound edges together properly.

Paul S. Auerbach, MD, MS, FACEP, MFAWM, FAAEM
Redlich Family Professor, Department of Emergency Medicine
Stanford University School of Medicine



RING REMOVAL

Wrap the swollen finger distally to proximally with suture, umbilical tape, or the elastic strap from an oxygen mask. Pass the proximal end under the ring and unwind the wrap proximally to distally to force the ring off of the finger.⁵



QUICK MEASURES

Mark your stethoscope with pre-measured lines to help with rapid length estimations.⁵

Nasogastric tube placement in the ED

Insert 5cc of 2% lidocaine jelly into the nostril, then fill a 50cc irrigating syringe with water and have the patient suck on the syringe to get water out. It takes the focus off the tube and as they suck and swallow it allows the NG tube to slide down.

Jay Kaplan, MD, FACEP

Immediate Past President, ACEP

Fluid resuscitation without IV access in the austere environment

Rectal fluid administration with hydration system tubing for fluid resuscitation as temporary measure to start rehydration and evacuate from the backcountry.

Jeremy Joslin, MD, FACEP, FAWM

Wilderness & Expedition Medicine Fellowship Director
SUNY Upstate Medical University

Remember “materials” you will always have

Splint a femur fracture by securing the injured and non-injured legs together when ease and speed of evacuation from the backcountry is important.

David Della-Giustina, MD, FACEP, FAWM

Wilderness Medicine Fellowship Director
Yale School of Medicine

A reminder for when you don't have exactly what you want

Buy a pen light. Have a backup for otoscopes, and know where they are in your department.

Rebecca Parker, MD, FACEP

President, American College of Emergency Physicians

Backcountry c-spine stabilization

An improvised cervical collar can be made by firmly rolling and taping a fleece jacket around the head and neck.

Scott E. McIntosh, MD, MPH

Wilderness Medicine Fellowship Director
University of Utah

Injury prevention and the athlete

Apply regular paper tape on specific blister-prone areas of the feet during hiking or other athletic events to prevent “hot spots” and friction blisters.

Grant S. Lipman, MD, FACEP, FAWM

Wilderness Medicine Fellowship Director
Stanford University

Often, creativity is necessary to provide exceptional patient care. Improvisation enhances both our in-hospital practice as well as wilderness capability.

What are some techniques that you have used in the emergency department? What unconventional tools do you employ in the hospital? How do you prepare for when things go awry in the wilderness? We would love to hear about it.

Join the conversation on twitter with the hashtag

#EMRAImprovMed to share your favorites!

Make sure to join us at 2017 EMRA MedWAR in Washington, D.C., at ACEP17 for some real-time examples of improvisation in the wilderness!

*The authors would like to thank all of our contributing experts for their ideas and wisdom. **





Floaters

Retinal detachment, posterior vitreous detachment, or vitreous hemorrhage?

A 68-year-old female with a history of diabetes, hypertension, and hyperlipidemia presents to the emergency department (ED) complaining of painless vision loss in her left eye. She reports that over the past week she has been seeing “spots” across her visual field, progressing to complete loss of vision today. Her visual acuity is 20/40 on the right and 20/200 on the left. There is no scleral injection, chemosis, or drainage. She has intact extraocular movements and her pupils react equally to light. Slit lamp exam reveals no foreign body or abrasions; however, it is difficult to assess the retina because of blood in the posterior chamber. You prepare to call your ophthalmology colleagues, but before you do, you pull over the ultrasound to see if you can determine a more precise cause for this patient’s symptoms.

Anatomy

Knowledge of eye anatomy is imperative when performing an ocular ultrasound. The structures of interest in this case all lie posterior to the lens in the area called the posterior segment. Together, the vitreous body and the posterior ocular wall form the posterior segment. The posterior ocular wall includes the retina, choroid and sclera. The retina has three insertion points: posteriorly at the optic disc and anteriorly at the medial and lateral aspects of the orbit at the ora serrata (Figure 1).¹

Definitions

Vitreous hemorrhage is defined as bleeding into the vitreous body and can be traumatic or non-traumatic. Diabetic retinopathy, retinal detachment, posterior vitreous detachment, retinal macroaneurysms, and macular



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degeneration comprise some of the non-traumatic causes of vitreous hemorrhage. The majority of non-traumatic cases are managed conservatively with follow-up imaging at 2-4 week intervals to monitor for clearing. If the hemorrhage is secondary to trauma or retinal detachment, management of the traumatic injury or the retinal detachment is necessary.¹

Posterior vitreous detachment occurs when the posterior vitreous capsule detaches from the retina. This is usually an age-related phenomenon that does not require emergent intervention but may lead to retinal detachment in the future. Patients should follow closely with ophthalmology.¹

Retinal detachment occurs when the inner neuronal layer of the retina separates from the outer pigmented layer. Small segments of the pigmented layer may break off, creating what patients often describe as “floaters” in the visual field. Causes of retinal detachment range from trauma to connective tissue disorders to simple aging. **All retinal detachments require emergent ophthalmologic consult.**¹

Differentiating between the three conditions often presents a diagnostic quandary because all three may have

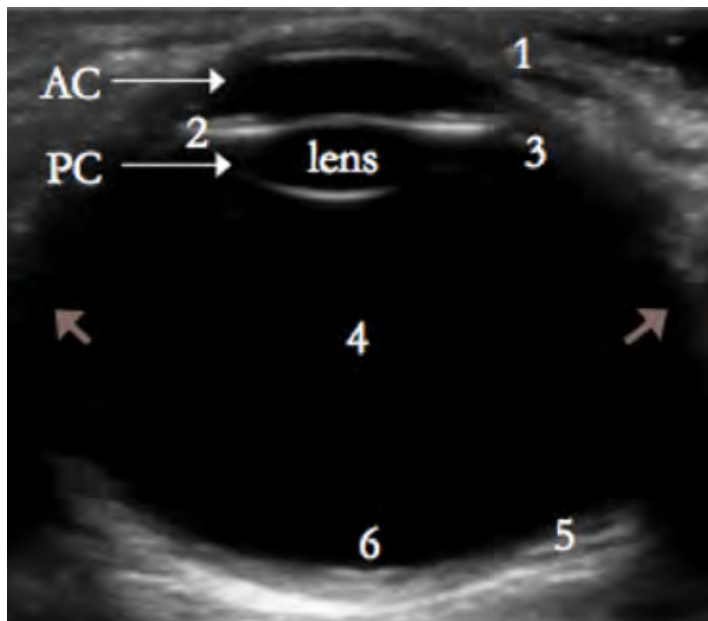


FIGURE 1. Ocular Anatomy
Anterior segment = cornea (1), anterior chamber (AC), iris (2), ciliary body (3), lens, and posterior chamber (PC). Posterior segment = vitreous chamber (4) and posterior ocular wall (5). Retina attaches anteriorly at ora serrata (small arrows) and posteriorly at optic disc (6).



FIGURE 2. Model of Ocular Ultrasound (Left: Gel placement; Middle: Transverse Axis; Right: Longitudinal Axis)



FIGURE 3. Vitreous Hemorrhage (Note “swaying” fibers with no attachment to optic disc)

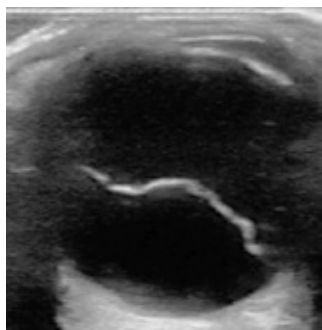


FIGURE 4. Vitreous Detachment

similar presenting symptoms. Bedside ultrasound is an ideal diagnostic tool to help differentiate between these three pathologies.

Technique

Ocular ultrasound is a useful when patients present with an acute visual abnormality. The linear high-frequency probe (7.5-15.0 MHz) provides optimal resolution. Choose the “superficial” or “small parts” preset and adjust the depth to optimize visualization of the globe. Gain should be turned down to interrogate the anechoic vitreous humor, after which the gain should be slowly increased to identify subtle abnormalities without creating false artifacts.²

Hold the probe with the thumb and index finger and rest the remainder of the hand on the bony structures of the face to maintain a stable view.³ Placement of a protective film (such as transparent dressings) over the

closed eye with a generous layer of gel allows for better visualization of structures without needing to apply pressure onto the orbit.⁴ Pan through the globe in both the transverse and longitudinal axes (Figure 2).

Ultrasound Findings

Early vitreous hemorrhage appears as low-amplitude hyperechoic areas, which may require an increase in gain to fully appreciate. As the blood matures it forms mobile membranes, which can be differentiated from retinal detachment by their fine structure, their lack of attachment to the optic disc, and anterior to posterior orientation.^{1,3} When the patient moves the eye, these membranes move like “swaying seaweed” (Figure 3).

Posterior vitreous detachment is seen as a freely mobile hyperechoic membrane that swirls away from the optic disc with movement of the eye. This finding differs from a retinal detachment in that it “crosses the midline,” with the optic disc representing the midline (Figure 4).¹

It may be challenging to differentiate a retinal from vitreous detachment depending on the angle of visualization. The retina will always remain attached at the optic disc because the retina is continuous with the optic sheath, whereas the vitreous body is not. In a partial detachment, the operator will see a “V” shape in the posterior segment, representing the retina attached to the optic disc posteriorly and the ora serrata anteriorly. **Notably, to differentiate between a retinal and a vitreous detachment, the optic nerve must**

be visualized. The retina may or may not remain attached to its anterior attachment site at the ora serrata. (Figure 5).^{1,3}

Evidence

Point-of-care bedside ocular ultrasound has demonstrated high sensitivity (97-100%) and specificity (83-97%) for detection of retinal detachment.^{5,7} However, there is minimal evidence in the literature using bedside ultrasound to diagnose posterior vitreous detachment or vitreous hemorrhage. One retrospective study of 130 pre-operative ocular ultrasounds performed by a single operator reported 92.3% sensitivity and 98.3% specificity for identifying retinal detachment, 96.2% and 100% for posterior vitreous detachment, and 100% and 100% for vitreous hemorrhage.⁸ The study has limitations, but results suggest that with proper training, ultrasound can be both sensitive and specific for identifying ocular pathology.

Bottom Line

Bedside ocular ultrasound is useful in identifying pathology in the posterior segment. Three closely related conditions include vitreous hemorrhage, posterior vitreous detachment and retinal detachment (Table 1). Correct identification is important given the different management strategies. Studies support accurate diagnosis of retinal detachment in the ED. Further research and training to accurately identify additional pathology is needed. ★



FIGURE 5. Retinal Detachment (Note the fine fiber attached to the optic disc)

TABLE 1. Comparison of posterior eye pathologies

Pathology	Mechanism	Ultrasound Findings	Management
Vitreous Hemorrhage	Bleeding into vitreous body	Anterior-posterior, swaying seaweed	Repeat ultrasound in 2-4 weeks, dx underlying cause
Posterior Vitreous Detachment	Separation of vitreous capsule from retina	Crosses optic disc “midline”	Ophthalmology follow-up
Retinal Detachment	Separation of inner sensory layer from outer pigmented layer	Attachment to optic disc, V shape	Emergent ophthalmology evaluation and possible intervention

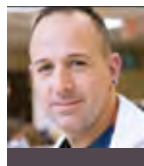
In Over Your Head

Pediatric Drowning

Drowning is the leading cause of pediatric mortality worldwide.



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The sudden and unexpected death of a child is especially tragic when it is preventable, which is oftentimes the case with drowning. There have been multiple terms used in the past to define drowning such as salt water, fresh water, dry, wet, secondary, and delayed drowning. To standardize this definition, in 2002, the World Congress of Drowning decided to define drowning as **the process of experiencing respiratory impairment due to submersion/immersion in a liquid.**¹

As emergency medicine (EM) providers, we will most certainly encounter this situation. How can we best respond and with what evidence?

Pathophysiology

The drowning process begins when the victim's airway is submerged and the victim is struggling for a gasp of air. It is estimated that children can only struggle for 20-30 seconds before final submersion.² When the drowning victim can no longer keep his or her airway clear, water enters the oropharynx and is either swallowed or spat out. This period is associated with panic and involuntary breath-holding, which results in reflexive coughing and laryngospasm when inspiratory drive becomes too high to resist and water is aspirated into the airways.^{3,4} If not rescued, aspiration of water leads to hypoxia, loss of consciousness, and apnea. Depending on the temperature in which the drowning occurs, the entire process may take 5 minutes or last up to an hour.^{1,3}

Management and Treatment

To provide care for a drowning victim, EM physicians should use a multi-tiered approach that includes management of **hypoxia, trauma, and hypothermia**. Hypoxia is the most pertinent factor in drowning victims, and **the main objective of prehospital therapy should be to reverse hypoxia** and restore normal

Case 1.

