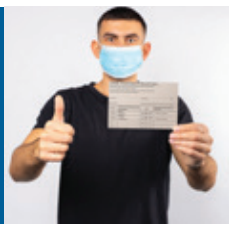


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The Official Voice of Emergency Medicine

MAY 2021

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ACEP Sepsis Task Force Report Delivers Key Insights

After years on the sidelines, emergency physicians grabbed the bull by the horns and set a new standard for sepsis guidelines

by JEREMY SAMUEL FAUST, MD, MS, FACEP

Perhaps no group of clinicians knows more about diagnosing and treating sepsis than emergency physicians. We routinely identify patients with sepsis and administer the crucial, lifesaving early care that our patients need to stand the best chance of pulling through. And yet, for the better part of this century, the major expert bodies in emergency medicine have not been leaders in producing clinical guidelines and policies on sepsis. Certainly, some key individuals have been important players, but the major documents that, for all intents and purposes, set the standards of care for the detection and treatment of sepsis have come from groups other than emer-

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ACEP4U: Workforce Considerations

ACEP'S COMMITMENT TO YOU AND EM

by THE ACEP BOARD OF DIRECTORS

Our specialty has been working for decades to create, evolve, and sustain a workforce that meets the growing emergency medicine needs of our country. Over the past two years, eight organizations—American Board of Emergency Medicine, American College of Emergency Physicians, American College of Osteopathic Emergency Physicians, American Osteopathic Board of Emergency Medicine, Association of Academic Chairs of Emergency Medicine, Council of Emergency Medicine Residency Directors, Emergency Medicine Residents' Association, and Society for Academic Emergency Medicine—came together with the common goal of taking a data-driven, forward-looking approach to studying the emergency medicine workforce. The findings from the *Emergency Medicine Physician Workforce: Projections for 2030* research, from which a manuscript is currently under independent peer review, show that for the first time in history we are headed toward an oversupply of emergency physicians in the next decade.

During an April 9, 2021, webinar, the

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POCUS for Hand Pain

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NEWS FROM THE COLLEGE

UPDATES AND ALERTS FROM ACEP

Congratulations to the 2021 Award Honorees

The recipients of the 2021 Leadership Awards have been announced! ACEP looks forward to honoring their outstanding achievements during ACEP21 in Boston:

- **John G. Wiegenstein Leadership Award:** Julius (Jay) A. Kaplan, MD, FACEP
- **James D. Mills Outstanding Contribution to Emergency Medicine Award:** James J. Augustine, MD, FACEP
- **Judith E. Tintinalli Award for Outstanding Contribution in Education Award:** Michael S. Beeson, MD, FACEP; and Michael A. Granovsky, MD, FACEP
- **Outstanding Contribution in Research Award:** Ahamed H. Idris, MD, FACEP
- **Outstanding Contribution in EMS:** Craig A. Manifold, DO, FACEP (posthumous)
- **Colin C. Rorrie Jr. Award for Excellence in Health Policy:** Susan M. Nedza, MD, MBA, FACEP
- **John A. Rupke Legacy Award:** Jeffrey D. Bettinger, MD, FACEP
- **Honorary Membership Award:** Sally Winkelman
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- **Pamela P. Bensen Trailblazer Award:** Rita A. Manfredi-Shutler, MD, FACEP
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- **Council Horizon Award:** Hilary Fairbrother, MD, FACEP
- **Council Curmudgeon Award:** David Overton, MD, FACEP
- **EM Wellness Center of Excellence:** Dept of EM, Indiana University School of Medicine and IU Health Physicians

Meet Your 2021 Candidates for President-Elect, Board, Council

The Nominating Committee has selected the final slate of candidates for 2021. Elections will occur during the Council meeting Sunday, Oct. 24, during ACEP21 in Boston. Look for more information about these candidates in the Au-

gust and September issues of *ACEP Now*.

- **President-Elect:** Aisha T. Terry, MD, MPH, FACEP (unopposed)
- **Council Speaker:** Kelly Gray-Eurom, MD, MMM, FACEP (unopposed)
- **Council Vice Speaker:**
 - » Melissa W. Costello, MD, MS, FACEP
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ACEP Lately: Executive Director Sue Sedory Launches Blog

After eight months as ACEP's executive director, Sue Sedory penned her first post to *ACEP Lately* at the end of March. *ACEP Lately* is a new monthly blog where Ms. Sedory will provide her insights and perspective on ACEP's ongoing work. Read the blog at www.acep.org/aceplately.



New Board Prep Tool

As part of ongoing efforts to grow and improve ACEP's board prep products, PEERPrep for Physicians launched in early May. If you're getting ready for the ConCert or Qualifying exams, this is an indispensable solution for maximizing study time and success. It includes what you've always appreciated about PEER—high-quality questions that are closer to the actual exam than any other prep—with a host of advanced new features to help you build confidence and prepare more effectively than ever. Learn more at acep.org/peerprep. Learn more about our other new PEER products, including PEERCert+ to help prepare for ABEM's MyEMCert exam, at acep.org/peer.



Check Out the New and Improved Sonoguide

ACEP is pleased to debut its new Sonoguide, developed to help emergency physicians understand the scope and practice of emergency ultrasound. The guide was initially developed for the beginner (the medical student) with little ultrasound experience, but it also includes advanced concepts and skills for those with more ultrasound background. View the new Sonoguide at www.acep.org/sonoguide. We thank FUJIFILM Sonosite, Inc., for their support of the Sonoguide. ☺

eight stakeholders plus additional thought leaders furthered the process by proposing several ideas for consideration and discussion. We encourage you to watch the webinar and download a PDF of the slides used in the webinar at www.acep.org/workforce.

In an all-member email sent on April 15, ACEP identified eight key considerations we are committed to addressing. In this article, we, the ACEP Board, want to explain in greater detail what we mean by that.

To start, we firmly believe there is not one ideal, holistic solution to address market-driven industry instability. Shifting health care economics and evolving practice models affect each of you in different ways. Change will take time and precision, yet we must forge ahead as there are no quick fixes for the challenges we face. Furthermore, the implementation of the ideas discussed will require the coordinated involvement of the entire specialty, with each stakeholder playing an integral role in the process.

To that spirit, we are committed to continuing the multiorganizational task force that conducted the study to discuss feedback received from you and your colleagues, establish working groups, and begin advancing solutions. For our part, ACEP has taken steps to schedule needed engagements, is collating feedback, and is already investigating options. We developed toolkits and assisted in generating feedback and solutions from stakeholder groups, including other organizations, state chapters, ACEP sections and committees, and your local practice or programs. Where there is opportunity for meaningful change, ACEP is committed to developing new approaches that the entire emergency medicine community can support and champion.

Eight Key Considerations

Stop the proliferation of emergency medicine residents and residency programs

We believe the entire emergency medicine community must come together to discuss all reasonable, realistic, and legal means to stem the growth of EM residencies and residency positions. Even though the Accreditation Council for Graduate Medical Education at this time continues to make decisions based exclusively on educational concerns and not workforce variables, all EM stakeholders as well as those in the EM industry—including hospital organizations, for-profit and nonprofit physician staffing organizations, and academic health care organizations—should take a hard look at workforce projections, along with market and financial drivers of the past decade, and take the prudent steps to protect the integrity of emergency medicine.

ACEP is committed to ensuring those conversations happen and to the development and adoption of a multiorganization policy specific to stopping the expansion of new programs.

Raise the bar to ensure consistency

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across emergency medicine residency training

The original number of required procedures for EM residencies was set decades ago. Some research exists, but more is needed to assess validity of the existing standard and what role simulation should play in competency. Based on such objective research, all emergency medicine organizations can work with the Residency Review Committee for Emergency Medicine to set appropriate requirements around such criteria as the number of procedures required on actual patients (versus simulation) and number of direct patient contact interactions (including primary responsibilities in such conditions as trauma, resuscitation, airway, pediatric critical care/trauma, etc.).

Emergency department volume requirements should impact competition for patient procedures, and EM residents should have priority for critical care encounters and procedures. These deliberations, and any subsequent changes they lead toward, should help to strengthen the value of the residency-trained, board-certified emergency physician leading the ED team.

Further, the expected presence of core faculty should be required at the primary sites and minimum qualifications should be delineated, as should faculty academic and scholarly requirements. These requirements must ensure the best educational environment to prepare emergency physicians to provide the quality of care our patients deserve, both now and in the evolving future.

There should be consideration of transitioning to a consistent four-year EM residency training model while maintaining the same total complement of residents. More research is needed to determine if there is evidence that this potential move would address additional educational needs while also resulting in a decrease in graduates each year.

ACEP is just one stakeholder in this realm, but we are committed to working with key organizations closely to examine and to update the standards and qualifications of new and existing residency programs while also protecting the residents and medical students who are counting on them.

Ensure business interests are not superseding the needs of educating the workforce

There are a lot of voices who assert that the root cause of our workforce issue can be

traced back to “pop-up” residencies funded by large, equity-backed management groups and the corporate practice of medicine. ACEP is committed to working with key stakeholders to closely examine the legality and ethics of organizations funding residency training programs. No business interests, whether from a not-for-profit organization or a for-profit organization, should supersede the service needs of educating a workforce while also caring for our communities.

We also acknowledge that resident salaries have remained relatively flat despite increased academic indebtedness. We encourage research to determine if low salaries have contributed to program expansion and/or limited opportunity in emergency medicine for students from less-well-off financial backgrounds.

Support practicing physicians to encourage rewarding practice in all communities

A consistent EM workforce issue is the under-supply of residency-trained, board-certified physicians working in rural and underserved communities. ACEP’s report from the 2019–2020 Rural Emergency Medicine Task Force (available at www.acep.org/RuralTaskForce-Summary) affirmed that rural emergency departments represent 53 percent of all hospitals in the United States and 24 percent of total ED patient volume, yet the number of EM residency-trained or EM board-certified physicians working in rural emergency departments has not changed over the past 10 years. ACEP is not saying that graduating residents should see working in rural emergency departments as their only option. Instead, we invite the entire EM community to look to the objectives proposed and help identify ways that we can better support those who wish to choose a rural practice. One item to note is our commitment to engage further with the federal government or other nongovernmental organizations to expand existing or create new rural, Indian Health Service, and public health scholarships to provide debt forgiveness and salary support for service in these areas.

Support for practicing physicians is not limited to rural or urban location. It pertains to the many different employment models emergency physicians choose to practice in. ACEP continues to update and evolve our policies, many as directed by Council, to support all practicing emergency physicians. Most recently, this includes updates to our policies on

Emergency Physician Rights and Responsibilities, Emergency Physician Contractual Relationships, and Compensation Arrangements for Emergency Physicians. ACEP policy statements can be found at www.acep.org/patient-care/policy-statements/. Work continues on other key Council resolutions that were approved or referred to the Board last October.

Ensure appropriate use of nurse practitioners (NPs) and physician assistants (PAs) to protect the unique role of emergency physicians

Emergency medicine is a medical specialty that requires advanced education, training, orientation, credentials, continuing education, and certification. The emergency department is a unique environment with significant challenges of dynamic patient care, limited information about patient present and past illness or injury, and unpredictable patient acuity and volume. **It is unacceptable to have an emergency department that is not led and staffed in real time by a board-certified emergency physician** with sufficient time to oversee the department and engage with patients.

The differences in training, competencies, and scope of practice among physicians and between physicians and nonphysicians must be clearly defined and delineated when it comes to acute, unscheduled care. There remains much debate, even among ourselves, on the establishment of minimum standards for education, training, and competence of EM NPs and EM PAs. However, **standards must not be misconstrued as training a nonphysician practitioner to replace the physician.**

ACEP and our chapters continue to advocate strongly at national and state levels **against independent practice** of NPs and PAs in emergency care. At no point should the role of the emergency physicians be performed by an independently practicing nonphysician practitioner.

Set the standards for emergency medicine so every patient has access to a board-certified emergency physician

Every patient, no matter their ZIP code, should receive the same high-quality care when they need acute, unscheduled care to improve overall patient outcomes and as a matter of equity. ACEP has developed accreditation programs in ultrasound, geriatric emergency departments, and pain and addiction care emergency departments. We believe the time is right to explore the merit, feasibility, and operationalization of an emergency department accreditation program that categorizes emergency departments. Similar to the American College of Surgeons’ Trauma Centers, there should be a “gold standard” that patients should expect from their emergency department and from those who are providing the care. We believe every patient seeking emergency care should have access to a board-certified emergency physician. We support **board-certified emergency physicians as the decision makers regarding staffing** within emergency departments specific to physicians, NPs, and PAs.

Broaden the umbrella to expand emergency medicine physician scope of practice

As evidenced by the many sections within ACEP, the skill-defined practice of an emergency physician is already broad. There is opportunity to deploy systemic solutions around what many emergency physicians already do: observation medicine, acute psychiatric emergencies, EMS medicine, and telehealth, among others. It is important to continue research in these and other emergency medicine practices to document improved quality of care and patient outcomes when care is provided and/or led by board-certified emergency physicians. Opportunities exist to create new or evolve current focused-practice designations toward formalizing additional EM subspecialties—disaster medicine, community health (public health), health care administration, informatics, pain management and addiction, telehealth, emergency psychiatry, and others.

Many have been saying for quite some time that the practice of emergency medicine should evolve to widely transcend the traditional “bricks and mortar” of hospital-based emergency departments. Board-certified emergency physicians should be seen as physicians to all patients with acute, undifferentiated illness or injury in any setting. We believe in exploring opportunities for the practice of emergency medicine within ED-based ICUs, freestanding emergency departments, hospital satellite departments, and physician-owned hospitals, particularly in rural areas. Coupled with the evolving physical and digital infrastructure to predict outcomes and ensure follow-up care, the time is right to broaden our practice.

Expand the reach of emergency medicine to ensure that no community is left behind

With strong diversity of practice among our members, ACEP recognizes the value of collaborative practice models between academic and rural/community sites to support mutual appreciation of different practice challenges and reduce feelings of isolation among rural emergency physicians. Furthering the development of blended practice models could meet the needs of the emergency physician, the community, and the hospital while enhancing quality and reducing geographic disparities of care.

Conclusion

In sum, these considerations are a starting point to outline pressing issues and potential solutions proposed to date. Very importantly, **your perspectives and approaches are critical to these ongoing deliberations.** Differing opinions are still needed and welcomed, as it is vital all consequences, whether intended and unintended, are considered in advance. Feedback, via email or on a discussion forum, can be provided at www.acep.org/workforce.

