

EM Resident

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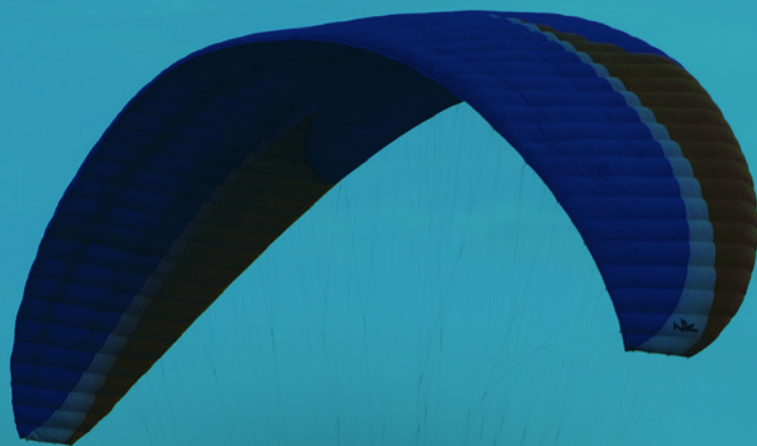
Pediatric Paralysis

**COVID-19 Vaccine:
Marvel of Science**

**Amyand's Hernia
Case Report**

**Single Accreditation:
Effect on DOs**

**Gift
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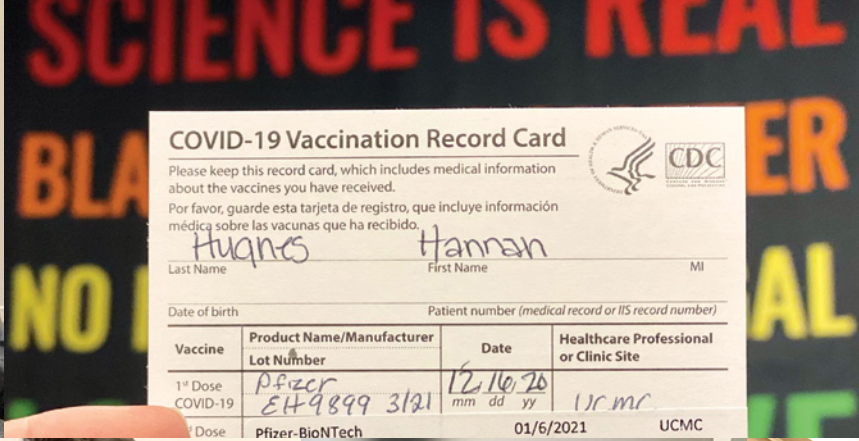


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Priyanka Lauber, DO

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Happy new year EMRA Family!

I hope the holiday season was a time of renewal and time that was well-spent with loved ones. We are starting a new chapter together, and I am looking forward to seeing how we can continue to progress towards a brighter and more social future.

As terrible as 2020 seemed to be at times, it was also a time for reflection and appreciation for me. I learned to appreciate the people near me and reconnect through virtual meet-ups with friends afar. I also understood the importance of maintaining and nurturing a feeling of connectivity and community with the people near you. At times, these people were my rock — often the ones I relied on when things became difficult. I appreciated the initiative shown by thousands of medical students around the country who gathered to help residents and attending physicians by volunteering for pet and childcare. Many such groups created grassroots student organizations to bring food and resources to impoverished neighborhoods, collect and distribute PPEs, and much more.¹

However, the community that I have grown to appreciate the most is the scientific and research community.

Both have been at the forefront of this pandemic. There has never been a time when a novel virus that ravaged the world was sequenced, studied, and understood down to its genetic makeup so quickly in the entire span of humanity's existence. The scientific community's advancements in the past 20 years, especially in terms of genome sequencing, helped forge this path.²

To truly appreciate the break-neck speed shaped by the research and scientific community's tireless effort, we need to quickly explore how long vaccine creations have taken in the past. Chickenpox vaccine took approximately 28 years to develop,³ while HPV and rotavirus both took 15 years.^{4,5} The 15-year timespan was thought to be an advancement at that time! The COVID-19 vaccine was created and distribution started in less than a year! There are many reasons why the COVID-19 vaccine was manufactured within a year of the virus's first entrance into human-to-human transmission.

1. Genetic sequencing allowed scientists to understand the virus in its most intimate form in record time. This technology, until recently, was just not available or feasible.⁶
2. The way the vaccines have been manufactured was changed with the COVID-19 vaccine. In the past, a weaker version of a virus or part of its protein was used to manufacture the

vaccine. The downside to this approach was its imperative to grow in eggs or cells - which were time-consuming and expensive. In contrast, the mRNA vaccine produced by Pfizer and Moderna was made using a surface protein found on the COVID-19 virus, which is coded to make Spike glycoprotein.⁷

3. Vaccines typically go through safety, efficacy, and comparison trials, subsequently listed as phases 1, 2, 3. COVID-19 vaccine phases combined its second and third phases while making sure safety remained untouched.⁸
4. Lastly, the recruitment of patients for the COVID-19 vaccine, unlike other vaccine trials, had such an overwhelming response for trial participants that it helped save time.⁸

The efforts listed above show how the research and scientific community saved humanity and provided us a glimpse of hope that we have all been coveting for the past several months. We, at the EMRA Board, have been so thankful and proud to have received our vaccines. I understand there are still some hesitant residents and medical students who are wary of the vaccine. We stand together as a community. As physicians and future physicians, you are seen as the leader in the department and the community.

Please be the change you want to see globally, do your research, and I encourage you all to get the vaccine. ★

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Emergency Medicine Residents' Association

Defending COVID-19's Latest Victims

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As the U.S. struggles to flatten the ever-rising curve of COVID-19, the virus has revealed a new weakness in the health care system. More and more patients are falling ill, and despite the fact that emergency medicine residents put their health at risk to treat them, the unimaginable is happening: Residents are becoming unemployed. In a shocking twist, it turns out that COVID-19's latest casualty is us.

The prospect of unemployment after residency graduation is a new one, and the pandemic is directly responsible. Though workforce trends have been shifting for years, EM has kept up. Non-physician providers vied for unsupervised patient care, and EMRA leads the fight to protect your education. Residency slots increased, but graduates found jobs.

Just last year, jobs were plentiful. The class of 2020 found themselves awash with recruiters offering up to six-figure signing bonuses. Many grads signed contracts in the fall of 2019. Largely able to pick their practice setting and location, they could focus on their education and patient care without worrying about what might come next.

That started to change in the spring of 2020. COVID-19 hit. Residents started getting sick, hospitals became overwhelmed, and economic forces beyond their control started closing in. Residents across the country, once secure in their future, started to worry. Their new employers started making changes to contracts. Some cut hours. Some cut pay. And tragically, some even terminated contracts. As the class of 2021 started looking for jobs, they hit a wall. This year, they barely get interviews.

How did this happen? In just one year, how did we go from a market that supports graduating residents to one that

**Now more than ever,
the EM community,
at every phase of
training and career,
must stand united,
instead of standing by.**

leaves us facing unemployment?

The problem lies at the core of our specialty. EM is the only specialty required to treat every patient who comes through the doors, day or night, regardless of their ability to pay. Our specialty embraces this social justice mission, and it is a prime reason many — including me — chose EM in the first place. But the government never provided a sustainable funding mechanism to support the EMTALA mandate. EM compensation is based on services provided, not on our 24/7 availability to manage literally any patient presentation possible.

This reimbursement model caught up with us in 2020. In the first full month of the pandemic in the U.S., EDs across the country suffered a massive drop in volume. Patient volume plunged by 40% and plateaued at a 25% drop throughout the summer. Most EDs have not recovered their volume, and their bottom lines suffered. According to an ACEP survey, 20% had layoffs, a third had furloughs, and more than half cut hours or wages.¹

These changes disproportionately affect residents. Despite making as little as \$15 per hour as residents, the debt is crushing. Half owe more than \$200,000 in student loans. I am part of the quarter of residents who owe more than \$300,000;² that is more than the average cost of buying a home in the U.S.

As expected, some senior residents are trying to find alternatives to typical employment, rather than attempting

to wade into the job market. More are choosing fellowships. Some are turning to urgent care.

Others are considering rural EM. EMRA is a leader in supporting rural EM training and service,³ and it is no surprise that members are looking for jobs in geographic areas that they might not have previously considered. But even those rural areas do not guarantee employment. In rural Ohio, one group has staffed their ED with 100% board certified/board eligible EM physicians for the first time ever.

With even rural groups filling up, residents struggle to get interviews anywhere. Residents are calling employers and simply being told they are not hiring this year, or that they will re-evaluate hiring decisions in the spring. This puts them in a holding pattern, casting a wider and wider net, hoping to catch a lead somewhere.

The larger political and market forces weighing down our industry should not prohibit our highly trained graduating residents from gainful employment. ACEP led a fierce fight against Medicare cuts,⁴ a success that helps us all. EMRA is doing our part to support our residents and protect our patients. When employers rescinded contracts, we banded together to support contract protections for graduating residents.⁵ EMRA also supports physician-led patient care and training, and we lead the effort to ensure resident education and training will not be compromised or diluted by non-physician providers.⁶

Now more than ever, the EM community, at every phase of training and career, must stand united, instead of standing by. We know we provide the very best emergency care for our patients, but we need a place to do that. We need employers to hire us. Volumes are starting to increase, and hiring new grads supports our EM community.

Give us the chance to shine. ★

EMRA & EDPMA Scholarship

A WORTHY INVESTMENT

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In a year ravaged by a global pandemic and uncertainty, three EMRA physicians-in-training were selected for the unique opportunity to be 2020 EMRA/EDPMA Scholars. EDPMA, the Emergency Department Practice Management Association, is a passionate leader for emergency care. EDPMA's members help deliver emergency care for nearly 150 million ED visits per year, which equates to roughly half of all ED visits throughout the country. Through advocacy, engagement, and networking opportunities, the 2020 EMRA/EDPMA Scholars successfully cultivated a meaningful professional experience.

EDPMA Federal Health Policy Committee



Nicholas Cozzi, MD, MBA

Being a member of the EDPMA Federal Health Policy Committee during a global pandemic was a unique and once-in-a-lifetime opportunity. The Federal Health Policy Committee strategically pursued advocacy initiatives that impacted emergency care for millions of patients. From COVID-19 reimbursement to surprise medical billing, the committee thoughtfully charted a course that navigated political uncertainties and economical realities. The committee advocated for EMTALA waivers for off-site COVID testing and for emergency medicine physician groups' access to meaningful financial reimbursement in the 2020 Coronavirus Aid, Relief, and Economic Security (CARES) Act. More than anything, liaising with and learning from emergency physician champions and leaders from the reimbursement and

revenue cycle management specialty made this experience invaluable. As a future EMS Fellow with the Fire Department of New York (FDNY) and Northwell Health, I am eager to stay involved with EDPMA. I highly recommend this opportunity to any EMRA member eager to learn more about emergency medicine advocacy and practice management.

EDPMA State Regulatory and Insurance



Tehreem Rahman, MD, MPH

Being an EMRA/EDPMA scholar this past year was an invaluable experience. I learned a tremendous amount about the active role the organization is taking to protect emergency medicine practice, particularly during these difficult times. EDPMA has worked hard to support emergency physicians in caring for an increasingly uninsured population with strategies such as conducting presumptive charity screening for self-pay patients.

EDPMA has consistently developed tools to optimize emergency practice for this pandemic as well as any other critical access crisis. Specifically, they have addressed preparation for COVID-19 rebound, rotation of telemedicine, cost containment, and alternative service lines. In addition to supporting emergency physicians directly, I was part of the committee that specifically helped inform legislation such as on the state telehealth insurance coverage model.

Legal advocacy efforts included a thorough evaluation of existing legislation such as state out-of-network laws. This evaluation was subsequently utilized to support or oppose state-based legislation in a targeted and strategic manner. The project gave me incredible insight into the level of impact state legislation has on daily clinical practice, even though the focus is often placed on federal legislation. For instance, when legislation was proposed by the Michigan Senate committee, EDPMA responded with

specific requests for amendments, such as requiring insurers to reimburse providers directly and allowing batching of similar claims for similar services.

Ultimately, my experience as an EMRA/EDPMA scholar was very informative, and I would recommend any training emergency physician to pursue this opportunity to learn more about optimizing their practice within a constantly evolving legal landscape.

EDPMA Quality, Coding and Documentation Committee



Allen Chang, MD

EMRA member knowledge of and operational awareness of the major entities within emergency medicine advocacy and reimbursement are essential for newer emergency medicine residency graduates. As an EMRA member and current EMS fellow at Harbor/UCLA, I believe emergency medicine trainees need to maintain knowledge and working proficiency of current coding and documentation essentials.

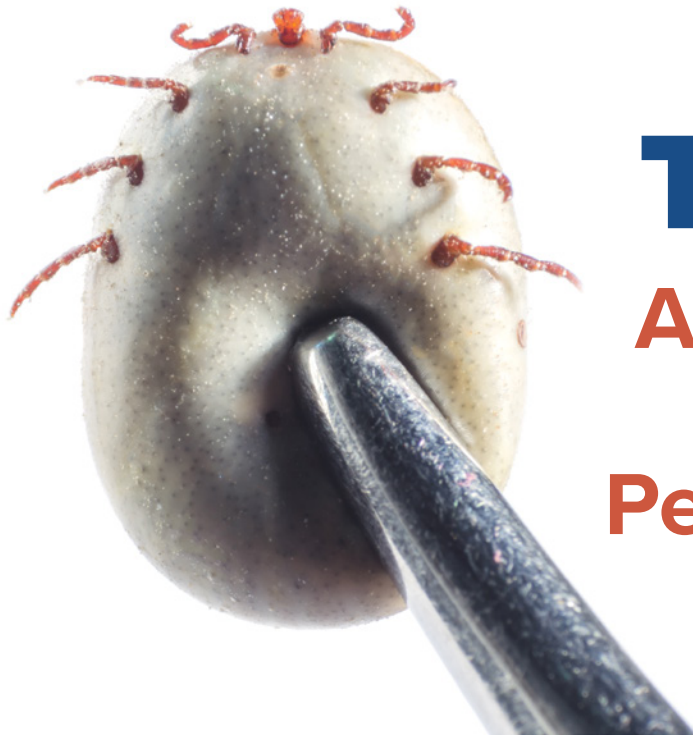
The opportunity to be an EMRA/EDPMA Scholar was invaluable for the 2020 Class. We strongly encourage all EMRA members to consider applying for a future class and looking into EDPMA's newest fellowship opportunity to work at a deeper level with the organization for one year. Of note, EDPMA is offering its unique and high-value programming at a discount for EMRA members. EDPMA is also charging EMRA members half the cost for attending the 2021 Solutions Summit.*

*To access the EMRA discount to EDPMA events, please contact emra@emra.org.

Learn More

Learn more about the Emergency Department Practice Management Association at edpma.org.

Become an EMRA/EDPMA Scholar or Fellow! Awards are given each year; find application details and deadlines at emra.org/be-involved/awards/edpma-scholarship and emra.org/be-involved/awards/edpma-fellowship. *



Tick Bites

An Often-Missed Cause of Pediatric Paralysis

Megan Hoffer, DO

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Class of 2021

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In early June, a 6-year-old female presented to the ED with a chief complaint of acute onset lower extremity weakness. Her father stated that she had been playing normally yesterday but complained that her legs felt “wobbly” once toward the end of the day. Upon waking the next morning, she was unable to stand or ambulate. He carried her to the nearest ED, where she was found to have bilateral motor weakness in the lower extremities.

The presentation of motor weakness in children is often alarming, difficult to characterize, and involves a large differential of uncommon pathologies. The can't-miss diagnoses include spinal cord compression, transverse myelitis, acute cerebellar ataxia, hypokalemic periodic paralysis, poliomyelitis, lead poisoning, and botulism, although the most common cause of acute pediatric paralysis is Guillain-Barré Syndrome.^{1,2} However, there is an etiology of acute paralysis that can be diagnosed with a physical exam alone and is curable at bedside.

Tick paralysis is a rare but important cause of pediatric paralysis. It is often overlooked or misdiagnosed, most frequently as Guillain-Barré Syndrome (GBS), which can lead to an extensive and invasive workup. If left undiagnosed, tick paralysis can progress to respiratory failure and death. ED providers should maintain a high index of suspicion for

tick paralysis when encountering a case of acute paralysis in an otherwise healthy child, particularly in the spring and summer months. A 60-year meta-analysis of tick paralysis in the United States showed that cases were predictably higher during the summer months and in regions of the country where ticks are prevalent.³ Case fatality rates have been reported to be as high as 11%, with the diagnosis in such cases being made at a very late stage or post-mortem.⁴

Tick paralysis is caused by a neurotoxin produced in the salivary glands of gravid ticks. The neurotoxin causes an acute flaccid paralysis by blocking acetylcholine release at the presynaptic neuromuscular junction.^{5,6} Paralysis progresses in an ascending fashion and includes loss of reflexes. Most cases occur in children, particularly young females under age 8, because they have long hair that can easily disguise

an attached tick.³ Additionally, children appear to be more susceptible to the toxin than adults due to their lower body mass.⁶ Ticks are typically attached for 3-4 days before the development of symptoms.⁷ Once removed, symptoms are rapidly reversed within hours.⁷

The differential diagnosis for acute flaccid paralysis in children is very broad, but tick paralysis can be distinguished from other causes of paralysis in several ways. Spinal cord compression typically involves sensory and urinary or fecal incontinence in addition to motor weakness.¹³ Botulism typically presents with a descending paralysis in contrast to the ascending paralysis noted in tick paralysis. In addition, botulism is more common in infants.¹⁴

Tick paralysis is most commonly misdiagnosed by emergency physicians as GBS, as both present with ascending paralysis and the patient typically appears non-toxic at first.³ Additionally, historical features such as history of recent vaccination or recent viral respiratory or gastrointestinal illness may support the diagnosis of GBS.⁶ In unvaccinated patients or those from endemic regions, poliomyelitis should be considered. Like tick paralysis, poliomyelitis develops rapidly, usually within 24-48 hours.¹⁵ However, patients typically have a high fever at onset, which would be unusual in tick paralysis.^{8,9} Patients with hypokalemic periodic paralysis present with episodic motor weakness and are more likely to be male, older (late childhood or teenage years), and have an associated trigger, such as exercise, stress, or carbohydrate-rich meals.¹⁰ Though rare, weakness can occur with lead poisoning. It is more common in children with underlying sickle cell anemia and presents with other symptoms, such as lethargy, abdominal pain and behavioral changes.¹¹

For patients with tick attachment greater than 36 hours and location in an endemic area, consider prophylactic doxycycline to prevent the development of Lyme Disease.¹² The CDC guidelines for prophylaxis are: one dose of doxycycline 4.4 mg/kg with a maximum

of 200 mg.¹² Prophylactic treatment should be administered within 72 hours of tick removal.¹²

Case Conclusion

In the case of this 6-year-old, her father did some research prior to arrival and inquired about tick paralysis. He stated that since the start of quarantine the family had been staying at their

cabin in rural Virginia and the kids had been spending a lot of time outdoors. The patient was found to have an engorged tick on her scalp. The tick was removed, and she was observed for signs of improvement in lieu of diagnostic work-up. She regained full use of her legs within a few hours and was discharged home ambulating normally.

Pediatric Paralysis Pearls

- During the spring and summer months, **consider the diagnosis of tick paralysis** in any child presenting with acute ascending paralysis.
- If considering the diagnosis of Guillain-Barre Syndrome, the **child should undergo a thorough physical exam** to look for ticks. This extra step could prevent an unnecessary invasive workup and reduce mortality.
- **Important historical questions** to ask in any child with acute flaccid paralysis include:
 - Onset (days vs. weeks)
 - Recent history of respiratory or gastrointestinal illness
 - Recent immunizations and immunization status
 - Incontinence, sensory deficits, or other signs of cord compression
 - History of fever or infectious symptoms
- Tick paralysis remains a rare diagnosis. However, it is a simple, curable, and gratifying one to make in the ED. **If you don't think of it, you can't diagnose it.** ★

Maintain a high index of suspicion for tick paralysis when encountering a case of acute paralysis in an otherwise healthy child, particularly in the spring and summer months.



RECREATE RESPONSIBLY

Exploring the Wilderness in the Age of COVID

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Wilderness Medicine Committee Chair

In April 2020, the EMRA Wilderness Committee recognized COVID-19 as a barrier to wilderness exploration and reached out to the wilderness medicine community via Zoom for solutions. Guest speakers Paul Auerbach, MD, MS, FACEP; Timothy Erickson, MD, FACEP; Taylor Haston, DO, FACEP; and Ian Wedmore, MD, FACEP, joined us to contribute their insights on staying mentally well and physically healthy amid the variable dangers of COVID-19.

How can you safely get outdoors? What do you need to plan to stay safe? How can you spend time in the wilderness responsibly? What impact can you have on the health of our planet and its future after COVID-19? In this article, we review the most up-to-date, expert recommendations for these questions in order to get you safely into the wild.

Getting Outdoors

As with any great trip, start by doing your homework. When it comes to your destination, consider the latest local regulations on travel. Avoid going too far in order to avoid potentially spreading the virus. Given the current state of international travel, you may have to delay or cancel a trip you have already planned. In the U.S., the Centers

for Disease Control and Prevention website offers the latest information on COVID-19 spread.¹ Popular activities like thru-hiking and visiting national or state parks may be restricted due to limited services or closures.² Instead of driving long distances or flying, consider biking to a trailhead, exploring a local park that is within walking distance, or checking out nearby forest lands that are less well-known. Be flexible. Your local area likely has many options you may not have considered before; take it on as a new adventure.

Staying Safe

Before embarking solo, there are a few things to consider to ensure your safety as well as that of others. As with any outdoor activity, check the weather forecast. The National Oceanic and Atmospheric Administration (NOAA) has in-depth reports even for remote locations.³ Be sure to let others know where you are going and when to expect your return. Review the route, read updates regarding trail conditions, and, most importantly, be realistic about your skill level and do not try to exceed it while alone. Emergency Medical Services (EMS) and rescue teams are already taxed and may not be able to reach you in a timely manner.⁴ Many hospitals are struggling with capacity and not performing elective surgeries, so now is not the time to push your limits on a solo mission.

To keep everyone healthy, don't forget about social distancing. Stay at least **6 feet** away from others, and wear a mask and glasses combination that covers your nose, mouth, and eyes (given both the CDC and the European Centre for Disease Prevention and Control's concern for airborne qualities of SARS-CoV-2).^{5,6} Consider a cotton mask or neck buff that you can put



on quickly as an acceptable solution when you are on a less busy trail. Many outdoor clothing companies are manufacturing face coverings and supporting local businesses when possible is a great option (Image 1). Try to travel at non-peak hours to steer clear of crowds. Avoid trailheads with busy parking lots and find less common access points where possible. Do not leave your house without hand sanitizer as water for hand washing may be limited. Consider bringing biodegradable soap if there is water access along your route, and **wash your hands for 20 seconds** (remember the birthday song?).⁷ Most importantly, do not touch your face.