A 22-month-old drowning victim is found downstream a fast-moving river one hour after she is last seen by her mother. Patient is unresponsive at the scene. Paramedics begin CPR and ROSC is achieved. Intraosseous access is obtained, but the patient is unable to be intubated. Core temperature is not obtained. You are notified that the patient is being bagged en route to the emergency department (ED).

Case 2.

A 12-year-old boy is brought to the ED after being found at the bottom of a pool with down time of at least 20 minutes. He is in full cardiopulmonary arrest. He is bagged en route to the ED and, after 2 doses of epinephrine, he achieves ROSC. You consider useful prognostic measures.

Case 3.


A 12-month-old boy is found unresponsive by his mother face-down in the bathtub. CPR is performed en route. In the trauma bay, resuscitation efforts continue for 1 hour. Patient is pronounced dead, and core temperature is measured at 29°C. Later that night, a call is received from the morgue stating that the child is moving.

For ACEP's stance on "dry drowning" visit
<http://newsroom.acep.org/2017-07-11-Death-After-Swimming-Is-Extremely-Rare-And-Is-NOT-Dry-Drowning>.

oxygenation and circulation as quickly as possible to ensure a good neurological outcome.² Cervical spine immobilization may be indicated in cases where trauma to the head and neck is suspected, such as after diving into shallow water or boating accidents.³ Hypothermia is defined as a core temperature $<35^{\circ}\text{C}$ and should be presumed in all drowning victims. Wet clothing should be removed, the victim should be wrapped in warm blankets, and core temperature should be measured continuously via an esophageal, rectal or bladder probe.

Patients who are breathing spontaneously and maintaining their oxygen saturation $>90\%$, or their partial pressure of oxygen >90 mmHg with a fraction of inspired oxygen (FiO_2) of 50%, may be observed with oxygen alone under continuous pulse oximetry monitoring.³ In individuals who do not meet the above criteria, a trial of NIPPV may be considered. For those who are unable to maintain their airway, rapid sequence intubation is definitive management. **Well appearing, asymptomatic patients should be observed for at least 8 hours** as per a retrospective review of 75 pediatric patients who drowned and developed symptoms within 7 hours (this is not to be confused with the erroneous concept of “dry drowning” that is claimed to occur days after an aspiration event)!^{5,6}


Should the victim obtain return of spontaneous circulation (ROSC), care should be taken to correct any hyper- or hypo-coagulability, rhabdomyolysis, or electrolyte abnormalities such as hypoglycemia, hyperkalemia, and hypophosphatemia. Make sure to evaluate patients for underlying medical causes for drowning, such as seizure or dysrhythmia.

 **Pearl: When is it safe to extubate a drowning victim?**


Once intubated, the patient should not be extubated for at least 24 hours, even when gas exchange appears to be adequate, due to the possibility of acute respiratory distress syndrome. Fraction of inspired oxygen should be decreased to $<50\%$ as soon as possible to avoid pulmonary injury through oxygen toxicity.⁷

Acute respiratory distress syndrome (ARDS) is common after a significant drowning event and can occur promptly as opposed to days later, as is the case

in other settings.⁸ Prevention of ARDS is of paramount importance, and the emergency medicine provider should be keenly aware of the initial ventilator settings (low tidal volume with appropriate PEEP) set in the ED.


 **Pearl: When should chest compressions be performed?**

In the setting of asphyxiation from drowning, bradycardia follows tachycardia in an attempt to conserve oxygen, followed by pulseless electrical activity and eventually asystole.⁸ As bradycardia is a physiological response to hypothermia, discussion regarding whether to perform chest compressions in a bradycardic or pulseless hypothermic child is warranted, as chest compressions could increase the risk of inducing ventricular fibrillation. In the absence of good outcomes data, this topic is controversial and decisions should be made on a case by case basis.


 **Pearl: How effective is epinephrine for cardiac arrest in a hypothermic patient?**

The efficacy of epinephrine is decreased, especially below 30°C .⁹ Epinephrine and antiarrhythmic medications accumulate in the periphery of a hypothermic patient due to vasoconstriction and poor perfusion, and, after repeated doses, cause an effective

overdose upon rewarming. However data on this are lacking.⁸

 **Pearl: What is the best central access for resuscitation for drowning victims?**

A femoral approach is preferred over an intra-jugular or subclavian approach to avoid the possibility of a guidewire-induced ventricular fibrillation.⁹

 **Pearl: What is the ideal rate of the rewarming process after cardiac arrest?**

The goal for rewarming is a target of 1° to 2° per hour to a range of 33°C to 36°C .¹⁰ If stable, aggressive rewarming beyond this point should be avoided as hyperthermia has been shown to worsen underlying cerebral ischemia and injury in post cardiac arrest patients. Active warming should be applied primarily to the trunk and not the extremities in an effort to avoid an afterdrop in core body temperature, which can result when the peripheral vasodilation delivers cold blood to the core.⁴

If the core temperature reaches 36°C and cardiac arrest persists, consideration should be given to terminating resuscitation efforts. If the patient has a core temperature less than 28°C , consider extracorporeal membrane oxygenation (ECMO) or cardiopulmonary bypass.¹¹

Case 1 Conclusion

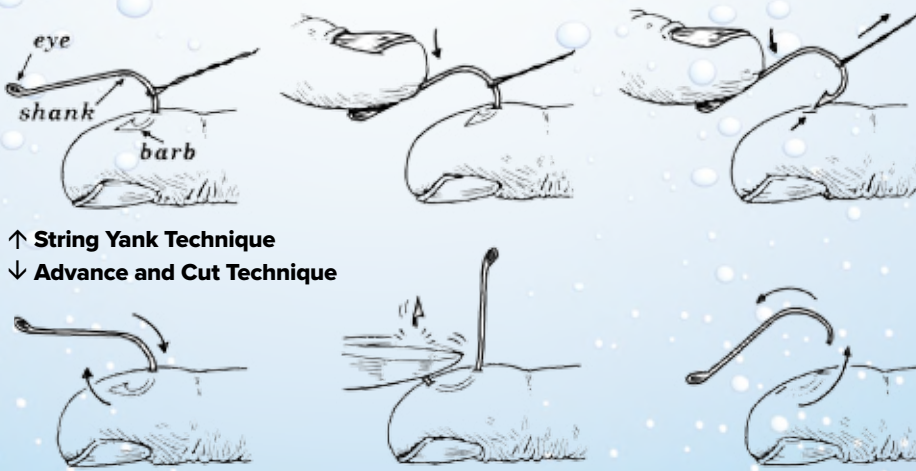
The patient had a GCS of 7 and was intubated. The core temperature was measured at 33°C , so the patient's clothes were removed and warm blankets were placed. Unfortunately, the patient went into cardiac arrest. Initial pH was 6.4. After 45 minutes of continuous resuscitation, efforts were terminated.

Case 2 Conclusion

A chest x-ray revealed diffuse pulmonary edema with bilateral coalescent opacities. The patient was admitted to the ICU with a diagnosis of ARDS. The patient was eventually intubated and placed on a ventilator. Measures to reduce tidal volume and increase PEEP while avoiding barotrauma were undertaken. The patient eventually had a full neurologic recovery and was discharged home.

Case 3 Conclusion

Children with hypothermia on arrival should not be pronounced dead until they are “warm and dead.” **Rewarming measures should be continued until the child is at least 34°C .** Drowning is the leading cause of pediatric mortality worldwide.¹ It is a common, complex, often fatal event that can be especially devastating in the pediatric patient. The immediate care of drowning victims is challenging because of unique pathophysiological mechanisms and complex management issues. Prognosis has a linear correlation to the duration and extent of hypoxia, and physicians should focus on early and aggressive management to correct hypoxia and preserve neurological function. Prevention strategies to improve outcome are of paramount importance. ★



↑ **String Yank Technique**
 ↓ **Advance and Cut Technique**

FIGURE COURTESY OF ARTOFMANLINESS.COM



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Angling for Success

Techniques for Fishhook Removal in the ED

An 11-year-old boy presents to the emergency department. While fishing, he was startled by a dog. He began to run away but tripped, landing on his rod. He immediately felt pain and noticed the fishhook had punctured his left index finger.

With summer comes outdoor activities — and ample opportunities for ED visits. Fishhook foreign body injuries generally present few complications and high satisfaction for patients and providers.^{1,2} Know these simple tricks for safe removal!

Methods of Removal

Needle Cover

An 18- or 20-gauge needle can be used to remove superficial or treble hooks. After anesthetic is applied, the needle is inserted to cover the fishhook barb and thus disengage it from the embedded tissue. The needle and barb can then be simultaneously removed.³⁻⁵

String Yank Technique

The string yank technique is quick and anesthetic-free. Wrap a piece of 0-nylon around the hook to secure it. Exert downward pressure on the fishhook eye to disengage the barb. While holding the nylon, forcefully yank 180 degrees from the site of insertion. This method is often successful if an abrupt, forceful yank can be applied without hesitation.³⁻⁵

Advance and Cut

This technique is generally preferred. Using needle drivers, advance the hook to penetrate through the skin surface. Clip the barb with ring cutters or flatten it with

pliers. Then, a smooth retrograde removal can be completed. This technique will require anesthetic and carries the most potential for tissue trauma.³⁻⁵

The Data

A prospective study of 97 cases of hook injuries noted 100% success rate when utilizing the above techniques.³ The advance and cut technique was the method of choice in 56/97 cases, while the needle cover and string yank were each chosen in 7/97 cases. Interestingly, 17/97 cases were removed only with a simple retrograde technique involving downward pressure and reversal along the hook's curvature.

Analgesia and Safety

Lidocaine may be required for patient comfort and safe removal of the hook. Digital blocks are effective in injuries only involving the digits. Given that the hooks may land unpredictably, it is important for the patient and the provider both to have proper eye protection.

Casting a Lifeline

In cases involving the eyelid or eye, prompt ophthalmology consult can help prevent vision loss or damage due to globe injury.¹

In other unique cases involving

bone or vascular penetration, consult orthopedists and vascular surgeons.^{4,5}

Antibiotic and Immunization Prophylaxis

While no official guidelines exist, antibiotics are generally not indicated.^{4,5} However, consider antibiotics in special patient populations, including the immunocompromised and those with tendon, cartilage, or ocular involvement.^{1,4,5} In cases of cellulitis, antibiotic coverage should account for staphylococcus aureus and group A streptococcus bacteria. Consider antibiotics if there is concern for bacterial exposure common to bodies of water, such as *Vibrio* or *Aeromonas*.^{4,5} Any doubt regarding a patient's tetanus immunization status within the past 5 years warrants a tetanus booster because of the penetrating injury caused by the hook.

Case Resolution

The string yank method failed. An x-ray was obtained because of concern for bony involvement but only showed superficial penetration. A digital block was performed, and advance and cut method effectively removed the fishhook. Tetanus prophylaxis was given but no antibiotics were prescribed. Follow-up was recommended with his family physician. ★



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Contact Summer Armstrong at sarmstrong@emra.org or call 866-566-2492, ext. 3152



Answering the Call for Help

It is not every day that we have an encounter that reminds us exactly why we love emergency medicine. I was fortunate and unfortunate enough to have one of these events occur on a Boeing 747 at 33,000 feet in the sky. On a return flight from an excellent vacation, I heard the oft-quoted overhead announcement, “Is there a doctor on board?”

As my adrenaline kicked in, I reported to the second deck, where a pediatrics attending was already present. We spoke with the purser, who quietly told us our patient had suddenly fallen ill after eating ice cream 30 minutes prior. He had developed epigastric abdominal pain, chest pain, and nausea.

As we moved toward the front of the aircraft, we met our patient — the captain of our flight. We walked into the private cockpit area, slightly away from the flight crew, and began asking him questions. He was in his 50s and stated that he started having moderate epigastric pain and chest pain after eating his meal. His only medical history was hypertension, and he had never had symptoms like this before.

The pediatric attending presumed

he had gastritis, so we gave him omeprazole. My emergency medicine mindset, however, prompted me to think about a worst-case scenario. The patient appeared uncomfortable, diaphoretic, and pale as he gripped his epigastric area. His vital signs, however, were normal.

