New York American College of Emergency Physicians

Let's Get Immunized New York Emergency Physicians Leading the Way

Empire State EPIC

VOL 38-03:21 EMERGENCY PHYSICIANS' INTERIM COMMUNIQUE


VIRTUAL ED DIRECTOR FORUM 2021
Friday, May 7 | 8:30 am - 4:00 pm
Alexander G. Bateman, Esq.
Michael A. Granovsky, MD, FACEP, CPC
Colleen McMahon, Esq.
Ben B. Rubinowitz, Esq.
Tracy G. Sanson, MD, FACEP
This forum is designed for ED Directors; ED Associate Directors; ED Administrators and Managers; Directors of Critical Care, EMS, Observation, Research, Ultrasound, and Trauma; Emergency Physicians; Nurse Managers; and Administration Fellows.
New York
American College of Emergency Physicians


Scientific Assembly
July 6-8, 2021
Register online at
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Sagamore Resort
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PRESIDENT'S MESSAGE

Keith E. Grams, MD FACEP
Chair, Emergency Medicine
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Tis the Season. . . Get Ready

What a year . . .

I took a stab at trying to describe this past year – rewriting the paragraph multiple times. Eventually, I gave up as each attempt failed to characterize the challenges and anxiety we faced. Obviously we are still faced with many of those continued obstacles, though I suggest that we have new hope moving forward (at least that is what I am sticking with).

As we sit and take measure of all that has happened over the last several months, we now prepare for the next season. That is correct… the legislative season. This time of year classically brings lots of change. At times, these transitions can be minor. Other times, they can bring major alterations to our profession and practice environments.

Even with all the COVID craziness of 2020, we still experienced a tremendous amount of change coming from all angles. We were all aware of the direct front line challenges as our teams were scrambling to provide care to patients. To add to the mix, governing bodies continued to propose requirements/recommendations that required near constant alterations (and continue today). For some of our colleagues in medicine, there were changes to coding methodology that have been in place for decades (i.e. updates to the coding rules for office based E&M codes) – completely revamping how they will approach a significant portion of their work. We also saw a major change in how patients interact with their medical record (although a somewhat stuttering speed of implementation). This offered a new way to interact with patients and required us to think a bit differently on how we document their health care.

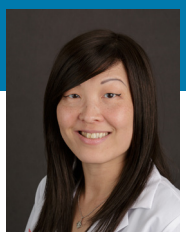
> It is up to us to advocate for our patients and our teams.

As in years past, it is likely the next few months will be a flurry of activity for New York legislative bodies. You are your best advocate. Take a moment and commit to the upcoming season. It is up to us to advocate for our patients and our teams. I hope you will participate in the New York American College of Emergency Physicians advocacy efforts. Whether you like it or not, there is power in numbers. Get ready and be prepared for any action alerts, as there always are quite a few. You are your best advocate.

New York ACEP is powered by your membership. Let us work together to make this a great year.

WHAT'S INSIDE

SOUND ROUNDS



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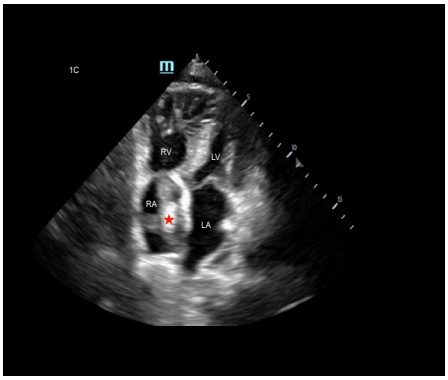
A "Moving" Diagnosis

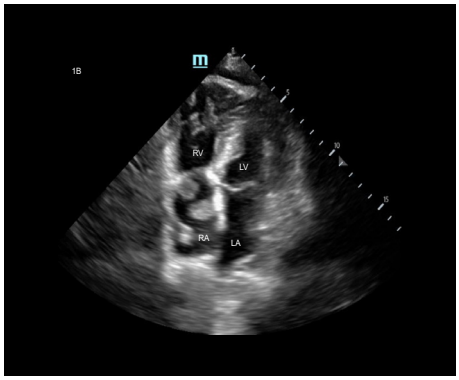
Case

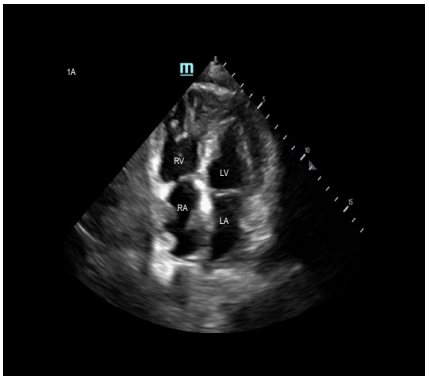
A 66 year old female with a history of metastatic endometrial adenocarcinoma, currently on chemotherapy, presented to the Emergency Department complaining of shortness of breath and light-headedness worsening over the last 24 hours. The patient's vital signs were remarkable for blood pressure 86/52, heart rate 136, respiratory rate 24, SpO2 98% on room air and temperature of 36.9C. Physical exam was remarkable for tachypnea, tachycardia, clear lung sounds and moderate abdominal distension consistent with her baseline. Labs showed elevated lactate of 3 mmol/L, high sensitivity troponin of 198 ng/L (normal </= 14 ng/L). Point-of-care ultrasound (POCUS) in the Emergency Department showed enlargement of the right ventricle (RV), positive McConnell's sign, clots in both the right atrium (RA) and RV (Figures 1A-C; video available at https://vimeo.com/502710368). CT angiogram of the chest confirmed diffuse bilateral segmental and subsegmental pulmonary emboli with enlargement of the right ventricle. The patient was initiated on a heparin drip and admitted to the Cardiac Intensive Care Unit (CCU). Advanced therapies such as thrombectomy and catheter directed thrombolysis were considered, but the patient was not deemed a good candidate given her poor overall prognosis.

Discussion

Point-of-care ultrasound (POCUS) can be implemented in real time for the diagnosis and management of pulmonary embolism (PE). POCUS is especially useful in the care of hemodynamically unstable patients, such as with a massive PE. Venous thromboembolism (VTE) has an annual incidence of 300-600,000 with a mortality of 100,000.[1] POCUS can be useful to both identify and risk stratify a potential VTE patient. When risk-stratifying PE, an uncommon thrombus-in-transit may be visualized on a bedside echo. Guidelines from the American College of Chest Physicians and other societies recommend risk-stratifying patients diagnosed with PE based on the presence of three factors.[2] Those factors are hypotension (systolic blood pressure [SBP] < 90 mm Hg), RV dysfunction or evidence of myocardial necrosis. With a visualized right heart thrombus and hypotension, this case can be classified as that of a massive PE thus requiring immediate intervention.[3,4] Right sided heart strain is seen on multiple views of the heart. (Figures 2 - 4) This case notably had D-sign (Figure 3), RV dilation with septal bowing (Figure 4) and McConnell's sign.







Figures 1A-C. Right atrial thrombus (red star) appears in motion detected on an apical 4 chamber view. Abbreviations: LA = left atrium; LV = left ventricle; RA = right atrium; RV = right ventricle.

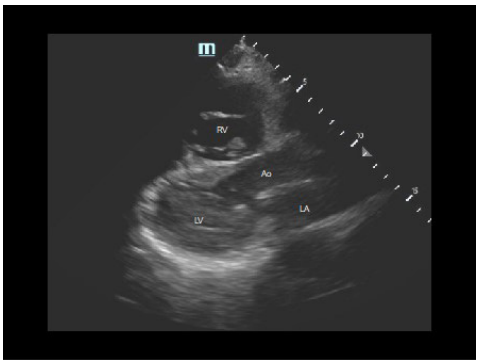


Figure 2. Dilated right ventricle viewed on parasternal long axis view. The RV is grossly larger in size than the ascending aorta or left atrium.

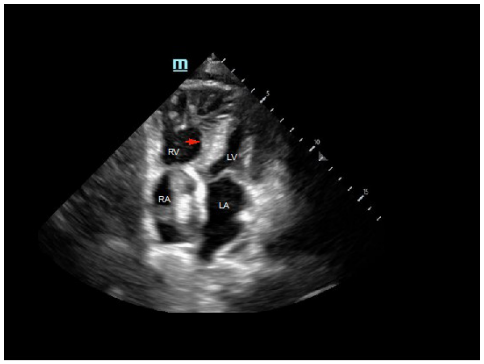


Figure 3. A thrombus in the right ventricle (RV) with septal flattening.

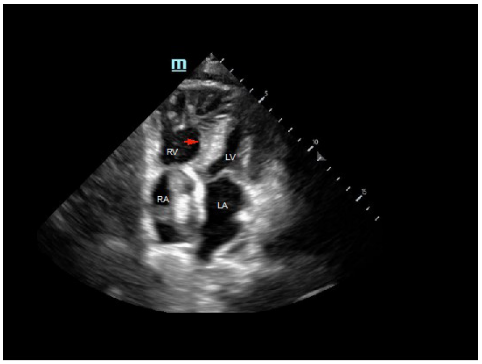


Figure 4. Apical 4 chamber view of the heart showing "bowing of the septum" (red arrow) and RV dilatation.

Signs to evaluate in a bedside echo in a suspected PE patient

D-Sign

The D-sign is characterized by an intraventricular septal shift on a parasternal short axis view of the heart due to an increase in pressure of the right ventricle. Specifically, the sign refers to the shape of the right ventricle like a "D" opposed to an "O" secondary to flattening of the intraventricular septum when imaged at the level of the papillary muscles. This can indicate acute RV strain, especially in the setting of hemodynamic instability.

McConnell's Sign

In an apical 4 chamber view, hypokinesis or akinesis of the mid right ventricular free wall, with preserved function or hyperkinesis of the RV apex is referred to as McConnell's sign. It is thought to be very sensitive (94%) and specific (77%) for PE.[2] However, McConnell's sign can also be encountered with a right ventricular infarction and pulmonary hypertension. The physiology of McConnell's sign lies with understanding the filling of the LV. A hyperdynamic, underfilled, hyperadrenergic LV apex pulls on the adjacent RV apical fibers causing hyperkinetic motion of the area.