ACEP remains dedicated to **working together with those who share our commitment to identify data-driven solutions that promote both patient safety and emergency physician opportunities.** ☺

FACEPs IN THE CROWD

More than 12,000 ACEP members have achieved Fellow status with the College and use the FACEP designation with pride! Here, we highlight ACEP Fellows who have fascinating hobbies and passions outside the emergency department.

ANDREA GREEN, MD, FACEP



As an attending physician at University Medical Center Northeast of El Paso in Texas and chair of the ACEP Diversity, Inclusion, and Health Equity Section, Andrea Green, MD, FACEP, makes time for another gig: owning a fitness studio! She's always loved sports and fitness, and the idea of owning her own gym was birthed when she was a new mom, dreaming of creating a studio geared toward mothers and their infants. Years later, she met two instructors at a fitness studio who also shared her dream, and they launched Tone 360 together. The studio has grown to 500 members but maintains a familial atmosphere. Tone 360 was recently named the winner of the Community Impact Award from its local chamber of commerce. “There are a lot of commonalities in emergency medicine and the fitness industry,” Dr. Green said. “... In both, you find people needing direction, compassion, and help finding their way to the healthy, happy lives they desire.” On the other hand, Dr. Green said the atmosphere in her fitness studio is completely different from the emergency department. “The studio does not have the intensity of the ED, where you often deal with somber and life-threatening situations. ... Many of our classes are based on dance and music, so there is usually a rhythm. ... I literally lose myself in the vibes.”

KNOW AN EMERGENCY PHYSICIAN WHO SHOULD BE FEATURED IN “FACEPs in the Crowd”? SEND YOUR SUGGESTIONS TO ACEPNOW@ACEP.ORG. LEARN HOW TO BECOME A FACEP AT WWW.ACEP.ORG/FACEPSINTHECROWD.

JASON HACK, MD, FACEP



Jason Hack, MD, FACEP, vice-chair of research and chief of the Division of Medical Toxicology at East Carolina University in Greenville, discovered a talent and passion for photography when his wife suggested he take his mind off work by getting outside more often. When he's not teaching, he tries to exercise the right side of his brain by getting behind the lens. His subjects are varied but have three main areas of concentration: poisonous, medicinal, and benign blossoms (his images are featured regularly in *ACEP Now*); manhole covers; and his collection focused on the intersection of alcohol and roadway safety called “Images in Impact.” His botanical photos have been shown at galleries and museums in the Northeast, and his Impact collection has been prominently featured in AAA's road safety training. The State of Rhode Island has used his imagery for its Department of Transportation Safety conferences and its Rhode Island Ripple Effect initiative for alcohol awareness. Dr. Hack explained that taking photographs is similar to being an emergency physician because it's important to “keep your eyes open, notice things, pay attention. What is on the surface might not be all there is to learn.” He enjoys focusing on something beautiful or interesting and thinking about how to translate that feeling through his images.

SEPSIS | CONTINUED FROM PAGE 1

gency physicians. Until now.

With the recent publication of “Early Care of Adults with Suspected Sepsis in the Emergency Department and Out-of-Hospital Environment: A Consensus-Based Task Force Report,” by Yealy and colleagues in the *Annals of Emergency Medicine*, emergency physicians as a whole have finally stepped up to the plate.¹ And it's a home run.

The document provides up-to-date guidance on a variety of key clinical questions. Is there one single best way to detect sepsis? No, but there are many good ones. Relying on one only, especially a low-bar threshold that trips sepsis flags too liberally, does not help patients. Which patients need antibiotics immediately, and which can be evaluated and tested first? The focus is on identifying patients with septic shock. These are the patients who urgently need antibiotics and source control when appropriate. Do we really need to give all patients 30 cc per kilogram of bodyweight of intravenous fluids? No. Many can receive that bolus, but clinician judgment is needed, and no one specific volume of fluids is “the right amount.” Can we use peripheral vasopressors? Yes, if the intravenous line is a good one. What about steroids? They can be used but need not be used routinely. How about adjuncts like vitamins? They are not recommended. These and many other key questions

are addressed.

There are three takeaways that bear emphasis. First, the report contradicts major swaths of the Centers for Medicare and Medicaid Services (CMS) SEP-1 core quality measure, which has been in effect since 2015. It will be interesting to see whether CMS will be able to continue to keep the measure active in light of both the ACEP guideline and a position paper published earlier this year by the Infectious Diseases Society of America by Rhee and colleagues, which shares many of the same concepts.² Second, the document is authoritative in its scope and depth. It covers an impressive number of issues and provides a much-needed review of the relevant literature. But as important is the process by which this document came to be. (I had the opportunity to be present for the task force's deliberations in Dallas in early 2020, though I was not a part of the committee.) Emergency physician expertise was at the core of these recommendations. However, ACEP was wise to include participation from a wide variety of other expert bodies, including other EM societies, representation from peer-group bodies ranging from infectious diseases, critical care, and nursing to EMS and hospitalists. That the final report was endorsed by so many of these organizations, including the Society of Hospital Medicine and the Society

of Critical Care Medicine, speaks to the value and rigor that are found in the resulting manuscript.

Emergency physicians have always been on the ground treating patients with sepsis. At long last, the collective expertise and experience of emergency physicians are reflected in the medical literature. Certainly, the evidence will evolve. But now, we are leading the way in developing that evidence, interpreting it, and implementing it. This will lead to better patient outcomes and improved systems for identifying and treating sepsis patients both now and in the future. ☺

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DR. FAUST is an instructor at Harvard Medical School, an attending physician in the department of emergency medicine at Brigham and Women's Hospital in Boston, and Medical Editor in Chief of *ACEP Now*.

POCUS for Hand Pain

Using point-of-care ultrasound to diagnose a patient with bilateral, atraumatic hand pain

by AMIR TABIBNIA, DO; AND DAVID HAASE, MD

The Case

A 25-year-old man with no past medical history presented to the emergency department with bilateral hand pain. This was his third ED presentation. During his second visit, at an outside facility, he was diagnosed with cellulitis and prescribed doxycycline. Despite taking antibiotics for two days, the pain and swelling continued to worsen, particularly in the left third digit. Symptoms initially began six days prior to presentation, when he noticed a small, raised lesion to the palm of his right hand. Several days later, he observed swelling and redness to the dorsum of his left hand and middle finger. He also began having pain in his right thumb while reporting decreased range of motion in both wrists and hands. The patient reported having subjective fever five days prior and left knee pain two days prior. He denied history of trauma. The patient worked as a waiter in a restaurant and had no history of IV drug use but acknowledged intermittent use of cocaine and alcohol. The patient denied recent unprotected intercourse. He also denied dysuria, penile discharge, or genital lesions.

Objectively, the patient presented afebrile, with a heart rate of 105 bpm and blood pressure of 139/88. On exam, his left hand had dorsal erythema and edema. His middle finger was held in flexion, swollen, tender to palpation, and painful with passive extension. The patient had limited active range of motion of the left wrist and middle digit with flexion. On the right hand, the patient had a 2 mm brown pustule on his palm. The right thumb was held in flexion with diffuse edema and had limited active range of motion due to pain. His left knee did not have any overlying skin changes or large effusions and had full range of motion without pain.

Soft tissue point-of-care ultrasound (POCUS) revealed fluid surrounding the flexor sheath at the left middle finger and also in the right thumb (see Figure 1). Laboratory was notable for a leukocytosis to 18.6, a C-reactive protein of 124.6, and an erythrocyte sedimentation rate of 50. Other basic laboratory results were normal. X-rays of the bilateral hands and left knee were unremarkable. Urine DNA amplification for gonorrhea and chlamydia were sent to lab.

In the emergency department, the patient was given IV fluids and started on vancomycin, piperacillin/tazobactam, and clindamycin. A consultation with hand surgery was initiated. Because the findings were bilateral, the consultants deferred immediate surgery and requested admission to continue IV antibiotics with suspicion of a nonbacterial and, more likely, rheumatologic source. However, because of the POCUS findings, the surgical team evaluated the patient sooner. (Initially, the bilateral nature of the symptoms were seen as inconsistent with a dangerous soft tissue infection.) He was admitted to the inpatient medicine team with the hand surgery following. By this time, the urine gonorrhea resulted as negative.

Rheumatology and infectious disease were consulted and advised to maintain the patient on vancomycin and ceftriaxone, with high sus-

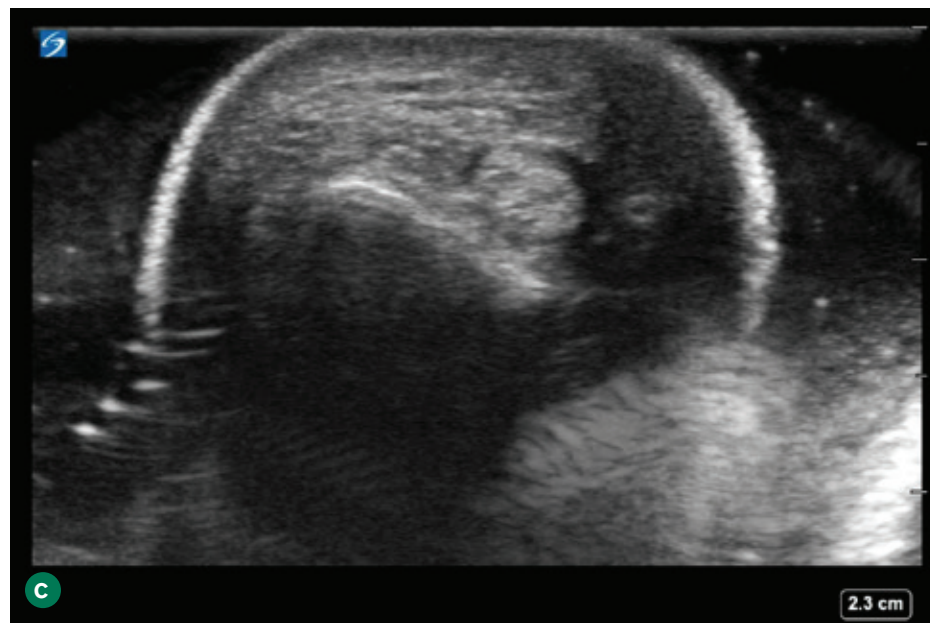
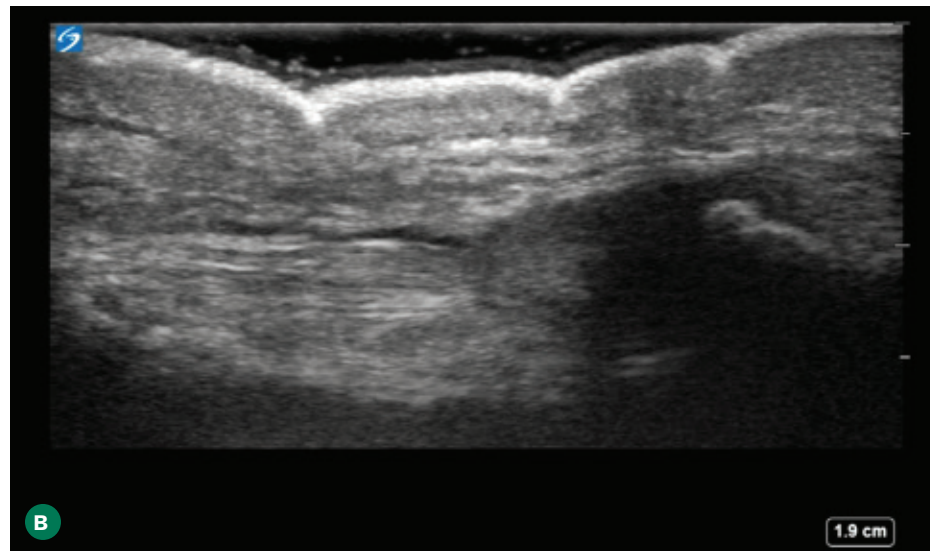
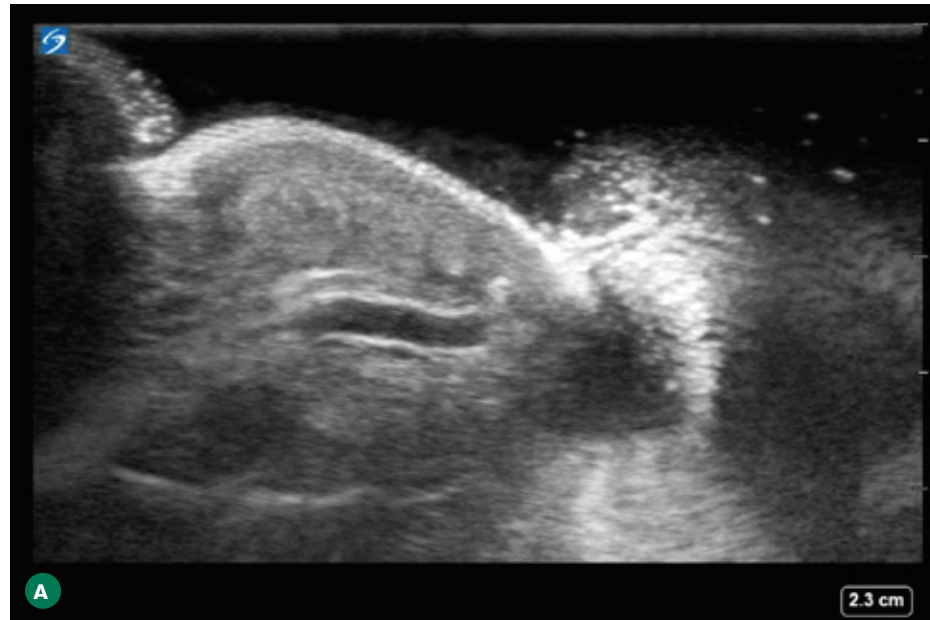


Figure 1: Soft tissue point-of-care ultrasound showing fluid surrounding the flexor sheath at the left middle finger (A) and right thumb (B and C).

picion of disseminated gonococcal infection despite a negative urine gonorrhea. On the second day of admission, the patient continued to report persistent pain without improvement, so he was taken to the operating room. The surgery team performed an irrigation and debridement of the left middle finger flexor tendon sheath and irrigation of his flexor tendon sheath of the right thumb with bilateral carpal tunnel releases. Intraoperatively, the patient was found to have extensive purulence of the left hand and middle finger tendon sheath, extending down into the carpal tunnel. He was

also found to have a small amount of seropurulent fluid of the right thumb flexor tendon sheath. The postoperative diagnosis was flexor tenosynovitis.