When packing your bag for an adventure, bring sufficient food, water, layers of clothing, sun protection, good shoes, extra socks, and a first aid kit. Some key components for a first aid kit include: blister prevention (moleskin, antibiotic ointment, band aids), a multi-tool/Swiss army knife, headlamp, duct



Emergency

Disaster Medicine

Perspectives from the Experts

Interviews with Dr. Paul Auerbach and Dr. Thomas Kirsch

Sophia Gorgens, MD
Hofstra-Northwell NS/LIJ

Disaster medicine is a growing niche in emergency medicine: According to the National Center for Environmental Information, in the U.S. between 1980 and 2020, there were 125 severe storms, 17 wildfires, 45 tropical cyclones, 33 floods, 27 droughts, 17 winter storms, and 9 freezes that each caused more than \$1 billion in damage.¹ The COVID pandemic alone is likely to cost the U.S. trillions of dollars in combined health care expenses and economic devastation.²

Where do emergency medicine physicians fit in to all of this? From conducting disaster responses to researching quality improvement to implementing administrative changes for disaster planning and management, there is a need for highly educated and trained EM physicians to be leaders on the local, state, national, and international levels. Due to the diversity of skills involved in disaster medicine, fellowships are 1-2 years long, with many combining the program with an EMS fellowship or an additional degree in public health, public policy, or business management. In disaster leadership, EM physicians are uniquely positioned by possessing both critical clinical thinking as well as an understanding of the greater health care systems.

Two experts in the field, Paul Auerbach, MD, MS, FACEP, and Thomas Kirsch, MD, MPH, FACEP, share further insights in this Q-and-A. Dr. Auerbach is the Redlich Family Professor Emeritus in the Department of Emergency Medicine at the Stanford University and Adjunct Professor of Military and Emergency Medicine at the Uniformed Services University of the Health Sciences. Dr. Kirsch is the Director of the National Center for Disaster Medicine and Public Health and a Professor of Military and Emergency Medicine at the Uniformed Services University of the Health Sciences.

How did you get into disaster medicine?

Dr. Auerbach

I came to disaster medicine later in my career. Prior to that, I did a lot of wilderness medicine, so I had some experience with providing care in austere settings. My first involvement with disaster medicine per se was when I became part of Stanford's response team to the earthquake in Haiti in 2010. We were deployed to the "University Hospital," which was an under-resourced facility. There were about a thousand injured patients on-site and 12 of us in that particular deployment. After a few days, I took on the role of supervising the site. At first, I treated a lot of patients too because it's hard to walk past a person in need of help without doing anything, but I soon realized that I couldn't be effective as an administrator and clinician simultaneously. I was doing greater good by organizing supplies and resources, coordinating the medical teams, communicating with the press, and essentially creating a medical center from the ground up.

My wilderness training came in useful — it had taught me resourcefulness, creativity, and innovation. For example, we estimated that we had approximately one hundred patients with femur fractures, and although we had traction pins, we had to improvise rigging systems with cement blocks, sandbags, and rock-filled buckets to provide traction. Every day was full of new challenges like that, and we had open discussions and contributions from everyone to figure these things out.

Dr. Kirsch

I discovered my passion for disaster medicine early on. When I was a medical student, I found a humanitarian rotation overseas at a refugee camp in Thailand, and even though it involved me missing my graduation and working the whole summer up to my internship start date, I jumped on the chance. That experience changed my life. After one year of a general surgery residency, I quit to pursue a Master's in Public Health and work overseas for a while before returning to start residency in

emergency medicine. EM seemed like the optimum skill set to work in global health and disaster. From the beginning I focused on the disaster public health issues, not medical response, with a focus on disaster science and education.

However, it can be hard to balance clinical work, disaster work, and raising a family. Disaster medicine, especially on the international level, is very time-intensive. I switched to domestic preparedness when my kids were born, only returning to a blend of international and domestic disaster management once they were older.

In a disaster event, how do communication and power structure play a role?

Dr. Auerbach

It depends on the hospital and command structure already in place and how badly they were damaged by the disaster. It also depends on the country affected. For example, after the earthquake in Nepal, the country at first was reluctant to accept foreign medical teams. FEMA, WHO, and other organizations can offer help, but the affected country has to allow them entry. We have to respect each country's sovereignty and culture, and how their approaches to disaster might differ from our own.

On the ground, the medical teams are respectful of each other and there's usually little conflict — people see how serious the situation is and work together. There isn't time for politics or power struggles. There's a hierarchy for the sake of organization, but it's a fluid and dynamic situation where everyone is contributing.

Dr. Kirsch

Both globally and nationally there are formal structured response systems. Domestically, FEMA runs the response and HHS coordinates health. Globally, the UNHCR has the lead with WHO on health. Most of the on-ground work is provided by NGOs. With a few exceptions, if physicians want to be part of a disaster response, they have to be part of one of these organizations.

The Haitian earthquake was the only time I provided clinical medicine,

because it was a rare example of when international healthcare was needed. Most other disasters, the affected countries and local NGOs handle the clinical medicine. My skills — the skills of any disaster medicine leader — are better utilized for management and public health aspects.

What is one of those difficult parts of disaster medicine?

Dr. Auerbach

It's frustrating for doctors to not be able to give patients the standard of care they are used to giving in non-disaster times. The nuances of triage, the ethical issues, limited resources, supply chain logistics, looser hierarchy—these are all dynamic factors in a disaster.

Dr. Kirsch

Emotionally, some events are overwhelming—seeing so much pain and suffering. Especially Haiti— I don't think anyone walked away from there without PTSD. In general, a career involving disaster response is very difficult. On the practical side, it can be difficult to get the time off from your clinical job to respond to a disaster. I was working in the private sector in Arizona when 9/11 happened and had to beg to get three weeks of shifts covered.

Tell us about some of the mass casualty events that you responded to more locally.

Dr. Auerbach

Local mass casualty events are disasters in their own right and require a similar set of skills. For example, during residency at UCLA, in the midst of the fuel crisis, a disgruntled person drove into a crowd of people waiting at a gas station—suddenly our ED had an influx of 10-15 traumas. A similar incidence occurred the summer after I graduated residency, up in Cape Cod. An intoxicated person drove into a block party and mowed down a whole bunch of people. It happened near where I had just rented a house, so I came onto the scene and immediately started triaging and helping patients. After, I went to the hospital where I was supposed to start working the next day, introduced myself,

and just began taking care of patients. Incidences with 10-20 people can be disasters on a smaller scale, because any time you overwhelm your existing resources, you have a disaster situation.

Dr. Kirsch

I've responded to dozens of domestic disasters, everything from wildfires to hurricanes, even more globally. Mostly, my role was not as a clinician but rather as a public health expert and scientist. For example, during 9/11 I was with the Red Cross health coordinator in NYC; during Hurricane Katrina I worked with the Red Cross in Louisiana on public health, shelter, safety issues; during Hurricanes Sandy and Harvey I deployed with FEMA to assess hospital impact and preparedness. That's not nearly as romantic as working in a hot tent, but even more important in the long run.

Tell us about your current work.

Dr. Auerbach

Right now, I'm a visiting scholar at the National Center for Disaster Medicine and Public Health. We're working on a public-private partnership that will train communities to be their own first responders and recognize and deal with disaster scenarios if no one can get to them in time. We are in an age of ever-increasing natural disasters caused by climate change. There just aren't enough first responders to go around when you have one disaster after another — when you have 10 fires simultaneously instead of 1 or 2. Communities — citizens — need to be aware of what to watch out for and how to avoid or handle potentially dangerous situations.

Dr. Kirsch

I'm currently the director of the National Center for Disaster Medicine and Public Health, which means that I work for the federal government. Our center focuses on disaster health research and education. My job entails a lot of meetings—mostly public policy based. One project involves researching health system preparedness and capacities in the time of COVID. In general, we work across the different government agencies to figure out healthcare worker safety and mental

healthcare issues. It isn't the adrenaline-filled side of disaster medicine where you're running around triaging and doing field medicine, but we are trying to fix the system and that has the potential to impact populations everywhere.

Where do you see the field of disaster medicine headed in over the next 10-20 years?

Dr. Auerbach

There's going to be a lot of epidemiology, and we're going to have to believe it. Moreover, our response to disasters right now is a hodgepodge of approaches — we need something more unified. Science and technology will improve our responses, but we also need education, community engagement, health policy, and legislation. It's a wide-open field, and I hope that there will be a groundswell of interest in disaster medicine — and that emergency medicine physicians can take on those leadership roles.

Disaster medicine is coming into its own, especially as we realize that we're going to be facing more and more climate-related disasters. Ideally, we need a way to predict these natural disasters and mitigate them ahead of time — and where that's not possible, we need citizen engagement and preparedness.

Dr. Kirsch

With climate change, there has been a steady and continuous upward trend of life lost and economic impact of disasters, and that's only going to increase in coming years. The real issue is how do we build health care resilience, both population-based in regard to protecting people from these events and hospital-based in regard to creating systems that can handle large surges in demand.

Moreover, the one thing our country is not prepared for is a massive catastrophe — an earthquake or a nuclear bomb in a major city. The hurricanes and wildfires we've seen have great economic impact, but our health care systems have adapted to evacuation plans and the smaller increases in patients such events can bring about. What we have little infrastructure in place for is for events injuring tens or even hundreds of thousands of people.

COVID has shown us the limits of our hospitals — if COVID had even a slightly higher mortality rate, the healthcare systems would have been overwhelmed, and they very nearly were, especially in New York.

What is your advice to EM residents looking to get involved in disaster medicine?

Dr. Auerbach

As a resident, become really good at what you do. These years are the foundations of emergency medicine as well as disaster medicine, and once you have a solid grasp of it, you can start to branch out into learning about structures, teams, and public health issues. Most people think of disaster medicine as the initial response, the medical triage and treatment—that's only the first phase. After that, it becomes a public health issue. It's about infectious diseases, food and shelter, migration. Emergency physicians are not necessarily trained in those areas, but it is and should be part of studying disaster medicine.

Dr. Kirsch

Residency is a time to learn the bread and butter of emergency medicine, but you can supplement your experience by diving into the research in disaster medicine. It's important to understand the structure of our national and international response system, and to think about where you'd like your career to take you. There's such a variety of disaster medicine opportunities out there, but most are bureaucratic, not clinical. Disaster fellowships offer a good opportunity to explore a career. They often concentrate on different aspects, such as public policy or administration or EMS. Emergency medicine physicians also work across all the federal agencies such as DoD, FBI, FEMA, HHS, the White House, and DOT. How you want to shape your career will determine where and how you should get involved in your local community. The wonderful thing about disaster medicine is that it gives you an opportunity to make a difference. It's not an easy career path, but if you're dedicated, there's a lot of good you can do. ★

Child Abuse Screening in the Emergency Department During the Pandemic

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According to the Child Maltreatment Report, an estimated 1,770 children died of abuse or neglect in 2018, indicating a rate of 2.39 per 100,000 children in the United States. Non-fatal incidents of abuse or neglect from the same report indicate a rate of 9.2 victims per every 1,000 children. With such staggering numbers, the importance of third-party reporting cannot be overstated. A single-center, observational and retrospective study conducted from 2008 to 2017 determined that only 0.07% of child abuse cases are diagnosed in the ED, but the current COVID-19 pandemic has forced a re-evaluation of the role of ED physicians in reporting suspected abuse.¹ There is now a heavy responsibility placed on those working in the ED, as the usual methods of reporting have become limited.

Prior to 2020, the majority of child abuse reports were received from teachers and other school personnel. The U.S. Department of Health and Human Services estimates that educators historically account for nearly 21% of child abuse or neglect referrals.² However, since the eruption of the COVID-19 pandemic in early 2020, calls to the child protective services for suspected child abuse have significantly declined, likely due to the stay-at-home orders and school closures that have limited teacher-student interactions. A report by the Maryland Department of Human Services reveals a 62% decrease in potential abuse calls from the time in-school sessions ended until March 2020, in only a couple of weeks. Unfortunately, this sudden drop in reporting is likely more indicative that children are suffering in silence, rather than of a legitimate downturn in cases. In fact, it is far more likely that cases of abuse have increased secondary to the pandemic.

Sudden spikes in abuse cases following a major crisis or event is not

a new phenomenon, especially when those events bring novel forms of stress. For example, following Hurricane Katrina, reports of partner physical abuse among women nearly doubled in the southernmost Mississippi counties.³ COVID-19 has caused panic as well as financial uncertainty, which are conditions that may create violence where it did not exist or exacerbate already unstable households.⁴ Despite what is known about major events and abuse, a unique hurdle faced today is the stay-at-home order and recommendation of strict social distancing, forcing victims to be effectively trapped with their abusers for extended periods of time. This results in countless missed opportunities for reporting, which going to public places such as schools, restaurants, and shopping centers would otherwise allow. Knowing that abuse victims are without their typical resources and likely facing new or increased abuse, the question becomes: What can be done about it?

This unprecedented time has not ceased in challenging emergency physicians, but it does not end with COVID patients. It must become second nature to recognize signs of child abuse in all pediatric patients that present to the department, regardless of the chief complaint. Through a thorough assessment of pediatric patients, the emergency department may be one of the few places that abuse cases can be caught during the pandemic, necessitating an efficient screening method.

The Escape questionnaire seems to be the best option for this purpose, as it is a successfully vetted assessment tool that can be applied to all pediatric patients.⁵

The Escape questionnaire was established in 2013 by Louwers et al. and determined via diagnostic accuracy study in 2017 to have an accuracy of 99.2% and a sensitivity of 100% (95% confidence interval 87.6-100).⁶ The Escape questionnaire consists of 6 questions, with one or more abnormal answers indicating a positive screen.

Escape

1. Is the history consistent?
2. Was seeking medical help unnecessarily delayed?
3. Does the onset of the injury fit with the development level of the child?
4. Is the behavior of the child, his or her caregivers and their interaction appropriate?
5. Are findings of the head-to-toe examination in accordance with the history?
6. Are there signals that make you doubt the safety of the child or other family members?

By evaluating each pediatric patient with this questionnaire, abuse cases can be identified with overwhelming confidence. The need for a widely accepted screening tool with a high sensitivity has never been more called for than during the current pandemic. The recommendation that all EDs adopt this tool could save lives and prevent tragedy.

While the ED can be hectic, especially during the pandemic, adding this questionnaire to the triage and intake process can allow it to be implemented by support staff before a physician begins their interactions with the patient. While it is never easy to add to the plate of anyone in the ED, the benefits significantly outweigh the effort when proper training and protocols are utilized.

COVID-19 has brought challenges that those in emergency medicine have worked tirelessly to address. The challenge of the increased pediatric abuse cases and limitations on reporting is no different, and it deserves to be met with the same tenacity as all others. During a global pandemic, an emergency department physician may be the only resource that a child has to be rescued from an abusive situation, so every visit must be assessed. The Escape questionnaire has proven its effectiveness as a simple and sensitive screening tool. It takes only minutes to ask 6 questions, but those 6 questions could be the difference between life and death. ★

An Unusual Case of Restless Legs

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Spinal epidural abscesses are a rare condition affecting the spinal column, but if left untreated, they can rapidly become fatal. The incidence of spinal epidural abscesses are 0.2 to 2.8 cases per 10,000 per year. Peak incidence occurs in patients between 60-70 years old. Often, the abscess is due to *Staphylococcus aureus* (*S. aureus*), however, other microbes such as *Actinomyces*, Gram-negative bacilli, and fungi can cause spinal epidural abscesses. Overall, *S. aureus* causes 63% of spinal epidural abscesses, while fungal strains cause roughly 10% of infections.¹

Risk factors for spinal epidural abscesses include:

- Spinal trauma
- Spinal procedures or surgery
- IV drug use
- Diabetes mellitus
- Chronic renal failure
- Alcoholism
- AIDS
- Malignancy

Diabetes mellitus is the most common risk factor, with about 33% of the patients diagnosed with a spinal epidural abscess also having a history of diabetes.^{2,3} Meanwhile, IV drug use and spinal manipulation (such as placement of an epidural catheter) are becoming more prevalent risk factors in recent years with the opioid epidemic and advances in

chronic pain medicine, respectively.

The classic triad of symptoms a patient might present with includes back pain, fever, and neurologic deficits secondary to compression from the abscess. However, only about 8% of patients will present with all three. If spinal epidural abscess is on the differential, it is important for the clinician to obtain prompt evaluation to minimize morbidity and mortality. Ultimately, though, preoperative status including age, comorbidities, and time to diagnosis and treatment best predicted morbidity and mortality rates.^{4,5}

Case

A 37-year-old female presented to the emergency department endorsing symptoms of fatigue and frequent sensation of restless legs. She also described having to crawl around for parts of the day, reporting that she felt too weak to use her legs. She had been seen at another facility 3 days prior and had basic labs performed, which were unremarkable. Over the past 24 hours, she continued to grow weaker, now returning to the emergency department for another evaluation. She denied any chest pain, shortness of breath, nausea, vomiting, diarrhea, or skin changes. When asked, she endorsed a past history of IV drug use and hepatitis C.

Exam

Physical exam revealed a disheveled female who appeared older than her stated age. Her vital signs were remarkable for a heart rate of 100 beats per minute. Otherwise she was afebrile, had a normal blood pressure of 115/60, a respiratory rate of 16 breaths per minute, and an oxygen saturation of 100% on room air. Her cardiopulmonary exam was unremarkable. The patient had scabs in different stages of healing over her body with evidence of track marks in the antecubital fossa of her bilateral arms. She had diminished strength, reflexes, and sensation in all four extremities, including inability to feel pinpoint sensation. Jerking movements were noted in the bilateral lower extremities that the patient reported she could not control. No rashes were seen throughout the integumentary examination and she had normal, intact rectal tone.

DISCUSSION

Pathophysiology

Most spinal epidural abscesses are located at the posterior aspect of the thoracic or lumbar spine. Posterior abscesses are thought to originate from a distant focus, such as the skin or from dental etiology. Anterior abscesses are predominantly due to discitis or vertebral osteomyelitis and can be caused by direct extension from retropharyngeal

or retroperitoneal abscesses.¹ Vertebral hematomas due to trauma are seen in up to 35% of cases and a nidus of blood serves as a nutrient source for bacteria to breed.

The pathophysiology of spinal epidural abscesses stems from the ability of bacteria to enter the epidural space. Normally, this part of the spinal column is sterile, however, once bacteria are able to enter, they tend to coalesce in a suppurative infection within the confined epidural space. Bacteria have a few ways to enter this space, the most common being via hematogenous spread. Manipulation of the spinal column with epidural catheter placement, spinal surgeries, and via lumbar puncture are also ways for bacteria to enter the central nervous system and spinal column via direct inoculation.

Diagnosis

Diagnosis of a spinal epidural abscess by physical exam alone is often difficult as most patients do not present with the classic triad that was previously mentioned. Pain is one of the most common presenting symptoms, which may be found on palpation of the spinous processes near or overlying the spinal epidural abscess. Another physical exam finding is pain with straight leg raise, which will cause compression of spinal nerve roots. Neurologic deficits can develop as abscesses increase in size, causing symptoms consistent with cauda equina syndrome. These include but are not limited to urinary retention, bowel incontinence, and perianal/saddle anesthesia. Patients may also report weakness with leg movement, paralysis, or numbness.⁵ Fever is present in 35-60% of patients; however, absence of fever cannot rule out spinal epidural abscess.⁶

Laboratory evaluation includes complete blood count, blood cultures, coagulation studies, and inflammatory markers. Oftentimes erythrocyte sedimentation rate (ESR) is elevated, but normal levels do not exclude the diagnosis of spinal epidural abscess. ESR sensitivity ranges from 68-100%, however, one case series posited only an ESR above 50mm/hour was considered positive. In a meta-analysis of 915 patients with spinal epidural abscesses, the sensitivity of an ESR was noted to be 94%. C-reactive protein has a similar sensitivity to ESR at

84-100%, but is a more effective marker of early disease as it rises faster than the ESR and is influenced less by other plasma factors. Presence of leukocytosis is extremely variable and does not predict the severity of disease. Given leukocyte count is a nonspecific lab marker, it should not be used to exclude the diagnosis of spinal epidural abscess. For imaging, magnetic resonance imaging is the test of choice. If unavailable, CT with IV contrast is another option, although it is less sensitive.⁶

Management

Management includes neurosurgical evaluation for any patient with evidence of epidural abscess or with an abnormal neurological examination from mass effect. These patients will often require emergency evacuation to decompress the spinal cord and nerve roots. Endoscopy-assisted surgery and percutaneous drainage have been reported to be successful in some cases. Nonsurgical candidates include those with minimal neurologic deficits or who are poor surgical candidates. Patients who are deemed surgical candidates will need to undergo aspiration, surgical drainage, and antibiotic therapy for 4-6 weeks post-surgery. Repeat MRI should be obtained at 4-6 weeks of therapy or if there is evidence of worsening symptoms or deteriorating clinical examination.

Antibiotic regimens include the following:

- Preferred: vancomycin + a 3rd or 4th generation cephalosporin (cefotaxime, ceftriaxone, ceftazidime, or cefepime)
- Alternative for suspected pseudomonal infection: vancomycin + cefepime
- Alternative for penicillin allergy (non-anaphylaxis): vancomycin + meropenem
- Alternative for severe penicillin allergy: vancomycin + aztreonam
- Alternative for vancomycin allergy: linezolid + secondary antibiotic as indicated above
- Be advised when using linezolid that serotonin syndrome is possible if the patient is on an SSRI or MAOI¹

Prompt diagnosis and management is important for patients with an underlying abscess, as delay in diagnosis can result in irreversible neurological damage.

Around 4-22% of patients diagnosed with spinal epidural abscess will have irreversible paraplegia. Around 5% of patients will die from sepsis. A prospective evaluation of clinical decision guidelines to diagnose spinal epidural abscesses in patients showed that 75% of patients diagnosed with spinal epidural abscess suffered delays in diagnosis. A permanent neurological deficit was nearly 6 times more likely in those who suffered a delay.⁷

CASE CONCLUSION

After the physical exam, it was determined the patient had symptoms consistent with a potentially catastrophic neurological process. Laboratory workup revealed a normal white blood cell count of 9.8, a slight anemia with hemoglobin of 10.8 and hematocrit of 36, and a normal platelet count of 390. ESR was elevated at 89 mm/hour and CRP was elevated at 62 mm/hour. Renal function panel revealed a normal BUN and creatinine at 20 mg/dL and 0.70 mg/dL, respectively. Urinalysis showed no evidence of infection. Bedside echocardiogram showed no evidence of vegetative lesions on the valves and showed a normal ejection fraction. The patient had a normal post-void residual bladder volume. CT angiogram of the chest showed no evidence of pulmonary embolism or underlying pneumonia. MRI of the spinal cord showed discitis osteomyelitis with a large epidural abscess at C5-6 compressing the spinal cord. It also noted epidural phlegmon extending from C3-7 with prevertebral phlegmon extending from C2-T1. The patient was given broad spectrum antibiotics including vancomycin and cefepime and was transferred to a tertiary medical center for neurosurgical evaluation. ★

TAKE-HOME POINTS

- Spinal epidural abscess is a difficult diagnosis to make. It should be on your differential when evaluating patients with back pain and other neurologic symptoms, especially those patients at increased risk, such as diabetics and IV drug users.
- Antibiotic choice must include *Staphylococcus aureus* coverage.
- Prompt diagnosis and treatment is important for epidural spinal abscesses to avoid permanent neurological damage.

Ocular Instillation of Cyanoacrylate Adhesive

A CASE REPORT

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Cyanoacrylate adhesive (superglue) is a common household product that is inadvertently instilled in the eye on rare occasions, with complications including conjunctivitis, corneal abrasion, conjunctival epithelial abrasion, dermatitis, keratitis, and ankyloblepharon.