I decided to give him aspirin, placed an intravenous (IV) line, and started giving him fluids. I decided to give him aspirin and placed an intravenous line for fluid administration. He also received metoclopramide for one episode of vomiting, and morphine for pain relief.

At this point, the co-pilot and first officer were flying the plane. I spoke with the flight crew regarding my concerns, and they arranged for a discussion with the ground medical team. The ground medical doctor asked me for my presumed diagnosis, and I informed him that although I could not be sure, it seemed very likely cardiac in nature. The decision was made to divert the plane to the nearest airport, 2 hours away. We continued to monitor the patient throughout the flight. Another pilot from the same airline, who happened to be on the flight, assisted in landing the plane.



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As we moved toward the front of the aircraft, we met our patient — the captain of our flight.

Upon landing, EMS performed an electrocardiogram — which showed an anterolateral ST-elevation myocardial infarction. The pilot was transported to the nearest cardiac catheterization center, where a single stent was placed.

Lessons Learned...

When I answered the call for help on board, a lot of questions went through my mind: Is this even an emergency? What

resources are available on a flight? Will I be safe in the event of a poor outcome? How will my decision impact the patient and the other passengers?

First, what constitutes a medical emergency on a flight? Most events that occur on planes can be handled by cabin crew providing reassurance, basic first aid measures, or over-the-counter medications. A medical emergency occurs when a patient requires further resources and utilizes on-board medical professional help, ground medical assistance, or has a medical event that results in diversion or death.¹

In terms of resources, this flight was furnished with a well-stocked enhanced medical kit. According to ACEP, “FAA regulations require all U.S. commercial airlines weighing 7,500 pounds or more and serviced by at least one flight attendant to carry a defibrillator and an enhanced emergency medical kit. Flight attendants must be certified in CPR, including the use of an AED, every 2 years. Pilots must also be trained in the use of the AED.”² Domestic flights may have very minimal resources because they are usually flying over ground with multiple airports nearby in the event there is a need for diversion. Internationally, there is much variance between airline medical kits, but most will have basic medications.

What happens when your patient is the pilot? In-flight pilot incapacitation is discussed in aviation literature, with the most common cause being gastroenteritis.

ENHANCED MEDICAL KIT (Example Contents)

Contaminated sharps box	Acetylsalicylic acid	Albuterol Neb	Urinary catheters
Face mask	Epinephrine	Prednisone	Oxytocin
Antiseptic wipes	Nitroglycerin spray	Dexamethasone	Umbilical clamps
Aneroid sphygmomanometer	Atropine	Diphenhydramine	Xylometazoline spray
Stethoscope	Morphine	Omeprazole	Loperamide
Scissors / Scalpel	Digoxin	Metoclopramide	500ml NSx2
Multiple dressing supplies	Metoprolol	Haloperidol	D50
Bag-valve mask with masks	Furosemide	Lorazepam	
Oropharyngeal airways	Naloxone	Acetaminophen	Oxygen
IV Kit (with 3 gauges of IVs)	Lidocaine	Ibuprofen	AED

For the two-pilot team typical of larger transport aircraft, incapacitation of only one of the pilots is unlikely to present a significant risk.³ There are multiple standard operating procedures for this event. In this case, the co-pilot continued flying with the assistance of the first officer, until another pilot was identified on board. For the medical aspect, the senior crew are available for assistance and are trained in basic patient care. Regardless, as a physician, the main concern should be the patient. The crew will take care of the plane.

Medicolegally, the aspect of providing care on flights is controversial — not much has been written on the topic. According to ACEP, “Federal legislation contained in the Air Carrier Access Act of 1998 has provided limited protection and guidance for physicians and

other medical professionals who volunteer their services during flight.”² However, in the case of an international flight, liability is generally determined by the law of the country where the aircraft is registered. Some countries in Europe and Australia impose a legal obligation to assist, and a physician can be penalized for not assisting.

Furthermore, even with “Good Samaritan” laws, unreasonable or extreme actions leading to poor outcome are not covered, so good clinical judgement is necessary.¹

The most important resource I had was the senior flight attendant and crew. They knew where everything was located and provided the emergency medical kit exactly when we needed it. They kept us in the loop with what the ground team was thinking and continued to ask for updates from us. After the event, the first officer noted this would be a scenario used to train other pilots and crew. They also asked us for feedback for improving the medical kit.

We documented our encounter thoroughly on an airline-provided medical form. We took a photo of it for our own record-keeping. As with all patient encounters, thorough documentation is vital, both for medicolegal purposes and personal medical records.

Epilogue

A few days after the incident, I received an email thanking us for our actions on board. The captain was recovering—he had suffered a large ST-elevation MI, but he was alive and well. As I settled back into the life of a resident, surrounded by all the technology of an advanced emergency department, I couldn’t help but reflect on this experience of helping a patient without all the diagnostic modalities utilized every day in the ED, and I couldn’t imagine doing anything but emergency medicine. ★



View of the well-organized medical kit



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TAKING A CUE FROM Netflix, Priceline *(and more)*

The Sustainable ED Looks to Other Industries for Tech



Mike Hoaglin, MD

EMRA Informatics Committee Chair
Director of Medical Content, Doximity
San Francisco, CA

With the current rise in patient census and physician burnout, is today's model of emergency medicine sustainable? Some innovative emergency departments (EDs) are borrowing technology that other industries have enjoyed for years in order to maximize productivity and satisfaction for both physicians and patients.

1. Appointments: What if patients felt the ED were waiting for them?



In the name of patient satisfaction, some emergency departments have

been offering appointments for lower acuity patients via their websites, using software such as InQuickER. The idea is to help patients know what to expect and to allow them to wait at home – but it can also help ED staff predict flow and perhaps even improve staffing models. Patients must check a box stating they do not have a life-threatening emergency in order to make an appointment.

Though both community and academic centers have started adding appointments in some EDs, it hasn't worked out in all places. Some EDs have given up on appointments when walk-in patients complained that the appointment patients didn't wait as long (in reality they have the same wait time, but those patients' wait times began at home). Others question whether EMTALA is violated, since two patients with the same condition may be seen as having a different medical screening exam experience.

2. Patient generated documentation: What if patients reduced our note-writing burden while waiting?



Electronic medical record (EMR) documentation, checkboxes, and billing documentation

requirements all take their toll on emergency physicians. The workarounds to chart burden include macros, dot phrases, and

copy forward, but is there a better potential to have more useful notes? While a number of emergency departments are part of health systems that participate in the OpenNotes initiative – allowing patients immediate access to clinical documentation online – some EDs may be taking it a step further. Like opening a trouble ticket with a computer IT department, using tablet PCs and iPads in the waiting room, patients can start their own intake. Following touch screen prompts, patients answer structured questions about their chief complaint, review of systems, and past medical history. From this, an initial patient-generated history of present illness (HPI) can be generated before the provider picks up the patient, further assisting triage and documentation. The idea is that more mental bandwidth may be spent on medical decision-making (MDM) documentation.

3. Machine learning in the ED: What if the EMR could predict ischemic heart disease better than an expert?



Each patient walks into the ED with a story, and sometimes the nuance of that story is buried deep in the chart.

Emergency physicians may have time to browse the chart, look at outside records, and eyeball old EKGs. But on a busy night shift, a technological helping hand could help synthesize data and save a life. With the help of machine learning, data from thousands of patients can be analyzed and insights can be obtained to hone clinical decision making. The clinical applications are still in very early stages,

but machine learning has the promise to make risk stratification better. We currently use crude measures such as HEART scores, but what if there were subtle changes in vital signs, labs, or EKGs that could only be picked up by a machine learning algorithm and helping uncover ischemic disease in chest pain patients? Machine learning may also make medicine more personalized, coloring decisions with omics and personal sensor data.

4. Real-time bedside chart updates: What if patients knew which labs were back before their physician?



Many patients have access to a personal health record like Epic MyChart, but some institutions are experimenting with real-time dashboards for patients to view the trajectory of their stay. Epic's tool is MyChart Bedside. Patients are able to see who's caring for them, check the status of labs and imaging, and sometimes even request a pillow with the click of a button. In some places, patients can initiate simple chat messages that will pop up on the physician's screen. The physician can then give updates to patients more efficiently and avoid "Can you get my doctor?" burdens on nurses.

The key to tech trends that will make the biggest impact in the ED are ones that not only improve patient care and outcomes, but also make the job of the emergency physician more rewarding. By implementing technology that allows physicians to practice at the top of their license, patients will feel more engaged and in control of their personalized ED experience. ★

SPLINTING TECHNIQUES

The EMRA Sports Medicine Division
is pleased to share this Splinting Guide.

Find it online at emra.org/publications/Reference-Cards
for easy reference whenever it's needed!

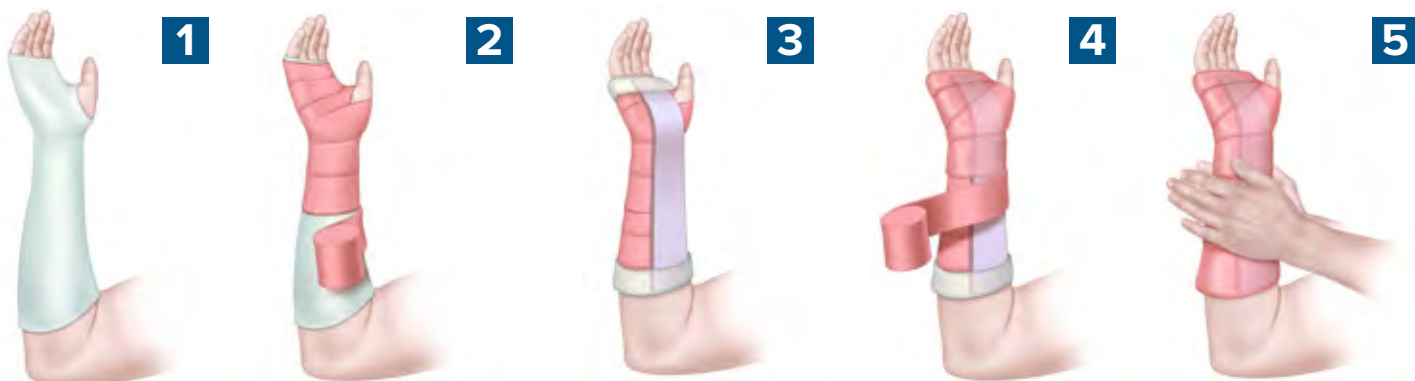
BASELINE MATERIALS

- Stockinette
- Splinting material
- Plaster
 - Upper extremity: 8–10 layers
 - Lower extremity: 10–12 layers
- Fiberglass
- Padding
- Elastic bandaging
- Bucket/receptacle of water (the warmer the water, the faster the splint sets)
- Trauma shears

BASELINE PROCEDURE

Measure and prepare the splinting material.

- Length: Measure out the dry splint on the contralateral extremity
- Width: Slightly greater than the diameter of the limb



- 1 Apply the stockinette to extend 2" beyond the splinting material.
- 2 Apply 2–3 layers of padding over the area to be splinted and between digits being splinted. Add an extra 2–3 layers over bony prominences.
- 3 Lightly moisten the splinting material. Place it and fold the ends of stockinette over the splinting material.
- 4 Apply the elastic bandaging.
- 5 While still wet, use palms to mold the splint to the desired shape.
- 6 Once hardened, check neurovascular status and motor function.