During his stay, the patient had a throat swab that was positive for gonorrhea. The patient then confirmed having oral intercourse with a sex worker. Unfortunately, the operative wound cultures were unable to be tested for gonorrhea or chlamydia, but bacterial cultures had no growth. Blood cultures remained negative, as did HIV and rapid plasma reagin testing. He continued to receive ceftriaxone

for presumed disseminated gonococcal infection and was discharged on hospital day seven with an intravenous midline in place to complete a 14-day course of ceftriaxone. The patient had improvement of his infection at his initial follow-up appointment but still had limited range of motion.

Discussion

Flexor tenosynovitis (FTS) is a surgical emergency due to its propensity to cause irreversible damage to tendons, leading to loss of function of the digits and possibly the entire hand.^{1,2} Clinically, it can present with some or all of the cardinal Kanavel's signs, including flexed posture of the affected digit, pain on passive extension, tenderness along the flexor sheath, and fusiform swelling.^{2,3,4}

Infectious FTS is usually a direct cause of trauma, commonly puncture wounds or, classically, high-pressure injection injuries from paint solvents.^{2,4} However, FTS can develop after hematogenous spread from atraumatic sources of infection.² Often *Neisseria gonorrhoeae* is the culprit in hematogenous spread and should be suspected in sexually active patients.^{2,4,5}

This patient presented with bilateral FTS likely due to hematogenous spread of a disseminated gonococcal infection from an oral sexual encounter. The triad of disseminated gonococcal infections of tenosynovitis, dermatitis, and arthralgias was present.^{5,9} The patient also exhibited all four of Kanavel's cardinal signs, though these physical exam findings are not specific, and they only project higher sensitivity when occurring in combination.⁴

Despite presenting to two other emergency departments, the patient was presumed to have cellulitis prior to his arrival. Urine studies were negative for gonorrhea and chlamydia, but the patient eventually confirmed positive for gonorrhea on an oral swab. POCUS proved invaluable in quickly elevating clinical suspicion of FTS and in convincing specialists to evaluate the patient promptly. While the POCUS findings did not result in immediate operating room transfer, they did expedite the consultation in the emergency department. This meant that when things worsened later, the team already knew the patient and had been following the course.

Intraoperatively, the patient was found to have purulent findings bilaterally. Generally, suppurative FTS is seen unilaterally and rarely found bilaterally. Disseminated gonococcal infections are also often from a genitourinary source, but this patient was negative for urine gonorrhea. Physicians should consider oral, rectal, cervical, and wound testing as appropriate when there is a high suspicion for a possible gonococcal infection.

Conclusion

Though FTS is usually found unilaterally, physicians should consider disseminated gonorrhea in any patient presenting with possible atraumatic FTS. A complete history should include sexual history, and consider testing oral and rectal sources if urine gonorrhea studies are normal. POCUS is a powerful adjunct and can be especially useful in challenging cases.

Management of FTS includes immediate

consultation with hand or plastic surgery for operative consideration, IV antibiotics, and admission.^{2,3,4} +

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Figure 2: Long axis view of the finger with hypoechoic fluid superficial to the tendon. The anterior-posterior measurement of the tendon sheath can be compared to the contralateral unaffected hand to support a FTS diagnosis.

HOW TO: POCUS OF THE HAND WITH WATER BATH

Emergency physicians can adequately identify signs of FTS using bedside ultrasound.⁶ To obtain the best images possible, it is often easier to perform with a water bath. It is not necessary to apply gel or have direct contact with the patient's injured and painful extremity.

To perform the water bath technique:

- Use a linear or other high-frequency ultrasound probe.
- Inspect probe, taking extra caution to ensure there are no cracks or open wires to avoid equipment damage.
- Take a basin (big enough for the entire hand to fit) and fill it with tap water.
- Submerge the patient's hand in the water, with the volar aspect facing up. This is easier because the patient will prefer the hand and digits flexed, and it will also place the point of interest more superficial on the image.
- Place the linear probe into the water and acquire a long axis view with the probe parallel to the digit, no more than a couple of centimeters away from the digit.
- Normal anatomy (superficial to deep) includes epidermis, subcutaneous tissue, flexor tendon, and phalanges (bone presents as hypoechoic [bright] lucency with

posterior shadowing).

- Pathological findings include:
 - » Cobble-stoning, where layered hypoechoic (dark) fluid encircles adipose tissue. Although this is commonly found in cellulitis, this can also be found in FTS but is not diagnostic on its own.
 - » Anechoic (completely dark) fluid anterior to a flexor tendon and, in more severe cases, circumferentially. This finding is sensitive for FTS.⁷
 - » Enlargement of a tendon sheath: Measure the flexor tendon from outer to outer using calipers (see Figure 2). It is considered abnormal if the affected tendon measures 25 percent bigger than the contralateral digit.^{6,8} This finding is not necessarily needed to make the diagnosis, but if you don't identify fluid along the tendon sheath and still have high clinical suspicion for FTS, consider this measurement.
- To obtain transverse images, place the point of interest in the middle of the screen and rotate the probe 90 degrees clockwise or counterclockwise. +

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COUNTER COVID-19 VACCINE HESITANCY



What it is, why it happens, and how to help

On March 17, ACEP's Diversity, Inclusion, and Health Equity Section hosted the panel discussion "This Is Our Shot: How EM Docs Can Empower Patients to End the Pandemic." Moderated by Tracy MacIntosh, MD, MPH, FACEP, this webinar brought together panelists Ugo Ezenkwele, MD, MPH; Pilar Ortega, MD; and Robert Rodriguez, MD, to discuss how historical abuses within the medical and scientific professions have led to modern-day mistrust and ways emergency physicians can compassionately address their patients' concerns about the COVID-19 vaccine.

"These groups whose health care is centered in the ED are especially vulnerable to vaccine hesitancy," Dr. Rodriguez said during the webinar. "[Emergency physicians] can become the trusted messenger for these populations."

Here are a few key takeaways:

1. Avoid assumptions.

DR. ORTEGA: We shouldn't make assumptions about our patients because of the way they look or sound. We should be attentive to

asking them, in a respectful way, about their background or language needs in order to ensure high-quality communication.

We may use terms like "vaccine hesitancy" to somehow set the blame on the patient for not getting the vaccine. It's true there is this skepticism that is well-justified by historical injustices of these groups—that's not to say that vaccine hesitancy is the reason that Latino or Black Americans aren't accessing the vaccine. It's much more about the access issues. Using this term to absolve the system of its own inefficiencies and inability to address the equity issues is not necessarily the appropriate approach.

2. Consider the patient's unique circumstances.

DR. ORTEGA: Among undocumented individuals, there are always underlying concerns about whether their private information may be reported to officials that would then put them at risk for deportation. We can be thinking through those obstacles ahead of time and eliminating them to make sure people feel that places of vaccination are a safe haven.

3. Acknowledge earned skepticism.

DR. EZENKWELE: There is hesitancy in Black communities regarding any vaccine or any new therapy that comes out. There is a historical precedent here that I call "earned skepticism." Emergency physicians on the front lines really have to acknowledge that.

4. Compassionate communication can build trust.

DR. EZENKWELE: Let's be real: Expecting you can erase or change some of the historical mistrust at the bedside may not be the right approach. The most you can do at bedside is listen to what the concerns are, ask specific questions, and acknowledge there is mistrust. You should try to answer their questions and share relevant information. You may not be able to erase the history, but you can start having the conversation.

Beyond the bedside, there are others in the community [patients] look up to. At Mount Sinai, we do community engagement. I've spoken directly to barbershops and churches.

These are things we can do, as emergency physicians, to start turning back the clock on this hesitancy.

5. Make vaccine communication part of your routine.

DR. RODRIGUEZ: [Emergency physicians] can become the trusted messenger for these vulnerable populations. Do it on every patient. I've incorporated questions about COVID-19 in all of my patient interactions now. If I see someone who has broken their arm, I ask about precautions, needs, have you thought about the vaccine, can we help you find a vaccine site? That has become part of my interaction. I've incorporated COVID-19 into my review of systems, past medical history—it's become part of that sequence in every patient interaction. We are their primary health care providers, and you can accomplish a lot on both a global basis and an individual one-on-one patient basis.

GET MORE: The full webinar recording is free to all members within ACEP's Online Learning Collaborative (www.ecme.acep.org). 📺

RESIDENCY SPOTLIGHT

MEDICAL COLLEGE OF GEORGIA EMERGENCY MEDICINE

Twitter:
@residencyEm

Location:
Augusta, Georgia

Year Founded:
1989

Number of Residents:
42

Program Length:
Three years



Medical College of Georgia residents at wilderness medicine day.

Secret Weapons (Medical):

- Interactive wilderness medicine day in which residents are paired in teams and race to complete an outdoor medical scavenger hunt
- Roughly half of our residents are active-duty military
- Tactical medicine pathway in which we work alongside a local SWAT team
- Large simulation center for multidisciplinary simulations
- Large ultrasound research center and Lumify ultrasounds recently incorporated in every unit of the hospital
- Global medicine focus with yearly trips across the globe, including a yearly ultrasound conference in Panama
- Event medicine experience working the Masters golf tournament, mixed martial arts fights, and the Augusta Ironman

Secret Weapons (Nonmedical):

- Augusta is the second largest city in Georgia and has both a city feel and open space and greenery for those wishing to slow down. It boasts the gorgeous Savannah River and the Augusta Canal, in which many residents paddle board and kayak on weekends.
- The Augusta GreenJackets are our local minor league baseball team—we LOVE enjoying the brand-new stadium overlooking the river.
- The Augusta downtown is full of nightlife including concerts, restaurants, and bars.
- Our dog-friendly brewery is a must, and our city is also abundant with dog parks and dog-friendly establishments.
- Real estate is cheap here, and many of our residents purchase their first home while in residency. Renting is also easy, with many options from houses to poolside apartments.
- Many of us play intramural sports, including sand volleyball and soccer.



Trivia

Bruce Janiak, MD, FACEP, the very first emergency medicine resident in the United States, recently retired from the Medical College of Georgia and still does occasional work here.

— Dan McCollum, MD, associate program director

By the Numbers

Flu Season

U.S. residents ages 18 and older

AVERAGE REPORTED INFLUENZA DEATHS

2016–2020 SEASONS

(Week 40 through Week 10)

6,990

2020–2021 SEASON

(Week 40 through Week 10)

571

A 92% Decrease

REPORTED COVID-19 DEATHS

2020–2021

(Week 40 through Week 10)

329,725

U.S. residents ages 0-17

AVERAGE REPORTED INFLUENZA DEATHS

2016–2020 SEASONS

(Week 40 through Week 10)

141

2020–2021 SEASON

(Week 40 through Week 10)

3

A 98% Decrease

REPORTED COVID-19 DEATHS

2020–2021

(Week 40 through Week 10)

134

Compiled by Jeremy Samuel Faust, MD, MS, FACEP, instructor at Harvard Medical School, attending physician in the department of emergency medicine at Brigham and Women's Hospital in Boston, and Medical Editor in Chief of ACEP Now. Visit ACEPNow.com for the sources of these statistics.



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Unintended Consequences of Vaccine "Passports"

They may exacerbate existing inequities in vaccine access and impose restrictions on those who haven't gotten a shot

by HARRY W. SEVERANCE, MD

With millions of coronavirus vaccinations being administered each day in the United States, an important question has emerged: Do people need proof of their vaccination status to gain access to public accommodations? In the simplest sense, a platform of standardization is already present. All vaccine recipients in the United States receive a registration card documenting their vaccination status. On the other hand, the cards are easily lost and not easily replaceable. Other countries have developed their own unifying standards. What should be done?

Vaccine Passports

The concept of vaccine passports as a pathway for restarting stalled and devastated economies is a burgeoning topic among news media outlets.¹

There is an expanding list of countries that have announced or formalized vaccine passport systems, including Israel, Greece, Belize, Ecuador and the Galapagos, Georgia, Iceland, Seychelles, and Lebanon, with other countries such as Spain, Sweden, Hungary, Poland, Australia, Saudi Arabia, and Denmark investigating such options, and more are coming.^{1,2} Two U.S. states, Vermont and Hawaii, have announced vaccine passport plans for visitors, with other states like New York considering such options.

Large numbers of cities and communities in this country are investigating vaccine passport options as a way to restart their tourism and/or local economies. Several airlines and cruise companies have already announced that vaccine documentation will be part of their upcoming boarding scenarios. Smartphone applications are now appearing that tout digital validation of proof of vaccination to avoid counterfeiting of vaccine cards. The European Union, the International Air Trans-

port Association, and China, among others, already have or are proposing COVID passport documentation schemes.^{1,2}

In addition, vaccine promotions are now appearing. For example, a brewery in Cleveland is offering 10-cent beers to the first 2,021 people who show proof of vaccination through its "Beer and the Shot" promo. Uber and Lyft have been providing free and discounted rides to and from vaccine sites. A luxury hotel in Dubai is offering 25 percent discounts to fully vaccinated United Arab Emirates residents. Many economies that have suffered a year-long battering from the pandemic are coming to view vaccine passports as a route to their salvation.³

Possible Consequences

It is clear that some forms of vaccine passport systems will be with us in the near future. What are some consequences of this? One of the chief consequences is the creation of groups of "haves"—those having received vaccinations—and "have-nots"—those not yet receiving vaccines. If currently accelerating pathways toward utilization of vaccine passport scenarios continue, those without vaccine documentation may find themselves increasingly restricted in the activities they can resume and more subject to the ongoing medical maladies that social distancing has created.¹

Will vaccine passports work as intended? Maybe. But there will be significant problems in standardization of any vaccine passport scheme, especially when considering the many different countries and venues. There will arise, as with any other sought-after commodity, persons and groups falsifying data to make a profit or gain access for themselves. All these things will make vaccine passport platforms less functional and create operational difficulties.

If, through ongoing vaccinations and

COVID-19 survival, we begin to see a steady decrease in ongoing infections (evolving herd immunity) that leads to COVID-19 fading into the background and either disappearing (like SARS-1) or becoming less pervasive and more seasonal like influenza, then the various COVID-19 vaccine passport scenarios currently being explored may eventually be dropped as being too difficult to operate and manage. In short, if vaccines work well enough and enough people get them, we won't need passports. We'll just need vaccines.