The following case examines accidental ocular instillation of cyanoacrylate adhesive after a patient was carrying the bottle of cyanoacrylate adhesives along with several similarly shaped eye medications in the same pocket.

Background

Cyanoacrylate adhesive, most commonly known as superglue, is used for many purposes, from home repairs, crafts, and cosmetics to medical and industrial uses.^{1,2,3} Easy availability, inexpensiveness and ability to adhere to a variety of surfaces at room temperature have made it widely popular for use by the public.^{2,3} First reports of ocular injuries related to cyanoacrylate adhesives came in the 1980s when the product was first packaged in small bottles similar to ophthalmic eye drops.^{4,5} Causes include inadvertently mistaking the product for over the counter eye drops, children playing with bottles, and deliberate installation such as in the cases of assault.^{3,4,6} Here we examine a patient who accidentally instilled cyanoacrylate adhesive in his eye after mistaking it for his prescribed eye drops.

Case

A 68-year-old male presents with a chief concern of right-sided eye pain for the past several hours. The patient had recently been diagnosed with herpes zoster ophthalmicus by an ophthalmologist who was treating him with moxifloxacin eye drops, valacyclovir, and erythromycin ointment. However, prior to arrival at the ED, he noticed his right eye was burning more than usual after administering the eyedrops. Upon inspection of the contents of the patient's pocket, several similarly sized bottles were found within the same pocket (image 1).



IMAGE 1. Contents of patient's left pocket, including cyanoacrylate adhesive

The patient's eye exam was remarkable for right sided visual acuity of 20/70, with the left being 20/20. The right-sided eyelids had a small amount of adhesive residue, and the right conjunctiva was notable for chemosis. The rest of the eye exam, including slit lamp examination and fluorescein staining, were unremarkable.

The patient's eye was irrigated continuously for 30 minutes with a Morgan lens, and small pieces of dried cyanoacrylate adhesive were removed from the patient's eyelashes. Ophthalmology was consulted, who recommended that the patient receive a dose of Tobramycin/Dexamethasone eye drops as well as oral dexamethasone in the emergency department. Additionally, he was given urgent referral instructions to be seen by the consulting ophthalmologist the next morning. After irrigation, and administration

of Tobramycin/Dexamethasone, the patient's symptoms were much improved, as well as his exam (Image 2). The patient was discharged with a prescription for the above eye drops, follow-up instructions and counseling to only instill prescribed medications into his eyes.

Discussion

Cyanoacrylate, the adhesive component of "superglue," is a monomer of cyanoacetate and formaldehyde which polymerizes when it comes into contact with a dry surface.^{1,4} When cyanoacrylate adhesives are instilled into the eye, the pain causes the eyes to forcefully blink pushing the adhesive towards the eye edges.⁶ The dry surface at the eyelid margins and eyelashes provides a surface for polymerization, often causing the eyelids to be glued shut.⁶ The term "cyanoacrylate adhesive tarsorrhaphy" is used when referring to the eyelids bound shut after being exposed to cyanoacrylate.⁹ Most commonly, after ocular instillation of cyanoacrylate adhesive, patients present to the ED with eyelids glued together and inability to open them.⁶ While the patient described in this case did not experience cyanoacrylate adhesive tarsorrhaphy, there was some amount of product on his eyelashes, which was able to be peeled off. Other ocular injuries include conjunctivitis, corneal abrasion, conjunctival epithelial abrasion, dermatitis, keratitis, ankyloblepharon (upper and lower eyelid margins

fused with each other), and loss of eyelashes.^{1,3,4,5,8}

Management focuses on 2 objectives; the first is to reverse the often seen tarsorrhaphy and remove any glue debris in order to properly evaluate the ocular structures.^{4,6} The second focuses on identifying and treating any possible ocular damage.^{4,6}

Patients often attempt immediate irrigation at home prior to coming to the ED.^{4,6} Eye irrigation along with manual removal of adhesive debris can help lessen the degree of chemically-induced tarsorrhaphy.^{3,4,6} An acetone swab can be used to remove the dried cyanoacrylate adhesive, but care must be taken as acetone can cause chemical injuries to the cornea and conjunctiva.^{1,3,6} Margarine or a high molecular weight oil can be rubbed at the eyelashes and eyelid margins to help facilitate eyelid separation.⁶ For patients with minimal ankyloblepharon (eyelid fusion), conservative management is preferred as the cyanoacrylate adhesive will peel off within a week.⁹ Most patients can follow up as outpatients; however, in some situations, they may require admission for observation and use of compresses with 3% sodium bicarbonate

solution to cause the eyelids to separate.⁶

Conservative management is often avoided in children because unilateral vision obstruction for up to a week may lead to amblyopia. Therefore, eyelash trimming can be performed.^{1,6,8,9} This procedure is generally poorly tolerated by children and may require sedation.^{1,4,9}

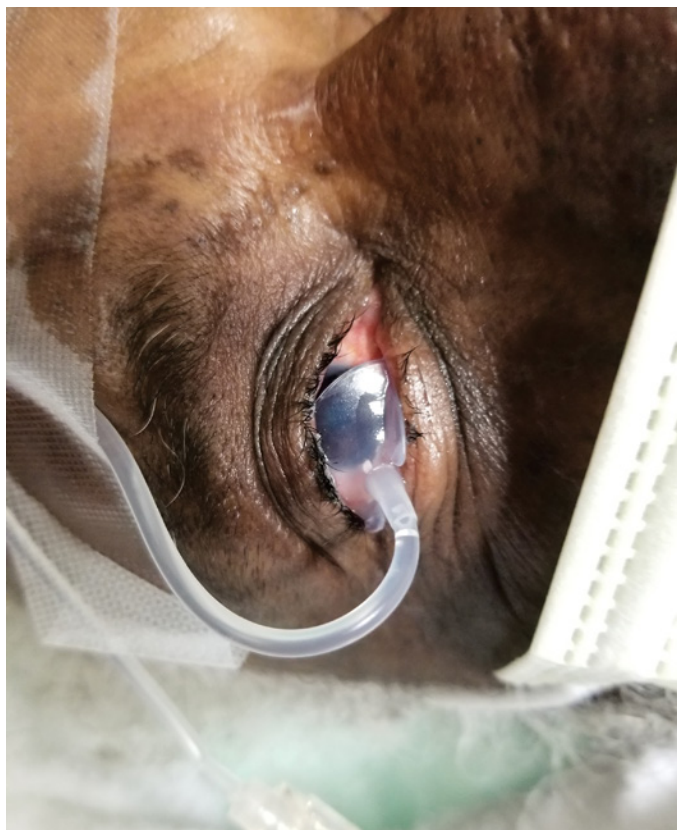
Once the eyelids are successfully separated, the eye should be carefully examined using a slit lamp, and adhesive residues removed with fine forceps.⁴ Fluorescein drops should be used to identify any corneal epithelial injuries.⁴ The most common injuries are corneal abrasions and punctate keratopathy.⁴ Corneal abrasion caused by cyanoacrylate adhesives can be managed with topical antibiotics, mydriatic medications, and adequate pain control.³ Long term prognosis is positive with full recovery from corneal epithelial abrasions.⁴

Conclusion

Accidental cyanoacrylate adhesive exposures to any and all parts of the body are not uncommon, with a 2017 paper finding the majority of cases to be unintentional, or due to intentional misuse (such as attempting to staunch

a bleed). The authors note that 36.1% of the 893 patients studied had ocular instillations.¹¹ Recommended treatments for non-ocular injuries include irrigation, petroleum jelly, mineral oil, topical antibiotic ointment, peanut butter, acetone, and WD-40. The packaging of cyanoacrylate adhesives in small bottles similar to eye drops presents a serious concern, and perhaps the greatest benefit of this report are the associated photos which illustrate how easily a sight-limited patient could make this mistake.

These injuries can be widely avoided by making several changes to the cyanoacrylate adhesive bottle size and shape, adding a distinctive odor, and clearly printing warnings on the bottle. The bottle cap should be redesigned to prevent children from being able to open it and to force adults to follow opening directions. Furthermore, bottles should be stored separately from medication bottles and should be kept out of reach of children. In the case of ocular instillation, patients should be instructed to irrigate the affected eye, remove any adhesive debris if possible and go to the ED for appropriate management.³ ★



IMAGES 2 and 3. Patient's right eye during and after irrigation and administration of tobramycin/dexamethasone



Failure of Follow-Up

Scrotal Hernia Case Illustrates Health Care Disparities

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Hernias with loss of domain are often a consequence of poor access to surgical care and require extensive planning and management. Emergency medicine and general surgery communities should collaborate on what constitutes a need for urgent surgical intervention or the need for surgical coordination without primary care acting as an additional step/obstacle.

Case

A 52-year-old male with a history of intravenous drug use, schizophrenia, Human Immunodeficiency Virus, and Hepatitis C presented for his fifth visit

to our ED for scrotal pain. The patient denied dysuria, urinary frequency, flank pain, or fevers. His vital signs were within normal limits. Physical exam was remarkable for a significant scrotal hernia, approximately 49 cm in diameter, with auscultation of bowel sounds within scrotum and non-purulent tender excoriations at the inferior aspect. (Image 1).



IMAGE 1. 52-year-old male with large scrotal hernia with excoriations (arrow).

Urinalysis, BNP, CBC, and CMP were unremarkable. Contrast CT of the abdomen and pelvis demonstrated massive right lower inguinal hernia involving several loops of bowel gas and fat with stranding. No free air or obstruction were appreciated but mild free fluid was noted. (Image 2). General surgery was consulted and concluded no emergent surgical intervention was warranted. Patient was instructed to follow up with his primary care provider for outpatient surgery clinic referral as had been done several times previously.

Discussion

Unfortunately, loss of domain (LOD) hernias lack an exact definition without a validated metric for severity or prognosis. However, it is widely accepted that earlier interventions decrease long term sequela. Our patient suffered from multiple risk factors associated with healthcare disparity, including homelessness, HIV, and schizophrenia. Early intervention for such cases would mutually benefit the patient and provider despite it being non-emergent.

Our case demonstrates the need for both emergency medicine and general surgery communities to reevaluate what constitutes an urgent surgical intervention, and address the systematic barriers to prompt consultation and/or referral.

Early intervention and prompt referral has readily apparent benefits such as decreased morbidity and mortality as guided by risk stratification and pre-operative assessment. As our patient is immunocompromised, more pre-emptive management could lead to a reduction of catastrophic infections such as necrotizing fasciitis and sepsis. Additional benefits may include less unnecessary imaging, reduction in cost (especially in cases of high healthcare utilization), and reduction of radiation exposure. Our patients' socioeconomic status further complicates his management, risk for postoperative complications, and ability to properly rehabilitate.

The benefit to the emergency medicine physician is simple. As high healthcare utilizers typically undergo multiple and repeat work-ups, their care leads to increased healthcare costs, decreased departmental efficiency, and increased risk for anchoring bias. The situation is further complicated by the fact that reproductive organ injuries are commonly litigated yet cannot be ruled out without extensive evaluations. Earlier intervention and well-coordinated follow-up from the ED could decrease the risk of bad outcomes for these types of patients.

The hospital itself would be well served to create a system to catch the patients "falling through the cracks" or getting lost to follow

up. Decreasing the risk of needless litigation as discussed above is an easy start, but also the preservation of medical assets to include money can be easily illustrated. For instance, it is not uncommon for hospitals to fail to recuperate expenses when caring for low socioeconomic, high utilizing, and significantly comorbid patients. The continuous cycle of costly work-ups and non-definitive intervention leads to financial losses for the hospital. The table uses figures from "Healthcare Bluebook" shows a rudimentary cost of this patient's visits to the emergency department.

This estimated cost of each visit to the ED is between \$1,814-\$10,995 using this source and a fair cost of \$2859. The estimated total cost for our patient would be between \$9,070 -\$54,775. While the complexity of medical billing makes it impossible to know the exact total costs, it's reasonable to expect these to be much higher than the overall expense of a curative intervention. It is also important to note these costs do not account for any visits to other hospitals in the area.

While LOD hernias are well-known in the surgical community, they pose a unique challenge. As they occur more frequently in rural and underserved populations, these patients are at higher risk for mental health issues, drug abuse, and poor access to care. These patients are generally worse surgical candidates and have higher risk of poor wound healing and hernia recurrence.^{2,3} Understandably general surgeons are hesitant of overtly aggressive management.



IMAGE 2. Computed Tomography of the patient's abdomen and pelvis with IV contrast demonstrating large scrotal hernia and free fluid.

Conclusion

After general surgery evaluation, our patient was determined to be a poor surgical candidate due to tobacco use, active IV drug abuse, and poor ability to follow-up.

While our patient's issues are complex, we feel the progression of his LOD hernia ultimately resulted from allowing a "failure of follow-up" cycle to continue, with each presentation being worse than the previous. While admittedly it may have been too late for our patient to receive surgical correction, our case demonstrates a large failure in our current system and an issue worth addressing. ★

TABLE. Healthcare Bluebook estimate of surgical intervention

| Intervention | Low Range | Fair Price | High Range |
|---|-----------|------------|------------|
| Emergency Room visit – complex problem | \$1377 | \$1720 | \$4301 |
| Abdomen and pelvic CT with and without | \$338 | \$992 | \$6181 |
| Testicular ultrasound | \$99 | \$147 | \$473 |
| Total of each emergency room visit | \$1814 | \$2859 | \$10,955 |
| Hernia repair (inguinal, umbilical, or ventral) | \$3526 | \$4407 | \$11,018 |

SOURCE: HEALTHCARE BLUEBOOK ON 06/04/2020¹

Treatment of Opioid Withdrawal with Buprenorphine in the Emergency Department

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A 2015 study showed that when patients with opioid use disorder were started on buprenorphine with a behavioral intervention in the ED, they were 80% more likely to remain in treatment at 30 days.

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Case Presentation

A 30-year-old male presents to the ED, triaged as "social work." Vital signs are within normal limits. When you walk into the room you see an uncomfortable appearing man with the blankets pulled over his head. He is complaining of stomach cramps and that he "feels sick." On exam, you notice gooseflesh, rhinorrhea, and dilated pupils. He states he has hit "rock bottom" and wants help. He reports he last used heroin yesterday morning and has been using 10 bags daily for the past 2 weeks. Before that, he was in a recovery house, where he was opioid-free for 1 month. The patient asks if there is anything you can do to help him quit heroin for good.

In addition to connecting this patient to treatment resources for his opioid use, what can you do to help this patient



while they are in the ED under your care? What should physicians know about this patient population?

Epidemiology

The Substance Abuse and Mental Health Services Administration (SAMHSA) describes Opioid Use Disorder (OUD) as a chronic treatable illness characterized by opioid misuse, impaired social functioning, risky use, and opioid tolerance.¹ The language around OUD has evolved over the last several years to be less stigmatizing towards patients and more precise in describing diseases and treatments. Commonly used terminology is included in Table 1. An estimated 2.2 million Americans suffer from OUD, the majority related to prescription opioid misuse, although a significant proportion have heroin and fentanyl related OUD.¹ Opioid overdose resulted in more than

46,000 deaths in 2018, exceeding the number of fatalities from motor vehicle collisions.¹ Because people with OUD are often socioeconomically disadvantaged and may lack the resources to maintain a primary care provider, and the episodic nature of relapses, many people with OUD will present to the emergency departments as a primary source of health care. Every ED visit by a person with OUD represents a chance to reduce the morbidity and mortality associated with the disease. One study estimated that after an ED visit for nonfatal opioid overdose, the 1-month mortality risk was 1.1% and the 1-year mortality was as high as 5.5%.² There has been an increased recognition within EM that starting a medication for OUD can improve survival in these patients. In fact, a 2015 study showed that when patients with OUD were started on buprenorphine with

a behavioral intervention in the ED, they were 80% more likely to remain in treatment at 30 days, compared to behavioral intervention or referral to treatment alone.³ It is important that ED physicians know how to use these medications in properly selected patients. This article will focus primarily on buprenorphine, which, although not the only medication for OUD, is one of the most accessible and easiest to initiate for an ED patient population.

Opioid Withdrawal Signs and Symptoms

Opioid withdrawal first begins with opioid dependence. Frequent exposure to opioid agonists will lead to opioid tolerance and neurobiological changes at the mu-opioid receptor.¹ As patients become more tolerant of opioids they no longer have the same clinical response at the same dose and will need higher doses to achieve the same response.⁴ A subset of patients who develop tolerance will become dependent on opioids, meaning that they will go through withdrawal

symptoms if they stop using the drug.⁴ Opioid addiction is further defined by aberrant behaviors and increased use despite negative health consequences, and is a chronic and often relapsing disorder.⁴ Cessation of agonist activity at the opioid receptor leads to the clinical syndrome of opioid withdrawal.¹ One way to evaluate for opioid withdrawal is the Clinical Opioid Withdrawal Scale (COWS), which is a score from 0-36 based on a combination of subjective and objective findings.^{1,5} Tachycardia, piloerection, mydriasis, myalgias, GI distress, and restlessness are all key findings that contribute to a high score.⁵ Generally, scores greater than 8-12 are used to define withdrawal for the purpose of buprenorphine administration.⁵

Treatment with Buprenorphine

Buprenorphine is a partial agonist at the mu-opioid receptor, meaning that at low doses it will act in many ways like a full agonist with some analgesic and decreased craving effect.¹ At high doses it has a ceiling effect and, although

it has a very high affinity for the mu-opioid receptor, it does not cause the respiratory depression and euphoria that full agonists do.⁴ Buprenorphine has the highest affinity for the mu-opioid receptor, and will thus displace other agonists from the receptor. This is important as it can precipitate opioid withdrawal by displacing the full agonist from the receptor if taken too close in time to a full agonist.^{5,6} It also suggests that a patient on buprenorphine will require higher doses of a full agonist such as fentanyl, if you are treating an acutely painful condition like a fracture and need to provide analgesia. Preparations of buprenorphine often include naloxone (brand name Suboxone), an opioid receptor antagonist. Naloxone undergoes extensive 1st pass metabolism and has low bioavailability when taken by mouth.⁶ It is included in buprenorphine preparations in order to deter IV misuse of prescribed buprenorphine. Protocols have been developed for initiating buprenorphine in the ED. Most protocols call for starting buprenorphine when the COWS score is greater than 8 to avoid precipitated withdrawal, although a more conservative approach might wait until COWS >12.^{5,6} Patients taking short-acting oral opioids, heroin, or fentanyl will typically require 6-12 hours since last use, longer acting oral opioids will require 12-24 hours and methadone will require >72 hours since last use before buprenorphine can be started without precipitating withdrawal.^{5,6} Additionally, most protocols call for starting with either a 4mg or 8mg sublingual (SL) buprenorphine dose and observing the patient for 30-60 minutes for resolution of withdrawal symptoms.^{3,5,6} If symptoms persist, another dose of buprenorphine can be administered. At doses of 8 mg to 16 mg of SL buprenorphine a patient's mu-opioid receptors will be almost entirely saturated, and this dose should treat withdrawal symptoms in most OUD patients if taken once daily.^{1,3,6} The most common adverse reaction to buprenorphine is nausea.¹ Although higher doses are likely safe, there is concern for respiratory depression particularly if co-ingested with other medications that are respiratory

TABLE 1. Staging and Management of Accidental Hypothermia

| Term | Definition | Use Instead of |
|--|---|--|
| Person with Opioid Use Disorder (OUD) | A person with a DSM-V defined illness, characterized by opioid misuse that results in impaired psychosocial functioning, increased use despite risks to health, and increased tolerance. | Addict Abuser Junkie |
| Recovery | A process of change through which individuals improve their health and wellbeing and have a remission of some of the signs and symptoms of OUD. Patients taking FDA approved medications for OUD can be considered in recovery. | Clean |
| Relapse | A process by which a person in recovery has reoccurrence of their symptoms of OUD. Relapses involve more than one instance of return of opioid use. Relapses need not be long lasting. | Dirty |
| Harm Reduction | A set of strategies and ideas aimed at reducing the negative consequences of drug use by meeting people where they are and addressing conditions of drug use as well as reducing drug use itself. | |
| Medication for Opioid Use Disorder (MOUD) | A phrase used to include all pharmacotherapies used to treat OUD, particularly buprenorphine, methadone, and naltrexone. | Replacement Substitution Therapy |
| Medication Assisted Treatment (MAT) | A phrase that also includes all pharmacotherapies used to treat OUD, particularly buprenorphine, methadone, and naltrexone. Often used interchangeably with MOUD and OAT. | |
| Opioid Agonist Therapy (OAT) | A phrase to refer to medications used to treat OUD by their mechanism of action at the mu-opioid receptor, specifically buprenorphine and methadone | |

Adapted from Substance Abuse and Mental Health Services Administration. Medications for Opioid Use Disorder. Treatment Improvement Protocol (TIP) Series 63. Publication No. PEP20-02-01-006. Rockville, MD: Substance Abuse and Mental Health Services Administration, 2020.

depressants such as benzodiazepines. If a patient is not in withdrawal but wishes to initiate buprenorphine, home initiation can be considered.¹ Patients who are initiated on buprenorphine should be referred to an outpatient prescriber of buprenorphine. Rapid follow up with an outpatient provider is important, and warm handoffs (i.e. face to face discussions with outpatient providers) or bridge clinics out of the ED can be ways of ensuring continuity of care in a patient population that historically has faced many hurdles to accessing healthcare.^{5,6} A peer recovery specialist, if available, can provide guidance and help engage the patient in treatment.⁷ A peer recovery specialist is someone who is in remission and trained to mentor and advocate for patients with substance use disorder.⁷ Through their shared lived experience they can provide effective support for patients who may struggle to navigate in a complex medical system, and peer recovery specialists have been shown to improve engagement in therapy and reduce use of substances.⁷ ED physicians who have obtained a DEA X-waiver can prescribe sufficient days of buprenorphine until the next outpatient appointment; however, even non X-waivered physicians can initiate buprenorphine and have patients return to the ED for up to 3 consecutive days to receive doses of buprenorphine.

Special Considerations

Concomitant Substance Use Disorders (SUD)

Patients should be counseled about the risk of respiratory depression if using other substances like benzodiazepines; however, other SUDs are not an absolute contraindication to buprenorphine. Overdose and respiratory depression from concomitant substance use is far more likely to be seen in untreated OUD than in a patient on buprenorphine.¹

Chronic Pain

Buprenorphine has an analgesic effect, although it is shorter than its effect on reducing craving in OUD. BID or TID dosing is sometimes employed in patients with chronic pain who also need treatment for OUD.^{1,6} Treatment of acute pain in patients with OUD on buprenorphine is beyond the scope of this

article, but, briefly: full opioid agonists can be used, however, this should be a shared decision with the patient, and consultation with an acute pain service should be considered.

Diversion

Diversion of buprenorphine is a concern of some clinicians, likely due to the concern of prescribing a multiple day course of an opioid receptor agonist to someone with a substance use disorder and reports of buprenorphine having a “street value”. Surveys of patients with opioid use disorder do show that patients will use diverted buprenorphine.⁸ However, studies have shown that diverted buprenorphine is most often used to treat withdrawal symptoms.⁸ As noted above, because of the pharmacologic properties of buprenorphine, it is less likely to cause respiratory depression than other opioids and thus diversion should be considered an acceptable risk.