POSTERIOR LONG ARM SPLINT



INDICATIONS

- Olecranon fractures
- Humerus fractures
- Radial head and neck fractures

CONSTRUCTION

- Start at posterior proximal arm
- Down the ulnar forearm
- End at the metacarpophalangeal joints

APPLICATION

- Cut hole in stockinette for thumb
- Elbow at 90°
- Forearm neutral position with thumb up
- Neutral or slightly extended wrist (10–20°)

VOLAR SPLINT



INDICATIONS

- Soft tissue injuries of the hand and wrist
- Carpal bone fractures
- 2nd–5th metacarpal head fractures

CONSTRUCTION

- Start at palm at the metacarpal heads
- Down the volar forearm
- End at distal forearm

APPLICATION

- Cut hole in stockinette for thumb
- Forearm in neutral position with thumb up
- Wrist slightly extended (10–20°)
- Like holding a can

SUGAR TONG SPLINT



INDICATIONS

- Distal radius and ulna fractures

CONSTRUCTION

- Metacarpal heads on the dorsal hand
- Around elbow
- End at volar metacarpal phalangeal joints

APPLICATION

- Cut hole in stockinette for thumb
- Elbow at 90°
- Forearm neutral with thumb up
- Slightly extended wrist (10–20°)

DOUBLE SUGAR TONG SPLINT



INDICATIONS

- Complex and unstable forearm and elbow fractures

CONSTRUCTION

- Forearm splint: as above
- Arm splint
 - Start at anterior proximal humerus
 - Around elbow
- End at posterior proximal humerus

APPLICATION

- Cut hole in stockinette for thumb
- Elbow at 90°
- Forearm neutral with thumb up
- Slightly extended wrist (10–20°)

RADIAL GUTTER SPLINT



INDICATIONS

- Fractures and soft tissue injuries of index and 3rd digits
- Fractures of the neck, shaft and base of the 2nd and 3rd metacarpals

CONSTRUCTION

- Starts at mid-forearm
- Down the radial forearm
- End mid-distal phalanx of 2nd and 3rd digits

APPLICATION

- Cut hole in stockinette and splinting material for the thumb
- Hand in position of function
- Forearm in neutral position
- Wrist slightly extended
- MCP 50° of flexion
- Proximal interphalangeal and distal interphalangeal joints 5°–10° flexion

THUMB SPICA SPLINT



INDICATIONS

- Injuries to scaphoid, lunate, thumb and 1st metacarpal
- Gamekeeper's/Skier's thumb
- De Quervain tenosynovitis

CONSTRUCTION

- Start at mid-distal phalanx of thumb
- End at mid-forearm

APPLICATION

- Cut hole in stockinette for thumb
- Cut wedges on both sides of splinting material at MCP joint
- Forearm in neutral position with thumb in wineglass position

ULNAR GUTTER SPLINT



INDICATIONS

- Fractures and soft tissue injuries of 5th digit
- Fractures of the neck, shaft, and base of 4th and 5th metacarpals

CONSTRUCTION

- Start at mid-forearm
- Extend down ulnar forearm
- End at mid-distal phalanx
- Include the 4th and 5th digits

APPLICATION

- Hand in position of function
- Forearm in neutral position
- Wrist slightly extended
- MCP 50° of flexion
- Proximal interphalangeal and distal interphalangeal joints 5–10° flexion
- If boxer's fracture: flex the metacarpal phalangeal joints to 90°



MALLET FINGER

INDICATION

- Mallet Finger

CONSTRUCTION

- Splint only the distal interphalangeal joint

APPLICATION

- Splint distal interphalangeal joint in hyperextension
- DIP must remain in continuous extension for 6–8 weeks



FINGER SPLINTS

INDICATION

- Phalanx fractures
- Tendon repairs

CONSTRUCTION

- Splint across fractured phalanx or repaired tendon

APPLICATION

- If tendon repair: splint in flexion or extension, depending on tendon repaired

POSTERIOR KNEE SPLINT



INDICATIONS

- Patients with legs too large for knee immobilizer
- Angulated fractures
- Injuries that require urgent operative fixation

CONSTRUCTION

- Start just inferior to buttocks crease
- Down the posterior leg
- End approximately 6cm above the malleoli

APPLICATION

- Slightly flexed knee

POSTERIOR ANKLE & STIRRUP SPLINTS



INDICATIONS

- Grade 2–Grade 3 ankle sprains
- Fractures of distal fibula and tibia
- Reduced ankle dislocations
- Can add stirrup splint for unstable ankle fractures

CONSTRUCTION—POSTERIOR ANKLE

- Start at plantar surface of the metatarsal heads
- Extend up posterior leg
- End at the level of the fibular head

CONSTRUCTION—STIRRUP

- Laterally, start 3–4cm below the level of fibular head
- Extend under the plantar surface of foot
- End at medial and lateral side of leg to just below fibular head

APPLICATION

- Place with the patient in the prone position
- Ankle at 90°
- Place posterior ankle splint first

SPLINTING COMPLICATIONS

- Compartment syndrome
- Ischemia
- Neurologic injury
- Thermal injury
- Pressure sores, skin breakdown
- Infection
- Dermatitis
- Joint stiffness

RESOURCES

Boyd A, Benjamin H, Asplund C. Principles of Casting and Splinting. *Am Fam Physician*. 2009 Jan 1;79(1):16–22.

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Eiff MP, Hatch RL. Fracture Management for Primary Care. Philadelphia, PA: Elsevier/Saunders, 2012.

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at the *On Doctoring* Olympics

An Insider's View of Event Medicine

Editor's note: During the Games of the XXXI Olympiad in Rio de Janeiro, Brazil, two adventurous emergency medicine residents served as part of the event medicine team. The experience, they say, opened their eyes to new opportunities.

Dr. Burkholder

As I returned to the “Cidade Maravilhosa,” the Marvelous City I had come to know quite well while working for a multinational health care company before attending medical school, I couldn’t believe the changes. In a city where one of the seven natural wonders of the world can be found, where visitors flock to the “Cristo Redentor,” where the famous dance “samba” originated, where the largest party in the world - “Carnaval” – takes place, with some of the most spectacular beaches on the planet, Rio was a great choice for the 2016 Summer Games. Amid political, economic, and bioenvironmental catastrophes, Rio proved to be a world-class city worthy of such an event.

On the evening of Aug. 5, 2016, I found myself in the basement of Maracanã, at one time the largest stadium in the world, with colleagues from the University of Miami’s Ryder Trauma

Center preparing to staff the venue for the Opening Ceremony. While working alongside a seasoned trauma surgeon, we realized our assigned area included the Olympic family members and executive officials from the International Olympic Committee. My surgeon colleague said, “If anyone needs the OR I’ll take care of them, otherwise you’re in charge!”

On the first day of competition, I was stationed in the Future Arena at the Barra Olympic Park as one of the lead Field of Play (FOP) physicians for Men’s and Women’s Olympic Handball. Although the majority of the medical team came from various regions of Brazil, our team comprised about 20 professionals from around the globe. The 4-person rotating FOP team included a nurse, physical therapist, dentist, and physician. We were briefed by the medical director of the venue, who offered a tour of the facility and a review of the equipment and temporary resuscitation bay. Before we knew it we were courtside watching over, and responsible for, some of the best athletes in the world. Bright lights, a rambunctious crowd of 10,000+ people, loud music, and high-intensity competition made it very real, very quickly.

Thankfully there were no injuries at handball the first day, but many will recall



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the egregious lower extremity fracture that occurred at the gymnastics venue. All eyes were on that health care team, and their actions were replayed on TV news reports around the world. This is when I fully understood the difficulty of medical stabilization under intense pressure in an unfamiliar environment.

Although providers can take advantage of multiple online training modules and read *The IOC Manual of Emergency Sports Medicine*, after watching the gymnastics rescue, it became evident we were underprepared.

Despite being qualified professionals, we realized that working with unfamiliar equipment, in an unfamiliar environment, with various languages, and unfamiliar people was extremely challenging. While this may be common to international sporting events, it is a recipe for disaster.

“We are working with world-class athletes and we need world-class performance, nothing less,” Dr. Luis Japiassu, the venue medical director, reminded us.

Under his guidance, we simulated traumatic events, practiced mobilizing our radio communication system and bringing appropriate evacuation equipment on field. We practiced cervical collar placement, pelvic binder placement, and our egress based on the severity of the trauma. We simulated dual athlete injury scenarios. We developed hand signals so the team who stayed courtside knew which equipment to bring to the accident scene after initial evaluation by the FOP physician. Thankfully, there were no major injuries.

Dr. Scheele

“Brian, grab the AED and come with me!” said Dr. Antonio Marttos as he motioned toward the seating for dignitaries and heads of state at the Opening Ceremony for the Olympic Games, pointing specifically toward a tall, gray-haired man in a sharp suit. A well-known politician was complaining of chest pain, and now we were his doctors. He was fine, and luckily, we didn’t have to use the AED. This was my introduction to Rio de Janeiro and the Olympic Games.

It was our job on this day to prepare a mini ICU in a small room within the heavily guarded VIP presidential viewing area at Maracanã Stadium. The show was like nothing we’d ever seen, a palpable sense of jubilation was in the air, and the emergency medicine on that day, thankfully, was quiet.

I had never heard of Equestrian eventing, or jumping, but Dr. Marttos told me those athletes have high potential for injury. Doctors, nurses, and physical therapists were strategically distributed across the 6 km eventing course. During competition riders sat upon their horses, galloping, jumping over obstacles, splashing through rivers, and occasionally falling at full speed from the height of the horse. Our teams of three would rush to

the downed rider as a veterinarian tended to the horse. ABCs, c-collar, backboard — the potential for intervention loomed. Our managers, Brazilian physicians themselves, were clear: “Athletes don’t die at the Olympic Games.” We had our laryngoscopes, RSI meds, ACLS bag, chest tubes — we were ready, but for the most part we didn’t use them.

Jumping is the Equestrian event where the horse, at full speed, jumps over obstacles in the confines of a small stadium. During an awards ceremony one of the horses was startled, causing her to kick a trainer in the head, knocking him unconscious and inflicting a large scalp laceration. Our team rushed to the scene, stabilized the c-spine, loaded him into the ambulance, and sent him to a local hospital for imaging.

My favorite days were those spent working at the rowing venue. Dr. Rishi Rattan, a friend and a trauma surgeon, asked for an extra doctor, and I quickly jumped at the opportunity. Positioned by the finish line, we were able to see the grueling finishes up close. I rowed and coached for 8 years, and I rarely witnessed an emergent medical event. In Rio that was no different. What was different was the landscape — situated in a lagoon known as Lagoa Rodrigo de Freitas, with Christ the Redeemer looking down from his perch atop Corcovado Mountain, Olympic athletes at the peak of their career were striving for gold — I was fortunate enough to be a part of it all.

Know Before You Go

Before signing up for event medicine, we encourage purposeful preparation. The sports arena is akin to the ED in many ways: there’s a ticking clock, high emotions, family and friends; there is pain and potential for disaster.

At Mount Sinai, residents walk the ED with a checklist before each shift, making sure the right equipment is in the appropriate place, is functioning, with back-up nearby. Before a resuscitation, roles are determined and communicated: who will place the monitors, who will give the medications, who takes the airway, who will gain vascular access, and who is in charge. These simple cultural habits, among others, make the difference between chaos and the calm, efficient

delivery of cutting-edge emergency care. Similar habits and preparation are useful in event medicine.

Event Med Prep Tips

- 1. Know your team**
Try to meet the providers you’ll be working with before the day of competition — a video conference at the very least would be beneficial.
- 2. Know their credentials**
Understand their training and who you can delegate for specific roles in true emergency situations.
- 3. Know your equipment**
Assess the medical station with your team and ensure that every medical resuscitation tool is working (eg, turn on the defibrillator, check your intubation tray, check your medicine cabinet, check the batteries) and be prepared for the worst.
- 4. Know your venue**
Identify entry and exit points that are most appropriate for each type of patient you may encounter.
- 5. Know your EMS crew**
Understand the policies and procedures if an athlete needs to be transported to the hospital.
- 6. Know how to communicate**
At an international event, there will be different languages spoken; know your limits and identify translators.
- 7. Know the sport!**
Understanding the pace and rules of the sport can help you quickly determine if there is a true medical emergency.

Special thanks

Dr. Antonio Marttos, a kind and happy family man from Brazil, is our attending at the Ryder Trauma Center in Miami, Florida, where he is the Director of the William Lehman Injury Research Center and a surgeon specializing in trauma, surgical critical care, and telemedicine. Dr. Marttos was the Manager of Emergency Medical Services and Multiple Casualty Incident Response at the Olympic Games, and he invited us and several other physicians and nurses to work with him at the Games. We are forever grateful. We would also like to thank our residency program directors who gave us the flexibility to attend the Games. ★

TELEMEDICINE



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A 34-year-old female woke up today with a sore throat. She hoped she would improve as the day went on, but the pain persisted despite over-the-counter medications. She tried calling her primary care physician but was unable to get an appointment until the following week. Next was a tough decision: Does she forego care? Does she brave the hour-long drive and 4-hour wait in the emergency department? She has to pick her kids up from school at 3 pm and it is already 12:30 pm. Unable to decide, she calls on a friend for help, who tells her about a new telemedicine app.

Within minutes, she has downloaded the app and created her patient profile. After another 10 minutes, she's face-to-face with a physician who, after a thorough consultation, reassures her this is most likely viral pharyngitis and offers tips on symptomatic relief as well as warning signs for seeking further care. Properly reassured, she continues with her busy day.