Dilated Right Ventricle

Prior to assessing RV size, it is important to obtain an ideal apical 4 chamber view. An oblique image may foreshorten the RV size. Isolating the crux and apex can better your image giving you an appropriate view for approximation.[5,6] If a patient presents with a pulmonary embolism the evidence for the diagnosis on a focused bedside echocardiography may be left ventricular septal wall flattening with impaired left ventricular systolic function and a severely dilated right ventricle. A normal RV:LV ratio is less than 60%. If the ratio is 60-100% then the RV is considered mildly dilated. RV is considered moderately dilated if it is equal to the size of the LV. If it is much greater than the size of the LV, the RV is severely dilated.

Thrombus in Transit

This patient had a clot-in-transit or thrombus-in-transit. The free floating clot visualized within the RA or RV can sometimes be seen in the inferior or superior vena cava. The mortality associated with this clot is approximately 40%. It is a rare finding overall, only seen in 4% of PE cases.[1] Typically a free floating thrombus is described as "wormlike" and thought to originate from the lower limbs. Immobile thrombi can also develop in-situ when there is blood stagnation. Sometimes it is difficult to distinguish a thrombus as it could be mistaken for other anatomical or pathological findings such as the Chiari network, vegetations and intracardiac tumors. Consider location and clinical presentation of a patient when using ultrasound. In a patient with rapid clinical deterioration, where a thrombus was not initially seen, consider serial imaging for assessment in suspected PE. Serial cardiac evaluation with ultrasound can also be used in monitoring during thrombolytic treatment.[1,7]

Indications for Echo

- Cardiac arrest
- Chest pain
- Hypotension
- Hypoxia
- Palpitations
- Sepsis
- Shortness of breath
- Syncope

Tips

- The cardiac parasternal short axis view is useful to assess for septal flattening of the septum and enlargement of the right heart.
- Apical 4 chamber view will also aid in assessing for right heart strain. Evaluate the motion of the right heart and its size.

Technique

- Use a phased array probe.
- A point-of-care echo consists of four views: parasternal long axis (PLAX), parasternal short axis (PSS), apical 4 chamber (A4) and subxiphoid (SX).
- Common assessments in a bedside echo include evaluation of cardiac motion, ejection fraction, pericardial effusion.
- Findings in PE can include D-sign (PSS), McConnell's sign (A4), dilated right ventricle (A4) and thrombus in transit (A4).

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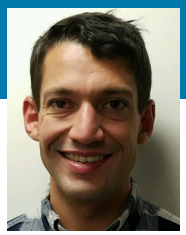
PEDIATRIC



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First-Time Seizure in the Pediatric Patient

They say that things tend to come in threes. It is a Sunday morning and you have just finished receiving sign out when your first pediatric patient registers, a 22 month-old with a seizure, followed a minute later by an 8 year-old with a seizure. Both are brought in by EMS and neither are currently seizing.

As you walk over to see the 22 month-old you quickly calculate the dose of lorazepam you will need if he starts seizing again (0.1mg/kg). He is sitting up on his mother's lap crying and looking around. His heart rate is 150 and temperature is 39.5. His tearful mom tells you he was fine when he woke up when, all of a sudden, he fell backwards and started to have shaking of his upper and lower extremities, lasting about two minutes.

Febrile Seizures

The first step in the management of febrile seizures is classifying them. It is important to differentiate a febrile seizure from a seizure that is brought on by a fever. For an otherwise healthy child with no medical problems, it is usually a febrile seizure. However, in a child with a complicated neurologic history or an underlying seizure disorder, the seizure threshold may be lowered by fever.

The next step is differentiating a simple from complex febrile seizure (Table-1). Simple febrile seizures are brief generalized tonic-clonic seizures. They make up the majority of presentations for febrile seizures. As they are so common, the American Academy of Pediatrics (AAP) released guidelines in 2011 on how to manage them (Figure-1); overall the guidelines recommend evaluation for the source of fever without any specific workup related to the seizure itself.[1]

After a thorough history and physical exam you determine the most likely cause of his fever to be a viral illness. He has no focal deficits, so you order some ibuprofen and discuss with his mother the plans for a brief period of observation.

You sit down with the medical student who has just shown up for the shift and you briefly discuss that in the case of a complex febreile seizure, the management is less straightforward because existing AAP guidelines do not include complex febrile seizures within their scope. Generally, however, no extensive workup is required for a well appearing child with a normal exam even after a complex febrile seizure.[2] Studies have shown children with meningitis are unlikely to present with isolated seizures without other neurological abnormalities, so LP is probably not necessary in the well appearing child who has returned to baseline with a non-focal neurological exam.[2] Similarly, children with an intracranial process causing their seizures would typically have an abnormality on neurologic exam, so in the well-appearing child without a history of trauma and a nonfocal neurological exam, there is usually no need for emergent head imaging.

Table 1 – Simple Vs. Complex Febrile Seizures

	Simple	Complex
Duration	< 15 minutes	> 15 minutes
Type	Generalized tonic-clonic	Focal
Frequency	No more than 1 in 24 hours	More than 1 in 24 hours
Percentage of Febrile Seizures	70-75%	25-30%

Figure – 1: AAP Febrile Seizure Guidelines[1]

1: Lumbar Puncture (LP)
- 1a: LP should be performed if meningitis suspected based on history and physical
- 1b: LP may be performed in infants 6mo – 12mo with unknown or deficient vaccines
- 1c: LP is an option in those pre-treated with antibiotics

2: EEG should not be performed routinely

3: Routine blood work should not be performed for the sole purpose of identifying the cause of a simple febrile seizure

4: Neuroimaging should not be performed routinely

PEDIATRIC

Afebrile Seizures

The two of you then head over to meet your second pediatric patient of the morning, an afebrile 8-year-old who had a first-time seizure. You remind the student that even if this patient was febrile, she would be a little old for a febrile seizure which typically occurs in children <5 years old. In talking with the family, it sounds like a very similar story to your other patient. She was sitting on the floor watching TV when she suddenly stopped responding and started to have shaking of her upper and lower extremities lasting about three minutes. She was a little sleepy for a while afterwards but seems to be coming back to herself now. She has otherwise been well without any recent illness and has no significant past medical history. You recall the practice parameter put out by the American Academy of Neurology and the Child Neurology Society on the evaluation of first-time seizures and pull it up to help guide your management for this patient.[3]

You remember that without a fever, there is no need to perform a lumbar puncture, but what about other testing?

EEG: Unlike in febrile seizures where EEG is unlikely to predict seizure recurrence or development of epilepsy, it does have an important diagnostic role in the evaluation of unprovoked seizures. However, the timing of when to perform the EEG is still up for debate. EEGs performed in the first 24-48 hours after a seizure are likely to show abnormalities that may not be of clinical significance.

Routine Blood Work: Although there may be value to getting a fingerstick to check the glucose level, most other routine blood work is not indicated. In a review from 2016, no child with an unremarkable history and physical exam was found to have electrolyte abnormalities.[4] Labs may be indicated for children <6 months who are at risk for sodium abnormalities from poor feeding or improperly mixed formula, or in children with a history that would otherwise suggest that lab work is necessary (i.e. significant vomiting/diarrhea).

Neuroimaging: The need for emergent neuroimaging is the most challenging question to address in the Emergency Department (ED). MRI is preferrable over CT scan to identify a potential structural cause for seizures, but it may not be practical to obtain in the ED. Absolute indications for emergent neuroimaging by any modality include a post-ictal focal deficit like Todd's paresis, history of trauma or failure to return to baseline quickly. Otherwise, most children with a first-time generalized tonic-clonic seizure can be scheduled for non-emergent neuroimaging at the time of outpatient neurology follow-up if they have an abnormal EEG or abnormal development. Children with focal seizures are slightly more challenging to triage. It seems younger children (<3 years-old) with a focal seizure should receive emergent neuroimaging and it may be worth considering in children with prolonged focal seizure.[5,6]

Discharge

As both children had brief generalized tonic-clonic seizures with a rapid return to baseline and no focal deficits on exam, you plan to discharge both after a period of observation in the ED. Both families have many questions and you try answer them as best as you can.

For the child with the febrile seizure you try to reassure his parents that while the recurrence rate for febrile seizures is around 30-40%, he should have no long-term sequelae.[7] Despite many studies looking at risk factors to anticipate febrile seizure recurrence, there is still no consensus. There is also no clear evidence that using antipyretics around the clock during intercurrent febrile illnesses can prevent recurrence. However, the rates of epilepsy in children with febrile seizures are only slightly higher than the rates of epilepsy in the general population (about 2% compared to the general population of around 0.5%)[8,9] and it will not impact his neurodevelopment.[10]

For the child with the afebrile seizure, your discharge instructions are more heavily geared toward the need for close neurology follow-up within 1-2 weeks, as recurrence rates after a first unprovoked seizure vary widely from 25-50%, and can be predicted by abnormalities detected on EEG and MRI.[11] You advise the parents they can expect to be scheduled for an EEG following their initial neurology appointment and the results from that will guide future expectations. Until more information becomes available, you discuss seizure precautions, such as not bathing or swimming alone and avoiding sports where it would be dangerous if the child seized.[12]

As you wave goodbye, you receive a notification from EMS a 5 year-old male with status epilepticus will be arriving in 5 minutes. You quickly calculate an estimated weight using the new Advanced Pediatric Life Support formula (2 x Age)+8 = 18kg and assemble your team. You ask your pharmacist to draw up multiple doses of lorazepam 0.1mg/kg and anticipate that if the child is still seizing after 2-3 doses of benzodiazepines, you will move on to either Levetiracetam 60mg/kg or Fosphenytoin (or Phenytoin) 20mg/kg while monitoring for airway compromise and hemodynamic stability that may indicate a need for intubation.[13–15] As his stretcher is wheeled in the door, you silently curse the rule of threes.