Pregnancy

There is theoretical concern that the naloxone present in many buprenorphine formulations may precipitate neonatal abstinence syndrome, and it has been recommended that pregnant women should use the buprenorphine monoproduct.^{1,5}

Harm Reduction

Not all patients with OUD will be ready to start MOUD and/or participate in psychosocial-based therapy. It is important to help patients with OUD reduce the morbidity and mortality from opioid misuse even if they aren't ready to stop misusing opioids, just as we would want a patient with diabetes to prevent a lower extremity amputation even if they aren't compliant with a low carbohydrate diet. Harm Reduction is a set of techniques and strategies to reduce the negative health consequences of drug use, such as skin and soft tissue infections, hepatitis C, and opioid overdose.⁶ For patients that use IV opioids there may be barriers to safe injection drug use such as fear of arrest because they are carrying drug paraphernalia or lack of access to clean water. If there are syringe exchange services in your community, they can provide resources for safer injection drug use. Because of an increase in high potency opioids in the drug supply, like fentanyl,

it is important to advise patients to not use alone, or to do a tester shot, in order to decrease the risk of overdose. Fentanyl testing strips, if available, can also be used to identify fentanyl in the drug supply so that patients with OUD can take the appropriate precautions. Finally, naloxone should be prescribed and made widely available for patients with OUD or for all patients in communities with high rates of OUD. Although prescribing naloxone is a logical intervention to reduce overdose death, one study found that of patients with an ICD-10 diagnosis of opioid misuse, dependence, or overdose, only 4.6% of insured patients received a prescription for naloxone.⁹

Summary

Many patients with OUD will visit your emergency department. These patients have a chronic illness that carries serious morbidity and mortality. For patients who are interested, buprenorphine is an effective and evidence-based treatment for OUD. Buprenorphine is safe, and starting a patient on buprenorphine is within the scope of practice of ED physicians. Start 4mg-8mg of buprenorphine once daily in patients with OUD who are experiencing withdrawal and ensure prompt follow up with an outpatient provider than can prescribe buprenorphine. Recognize that some patients may need high doses or split doses. Some patients will not want to start buprenorphine, but there are still ways to help these patients based on resources that are available in your community for harm reduction. Consider drafting “Harm reduction” discharge instructions. Finally, patients with OUD face a lot of stigma in society; they shouldn't have to in an ED. Treat these patients with the respect they deserve.

Case Conclusion

The patient's COWS score is 11. You start the patient on 8mg buprenorphine. He reports improvement in his cravings and stomach cramps. A peer recovery specialist connects with the patient while still in the ED and makes a plan to accompany the patient to a residential addiction treatment center, with an open bed, during normal business hours. The treatment center will continue his buprenorphine prescription. ★

Amyand's Hernia

A Rare Cause of Acute Inguinal Pain

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Abdominal hernias are defined as a defect in the abdominal wall that allows part of or all of an organ to protrude beyond the natural abdominal barrier. In 2016 there were 293,000 ED visits for abdominal hernias. In 2004, groin hernias were the third leading cause of gastrointestinal visits, with inguinal hernias being the most common. Inguinal hernias are mostly asymptomatic until they become incarcerated and/or strangulated. Symptoms of an incarcerated/strangulated hernia include a painful bulge or swelling, abdominal pain, nausea, vomiting, and fever. Once strangulation occurs, best outcomes are achieved when emergent surgery is done to relieve the ischemia in four to six hours.

Case

A 60-year-old female presents with sudden onset right groin pain that woke her from sleep at 2:30 am, approximately 10.5 hours prior to arrival. She reports associated nausea and vomiting. She denies fevers, chills, chest pain, shortness of breath, back pain, changes in urination/defecation, or vaginal discharge/bleeding. Upon further history the patient states she had a right femoral hernia repair almost three years ago and the pain feels similar. When asked why she waited so long to come to the ED, she stated she had a doctor's appointment for an unrelated issue earlier in the day and didn't want to miss it.

Physical exam is notable for tachycardia and acute discomfort. There is a severely tender bulge in the right groin just medial to the inguinal ligament that cannot be reduced with manual manipulation.

Abdominal and pre-op labs, urinalysis, and CT abdomen/pelvis with contrast were ordered for further



IMAGE 1. Abdominal scan reveals the rare presentation of Amyand's hernia.

evaluation. Morphine, ondansetron, and fluids were also given. Blood work was significant for mild leukocytosis. The CT results were available approximately 12 hours after symptom onset and showed acute appendicitis within a recurrent right inguinal hernia, also called Amyand's hernia.

General surgery was consulted and the patient was taken to the operating room a few hours later where her appendix was reduced out of the hernia and then resected. I spoke with the surgeon who performed the appendectomy who stated there may have been more complications if the patient's primary hernia repair had been done with mesh. He had never personally seen an Amyand's hernia before. At follow up two weeks later the patient was doing well and hernia repair was scheduled 4 weeks later.

Discussion

Amyand's hernia is defined as an appendix that is contained within an inguinal hernia. The rate of the appendix being found within an inguinal hernia has been noted to be about 1%. Of the 1%, the appendix has been found to be inflamed in just 0.1%. In most cases they present with signs and symptoms of an incarcerated or strangulated hernia. Several theories about the etiology of Amyand's hernia have been hypothesized. The theory with the most support suggests that compression of the appendiceal neck within the hernia itself causes the ischemia and inflammation. Interestingly, Amyand's hernia is up to three times more common in children due to the processus vaginalis being patent.

Amyand's hernia is named after the French surgeon Claudius Amyand who is thought to have performed the first appendectomy that was contained within an inguinal hernia. In 1735, he performed surgery on an 11-year old boy who had presented with a right inguinal hernia only to find the appendix trapped within the hernia.

One study found Amyand's hernia exclusively in males on the right side; another study found some cases in females but they were exclusively in postmenopausal patients. Despite these studies there have been documented cases on the left side due to causes like situs inversus or a mobile cecum. Evidence of appendicitis within a hernia can be seen on both ultrasound and CT. However, most cases are found incidentally in the operating room during hernia repair. ★

TAKE-HOME POINTS

- ✓ Strangulated hernias require surgical repair within 4-6 hours.
- ✓ Acute appendicitis within an inguinal hernia is a very rare cause of groin pain.
- ✓ Amyand's hernia can occur in all ages and genders.

ICE Detention Center Patient with Omental Tuberculosis

POCUS Aids in the Diagnosis

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Tuberculosis (TB) continues to be one of the leading causes of death worldwide, with an estimated 10 million new cases in 2019; 44% of them in Southeast Asia and 25% in Africa.¹ Recognition of risk factors for and classic signs and symptoms of pulmonary TB (prolonged cough, night sweats, fever, weight loss, travel to endemic areas, and contact with the disease), followed by prompt initiation of pharmacotherapy (usually with rifampin, isoniazid, pyrazinamide, and ethambutol, known as “RIPE” therapy) has helped save approximately 60 million lives since the early 2000s.^{1,2}

Abdominal TB involves the gastrointestinal tract, peritoneum, abdominal viscera, or lymph nodes and makes up about five percent of TB cases worldwide.³ A subtype of abdominal TB is omental TB.⁴ It is characterized by “large omental masses, matted and tethered bowel loops and mesentery.”⁴ Non-specific findings of ascites and lymphadenopathy make this diagnosis challenging to differentiate from other intra-abdominal pathologies.⁵ Here we present a case report in which point-of-care ultrasound (POCUS) was instrumental to diagnosing omental TB.

Case Report

A 19-year-old male presented to the ED from a U.S. Immigration and Customs Enforcement (ICE) detention center with subjective fevers, cough, and body aches for 12 days. He left his hometown in Punjab, India, and was detained a few days later by ICE in Texas, approximately

4 weeks before being seen. The accompanying transfer paperwork noted “pulmonary TB” with no additional medical history. The patient denied abdominal pain, nausea, vomiting, diarrhea, shortness of breath, chest pain, recent weight changes, sore throat, or rashes/wounds. He denied any history of HIV, hepatitis, TB, malignancy, sexual activity, or use of drugs or alcohol.

Initial vital signs showed a temperature of 39.1°C, heart rate of 125 bpm, blood pressure of 89/50, respiratory rate of 21, and oxygen saturation of 96% on room air. On physical examination, he appeared alert, diaphoretic, and had notably dry mucous membranes. He showed no signs of respiratory distress, abdominal swelling, or tenderness to palpation.

A rapid ultrasound for shock and hypotension (RUSH) exam was performed to evaluate for undifferentiated hypotension. POCUS showed free fluid in the pelvis and in the right and left upper quadrants (Image 1), a flat inferior vena cava, and hyperdynamic left ventricle but no other concerning findings. Due to concern for sepsis, the patient was started on vancomycin and ceftriaxone along with IV fluid boluses, which improved heart rate and blood pressure.

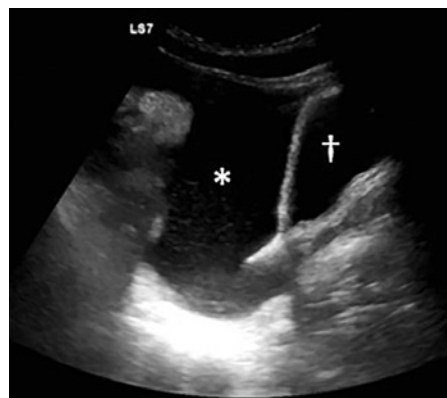


IMAGE 1. Pelvic ultrasound, sagittal view. A large amount of free fluid (*) is seen between the bowel (left of screen) and bladder (*).

Initial work-up was notable for a negative chest radiograph, a normal white blood cell count (7.2), microcytic anemia (Hgb 10.7, MVC 56), normal lactate at 1.4, and a C-reactive protein (CRP) elevated to 133. A CT scan of the abdomen and pelvis with IV contrast demonstrated a large volume of simple-appearing ascites of uncertain origin along with hepatosplenomegaly. Pending labs included blood cultures, urine culture, HIV antibodies, thick and thin malaria smears, hepatitis antibody panel, and QuantiFERON-TB Gold. The pediatric infectious disease service was consulted, and their primary concern was for dengue viral infection and typhoid fever. The patient was admitted to the pediatric ICU.

Additional labs for Epstein-Barr, dengue, toxoplasma, leishmania, and schistosoma were negative, but the patient’s QuantiFERON-TB Gold test returned positive. On day 4 of admission, the patient was febrile, tachycardic, and intermittently hypotensive despite receiving broad-spectrum IV antibiotics.

A repeat CT of the abdomen and pelvis with IV contrast showed persistent large-volume ascites with mild diffuse peritoneal enhancement. A thickened/edematous omentum was also noted. The persistent hepatosplenomegaly and findings of omental and peritoneal inflammation raised concern for TB peritonitis (Images 2 and 3).

On day 6 of admission, the patient underwent a diagnostic laparoscopy, during which sampling of the ascites and biopsies of the omentum/peritoneum were performed. Necrotizing and non-necrotizing granulomas in addition to rare amounts of acid-fast bacilli were found, supporting the diagnosis of sepsis from peritoneal TB.

Treatment with RIPE therapy plus pyridoxine was initiated, leading to rapid resolution of the patient’s sepsis. The patient was discharged to the ICE detention facility on day 13 of admission.

Discussion

TB most commonly presents as a pulmonary syndrome. However, the classical symptoms of pulmonary TB are not always observed in extrapulmonary TB cases. Only an estimated 15-25% of cases of abdominal TB have concomitant pulmonary TB findings.⁶

Abdominal involvement usually presents with nonspecific symptoms such as persistent fever and abdominal pain or swelling, which mimic many other intra-abdominal pathologies. Keep abdominal TB on the differential for patients with these symptoms along with epidemiological risk factors for TB, recent contact with the disease, or immunocompromised.

In this case, the patient's hypotension was evaluated using the RUSH protocol to evaluate the "pump, tank, and pipes."¹¹ The pump refers to the heart, which is assessed by evaluating for gross left ventricular function and for the presence or absence of a pericardial effusion. The tank refers to intravascular volume status, which is assessed via two steps. First, the inferior vena cava is measured to evaluate the volume status of the patient. Second, the pleural and abdominal spaces are assessed for pathology that could compromise intravascular volume. "Pipes" refers to the large arteries and veins. The aorta is scanned for evidence of aneurysm or dissection. The femoral and popliteal veins are evaluated for lack of compressibility suggestive of a deep venous thrombosis.¹¹

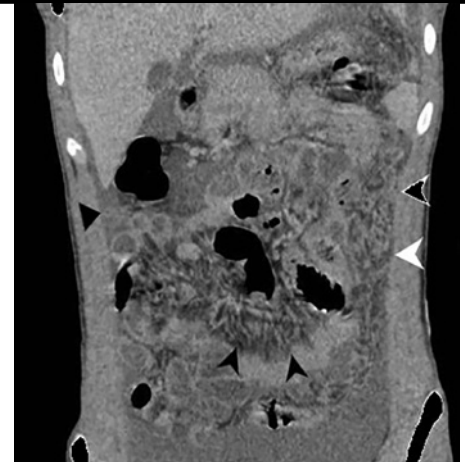
In this case, POCUS allowed evaluation in a negative pressure room, reducing the risk of exposure. The remainder of the RUSH exam evaluated the heart and abdomen for potential causes of shock. Identifying large amounts of abdominal free fluid in this case was unexpected, especially since the patient had no signs of distention or tenderness. This helped to direct the team's attention towards intra-abdominal pathology.

POCUS Advancements

The use of POCUS to diagnose extrapulmonary TB is a novel area of research in areas where TB is highly endemic. Research performed in South Africa and India has used the Focused Assessment with Sonography for TB-HIV (FASH) protocol to investigate the effectiveness of



IMAGE 2 and 3. Axial and Coronal CT abdomen/pelvis images showing diffuse ascites (black triangles), mesenteric edema (black arrows), and thickening of omentum (white arrows).



POCUS in detecting positive findings of TB in HIV-positive patients.

The FASH protocol is based on the FAST exam,¹² with 6 additional probe positions to assess periportal/para-aortic lymph nodes, focal hepatic/splenic lesions, and pericardial/pleural effusion and ascites.⁸

One study using the FASH exam for TB in HIV-positive and HIV-negative patients showed approximately one third of all participants had positive findings.⁹ Abdominal lymphadenopathy and splenic microabscesses were strongly associated with TB in HIV-positive patients. Additionally, in a subset of patients with negative chest radiography, POCUS provided sonographic evidence of extrapulmonary TB. Among HIV-negative patients, positive FASH exam findings did not correlate specifically to TB but provided the basis for further investigation into possible malignancy or other infectious disease.⁹

A different study with pediatric patients found that one third of patients diagnosed with pulmonary TB also had evidence of extrapulmonary TB.¹⁰ Pleural effusions and abdominal lymphadenopathy were the most common findings, although splenic microabscesses had the strongest correlation with confirmed pulmonary TB. HIV-positive children with TB were more likely to have evidence of abdominal lymphadenopathy and splenic microabscesses compared to HIV-negative children with TB.¹⁰ These results support the use of the FASH exam in at-risk patients who have TB symptoms but do not have chest imaging findings of pulmonary TB.

POCUS may also be used to identify peritoneal, omental, or bowel wall

thickening with no additional radiation exposure.⁶ On ultrasound, omental TB is seen as a hyperechoic mass located anterior to the intestines. In retrospective studies reviewing ultrasound imaging of patients diagnosed with omental TB, a hyperechoic mass was able to be distinguished from the intestines and/or anterior abdominal wall 14-55% of the time.^{3,6} Therefore, ultrasound may be used as an aid to guide further work up but lacks specificity. CT is the best test for omental TB.

Summary

Diagnosing extrapulmonary TB is difficult; it is characterized by non-specific symptoms and diverse patient presentations. Using POCUS in the diagnosis is novel and may not translate well where TB has low prevalence, such as the U.S. However, in the setting of suspicious epidemiological factors, unusual abdominal findings, and undifferentiated hypotension, a RUSH and/or FASH exam may provide evidence for extrapulmonary TB. Additionally, in patients with significant risk factors, a positive RUSH exam can warrant further investigation with a FASH exam. ★

TAKE-HOME POINTS

- In the setting of possible TB, the RUSH exam allowed evaluation of the lungs and undifferentiated hypotension in a negative pressure room, mitigating risk of exposure.
- Abdominal TB should be on the differential for patients with nonspecific symptoms (persistent fever, abdominal pain, distention) who have epidemiological risk factors for TB, recent disease contacts, or immunocompromised.
- In this context, a positive RUSH exam can trigger further investigation with a FASH exam.

A SCUBA Scary Case of Shoulder Pain

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Case

A 50-year-old male with no significant past medical history presents to the emergency department after a recreational dive to ninety feet one day prior. Upon surfacing, the patient developed confusion, bilateral shoulder pain, lower extremity weakness, and lower extremity paresthesias. After resurfacing, he was administered supplemental oxygen by his dive company for 2 hours, and his symptoms improved. The next day he developed recurrence of his bilateral shoulder pain and lower extremity paresthesias, prompting a visit to the ED.

On examination he was well-appearing with stable vital signs. He had full range of motion in all his extremities and strength was 5/5 and symmetric in both the upper and lower limbs. His tympanic membranes were intact bilaterally, pulses were equal and symmetric, and had no objective sensory deficit. The remainder of his physical examination was unremarkable. A complete blood count, comprehensive metabolic panel, and chest x-ray were unremarkable. The patient was given supplemental oxygen via a non-rebreather mask and started on IV fluids for suspected decompression sickness. The Diver's Alert Network (DAN) was consulted and recommended transfer for hyperbaric therapy.

The pathophysiology behind decompression sickness requires an understanding of Henry's law.

Discussion

Decompression Sickness (DCS) is a result of the formation of gas bubbles in body tissues during descent and subsequent re-circulation during depressurization or ascent. The majority of cases occur in divers. Other populations affected are caisson (watertight chamber) workers, high-altitude pilots, and astronauts.¹

The pathophysiology behind DCS requires an understanding of Henry's law, which states that at a constant pressure, the amount of gas dissolved in a liquid is directly proportional to the partial pressure of that gas. Take for example, a diver: an individual descends in the water, ambient pressure increases by approximately one atmosphere every 33ft of depth in saltwater. When a diver takes a breath of compressed air in this increasingly pressurized environment, inert gases in the air (mostly nitrogen) have increased solubility in blood and begin to saturate the diver's tissues until a state of equilibrium is reached. During ascent, or decompression, ambient

pressure decreases, and nitrogen is released from these tissues. The nitrogen gas eventually travels to the lungs, where it is released with exhalation ("off gassing"). DCS occurs when overly rapid ascent leads to insufficient nitrogen washout by the lungs and the gas bubbles remain trapped in various tissues. This becomes clinically apparent when the liberated gas causes mechanical tissue compression and/or embolization to the venous system.²

Anatomic location of gas bubbles will reflect symptomology. DCS can be classified based on these clinical manifestations. Type I DCS is the milder of the two, affecting the musculoskeletal, cutaneous, and lymphatic organ systems. The most common manifestation of DCS Type I is localized joint pain ("the bends").¹ The elbow and shoulder are the most often affected joints. Skin manifestations of Type I DCS include pruritus and rash- notably Cutaneous marmorata, a type of skin mottling. Furthermore, lymphatic obstruction can cause lymphadenopathy and diffuse edema.

Type II decompression sickness is the more severe type, affecting the neurologic and cardiopulmonary organ systems. Neurologic symptoms include headache, confusion, numbness, paresthesia, altered mental status, and loss of bladder control. In severe cases it can cause weakness, even to the point of paralysis. When the inner ear is affected, one can experience nausea, vertigo, tinnitus and ataxia. Signs of barotrauma on examination may be evidenced by tympanic membrane rupture. Cardiopulmonary symptoms include chest pain, wheezing, cough and shortness of breath (“the chokes”). Of note, Type II decompression illness is a distinct entity from arterial gas embolism. In arterial gas embolism, rapid ascent without exhalation results in alveolar rupture and subsequent tissue embolization. The classic presentation of arterial gas embolism is a diver who becomes unconscious when resurfacing from the water.

Diagnosis and Management

DCS is a clinical diagnosis, as presentation may be delayed up to 48 hours after the inciting event. No specific investigations will establish its diagnosis. Thus, treatment for patients with DCS should not be delayed for diagnostic workup. Complete blood counts and basic chemistries can be performed to assess fluids status.⁴ A chest x-ray can be useful as DCS can cause barotrauma resulting in pneumothorax, pneumomediastinum, and pulmonary edema.

The goal in treatment of DCS is nitrogen washout. Initial management should include placing the patient on

Did You Know?

The Divers Alert Network (DAN) records more than 1,000 diving related injuries each year. On call medical personnel can be reached via the international emergency hotline: +1-919-684-9111.



100% oxygen via a non-rebreather mask, regardless of their oxygen saturation on pulse oximetry. This will help decrease plasma nitrogen concentration as well as decrease the size of the bubbles.⁵ Fluid administration at a rate of 1.5 mL/kg/hr will reverse dehydration that is common in divers.⁶ Definitive treatment of DCS is hyperbaric oxygen therapy. Recompression in a hyperbaric chamber re-shrinks the bubbles, allowing for them to exit the tissue and be filtered out via the pulmonary capillaries. Furthermore, administration of high partial pressure oxygen will increase oxygen delivery to tissues and alleviate ischemic insults that may have been caused by an air embolism.⁴ Length of treatment in decompression chambers is based on severity of symptoms. Patients who require transfer for hyperbaric therapy

should go via ground transport, because air travel can worsen DCS.⁷ Patients with minimal symptoms who are being discharged should be advised to avoid any air travel for 48 hours.⁸

Case Conclusion

Because of concern for decompression sickness, we contacted the Divers Alert Network (DAN). Consultation included a description of the presentation as well as a thorough evaluation of the patient's dive profile. It was ultimately determined that the patient be transferred for hyperbaric therapy at the nearest facility. ★

TAKE-HOME POINTS

- Careful history-taking in patients with recent SCUBA diving activity can help guide further work-up. Inquire about the depth of descent and timing in which symptoms developed.
- Decompression illness occurs when gas bubbles remain trapped in bodily tissues. Type I is mild while Type II is more severe and can be life threatening.
- The goal in the management of decompression illness is nitrogen washout. This can be achieved by hydration, supplemental oxygen, and consideration for hyperbaric therapy.
- The Divers Alert Network (DAN) is available for emergent medical assistance when treating patients with suspected diving related diseases.

SCUBA Diving Complications

| | | |
|-------------------------------|--|--|
| Barotrauma | <ul style="list-style-type: none"> • Most common complication that can occur during descent or ascent • Arterial gas embolism can result in loss of consciousness and death • Middle ear involvement (“ear squeeze”) can lead to tympanic membrane rupture | |
| Decompression sickness | <ul style="list-style-type: none"> • Type I: Milder, impacts the musculoskeletal, cutaneous, and lymphatic systems | <ul style="list-style-type: none"> • Type II: More severe and can lead to neurologic injury and death |
| Nitrogen narcosis | <ul style="list-style-type: none"> • Typically occurs at depths greater than 100 feet • Produces symptoms similar to alcohol intoxication (impairment in neuromuscular performance and cognitive ability) • Recovery occurs rapidly upon ascent to shallow depths | |

A Peculiar Case of Pediatric Subdural Empyema

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Subdural empyemas are purulent fluid collections between the dura and arachnoid mater. In infants, meningitis is the most common cause; in older children, sinusitis and otitis media are typically the primary sources that spread either through direct extension or hematogenously.¹⁻³ Subdural empyemas are associated with significant morbidity and mortality if not recognized and treated promptly.^{1,4-5} Without proper treatment, the infection may spread through the subdural space resulting in increased intracranial pressures, disruption of cerebrovascular flow, and death. Associated thrombophlebitis of contiguous veins near the fluid collection may lead to cerebritis and cerebral infarction.² As a result, morbidity includes persistent seizures and long-term neurologic deficits in up to one-half of cases.^{2,5} We describe here the presentation of a complicated subdural empyema in a pediatric patient.