What is telemedicine and why are we hearing about it now?

Telemedicine refers to clinical services

performed using telecommunications, such as video or voice, and was formed in the 1970s by mostly EMS providers.¹ Mainstream adoption began due to improved access to high speed mobile networks, better video technology, and monetary incentives. Medicare passed its Medicare Telehealth Parity Act of 2015, so more insurance companies are starting to cover telemedicine services. With 84% of Americans using the internet and two-thirds of Americans owning a smartphone in 2015, telemedicine is currently estimated to be worth \$23 billion, with a projected rise to \$66 billion by 2021.^{2,3}

How is telemedicine currently being used?

Telemedicine is most well-known as a direct-to-consumer product that enables patients to use a secure app to have a medical encounter with a provider through video. The goal is to decrease costs, waiting times, and other barriers associated with seeking treatment. Another facet of telemedicine is physician-to-physician consulting, such as teleradiology, telestroke, teletrauma, and tele-ICU, with many more avenues expected as technology improves.

What are some of the benefits of telemedicine?

The ultimate benefit is convenience to the patient. The patient is able to access the service anywhere with an internet connection and, when compared to office visits, enjoy decreased wait times and decreased cost. One company's brochure advertises 24-hour service with a median 8-minute wait time.⁴

The question of whether telemedicine decreases costs to the health care system remains unresolved. Researchers at the RAND Corporation recently analyzed telemedicine visits for acute bronchitis. They found the cost of an average bronchitis episode decreased from \$1,734 in the ED to \$79 via telehealth, a 95% decrease in costs.⁵ However, they also noted increased utilization of services, leading to an increase in net cost. It did improve access, and it may be worthwhile to consider



telemedicine as an aid to access rather than simply a cost-saving tool.

What are some of the drawbacks?

Of course, telemedicine cannot be used for all complaints and is not a panacea. Some of the major drawbacks in telemedicine include lack of reimbursement, patient and provider buy-in, internet access, set standards, and education in the field. States require physicians to be licensed in the patient's state, which increases cost. However, there are some solutions on the horizon: to improve internet access, the Federal Communications Commission is proposing broadening its Lifeline assistance program, designed to provide subsidized internet to low income Americans. Medicare currently only covers telemedicine services in rural areas, but the Connect Bill (S2485) is seeking to bridge that gap. As more institutions and companies offer the service, more patients and providers are learning about it.

What about the physical exam?

The telemedicine exam is different from an in-person visit, as it may require

unorthodox means of eliciting findings, such as teaching patients to count their own pulse or instructing them on a back exam. In this age of informatics and clinical decision-making tools, many diagnoses can be elicited by a complete history and a limited telemedicine physical exam.⁶

What are the effects of telemedicine on emergency medicine?

Emergency departments nationwide have already benefited in the form of teleradiology and telestroke consultations. With increased access to on-demand telemedicine visits from their homes, the hope is that patients are less likely to need to visit the ED. One company cites that almost 20% of its visits would have been in an ED without their service.⁷ Many telemedicine companies are recruiting emergency medicine trained physicians to provide services, because they are equipped to make quick decisions with limited information. Future options for EM applications of telemedicine include tele-triage and remote second opinions in trauma.

Where is the future of telemedicine?

The field of telemedicine is blossoming in the age of rapid technological innovation. It is branching into electronic medical record development, digital health, wearable technology, and mobile applications. One of the biggest hurdles is acceptance by the medical community and general populace. It will be interesting to see where telemedicine fits into our current healthcare paradigm in the near future.

Where can I learn more?

ACEP offers a Telemedicine Primer ([acep.org/uploadedFiles/ACEP/Membership/Sections_of_Membership/telemd/ACEP Telemedicine Primer.pdf](http://acep.org/uploadedFiles/ACEP/Membership/Sections_of_Membership/telemd/ACEP%20Telemedicine%20Primer.pdf)), describing telemedicine's use in the emergency department. Students or residents interested in the field of telemedicine and in joining the ACEP Emergency Telemedicine Section should contact Aditi Joshi, MD, MSc, FACEP, Medical Director of JeffConnect® (aditi.joshi@jefferson.edu) and the section liaison to EMRA. ★

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



EMRA President, 1996-1997
 EMRA Board of Directors, 1995-1998
 ACEP Councillor 2008-2015
 ACEP Alternate Councillor 2016-
 Oklahoma College of Emergency Physicians
 Vice President 2012-2015
 Oklahoma College of Emergency Physicians
 President 2016-
 ACEP Emergency Medical Services
 Committee Chair 2016-2018

When Jeff Goodloe served as EMRA President in 1996-1997, the organization had roughly 4,000 members, was building its first-ever website, and was advocating the merits of a proposal that became a resolution approved by the ACEP Council to limit future ACEP membership to emergency medicine residency-trained physicians. Fast-forward 20 years, and EMRA has nearly quadrupled in size. Dr. Goodloe is now a faculty member helping prepare EM residency-trained physicians for today's workforce, and has become a leader in EMS medicine.

Disclaimer by the respondent: All answers concurrently and freely acknowledge that the practice of emergency medicine can be described as intellectual warfare. Institutional politics, financial stress, whiny consultants, and markedly unpleasant patients and families exist. What? You were expecting Disneyland? Let's still choose to focus on the positives because they really do far outweigh the craptastic.

empower

Sharing our Stories

Your Time, Your Legacy

Jeffrey M. Goodloe, MD, NRP, FACEP, FAEMS

Medical School: Texas Tech University Health Sciences Center

Residency: Methodist Hospital of Indiana/Indiana University School of Medicine

Fellowship: EMS – The University of Texas Southwestern Medical Center at Dallas

Current Position: Professor, EMS Section Chief & Director of the Oklahoma Center for Prehospital & Disaster Medicine, Department of Emergency Medicine, University of Oklahoma School of Community Medicine in Tulsa. Medical Director, EMS System for Metropolitan Oklahoma City and Tulsa, including the Emergency Medical Services Authority (EMSA), the Oklahoma City Fire Department, the Tulsa Fire Department, and a multitude of metropolitan fire and law enforcement agencies.

What has surprised you most about the reality of your EM career vs. your expectation of it during residency?

I believe the surprise could be that there hasn't been a "surprised me the most" part of the journey. I'm truly fortunate that I had experienced mentors (some never considered themselves mentors, but they were in their daily words and actions) from my very first days in EMS, through the years working as a paramedic and going to medical school, doing residency, helping to start the EMS fellowship at UT Southwestern, and honestly continuing each and every day. Every day is a myriad of opportunities to learn. Don't miss the opportunities. I didn't honestly think I would be in the academic position I'm privileged to get the chance to earn its responsibilities every day, though good "luck" can happen if you'll work very hard.

How did being involved in EMRA affect your career path?

EMRA service was an incredible opportunity to see a bigger picture of what a lifetime career in emergency medicine can allow an individual to contribute. More than 80,000 direct patient encounters into my career, there's still nothing like the dynamic that instantly occurs between emergency physician and patient. So it's not an "either/or" choice for me. I love taking care of patients AND I love teaching — EMTs, paramedics, nurses, medical students, residents, fellows — AND I love supporting an EMS system that makes life better for hundreds of thousands of citizens AND I love helping to advance our specialty through ACEP. Being deeply involved in EMRA helped me to see the power of "AND" in abundance in a career.

What do you wish you had known then that you know now?

Balance. There's only 24 hours in a day. Residency is by design out of balance because there is so much core knowledge and skill development to impart within 3-4 years. However, even in those years, I could have been better balanced. I wouldn't change a thing in the past though. Change one aspect of your life and how do you know what the effect is going to be 1 year from now — let alone 20+ years down the road? What I can do now is be more mindful about my own health to be able to be around to help others as long as I can. My No. 1 expectation for EMTs, paramedics, and residents is to take care of their own mental and physical health. If they aren't taking care of that, how can they fully, accurately help others?

Best advice for residents today?

When I graduated medical school, Dr. Donald Gordon (former Medical Director, San Antonio Fire Department) told me to never pass up the opportunity to see one more patient and learn from them. Sounds a bit trite, but I think he shared something really

wonderful with me. We all need teachers, podcasts, web resources, apps, peer-reviewed journals, textbooks, etc., but patients are the best educators. I'd add to Dr. Gordon's advice to make sure you are learning emergency medicine for what I believe is THE right reason: making a positive difference in times of perceived and actual medical crisis. Lots of easier options are there for better financial gain and fame. Nothing will "pay" you more than knowing you made a real difference for someone who can't reimburse the bills sent and won't even remember your name, if they were even conscious to do so anyway.

You've been involved in emergency medical services since 1988, and now you're chair of the ACEP EMS Committee. What's the driving force behind all your work with EMS?

EMS professionals are some of the best souls on Planet Earth. Are they human? Yep. Do they make mistakes of the mind? Yep. Do they make mistakes of the heart? Yep. And they are still incredibly wonderful to support. I dreamed about being on the "other side of the radio" early on in my EMS career. What a journey to doing that. EMS is also a great "force multiplier" for an emergency physician. In a typical ED shift, you might personally manage 20-50 patients over 10-12 hours. We get the privilege of taking care of that many

patients in our local EMS system within an hour. I don't get to directly see most of those patients, even if I'm responding alongside some of our EMTs and paramedics, but I get to be a small part of all of those encounters because of how I encourage, support, and educate EMS professionals.

Why volunteer?

Someone more insightful than I encouraged all of us that meaningful life isn't what you take out of it for yourself, it's what you put into it for others. ACEP isn't an evil empire any more than it is the panacea for all the stressors upon our specialty today. What ACEP has proven to me to be is a door that if you will walk through it, look around, find some work that needs to be done or at least raise your hand when asked who is willing to do some work... well, what a great collective of individuals who share the bond of being willing to do some very hard work on the easiest of days in emergency medicine. Why wouldn't someone want to help their fellow souls in this collective endeavor? Here's the bonus part that you'll find once you start: ACEP staff professionals are the best we could hope that exist. I hope every emergency medicine resident makes the opportunity to contribute regularly throughout their career. Maybe it's EMRA. Maybe it's ACEP. Maybe it's both or perhaps another organization.



Volunteer with a good heart and you'll find you will get non-financial rewards far above whatever you give in time and effort.

Reading advice for residents?

Here's where my Chair/Program Director seizes, so someone get some lorazepam and levetiracetam handy: *Ditch the academic reading*. Well, temporarily put it aside. Read these to make you a better leader and person: "Leadership Gold" by John C. Maxwell and "Wooden on Leadership" by John Wooden and Steve Jamison. If you don't know who either of these men is, change that today. Seriously. You'll be better for it. (By the way, my Chair/Program Director, Dr. Bo Burns, gets this, too. You'd get similar advice if you asked him. That's a big part of why I choose to stay where I am teaching. There's a valuable message right there if you think about it.)

Favorite kind of vacation?

Mentally and physically away from work! Work hard. Play hard. Work harder than you thought you could and then enjoy well-deserved time away. You do incredible things for others at work; do different incredible things and create incredible experiences for your loved ones and for you away from work. We are witnesses to life abruptly ending for so many. Make sure you do the incredible whenever you can for those you love. That's what you'll remember most in the end and will help you live a life of no regrets.

Last thought?

On every obituary you'll see a date of birth, then a "dash," then a date of death. What are you doing with your "dash" today? ★



Clarification on Take-Home Naloxone

Dear Editor,

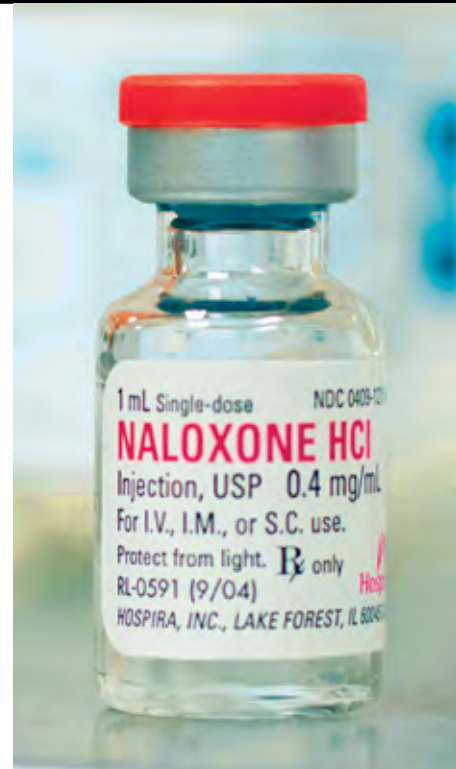
We applaud EM Resident (June/July 2017) cover and related review on “Take-Home Naloxone.” We would like to provide clarification on content to avoid confusion and/or misperceptions. Naloxone is available in a variety of dosage forms (see Table 1).