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COVID Vaccination: Our Responsibility to Educate Family, Friends and the Community

Approximately two months ago the first of two mRNA COVID-19 vaccines received Federal Drug Administration (FDA) emergency use authorization (EUA). This was supposed to be the rainbow after the storm, however, as of this writing the dissemination of the vaccine has been hampered. Logistical issues, scheduling difficulties, the holiday season and staff being committed to their primary role in patient care have stymied the vaccination roll out. Beyond the technical challenges there is a bigger obstacle facing the success of the vaccination program. Lack of understanding, safety concerns and even fear. Unfortunately, these issues exist even within the walls of the house of medicine. As frontline leaders in the medical field, we should be familiar with the science and prepared to educate those around us.

As of October, a Harris poll was conducted and only 58% of the general public noted they would accept COVID vaccination. The top concerns were side effects, safety, efficacy and cost. Our role in educating patients is providing understandable information and dispelling myths. In the poll, members of the public were more accepting if the healthcare team agreed it was safe, if it was free, if it was easy to get and if it would allow society to get back to school and work. More concerning were surveys of healthcare workers. As we know and have seen, we in healthcare are directly exposed multiple times per shift with the highest risk aerosol generating exposures. A CDC survey noted only 63% of healthcare workers were planning on taking the COVID vaccination. Additionally, an American Nursing Foundation Survey, also done in October, noted a similar percentage of healthcare staff believing the vaccine would be safe and effective with only one-third planning to receive it voluntarily and only approximately half feeling comfortable discussing the vaccine with patients.

There is a clear need for education and understanding both in the healthcare community and general population. To start, we know our work environment and have seen the devastation of the COVID-19 surge first hand. This work increases the risk of transmission to families and communities. Let us focus on what we know and strategies to dispel fears or myths surrounding COVID vaccination. In terms of efficacy, both the Pfizer/BioNTech and Moderna products report mid 90% efficacy. It should be noted despite similarity, effectiveness and efficacy are different (efficacy is in study conditions) and effectiveness may be lower in the real world setting. With that being said, the typical flu shot effectiveness falls in the 40-50% range. Over 90% brings these two vaccine options in-line with the polio and MMR vaccines. Both the Pfizer and Moderna products are mRNA based vaccines requiring two doses. Both were studied in a wide range of ages and ethnic/racial groups across the US including over 70,000 patients. The ability to protect and safety in these large studies is paramount to alleviating patient concerns.

How should we talk to reluctant colleagues and patients about mRNA vaccines? Using language and comparisons the public can relate to and understand is key. The best description I have heard is to think of mRNA as a "post-it" note that tells you to buy eggs and milk. A simple set of instructions that after it is used gets crumpled up and tossed in the trash. The mRNA is instructions for the cell to create a spike protein or the "key" the COVID virus uses to enter cells. Without the virus itself this protein cannot cause harm. The body recognizes it as foreign and creates antibodies to bind the "key" making it ineffective at opening the "lock" or cells with the goal to then bind the "key" proteins on the actual COVID virus if the immune system ever encounters it. The mRNA is rapidly "tossed in the trash" but the antibody response remains. Of course there are things we do not yet know, and the duration of protection from those antibodies remains to be seen. The benefit of utilizing mRNA is it does not contain the components to either infect one with the virus or the equipment to enter the nucleus of the cell so it does not effect DNA. Many people do get an immune response (more so after the second dose it seems) and communication that myalgia, headaches, fever or viral syndrome like symptoms are expected, usually short lived and NOT the COVID infection from the vaccine. Speaking to safety is crucial. The FDA identified no significant safety concerns during the trial or for at least eight weeks after the trials (vaccine related concerns typically present within six weeks). There were no short cuts but there were numerous resources which allowed for acceleration of the development and EUA process. Two independent vaccine agencies reviewed the trial data and reported to the FDA and safety monitoring is ongoing even as doses are being given. In addition to the multiple existing vaccine safety monitoring and reporting sources (i.e.: Vaccine Adverse Event Reporting System [VAERS], etc.) there was the creation of the V-Safe web app for individuals who received the vaccines to monitor and report issues and symptoms. Resources were the key to accelerating the process. There was global focus on COVID treatments and vaccine development which include the scientific community, existing research networks, a willing trial population, government and private investment, prioritization with approving bodies, technology that allows mRNA vaccines to be produced faster than traditional vaccines and production started during trials rather than

waiting for trial completion.

As noted reactions happen as part of the immune response. Anticipation and planning for them are important. In the healthcare environment units should plan for this and prepare for potential absenteeism. Staggering staff from departments or planning scheduling to account for side effects can mitigate this effect. Concern about allergies is real. The protocol for vaccination takes this into account with a prescribed observation period post vaccination. Other concerns related to traditional vaccinations such as Guillain-Barre, immunocompromise/autoimmune disease and egg allergy are not contraindications to these vaccine products. Additionally, concerns about Bell's palsy seem to not have occurred at a rate higher than the general population. As for pregnancy and lactation, it may also be received.

The CDC lays out a plan for using this information to build confidence in the vaccination program. The first step in empowering healthcare personnel to get the vaccine and recommend vaccination to patients. Within groups, encourage leaders as vaccine champions, spread this information to staff, hold shareholder meetings, make your decision to get vaccinated visible and celebrate it. Address the myths and concerns with knowledge creating a culture of dialogue and promotion. Share your personal story. Discuss the key points of protecting yourself, family, patients and the community. What about prior infection? The vaccine adds protection even for those still with detectable antibodies. What about the long term? That is an unknown but as noted, vaccine side effects primarily present early. Where can you get more information? Utilize existing resources to improve communication. Some resources are the CDC Communication Toolkit www.cdc.gov/vaccines/covid-19/health-systems-communication-toolkit.html & http://www.cdc.gov/vaccines/hcp/covid-conversations. The second resource provides further discussion points for conversation with the public, families and patients. Use your knowledge, expertise, role, and position to educate and vaccinate. There will be the challenge of supply but with work and hope this may be the path out of the COVID storm.

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PRACTICE MANAGEMENT

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Individualized Care Plans Emergency Department Super Utilizer

Background

The term "super-utilizer" has been developed to represent individual patients who utilize healthcare resources at a significantly increased rate compared to peers. When the AHRQ (Agency for Healthcare Research and Quality-part of HHS) presented data stratified by payor; 2.6-6.1% of the patients accounted for 10-26% of the total Emergency Department (ED) visits.[1] Focusing on Medicaid patients, the super-utilizer averaged 10 visits per year, had a median age 32 and was 70% female, with the most likely reasons to be seen being abdominal pain and back pain.

We all see these patients daily, we can probably think of a few off the top of our head. They know most of the staff by name. They may be on a first name basis, if you say "X is here" everyone knows who you mean. They may be frustrating for several reasons. They may be medically complex, with severe disease requiring multiple admissions. They may be on the opposite end of the spectrum and be very unlikely to have serious disease. They also could be the extremely difficult middle ground, a mix of medical comorbidities and anxiety about the presence of new or worsening disease. Many super utilizers suffer from mental health, at a rate 2x or higher than that of their non super utilizer payor peers.[1] There are patients who have had far too many CT scans for abdominal pain and patients who receive opioids in the ED at a rate that is concerning.

Our Situation

At our site, we have a LPN who works as our "Care Navigator". As part of her routine work, she monitors repeat visits and tries to get services, specialist appointments or other needed interventions performed outside of the ED. After discussion of one of our first name basis, super-utilizers, we wondered if there was a better way. We found the practice pattern of workup intensity and medication utilization varied widely within the provider group, especially in periods of medical staff turnover. Detailed medical record review is not always feasible given volume and time constraints. We wondered whether we could create a book of individualized care plans for these types of patients that would allow for a quick "download" of the issues at hand. We could have them easily available for staff to review when a patient arrives. They could be brought by the secretary or charge nurse to the provider upon signing up for the patient.

While working to develop our document, one of the first things we found was the AHRQ Medicaid re-admission toolkit Care Plan Template.[2] We also found many other institutions have followed this process with good success. There are several publications showing positive results in health care utilization and narcotic use from institutions using an individual care plan program.[3,4,5]

The Process

Our document template is very much based off the Medicaid toolkit template. Care Plan nominations are accepted from any source. Nominations come directly by ED staff, inpatient services or Care Transitions, external providers such as primary care physicians, or can be picked based on utilization patterns. Our preparation of the template comes from our Quality Assurance department. The nurse summarizes data from our EMR as well as the regional health information exchange. We then review a summary of ED visits, hospitalizations and radiology studies obtained year-to-date and the two prior years.

We then meet for 30-45 minutes, covering 2-4 patients depending on timing, nominations and complexity. We schedule meetings to be immediately prior to a bi-monthly Utilization Review, which already had most of the participants scheduled in one place. Present at the meeting are the ED medical director, ED Nurse manager, ED Care Navigator, QA Department, Care Transitions Department, Nursing Education and Hospital Practice Care Manager. Our risk management/compliance officer reviewed the process and attended the first meeting. We often have the Chief Medical Officer and Chief Nursing Officer present. We invite other members of medical staff as indicated by the situation. We have had Gastroenterology, Primary Care and Hospitalists involved on a case-by-case basis.

We then discuss the underlying reasons for high utilization. This varies across many categories: anxiety, malingering, end stage disease, lack of resources at home, alcoholism, pain management issues, drug seeking behavior, etc.

Our recommendations typically involve referrals for home care services, mental health, or a new specialist. Our ED visit recommendations are focused to limit wasteful or harmful interventions such as advanced imaging with ionizing radiation and the use of controlled substances.

It is important to consider issues such as housing, financial/food stability, familial/social support limitations and difficulties with employment attendance. We often refer to county or charitable organizations after this process.