Case

A previously healthy 10-year-old boy presented to the emergency department (ED) after his parents noticed he was limping with his right leg since that morning. The parents noted he had a tactile fever two weeks prior, however his older brother had signs of an upper respiratory infection at that time. The child had been attending school daily and had been playing normally with his siblings. Associated symptoms reported included right arm numbness and one episode of vomiting that morning. The patient and parents denied any complaints of headaches, facial pain, eye pain, visual changes, ear pain,

rhinorrhea, cough, rash, recent injuries, or altered mental status. Parents denied any pertinent past medical, surgical, or family history. The child was afebrile with normal vital signs on presentation. Examination revealed an alert child, answering questions appropriately for his age, and following simple commands. There was no facial swelling or tenderness. Neurologic examination was remarkable for right upper and lower extremity weakness with decreased sensation, bilateral ankle clonus, abnormal finger to nose and heel to shin test bilaterally, and difficulty with rapid alternating movements. He was unable to lift his right foot off the ground during gait testing.

On laboratory analysis, a complete blood count was significant for thrombocytosis of 559 bil/L (normal range: 140 – 340 bil/L). Inflammatory markers were markedly elevated with an erythrocyte sedimentation rate (ESR) of 118 mm per hour (normal range: 0 – 9 mm/hr) and C-reactive protein (CRP) of 5.7 mg/dL (normal range: 0.0 – 0.8 mg/dL). Differential diagnoses for our case included 1) acute cerebellar ataxia, given the sudden gait disturbance and cerebellar signs, 2) stroke, given the acute right-sided hemiparesis, 3) acute disseminated encephalomyelitis, given the focal neurologic deficits in the setting of fever and elevated inflammatory markers, 4) clinically isolated syndrome (an isolated incident that may represent the onset of multiple sclerosis), given the potential of central nervous system (CNS) demyelination, and 5) an intracranial lesion, given the unilateral hemiparesis.

The patient's case was discussed with the pediatric neurology team, who recommended magnetic resonance imaging (MRI) of the brain, cervical spine and thoracic spine with and without contrast using a multiple sclerosis protocol to evaluate for CNS lesions. This revealed a subdural empyema along the anterior hemispheric falx with left frontoparietal

lobe involvement (Figures 1 and 2). These findings correlated with the predominant motor weakness of the right extremities. The MRI also showed regional meningeal changes near the anterior hemispheric collection, which may have contributed to the bilateral findings on his exam. There were also changes consistent with paranasal sinusitis. The MRI showed no abnormalities of the cervical and thoracic spine.

The neurosurgery team was consulted and recommended non-surgical treatment with intravenous antibiotics given that the patient's mental status was intact without evidence of increased intracranial pressures, the small size of the purulent collection, and the risks of proceeding with neurosurgical intervention. Levetiracetam was recommended for seizure prophylaxis. In consultation with the infectious disease team, the patient was initially treated with broad-spectrum antibiotics: ceftriaxone, vancomycin, and metronidazole. An MRI four days later showed improvement in the subdural empyema. His gait normalized, the paresthesias resolved, and the right-sided hemiparesis greatly improved. The patient was discharged on hospital day five with oral metronidazole, levetiracetam, and ceftriaxone via a peripherally-inserted central catheter. An MRI four weeks after discharge showed interval resolution of the subdural empyema (Figures 3 and 4). A clinic visit six weeks later noted that he was back to his neurologic baseline.

Discussion

In children, fever and headache are the most common presenting symptoms of sinusitis.² Accepted mechanisms for sinusitis evolving to intracranial abscesses include direct extension due to close proximity of the subdural space and paranasal sinuses or hematogenous spread via the valveless diploic veins.^{1,2} These purulent collections can rapidly expand and cause increased intracranial pressure, potentially leading to herniation and death within 48 hours if untreated.²

Thus, prompt recognition and treatment is required to preserve appropriate neurologic function. Hemiparesis, seizures, and altered mental status are the most common neurologic signs when the intracranial space is involved.⁴ Other presenting symptoms, such as periorbital swelling, diplopia, or facial swelling should also prompt imaging studies, as these signs may indicate a high likelihood of empyema expanding into the intracranial space.⁶

The leukocyte count, CRP, and ESR may be elevated or normal in subdural

empyemas.⁴ Blood cultures are often negative and may not be helpful in contributing to the management of intracranial abscesses.^{4,5} Spinal cultures are often low yield as well and not needed for diagnosis. They also pose risk of deterioration in patients with empyemas that cause mass effect and increased intracranial pressures. Neurodiagnostic imaging options include computed tomography (CT) scan and MRI. CT scans have the advantage of being readily available at most hospitals and should be done emergently if there are concerns

of increased intracranial pressure. They should be performed with intravenous contrast if infectious etiologies are suspected. Magnetic resonance imaging is more sensitive than CT for intracranial infectious lesions; initial CT scans may miss 24-35% of intracranial abscesses.^{1,4} A CT scan is a reasonable first-line choice for imaging due to its accessibility, however MRI with gadolinium contrast is the preferred imaging modality if available and clinical suspicion remains high despite an initially negative CT scan.⁴

After establishing the diagnosis, neurosurgery, infectious disease, and otorhinolaryngology (if the cause is sinogenic) consultations are warranted for multispecialty management of subdural empyemas. Neurosurgical interventions (craniotomy or burr holes) are indicated in patients with associated sepsis, neurologic deterioration, or failure to respond to antibiotics.^{4,5} Stable patients may undergo conservative treatment with broad-spectrum antibiotics and close monitoring for signs of deterioration. A typical regimen is ceftriaxone or cefotaxime plus metronidazole, as subdural empyemas are usually polymicrobial with anaerobic gram-positive cocci and gram-negative rods.^{3,3} Seizure prophylaxis is recommended due to the high rate of seizures with intracranial abscesses.³ Although corticosteroids can reduce edema and inflammation, there are no documented studies in its utility for subdural empyemas and remains controversial. A conservative approach requires frequent follow-up imaging to assess for improvement and resolution of the subdural empyema. In our case, MRI studies were obtained on day one, day four, and week four.

Prior to the availability of antibiotics, CT, and MRI, subdural empyemas were almost always fatal. With advances in diagnosis and treatment, mortality rates have decreased to 6-15%.^{3,4} Nonetheless, survivors may have significant morbidity, including permanent residual hemiparesis (15-35%), persistent seizures (12-38%), and residual neurologic deficits in up to one-half of cases.² Thus, it is important to consider and evaluate for intracranial abscesses in children presenting with neurologic signs and any indication of sinusitis within the past several weeks. ★

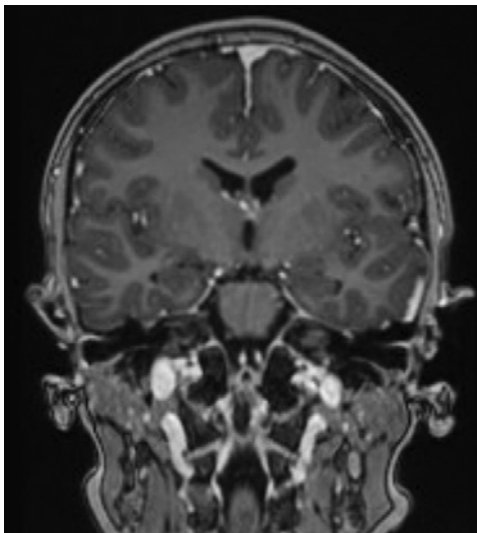


FIGURE 1. Axial T1 with and without gadolinium MRI of the brain shows a left subdural empyema involving the frontal and parietal lobes. There is also regional meningitic changes.

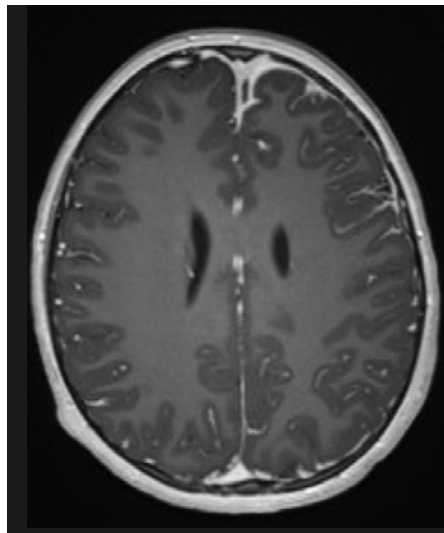


FIGURE 2. Coronal T1 with and without gadolinium MRI shows a superior, left subdural empyema.

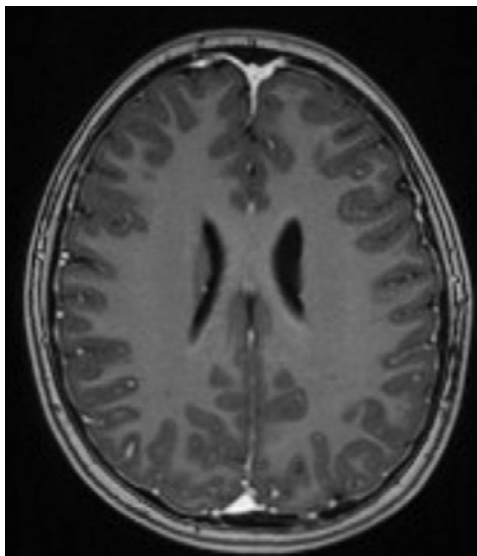


FIGURE 3. Axial T1 with and without gadolinium MRI of the brain without subdural empyema after treatment.

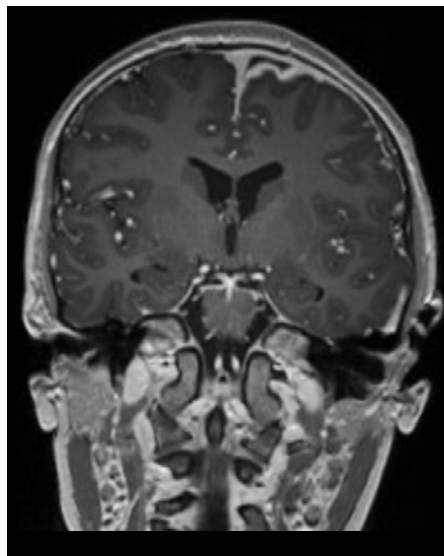


FIGURE 4. Coronal T1 with and without gadolinium MRI of the brain without subdural empyema after antibiotic.

Coinfection of Trichomoniasis with other Sexually Transmitted Infections



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A 22-year-old Black female presents to your emergency department with a chief complaint of painful urination and intercourse, as well as post-coital bleeding. Upon further questioning, you learn that this patient had unprotected sexual intercourse 2 weeks ago and has had 3 new, different sexual partners within the past 6 months. On pelvic examination, you notice whitish discharge along with vulvovaginal erythema. Rapid testing for Chlamydia and Gonorrhea (CT/NG) are ordered. Rapid testing for *Trichomonas Vaginalis* (TV) is unavailable, however. You decide to treat her empirically with 250 mg IM ceftriaxone and 1 g PO azithromycin.

Clinical Question: What is the prevalence of gonorrhea, chlamydia, and trichomonas co-infection rates, and if

rapid testing for Trichomoniasis is unavailable in the ED, should the clinician empirically treat the patient for trichomonas given the patient's current presumed sexually transmitted infection (STI)?

Background and Overview

Trichomoniasis is a urogenital protozoan sexually transmitted infection. Its formal protozoan name is *Trichomonas vaginalis*, which also goes by *T. vaginalis* (TV). It often manifests as vulvovaginitis in women or urethritis in men.¹ Within the United States, it is considered to be the most common non-viral sexually transmitted infection (STI) with an annual incidence of 3-5 million cases.² The reported prevalence was 1.8% among women in the US and 0.5% of men in the U.S.² Trichomoniasis has the strongest prevalence in women who are older than 40 years of age, whereas other STIs like chlamydia (CT) and gonorrhea (NG) are lowest within this age group.³

The pathogenesis of trichomoniasis is not completely understood, but it is

presumed that *T. vaginalis* comes in contact with an individual's genital epithelial during sexual intercourse, facilitating the transmission from an infected individual to an uninfected individual. *T. vaginalis* is able to adhere to the epithelial surface and form aggregates and later erode through the epithelial layer to spread along other regions of the genitourinary tract. Sequela of trichomoniasis infection can include pelvic inflammatory disease, infertility, cervical neoplasia, pregnancy complications and an increased susceptibility of HIV transmission in women.⁴ Risk factors for contracting trichomoniasis include history of STI infections, new and/or multiple sexual partners, early onset of sexual intercourse, and intravenous drug use.³

Common chief complaints for women with this infection include vulvar pruritis, dysuria, odorous discharge, and/or postcoital bleeding. Men may have symptomatic complaints of dysuria, genital pruritis, or hematuria. However,

it is very common for either gender to present asymptomatic and thus screening for the disease is very important. Diagnosis is performed through wet mount microscopy or molecular assays. Treatment is a recommended one-time dose of either metronidazole/tinidazole 2g PO or metronidazole 500 mg BID x 7 days. Patients should refrain from alcohol use while on the prescribed medications until 24 hours after completion to avoid a disulfiram-like reaction. Patients should also abstain from sexual intercourse until all partners have completed the treatment regimen and have full symptomatic resolution. Additionally, patients should receive follow up testing between 2 weeks and 3 months of completing treatment. It is important for these patients to undergo additional STI testing at that time including further evaluation for HIV.

Epidemiology and Prevalence of Co-infection

T. Vaginalis is considered to be the “neglected” STI as there is still a lack of established screening programs within the United States. There is also a relatively poor understanding of co - infection rates between trichomoniasis and other STIs. One study investigated the coinfection rates between CT and TV by collecting CT positive patient samples and performing molecular assays for TV. The study showed an overall CT/TV co-infection rate of 22%. The rates were even higher in black women ages 18-24.⁵ Several studies have demonstrated a significant racial disparity of TV infection, with TV being vastly more prevalent in non-Hispanic, Black women. One study cited a 10.3x higher rate than that among non-Hispanic Caucasian and Hispanic-American women.⁶

There has been a suggestive association of age and the prevalence of TV/CT or TV/NG coinfection. Trichomoniasis, alone, is unique in that it increases in prevalence with increasing age among women until age 50, at which point the prevalence plateaus. This is unlike the pattern demonstrated in the majority of other STIs.⁶ Chlamydia and gonorrhea, for example, show highest prevalence in the 15-29 age range and decrease in prevalence with increasing age.³

This contrast in prevalence between isolated TV and other isolated STIs

is the reason why studies showed low rates of co-infection between TV/NG or TV/CT (<1.3%) when studying the whole population (combining young and older age groups).⁷ However, there is a paradoxical relationship in that although the prevalence of Trichomoniasis is lower in younger age groups, the prevalence of coinfections is highest in the younger age ranges. The same study done by Ginocchio and colleagues noted that coinfection of TV with CT or TV with NG were found to be more prevalent in women <30 years of age likely due to the increased prevalence of CT and NG in this younger demographic.⁷ Another study showed that the association between CT and TV coinfection was significant when categorizing for a higher risk age group (14-25) of contracting STIs.⁸

Another study published in 2002 investigated epidemiological features of female attendees at an STI clinic who had been diagnosed with TV infection. The study found that of those female patients, 28% had coexisting CT infection and 10% had coexisting NG infection.⁹ A separate study investigated the same correlation but in men attending a STI clinic. The study found that in men older than 30 years of age, the presence of discharge and non-gonococcal urethritis were independently predictive of a TV infection.¹⁰ This study suggested that empiric treatment and partner management should include the high likelihood of TV co-infection.¹⁰ Although the patient population at STI clinics do not represent the general population, the above studies do indicate a correlation between TV with concurrent CT or NG infection.

Conclusion

For many patients, the ED represents the primary access point for healthcare. The ED often serves patients at high risk for sexually transmitted infections who are either symptomatic or asymptomatic with presumed exposure. It is likely that patients are lost to follow up or unlikely to follow up with testing, making it even more important that the adequate treatment and diagnostic testing are provided.

In regard to trichomoniasis, there have been several studies indicating a significant prevalence of coinfection with CT or NG, when a patient is in the

high risk age range (18-25) or is a non-Hispanic African American individual. Currently, there are no broad guidelines from the center for disease control (CDC), American College of Obstetrics and Gynecology (ACOG), American College of Emergency Physicians (ACEP) or Infectious Disease Society of America (IDSA) regarding empiric treatment of TV in patients presenting with concerns for STIs. The current treatment guidelines only recommend for empiric treatment of TV, NG, and CT infections for patients who are survivors of sexual assault due to poor compliance for follow up visits.

Nevertheless, based on prevalence/co infection rates, physicians should consider empirically treating for TV in settings where rapid testing is unavailable. This is especially true in young adults or African American patients. In settings where rapid diagnostics are available, physicians should include TV testing when evaluating a patient for STIs. Empiric treatment covering TV can prevent long term sequelae and decrease the overall burden of transmission.

Case Conclusion

*The patient was found to be positive for both CT and NG on the rapid testing. Given the patient's high-risk profile, including her age and non-Hispanic black ethnicity, she was treated empirically to cover for TV. In addition to the 250 mg IM ceftriaxone and 1 g PO azithromycin she was given a single dose of 2 mg metronidazole. She was recommended to receive follow up testing for reinfection and to undergo further evaluation for other STIs in the ambulatory setting within 3 months and to inform her sexual partner(s) for treatment to avoid reinfection. Abstinence was recommended until completion of the treatment course and resolution of symptoms for both the patient and any affected sexual partner(s). The patient was also educated that contract tracing varies with the STI one is diagnosed with. Infections with chlamydia warrants informing all sexual partners one has had in the past 6 months prior to confirmed diagnosis, whereas gonorrhea is 2 months and trichomoniasis is unknown (other than treating the current/most recent sexual partner). **

Financial Impacts of ED Observation Units

Literature and Strategies Review

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The emergency department observation unit (EDO) is a specialized unit designed for efficient, ongoing medical treatment, assessment, and reassessment of patients before the appropriate decision can be made to either discharge or admit.¹ Since the 1960s, EDOs have been increasingly utilized to avoid unnecessary admissions, optimize inpatient bed capacity, improve emergency department (ED) throughput, and overall deliver more efficient care; all resulting in significant national and hospital cost savings.² However, since observation services are billed as outpatient services, EDO expansion may increase out-of-pocket costs for patients, particularly Medicare beneficiaries.¹⁻² As there is significant speculation, controversy, and media attention surrounding these issues, this literature review aims to explore financial impacts of EDOs at the hospital and patient levels.

REVIEW OF LITERATURE

Emergency Department Observation Units: A Clinical and Financial Benefit for Hospitals

The authors of this literature synthesis present financial arguments and evidence supporting the expansion of EDOs in hospitals nationwide. According to the authors, EDOs help hospitals maximize profit margins by billing via a fee-for-service outpatient model, in contrast to the lower reimbursing bundled diagnosis-related

groups offered for inpatient services. Moreover, since admissions tend to be costly for hospitals, EDOs can conserve scarce ED resources and maximize profitability by diverting appropriate patients away from inpatient beds. Additionally, optimizing inpatient bed capacity creates opportunities to manage more profitable cases like elective surgeries, further increasing profit margins. As pressure continues to mount on clinicians and administrators to deliver higher quality care at lower costs, EDOs help maximize efficiency and profitability of EDs and hospitals. The authors conclude that hospitals with the ED volume to justify the operational costs of establishing an EDO should consider the return on investment of doing so.³

Factors Associated with Prolonged Observation Services Stays and the Impact of Long Stays on Patient Cost

The authors performed bivariate analyses and hierarchical linear

modeling of Healthcare Cost and Utilization Project data to determine the additional costs of prolonged observation services stays to Medicare beneficiaries. Notably, under Medicare Part A in 2012, inpatients paid no coinsurance for up to 60-day stays after meeting a \$1,156 deductible per admission, whereas patients admitted to observation paid 20% coinsurance per treatment with multiple treatments often being the norm (see Table 1). The authors found that Medicare patients in observation services stays were charged \$10,373 on average, with stays of 48 to 72 hours and over 72 hours associated with a 42% and 61% increase in costs, respectively. Additionally, medications administered while under observation are not covered as they would be for inpatients or by Medicare Part D, further contributing to increased out-of-pocket costs. The authors conclude that the cost share for observation services stays under 24 hours is on average less than

TABLE 1. Cost and Payment Advantages of Observation Care vs Inpatient Care

| | Observation Unit | Examples/Rationale | Inpatient Unit | Examples/Rationale |
|--|---------------------------------|--|-------------------------------------|---|
| Costs | | | | |
| Average length of stay | ~10 hours | Protocol driven care with minimal variability | ~2 days | More diagnostic variability |
| Patient-to-nurse ratio | Up to 5:1 | Limited number of diagnostic and treatment protocols | Usually 3:1 or 4:1 | More heterogeneous mix of patients requires higher ratios of nurse staffing |
| Room size requirements and fixed costs | Flexible rooms, use of curtains | Patients preselected as low risk/acuity with low nursing needs, rooms can be smaller with less equipment | Minimum standards limit flexibility | More heterogeneous mix of patients requires more fixed resources; trend toward private rooms |
| Payments | | | | |
| Revenue | Fee-for-service | Discrete payments for diagnostics (i.e., ECG, chest x-ray, stress test) and therapeutics (i.e., medications) | Bundled | DRG payments bundle all inpatient diagnostic and therapeutic services |
| Risk of denial and/or audit | Low | Payees have less incentive to investigate lower cost encounters | High | Patients with short inpatient stays (i.e., 1-2 days) are targeted by payers as possibly inappropriate |

Note. Inpatient length of stay estimate assumes patient would have been candidate for EO observation care. Sources: Graff (2009) and Sieck (2005).

the Medicare Part A deductible amount, but stays longer than 24 hours may raise out-of-pocket costs.⁴

Protocol-Driven Emergency Department Observation Units Offer Savings, Shorter Stays, and Reduced Admissions

The authors highlight the differences between 4 common approaches to observation services, and discuss the myriad of advantages of providing observation care in a type 1 unit (see Exhibit 1), a dedicated observation unit with well-defined protocols for specific symptoms and diagnoses. Specifically, the benefits include:

- 1) 17% to 44% decreased likelihood of admission following observation care
- 2) 23% to 38% shorter length-of-stays in the hospital
- 3) \$950 million in annual national cost savings

As of 2013, two-thirds of hospitals in the United States do not have a dedicated observation unit, and most patients who receive observation services in these hospitals do so in a type 4 unit. As type 1 units offer the most benefits from both clinical and financial standpoints, the authors argue that policymakers should consider monetary incentives for hospitals to employ observation care in type 1 units, as they best align ED resources with patient needs, have shorter length-of-stays, and have lower hospital costs and lower patient copayments compared to other observation settings.⁵

What Is An Observation Stay? Evaluating the Use of Hospital Observation Stays in Medicare

The authors of this observational cohort study investigated the extent to which observation stays are used and billed for acute, unscheduled conditions as intended by the Centers for Medicare and Medicaid Services (CMS). The study found that 63% of observation stays were billed under the 0761 revenue code, which is generally used for chronic or episodic conditions as opposed to acute, unscheduled care for patients awaiting discharge or admission. In addition, conditions that involved short-term treatments including maintenance chemotherapy and epidural spinal

EXHIBIT 1. Hospital Settings in which Observation Services are Provided

| Setting | Description | Characteristics |
|----------------|---|---|
| Type 1 | Protocol driven, observation unit | Highest level of evidence for favorable outcomes Care typically directed by ED |
| Type 2 | Discretionary care, observation unit | Care directed by a variety of specialists Unit typically based in ED |
| Type 3 | Protocol driven, bed in any location | Often called a “virtual observation unit” |
| Type 4 | Discretionary care, bed in any location | Most common practice Unstructured care Poor alignment of resources with patients’ needs |

injections were more likely to be coded as 0761. The rampant use of the 0761 revenue code for observation stays may have unintended cost sharing consequences under Medicare Part B, as no cap exists for patient out-of-pocket costs that would be subsequently incurred. The authors argue that these aberrant billing practices highlight providers’ lack of understanding of policy pertaining to observation stays. Therefore, CMS should provide more guidance regarding the appropriate use of observation stays and whether they should be billed under an alternative mechanism.⁶

SUMMARY OF LITERATURE

EDOUs create an additional disposition option for patients who are too sick for discharge but not sick enough for inpatient admission. By admitting these patients to EDOUs, emergency physicians conserve much-needed ED resources and maximize profit margins with significant cost savings to EDs, hospitals, and national health spendings.¹⁻³ However, as observation services are billed as outpatient services, the high costs of prolonged observation stays are often shifted to patients, disproportionately affecting Medicare beneficiaries.⁴ As many EDOUs are unstructured and functioning suboptimally, there is a need for protocol-driven observation care that makes financial sense not only to hospitals but also to patients.⁵ Further guidance from the CMS is also needed to standardize billing practices for observation stays and contain patient out-of-pocket costs.⁶

Looking Forward/What’s Next

As EDOUs are rapidly expanding and cementing their place in United States health systems, the observation of appropriate patients in a dedicated

EDOU is becoming increasingly recognized as “best practice.”¹¹ However, EDOUs increase cost sharing for Medicare beneficiaries, as they are billed for outpatient services and are increasingly more likely to be readmitted to the EDOU versus inpatient.⁷ However, more recent research suggests that same may not be true for the commercially insured, leaving much to be considered regarding health equity and disparities.⁸⁻¹¹ Therefore, hospitals must adapt to strategically deliver observation services that are both clinically and economically sound, likely through EDOUs, for their patient populations. More research, policymaking, and evidence-based guidelines are needed to standardize their usage and billing, optimize their function, and alleviate cost-sharing burdens on Medicare beneficiaries and others in a manner that is just and equitable.