While many states have taken steps to increase access to naloxone, it would be inaccurate to describe this medication as “Over-the-Counter” (OTC), despite this use by some media outlets. OTC traditionally implies that a medication is available without a prescription and located on the shelf of a pharmacy. Naloxone is currently by prescription only; however, many states have enacted laws/regulations that no longer require an individualized or traditional prescription.

- Statewide Standing Order — written order by the state’s Physician General that permits designated individuals (usually pharmacists) to distribute naloxone
- Entity Specific Standing Order — written order by physician/provider that allows specific designated individuals to distribute naloxone
- Pharmacist Prescriptive Authority — allows pharmacists to initiate prescriptions

- Collaborative Practice Agreements — Formal relationships between pharmacists and physicians (or other providers) that allow specific pharmacists to provide to patients. These standing orders or collaborative practice agreements may be written for one dosage form or multiple dosage forms including the “off label” generic prefilled syringe with a nasal adapter.

This clarification is important, as we share the authors’ concerns that designating naloxone as an OTC product may result in a lack of proper training among individuals purchasing this medication. Fortunately, even though naloxone may be perceived as an OTC product because of its increased availability through the mechanisms described above, current laws still require a prescription and in turn counseling from a licensed pharmacist. This ensures an opportunity to provide each individual with appropriate training and instructional materials. Most importantly, this training should include the importance of calling 911 and not delaying the activation of emergency medical services. In some cases, individuals experiencing an overdose caused by long acting opioids or new synthetic opioids may require additional doses or continuous infusion of naloxone



over an extended period of time to fully reverse the respiratory depressive effects caused by these substances.

Sincerely,

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Department of Pharmacy Practice and
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Philadelphia College of Pharmacy/
University of the Sciences

Katherine F. Koffer, BS, PharmD, CDE
Assistant Professor of Pharmacy Practice
Department of Pharmacy Practice and
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TABLE 1. Forms of Naloxone

Product	Strength	FDA approved	Cost (AWP— Redbook.com)	Use as “Take Home”
Solution, Injection (Vial — as pictured on the cover)	0.4 mg/mL (1 mL) 4 mg/10 mL (10 mL)	Yes — IM, IV, Subcutaneous	\$13-24/ 1mL	Unlikely as a volumetric syringe is required for use.
Solution, Prefilled Syringe	2 mg/2 mL (2 mL)	Yes — IM, IV, SQ Off Label — intranasal use	\$20/ unit plus cost of intranasal adapter	Unlikely with luer lock syringe (IM/IV, subcutaneous use) Yes with nasal adapter option
Liquid, Nasal (Narcan®)	4 mg/0.1 mL 2 mg/0.1mL	Yes — intranasal	\$75 per unit (packaged with two units)	Yes as no assembly is required
Solution, Auto-injector Injection (Evzio®)	0.4 mg/0.4 mL (0.4 mL) AND 2 mg/0.4 mL (0.4 mL)	Yes — IM/ Subcutaneous	\$2250 — \$2460/ unit (Packaged with 2 units plus a trainer device)	Yes as voice prompted instructions

THE DADDY DIARIES

Emergency Tee-ball

Editor's note: Dr. McDonald and his wife are raising 7 children as he completes his third year of residency, serves on the EMRA Board, and represents residents on the ACGME Review Committee for Emergency Medicine. His daily lessons in parenthood reverberate in the practice of emergency medicine as well.

Standing in the front yard sporting his cap, glove, and uniform, my son is awaiting his first tee-ball game. His hat is slightly askew, his shirt half-tucked, and he is ecstatic. The game is still 2 hours away, but he's ready. Over the past several months, I've taught him to throw, catch, and hit. He has logged countless hours and baseballs to the chin, but he's determined. He's got plenty to learn, but in his mind, there has never been a better tee-ball player.

A couple of hours later, it's his time to shine. He steps up to the plate and shouts

at the top of his lungs, "DADDY, WANT ME TO HIT A HOME RUN?" Well, what can I say? "Sure, son, you go for it!" He grips his bat as if it's trying to run away from him. The beads of sweat dripping down his forehead are the only thing that could obscure the determination in his eyes.

WHOOSH!

He swings with all his might, causing his body to do a complete 360. As he rights himself, the ball remains undisturbed on the tee. I'm not disappointed and neither is he. In fact, he's beside himself. He swings again.

CRACK!

He's off like a rocket, running his heart out to first base. It's not a home run, but you can't tell by the smile on his face. The rest of that day, he couldn't stop talking about "almost" hitting his home run.

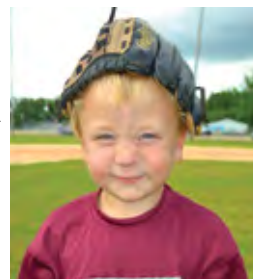
Have you ever swung with all your might, only to realize you completely



Eric McDonald, MD
EMRA RC-EM Representative
Emergency Medicine Resident
University of Mississippi
Jackson, MS

missed the ball?

Have you ever felt like one of your patients had a bad outcome that could have been your fault? You are not alone! Everyone,



at one point or another, has experienced this. In fact, most of us are constantly aware of how little we know or how much more we need to learn.

Failures are a part of learning. Let's take each failure as a learning experience and remember that it doesn't have to be a home run to be a success. Medical training is a lifelong process – a marathon, not a sprint. So in an environment that tends to discourage "almost home run" hitters, let's take a page from my son: keep a positive attitude, play emergency tee-ball, and go hit our home runs. ★



Bart Paull, MD
Denver Health Class of 2017
Denver, CO

Obsidian

The pager goes off... trauma activation. SICU and I'm on call. I make my way to the ED. My fellow resident is there, doing the lateral canthotomy, ET tube's in. It's bad – auto vs. pedestrian – and our patient appears to be a young, healthy guy. This incident, for him, will be life-changing at best. Bed's dropped, to the OR with neurosurgery. I've still got some other stuff to figure out before rounds, complex signouts (what did that echo show on the rollover truck accident r/o BCI guy again?) – the pace of life in the emergency department rolls on like a treadmill. Seconds before rounds start they come out from the OR, brief transfer of care.

"Yeah, partially decompressed ... it's

not survivable ..."

"... he got a lot of pressors and blood products – gotta go, there is a critical child in another OR I need to help..."

Rounds start, and the trauma surgeon's gaze pierces me. "How much blood? What meds did he get in the OR? Why don't you know this?" The attending and the rest of the surgery department stare at me. The rest of rounds don't go better. Then I walk back to the room where my young patient lies. Now she's there. His mother.

"So this is the worst moment of your life," I say.

I take her in my arms. We're crying. Soon, I call the consult.

"Is she ready?"

"Ready? How could she be ready?" I ask. I think she is ready, though.

The palliative care attending feels like my Aslan, yet my atheism is only growing stronger.

"He was doing so well, off drugs, going to school. Now this ..."

She touches his hair; her tears drop on his face. Yet she's brave. She's ready. I deflate the cuff and pull the tube. He takes his last breath while his mother's hands cradle his face. His eyes turn from that dark liquid color of life to the final obsidian, solid out of the fire.

I see and feel that moment.

She kisses him for the last time; she's crying, smiling, caressing. I have to leave – now shattered glass barely held together. And then I'm crouched on the floor of the bathroom, holding my knees, bawling, bawling.

I haven't cried like this in years. But sometimes as a doctor, you have to. ★

CONSULT CORNER

Otolaryngology



Robert Reed, MD
Otolaryngology Resident (PGY4)
University of Virginia
Charlottesville, VA



EMR: What is the most effective way to present an otolaryngology consult over the phone?

In general, a focused presentation following an upfront, clearly stated consult question with a thorough description of the otolaryngologic exam and perceived urgency are helpful.

EMR: What basic workup do you prefer to be completed prior to placing a consult?

Consults for assistance with a possible infection:

- Basic labs, CBC with differential, CRP → CRP can be helpful because it allows for computing of a LRINEC score if there is concern for necrotizing fasciitis.
- If imaging is indicated, typically a CT scan with contrast.

Consults related to bleeding (epistaxis, tonsil bleed):

- Basic labs (H/H), Coags

EMR: What are some common procedures that an EM resident should feel comfortable with managing in the community?

1. **Needle aspiration of a PTA.** A small to medium sized peritonsillar abscess that does not raise concern for airway compromise or extension into the neck can often be aspirated successfully by an EM provider.
2. **Tracheostomy changes.** Remember the mnemonic SPLAT when manipulating and/or changing tracheostomies:
 - Suctioning (have available Yankauer and red rubber catheter)
 - Positioning (supine, neck extended)
 - Light (good overhead light/headlight)

- Assistance (two sets of hands preferred)
- Tracheostomy (replace like with like if possible; have cuffed and uncuffed options available)

EMR: What do you consider to be emergent consultations?

The ABCs start with the airway. Remember, audible stridor often indicates the airway is at least 80% stenotic and is often >90%. These patients should be kept sitting upright, and providers need to be extremely cautious with use of pain medicine or sedatives; otolaryngology should be consulted urgently. Early involvement of anesthesia and otolaryngology and having an algorithm for dealing with acute upper airway obstruction is essential for successful treatment.

EMR: Top 3 ED pet peeves?

1. **Lack of a diligent exam:** Exposure to ENT anatomy and pathology is somewhat limited in medical school, which makes good examination of these patients a formidable task for the non-specialist. You only get better by trying.
2. **Blood pressure management during epistaxis:** We often get pushback from the ED on this. We see the cause and effect relationship in sinus surgery all the time; good management of hypertension *does* help.
3. **Consult for equipment:** Calling because we have the fancy instruments. Typically, getting these patients to clinic is in everybody's best interest.

EMR: Other pearls?

1. Peritonsillar abscesses form in the pseudocapsule between the tonsil and the pharyngeal constrictor muscle. Remember the tonsil is

somewhat football shaped and often only about half of it can be seen. The key to striking gold (ie, pus) on an aspiration is identifying the palatoglossus muscle (anterior tonsillar pillar) and fanning out radially enough to ensure the needle is in this potential space rather than embedded in the parenchyma of the tonsil itself.

2. The absorbable packing options for dealing with epistaxis are great. Often, anterior epistaxis can be dealt with successfully by generous use of surgical, gelfoam, and/or nasopore packing avoiding cumbersome, uncomfortable nasal packs that must be removed 2-3 days later.
 3. Perform laryngoscopy when possible! When positioned in the oro/hypopharynx, ask the patient to do the same set of maneuvers every time (be systematic!):
 - a. Stick their tongue out → exposes the tongue base and vallecula.
 - b. Tongue back in and put chin up (sniffing position) → improves visualizing the larynx. Strongly sniff in through their nose and say “EEEE.”
 - i. A strong sniff is the most powerful neurologic signal to abduct the cords; enables you to check vocal fold abduction and evaluate patency of glottic airway.
 - ii. During phonation (“EEEE”) analyze how the cords come together to see if they look healthy or not.
 - c. Sniff in one more time to look at the patency of the subglottis when possible.
 - d. Insufflate cheeks and valsava with a closed glottis (“puff your cheeks up like you’re playing the trumpet”) to look at both pyriform sinuses.
- Routine practice will help you get this down and improve the accuracy of your scopes! ★

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1 – 3 pm



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EMRA Resident SIM•WARS

Monday, Oct 30
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NYU defends their title at ACEP17.
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Things Are Not
What They Seem



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EMRA Awards in Action: Critical Care Medicine Conference Scholarship

Editor's note: In 2017, the EMRA Critical Care Division awarded its inaugural Critical Care Medicine Scholarships. The travel stipend, which will be given annually, is designed to help an emergency medicine resident attend a critical care conference, with the goal of stimulating EM critical care research. The first recipient, Nancy Guber, MD, of UC-San Diego, attended the Society of Critical Care Medicine's conference. In her own words, Dr. Guber shares how the EMRA award has impacted her.

In the upcoming months, I am planning on applying to EMS fellowships with the hopes of pursuing the conventional ACGME fellowship curriculum and additionally incorporating resuscitation research that blends well with the EMS setting, such as use of code epinephrine or peripheral limb ischemia reperfusion.