Once we achieve consensus on recommendations, the care plan is edited and confirmed by the committee within a few days. The completed plans are printed and stored in a binder at the workstation. The updated roster is distributed to ED nurses and physicians via HIPAA compliant email. We also distribute the individual care plans to each relevant office that treats these patients regularly, regardless of

their affiliation with the hospital. We include an introductory letter to our process.

Conclusions

We have experienced positive results. We have directly discussed the process with several of the patients involved. They really appreciate the care and detail we have focused on them. We have been very careful to explain to patients and staff the plans do not mean we will deny any needed test or intervention. A few patient conversations led to the patients accepting new referrals after our process was explained.

Not all care plans lead to a drastic change in utilization patterns, but we have certainly seen a trend. Most significantly a patient with greater than 200 visits in 2019 has less than 1 visit per month in 2020 and is doing well with their outpatient regimen.

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continued from page 4

Pitfalls and Limitations

- Right heart strain can also be chronic in cases of cor pulmonale.
- Echo findings of a PE may not be present initially. If a patient's clinical condition deteriorates, a repeat POCUS is recommended.
- Some patients may have difficult cardiac windows. In patients with severe COPD, the SX cardiac view may be the optimal cardiac window.

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Triumph of Hope and Science

It is hard to believe that it has been a little more than a year since COVID-19 was first reported. At its peak, COVID-19 wreaked havoc in New York City, where I practice. Hospitals were flooded with patients and there was a shortage of personal protective equipment. Talks of vaccine had surfaced and served as a ray of hope during our darkest days. Once the vaccine was available, as an emergency resident physician, I was offered the option of early vaccination. Although I had grown exhausted of the COVID pandemic and was looking forward to its end, I was initially very hesitant to take the vaccine and felt I should wait until more could be known about how safe it was.

This hesitancy stemmed from my knowledge of scientific research and the amount of time it usually takes to develop a vaccine. The process typically takes 10–15 years and entails several stages, including exploratory, pre-clinical, three phases of clinical studies, review, approval, manufacturing and post-marketing surveillance. To date, the fastest vaccine ever developed was for mumps and it took five years.[1]

To develop a vaccine against COVID-19, the traditional process was accelerated by combining phases, and the goal was to finish the process in 12–24 months. In the United States, the FDA has granted emergency use approval to two RNA vaccines that are the first of their kind (RNA has never been used in a vaccine).[1] Considering the speed at which the vaccines were developed and the innovative RNA technology involved, it is understandable why many, including me, would be wary of getting vaccinated.

Faced with this difficult decision, I first turned to senior colleagues who had decided to get vaccinated. Many were experienced medical professionals and said they trust in the scientific process and the scrutiny the vaccines had been through before they were offered to the public. These colleagues felt honored to be among the first to get vaccinated. They inspired me to join their ranks. I began to ask myself deeper questions about my initial hesitancy and I realized it was mainly related to the fact that I am a young healthy person living alone and away from family; delaying vaccination may not have been as problematic for me as others.

However, there were bigger factors than my fear of adverse reactions. COVID-19 had taken a toll in how frequently I saw my family and the risk I was exposing them to when I did see them. Getting vaccinated has not completely eliminated risk but has allowed for more frequent and less stressful contact. Additionally, my colleagues and patients are offered a similar benefit.

Beyond the protective benefits for myself and those around me, getting vaccinated has been beneficial on a larger level as well. The antivaccination movement was around long before COVID-19 and has played a role in "lowered vaccine acceptance rates and in the increase in vaccine-preventable disease outbreaks and epidemics," such as that of measles.[2] It is known health-care providers are among the strongest influencers of vaccination decisions. "Several studies identified [health-care providers] were more likely to recommend vaccinations if they were themselves vaccinated."[3] The best way to show trust in a vaccine people may be skeptical about was by taking it myself and providing a reassuring example. Furthermore, the social and economic hardships wrought by the pandemic need to come to a stop. While social distancing and mask measures have helped, there have still been spikes in cases and herd immunity is the most viable means of putting an end to the situation. However, achieving herd immunity through natural infection would likely kill many more people and the use of vaccines is a crucial, life-saving path to the same end.

Although the traditional vaccine development process was accelerated and can lead to distrust, getting vaccinated is not only about personal and familial protection. In my opinion, there is the larger reason of setting an example for patients, which is important to achieving herd immunity. With this broader picture in mind, I had decided to take the vaccine.

I did my research and the two vaccines approved for emergency use in the United States have similar side effect profiles that include a couple days of pain at the injection site, fever, chills, body aches and headaches.[4] On the day I got my first shot, I was confident in the vaccine and not worried about the side effects because of the research I had done. I will say that the thought of being a guinea pig lingered in the back of my mind as I received the shot, but it paled in comparison to my larger desire to play a role both in ending the pandemic and in this very historic scientific moment; one in which hope will soon triumph.

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Get Vaccinated!

I was extremely honored to be seleced to be the first person vaccinated on Staten Island.

At my hospital, the team never wavered and never surrendered in face of the pandemic. At times, the only tools we had at our disposal were grit, extreme professionalism and raw courage. Now we have another tool in our toolbox. A real game changer. The day I received the vaccine, I thought for the first time that we are going to beat this. I think we are going to win.

Even before getting the first shot, I strongly advocated for the vaccine. Anybody who would stand still long enough would hear one of my little speeches.

A month before the vaccine was approved, someone asked Dr. Jordan Glaser at our Medical Executive Committee meeting if he would take the vaccine. Dr. Glaser is the head of Infectious Disease at Staten Island University Hospital (SIUH), and I have worked closely with him for over thirty years. I have always considered him to be exceedingly knowledgeable, but at the same time, a fairly safe, careful and conservative practitioner. Jordan's response was unequivocal. He said, "If someone gave me three doses, I'd give the first two doses to my children and the other dose to me…"

It has been gratifying to know so many of my coworkers have taken the vaccine. I respect those who wish to decline it at this time; after all, it is a completely new kind of drug. It is not fully FDA approved. But I really admire those who have set aside their concerns for themselves for the sake of their patients and for the sake of their community and took the shot. It is truly inspiring.

From the very beginning of this crisis, our community has showed us support in a way I have never seen before. It has been exceedingly generous and genuine. By taking the vaccine and encouraging others to take the vaccine, I feel like it is my way of giving back to my patients, friends, family and neighbors. People ask me if I am afraid of the vaccine. No way. When I meet someone for the first time and I tell them I have worked in a New York City Emergency Department for 30 years, they usually say, "Boy, you must have seen everything…" I thought they were right until last March. I am afraid of COVID. It is an unpredictable and malicious killer. I am afraid of the virus, not the vaccine. Taking the vaccine is a no brainer.

I have been giving a little free medical advice to my fellow Staten Islanders:

You want to go out to dinner on Saturday night? Get vaccinated!

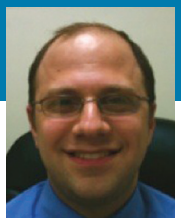
You want to make travel plans that won't get cancelled? Get vaccinated!

You want to go to a concert, a ballgame or a big wedding ever again? Get vaccinated!

The vaccine: it is our "best shot" at getting back to normal.

It's just what the doctor ordered.

ASK THE EXPERTS



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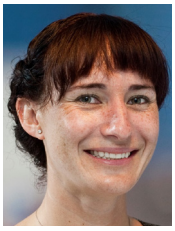

Interview With
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SIM

Introduction

Dr. Rebekah Burns is a pediatric emergency medicine (EM) physician at Seattle Children's Hospital and an Associate Professor of Pediatrics at the University of Washington School of Medicine. In addition to her clinical work, she is a medical educator. She has integrated simulation-based education into the curriculum for medical students, residents, fellows and faculty. Her publications include numerous peer-reviewed simulation cases and she is currently serving as an Associate Editor for MedEdPORTAL, the premier clearinghouse for teaching and learning resources for health professionals. Dr. Burns has served as the Chief Editor for an open-access national Emergency Medicine Resident Simulation Curriculum for Pediatrics (EM ReSCu Peds) that has recently been made available on the ALiEM website.
(https://www.aliem.com/emrescupeds-em-resident-simulation-curriculum-pediatrics/)

How can simulation be used to improve EM resident learning?

Simulation can be used to enhance EM resident learning by supplementing their clinical experiences. For example, caring for simulated patients can let residents practice managing everything from common problems to once-in-a-lifetime, complex zebras to help prepare them for variety of presentations they will encounter. Simulation can also provide a controlled environment to practice cognitive skills (like clinical reasoning) and teamwork while allowing for direct observation and feedback from facilitators and peers. Simulation can also be used to help residents practice procedures without placing patients at risk and can allow them to deliberately practice a technical skill step-by-step until they are able to do it easily. It also allows residents to practice before they might have their first opportunity to perform a procedure on a patient.

How can simulation translate into actual patient care?

There have been several studies showing the positive impact simulation can have on patient care. Simulation-based training has been linked to improved teamwork in actual clinical settings and to improved patient outcomes including decreased infection rates and increased survival. It isn't just for trainees. In my institution, all emergency department attendings, nurses, advanced practitioners, respiratory therapists, pharmacists and fellows participate in at least one in situ interprofessional simulation together each year. It gives everyone an opportunity to practice teamwork and technical skills, as well as follow guidelines and implement procedures that might be critical but infrequently used in day-to-day patient care. Not only are these sessions important from a training standpoint because these simulations take place in our actual emergency department, we often identify latent safety threats in the environment that can be fixed before they were to ever reach a patient.

When someone mentions sim, a fancy state of the art simulation center might come to mind. I am curious to learn whether simulation can be performed without the support of a sim center and a bunch of expensive mannikins?