EMRA Administration & Operations Committee Links, Guides and Opportunities

- Check out what’s happening with our group at the EMRA A&O landing page! <https://www.emra.org/be-involved/committees/administration-and-operations-committee>
- Looking to gain a mastery of this and other relevant operational knowledge? Consider applying for EMRA’s ED Directors Academy scholarship! <https://www.emra.org/be-involved/awards/edda-travel-scholarship>
- Interested in the management and business issues involved in running a successful emergency medicine practice? Take a look at the EMRA/EDPMA Scholarship Opportunity: <https://www.emra.org/be-involved/awards/edpma-scholarship> ★



Adapting to the COVID-19 Pandemic Weekly Multidisciplinary Simulation Education

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Thrust into a pandemic unlike any other, health professionals today must continually adapt to an ever-changing environment. Protocols change at dizzying rates, while the physical and mental demands of our jobs increase exponentially. Both nursing and physician education has been interrupted

and altered in ways that leave concerns about the quality of instruction.

To help health professionals with continued education and applied skills, we turned to medical simulation as both a content delivery tool and quality improvement aid at our institution as part of our adaptation to the pandemic. We aimed to provide high-quality medical education with a hands-on experience for the maximum number of learners while complying with infection control measures during an active pandemic. To this end, we implemented multidisciplinary weekly simulation sessions at the Michael E. DeBakey Veterans Affairs Medical Center in Houston, Texas.

Design

Prior to the Session

Simulation sessions were targeted to an audience of health technicians,

emergency department nurses, acute care nurses, critical care nurses, emergency medicine residents, and internal medicine residents. Simulation session participants were notified in advance of the session and provided with a pre-simulation orientation packet. The pre-session materials included guidance on the equipment expected to be utilized (eg, mechanical compressions device), institutional code blue procedural policy, and an overview of the session format. Each session was limited to 3 nurses, 2 physicians, 1 health technician, and 3 simulation session moderators. The number of participants was limited to those present in an actual cardiac arrest case in our hospital's standard operating protocol. No individual could participate in more than one scheduled simulation session in a 3-month period. Participants were expected to complete

a pre-simulation assessment and survey on arrival to the session. Participants then engaged in COVID-19 or “Patient Under Investigation” (PUI) cardiac arrest simulations and associated debriefings.

Format of the Session

After a brief pre-simulation survey and assessment, participants were presented with a COVID/PUI cardiac arrest case in the setting of either the emergency department or the inpatient unit. Each case was approximately 14 minutes in duration. The participants had access to personal protective equipment (PPE) that was not intended for clinical use (eg, expired PPE). A high-fidelity simulation mannequin was utilized with a standard hospital simulation crash cart and airway box.

The case was run through initially with a structured debriefing led by simulation moderators and aimed at provoking self-reflection and areas for improvement. Next, participants were allowed a chance to incorporate feedback and rerun the same case. A second and more in-depth debriefing session followed. Debriefings were held as a group without separation of physicians and other team members. Participants completed a post-session assessment and survey.

After the Session

The final debriefing session included breakout sessions to discuss evidence-based protocols for COVID/PUI cardiac arrest care in detail and a formal review of infection prevention protocols. Participants were encouraged to ask questions and to review primary literature after the session. In addition, they received e-mails post-session initially 2 weeks after the session and then again one month after the initial session with additional content related to evidence-based cardiac arrest and COVID/PUI care.

Limitations

Given that these sessions were pre-scheduled, and participants were informed they would occur in advance, this compromised the level of fidelity of the simulation. In a more true-to-life scenario, participants would have an unannounced simulation case. However, given the strict infection control measures necessary during an active pandemic,

it was crucial to announce the sessions beforehand to hold them in care areas with enough physical distancing possible. Additionally, the PPE utilized for these simulated cases was slightly different infection control grade and material compared to what is used in actual clinical practice. This was also necessary to allow us to evaluate appropriate donning and doffing protocols while being mindful of our limited PPE stores for clinical use. All assessments and surveys were anonymous except for identifying training level (eg, PGY-1 v PGY-3 resident), which limited the ability to provide personalized feedback to participants. In a realistic scenario, each individual would be identified and receive targeted goals for improvement.

Outcomes Measured

Three simulation moderators monitored each simulated case which comprised both simulation trained nurses and physicians. Objective metrics were noted during each simulated case to monitor for specific areas of improvement, such as but not limited to delays in defibrillation for appropriate rhythms, total hands-off time in regards to chest compressions, and time to backboard placement. Moderators also were expected to focus on effective communication, infection control measures, team dynamics, and care team-family interactions.

Survey and assessment data collected both before and after the sessions were monitored for trends for quality improvement efforts and targeted education for the hospital-at-large. The written surveys included whether participants felt comfortable with the donning and doffing protocols, equipment utilized in cardiac arrest care (eg, AutoPulse mechanical compressions device), and ACLS algorithms, as well as how their confidence changed in these areas after the session. Written assessments aimed to identify knowledge deficits that needed to be ameliorated and asked participants to identify interventions known to improve mortality outcomes in cardiac arrest care, list potentially reversible causes of cardiac arrest, and identify appropriate care measures post-return of spontaneous circulation (ROSC).

Discussion

We describe a novel multidisciplinary simulation program piloted at our tertiary care facility in the setting of an active and ever-evolving pandemic. Several modifications to usual medical education and simulation sessions were necessary. Medical simulation has long been utilized as a critical tool for providing hands-on clinical education, with its roots in the military, which first used such an instructional modality. From its inception, simulation has offered a risk-free and safe clinical practice environment for trainees. For this reason, we opted to use this as our instructional tool to address the educational and quality improvement needs of our institution and its health care team members.

The reception of this novel simulation program was exceedingly positive by multiple hospital departments and participants alike. Several departments, including anesthesia, respiratory therapy, and other clinical units (eg, primary care clinics, long-term acute care facilities, etc.), requested expansion of this simulation program to include their team members. In the event of rising positivity rates and the need to reconsider live time sessions, we are exploring virtual simulation sessions. This would allow us to build out longitudinal simulation goals, tailor objectives to the individual learner, meet night and weekend shift workers' educational needs, and adhere to all infection control precautions. It would also occur asynchronously, allowing for minimal disruptions in clinical care during scheduled work time hours. We have currently already employed virtual simulation as part of our BLS and ACLS recertification programs. We hope to continuously re-assess and improve our simulation efforts in response to the growing educational and quality improvement needs during the global COVID-19 pandemic. We anticipate the instructional modalities solidified during this time will be useful for years to come beyond the acute period of adapting to the pandemic. ★

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Single GME Accreditation

Osteopathic Match Outcomes in Emergency Medicine and Strategies for Future Applicants

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2020 marked the first year of the new unified residency match, and the data is here. Before the single GME accreditation system, osteopathic medical students applying for emergency medicine had two separate matches they could participate in: the AOA (osteopathic) or the ACGME (allopathic) match. For osteopathic students, this posed additional challenges in developing an application strategy. These students had to decide whether to participate in one or both matches, which created a complicated series of potential match outcomes and extra financial burden. Currently, the ACGME now serves as the sole accrediting institution for residencies and fellowships, and all MD and DO students applying for emergency medicine will participate in the same single match.

Throughout the 5-year transition process, 98% of AOA accredited programs that applied have received ACGME accreditation, and 233 programs (spanning 27 specialties) have received “Osteopathic Recognition.” This includes 40+ emergency medicine programs with five programs maintaining “Osteopathic Recognition.” NRMP data shows that the match rate for DO graduates was 90.7%, and the total GME placement rate in the combined match this year was an impressive 99.2%. This is a significant increase in both match and placement rate despite increasing 1,103 osteopathic applicants from 2019. The goal of this article is to explore this data as it relates to matching emergency medicine as an osteopathic applicant

and how it compares to prior years. We believe this analysis will set a new framework for assessing competitiveness and developing application strategies for osteopathic medical students applying for emergency medicine.

2020 Osteopathic Charting Outcomes Data

So osteopathic applicants match better in the ACGME match than in any year prior, but how about for emergency medicine specifically? When comparing the NRMP Osteopathic Charting Outcomes data from this year and 2018 (data released every other year), the overall match rate has stayed the same: 83.8% (643/767) in 2020 and 83.9% (434/517) in 2018. Due to the AOA match in 2018, it is difficult to assess the real increase in the number of osteopathic EM applicants and matches for 2020. Though 250 more osteopathic students applied to EM in the ACGME match in 2020 than in 2018, it is essential to note that the 180 applicants applied EM in the AOA match that year. Of all matched osteopathic students in 2020, 12.3% matched into emergency medicine. For comparison, the match rate in emergency medicine for US MDs this year was 91.9% (1,739/1,598). This indicates that though the DO bias is dissipating, it still exists and should be considered when applying and evaluating your specialty’s competitiveness.

Of note is the increase in the percentage of Program Directors who report their willingness to interview and rank DO applicants. **In the 2020 NRMP Program Director Survey,**

74% of EM PDs reports that they “often interview” DO applicants, which is an increase of 14% from 2018. Likewise, 78% of EM PDs report they “often rank” DO applicants (an increase of 16% from 2018). Part of this increase is likely explained by the addition of former AOA EM programs into the survey this year.

USMLE/COMLEX Scores

In 2020, the mean USMLE Step I and COMLEX Level I score for osteopathic applicants that matched EM successfully were 228 and 562, respectively. The mean USMLE Step I and COMLEX Level I score for an unmatched osteopathic applicant were 219 and 504. The mean USMLE Step 2 and COMLEX Level II score for matched applicants was 241 and 599, while the mean for unmatched applicants was 231 and 532. Though the overall match rate for osteopathic students is 83%, one can better determine their chance of a successful match looking at the board score specific data (Table 1). The NRMP also has an “Interactive Charting Outcomes” that allows you to visualize match data in greater detail with more parameters.

Those in the category of “Score Unknown” are presumably applicants who did not take the USMLE or did not disclose their score to the NRMP. Though it is possible to match without a USMLE score as an osteopathic applicant, currently, it is still primarily advised to take the USMLE. A survey conducted by the COD Advising Students Committee for Emergency Medicine showed that of the programs that consider osteopathic applicants, only half

TABLE 1

| USMLE Step 1 Score | Match Rate(%) | COMLEX Level I Score | Match Rate (%) |
|--------------------|----------------|----------------------|----------------|
| 191-210 | 67.1 (55/82) | 400-500 | 66.7 (128/192) |
| 211-220 | 87.9 (94/107) | 501-550 | 84.7 (166/196) |
| 221-230 | 88.4 (129/146) | 551-600 | 90.5 (171/189) |
| 231-240 | 91.5 (118/129) | 600+ | 95.5 (171/179) |
| 240+ | 93.7 (89/95) | | |
| Score Unknown | 76.2 (157/206) | | |

would offer an interview without USMLE Step 1 and Step 2. In contrast, 87% would offer an interview with an applicant who had taken USMLE Step 1. Also of note is that 27% of program directors surveyed do not weigh the COMLEX at all.

It is important to note that the USMLE Step 1 exam score will transition to being reported as Pass/Fail no earlier than Jan. 1, 2022. This means that extrapolating current match data related to specific USMLE Step 1 Scores may be futile. However, the USMLE Step 2 CK and COMLEX Level 1 exam (as of the publication date of this article) will remain to be scored in the traditional 3-digit fashion. So this data is still of value when comparing those exam scores to previous match outcomes for applicants applying in 2022 and beyond.

How Many Interviews/Ranks?

Number of interviews is a hot topic; however, the data on this has been relatively consistent for osteopathic applicants. This year, osteopathic applicants who ranked 9-12 EM programs had a match rate of 95.8%, with quickly diminishing returns after 10 interviews. Due to the COVID-19 pandemic and the resulting changes to the 2020-2021 application cycle, it remains to be seen if these numbers will hold. However, the CORD Consensus Statement currently recommends attending 12 interviews with an absolute maximum of 17 for the 2020-2022 application cycle.

Geographic Considerations

One factor that may influence application strategies for osteopathic applicants is the geographic match distribution for DOs. Unsurprisingly, DO matches are greater in states with a larger number of previously AOA accredited programs (OK, MI, PA, OH). However, this is not always the case (NY, NJ, IL, FL). Of the 35 states (including the District of Columbia) with an EM residency program, 21 (60.0%) filled 20% or more spots with DO applicants last year. This includes three states (NV, OK, WV) that each matched >50% DO applicants to available positions. These states comprise the majority of EM residency positions, with 1,382 available in 2020 compared to only 160 open positions in the ten states where 0-5% of matched EM applicants came from DO programs.

States in Which 20% or More of EM Spots Filled with Osteopathic Graduates

| | |
|-------------------------------|--------------------------------|
| Arizona (16/49 – 32.7%) | Texas (32/137 – 23.4%) |
| Missouri (10/47 – 21.3%) | Kansas*** (2/10) – 20% |
| Oklahoma (27/35 – 77.1%) | New York (92/372 – 24.7%) |
| Delaware*** (3/12 – 25%) | Utah*** (4/9 – 44.4%) |
| Nebraska*** (4/11 – 36.4%) | Michigan (101/228 – 44.3%) |
| Pennsylvania (84/202 – 41.6%) | North Carolina (16/79 – 20.3%) |
| Florida (54/185 – 29.2%) | Virginia (16/50 – 32%) |
| Nevada (17/27 – 63%) | Mississippi (9/22 – 40.9%) |
| South Carolina (18/45 – 40%) | Ohio (54/141 – 38.3%) |
| Georgia (10/50 – 20%) | West Virginia (14/24 – 58.3%) |
| New Jersey (39/88 – 44.3%) | |

(States in which the majority of EM spots were filled with osteopathic graduates in red.)

*(*** indicates states that only have 1 EM residency. It does not include military matches.)*

States in Which 0-5% of EM Spots Filled with Osteopathic Graduates

| |
|----------------------------|
| Arkansas (0/16) |
| Vermont*** (0/6) |
| New Mexico*** (0/12) |
| Colorado*** (0/17) |
| Washington*** (0/12) |
| Wisconsin (1/24 – 4.2%) |
| D.C. (0/21) |
| Maryland (1/24 – 4.2%) |
| New Hampshire*** (0/6) |
| Rhode Island (1/22 – 4.5%) |

Others

| |
|-----------------------------|
| California (29/229 – 12.7%) |
| Illinois (24/135 – 17.8%) |
| Kentucky (2/29 – 6.9%) |
| Tennessee (2/18 – 5.9%) |

Using the Mississippi River as a divider of East and West, most EM programs, and thus residency positions, are located in the East. There were 1,825 positions available in the East compared to 564 in the West in 2020. DO applicants filled 551 (30.2%) of available East positions versus 131 (23.2%) West positions. Of note, there are currently 37 osteopathic medical schools offering instruction at 58 campuses. Thirty-five (39.7%) of these campuses are located in the West. Of the 5 programs with Osteopathic Recognition, 2 are located in the West, both at Oklahoma State University affiliated programs.

Strategies

Each osteopathic student must consider many factors when applying for EM residency. First, you must determine what type of training you desire (county, academic, community, hybrid) and then assess your relative competitiveness at programs in each of those categories. Another consideration is whether to apply to any of the 5 programs that currently maintain Osteopathic Recognition.

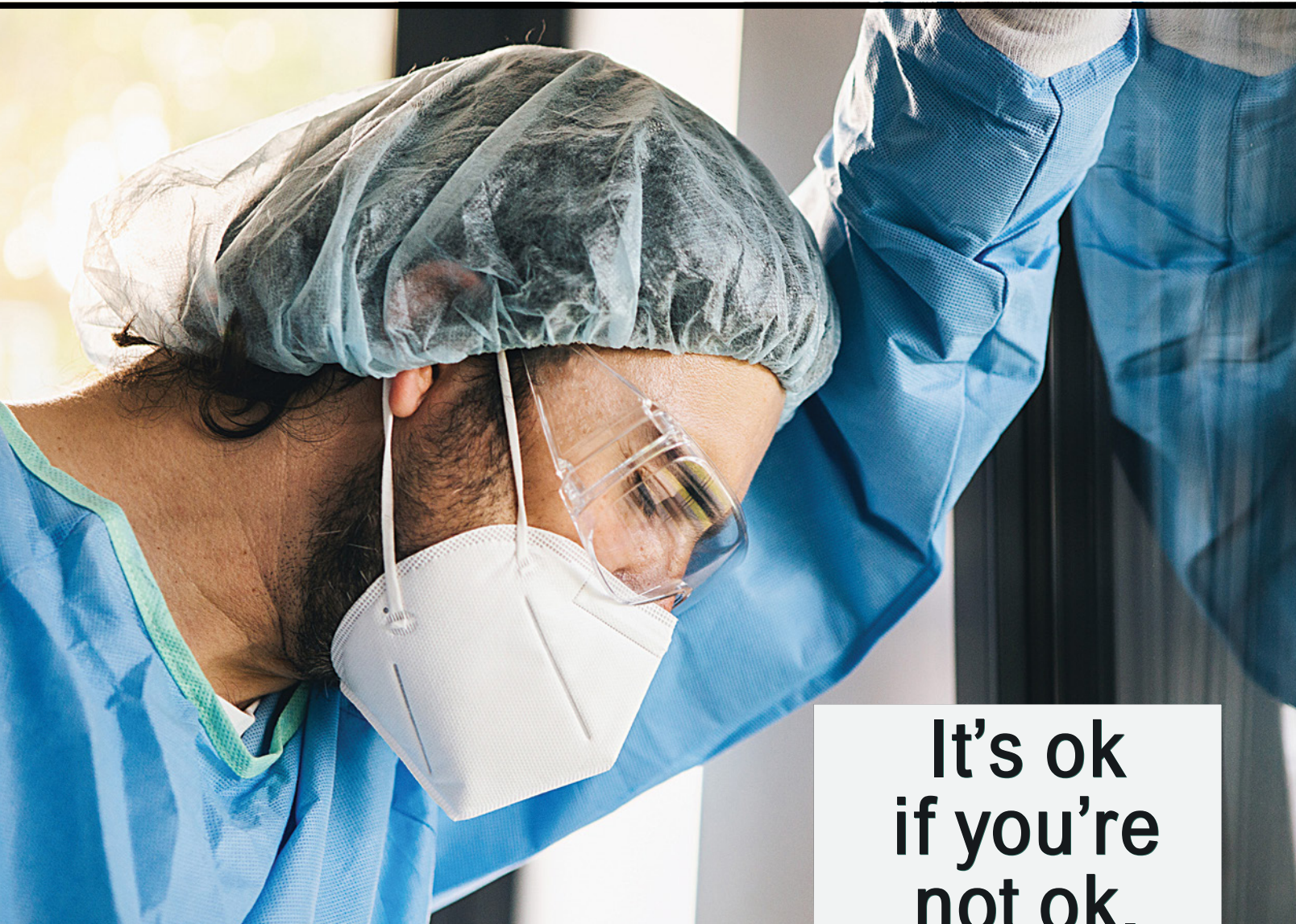
Historically, competitiveness has been heavily assumed to be related to board exam scores, with many programs focusing on USMLE Step 1 scores. However, with Step 1 going to pass/fail as early as 2022, there will likely be a shift of focus to Step 2 and possibly even COMLEX Level 1/2 for osteopathic students as long as they continue to report scores in the 3-digit format. Recall though, based on the PD Survey, the SLOE remains the most heavily weighted aspect of any EM applicant's application.

When applying for EM residencies, osteopathic students also should consider

geographic location. As previously mentioned, most PGY-1 EM residency positions (76.4%), especially those currently occupied by DOs, are located east of the Mississippi River. DOs do, however, now comprise >20% of PGY-1 positions in 21 states. One strategy is to research geographic regions and the programs that have historically matched DO candidates. This information can be found on both EMRA Match or the individual programs' websites.

Conclusions

Osteopathic applicants who are developing an application strategy for emergency medicine residency should first assess their relative competitiveness with metrics such as board scores. Applicants applying with a 3-digit USMLE Step 1 score can use the data and diagrams in this article to obtain an idea of their competitiveness. Future applicants should consider taking both the USMLE and COMLEX with particular focus on the USMLE Step 2 exam as it will remain scored. Those with below-average USMLE scores or no USMLE score should focus their applications towards the historically AOA program and those with osteopathic recognition, as these programs are more familiar with using the COMLEX as their primary metric. Targeting programs in states with a broad representation of DOs may increase the interview return and match success. Most important, board scores are not the end-all-be-all, and the primary focus should be on performing well on your EM rotations to obtain good SLOEs. The EMRA Match map is a useful resource to quickly identify programs with DO representation, score cutoffs, and programs that accept the COMLEX. ★



It's ok
if you're
not ok.