However, for the immediate future, there is a real possibility that one or several vaccine passport scenarios will have an impact on all of us, whether we are considering international travel and vacationing or indoor dining at a local restaurant. And we may see, during this immediate future, an evolution of groups of "haves" and "have-nots." This could cause conflicts, or it could encourage more people to want to get vaccinated. Likely, vaccine passports will cause both. +

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Rethink STI Care

Start treating partners, too

by RACHEL SOLNICK, MD; MELISSA FLEEGLER, MD, FACEP; LARISSA MAY, MD; AND KEITH KOCHER, MD, MPH

A 21-year-old patient presents to the emergency department with complaints of dysuria a week following exposure to a new sex partner. She has increased vaginal discharge on exam and is empirically treated for gonorrhea and chlamydia. After her ED visit, the test results are positive for gonorrhea, so the department's follow-up nurse fills out the communicable disease reporting form to the health department.

Meanwhile, the patient has talked to her partner about the diagnosis and urges him to seek care. Because he is asymptomatic and concerned about the cost of care, he does not get tested. A month later, the patient is reinfecting by her untreated partner. This time, she waits to go to the emergency department because she is embarrassed. She finally presents with pelvic inflammatory disease and a tubo-ovarian abscess, requiring admission to the hospital.

This case represents many others that are examples of preventable morbidity. The emergency department might have helped avoid this outcome if it had provided the patient with antibiotics for her partner via expedited partner therapy (EPT). EPT is the practice of treating the partners of patients diagnosed with sexually transmitted infections (STIs) if their partners are unlikely to seek timely care. In the era of increased awareness of transmissible diseases and health equity, the time has come for emergency medicine to embrace EPT.

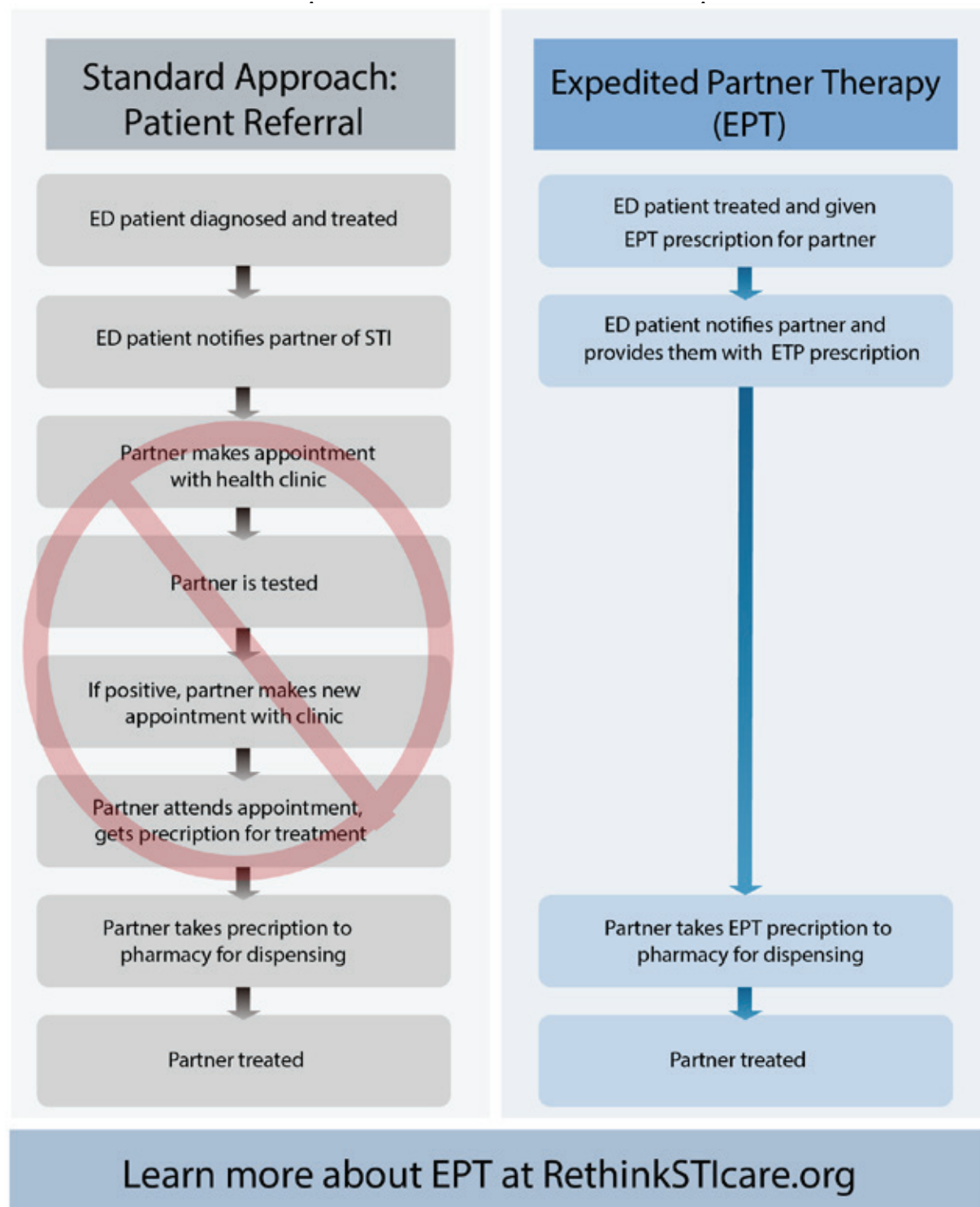
STIs Are a Hidden Public Health Crisis

Though the COVID-19 pandemic has seized the world's attention to the threat of communicable diseases for the past year, the United States' STI epidemic has been intensifying unchecked for the past decade. The Centers for Disease Control and Prevention (CDC) estimated one in five Americans had an STI on any given day in 2018.¹ From 2014 to 2018, the incidence of gonorrhea rose 63 percent, and chlamydia rose 19 percent to 1.8 million cases, the most chlamydia cases ever reported to the CDC.²

STIs are not just a problem for the American health care system; they are a specific issue for the emergency department. STI visits in the emergency department have been outpacing the general rise in all-cause ED visits.³ In certain cities, emergency departments have had a substantial increase in positive tests, with higher positivity rates than outpatient settings.⁴ Emergency departments see a disproportionate share of STI cases compared to other health care settings. On a national level, in 2018, emergency departments diagnosed similar proportions of all gonorrhea cases as STD clinics.⁵

Moreover, STIs are an issue of social justice and health equity. STIs disproportionately affect those with low health care access, racial minority and minoritized populations, and low-income populations, the same vulnerable populations that are more likely to use the emergency department for STI care.^{6,7} Additionally, young males without primary care

Figure 1: Standard therapy versus expedited partner therapy for sexually transmitted infections.



access are more likely to seek care in ED settings, representing an opportunity for EPT of male partners to improve women's reproductive health via the prevention of STI complications, including future infertility and pregnancy complications.

Adding to the urgency to stop the STI epidemic, antimicrobial resistance for gonorrhea is increasing. In December 2020, for the first time in a decade, the CDC revised its treatment guidelines for gonococcal infections.⁸ Among other changes, these updates recommended: 1) doubling the recommended cephalosporin doses both for parenteral treatment and pill-based therapy and 2) replacing azithromycin for concurrent treatment of suspected chlamydia with doxycycline when treating empirically for gonorrhea. These changes were made due to increasing azithromycin resistance and concerns for antimicrobial stewardship.

Why Use EPT?

The good news is the emergency department can play an important role in curbing the STI public health crisis by using a tool readily at

our disposal: EPT.⁹ EPT has proven effective at breaking the cycle of STI reinfection. In a meta-analysis, EPT reduced reinfection rates by 29 percent and increased the number of partners treated per patient compared to telling the patient to have their partner treated (ie, simple patient referral).¹⁰

In addition to being efficacious, patients want EPT. In STD clinics, 69 percent of patients accepted EPT when offered.¹¹ EPT is legally protected or permissible in 46 states and potentially allowed in four states.¹² EPT has a history of broad-based support by the CDC, American Osteopathic Association, American Academy of Family Physicians, Society for Adolescent Health and Medicine, American College of Obstetricians and Gynecologists, and American Bar Association.¹³ In the 2020 ACEP Council meeting, ACEP joined these organizations in official support of EPT.¹⁴

The State of EPT in the ED

Despite the potential for EPT to help stop the spread of STIs, the practice is not yet widely used in emergency departments. Studies have

identified a need to increase awareness and education among outpatient clinicians. This knowledge gap is magnified in the emergency department, where the practice has received little attention both at the training and practice levels. In a national survey of medical directors in academic emergency departments, only 19 percent reported their department had implemented EPT. Moreover, departmental uptake of its use was uneven; some physicians did not realize EPT was even legal within the reported implementer sites. Despite low awareness, there is enthusiasm for EPT: About half (56 percent) of those surveyed thought their department would support EPT, and most (79 percent) personally supported EPT. These findings demonstrate there is room for growth in the national implementation of ED-based EPT.

What Can You Do?

What are some things you can do as an individual to implement EPT in your department?

CONTINUED on page 13

STYMIED BY STEMI

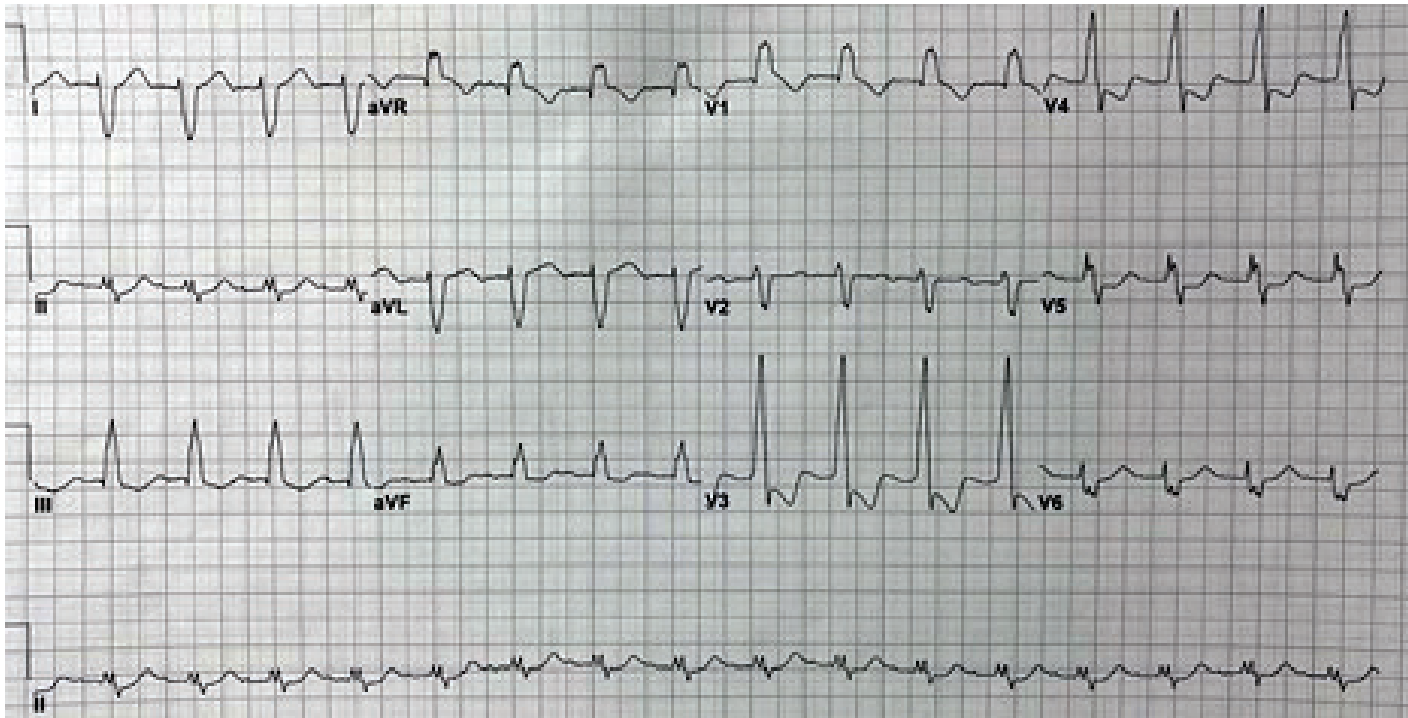


Figure 1: The patient's baseline ECG.

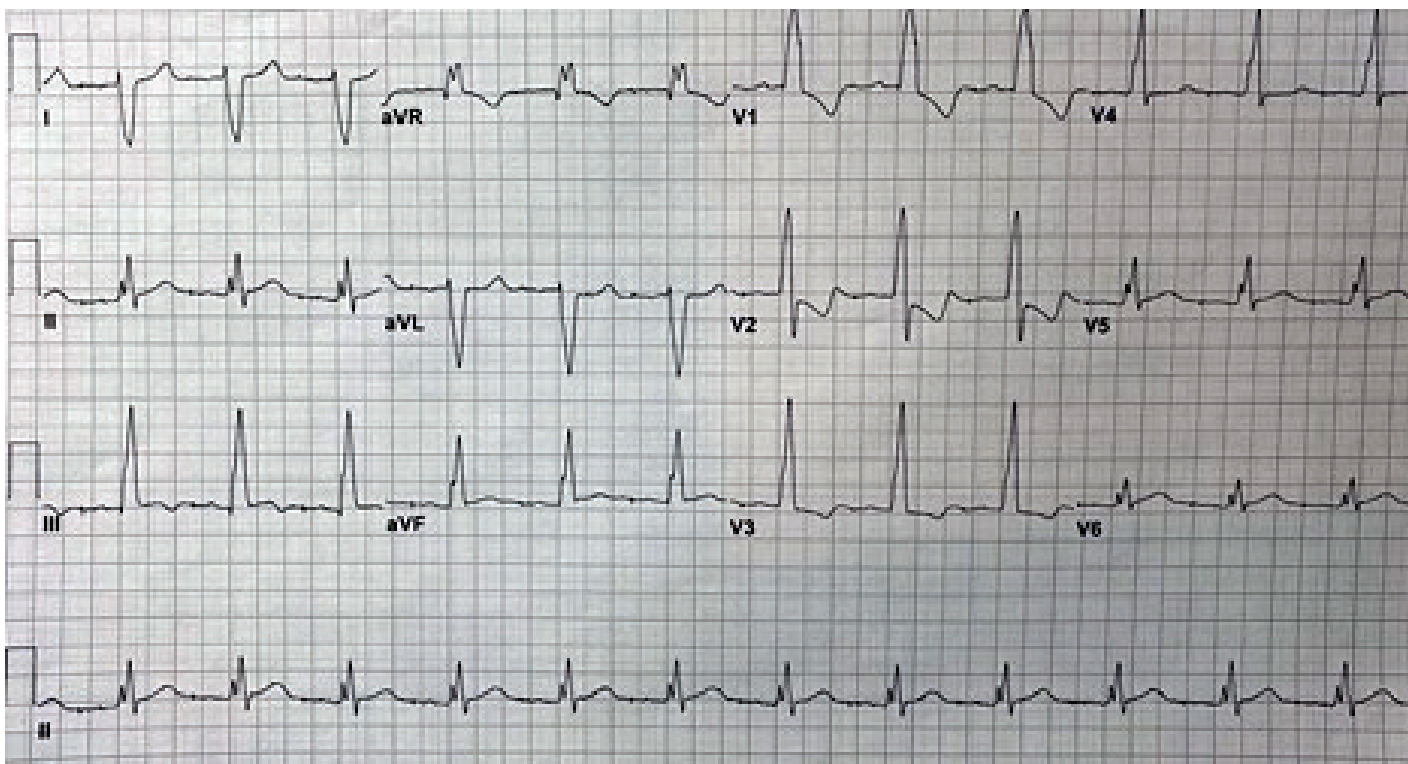


Figure 2: The patient's initial ECG 10 minutes after presentation.