Simulation is a broad term. It is a technique rather than a technology. A healthcare simulation is a representation of a clinical scenario or event in which participants practice skills or behaviors and apply knowledge. Depending on what the goals are for the simulation, a mannikin might not even be needed. For example, if the goal is to practice discussing difficult news with a family member, simulating the conversation with a facilitator or peer without the use of any equipment may be perfectly sufficient. If the goal is to train a team to use crisis resource management skills such as closed loop communication, a shared mental model and situational awareness, a simulated clinical scenario could use a high fidelity patient simulator but another low fidelity object, such as toy doll or even a sack of flour could represent the patient as long as the participants are getting enough input regarding the clinical status from the environment and facilitators. Some lower tech ways of doing this include using apps to display vitals on tablets in lieu of monitors and having facilitators describe exam findings or play audio recordings and show photos or videos of findings. Simulation has been implemented in low resource settings across the world without expensive mannikins or simulation technicians and has demonstrated improvements in patient outcomes. Given the pandemic and current social distancing requirements, there has been an expansion of the use of teleconferencing platforms to engage participants and facilitators in simulated scenarios while everyone participates remotely. ACEP SimBox has some great resources. (https://www.acepsim.com/)

Some people say they feel simulation is not real. How can realism be improved in order to engage participants?

All simulation requires the participants to "buy into" it, no matter how high tech the mannikin is. First off, participating can make many people feel uncomfortable, like they are being watched or judged, which may make them hesitant to engage. One of the most important parts of a simulation is to orient the learners to the purpose and the process of the session. Sharing what is called the Basic Assumption can help get everyone on the same page. A facilitator should state they believe everyone participating in the simulation is intelligent, capable and invested in doing their best. The simulation activity is a tool to help everyone improve. It is also important to point out everyone recognizes they are not caring for an actual patient but treating the situation as if it were real will help maximize the learning opportunities. Other strategies to maximize realism involve approximating real-life environments and processes as much as possible. For example, holding simulations in the actual clinical environment or in a simulated environment that closely matches where the residents practice can make it seem more real. Having team members fill rolls they actually do in real life is another strategy to increase realism. Also, participants should do what they would do in real life, like examine the "patient" or gather needed supplies, as much as possible, rather than only saying what they would do.

Why is simulating pediatric cases important for emergency medicine residents?

Most children seeking emergency care in the United States are seen in general emergency departments. Emergency medicine (EM) residents need to graduate being able to care for sick and injured children. However, there is a lot of variability in pediatric exposure during residency. Across programs, there are wide differences in the number of children EM residents care for, the acuity of illness, and the types of diagnoses. Li, et al. reported 43% of the pediatric diagnoses on the 2016 Model of Clinical Practice of Emergency Medicine were not seen by more than 50% of EM residents who participated in their study. Simulation can allow trainees to practice caring for children presenting with infrequent but high-risk illnesses just as it can be used to train for common presentations and practice skills applicable in multiple clinical scenarios.

Are there any pediatric specific resources for finding simulation curriculum?

Because stakeholders in EM resident education and simulation-based training recognized simulation is an important tool to help EM residents prepare to care for pediatric patients, ACEP helped form a collaborative of 10 organizations. This work group asked experts in EM, Pediatric EM and simulation to identify topics that should be taught using simulation. These topics were then mapped to 16 simulation cases created and peer reviewed, after implementation with EM residents, by physicians across the country. The goal of EM ReSCu Peds is to provide programs across the country with a comprehensive curriculum they can implement to help train the residents to care for pediatric emergencies and ultimately, improve the care of children nationwide. This curriculum is now available as a free eBook on the ALiEM website (https://www.aliem.com/free-ebook-announcement-emrescupeds-em-resident-simulation-curriculum-for-pediatrics-em-rescu-peds/). There are other open access resources available, as well. MedEdPORTAL has many simulation cases and can be searched by topic or by looking for cases with "Pediatric Emergency Medicine" in the title. Emsimcases.com is an open access site with peer-reviewed simulation cases of EM programs. They have multiple pediatric cases available.

Are there any opportunities to incorporate simulation into a career in EM? What are the opportunities?

There are so many opportunities to incorporate simulation into a career. As we have discussed, it can be a powerful educational tool so people who teach learners at all levels can consider how to use it to address the goals they are looking to achieve. Simulation can also be used as a tool to test clinical environments, systems and processes, so it partners well with quality improvement work. Simulation can be powerful as a research tool. Depending on the study and its aims, it could be used as the intervention or as the method to assess an intervention. There are several professional societies and organizations dedicated to simulation in healthcare. These are great places to network, find resources and collaborators.

What advice do you have for EM residents?

Learn from every opportunity you have whether that be a patient encounter, simulation or your power of observation of the people and systems working around you. Be deliberate and reflect on what you have learned and what gaps you still have so you can continually grow as a clinician and provider.

What are some of the "lessons learned" from simulation you want to share?

Even when you have the fancy high-tech mannikin, it doesn't always work! Flexibility and adaptability for both learners and facilitators is key. It is important to understand what the objectives are of any educational intervention, including simulation, and make sure the methods match. Simulation is great to teach and practice many things, but it doesn't work for everything, in all situations.

Closing Remarks

I am so excited the EM ReSCu Peds curriculum is now available. The members of the collaborative look forward to partnering with programs to help implement the curriculum and evaluate its content. Providing excellent emergency care to children is so important, and we hope this work will help support the growth and development of the next generation of EM physicians.

RESEARCH

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Shock Value: Utility of the Shock Index

There is a seemingly infinite number of formulas and ratios available on MDCalc and other such websites that can be used to determine the most appropriate next steps to manage patients in the emergency department (ED). One such formula underappreciated and worth remembering is the shock index, which was developed by Allgöwer and Burri in 1967 as a way to rapidly evaluate whether a patient is at high risk of developing circulatory shock in the case of sepsis or hemorrhage.[1] Numerous studies have gone on to examine the application of the shock index in larger patient populations and to try to determine an optimal cutoff above which patients should be considered for interventions such as fluid resuscitation, blood products or vasopressors.

Why Use Shock Index?

One benefit of incorporating shock index into the evaluation and management of ED patients: the formula itself is about as easy as they get (SI = HR / SBP).[1] In particular, if the HR is greater than the SBP (e.g. HR 110 and SBP 100), one should be concerned. Even among patients with vital signs that may not individually raise alarm, those with higher SI were found to have other laboratory markers of shock, such as elevated lactate.[2] Exact SI cutoffs above which patients should be considered to be in shock vary from study to study and there is currently no standardized practice management guideline for use of shock index. However, a SI value of 0.5 to 0.7 is generally accepted as being normal, and concern for shock should be raised at values of 0.8 or higher (and certainly when the HR is greater than the SBP).

Shock index has been studied extensively in the trauma population, with a cutoff of >0.9 associated with a 1.6x increased need for massive transfusion compared to patients with a normal SI.[3] One study found SI to be more sensitive than the ABC score, which is a classic decision rule used to assist in the decision to activate massive transfusion,[4] in predicting the need for massive transfusion in trauma patients when using a cutoff of SI ≥1.[5] Incorporating a quick calculation of shock index when provided with a patient's vital signs, therefore, can be a way for clinicians to prepare for and anticipate a patient's needs even before they arrive in the ED. Given the immense importance of rapid activation of the massive transfusion protocol and deployment of other resources for patients in hemorrhagic shock, getting back even a few extra minutes can make the difference between life and death.

In septic shock research, SI has been found to be as sensitive and specific as the SIRS criteria in screening for severe sepsis, with a negative predictive value of 95% when the cutoff of ≥ 0.7 was used.[6] It was also found to be inversely related to left ventricular stroke work index (LVSWI) in a model of clinical septic shock in pigs.[7] Reduced LVSWI has been shown to be a marker of mortality even after fluid resuscitation in critically ill patients, suggesting shock index not only provides a snapshot in time of a patient's condition, but also may serve as a prognostic indicator for patient outcome.[8] In particular, using shock index as a noninvasive way to establish a benchmark for a patient's cardiac function in the acute setting also provides the opportunity to follow the SI over time and ensure complete recovery.

The ED and Beyond

The trend in SI even in the first hour after a trauma or other hemodynamic insult is predictive of later patient outcomes. Patients are more likely to die as a result of their injuries if their SI increased from their vital signs in the field to their vital signs in the emergency department compared to those whose SI values did not change or decreased during transit to the hospital.[9] While the exact degree of this risk has not yet been quantified, it provides a direction for future research as well as an informal guideline to supplement the existing clinical gestalt providers use in the intense environment of the resuscitation bay. In addition, when making the call to the ICU or the hospitalist team who will be assuming charge of a patient upon their admission, being able to remark on their shock index as well as any trends in that value can help flesh out the picture of the patient's clinical condition in a language that is easily communicated and understood.

Much like the consideration for activating massive transfusion protocols, calculating SI can help to raise red flags for a patient who may be at risk for rapid decompensation and later complications during their hospitalization. SI has predictive value, as it is associated with increased Injury Severity Score, increased multiple organ failure, and increased mortality both in the short-term and at 28 days.[9-11]

Key Points

- Shock index is calculated by dividing heart rate by systolic blood pressure (HR / SBP). While there is currently no validated cutoff that guides management, a value of ≥ 0.8 or 0.9 is commonly regarded as the value

RESEARCH

above which patient outcomes are worse.

- Elevated SI on prehospital or ED assessment is sensitive and specific for identifying severe sepsis and need for massive transfusion in hemorrhagic shock patients, as well as predicting mortality and multiorgan dysfunction.
- Although shock index does not replace the careful and thorough evaluation of the trauma patient or the unstable sepsis patient, it can be used as a useful and quick bedside tool to guide clinical decision-making.