At the SCCM conference in January, I presented the abstract "Improving the Specificity of the D-dimer in the Emergency Department." With a team of attending physicians, residents, and students, we reviewed 8,486 patient charts from the emergency department on whom D-dimers and imaging were ordered.

We collected data including symptoms (dyspnea, unilateral leg swelling, hemoptysis),

age, vital signs, medical history (cancer, recent surgery, medications, history of deep vein thrombosis or PE, COPD, smoking), laboratory values (quantitative D-dimer, platelets, and mean platelet volume [MPV]), and imaging results (CT, VQ, and duplex ultrasound).

At the conference, I presented the preliminary results of this data, including practice patterns of physicians ordering D-dimers in the ED, results of false positive and negative D-dimers, and discussion for potential improvement of sensitivity and specificity of the D-dimer assay by adjusting for data collected.

Overall Experience

I had an incredible experience at this conference. It was humbling to learn how to present my research in that type of venue and field questions by colleagues. After spending months working on and discussing a project,

it is always interesting to hear the novel questions that a new audience brings to the table.

Beyond presenting my own research, I had the opportunity to attend many lectures on physiology, disaster response, the Stop the Bleed Campaign, and sepsis. I also attended a panel discussing recent practice-changing literature in emergency medicine.

A significant part of emergency medicine is critical care. I enjoyed the opportunity to learn about critical care from this perspective, with the hope of taking it home to apply in my own emergency department.

If you'd like to apply for a Critical Care Medicine Conference Scholarship, complete the EMRA Award Application form at emra.org/Content.aspx?ekfrm=585. This is a Spring Award; application deadline is Jan. 15. ★

New Video Tackles Transitions of Care

CDEM, EMRA, CORD, and SAEM are pleased to announce the release of a new instructional video titled "Transitions of Care" — posted online at emra.org/resources/Transitions-of-Care.

Improving transitions of care — also called patient handoffs or signouts — is a national patient safety priority because communication failures are a leading cause of medical error. In a multi-institutional study, a handoff program using the "I-PASS" mnemonic as a structured-communication tool was found to reduce medical errors and preventable adverse events in the inpatient pediatric setting. This video provides an overview of effective transitions of care within the emergency department and features the I-PASS mnemonic. ★

EMRA Match Wins "Power of A" Silver Award

EMRA Match has been named a 2017 Power of A Silver Award winner by the American Society of Association Executives. The Power of A awards recognize a select number of organizations annually that distinguish themselves with innovative, effective, and broad-reaching programs and activities that positively impact America and the world. The honor recognizes and celebrates the extraordinary contributions associations make to society by enriching lives, creating a competitive workforce, preparing society for the future, and driving innovation. ★



#EMDayofService

What are you doing this September to give back to the community? Get your fellow residents together and plan a specialty event that helps improve the area where you live and work. Be sure to tweet [#EMDayofService](https://twitter.com/EMDayofService) so we can recognize your efforts! ★

Want to Run for the Board?

The EMRA Board of Directors will be filling 5 positions during elections at the Representative Council meeting in October. Are you interested in running? Electronic candidate packets are due Sept. 4 to emra@emra.org and should include your CV, platform statement (max 200 words), signed letter of support from your program director, and a professional portrait. The open positions include President-Elect, Secretary/Editor, Vice-Speaker, Academic Affairs Representative, and Informatics Coordinator. Find details of the positions at emra.org/leadership/Board-of-Directors. ★

Diagnose this Condition



Cristiana Baloescu, MD
Emergency Medicine
Resident
Yale University
New Haven, CT



Rachel Liu, MD, FACEP
Yale University Department
of Emergency Medicine
New Haven, CT



The Patient

A 28-year-old female, who was the restrained front passenger in a motor vehicle accident 1 week before, presents to the ED with abdominal pain. A CT scan of the chest, abdomen and pelvis was negative at the initial visit. On this second visit, she is febrile and has a distended tender abdomen. Her pregnancy test is negative. Point-of-care ultrasound is performed.

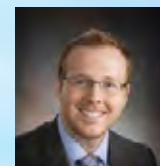
What is the diagnosis?

See the **DIAGNOSIS** on page 42



ECG Challenge

See the **ANSWER** on page 42



Gregory Taylor, DO
Emergency Medicine
Resident
Beaumont Hospital/
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Diane Paratore, DO, FACEP
Program Director
Beaumont Hospital/
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Farmington Hills, MI

CASE. A 97-year-old female with a past medical history of congestive heart failure with an ejection fraction of 20%, hypertension, and chronic left bundle branch block presents to the emergency department with the chief complaint of nausea, shortness of breath, and epigastric abdominal pain for 1-day duration. The patient states that her symptoms had started gradually around 10:30 PM and continued to get worse until her presentation in the morning.

What are you concerned about?



The Diagnosis

Point-of-care ultrasound of the abdomen demonstrates free fluid in the pelvis (**Figure 1**) and dilated loops of bowel with absent peristalsis (**Figure 2**). Confirmatory CT scan revealed a bowel perforation with free fluid and ileus.

Bowel injury secondary to blunt trauma to the abdomen comprises 1% of traumatic injuries, but small bowel is the third most commonly injured abdominal organ after spleen and liver.^{1,2} Delayed presentation of injuries is even more unusual, with reports in the English language literature limited to case reports and small case series, and is associated with increased mortality.^{1,10} Patients usually return when initially missed small perforations progress to peritonitis or symptoms of small bowel obstruction.^{2,6,10} Small tears or hematomas can also heal and lead to strictures and small bowel obstruction days or weeks after a traumatic event.^{6,9} Though diagnosis is usually made with a CT scan, ultrasound has 80% sensitivity.⁴ Findings on ultrasound include free fluid, dilated loops of bowel with absent peristalsis in the case of obstruction or ileus, focal areas of bowel thickening, and loss of stratification of the small bowel wall.^{4,11} ★

References available online.



ECG Challenge

ANSWER

This ECG demonstrates a heart rate of 24 BPM, a left bundle branch block, and a QRS duration of 220ms. There are peaked T-waves with flat to widened P-waves intermittently, that do not necessarily associate with the QRS complexes. The ventricular rate with a widened QRS would suggest an idioventricular rhythm, giving us a complete third degree heart block with an idioventricular rhythm.

The patient had stopped taking her furosemide for the past week and continued taking her spironolactone. She was found to have a non-hemolyzed potassium of 9.6. The patient was hemodynamically stable from a blood pressure standpoint. However, had she become unstable, she would have undergone temporary pacing. While the patient was being prepared for dialysis, she received 1gm calcium gluconate, 20 units of regular insulin IV, 2 amps of D50, and a 10mg albuterol nebulizer treatment. Repeat potassium prior to starting dialysis was 8.0. Status post Quinton catheter placement, she underwent emergent dialysis. Repeat potassium post-dialysis was 6.2. Repeat 12-lead ECG showed normal sinus rhythm at 90 beats per minute with a decreased QRS diameter from 220 to 180. The patient remained hemodynamically stable and was transferred to the ICU for closer monitoring.

Our patient had a critically elevated potassium with an impending sine wave appearance and impending cardiac arrest. Emergent treatment was necessary to save the patient's life.

LEARNING POINTS

1. When a patient is noted to be bradycardic, especially if irregular, the clinician must always think of hyperkalemia.
2. Hyperkalemia is the great masquerader, and ECG changes can be marked and varied.
3. Hyperkalemia is one of the few potentially lethal electrolyte abnormalities that mandates prompt suspicion and recognition. ★

Board Review

QUESTIONS

PEER (Physician's Evaluation and Educational Review in Emergency Medicine) is ACEP's gold standard in self-assessment and educational review. These questions are from *PEER VIII*. For complete answers and explanations, visit the [Board Review Questions page](#) under "Features" at [emresident.org](#).

To learn more about *PEER VIII*, or to order the newly released *PEER IX*, go to [acep.org/bookstore](#).



- A social worker brings a 10-month-old boy to the emergency department for an examination before placing him in a foster home. He was removed from his own home because of concerns involving his school-aged sister. His clothes are stained, somewhat dirty, and frayed. On physical examination, he appears thin and long; he has a normal head size and redundant skin folds, and he cannot sit unsupported. He does not seem to be dysmorphic. Which of the following is the most likely cause of his condition?

 - Inborn error of metabolism
 - Insufficient caloric intake
 - Intestinal atresia
 - Intracranial neoplasm
- An acutely poisoned patient presents with a severely depressed level of consciousness and tachypnea. Blood pressure and heart rate are normal. Blood gas analysis reveals a pH of 7.23, PCO_2 of 23 mm Hg, and a serum bicarbonate level of 10 mEq/L. Which of the following toxins is most consistent with this presentation?

 - Ethylene glycol
 - Isopropyl alcohol
 - Phenobarbital
 - Salicylates
- Which of the following statements regarding cystic fibrosis is correct?

 - Hypernatremic hyperchloremic dehydration is common.
 - Most patients are colonized with *Aspergillus fumigatus* by age 18 years.
 - Recurrent episodes of pancreatitis with increased levels of amylase and lipase become more frequent with age.
 - Treatment includes therapies that can help clear mucus, such as N-acetylcysteine aerosols.
- A 65-year-old man presents with severe respiratory distress and a history of both COPD and heart failure. Blood pressure is 195/115, and respirations are 32. Which of the following additional findings would support the decision to use BiPAP?

 - Altered level of consciousness
 - ECG evidence of acute MI
 - Elements of both heart failure and COPD
 - pH level of 7
- A 3-year-old boy with a history of chiari malformation and ventriculoperitoneal shunt placement is brought in by his mother because he has had intermittent headache, nausea, vomiting, and abdominal pain for 4 days. His siblings have recently been ill with influenza A. On examination, the child is irritable. He is afebrile, and there are no external signs of infection around the catheter. The chamber is easily compressible, and refill time is less than 3 seconds. What are the appropriate next steps?

 - Order head CT, shunt series, and shunt tap
 - Treat with acetazolamide to decrease CSF production
 - Treat with antiemetics and rehydration and attempt to feed
 - Treat with oseltamivir and discharge with instructions to follow up with pediatrician ★

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

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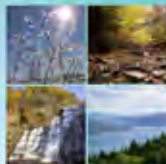
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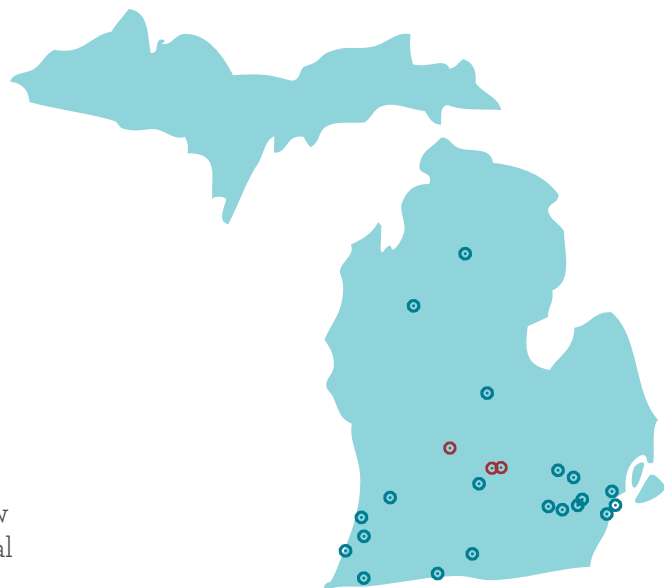
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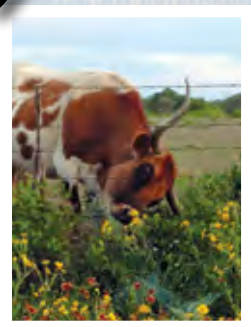


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Adirondacks. This is an exceptional opportunity to join a stable practice at Saratoga Hospital, with annual volume of 40,000 visits, in a spacious, state-of-the-art, 41-bed ED, constructed six years ago. SEPPC has staffed the hospital for 28 years. We offer comprehensive benefits and locally competitive compensation. There is a two-year shareholder track with no financial buy-in. Check out our website at www.seppc.com. Contact: Denise Romand, Saratoga Hospital (518) 583-8436, email: docfind@saratogacare.org. Famous venues locally include Saratoga Race Course, Saratoga Spa State Park, and the Saratoga Performing Arts Center. View us: www.saratogahospital.org, www.saratoga.org, <http://discoversaratoga.org>, and <http://www.ilovesaratoga.us>.