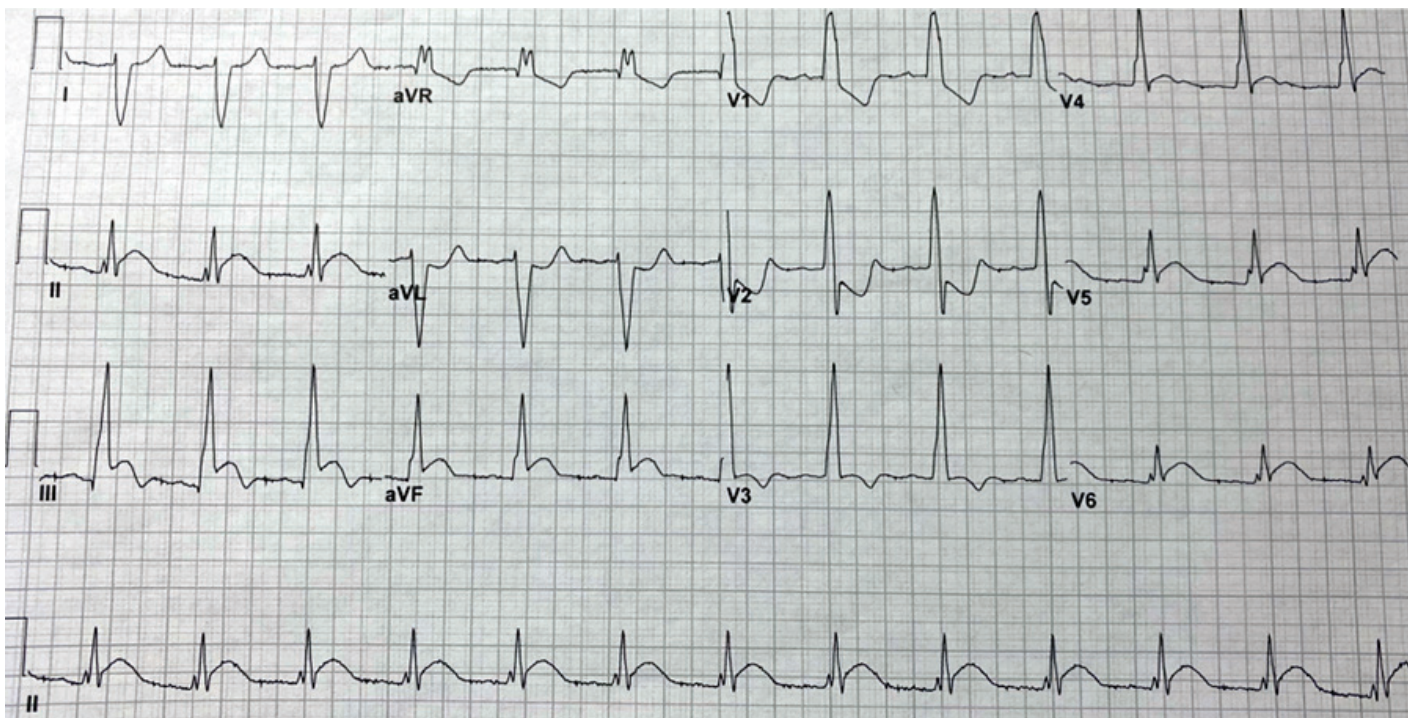


Figure 3: The patient's ECG prior to cardiac catheterization, one hour after the initial ECG.

A patient with acute coronary syndrome symptoms required repeat ECGs

by ALEXANDRA FERGUSON, MD

The Case

A 35-year-old white woman presented to the emergency department with a chief complaint of chest pain. She stated the chest pain began acutely, about 15 minutes prior to her arrival. The pain was sharp; radiated to her left arm; and was not accompanied by nausea, vomiting, fever, or chills. She had not missed any of her daily medications and had never experienced this type of discomfort before. She had no history of pulmonary embolism or deep vein thrombosis.

The patient's past medical history was significant for transposition of the great vessels, which required surgical repair at 4 months of age (a Senning procedure). She was known to have severe right ventricular (RV) dysfunction and was awaiting transplant workup. She also had a history of diabetes mellitus, hypothyroidism, atrial fibrillation, atrioventricular nodal re-entrant tachycardia (requiring previous ablation), and cardiac arrest with subsequent placement of an automated implantable cardioverter defibrillator. Her medications included rivaroxaban, insulin glargine, dulaglutide, levothyroxine, lisinopril, spironolactone, and metoprolol.

On exam, she was an obese woman who appeared slightly uncomfortable but in no acute distress. Vital signs were unremarkable: blood pressure 98/61, heart rate 84, temperature 97.3°F, respiratory rate 18, and oxygen saturation 95 percent on room air. She had normal speech and mental status and had no diaphoresis. Her lungs were clear. A cardiac examination was normal. There was no pitting edema.

Her initial electrocardiogram (ECG) demonstrated an atrially paced rhythm with prolonged atrioventricular (AV) conduction and a bifascicular block, also evident on an ECG obtained one year prior to this incident (see Figures 1 and 2). Notably, the ST depression expected in the anterior leads with a right bundle branch block (RBBB) were changed, with less ST depression in V3 than before and no ST depression noted in V4. Though no pronounced ST elevations or depressions were noted, these findings were changes from the patient's most recently known baseline and expected discordance in the ST segment in RBBB.

Standard labs were obtained, with a complete blood count and basic metabolic panel within normal limits. A high-sensitivity initial troponin was normal.

At one hour, although her chest pain remained unchanged, her repeat troponin was elevated at 73 ng/L, up from 13 ng/L initially. A repeat ECG demonstrated ST segment elevations in leads II, III, AVF, and V6, with ST depression in V1 and V2 (see Figure 3). Given the

concern for acute coronary syndrome (ACS), the patient was given a 324 mg dose of aspirin, intravenous heparin bolus, and infusion. She was seen by cardiology and was taken for emergent cardiac catheterization.

Cardiac catheterization demonstrated a complete embolic occlusion of the apical left anterior descending artery supplying the systemic right ventricle. Severe dilation of the right ventricle was also noted. The distal location of the embolus was not amenable to percutaneous coronary intervention.

The patient remained hemodynamically stable, and the decision was made to continue her on a heparin infusion and transfer her to the tertiary care facility for advanced cardiac care. There, she was evaluated for heart transplantation due to her worsening right ventricular dilation and systolic function.

Discussion

ACS includes a spectrum of illness, encompassing several types of NSTEMIs (non-ST segment elevation myocardial infarctions) and STEMI (ST segment elevation myocardial infarctions).² NSTEMIs result when there has been enough ischemia to the myocardium that myocardial cells are injured and begin to leak intracellular contents that may be measured in the blood (eg, troponin, creatine kinase, etc.).^{1,3} In contrast, STEMI result most commonly from total occlusion of a coronary vessel, typically from a ruptured atherosclerotic

plaque. STEMI are suspected by a specific set of criteria on ECG tracings, including:⁴

- New ST elevation at the J point in two contiguous leads with $f > 0.1$ mV in all leads other than leads V₂-V₃
- For leads V₂-V₃, ≥ 0.2 mV in men ≥ 40 years, ≥ 0.25 mV in men < 40 years, or ≥ 0.15 mV in women
- New left bundle branch block (in some cases, especially with Sgarbossa criteria)⁵

Regardless of the cause, restoring perfusion and oxygen supply to the myocardium is critical and time-dependent, making rapid diagnosis essential.

Although there are relatively clear diagnostic criteria to indicate STEMI, actual ECG findings can vary widely depending on the characteristics of the infarct (ie, size, severity, and timing) as well as when the ECG was obtained. In the patient described above, at the time of presentation, STEMI criteria were absent.

Riley and colleagues conducted a retrospective study in 2013 that evaluated 41,560 patients from 432 sites and found that 11 percent of patients who were ultimately diagnosed with STEMI did not meet STEMI criteria at the time of the initial ECG. They noted that 72.4 percent of this group developed diagnostic ECGs for STEMI on repeat testing obtained within 90 minutes. Further analysis of these populations showed no significant difference in the timing of the initial ECG being obtained

in relation to symptom onset and no significant difference in coronary artery disease risk factors between the population who had initially diagnostic ECGs for STEMI and those who did not.⁶

Meanwhile, a paradigm shift in ACS may be under way. Meyers and colleagues conducted a retrospective study that reviewed a prospectively collected population of 467 ACS patients. The researchers compared two paradigms: occlusion with STEMI and occlusion without STEMI. Occlusion myocardial infarction (OMI) was defined as acute with either Thrombolysis in Myocardial Infarction (TIMI) 0-2 flow or TIMI 3 flow plus peak troponin T > 1.0 ng/mL. The results demonstrated that among 108 OMIs, only 60 percent met the usual STEMI criteria. Therefore, the study suggested that about 40 percent of OMIs did not present with STEMI criteria; those with STEMI plus OMI were more likely to go to a catheterization lab sooner than STEMI without OMI, though adverse outcomes were similar.⁷

Summary

This case describes a patient who presented with symptoms concerning for ACS. Repeat ECGs and troponin demonstrated myocardial ischemia that was not previously apparent.

It is widely known that ACS may be present without an initial increase in cardiac troponin if there has not been sufficient time. Many patients may be experiencing an acute STEMI

without classic diagnostic ECG changes. Because the time to reperfusion is critical, it is important to obtain serial ECGs to reevaluate patients presenting with ACS symptoms.⁸

New studies have challenged the STEMI/NSTEMI model to include additional patterns in order to prevent delay in intervention of occlusion without STEMI. **+**

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EPT | CONTINUED FROM PAGE 11

Begin by checking the legal status of EPT in your state. The CDC's website provides recent guidelines by state (www.cdc.gov/std/ept/legal), and state health departments often have guidance for clinicians and patient information sheets. If the legal status of EPT is not specified by your state's laws, work with your state ACEP chapter to lobby for this public health intervention at your next state advocacy day. If EPT is not explicitly legally protected in your state like it is in some states, advocate that your legislature promote clarity around ambiguous laws to protect prescribers from legal liability. If your state supports it, determine the specific prescribing guidelines and refer your patients locally for follow-up testing and partner treatment.

Note that prescribing guidelines vary by state. Some require the name of the patient or partner on the prescription, while in others you can simply prescribe to the name "Expedited Partner Therapy." Likewise, different states have varying legal requirements regarding what information must be provided along with EPT, such as specific information sheets to hand to the patient.

Once you have confirmed your state supports EPT prescribing, you can take action at a local level. To improve the overall care for STIs, advocate that your department use rapid tests to improve the accuracy of empiric treatment.¹⁵ Though EPT can still be offered empirically based on clinical diagnosis before lab confirmation, rapid testing can aid in the precision of selecting which patients should be offered EPT at the primary visit.

Help educate your colleagues and potential prescribers by giving a presentation at your departmental or faculty meetings. Meet with key stakeholders (eg, medical directors, nursing, pharmacy, electronic health record builders, informatics officers, hospital legal



counsel, etc.) to determine what orders and policies work best for your group. For patients identified as positive during lab follow-up, work with your medical director and follow-up office (eg, nurse, physician assistant, nurse practitioner, pharmacist, etc.) to create straightforward protocols for offering EPT after lab confirmation. For tips and tools on starting EPT at your emergency department, check out this website designed by emergency physicians: www.RethinkSTIcare.org.

EPT is not a process that will happen on its own in the emergency department. But by learning about EPT and becoming a departmental champion, you can take the critical first step in moving emergency medicine toward improving the sexual and reproductive health of our patients. **+**

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IS YOUR ED READY FOR OUR LITTLEST PATIENTS?

The National Pediatric Readiness Project Assessment starts this month

Emergency departments pride themselves on being ready to treat any patient at any time—but how prepared is your emergency department to provide top-quality care for children of all ages? The National Pediatric Readiness Project (NPRP) aims to find out. The project measures how prepared U.S. emergency departments are to treat young patients and monitors for changes in preparedness scores over time.

The multiphase quality improvement initiative is supported by ACEP, the Emergency Nurses Association, the federal Emergency Medical Services for Children Program, and the American Academy of Pediatrics.

How It Works

Using a periodic questionnaire, NPRP assesses how prepared emergency departments are to provide high-quality care to children. The assessment will run May 1, 2021, through July 31, 2021, and will include emergency departments in the United States, including territories and freely associated states. ED nurse managers will receive mail and email notifications to

WEBINAR

Register for this webinar for an overview of the National Pediatric Readiness Project and the upcoming assessment. Miss the session? Get a link to the recording at www.acep.org/pediatrics.

Name: Pediatric Readiness: Every Child, Every Day

Date: Wednesday, May 19, 2021

Time: 2–3 p.m. Eastern

Register: <https://webapps.acep.org/meetingsv1/registration.aspx?mcode=emp-51921>

complete the online assessment. Each emergency department can only complete one assessment, so it's important to engage with hospital leadership now so you can have input in your emergency department's response.

How to Get Ready

- Visit www.PediatricReadiness.org to ac-

cess a toolkit and checklist to help your emergency department prepare to deliver the highest-quality care to pediatric patients.

- Download and print the assessment form at www.PedsReady.org.
- Work with your ED leadership to gather the requested information so you're ready to

complete the online assessment when the invitation arrives.

Benefits

Each emergency department that participates in the NPRP Assessment will receive an ED Gap Report that includes:

- ED pediatric readiness score from 0–100
- Average scores of emergency departments of similar pediatric volume
- Average score of all participating emergency departments
- Analysis to target efforts for improvement in pediatric readiness

Emergency departments with higher pediatric readiness scores have a fourfold lower rate of mortality for children with critical illness compared to those with lower readiness scores.