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Calendar

April 2021

2-5 Office Closed
7 Medical Student Symposium 6-9:30 pm
8 Practice Management Conference Call, 1:00 pm
14 Education Committee Conference Call, 2:45 pm
14 Professional Development Conference Call, 3:30 pm
15 EMS Committee Conference Call, 2:30 pm
21 Government Affairs Conference Call, 11:00 am
21 Emergency Medicine Resident Committee Conference Call, 2:00 pm
21 Research Committee Conference Call, 3:00 pm

May 2021

6 Board of Directors Meeting, 1:30 pm - 4:30 pm
7 Virtual ED Director Forum, 8:30 am - 4:00 pm
11 Leadership Virtual Advocacy Day
12 Education Committee Conference Call, 2:45 pm
12 Professional Development Conference Call, 3:30 pm
13 Practice Management Conference Call, 1:00 pm
19 Government Affairs Conference Call, 11:00 am
19 Emergency Medicine Resident Committee Conference Call, 2:00 pm
19 Research Committee Conference Call, 3:00 pm
20 EMS Committee Conference Call, 2:30 pm

June 2021

7 Online Professional Development Lecture:
Rags to Riches: Personal Finances for Emergency Physicians, 3:30 pm
9 Education Committee Conference Call, 2:45 pm
9 Professional Development Conference Call, 3:30 pm
10 Practice Management Conference Call, 1:00 pm
16 Government Affairs Conference Call, 11:00 am
16 Emergency Medicine Resident Committee Conference Call, 2:00 pm
16 Research Committee Conference Call, 3:00 pm
17 EMS Committee Conference Call, 2:30 pm

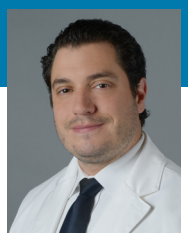
July 2021

6-8 Scientific Assembly
6 Board of Directors Meeting, 11 am - 12 pm
7 Annual Meeting
8 Board of Directors Meeting, 7 am - 8 am

August 2021

25 Emergency Medicine Resident Career Day

EMS



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Emergency Triage, Treat and Transport (ET3): The New Payment Model That May Change EMS as We Know It

The 5 W's of ET3	
WHO	➔ 205 applicants were accepted February 27, 2020 ➔ Applicants were either: ◆ Medicare-enrolled ambulance service suppliers ◆ Hospital-owned ambulance providers ◆ Local governments that oversee 911 dispatch in participating areas
WHAT	Will get reimbursed by Medicare for not only transporting patients to the ED, but now also for: 1) Treatment in place 2) Transport to an appropriate alternative destination
WHEN	➔ Initial start date delayed due to COVID-19 pandemic ➔ Start date now January 1, 2021 ➔ Five-year performance period
WHERE	Across the US: approved applicants come from 36 different states and Washington D.C.
WHY	To provide more patient-centered, efficient, cost effective emergency medical care

A sixty-seven-year-old female with a past medical history of osteoarthritis presents to the emergency department (ED) via EMS for chronic, atraumatic right knee pain. Have you ever seen a similarly presenting patient and thought "Why did she come to the ED?"

Currently, when ambulances respond to 911 calls they are reimbursed by Medicare only if the patient is transported to one of a few destinations. These destinations currently include: hospitals, critical access hospitals, skilled nursing facilities and dialysis centers.[1] The majority of these patients are ultimately taken to an ED.

This financial model has existed since Medicare was established in 1965. Over the years, as the scope of practice of prehospital care providers has expanded, reimbursement models began taking into account the level of care provided en route to the hospital.[5] Unfortunately, what had remained unchanged was the fact reimbursement was still provided only if the patient was transported to one of the above high-acuity destinations. Therefore, ambulance suppliers are incentivized to bring all patients to the ED even if this is not the most appropriate destination for the patient.

This reimbursement model not only contributes to overcrowding of EDs but could also lead to suboptimal patient care. In the above scenario, the patient who called 911 for chronic joint pain may have been better evaluated and treated at a clinic or doctor's office. Instead, she was brought to a high-acuity destination and subjected to delayed care and higher costs for evaluation of her low-acuity complaint.

In 2013, the Department of Transportation (DOT) and Department of Health and Human Services (HHS) collaborated to consider alternative approaches to the way EMS systems function. What resulted was a draft white paper which introduced the idea of a new approach to triage and treatment of these patients. This document highlights a national study funded by the HHS Office of the Assistant Secretary for Prepared-

ness and Response (ASPR) which estimated fifteen percent of Medicare patients that were transported to the ED could have been safely treated in a lower-acuity setting. Additionally, it was estimated that if these patients were alternatively transported to a physician's office, Medicare savings could approach $560 million annually. If these patients were treated on scene without transportation, these savings would likely be even greater.[5]

In 2012, the Centers for Disease Control (CDC) performed a study on ED use among adult patients. This study found 79.7% of adults who presented to the ED did so due to lack of access to other healthcare providers.[3] This study showed it was more likely to be poor access to healthcare than perceived illness severity that prompted these 911 calls. This resulted in patients being brought to the ED which we know is one of the most expensive sites for patient care.

In February 2019, the U.S. Department of Health and Human Services Center for Medicare and Medicaid Innovation introduced a new payment model for ambulance services known as Emergency Triage, Treat and Transport or ET3, which has the potential to completely alter EMS as we know it. ET3 is a five-year pilot program in which ambulance services could apply to participate. The ET3 Model allows more interventions than just stabilizing and transporting patients to the ED.

In the ET3 Model, when an ambulance is dispatched to evaluate a patient, there will be two additional services that may be offered to the patient. First, the patient may receive treatment without transport or "treatment in place."[6] This treatment would be provided in conjunction with a qualified healthcare practitioner (i.e. physician or nurse practitioner) either on scene or via telemedicine. Second, if the patient is transported, the ambulance may transport to the ED or consider alternate care facilities such as clinics, urgent care centers, doctors' offices and behavioral health centers. The Centers for Medicare and Medicaid Services (CMS) hopes that the focus will shift from simply transporting patients to hospitals to getting the patient the most appropriate level of care in a cost-effective and efficient manner. Of note, at any time during a patient encounter, if the patient states he/she prefers transport to the ED, that request should be honored.

ET3 will have a five-year performance period. The deadline to enroll was October 2019. 205 applicants were accepted in February 2020. The original anticipated start date was delayed due to the COVID-19 pandemic to January 1, 2021.

Developing a plan to execute the ET3 Model has been a complex task for EMS systems, requiring extensive research and planning. Over the next five years, as these plans are put into action, we should begin to better understand the realities of how this model can be integrated into EMS and grow closer to achieving our ultimate goal: providing more efficient, effective emergency care to our patients.

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Tackling Acute Mental Health Challenges in a Digital Age Pandemic: Is there an App for That?

A historic pandemic with significant behavioral and mental health implications

The COVID-19 pandemic has created a dramatic global disruption. The population is on edge and hospitals across the country have faced unique challenges with regards to capacity and resources during the pandemic. While coordinated public health efforts to "flatten the curve" have made promising strides in reducing disease transmission, the broad population level approach to curbing disease transmission introduces profound disruptions to the fabric of society beyond the physical dimension of this crisis. This is not our first pandemic and we have learned from prior outbreaks important behavioral and psychosocial effects occurred beyond the physical dimension of these crises.[1] Preliminary data from the COVID-19 crisis has already documented depressive and anxiety symptoms amongst frontline caregivers,[2] and there will be a critical need for mental health services for the community in the face of the increased social isolation and broader psychosocial stressors resulting from the public health measures enacted. Individuals with pre-existing behavioral health conditions are especially vulnerable and access to mental health care is already quite difficult. While mounting an effective mental health response during this crisis is critical, challenges include the widespread reduction of available live in-person mental health services and broad limitations in mobility as a result of the public health measures enacted.

A pandemic for a digital era

Unlike past pandemics, COVID-19 is occurring in an age of unprecedented adoption of digital technology. Within the past 10 years, the percentage of US adults owning a smartphone has increased from 35% to more than 80%,[3] creating a digital environment allowing rapid transmission of information and continuous communication. This digital environment also creates a unique opportunity for rapid data-driven testing and dissemination of effective solutions to assess and treat the mental health problems anticipated to arise during the prolonged period of social distancing and isolation that many will endure. Digital mental health programs offer the ability to respond quickly and efficiently and to reach individuals over great distances with minimal mobility requirements.[4] These advantages make digital mental health particularly apt for the mental health needs in the wake of the COVID-19 crisis. The range of mental health digital approaches is broad. These include guided telemedicine encounters with a licensed clinician (e.g. therapy/treatments conducted over video or phone), computer guided internet/app based mental health programs with non-clinician coaches and finally, unguided internet/app based therapies with no coach or therapist.[5]

On March 6, 2020, the Centers for Medicare and Medicaid Services took the dramatic step of instituting a temporary waiver, allowing reimbursement for telehealth services across the country, recognizing the key role digital platforms could play in combating the current crisis. This has created an unprecedented impetus for the broader integration of digital strategies in the management of mental health emergencies stemming from this crisis and has led to a deluge of potential digital solutions for the population. Emergency Departments serve a particularly important role in any of these proposed interventions, as our clinical settings serve, for many, as the primary source of face-to-face care during this pandemic and an opportunity to integrate with innovative developments in telehealth and telemedicine in the acute care setting.

Patients and providers can now access a dizzying number of possible digital solutions and services. There are currently over 10,000 mental health related smartphone apps alone, each with diverse approaches ranging from remote cognitive behavioral therapy, to the use of automated "chat bots."[6] Despite the large number of available digital treatment options, little evidence based guidance exists. In the setting of this fast moving pandemic, it is vital to deploy digital mental health services that are evidence based and efficacious, but a recent review found only 3% of existing digital apps have peer-reviewed evidence of effectiveness.[7] Additionally, how any such applications interface with the broader care system and particularly emergency providers and other specialists remains unclear. Attempts to rapidly implement services lacking in evidence on effectiveness and for whom, may be unhelpful and potentially even dangerous, such as in the case of the Samaritans Radar app that was intended to be helpful but suspended after evidence emerged that it was harmful to many users.[8]

How can we separate the wheat from the chaff amongst digital mental health interventions?