Why Doctors Can't Get the Help They Need

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Imagine you have a patient who comes to you for a checkup. They state they have been feeling depressed for the past 3 months with a decreased appetite, insomnia, lack of interest in things they used to enjoy, and difficulty getting out of bed in the morning. We are taught in medical school the classic signs of major depressive disorder, and this patient has them. As their doctor, you may rule out other causes of these symptoms, but you would also look at the possibility of starting them on medications and referrals for therapy. You would determine whether they are a harm to themselves or others. Assuming there is no other further underlying psychiatric illness or complicating circumstances, you would not stop this patient from returning to work.

Would this change if your patient was also a physician?

Superhuman Requirements in an All-Too-Human Field

Physicians and medical professionals are held to a standard that often takes away their humanity. This can come with both positives and negatives. You have worked hard for many years, and it is a good feeling to know that society acknowledges this. It may be important for your patient interactions to be seen as a valid source of information. That being said, we are also at risk for being faulted for being a normal human being. This was exemplified in the “#medbikini” debate, where physicians were called out for being unprofessional because they posted photos on social media showing themselves wearing a swimsuit or drinking alcohol outside of work (to name just 2 examples). It’s the same double standard with mental health. A physician with depression is seen as unacceptable or even dangerous. Yet we educate our patients on how common depression can be and how important it is to seek help. We encourage them to return to their normal lives after getting help. But when it comes to ourselves and other physicians, we’ve been conditioned to view mental illness as a weakness. Physicians who admit they need help are seen as groundbreakingly brave because others are unwilling to do the same.

It should not be this way.

Entering medical school, students have lower levels of depression than age-matched college graduates, but their rates of suicidality and burnout exceed their peers within months of the academic year starting.¹ The prevalence of depression or depressive symptoms among residents has been estimated at 28.8%, with the prevalence increasing each year.² Perhaps most disturbing is the estimation that **male physicians have a 40% higher suicide rate and female physicians have a 130% higher suicide rate** than the general population.³

I was unfortunate enough to see the effects of suicide in both my undergraduate and my medical school career. Looking back, I realized the rhetoric surrounding these situations differed. In undergrad, the focus was on the person and the things they had accomplished, the people who loved

them, and how much they would be missed. While these things were also mentioned when hearing about the medical professionals who died, there was also the sense of the wasted potential and how no one knew they were struggling. How they had worked so hard and had wanted to do so much, but ultimately could not because of their hidden mental illness. What strikes me is the focus on career in this narrative. We place so much weight on being in the medical profession that our careers should somehow make us immune to the very common pathology of mental illness. Perhaps that is why it is so shocking when someone who pursued a career dedicated to helping others was unable to get help themselves.

Why don’t doctors get the help they need? One large reason is stigma. This is what most medical institutions focus on. Many institutions send an obligatory yearly survey assessing for burnout. Many institutions offer counseling or therapy. There are conferences dedicated to discussions on physician wellness and burnout. However, I would argue that a huge barrier is the fear that seeing a therapist will affect the ability to get or renew your medical license. In medical school, I knew a student who self-discontinued her medications for anxiety because she did not want to have to report those medications to her residency or the state medical board when she graduated. The fear of having to report to the state has been ingrained into us. As I look into therapy options for my co-residents, the No. 1 question I and many people have is whether this will affect their ability to renew their licenses. It is a valid question.

Before addressing this issue, let me be very clear: A physician should not be working if their judgment or functioning is impaired by psychiatric illness. However, physicians who are completely functioning while being treated for a mental health illness should not face any difficulties with renewing their licenses. This is not a novel idea. In 2018, the AMA released a statement that encouraged state medical license boards to only ask about mental health

conditions that would impair judgment, adversely affect the ability to practice medicine, or present as a public health danger.⁴ A study looking into initial state licensing questions found that only 18 states are in compliance with the American Disabilities Act standards for asking about mental illness (these states either do not ask a question or only ask about current impairment).⁵ Another study looked at both initial and renewal applications for medical licensing. They found that only one-third of states either did not ask about mental health or only asked about current impairment. They also found that nearly 40% of physicians reported they would be reluctant to seek help for their mental health due to licensing concerns, with a higher reluctance among physicians working in states with non-compliant licensing questions.⁶ How is this acceptable, especially as our awareness of physician depression grows? We do not want to be seen as less of a doctor. We do not want delays in getting our licenses. We do not want mental illness to affect our careers. So why would we seek help?

As the COVID-19 pandemic pushes physicians in their careers and in their daily lives, the risk of depression, anxiety, and mental illness grows greater. I do not have all of the answers, but I do believe physicians should be able to seek and get help without repercussions, just as I believe this should be the case for anyone outside of medicine. This starts, in part, by pushing to remove questions on license renewals and applications regarding mental health. We cannot preach wellness without removing the real barriers to getting help first.

Help is Available

The ACEP Wellness & Assistance Program offers ACEP members exclusive access to 3 free counseling or wellness sessions. Your mental health is important. This program is strictly confidential and is free with your ACEP membership. Get details at <https://www.acep.org/life-as-a-physician/wellness>.

Additional peer support, crisis support, and physician wellness resources are available at <https://www.acep.org/corona/covid-19-physician-wellness>. ★



The Biggest Lie We Tell Ourselves *I Am Not Stressed*

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Stress is an everyday part of life. Stress is even more prevalent for emergency medicine residents during COVID. Many of us are working harder than ever, putting our health at risk for individuals who, many times, seem to not care about our wellbeing. It makes sense that stress can lead to suicide, and the data support this fact. Physician suicide was already double the national average pre-COVID. Before social isolation, before PPE fatigue, before our jobs became even harder.

One of the biggest problems with stress is that we are so used to it, we can be blissfully unaware of it.

Am I Stressed?

There are several well-known stress scales, with one of the most widely used being the Perceived Stress Scale. This scale asks you to think back over the past month and answer 10 questions in terms ranging from 0 (never) to 4 (very often). The study also provides a table with averages for gender, age, and race. That is all well and good, but what about day-to-day? Are we supposed to answer these

10 questions every day? No, actually the data shows its validity decreases after 1-2 months of use. We do not need a fancy scale to figure out if we are stressed. I am sure if you think back you can begin to pinpoint some things you do when you are stressed. Friends and family can likely help if you are struggling to identify your “stress tells” or coping mechanisms. We need to be evaluating our stress levels frequently so we can intervene BEFORE we spiral. I have been guilty of that spiral, and I can assure you it is much easier to climb out before you end up at the bottom.

I'm sharing several markers of increased stress for me. For context: I am a chief resident at UF Health in Gainesville, Florida. I own a house and have 2 floofy puppers named Moose and Libby. I also have 9 chickens and a garden.

Already sounds stressful, right?

My personal stress scale:

- Can I not sleep because my mind will not shut off (not lack of time for sleep)?
- Am I eating my feelings more than normal?
- Have I yelled at my dogs for stupid things?
- Am I shutting myself off from friends and family?
- Have I yelled at said friends and family for stupid things?
- Am I crying at TV commercials or shows (ASPCA commercials do not count)?
- Am I letting things that are important to me slide?
- How long has it been since I gathered eggs from my chickens or checked on my garden?
- How long has it been since I actually cooked?
- Do I feel stressed?

If you notice, "Do I feel stressed?" is last. If I truly feel stressed, I am way down the proverbial rabbit hole. Most folks, especially ED residents, have a high tolerance for stress and for us to *FEEL* stressed takes a lot. If I answer "yes" to a couple of questions, I need to work on my stress level. If I yell at my dogs, that is a wakeup call; I need to do something. If I answer "yes" to almost half the questions, I know I need to reach out to someone for help.

I encourage you to make your own list. It does not have to be 10 things and you do not have to publish it, just write it down for your reference.

OK, So I AM Stressed. Now What?

Now that we recognize our own personal signs of stress, what do we do about said stress? First, we need to realize how we are currently coping with stress. If you notice, in my stress scale above there are several unhealthy coping mechanisms. Overeating, withdrawing,

angry outbursts, etc. You may find a similar trend in your list.

There are 2 broad categories for dealing with individual stressors: change the circumstances or change your response. If you can, avoid the circumstance causing your stress. This may work for some stresses, but it sure will not work for COVID. Are perfectionistic tendencies stressing you out? Channel your inner ice princess and let it go (ie, change your response).

Changing the circumstance can be any number of things. If COVID PPE is stressing you out, reframe how you think about it. Instead of it being another burden and time sink on an already busy shift, think of it as a way to protect yourself, friends, and family. If you are competitive, make a game out of safely donning and doffing. Alternatively, you can channel that stress and advocate for change! Your changes could lead to the betterment of many and reduce the inherent stressors of your institution. Small changes can make a big difference on a busy shift. If big changes need to be made, enlist faculty, and spearhead the change you want to see.

Changing your response can be much harder. Many of us have honed our stress response over years of high-intensity stress. We *survive* on stress, caffeine, and alcohol, dang it! Express your feelings in a CONSTRUCTIVE manner. Communicate your needs. If need be, insert a filter between your brain and mouth to catch the angry outburst and snide remarks. Keep those in your cartoon character bubble over your head. When we snap at others, they can become even more stressed. Then the stress can feed off each other and turn into a big, ugly monster.

Cumulative Coping

The above works with individual stresses, but our lives have a double handful of stressors on a good day. Then what? Well that depends on what you find relaxing. Research abounds on the subject. van der Zwan, et al., determined physical activity, mindfulness meditation, and heart rate variability biofeedback all reduced perceived stress with no statistical difference between the groups appreciated. Abbott, et al., found

that artistic tasks lead to greater stress reduction than tasks aimed at stress reduction that are not artistic in nature.

These 2 articles offer 4 broad stress reduction techniques. To me, this means pick something YOU find relaxing. Art may stress you out. For me, just the thought of physical activity outside of walking my dogs after a busy shift is stressful, while other folks like to sweat the stress out. The point is to find what works for you at any given time.

I have found several things that I typically find to be stress reducers: playing with my floofs (especially their tennis ball launcher), cooking (cheesecake, yum!), working in my garden, and hanging out with my friends (although COVID has put a damper on that.) The decreased ability to meet with friends and loved ones is hard on most people. Give video chatting a try. There are some web-based games that will work over video chatting. Humor is considered a healthy coping mechanism, which is a good thing seeing as most ED staff have a dark sense of humor. Try yoga or meditation or any other studied stress-relieving techniques. If you are able, schedule some "me time." Even 5 minutes can help. Try a massage if the idea of a stranger touching you does not freak you out. The list is endless, but it may take some time and practice for you to figure out what is most relaxing for you.

If you need help, please ask! Ask your co-residents, your attendings, your program leadership, your family, your non-work friends. Your non-ED friends and family will not understand as well, no matter how hard they try, but they can be surprisingly good listeners. ★

TAKE-HOME POINTS

- Stress is ever-present. We need to be aware of our stress levels and our coping mechanisms.
- Individual stressors can be handled in different ways, and you must also develop a strategy for coping with cumulative stress.
- Ask for help. And if you see somebody struggling, reach out and try to help.

Motherhood in Residency

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I was racing my kids out of the house this morning to try to make it to work on time. My son's shoes, wet from the shortcut through the morning grass, slipped on the edge of the sidewalk. He tore up his knee on his way down. I gathered him up and we marched right back upstairs for a quick appointment with Dr. Mommy. My little man was still limping when I dropped him off at daycare. I was late to work.

"I don't know how you do it," they all say.

I have heard this phrase so many times over the past 2 years. To many residents, having a baby or raising kids on top of the stress of this professional phase seems impossible. Having children was never a question for me. I come from a

Parenting during residency is your journey, but remember you are dragging all of your peers and supervisors along with you.

big family and am the second-youngest of 5 siblings. My husband and I were ready to start our family as soon as we were married. Delay was not a sacrifice we were willing to make. We knew we would face challenges during residency, but we looked at it as a temporary investment in our future.

I started intern year with a 9-month-old, and 6 months into the year found out I was pregnant with our second. I am very fortunate to be in a program that has been supportive and accommodating to my journey as a Mom. Our PD was open to helping me design whatever maternity leave I decided was right for me. I have

been able to breastfeed my daughter for a year despite working odd hours, rotating in and out of ICUs, and facing COVID.

I have gotten to where I am one day at a time, with a lot of help from others. Along the way, I have learned a few things about successfully balancing life with residency. I offer this advice with the added warning that it will take dedication and resolve. The To-Do lists are draining but the rewards are priceless.

Checklist for Pregnancy and Parenting in Residency
Have a support system.

This is requirement 1, 2, and 3. I would absolutely not be able to manage

everything on my plate if my husband wasn't incredibly supportive and involved. He constantly steps up and co-manages our household. He wakes up early with the kids to let me get an extra hour of sleep. He does laundry, sterilizes pumping parts, packs lunches, and the list goes on. He never complains. He is a saint.

You will need extra help apart from your spouse. My husband and I have no family nearby. Luckily, I matched to Stony Brook with 15 other amazing people who I am very grateful for. I occasionally have to ask my co-residents for emergency and non-emergency childcare, and someone always offers to help. I don't think they realize how much it means to know that I always have a backup plan.

Announcing a pregnancy and insisting on breastfeeding may put you in a seemingly vulnerable position because it is simply not the norm. Add to the fact that women remain a minority in EM and it can be even more uncomfortable. Our department is no exception to staffing ratios, but the female core is fierce. I was confident they would rally for me if I ever needed it – which I didn't (the men here are pretty great too). But, knowing these women are present and waiting is another blessing.

Pregnancy is not a handicap.

It is amazing and beautiful. Some pregnancies are harder than others. I was blessed with relatively easy pregnancies. I got through the early days with a package of ginger candy and the later days with my trusty compression socks.

Whatever your experience, try not to ask for or accept special treatment unless necessary. Appreciate the attendings who make a point of getting up to put the discharge papers in the rack themselves, but don't expect it. You are capable of performing your clinical duties at the same level as your peers even while being very pregnant.

Don't ask for permission.

I told my PD I was expecting at 8 weeks. I knew I would need accommodations and thought it was important to be forthcoming. I had no reason to be anxious because I had made a personal choice and knew I was capable

of managing residency as a pregnant woman and later as a mom of 2.

So telling — not asking — is the best advice I can give to a resident who is planning a maternity leave or trying to breastfeed. In addition, plan ahead and communicate. This is your journey, but remember you are dragging all of your peers and supervisors along with you. Understand you will be inconveniencing your colleagues, so do your best to minimize the impact. Contact your off-service attendings ahead of your rotations and tell them exactly what you will be doing and when. Use judgement about when it is reasonable to leave your shift.

My approach in the ED was to try to see several patients back-to-back right before I had to go pump. Then I would use the phrase "I am going to go pump. I will be back in 30 minutes." I would write the charts of those few patients while I was pumping. I never once asked for permission. This worked for me because I was tactful and reasonable about my needs. On rare occasions, I truly could not get away and I had to be OK with that. There were clogged ducts and an episode of mastitis, but they were few and far between.

I would also tell you to remember that **breastfeeding is not embarrassing**. Pumping technology has made it possible to wear cordless, hands-free breast pumps under your clothes while you carry on with your day. They are not discreet and you will be the subject of lots of double takes, but this was a lifesaver during my critical care shifts and in single coverage zones. Not many people can say they have intubated and placed crash central lines WHILE pumping to feed to their baby. I am pretty sure this is how I earned my SuperMom badge.

Prioritize your responsibilities.

As a medical student, I listened to a short webinar on being a female in EM. One of the facilitators who was a PD said something to the effect of — "*As a Mom and a physician, you will not be able to do everything at 100% of your ability. But you can do everything at 80%. If you can accept that, then you can do it.*"

I was pregnant at the time and took this straight to heart. If you are like me, you have always been an overachiever and are maybe a bit competitive. You will have to learn how to accept and forgive yourself for a lack of perfection.

Having a clear distinction between work and home can be helpful. Do your best to finish your notes and clinical tasks before you leave the hospital so that you can make the most of the couple of hours that you can see your family that day.

FOMO will be real. I follow our group chats closely and always want to say yes when my peers are planning something fun or meeting up for a spontaneous happy hour. But alas, bedtime is 8 pm sharp.

You will learn to choose what balls have to be dropped. Do your best. Apologize when you fall short, but do not make excuses.

No Judging.

I am not a perfect mother, wife, or resident. I don't spend enough time with my kids. Sometimes they go to daycare just so I can sleep. My husband and I never go out. I sometimes need reminders to complete administrative tasks for work. I haven't stepped foot in a gym. But — my toddler says please and thank you, he tells me he loves me — as does my saint of a husband, and I was given the privilege of being elected chief by my peers and faculty. I can't be doing too bad, right?

No judging also applies to your peers. Don't fall into the trap of minimizing the experiences of your peers by comparing them to your own. Life as a working mom is tough, but it was a choice. Your peers may not have the same responsibilities, but it doesn't mean they can't also be tired or stressed. I make a point of never negating a complaint by playing the "I have the same problems plus 2 kids" card.

On that note, **no complaining**. Remember why you are doing all of this. You are a badass Woman/Mom/Doctor. You will rise. You will tackle each day as they come. You will survive. And you will love your new normal. ★

Editor's note: This post appeared first on The Morning Report blog run by Stony Brook Medicine Emergency Department.

This is Also Our Lane

Climate Change and Public Health



Hunter Lau, MD

University of Rochester

A 66-year-old woman is brought to the emergency department via ambulance. Lying on a stretcher being wheeled into the room, she is struggling to keep her eyes open. The nurse asks her name, if she knows where she is, and why she is here. Weakly turning her head and trying to figure out what is happening, she stares blankly, confused and scared. Reaching down to feel her pulse, her skin is scorching. “Can we get a temperature reading on her?” “What happened?” The lead paramedic starts giving the report, working simultaneously to get the patient connected to the vital monitors: “She was found in her apartment by her granddaughter. The place was like a sauna, her AC unit had stopped working.”

It is 2 a.m. at a busy hospital in Queens, NY. In the pediatric ED, a father bursts through the doors carrying his 8-year-old son in his arms - the boy's body is limp, his head tilted upwards and back, with visible foam around his mouth. “No breathe, no breathe,” the father shouts in broken English. Within seconds the boy is lying in a bed, a nurse at each side placing IVs, the lead physician tilting the child's head up and squeezing breaths of air into his lungs. More team members file into the room - a pharmacist, a respiratory therapist, an additional physician, 2 more nurses, a Spanish translator. The translator reports, “The father says his son has asthma and it has been getting progressively worse over the past few days. They have been unable to afford his medications, and tonight his breathing got worse and worse until it stopped.”

A 54-year-old woman comes to the ED reporting 4 days of fevers, abdominal pain, nausea, vomiting, muscle aches, headaches, and a skin rash. Her husband reports she has become progressively weak, confused, and disoriented. Speaking incoherently and with slurred speech, she is unable to answer questions. Fluid from her spinal canal is extracted, leading to a presumptive diagnosis of viral meningoencephalitis. She is admitted to the hospital for antiviral treatment, and after a few days her test results come back positive for West Nile Virus. After an extended hospitalization, her strength and speech improve only partially, and she will likely have permanent deficits.

When the NRA tweeted that physicians should “stay in their lanes” after the Thousand Oaks shooting, the medical community responded in uproar, which launched the #ThisIsOurLane movement. Doctors around the country shared their stories, graphic depictions of their intimate experience with gun violence. The movement was powerful. It revealed to the country how close physicians are to the issue of gun violence. It forced people to realize that patient care extends beyond the hospital or clinic. The responsibility of a medical provider is to care and advocate for those who are unable to do so, and speaking up about the issue of gun regulation in America is a vital part of that responsibility. It therefore follows that climate change must similarly be considered within the purview of the medical community.

The issue of climate change and public health is what the World Health Organization calls the greatest health challenge of the 21st century.¹ The opening vignettes are real cases demonstrating the effects that climate change is currently

having in this country. In the United States, heat injury kills more people than hurricanes, tornadoes, lightning, and floods combined, and it's getting worse.² In New York, there are currently around 13 days over 90°F, but by 2050 that number will climb to 40 per year.³ One study predicts that in California by the year 2050, the number of premature deaths per year due to heat exposure is going to nearly triple.⁴ Likewise, the incidence of respiratory conditions is intimately tied to climate change. The effects of ambient ozone changes, increased fire frequency, and increased thunderstorms and floods that are occurring with climate destabilization results in increased visits for conditions such as pediatric asthma, COPD, and other respiratory conditions.⁵⁻⁸ Vector transmitted diseases such as West Nile Virus, Lyme disease, malaria, dengue, hantavirus, and zika virus are also increasing as a direct result of a warming planet.⁹⁻¹³ Due to various causal mechanisms, the warming planet is facilitating vector-borne pathogen transmission, especially in the Northern Latitude of the United States.

These cases serve to illustrate a point: climate change is happening now, patients are being affected now, and now is the time for the medical community to respond. Our ‘lane’ is human health and wellbeing, seen through an evidence-based lens. Just as in 1954 when the American Medical Association acted as a prime advocate for car safety belts 13 years before the U.S. government made it officially mandatory, and just as the #ThisIsOurLane movement has inspired physician advocacy for improved gun safety, the medical community must also take an evidence-based stance on climate change because it is, also, our lane. ★

Global Perspective on EM Residency

A Guide to Maximizing an Elective Global Emergency Medicine as a Resident

Hamid Ehsani-Nia, DO

Rutgers Robert Wood Johnson
Medical School

It is very easy to get swept up into residency. You start off residency drinking from a fire hose; you dedicate nearly all of your time and energy to the profession, and thousands of hours later you are ready to graduate. However, there is still potential for personal fulfillment outside of your strictly defined residency program. As doctors, we are driven to help others. We also want to strengthen our community and propel our fields forward. I sought this fulfillment by involving myself in a medical project abroad.

EM in Global Context

In the context of academic medicine, emergency medicine is new, and global emergency medicine (GEM) is newer still. While medical emergencies are as old as humans, in the systematic approach we use, the theory and practice of emergency medicine as a defined medical specialty is only about half a century old. Since the 1970s, GEM started to develop as a way for physicians from areas where EM was initially developed, namely Europe and the United States, to practice across borders and help with the greatest need. For example, MSF (Doctors without Borders) has its foundations in 1971 for French physicians to provide humanitarian aid during the Nigerian Civil War.¹

The efforts of GEM programs primarily focus on countries with underdeveloped and developing EM systems.² GEM programs allow one to pursue specific goals, primarily focusing on EM specialty development (education and skills training), public health and capacity building (EMS/Emergency services), disaster relief, humanitarian aid, or academic research.³ As a resident in emergency medicine, there are roles



Say hello to the future of emergency medicine in India.

to play in each of these goals within the broader objectives of a GEM program.

Personal Motivation to Rotate in Global Emergency Medicine

Midway through residency I knew I wanted to get involved in an elective abroad, but I didn't know where to start. I wanted to challenge myself to experience medicine with an entirely different patient population, resource availability, and medical culture. By the same token I wanted to give back. I was looking for a project, however small, that would be humanitarian in nature, helping to deliver emergency medicine to communities in need, while also elevating that community with mutual respect and collegiality. This is when I was introduced to GEM and their tremendous efforts to do just that.

It is difficult to find a more noble cause than GEM. These programs are building the entire EM infrastructure of countries, has profound impact for the

patients being treated through them, and will make a difference in the way medicine will be practiced for generations to come. It is also difficult to appreciate the scale of impact these programs have on the number of patients treated.