Getting your emergency department ready for the NPRP Assessment can make a real difference for our littlest patients. Get started today! ➕

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Abusive Head Trauma

Tips for diagnosing this challenging condition

by RALPH J. RIVIELLO, MD, MS, FACEP; AND
HEATHER V. ROZZI, MD, FACEP

The Case

A 2-year-old male presents with vomiting. He was seen by his pediatrician two days ago after having fallen from his mother's lap. At that time, the pediatrician noted bruising to the child's face (see Figure 1). A radiograph of his facial bones was normal. The child has been fussy since then and today vomited several times.

Diagnosis Tips

Abusive head trauma (AHT) can be caused by shaking of a child or direct impact to the head of a child. AHT is fatal more often than any other form of child abuse injury.^{1,2} AHT sustained in the first year of life is fatal in nearly a quarter of cases.² Children who survive AHT are often left with significant long-term morbidity, including intellectual disability, seizure disorders, cortical blindness, endocrine dysfunction, and neuromuscular disorders.³

AHT may be a challenging diagnosis to make because patients often present with nonspecific symptoms. However, it is crucial for emergency clinicians to consider AHT because up to 28 percent of AHT victims suffer subsequent injuries if the initial diagnosis is missed.²

As many as 30 percent of AHT cases are misdiagnosed at initial presentation. Factors contributing to misdiagnosis include presentation with nonspecific symptoms, race (white children are more often misdiagnosed), and the presence of both biological parents in the household. The lack of radiologists specializing in pediatrics may allow for incorrect interpretations of radiological studies, further contributing to missed AHT.²

Most AHT is not planned; perpetrators often inflict AHT during attempts to make an infant stop crying. Thus, many patients with AHT present with an altered level of consciousness. Other common presentations of AHT include bruising to the torso, ears, or neck in a child under age 4 (ie, TEN-4 bruising), bruising to any child younger than 4 months, vomiting without diarrhea, poor feeding, and irritability.^{2,4} In contrast, the most common presentation of *unintentional* head trauma is localized scalp swelling in an otherwise asymptomatic child.⁵

A thorough review of the patient's chart, including previous emergency department visits and outpatient visits, may improve the odds of diagnosing AHT. In one chart review, more than a quarter of children who suffered severe physical abuse had previous abusive trauma that was missed or misdiagnosed by physicians. The most common misses were related to encounters with a chief complaint of bruising in which the history provided was unlikely to be accurate due to the developmental stage of the child or in which the mechanism could not plausibly have caused the injury.⁶ Pierce and colleagues described bruising in the TEN-4 distribution as a common sentinel injury for later, more significant physical abuse.⁴

Once AHT is considered as a diagnosis, a thorough evaluation is warranted; laboratory and radiological studies are often required. Traumatic head injury in conjunction with other traumatic injuries such as fractures, retinal hemorrhage, intra-abdominal injury, or oropharyngeal injury is significantly more concerning for AHT than an isolated head injury alone.⁷

Neuroimaging (such as CT and/or MRI) should be obtained to provide a diagnosis and to ascertain the extent and (to some degree) the timing of the injuries.⁷ A skeletal survey (see Figure 2) should also be obtained and, ideally, interpreted by a pediatric radiologist; 42 percent of children with AHT have occult fractures.

Lab abnormalities may include anemia due to intracranial or intra-abdominal injuries. Electrolytes, liver function tests, pancreatic enzymes, and a urinalysis are also recommended



Figure 1 (TOP): A 2-year-old male with bruising to his face.



Figure 2 (LEFT): Radiograph of an arm fracture from a pediatric skeletal survey.

KEY POINTS

- Abusive head trauma in infants and children is often fatal. When not fatal, it can result in significant long-term morbidity.
- Abusive head trauma is often misdiagnosed. Clinicians should remain vigilant in infants with bruising or nonspecific symptoms, such as vomiting.
- A thorough review of the medical record may reveal sentinel injuries, which increase concern for abusive trauma.
- Children suspected to have abusive head trauma should undergo a thorough workup, including laboratory and imaging studies.
- Child abuse patients will benefit from a multidisciplinary approach.

to identify potential injuries to other organ systems.⁷

A multidisciplinary approach is recommended for children with AHT. Involvement of child protective services is legally required. Where available, consultation with pediatric trauma surgery, pediatric ophthalmology, and pediatric neurology/neurosurgery should be obtained. If available, child abuse specialists can provide significant assistance with evaluation and disposition.

Case Resolution

Due to the patient's head injury and vomiting, CT of the head was obtained and showed a 4 mm left frontal subdural hematoma that appeared acute. A skeletal survey revealed healing rib fractures. The child was hospitalized, and child protective

services was notified. ☒

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by LANDON JONES, MD, AND RICHARD M. CANTOR, MD, FAAP, FACEP

The best questions often stem from the inquisitive learner. As educators, we love, and are always humbled by, those moments when we get to say, "I don't know." For some of these questions, you may already know the answers. For others, you may never have thought to ask the question. For all, questions, comments, concerns, and critiques are encouraged. Welcome to the Kids Korner.



Don't Burst the Balloon

Question 1: What is the ideal solution to fill the G-tube balloon?

Clinicians commonly replace silicone gastrostomy tubes, or G-tubes, in the emergency department. While the kits seem to have all the needed tools for replacement, they do not have an appropriate liquid to fill the balloon. Anecdotally, we have been told that saline degrades the balloon, leading to G-tube failure, and that balloons should be filled with either distilled water or tap water. Is this true?

While not specific to G-tubes, a 1983 study by Studer and colleagues evaluated silicone Foley catheter performance with increasing concentrations of saline (0.9 percent, 2.5 percent, 5 percent, and 10 percent) and compared this to distilled water.¹ Silicone urinary catheters were filled with each concentration of saline and tested in 22° C urine for volume loss at two weeks and four weeks. Each catheter was filled with 5 mL of the respective fluid. The authors also compared the 0.9 percent and 5 percent saline at 37° C. Catheters using distilled water had an average volume of 3.8 mL and 3.3 mL remaining at two and four weeks, respectively. The volume of 0.9 percent saline was 3.9 mL and 3.4 mL, respectively. No *P* values or other tests of statistical significance were provided.

A prospective randomized study by Hui and colleagues evaluated 4,000 latex 14 French Foley urethral catheters using either sterile water (n=2,011) or 0.9 percent normal saline (n=1,972).² According to the authors, it is often anecdotally reported that saline prevents catheter removal because sodium crystals block the balloon channel. The investigators filled the catheters with 10 mL of fluid and stored them in 37° C water



baths for four weeks. The primary endpoint of this study was "rate of deflation failure of the Foley balloon." The mean balloon volumes in both groups were also measured. In the sterile water group, there was a 9.2 percent deflation failure rate (185 of 2,011), with an average balloon residual volume of 9.005 mL at four weeks. In the saline group, the deflation failure rate was

8.0 percent (162 of 1,972), with a mean residual balloon volume of 9.182 mL at four weeks. There was no statistical difference between the two groups (*P*=0.162), suggesting no difference in failure to deflate the balloon depending on the solution used.

It is important to note that these were latex urinary catheters—not silicone—and the measured endpoint may not be applicable to G-tubes, which are not routinely deflated and reinflated as a part of their typical use.

A similar randomized study by Huang and colleagues evaluated 600 latex urinary catheters using water, saline, and glycine.³ The authors used the same endpoint of "catheter deflation–failure rate" and measured the residual volume within the balloon after six weeks in an artificial urine solution. The retained balloon volumes after six weeks for water, saline, and glycine were 9.0 mL, 9.2 mL, and 9.1 mL, respectively. There were no catheter failures, and the differences were felt to be clinically insignificant.

Conclusion

Data are very limited on this topic. We are unable to find any definitive medical literature that suggests the choice of balloon-filling solution affects silicone G-tube balloon function.

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Diarrhea in Appendicitis

Question 2: How commonly do children with acute appendicitis present with diarrhea?

A 2011 retrospective study by Gendel and colleagues evaluated 1,848 children admitted to a pediatric surgical service over a five-year period.¹ Of these, 686 underwent appendectomy for suspected acute appendicitis. The negative appendectomy rate was 5 percent. Of the patients who demonstrated acute appendicitis, 9 percent had diarrhea. Another retrospective study by Choi and colleagues evaluated 712 pediatric patients with surgically confirmed acute appendicitis.² There was noted diarrhea in 10.7 percent of patients with confirmed acute appendicitis. Interestingly, in cases involving a delayed diagnosis of acute appendicitis, diarrhea was present in 18.1 percent of cases, suggesting that the presence of diarrhea may have falsely reassured clinicians at the time of initial evaluation.

A retrospective case control study by Lu and colleagues evaluated 114 pediatric cases with either acute appendicitis (n=32) or acute gastroenteritis (n=82).³ All the children had been admitted for abdominal pain evaluation, and data were analyzed according to their final diagnosis. The authors sought to better delineate clinical characteristics of these two diagnoses. Regarding diarrhea specifically, there was no



clinically significant difference between the average number of days of diarrhea for either acute appendicitis (1.78 ± 2.11 days) or gastroenteritis (1.76 ± 1.47 days), suggesting that diarrhea should not dissuade the clinician from evaluating for acute appendicitis.

While acute appendicitis is much less common in children younger than 5 years of age, the clinical presentation in young patients with acute appendicitis is typically less straightforward.

A 10-year retrospective study by Pogorelic

and colleagues evaluated 1,687 appendectomies at a single institution. Only 5.3 percent (90) of the cases were identified in children younger than 5 years of age.⁴ The authors also analyzed the data according to appendiceal perforation or nonperforation. In the 90 children younger than 5 years of age, 58 cases were perforated while 32 cases were nonperforated. Overall, 30 of 90 (33 percent) children under 5 years with acute appendicitis had diarrhea, and 29 of 30 cases with diarrhea were in the perforated appendicitis group. While acute

appendicitis in children younger than 5 years is uncommon, diarrhea was not uncommon in these individuals. The present of diarrhea should therefore not influence the practitioner away from considering appendicitis in a pediatric patient with lower abdominal pain.

Conclusion

Overall, the literature suggests that diarrhea is present in approximately 10 percent of cases of acute appendicitis; its presence should not falsely reassure the clinician with higher suspicion of acute appendicitis. Additionally, while appendicitis is much less common in children younger than 5 years of age, diarrhea, in particular, appears to be relatively common in children in this age group with acute appendicitis. +

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ED Design Post-Pandemic

Emergency department redesigns must incorporate recent lessons learned

by JAMES AUGUSTINE, MD

It won't be long now: Emergency department medical directors and nurse managers will soon be asked to prepare an after-action report on the pandemic. The goal will be to develop recommendations for new processes and designs for a safer emergency department.

After the COVID-19 pandemic subsides, most hospitals and their emergency departments will need to be designed for unscheduled care as it will be practiced over the next 15 to 20 years, which will be the approximate interval for planning the changes and the average life cycle of the redesigned emergency departments. ED leaders must plan for the most important elements for the next-generation emergency department, taking into account key lessons of COVID-19, Ebola, and other emerging infectious diseases. But plans must also include contingencies for active-shooter events, bad weather, and an ED staff that is prepared to succeed in managing any and all of those challenges.

Here are a number of necessary future ED design elements.

Design Considerations

It has never been clearer that the emergency department is the front door to the hospital and that those who work in the emergency department need a correctly designed space to address the full spectrum of patient needs. Space design for the emergency department must demonstrate great flexibility for patient needs and enable ED staff to deliver services safely, supported by technology, to a patient group that is much higher acuity than in the past.

Every patient's journey to the emergency department starts outside the building. Tents outside of emergency departments are not an acceptable long-term hospital practice for patient care or staff. An alternative is to design ED parking lots and EMS entrances so they can be flexed into treatment areas when major incidents occur. This means the area outside the emergency department must have signage, lighting, intercom, water, electrical, and computer outlets that will make it easier to initiate care. There must be built space that accommodates patient greeting and initial management even if there is a major multiple-casualty incident or victims are contaminated with biologic, chemical, or radiological material. The intake area of the emergency department must be able to accommodate routine intake and screening. Eventually, devices for rapid detection of hazardous substances will be part of every ED entrance, doing surveillance for dangerous contaminants. A separate entrance must be designed—a multipurpose “dirty” entry—for the most dangerous patients, such as those with Ebola.

Emergency departments should be designed for a digital management process, not paper-based systems. Registration of ED patients must be done near the site of care. Innovative use of portable computers, phone systems, and passive tracking of staff can make the department safer and quieter. ED staff in the COVID-19 and Ebola eras needed hands-free access to communication systems. Investment in the right technology needs to be part of the plan.

Mental health and substance abuse patients are increasing in numbers. Their crisis events must be managed in some space in the community. Either the hospital community and mental health resource agencies must plan for appropriate and dedicated care spaces for these patients, or the default site of care will be the emergency department. There must be specific plans to build a dedicated mental health suite in the emergency department designed for safe management of patients, for longer stays of those patients, and for the safety of appropriate hospital staff.

Telemedicine has become an important element of unsched-



uled care. There should be a dedicated space in the emergency department established as a telemedicine hub for this growing market, where ED staff can contribute to both on-site care and telemedicine-delivered care. Central communication hub functions will be a hallmark of the future emergency department.

Universal ED room design is important for the wide mix of patients emergency departments receive and for the safety of the staff. The use of recliners as an alternative to stretchers can save space and actually be more comfortable for many patients. Rooms must be easy to clean and disinfect, plus must include durable surfaces on all fixtures. Carts that can be pulled into rooms can give specialty care (eg, wounds, enterology, gynecology, seclusion for patients who need quiet care in a safe space, orthopedic, cardiac, pulmonary, and pediatric). All patient care areas need patient-friendly features, such as telephones, televisions, sound systems, and intercoms. Toilets should be plentiful and easy to clean and disinfect.

The COVID-19 era has been family-unfriendly in health care buildings. It is unlikely this will be acceptable in the future. ED rooms should be designed to accommodate guests, with only small central congregation areas used for guest waiting if something is going on in the room that is not family-friendly.

The core staff work areas should have counter-height work spaces, with ample access to the ED information system for physician, nursing, and technician staff to work on without sitting down. Cart systems should also supply the staff work areas.

ED nurses and other staff need a donning and doffing area that is safe and easy to use. That starts with adequate locker

space for work entry and exit around the shifts. Importantly, there must be spaces adjacent to critical care areas that allow personal protective equipment changeout. There should be generous space available for patients who need care in negative pressure or laminar-flow rooms.