There is longstanding and compelling evidence for the efficacy of psychotherapies in treating a range of mental disorders,[9] and more recently, meta-analyses of existing trials of mental health digital apps have also found such digital apps are associated with significantly reduced anxiety and depression compared to waiting list controls,[10] with effect sizes for guided apps

(i.e., those requiring brief interactions with a human clinician) that approximate those of much more time and resource intensive face-to-face psychotherapy.[11] However, these are aggregate effects. There is good reason to believe individual patients differ greatly in the extent to which digital apps would help them as well as in the specific apps that would be most helpful.[12] The only way to learn about such differences is by conducting large-scale experimental trials. Such trials are feasible given the low cost and scalability of these apps.

Empirical tests for the mental health consequences of the current pandemic should be conducted in a timely manner in ecologically valid situations with the goal of comparing effectiveness of the diverse interventions existing today in the digital mental health marketplace. One approach would be to randomize patients in one or more health plans invited to try them across a number of apps rated highly by independent experts.[13] Pragmatic clinical trials of this sort would allow the association between digital interventions and outcomes to be evaluated rapidly and without bias in a real-world context.[14] Whereas randomized trials of traditional mental health interventions typically take years, recent studies using digital interventions have shown they can be carried out among >1,000 participants in a matter of weeks.[15] Rapid evidence-based guidance based on such trials would have enormous public health value given best-practices digital mental health interventions will almost certainly be needed to address the enormous need for care the pandemic is creating. Such pragmatic trials could lead to dramatic enhancements in our abilities to monitor, assess and treat mental health problems not just during this pandemic, but with lasting effects for populations in historically underserved areas such as rural populations of low income regions, traditionally faced with limited availability of local mental health resources.

Another key area for exploration and development will be the integration of any of these digital mental health services with existing acute care services. Emergency departments across the country and particularly within New York State, have already created a robust framework of telehealth services for many patients. Integrating discharge planning and follow-up care of patients seen in the Emergency Department with complementing digital services and outpatient care may provide a unique development in the conceptualization of the continuum of acute, inpatient and outpatient care.

In the short span of several months, COVID-19 has exploded as a global pandemic, tragically affecting victims and their families around the world, shuttering the global economy and fraying the foundations of human interactions for billions. Digital mental health solutions offer an innovative avenue to remotely deliver mental health care. In coordination with other existing acute care and emergency medical services and guided by a rigorous evidence based approach, innovative digital health solutions may be the "killer app" to help combat the behavioral and psychosocial fallout from this global pandemic.

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Basic LVAD Management in the Emergency Department

The Left Ventricular Assist Device (LVAD) is a clinically intimidating part of a patient's body that physicians usually do not learn much about in medical school and seldom see in residency. The objective of this article is to discuss the basic management of the LVAD patient in the Emergency Department (ED).

Introduction

LVAD is a pump that is implanted in the heart of patients with end-stage heart failure. It can be a bridge to a heart transplant or destination therapy in patients who do not qualify for transplant. Moreover, it can be a temporary therapy for patients with reversible cardiac pathology like myocarditis. Of note, while the LVAD is implanted, the patient's heart may still contract for itself and provide its own blood flow through the aortic valves. LVADs can only be placed in patients with a functional right ventricle.

In its basic form, the LVAD consists of an inflow cannula that draws blood from the left ventricle, and a pump that pushes this blood through to the outflow cannula attached to the ascending aorta. The controller component is outside the body. The pump is connected to the outside controller via the driveline, which is a percutaneous cable that exits the abdominal wall. The batteries (typically two) for the LVAD are carried by the patient at all times.

Management

If the ED is fortunate to receive a notification before the arrival of a LVAD patient, the LVAD team should be called in preparation. The LVAD team may consist of cardiothoracic surgeons, cardiologists and nurse coordinators. In addition, locate the vascular doppler machine, ultrasound machine, airway and cardiac arrest code equipment.

Once the patient arrives, assess the airway, breathing and circulation. Place the patient on the monitor and obtain IV access. Many LVADs do not create a palpable pulse or blood pressure (BP). For all patients, measure the blood pressure by inflating a manual blood pressure cuff over the arm and placing a doppler or ultrasound probe over the brachial or radial artery. As the BP cuff deflates, when the arterial flow is audible on the doppler, or when the pulse is visible on ultrasound, the gauge number is the mean arterial pressure (MAP). Literature states the ideal MAP for LVAD patients may be 70-90 mmHg. An arterial line may also be placed to measure MAP.

Auscultate for a "hum" sound produced by the LVAD in the chest or abdomen. If this sound is absent, the pump is not working. If a patient appears underperfused with signs of end-organ damage like altered mental status, apnea, cyanosis or poor capillary refill and the MAP is below 60, be concerned for cardiac arrest. In these cases, CPR following normal ACLS guidelines could be considered for cardiac arrest, if no other steps could be taken to repair the pump function and the patient has a MAP below 60. There is concern that compressions may damage or dislodge the LVAD, or even rupture the ventricular wall, but studies have shown compressions may be safe. If defibrillation is needed, avoid applying pads over the LVAD. Of note, some LVADs include hand pumps that may assist in inducing circulation. Once the patient is stable after chest compressions, confirm the function and positioning of LVAD.

Do not forget to obtain an EKG and if capable, a bedside echocardiogram. Also obtain labs including troponin, blood culture, LDH and coagulopathy labs. Of note, the patient or their family member may carry an information card that may guide your LVAD troubleshooting.

Immediate actions that may reverse the pump's malfunction include:

- Checking all connections such as the driveline and power source.
- Replacing batteries or the controller. If replacing batteries, make sure to replace one battery at a time so that the controller is always connected to one battery. If there is no back-up battery, the LVAD coordinator or family member are sources for spare batteries. You may also connect the LVAD to AC power.
- Give fluids as LVAD hearts are preload dependent.
- If pump thrombosis is suspected, consider giving heparin and TPA. Hot skin over the pump may indicate that the pump is overworking to overcome the thrombosis. On echocardiogram, both the LV and the RV walls may be enlarged. In addition, LDH elevation in lab work has been noted in literature to be specific for pump thrombosis.

The LVAD controller shows parameters that tell us about how the LVAD is running. Two notable ones are the battery level, and pulsatility index (PI). The PI measures the magnitude of the pulsatile flow provided by the heart's own contractions. Normal Pulsatility Index is 1-10. Higher PI means less LVAD support because there is more ventricular filling and higher pulsatility. The lower the PI, the more LVAD support is needed as there may be hypovolemia, or inflow/outflow obstruction. The PI may be trended in the ED.

Other Common LVAD Problems

A suction event is a common LVAD com-

plication that usually occurs when the inflow cannula attempts to pull blood from the LV that does not contain a sufficient amount of blood or is experiencing increased negative pressure. The inflow cannula gets pulled against the ventricular wall. The result is reduced inflow through the pump and thus reduced output. Treat this condition with IV fluids to help hypovolemia and screen for arrhythmias that could be treated. If there is an elevated MAP over 90 mmHg, with increased afterload, consider blood pressure reducing medications with the LVAD team.

Bleeding, especially GI bleeding, is a common complication because the patient is on anticoagulants and antiplatelet agents. There is also shear stress from the pump that causes platelet dysfunction. Moreover, the lack of pulsatile flow causes arteriovenous malformations and angiodysplasias. LVAD patients may have acquired von-Willebrand syndrome because LVAD's shearing forces cause breakdown of von Willebrand multimers. If there is severe anemia, transfuse blood. Consider leukoreduced or irradiated blood products for patients pending heart transplant. Also consider consulting the endoscopist for source control of suspected GI bleed. If a patient has altered mental status and neurological deficits, hemorrhagic stroke may also be on the differential. Treatment may include reversing anticoagulation with tranexamic acid, desmopressin, prothrombin complex concentrates, recombinant factor VII or fresh frozen plasma. Weigh the benefit of reversing anticoagulation with the risk of inducing device thrombosis with the LVAD team.

Infections may occur anywhere but commonly in the driveline. Examine the skin of the driveline site for erythema and pus. Send three blood cultures and initiate broad spectrum antibiotics and antifungal coverage. Go through your normal sepsis workup including imaging and urinalysis if sepsis is suspected.

Once the patient is stabilized, work with the LVAD team in your hospital or at a transfer site for disposition. This discussion of the LVAD management is not comprehensive, always collaborate with your local LVAD team and use your clinical judgement on individual patients.

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EDUCATION

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A New Era of Bedside Teaching for the Resident Learner

Note to Readers: This is the first installment of a series we are putting together about teaching theories, techniques and innovations in the Emergency Department. Please feel free to contact us with questions or suggestions for future topics.

Bedside teaching has classically been defined as teaching that happens directly on the wards or at the patient bedside. Usually, on patient rounds, the attending and junior physicians come together to present and discuss patient cases. In 1964, Reichsman et al. observed teaching practices at the University of Rochester School of Medicine and found the attending physicians rounded at the bedside in 75% of all patient cases presented during medical student floor rounds.[1] Today, that number is estimated to be around 10-19% of all patient encounters.[2]

It can be argued, however, in emergency medicine (EM), this statistic does not apply. The attending, for the most part, is always at the bedside or functionally "on the wards" (or our modern day version of the "wards"). We, therefore, are in a sense the preservers of bedside teaching and it is our responsibility to keep it alive and innovate to help keep up with the ever-changing medical world.

But what is the best way for us to maintain bedside teaching? Clearly, we have evolved past the days of "see one, do one, teach one." So, how can we work with our learners to optimize their opportunities to learn? And further, how can we prove the teaching we are doing results in actual learning?

What is the best way for us to maintain beside teaching? Clearly, we have evolved past the days of "see one, do one, teach one." So, how can we work with our learners to optimize their opportunties to learn? And further, how can we prove the teaching we are doing results in actual learning?

The answer was elucidated to me during a recent faculty development session I attended. The course was centered around organizing our thoughts and educational projects based on conceptual frameworks and theories to help formulate a clinical question and logistically measure and answer it. I was skeptical… I'm not a researcher, I thought. I'm an educator. I show up and teach on shift by trying to find teaching points from each patient and relay them to my learners in the hopes of making them better at their future job. These frameworks would impede my teaching. Every learner is different and has different needs - my thought was we could not simply apply the same framework to all learners.