Build Your Elective as a Resident

As a resident looking to get involved in the broader scope of a GEM program during your residency, first start by researching programs. There are dozens of phenomenal GEM fellowship programs in the U.S., and many of them have meaningful ways for residents to contribute. Depending on where the funding is from, many of these programs will cover all transportation and accommodation, which makes it much more realistic to pursue on a resident budget.

The most crucial barrier to overcome in trying to work out a project abroad is time. During residency it is hard to

envision a scenario where you are able to dedicate 100% of your time in another part of the world. Planning ahead is key, often over one year in advance to help facilitate all the steps necessary for a successful project. Every EM residency in the U.S. has dedicated elective time, as well as dedicated vacation time. In my residency, we have a single four-week block in our senior year as well as vacation time taken in 2-week segments. By planning a year in advance, I was able to shift my schedule so that my elective block was attached to my vacation block, which allowed me to spend a total of 6 weeks participating in a GEM project in India.

Another good point to keep in mind when scheduling your blocks with an elective abroad is overlap with a local conference. For instance, the Asian Conference of Emergency Medicine is an international conference that meets every 2 years, and in 2019 it was hosted in Delhi, India.^{4,5} Knowing the dates of this conference influenced the scheduling of my GEM elective, so that I could further utilize my time abroad to present a poster at an international conference (a case report on paroxysmal ventricular standstill). When selecting a GEM



Typical EKG in India. Generally speaking, high tech instruments like ventilators, ultrasound, CT, and XRay machines are imported from western countries. However, India is nearly self-sufficient otherwise. The medications, intravenous fluids, medical instruments, bedding, stretchers, even the ambulances — almost entirely made in India.



Travel Plan

program itself, see what they offer and where they offer it with the above in mind.

Research GEM programs to see what they offer and where they offer it. I found what I was looking for in George Washington University and the Ronald Reagan Institute of Emergency Medicine. They have many programs around the world, and what I found most interesting was their master's in emergency medicine (MEM) program in India. In a nutshell, their primary objective is to develop the educational infrastructure of emergency medicine in India so that it can eventually be self-sustaining. They do this through developing residencies throughout the country. GW has developed a curriculum that is followed by all EM programs in the country. Through it, they send educators from the United States who give lecture series as well as provide bedside learning.⁶ These educators consist of GEM Fellows, attendings, and senior residents in EM.

The need for EM is there. As of 2018, there were only 194 available training positions for emergency medicine in the entirety of India, a country of more than 1.3 billion citizens. In comparison, the United States filled 2,278 EM training positions that year, in a country of approximately 330 million. At the current rate of population growth, and with so

few training positions, there will never be enough EM physicians in India. One of the largest barriers to this is that the pump needs to be primed. EM trainees need EM physicians to train them, and with EM only being nationally recognized in India as of 2008, there are very few EM trained physician educators in India. Thus, the GWU GEM program developed a model to propagate the field exponentially through locally training home-grown emergency physicians that can then be leaders in the field and educate future generations of EM physicians.⁷ The program is a large endeavor with many moving parts, and herein lies the opportunity to contribute as a resident.

Daily Experience in India and Bridging the Gap

During my own elective, I spent 6 weeks in India giving lectures and bedside teaching at 5 different hospitals throughout the country that were affiliated with GWU. Their curriculum was set far in advance and my time there overlapped blocks in orthopedics and procedures. Before going I made lectures in these topics covering their respective chapters in Tintinalli and questions out of Rosh Review. On a typical day, I would arrive at the hospital at 08:00 and lecture until noon. Lectures would consist of PowerPoints on topics for their current blocks, jeopardy style questions,

oral boards cases, and Q&A sessions. After breaking for lunch, we would return to the department to round on patients and had beside teaching as well as training in ultrasound when a machine was available.

On a day-to-day level, my experience there was bringing fundamentals of emergency medicine to a motivated and intellectual community of doctors. These residents sit for an annual US in-service exam through the GW program, and take the UK boards upon graduation. Therefore the lectures were focused on teaching EM in the perspective of the written and oral boards, with the larger goal of expanding that to real-world application.

The purpose of my elective abroad wasn't to go there to tell them how we do emergency medicine in the US, but to bridge the gap by offering knowledge and experience and tailoring it to what they can use and what will help them in India. They have different patient populations, different medical supplies, different dispositions, and different payment structures. They, just like any EM doc in the west, must practice medicine within the confines of their resources. For example: medical management of myocardial infarction due to cost effectiveness and no available catheterization center.

I was fortunate to see much of India, from the placid countryside to the bustling cities. India is an ancient

land with very diverse people made up of dozens of languages, ethnicities, and religions. Society is complex in India, and like all other countries, the medical infrastructure is not without flaws. However, India has been theorizing and practicing medicine long before most of the world was able to put ink to paper. This was important to keep in mind.

Bringing It Back Home

I am extraordinarily fortunate to have had this opportunity. During my senior year of residency, I was able to break away for 6 weeks and go to the opposite side of the planet, to teach and to learn in an entirely new way. This experience reaffirmed many things, namely that medicine is not best practiced in the framework of absolutes. Practicing medicine requires an understanding of the setting and resources available. There is a finesse to this whole thing.

There were cases I saw in India that I would likely never see in the U.S.:

- Organophosphate poisoning, common in agricultural accidents
- Dengue and malaria, endemic and seasonal
- Snake and scorpion envenomation, which have a wide variety of presentation depending on the species
- STEMI in patients in their 30s
- Trocar chest tubes are faster compared with our standard practice in the U.S.
- Motorcycle EMS are available in most



Collection of snakes and scorpions. This hospital in south India was surrounded by marshes and farmland. Patients would commonly bring their envenomating culprit in a plastic bag, and this department started collecting souvenirs in bottles of formaldehyde.

emergency departments. They can respond to the scene faster, as they can bypass gridlock traffic, but pose danger for EMS personnel themselves. Experiencing a practice setting abroad that was outside of my comfort zone gave me a new appreciation for communicating efficiently, as well as the virtue of patience in navigating differences of perspective. This mentality was useful to bring home because it also applies to communicating with consultants, colleagues, and patients. Also importantly, as I write this article, our society is in the midst of the COVID-19 pandemic, and we are learning to practice in new ways every day. I feel this experience has prepared me to be more adaptable when facing the many challenges presented by the current global pandemic.

The experience of traveling to India has given me a new appreciation for our field, a camaraderie with our international colleagues, and affirmation that no matter the setting our driving purpose is to help others, do the least harm, and do the most good.

As the poet Saadi once said:
*“Human beings are members of a whole,
 since in their creation they are of one essence.
 When the conditions of the time bring a member to pain,
 the other members will suffer.”* ★



EMS system in India is very decentralized with many local ambulance companies in the same region.

ACEP



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Please make note of these dates and times – we'll have specifics very soon!

EXCLUSIVELY FOR OUR MEDICAL STUDENTS

Spring Virtual Medical Student Forum

Saturday, March 27 @ 9:30 am

emra.org/student-forum

Medical Student Council Meeting

Saturday, March 27 @ 1:30 pm

EMRA/ACEP LEADERSHIP ACADEMY

Sunday, April 11 @ 2 pm

ALL-EMRA PROGRAMMING

Mix and mingle with residents and faculty by taking part in our all-EMRA programming!

Follow @emresidents
for programming updates!

All times listed are Central.



EMRA REFERENCE COMMITTEE

The Reference Committee hearing is open to all EMRA members, invited guests, and interested outsiders. Any member is privileged to speak on the resolution or report under consideration. The Committee then draws up a report with recommendations to the Council for disposition of its items of business.

Saturday, April 10 @ 1 pm

emra.org/events/emra-at-cord

EMRA REPRESENTATIVE COUNCIL

Participate in our Representative Council to vote upon important matters to the specialty.

Monday, April 12 @ 10 am

Resolutions due February 26

emra.org/repc

COMPETITION & MEDUTAINMENT

*EMRA Quiz Show *Online**

Tuesday, April 13 @ 6:30 pm

Team registration deadline is February 22

emra.org/quizshow

COMMITTEE MEETINGS

Join a committee business meeting (or two!) to whet your appetite for a sub-specialty within emergency medicine.

Tuesday, April 13 @ 10 am - 5 pm

Wednesday, April 14 @ 2 pm - 5:30 pm

Individual committee schedule released soon

for more information, visit
emra.org/events/emra-at-cord

#CORDAA21

#EMRAatCORD21

Editor's Note: Update on Dec/Jan Paper

At *EM Resident*, we pride ourselves in offering high-quality emergency medicine related education and updates as best as we can learn it.

In that spirit, we would like to submit the following correction to the article titled "OUD: The Silent Opportunistic Infection."

We want to start with the article's title, which can be misconstrued as disparaging to people with Opioid Use Disorder. New title: "Medication Assisted Treatment for Opioid Use Disorder in the Emergency Department." We would also like to retract the following sentence from the article: "The natural follow-up question remains: If MAT saves lives, allows people to regain purpose and functionality in society, why is it difficult to obtain certification to prescribe?" We want to replace that sentence with the following: "The natural follow-up question remains: If MAT saves lives, why is it difficult to obtain certification to prescribe?"

Thank you to our readers, authors, and editorial board who work tirelessly to make *EM Resident* a successful EMRA publication. *

Virtual Medical Student Forum

The EMRA Medical Student Forum is all-virtual this spring — making it easier and more convenient for every medical student interested in the specialty to zoom in!

Plan your day on **Saturday, March 27**, to take advantage of a morning full of key speakers from EM program around the country. General sessions will address big-picture topics, and breakout sessions (categorized per year of training) will help you plan your path to the Match.

This event is free to all EMRA medical student members! Register at <https://www.emra.org/be-involved/events--activities/medical-student-forum/msf-registration>. *

ABEM Announces Oral Exam Dates

The American Board of Emergency Medicine has identified testing dates for upcoming Virtual Oral Certification Exam administrations.

2021 Exam Dates*

Wednesday, March 3 – Saturday, March 6

Wednesday, April 21 – Saturday, April 24

Thursday, June 3 – Sunday, June 6

*Exam dates are tentative and subject to change

Candidates who were scheduled for the postponed 2020 exams will be the first ones assigned to the 2021 administrations.

ABEM will announce additional dates for fall Oral Exams later in 2021. For an FAQ on ABEM's Virtual Oral Exam process, visit <https://www.abem.org/public/docs/default-source/policies-faqs/virtual-oral-exam-faqs.pdf>.

In December, ABEM successfully administered a virtual oral exam to nearly 200 emergency physicians. The shift from in-person to virtual allowed the exam to be administered during the COVID pandemic giving recently graduated emergency physicians the opportunity to become ABEM certified. *



Annals Names New Resident Fellow

Laura A. Dean, MD, of Harvard-Affiliated Emergency Medicine Residency, has been selected to serve as the new *Annals* Editorial Board Resident Fellow for the coming year, taking over from Christopher S. Evans, MD, MPH, of Vanderbilt University Medical Center.

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

Get Ready for EM Residents' Appreciation Day

If there was ever a time to take our hats off to EM residents, it's now. And the official **EM Residents' Appreciation Day** is coming up fast — what will you do March 3 to show your love for residents?

This national day of recognition was started by EMRA in 2000 as a way to publicly recognize the dedicated service residents provide on a 24/7 basis as a significant and vital workforce.

Emergency medicine residency requires long hours and personal sacrifice dedicated to:

- Education
- Study
- Quality patient care
- Patient advocacy
- Research
- Leadership

Join us in celebrating this day and especially the residents at the heart of it. Tag [@emresidents](https://twitter.com/emresidents) so we can shine a spotlight on your efforts! *

UPCOMING EVENTS

| | |
|------------------|--|
| Feb. 23-March 5: | In-Training Exam dates |
| Feb. 26: | Spring Representative Council Resolutions due |
| March 3: | NRMP Main Residency Match Rank Lists due |
| March 15: | NRMP Match Week |
| March 19: | NRMP Match Day |
| March 27: | Spring Medical Student Forum — all-virtual |
| April 8-11: | Government Services Symposium — Austin, Texas, and virtual |
| April 12-15: | EMRA Events @ CORD Academic Assembly — all-virtual |

ECG Challenge

Elizabeth Shanahan, MD
Emergency Medicine PGY-2
ChristianaCare

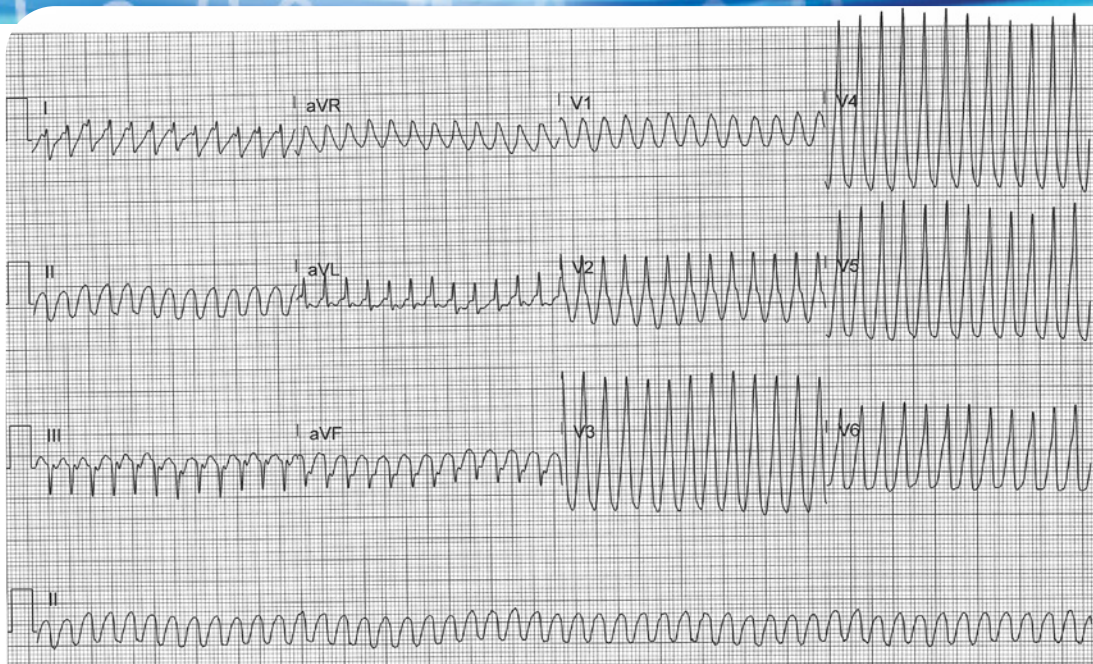
Jeremy Berberian, MD
Associate Director of Resident Education
Dept. of Emergency Medicine,
ChristianaCare
@jgberberian

CASE.

A 48-year-old male with a past medical history of asthma and recent positive COVID-19 test presents to the ED with acute onset of palpitations and chest pressure followed by a brief syncopal episode.

What is your interpretation of his ECG?

See the ANSWER on page 52



EMF and EMRA are proud to present our Resident Research Grantees for the 2020/2021 grant cycle.



Ryan Coute, DO
EMF/EMRA Resident Research Grant

Dr. Coute was awarded the EMF/EMRA Resident Research Grant for \$10,000 over one year to work on his project titled "Disability-Adjusted Life Years Due to In-hospital Cardiac Arrest in the United States" at the University of Alabama at Birmingham.



JJ Hoff, MD
EMF/EMRA Resident Research Grant

Dr. Hoff was awarded the EMF/EMRA Resident Research Grant for \$10,000 over one year. He will work on his project titled "Shame and Error in EMS: A Qualitative Analysis of Culture and Attitudes in Prehospital Emergency Care" at Duke University Hospital.



Alexander Janke, MD
EMF/EMRA Resident Research Grant

Dr. Janke was awarded the EMF/EMRA Resident Research Grant for \$10,000 over one year. He will work on his project titled "Trends in Complexity and Resource Utilization of Treat-and-Release ED Visits in the US, 2006-2018" at Yale School of Medicine.



Peter Serina, MD, MPH
EMF/EMRA Resident Research Grant

Dr. Serina was awarded the EMF/EMRA Resident Research Grant for \$10,000 over one year. He will work on his project titled "Development and validation of the Admission for Geriatric patients in the Emergency Department (AGED)" at Northwestern University.





ECG Challenge

COVID-19 VT Storm

This ECG shows a regular wide complex tachycardia with ventricular rate of 297 bpm, no discernible P-waves, northwest/extreme axis deviation (ie, between -90° and 180°), prolonged QRS complex duration of 157 ms, and positive QRS complex concordance in leads V1-V6 (ie, all of the QRS complexes are positively oriented).

The differential diagnosis for a regular wide complex tachycardia includes:

- Monomorphic ventricular tachycardia
- Antidromic AVRT
- Any regular SVT (sinus tach, AVNRT, atrial flutter, etc.) with aberrant conduction
 - Causes of aberrant conduction include fixed or rate-related BBB, metabolic abnormalities, sodium channel blocker toxicity, ventricular paced rhythm, and ventricular pre-excitation (eg, WPW)

The EKG features that increase the likelihood of VT in a regular wide complex tachycardia include:

- QRS complex duration > 200 ms is almost always VT, hyperkalemia, or sodium channel blocker toxicity
- AV dissociation (ventricular rate $>$ atrial rate)
- Positive or negative QRS complex concordance in leads V1-V6 (entirely or predominantly positive or negative QRS complexes from leads V1 to V6)
- Extreme axis deviation (also called “northwest axis”)
- The absence of a typical RBBB or LBBB pattern suggests VT (ie, normal RBBB or LBBB pattern makes SVT with aberrant conduction more likely)
- Fusion beats: hybrid QRS complex formed by both supraventricular and ventricular focus
- Capture beats: sinus QRS formed by transient normal conduction amid AV dissociation
- Brugada’s sign: time from the onset of the QRS complex to the nadir of the S-wave is > 100 ms
- Josephson’s sign: notching on the downslope of the S-wave near its nadir

The findings in this EKG that suggest monomorphic VT include positive QRS complex concordance in leads V1-V6, northwest/extreme axis deviation, and the absence of a typical RBBB or LBBB pattern.

Case Conclusion

This patient’s initial evaluation was notable for thready, but palpable, pulses with a systolic blood pressure of 90 mmHg. Given these findings in the setting of active chest pressure, the patient was treated with synchronized cardioversion. This was successful in converting the patient back to normal sinus rhythm, but only transiently, and he went back into monomorphic VT. He was cardioverted 2 more times, both only transiently successful, and also was treated with IV amiodarone (150 mg bolus followed by a drip) and 4 g IV magnesium sulfate.

Cardiology was consulted and started the patient on a continuous infusion of lidocaine for VT storm.

VT storm, also called VT/VF storm, electrical storm, or arrhythmic storm, refers to a state of cardiac electrical instability that is generally defined as ≥ 3 episodes of sustained VT, VF, or appropriate shocks from an ICD within 24 hrs.¹ The patient eventually was stabilized on a continuous esmolol infusion, and a subsequent cardiac catheterization showed no significant coronary artery disease. He was admitted to the Cardiac ICU, and during his hospitalization had a cardiac MRI that showed delayed myocardial hyperenhancement consistent with myocarditis, likely caused by COVID-19. ★

MONOMORPHIC VT LEARNING POINTS

- ≥ 3 consecutive, regular, wide complex beats with rate > 120 -130 bpm
 - Non-sustained: < 30 sec duration with no hemodynamic instability
 - Sustained: ≥ 30 sec duration OR causes hemodynamic instability
- Rates < 120 -130 bpm can be seen in patients on chronic antidysrhythmic medications (eg, amiodarone, flecainide, sotalol) or with severe cardiomyopathies
- For regular WCT with rates < 120 bpm, consider mimics:
 - Hyperkalemia
 - Sodium channel blocker toxicity
 - Accelerated idioventricular rhythm (AIVR)

Board Review Questions



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

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

Order PEER at acep.org/peer

1. A 34-year-old man is transferred from a long-term care facility shortly after inadvertently pulling out his gastrostomy tube. A review of his records shows that it was surgically placed 6 days earlier without complication. He has mild abdominal tenderness and is otherwise well appearing with stable vital signs. What is the most appropriate next step?
 - A. Apply a sterile occlusive dressing to the opening and arrange follow-up care
 - B. Obtain surgical consultation while considering imaging and intravenous antibiotics
 - C. Replace it with a similarly sized gastrostomy tube or Foley catheter to maintain tract patency
 - D. Use a wire and Seldinger technique to replace it with a similarly sized gastrostomy tube
2. A 2-week-old girl presents via ambulance in shock. She was recently taken to a pediatrician to be evaluated for irritability. Which sign is most consistent with a diagnosis of congenital heart disease?
 - A. Bilateral pedal edema
 - B. Soft systolic murmur
 - C. Stridor and choking
 - D. Sweating with feeds
3. A 17-year-old girl presents with respiratory distress during an acute exacerbation of cystic fibrosis. While being treated with a nebulized beta-agonist, she suddenly arrests. She is pulseless, but some electrical activity is noted on the cardiac monitor. Her airway is controlled, and CPR is in progress. What procedure should be performed next?
 - A. Central line placement
 - B. Cricothyrotomy
 - C. Needle decompression of chest
 - D. Peripheral intravenous line placement
4. A mother brings in her 3-year-old daughter after discovering that the child had bitten into a glow-stick at a birthday party. On examination, the child is awake, alert, and in no distress, but she has a neon-yellow coating around her mouth and on her tongue. She is tolerating her secretions without difficulty. Her vital signs include BP 77/58, P 105, and R 28; SpO₂ is 98% on room air. What is the best next step?
 - A. Administer oxygen via nasal cannula
 - B. Begin decontamination using activated charcoal
 - C. Get information about the time and amount of ingestion
 - D. Send blood samples for co-oximetry evaluation
5. A 16-year-old boy presents after hitting his head in a collision with another player during a soccer game. He denies loss of consciousness but complains of a moderate headache, nausea, and difficulty concentrating. What is the appropriate next step in management?
 - A. Admit the patient to the hospital for overnight observation
 - B. Clear the patient to return to play after 48 hours if his symptoms resolve
 - C. Discharge with instructions to get follow-up care and not return to play
 - D. Order a head CT to rule out the presence of an intracranial bleed or swelling ★

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



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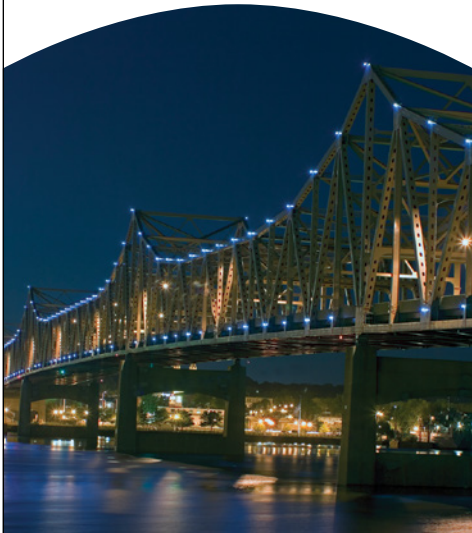
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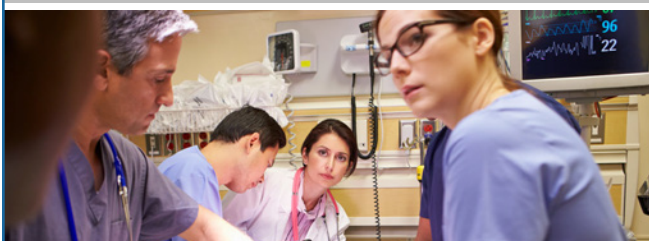


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