Emergency departments must be friendly to seniors, both inside and outside the walls, and through all communication needs. (One of the enduring images of COVID-19 is an elderly patient lying on a stretcher with a staff member trying to communicate through a personal protective mask.) Lighting, flooring, signage, wheelchairs, and staff training must reflect the growing number of senior patients in the ED mix.

An observation area or clinical decision unit is an essential element of unscheduled care. In many hospitals, emergency physicians will be responsible for these patients for the duration of the patient stay, so the area should be close enough to the emergency department to allow efficient management and excellent patient care.

Summary

The COVID-19 pandemic will not be an isolated event. The lessons from more than half a million deaths in the United States and tremendous stress on health care workers and the emergency system must be applied. The post-pandemic period will be an important opportunity for every emergency physician and ED leader to redesign our practice environments and systems. The lessons we learn and improvements we make stand to enhance the level of care that we are able to provide for years to come. +



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Will COVID-19 Change Medicine for the Better?

The pandemic has created opportunities to improve our health care system

by CEDRIC DARK, MD, MPH, FACEP

Many emergency physicians outside of the initial hot zones remember the first few weeks of the COVID-19 pandemic—cities shut down, hospitals devoid of elective cases, and emergency department volumes slowed to a trickle. Many Americans, fearful of contracting the virus, stayed home. Colleagues sent dispatches—from the East telling of a vicious warring front, from the Rocky Mountain West of a battle yet to be fought, and from the South of a scourge coming ashore.¹

Nationwide, it was only a matter of time until COVID-19 finally breached emergency departments around the nation. As it did, practice patterns changed dramatically. As mentioned in this month's journal club article at right, non-COVID-19 admissions dropped nearly 43 percent by April 2020. At my shop, we spoke to the remaining patients via iPads, limiting our contact time to brief interactions necessary to gather data from the physical exam.

Our patients were not visiting their primary care doctors, and specialty appointments were cancelled en masse. As a result, people weren't being sent to the emergency department for abnormal labs or concerning symptoms, as clinics often did before the pandemic. Low-acuity patients converted to virtual visits, bypassing our doorsteps. Many unfortunate souls suffered in silence at home, becoming a hidden death toll amid this pandemic.²

After flattening the curve in the spring and being buffeted by several waves of coronavirus hot spots over the summer, the profession of medicine settled into a new normal by the fall and winter. How has emergency medicine changed?

By now, almost all of us have been vaccinated. Vaccina-

tion likely will prove to be our greatest weapon against this viral enemy. Yet, simple things, such as physical distancing and mask wearing, will remain with us for some time. I fully anticipate wearing a mask inside the hospital for months, if not years, to come until COVID-19 is relegated to medical history like Haemophilus influenzae in children.

Instead of carrying a doctor bag, a stethoscope, and a bottle of our own proprietary remedy as we walk from house to house, physicians now possess telemedicine, handheld ultrasounds, and electronic prescribing, which can bring us inside of our patients' homes. The move to virtual care is not likely to disappear.³ Although some insurance companies are already pulling back on their obligations to pay for telemedicine services, patients and physicians expect this new mode of health care delivery to continue.⁴

The revolutionary speed with which medical science has disseminated amid this pandemic, the growing acceptance of therapies like mRNA vaccines, and the rapid acceleration of telemedicine portend a bright future for our profession, should we choose to look beyond the transient blips in our practice patterns during 2020 and into a future shaped by those who came of age in the time of COVID-19. ☺

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EMRA+POLICYRx HEALTH POLICY JOURNAL CLUB

Patient Visits Plummet During Pandemic

by CLINTON LAM

After the declaration of the COVID-19 pandemic in the United States in March 2020, hospital admissions nationwide, including those for non-COVID-19 diagnoses, fell substantially.¹ Despite an uptick in health care use beginning in June and July 2020, non-COVID-19 admissions remained significantly beneath pre-pandemic baseline volumes as many patients continued to defer hospital care for acute and sometimes even life-threatening medical conditions. However, the differential impacts of the pandemic and rebound on admission patterns among demographic groups are not well understood.

A recent study investigated the pandemic's impact on admissions in relation to patient demographic factors and admission diagnoses.² Using a nationally representative hospital group's data comprising more than 1 million admissions across 36 states, the authors compared weekly non-COVID-19 and total admissions in 2020 to corresponding weeks in 2019. They also collected data on patient demographics including age, race, ethnicity, poverty rate of the patient's ZIP code, insurance coverage, and hospital COVID-19 volume.

The authors found that non-COVID-19 admissions decreased 42.8 percent below baseline as of the nadir in April 2020 before rebounding to 15.9 percent below baseline during the summer of 2020. Somewhat larger but significant declines were witnessed in patients over the age of 70; patients residing in majority-Hispanic, majority-Black, or high-poverty ZIP codes; uninsured patients; and hospitals belonging to the highest quintile of COVID-19 exposure. Most notably, during the rebound in June and July, non-COVID-19 admissions for patients residing in majority-Hispanic ZIP codes remained especially low at 31.8 percent below baseline. Moreover, admissions for non-COVID-19 diagnoses in this study decreased by at least 20 percent by April 2020 and remained below pre-pandemic baselines during the rebound.

COVID-19 has presented new public health challenges, highlighting the systemic inequities in the modern health care system and access barriers facing patients requiring hospital care.³ Deferred treatment for acute medical conditions likely contribute to adverse outcomes that disproportionately harm minority and low-income populations. Some of that may not be immediately detectable, though some is. Without a quick return to normalcy within reach, hospitals, health care systems, and public health authorities must collaborate to ensure that all patients can obtain needed hospital care during the pandemic in a timely, just, and equitable manner.

This Health Policy Journal Club review is a collaboration between Policy Prescriptions and the Emergency Medicine Residents' Association. ☺

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SKEPTICS' GUIDE TO EMERGENCY MEDICINE



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Admission Decisions in Rib Fracture Cases

Can spirometry help assess older patients with multiple rib fractures?

by KEN MILNE, MD

The Case

A 71-year-old man presents to the emergency department after a ground-level fall. He has a history of hypertension and benign prostatic hypertrophy. His vital signs are all normal, and he declines any pain medication. Investigations reveal rib fractures on the right side. Guidelines recommend admitting him, but he would like to go home.

Clinical Question

In patients 60 years of age and older and with three or more rib fractures, can spirometry identify those who can safely be discharged home from the emergency department?

Background

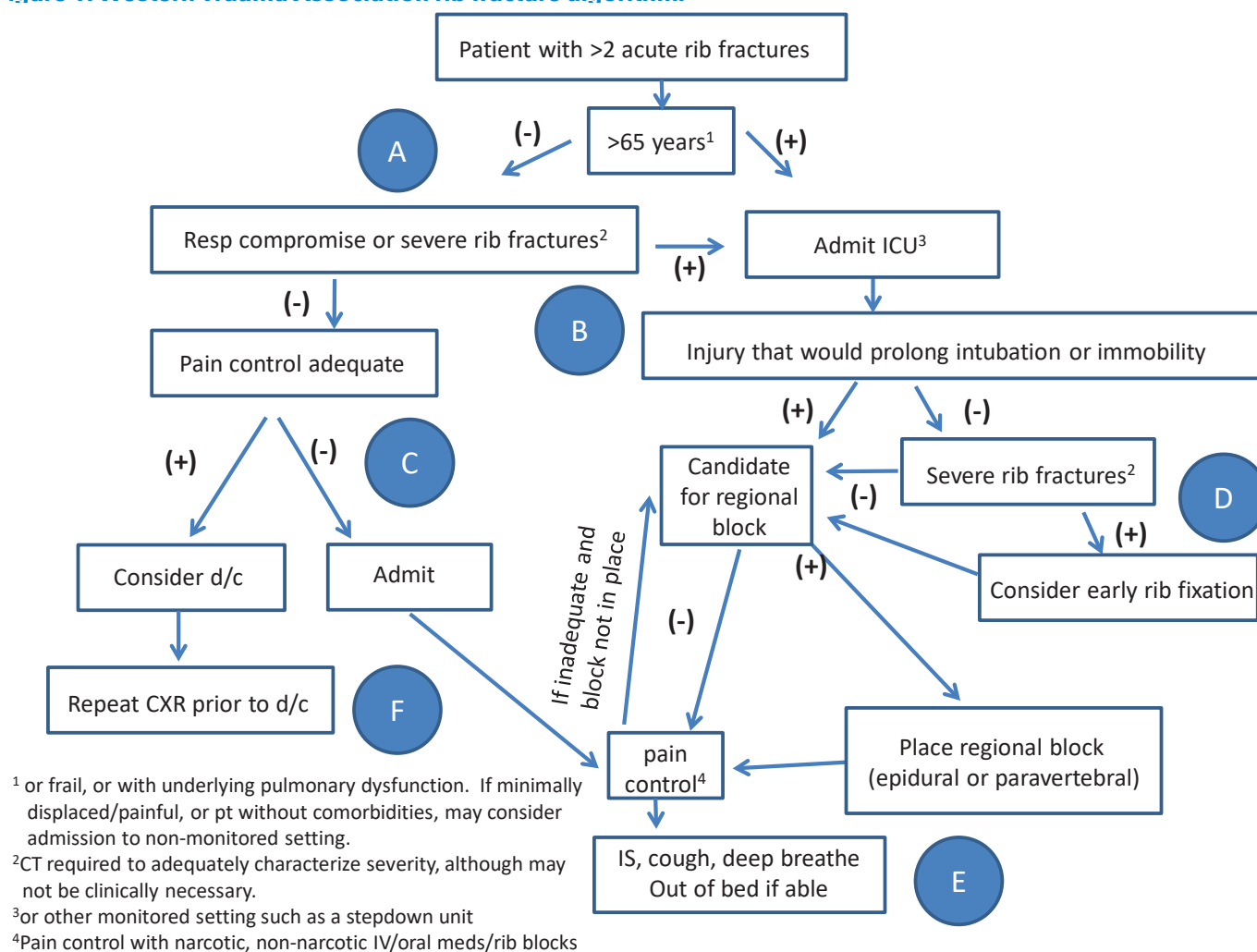
Older patients often present to the emergency department with traumatic rib fractures. These injuries can lead to life-threatening complications such as pneumonia, pneumothorax, and acute respiratory distress syndrome. The Western Trauma Association guidelines recommend admitting patients older than 65 years of age with two or more rib fractures to an ICU or other step-down monitored setting (see Figure 1).¹

There are some studies suggesting that early spirometry may be a useful prognostic indicator in patients with multiple rib fractures.² Spirometry measurements include forced vital capacity (FVC), peak expiratory flow (PEF), forced expiratory volume in 1 second (FEV₁), and negative inspiratory force (NIF). While PEF has not been demonstrated to be closely correlated with patient outcomes, it remains possible that spirometry could be used to identify patients who could avoid unnecessary hospitalization and be discharged home.³ However, these studies were all limited by their retrospective observational nature.

Reference: Schuster KM, Sanghvi M, O'Connor R, et al. Spirometry not pain level predicts outcomes in geriatric patients with isolated rib fractures. *J Trauma Acute Care Surg.* 2020;89(5):947-954.

- **Population:** Patients 60 years of age and older admitted to the hospital with at least three rib fractures within 24 hours of injury.
- **Exclusions:** Injury occurred greater than 24 hours before presentation, significant additional musculoskeletal injury, or cognitive impairment and able to cooperate with testing.
- **Exposure:** Spirometry measuring (FVC, FEV₁, and NIF).
- **Comparison:** Handgrip strength to assess frailty and pain measured on a visual

Figure 1: Western Trauma Association rib fracture algorithm.



¹ or frail, or with underlying pulmonary dysfunction. If minimally displaced/painful, or pt without comorbidities, may consider admission to non-monitored setting.

²CT required to adequately characterize severity, although may not be clinically necessary.

³or other monitored setting such as a stepdown unit

⁴Pain control with narcotic, non-narcotic IV/oral meds/rib blocks

analog scale (VAS).

Outcomes:

- » **Primary Outcomes:** Discharge disposition and length of stay (LOS).
- » **Secondary Outcomes:** Mortality, pneumonia, intubation, unplanned transfer to higher level of care, and re-admission (within 30 days).

Authors' Conclusions

"Spirometry measurements early in the hospital stay predict ultimate discharge home, and this may allow immediate or early discharge. The impact of pain control on pulmonary function requires further study."

Key Results

There were 346 patients over the age of 60 with isolated rib fractures requiring admission to the hospital. Of those, 260 met the exclusion criteria. This resulted in a cohort of 86 patients with a mean age of 77 years that was 50 percent female. Just over half (45 of 86) were admitted to the step-down unit, 19 of 86 (22 percent) to the ICU, and 22 of 86 (26 percent) to the surgical floor. The mechanisms of injury were falls (54 percent), motor vehicle collisions (45

percent), or motorcycle collisions (1 percent). The median number of fractured ribs was five. Pneumothorax was present in 5 percent and hemothorax in 4 percent of the patients included in the analysis. One patient out of 86 died (1.2 percent).

Higher spirometry values and grip strength were associated with early discharge from the hospital

Outcomes:

- **Primary Outcomes:** Discharge disposition and LOS
 - » The FEV₁ adjusted odds ratio (aOR) was 1.03 (95 percent confidence interval, 1.01–1.06; $P=0.001$).
 - » Grip strength was also significantly associated with being discharged home.
 - » FVC and NIF values were not statistically significant in providing prognostic information.
 - » **Pain score was poorly predicative of hospital LOS.**
- **Secondary Outcomes:** A few patients experienced some of the secondary outcomes of interest (n). This included mortality (1), pneumonia (2), intubation (1), unplanned

transfer to higher level of care (3), and hospital readmission within 30 days (3).

Evidence-Based Medicine Commentary

1. Selection Bias: All patients were screened except when an investigator was unavailable. Three-quarters of patients (260 of 346) were excluded for a variety of reasons, but no breakdowns were provided in the manuscript. This introduces the possibility of selection bias that may impact the results.