I now believe I was wrong. These frameworks, while they may not be applied to the individual learner, can help clarify and elucidate the bigger picture. They may not describe what I teach and to whom, but they do explain how and why I deliver the information in the format I do. For example, the reason I am more assertive and vocal during resuscitations with residents who I think need to be more assertive and vocal, and less so with residents I think have mastered this ability, can be explained by sociocultural theory. Sociocultural theory explains how one learns from observing someone slightly more experienced than the learner. That is the reason I am more involved in resuscitations with residents who need to learn to model leadership behaviors. The theory also explains prompts and hints help improve ability levels, which may be helpful for other types of learners.

Another learning theory, cognitive frameworks, allow for greater organization leading to research questions and systematic ways of getting measured outcomes. It also allows for a stepwise approach to measure how learning happens and why. Frameworks provide different angles of looking at a problem and conceptualizing solutions.[3] Few will argue against the theory of deliberate practice as an effective construct to explain how to learn procedural skills. If familiar with Kern's six steps to building a curriculum,[4] no one will deny it is an effective path to strong curriculum development. These are both examples of organized, big picture approaches to teaching that do not compromise the needs of the individual learner. They do not infringe on one's teaching style, but rather seek to explain the reasons and motivations behind it. Furthermore, educators have used these frameworks to "measure learning" and publish their findings for scholarly advancement - which is a difficult realm to break into for those

who primarily enjoy teaching.

There are hundreds of theories and frameworks from multiple scientific areas, from neuroscience to psychology and sociology. There are masters and PhD programs to learn about them. There are fellowships that focus on their application, within emergency medicine as well. I am not suggesting all of us working within academic medicine need to undertake these pursuits and become experts. I am merely recommending we become familiar with the fact that these things exist and could be used to make us better teachers and provide more benefit to our learners. As emergency physicians, we are familiar with multiple aspects of care in multiple specialties. My recommendation is we approach this the same way; familiarize ourselves with the basics, look things up and seek out experts to help us when we need and then apply what we learn to make it our own.

Most of my views on education and teaching style can be summed up by a few learning theories. My initial skepticism was based on my lack of knowledge about the subject. In fact, as Reeves et al. stated, "theory can help people move beyond individual insights gained from their professional lives to a situation where they can understand the wider significance and applicability of these phenomena."[5] As medical educators, familiarity with frameworks will allow us to be more reflective about our educational practices and our approaches to teaching, similar to how we ask our learners to reflect on the reasons and patterns behind their clinical decisions.

Upcoming Topic for Next Installment

While there has been a steady, progressive transformation in medical education over the past 10-20 years, the COVID-19 pandemic has highlighted the need for innovation, accelerating the evolution of traditional medical education.

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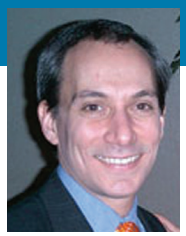

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The Effect of Direct Oral Anti-Coagulants on Delayed Traumatic Intracranial Hemorrhage After Mild Traumatic Brain Injury: A Systematic Review.

Hickey S, Hickman ZL, Conway J, Giwa A; Department of Emergency Medicine, Icahn School of Medicine at the Mount Sinai Hospital, New York; J Emerg Med; 2020

BACKGROUND: The use of anticoagulant medications leads to a higher risk of developing traumatic intracranial hemorrhage (tICH) after a mild traumatic brain injury (mTBI). The management of anticoagulated patients can be difficult to determine when the initial head computed tomography is negative for tICH. There has been limited research on the risk of delayed tICH in patients taking direct oral anticoagulant (DOAC) medications.
OBJECTIVE: Our aim was to determine the risk of delayed tICH for patients anticoagulated with DOACs after mTBI.
METHODS: We conducted a systematic review using Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines and searched several medical databases to examine the risk of delayed tICH in patients on DOACs.
RESULTS: There were 1,252 nonduplicate studies that were identified through an initial database search, 15 of which met our inclusion and exclusion criteria and were included in our analysis after full-text review. A total of 1,375 subjects were combined among the 15 studies, with 20 instances of delayed tICH after mTBI. Nineteen of the 20 patients with a delayed tICH were discharged without any neurosurgical intervention, and 1 patient on apixaban died due to a delayed tICH.
CONCLUSIONS: This systematic review confirms that delayed tICH after mTBI in patients on DOACs is uncommon. However, large, multicenter, prospective studies are needed to confirm the true incidence of clinically significant delayed tICH after DOAC use. Due to the limited data, we recommend using shared decision-making for patients who are candidates for discharge.

The Opportunities and Challenges of Machine Learning in the Acute Care Setting for Precision Prevention of Posttraumatic Stress Sequelae.

Schultebraucks K, Chang BP; Department of Emergency Medicine, Columbia University Irving Medical Center, New York; Exp Neurol; 2020

Personalized medicine is among the most exciting innovations in recent clinical research, offering the opportunity for tailored screening and management at the individual level. Biomarker-enriched clinical trials have shown increased efficiency and informativeness in cancer research due to the selective exclusion of patients unlikely to benefit. In acute stress situations, clinically significant decisions are often made in time-sensitive manners and providers may be pressed to make decisions based on abbreviated clinical assessments. Up to 30% of trauma survivors admitted to the Emergency Department (ED) will develop long-lasting posttraumatic stress psychopathologies. The long-term impact of those survivors with posttraumatic stress sequelae are significant, impacting both long-term psychological and physiological recovery. An accurate prognostic model of who will develop posttraumatic stress symptoms does not exist yet. Additionally, no scalable and cost-effective method that can be easily integrated into routine care exists, even though especially the acute care setting provides a critical window of opportunity for prevention in the so-called golden hours when preventive measures are most effective. In this review, we aim to discuss emerging machine learning (ML) applications that are promising for precisely risk stratification and targeted treatments in the acute care setting. The aim of this narrative review is to present examples of digital health innovations and to discuss the potential of these new approaches for treatment selection and prevention of posttraumatic sequelae in the acute care setting. The application of artificial intelligence-based solutions have already had great success in other areas and are rapidly approaching the field of psychological care as well. New ways of algorithm-based risk predicting, and the use of digital phenotypes provide a high potential for predicting future risk of PTSD in acute care settings and to go new steps in precision psychiatry.

Lung Point-of-Care Ultrasound in Pediatric COVID-19: A Case Series.

Kennedy TM, Malia L, Dessie A, Kessler DO, Ng L, Chiang EL, Rabiner JE; Department of Emergency Medicine, Division of Pediatric Emergency Medicine, NewYork-Presbyterian Morgan Stanley Children's Hospital/Columbia University Irving Medical Center, New York; Pediatr Emerg Care; 2020 Nov;36(11):544-548.

Lung point-of-care ultrasound (POCUS) has been shown to be useful for identifying pulmonary pathology in adult patients with coronavirus disease 2019 (COVID-19). However, pediatric literature for POCUS in COVID-19 is limited. The objective of this case series was to describe lung POCUS findings in pediatric patients with COVID-19. Three patients with COVID-19 who had lung POCUS performed in a pediatric emergency department were included. Point-of-care ultrasound revealed bilateral abnormalities in all patients, including pleural line irregularities, scattered and coalescing B-lines, consolidations, and pleural effusions. Additional pediatric studies are necessary to gain a broader understanding of COVID-19's sonographic appearance in this age group and to determine whether POCUS may be helpful to facilitate diagnosis and expedite management decisions.

Comparison of Intravenous Lidocaine/Ketorolac Combination to Either Analgesic Alone for Suspected Renal Colic Pain in the ED.

Motov S, Fassassi C, Drapkin J, Butt M, Hossain R, Likourezos A, Monfort R, Brady J, Rothberger N, Mann SS, Flom P, Gulati V, Marshall J; Department of Emergency Medicine, Maimonides Medical Center, Brooklyn; Am J Emerg Med; 2020 Feb;38(2):165-172.

STUDY OBJECTIVE: To compare analgesic efficacy and safety of intravenous lidocaine and ketorolac combination to each analgesic alone for ED patients with suspected renal colic.
METHODS: We conducted a randomized, double-blind trial comparing analgesic efficacy of a combination of intravenous lidocaine

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(1.5 mg/kg) and ketorolac (30 mg), to ketorolac (30 mg), and to lidocaine (1.5 mg/kg) in patients aged 18-64 presenting to the ED with suspected renal colic. Primary outcome included difference in pain scores between the groups at 30 minutes. Secondary outcomes included a comparative reduction in pain scores in each group from baseline to 30 and 60 minutes as well as rates of adverse events and need for rescue analgesia at 30 and 60 minutes.

RESULTS: We enrolled 150 subjects (50 per group). The difference in mean pain scores at 30 minutes between Lidocaine and Lidocaine/Ketorolac groups was -2.89 (95% CI: -4.39 to -1.39); between Ketorolac and Lidocaine/Ketorolac group was -0.92 (95% CI: -2.44 to 0.61); and between Ketorolac and Lidocaine was -1.98 (95% CI: -3.69 to -0.27). A comparative percentage of subjects in each group required rescue analgesia at 30 and 60 minutes. No clinically concerning changes in vital signs were observed. No serious adverse events occurred in either group. Commonly reported adverse effects were dizziness, nausea and headache.

CONCLUSION: The administration of intravenous lidocaine/ketorolac combination to ED patients with suspected renal colic results in better analgesia in comparison to lidocaine alone but provides no analgesic advantages over ketorolac alone.

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June 7 | Nathaniel S Minnick, DO FACEP

Rags to Riches: Personal Finance for Emergency Physicians

Despite high earnings and high debt loads, personal finance education is an under-taught area in medical education and lacks the longitudinal curriculum the topic warrants. Proliferation of social media has enabled physicians to improve their financial literacy, but generally remains a self-directed and self-taught topic. This session focuses on the "101" area of early-career finances: introducing the basics of retirement accounts, an overview of investing concepts and a brief explanation of personal insurance options.

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