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.

CAPE FEAR VALLEY HEALTH

Hospital employed emergency physician group covering 2 sites seeks additional physicians to meet growing patient volume and support their new emergency medicine residency.

Cape Fear Valley Medical Center

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 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 EM residents in July 2017.

Opportunities exist for both clinical and academic emergency physicians.

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 and dental.

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 and has been recognized for cultural diversity and municipal excellence by the National League of Cities.

Fayetteville is known for its many golf courses with the Home of Golf, aka Pinehurst, located only 30 minutes from the city. Our central location provides easy access to some of the most beautiful beaches in the country to our east and the majestic Blue Ridge Mountains to our west.

In addition to our central location, our mild climate, low cost of living, and patriotic spirit makes it an ideal city for rising healthcare professionals and families. As the sixth-largest city in North Carolina - and growing - both Fayetteville and Cape Fear Valley Health's healthcare needs are on the rise.

Please contact Physician Services for more details at (910) 615-1891 or adowl@capefearvalley.com.

Fayetteville, NC



{ Job Opportunities }

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PEDIATRIC EMERGENCY MEDICINE LEADERSHIP OPPORTUNITIES

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EMERGENCY MEDICINE RESEARCHER POSITIONS



The Emergency Medicine Department at Penn State Health Milton S. Hershey Medical Center seeks energetic, highly motivated and talented physicians to join our Penn State Hershey family. Opportunities exist in both teaching and community hospital sites. This is an excellent opportunity from both an academic and a clinical perspective. As one of Pennsylvania's busiest Emergency Departments treating over 75,000 patients annually, Hershey Medical Center is a Magnet® healthcare organization and the only Level 1 Adult and Level 1 Pediatric Trauma Center in PA with state-of-the-art resuscitation/trauma bays, incorporated Pediatric Emergency Department and Observation Unit, along with our Life Lion Flight Critical Care and Ground EMS Division. We offer salaries commensurate with qualifications, sign-on bonus, relocation assistance, physician incentive program and a CME allowance. Our comprehensive benefit package includes health insurance, education assistance, retirement options, on-campus fitness center, day care, credit union and so much more! For your health, Hershey Medical Center is a smoke-free campus. Applicants must have graduated from an accredited Emergency Medicine Residency Program and be board eligible or board certified by ABEM or AOBEM. We seek candidates with strong interpersonal skills and the ability to work collaboratively within diverse academic and clinical environments. Observation experience is a plus.

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, PO Box 855 Mail Code A595, Hershey PA 17033, Email: hpeffley@pennstatehealth.psu.edu
OR apply online at: <http://hmc.pennstatehealth.org/careers/physicians>



**Department of Emergency Medicine
Fellowship Opportunities**

The Department of Emergency Medicine at University Hospitals Cleveland Medical Center is currently seeking ABEM/ABOEM certified or eligible physicians for the following fellowships in July 2018:

- **Global Emergency Medicine Fellowship**
Program Director: Dr. Justin Yax
- **Ultrasound Fellowship**
Program Director: Dr. Vicki Noble
- **Administrative Fellowship**
Program Director: Dr. Christopher Miller
- **EMS Fellowship (ACGME-Accredited)**
Program Director: Dr. Jeffrey Luk

University Hospitals Cleveland Medical Center (UHMC) is a 1,032-bed Magnet facility on the campus of Case Western Reserve University (CWRU) located in the cultural heart of Cleveland: University Circle. UHMC is a verified Level I Adult Trauma Center, Comprehensive Stroke Center, and STEMI Center. The Department of Emergency Medicine hosts a three-year emergency medicine residency training program with 10 residents/year. UHMC also includes Rainbow Babies and Children's Hospital, which is a verified Level I Pediatric Trauma Center. UHMC is a teaching affiliate of the CWRU School of Medicine.

Visit our website to learn more:
<https://www.uhdoctor.org/center-for-emergency-medicine>

Salary and academic rank will be commensurate with accomplishments and experience.

Qualified candidates should email a letter of interest to the appropriate fellowship director c/o Ms. Dildred Houston, Education and Practice Coordinator, Department of Emergency Medicine, at Dildred.Houston@UHHospitals.org

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Upstate: Seeking Emergency Medicine Physicians, PAs, & NPs. Independent, democratic group offering partnership for BC/BE emergency physicians with exceptional daily coverage, equal pay and scheduling from day one; occurrence malpractice insurance; Level II Trauma Center and area referral center; Emergency department with adjacent fast track facility have combined annual volume of 85k visits. Affordable, lakefront property on beautiful Lake Hartwell; Short drive to mountains and beaches. Contact: Brandy Vaughn at brandy.vaughn@amedhealth.org or (864) 512-3897.

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Lehigh Valley Health Network (LVHN) seeks BE/BC EM physicians to join our employed group of 75 emergency medicine physicians (including 4 toxicologists) and 31 advanced practice clinicians. LVHN emergency medicine physicians staff 5 emergency departments and treat approximately 240,000 annual patient visits. We have locations that range from 90k annual patient visits to a variety of small town locations that treat approximately 30k. To provide Eastern Pennsylvania access to excellent healthcare, our continued growth is projected to add multiple emergency departments over the upcoming years. LVHN has a Level I Trauma Center with primary angioplasty, MI alert and stroke alert programs, 4 helicopters and PACs. Our large, physician-led network offers advanced career opportunities in teaching, research and leadership. LVHN has the third largest EM residency program in the U.S. and our physicians are eligible for academic appointment at the University of South Florida. In the world of rapidly changing healthcare, the Department of Emergency Medicine at LVHN provides a cohesive, team-



Interest? Please contact Craig Bleiler at 484-862-3908 or craig.bleiler@lvhn.org



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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



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Rapid expansion in Greenville, SC due to new EM Residency Program and community hospital growth

Greenville Health System (GHS) seeks BC/BE Emergency Physicians to become faculty in the newly established Department of Emergency Medicine. Successful candidates should be prepared to shape the Emergency Medicine Residency Program and contribute to the academic output of the department.

GHS is the largest healthcare provider in South Carolina and serves as a tertiary referral center for the entire Upstate region. The flagship Greenville academic Department of Emergency Medicine is integral to the patient care services for the:

- Level 1 Trauma Center
- Dedicated Pediatric Emergency Department within the Children's Hospital
- Five Community Hospital Emergency Departments
- Accredited Chest Pain Center
- STEMI and Comprehensive Stroke Center
- Emergency Department Observation Center
- Regional ground and air Emergency Medical Systems
- Accredited 3-year Emergency Medicine Residency Program

Emergency Department Faculty enjoy a flexible work schedule, highly competitive salary, generous benefits and additional incentives based on clinical, operational and academic productivity. The campus hosts 15 other residency and fellowship programs and one of the nation's newest allopathic medical schools - University of South Carolina School of Medicine Greenville.

**Come see us at booth #T804 (Southeast) during the
EMRA Job Fair or booth #2525 at ACEP 2017!**

Greenville, South Carolina is a beautiful place to live and work. It is one of the fastest growing areas in the country, and is ideally situated near beautiful mountains, beaches and lakes. We enjoy a diverse and thriving economy, excellent quality of life, and wonderful cultural and educational opportunities.

**Public Service Loan Forgiveness (PSLF) Program Qualified Employer*

Qualified candidates should submit a letter of interest and CV to: Kendra Hall, Sr. Physician Recruiter, kbhall@ghs.org. P: 800-772-6987. GHS does not offer sponsorship at this time. EOE



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Health System

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- 40+ Physicians in current employed group

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Huntsville, is situated in the fastest growing major metropolitan area in 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 traditions while progressing with new ideas, exciting technologies and creative talents. With a population of 386,661 in the metro area, we are a high-tech, family oriented, multi cultural community with excellent schools, dining and entertainment.

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



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Geisinger Health System serves more than 3 million people in central, south-central and northeast Pennsylvania and also in southern New Jersey with the addition of AtlantiCare, a National Malcolm Baldrige Award recipient. In 2017, the Geisinger Commonwealth School of Medicine became the newest member of the Geisinger family. Geisinger is nationally recognized for innovative practices and quality care. A mature electronic health record connects a comprehensive network of 12 hospital campuses, 43 community practice sites and nearly 1,600 Geisinger primary and specialty care physicians.

Come see us at booth #2611 at ACEP and visit us at the EMRA job fair during the conference!

For more information, visit geisinger.org/careers or contact Miranda Grace, Talent Management, at 717-242-7109 or mgrace@geisinger.edu.

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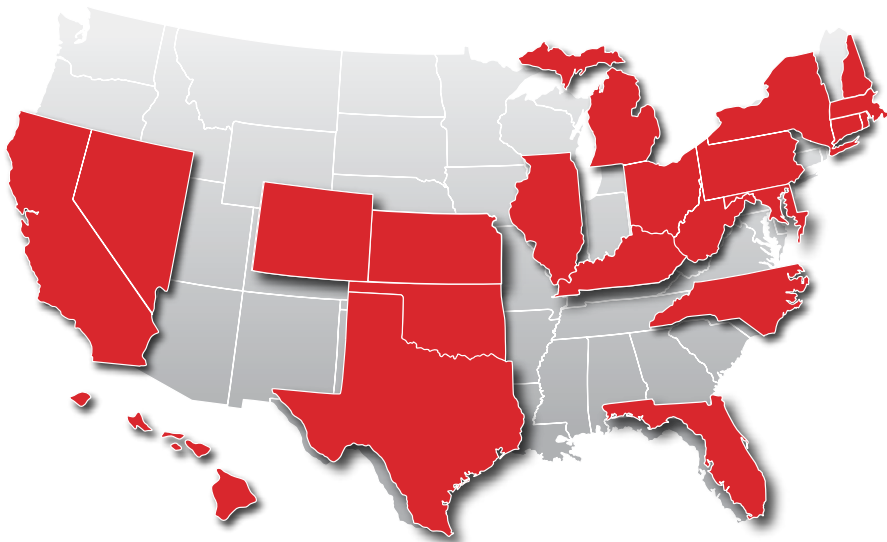


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THE DEPARTMENT OF EMERGENCY MEDICINE

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Exciting Emergency Medicine Opportunities Academic Faculty & Clinical Faculty Opening

The Department of Emergency Medicine at Baylor College of Medicine is looking for Faculty who are interested in a career in Academic Emergency Medicine. We are currently hiring faculty of all ranks commensurate with prior experience and seeking applicants who have demonstrated a strong interest and background in medical education, simulation, ultrasound, or research. Clinical opportunities are also available at our affiliated hospitals.

The Department of Emergency Medicine at Baylor College of Medicine, a top medical school, is located in the world's largest medical center, in Houston, Texas. The Baylor Emergency Medicine Residency was established in 2010, and we recently received department status in Jan 2017. Our residency program has grown to 14 residents per year in a 3-year format. We offer a highly competitive academic salary and benefits commiserate to academic level and experience.

Our academic program is based out of Ben Taub General Hospital and Baylor St. Luke's Medical Center. Ben Taub General Hospital is the largest Level 1 trauma center in southeast Texas with certified stroke and STEMI programs that sees nearly 100,000 emergency visits per year. Baylor St. Luke's Medical Center is home to the Texas Heart Institute and with freestanding Baylor St. Luke's Emergency Centers offers multiple additional practice sites for Baylor faculty. BCM has a collaborative affiliation with eight world-class hospitals and clinics in the Texas Medical Center. These affiliations, along with the medical school's preeminence in education and research, help to create one of the strongest emergency medicine experiences in the country.

Those interested in a position or further information may contact Dr. Dick Kuo via email dckuo@bcm.edu or by phone at 713-873-7044. Please send a CV and cover letter with your past experience and interests.

ASSISTANT/ASSOCIATE PROGRAM DIRECTOR OPENING

The Department of Emergency Medicine at Baylor College of Medicine in Houston, TX is seeking outstanding candidates for the **position of Assistant/Associate Program Director**.

Applicants should have a strong background in medical education with a career path directed towards graduate medical education. Duties of this position will include a focus on developing and implementing innovative educational strategies in the CLER pathways (Patient Safety, Health Care Quality, etc.) that meet and exceed the ACGME accreditation standards. In addition, we are searching for applicants who will contribute to our missions of promoting academic excellence, diversity, and teamwork in service to our patients.

Interested applicants should submit a CV, letter of intent, and 1 letter of recommendation to the Program Director, Dr. Tyson Pillow (pillow@bcm.edu).

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