2. Power: There was no formal power calculation prior to the study, though the authors say a "rough" estimate to find a difference between the two groups would have been about 400 patients. It is unclear exactly how they arrived at this number. They did estimate a complication rate of about 20 percent based on the Geriatric Trauma Outcome Score, which is calculated by taking the patients age + (injury severity score x 2.5) + 22 (if given packed red blood cells by 24 hours).⁴

It is good practice to do a power calculation when planning a research project. Moreover,

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Massive Hemorrhage Protocols

The 7 Ts of Excellence

by ANTON HELMAN, MD, CCFP(EM), FCFP

Outcomes in polytrauma depend not only on prompt recognition of occult shock and early source control of bleeding but on having a standardized massive hemorrhage protocol (MHP) that enables rapid and coordinated delivery of lifesaving blood products and medications.^{1,2} Observational data suggest that every one-minute delay in administering the first blood product to the exsanguinating polytrauma patient is associated with a 5 percent increase in mortality.³



Historically, the definition of massive transfusion protocol is the administration of 10 units of red cells over 24 hours. This definition, however, is inadequate for short ED stays.⁴ And it's not just transfusion. We also have to initiate a series of adjacent and often crucial actions simultaneously. MHP places the emphasis on the early, timely administration of blood products, ancillary medications such as tranexamic acid, precise clinical and laboratory monitoring and targets, temperature control, and hemorrhage control.

Historically, the definition of massive transfusion protocol is the administration of 10 units of red cells over 24 hours. This definition, however, is inadequate for short ED stays.⁴ And it's not just transfusion. We also have to initiate a series of adjacent and often crucial actions simultaneously. MHP places the emphasis on the early, timely administration of blood products, ancillary medications such as tranexamic acid, precise clinical and laboratory monitoring and targets, temperature control, and hemorrhage control.

7 Ts of Massive Hemorrhage Protocol

1. Trigger

The decision to activate an MHP should be guided by clinical judgment, decision tools, and response to early management. There is no one clinical or laboratory finding that accurately predicts the need to activate an MHP. Nonetheless, there are three time periods during which activation of an MHP should be considered: prehospital, ED arrival, and intra-resuscitation. During the prehospital period, a concerning mechanism of injury such as a fall from three stories or a shock index (heart rate/systolic blood pressure) ≥ 1 should trigger the consideration for an MHP activation.⁵

When the patient arrives to the trauma bay, clinical judgment, clinical decision tools, and pitfall conditions should be considered. A Revised Assessment of Bleeding and Transfusion (RABT) score ≥ 2 has been shown to be more accurate than the Airway, Breathing, and Circulation (ABC) score in predicting the need for massive transfusion.⁶ RABT assigns one point each for shock index >1 , pelvic fracture, positive Focused Assessment with Sonography for Trauma (FAST), and penetrating injury. Pitfall conditions that may lower the threshold for activating an MHP include those patients who are elderly, those taking anticoagulant medications or dual antiplatelet therapy, and those taking medications that may blunt hemodynamic response to hemorrhage such as a beta blockers.

The third time period to consider activation of an MHP is during resuscitation. Resuscitation intensity has been suggested as a trigger; specifically, if there has been a requirement of three units of any combination of crystalloids or blood products to maintain adequate tissue perfusion, we might call this an "intense" resuscitation.⁷ I recommend a 2:1:1 ratio of red cells to plasma to platelets. This is based on my interpretation of the Pragmatic, Randomized Optimal Platelet and Plasma Ratios (PROPPR) trial, which found no significant mortality difference at one or 30 days between those patients who received a 1:1:1 ratio versus a 2:1:1 ratio.⁸ The 2:1:1 ratio may allow for faster administration of blood products since plasma takes time to thaw and can therefore be a rate-limiting bottleneck. Hence, our goal should be to have four units of uncrossmatched red cells at the bedside in under 10 minutes, with a rapid transfuser administering the blood product soon thereafter. If more blood product is required to maintain adequate tissue perfusion, then four units of plasma and four units of red cells should be transfused simultaneously thereafter. Benefits of this strategy are

twofold: Administration of red cells is not delayed by plasma preparation (ie, labeling and thawing), and some patients will stabilize with red cells only.

While this strategy is familiar to North American trauma centers, some European centers favor a fibrinogen and prothrombin complex concentrates (PCCs)—first strategy. Small randomized trials suggest that using fibrinogen concentrate or cryoprecipitate with or without PCCs is at least as effective as the North American red cell/plasma strategy at 1:1, though larger trials are required to further corroborate these findings.⁹ The benefits of the concentrate strategy are that blood products can be kept at room temperature in the trauma bay for rapid access, a blood group is not necessary, the need for AB plasma (often in short supply) is avoided, they are pathogen-reduced small volumes injected over minutes, and they do not cause transfusion-related acute lung injury—a not uncommon complication of red cell transfusions. A fibrinogen and PCCs-first strategy should be considered in rural hospital settings where blood products may not be immediately available.

2. Team

Preparing yourself, your team, and your equipment is essential for optimizing care. Psychological preparation affects both individual and team performance.¹⁰ Visualization of complex tasks, deep breathing exercises, and positive self-talk can help focus.¹⁰ To ensure rapid delivery of blood products and bleeding source control, early notification and preparation of the extended team—including the ED team, laboratory team, blood bank, and surgical team—are recommended. Time permitting, briefing the ED team is important, based on the limited data gathered from paramedics, and should include prioritizing objectives and assigning roles with each team player and ensuring specific equipment is in place and ready. Adapting a shared mental model may improve team performance.¹⁰

3. Testing

A standardized order set for laboratory tests can help reduce cognitive burden and more rapidly identify potential coagulopathy and metabolic dysfunction caused by massive hemorrhage.¹¹ Without a standardized order set, the most common laboratory tests that are omitted in the emergency department are calcium and fibrinogen. Calcium plays an important role in regulating coagulation and hemostasis. The citrate preservative in blood products binds to serum calcium, making it inactive. It is therefore important to monitor serum calcium and to consider administering supplemental calcium every three to four blood products that are administered. Fibrinogen is consumed in coagulopathies of trauma and diluted by the administration of blood products. It requires careful monitoring and replacement with cryoprecipitate or fibrinogen concentrate. Pregnant and postpartum patients with active hemorrhage tend to have lower fibrinogen levels compared to other patients, and they carry an increased risk for disseminated intravascular coagulation.¹² It is thus imperative to have a low threshold to administer fibrinogen in the pregnant or postpartum polytrauma patient with massive hemorrhage.

To assess the trajectory of the trauma resuscitation, in addition to hemoglobin, fibrinogen, and lactate, international normalized ratio (INR) should be monitored. Elevated INR has been shown to predict poor outcomes in trauma patients; correcting it with fresh frozen plasma (FFP), with or without PCCs, is advised.¹³ If the patient with imminent life-threatening bleeding is known to be taking warfarin and an MHP has been activated, both FFP at a minimum ratio of 1:2 and 2,000 IU prothrombin concentrates, plus 10 mg of vitamin K, should be administered. It is not necessary to wait for the INR result before administering PCCs in this context.

4. Tranexamic Acid

Despite recent literature suggesting no benefit and potential

harms in patients with massive gastrointestinal bleeding, in many centers, tranexamic acid (TXA) continues to be part of the standard order set for polytrauma patients based on the Clinical Randomisation of an Antifibrinolytic in Significant Haemorrhage 2 (CRASH-2) trial.^{14,15} TXA administration is recommended for all trauma patients suspected of life-threatening hemorrhage within three hours of the time of injury who are deemed candidates for massive transfusion as well as for patients with initial systolic blood pressure <90 or heart rate (HR) >110 . Observational data suggest that every 15-minute delay decreases its mortality benefit by 10 percent.¹⁶ An important exception for the administration of TXA in trauma patients is for isolated head injury. The CRASH-3 trial did not show a clinically significant benefit for early administration of TXA in these patients.¹⁷ For patients seen at nontrauma centers being prepared for transfer to one, if TXA is indicated, it is imperative that it be administered prior to transfer. The dose of TXA in the CRASH-2 trial was 1 g bolus followed by 1 g infusion over eight hours. However, subsequent observational data in trauma patients suggest that as much as half the time, the infusion of TXA after the initial 1 g bolus is not given at all.¹⁸ This may be because the infusion is associated with logistical problems of requiring a dedicated IV. This has led some experts to administer a one-time 2 g IV dose up-front to ensure all patients receive an adequate dose of TXA.

5. Temperature

Hypothermia has been shown to increase mortality via worsening coagulopathy in trauma patients.¹⁹ It can result from prehospital environmental conditions, the trauma itself, or administration of blood products. It is important to monitor the patient's rectal temperature during the initial ED assessment and at least every hour thereafter, depending on whether the patient presented to the ED hypothermic. To prevent hypothermia, remove wet clothing, place warm blankets, and administer warmed IV products.

6. Targets

Clinical, hematologic, and metabolic resuscitation targets are used to monitor patient tissue perfusion and response to resuscitation and for prognostication. Clinical targets to consider include HR <100 , mean arterial pressure >55 – 70 (depending on baseline blood pressure), Glasgow Coma Scale >15 (if no head injury or intoxication), urine output >30 mL/hr, and normal inferior vena cava diameter/collapsibility on point-of-care ultrasound. Hematologic targets include serum hemoglobin >8 mmol/L, platelets $>50 \times 10^9/L$ (>100 in head injured patients), INR >1.8 , and fibrinogen 1.5–2 g/L. Metabolic targets include pH >7.3 , lactate <4 mmol/L, and serum calcium >1.15 mmol/L.²

7. Termination

The general requirements for termination of an MHP include reaching the clinical, hematologic, and metabolic targets described above. However, the decision to cease an MHP is often more nuanced, usually requiring collaboration between the emergency department and inpatient teams. A common pitfall is terminating an MHP at the first sign of hemodynamic stability, only to be hit with a second wave of hemorrhage and instability during transfer to the operating room. Peri-trauma vasoplegia may occur despite appropriate resuscitation.

Whether you work in a rural setting or a state-of-the-art trauma center, a standardized, protocolized approach using the "7 Ts" to massive hemorrhage in trauma patients will help your workflow and your patients.

A special thanks to Dr. Jeannie Callum, Dr. Barbara Haas, and Dr. Andrew Petrosoniak, whose expertise on an EM Cases podcast inspired this column.

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doing a post-hoc power (PHP) calculation can be misleading. It is better just to look at the confidence interval around the point estimate. Looking backwards with a PHP calculation does not help interpret the results.⁵⁻⁷

3. Blinding: The investigators in this study were not blinded. Although spirometry seems like an objective measurement, it does require significant instructing of the patient. The fact that the same investigator performed both the pain assessment and the spirometry could have introduced “coaching bias.” Coaching bias could be conscious or unconscious. It may have occurred when investigators failed to encourage patients equally depending on their perceived level of pain.

4. Rib Fractures: Rib fractures are missed on initial chest X-ray in up to 50 percent of cases. One rib fracture on chest X-ray is associated with a high risk of multiple rib fractures.⁸ In this study, all but four patients had their injuries identified by CT scan. This suggests that there could have been denominator neglect (ie, some patients may have been discharged from the emergency department with undiagnosed multiple rib fractures). The authors did not screen 322 acutely injured patients who were discharged directly from the emergency department. Three were believed to have subacute rib fractures by imaging characteristics.

5. Follow-up: Secondary outcomes included pneumonia, readmission, and mortality at

Older patients often present to the emergency department with traumatic rib fractures.

30 days. Very few patients were observed to have any of these outcomes. It is possible that some patients deteriorated more gradually and that these secondary outcomes were not captured within the one-month time frame.

Bottom Line

The use of spirometry as a simple prognostic tool for older patients with multiple rib fractures is interesting. However, there is not enough high-quality evidence for it to guide us in discharging patients home from the emergency department at this time.

Case Resolution

You perform a spirometry, and the patient's FEV1 is 64 percent of predicted. This provides a baseline but does not affect your decision to admit him to hospital on a monitored bed

with the hope that he can be discharged home within the next 24 to 48 hours.

Thank you to Dr. Emil Iversen, an emergency medicine resident at the University Hospital of Zealand and vice-chair of the Danish Society for Emergency Medicine, for his help with this review.

Remember to be skeptical of anything you learn, even if you heard it on the Skeptics' Guide to Emergency Medicine. 🧠

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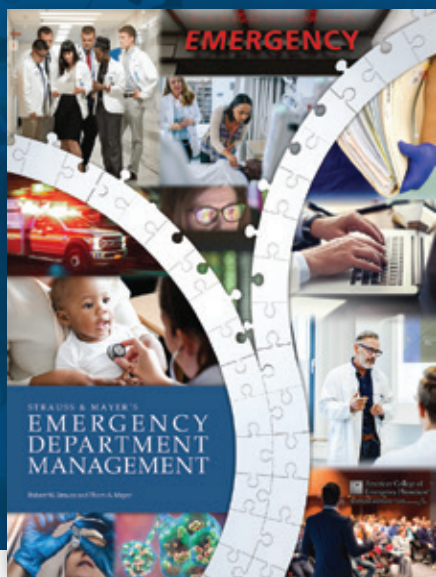
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Preprints, Pandemic, & Peer Review

How COVID-19 has changed how research is published and consumed

by LAUREN WESTAFER, DO, MPH

The need for expedient knowledge translation became apparent early in the course of the COVID-19 pandemic. Clinicians quickly found themselves in the midst of an “infodemic” as well—a torrent of misinformation and poor-quality information that was, at times, difficult to distinguish from trustworthy science. Peer-reviewed journals, which often take months to review and edit manuscripts prior to online “early view” publication, faced a record volume of submissions and intense pressure to publish quickly. Here, Michael Callaham, MD, Editor in Chief of *Annals of Emergency Medicine*, and Henry Wang, MD, MS, Editor in Chief of the *Journal of the American College of Emergency Physicians Open*, discuss the impact of these competing forces on the journals.

LW: The COVID-19 pandemic seems to have created a thirst for knowledge and a surge of manuscripts both preprint and peer-reviewed. How have you balanced the need for immediate knowledge with the desire for quality?

HW: We published the first issue of *JACEP Open* in early 2020, just as the pandemic was starting. We soon recognized that, given *JACEP Open*'s open-access format, we had an



Dr. Michael Callaham, Editor in Chief of *Annals of Emergency Medicine*



Dr. Henry Wang, Editor in Chief of *JACEP Open*



important opportunity—and obligation—to quickly disseminate information about COVID-19. We rallied our editorial resources to solicit and rapidly publish as many COVID-19 manuscripts as possible. We had to quickly add 10 new editors to our editorial board to ensure reasonable workloads and to maintain high-quality editorial oversight. Bear in mind that this surge of submissions occurred during the nascent phase of *JACEP Open*, a period where we expected to be striving to calibrate and achieve consistent editorial decisions.

LW: Has your view on the need or utility of preprints changed at all throughout the pandemic?

MC: I gained more experience with this than I'd had previously. One of my first papers to release as preprint was one of the few of quality [that we received]. I've concluded that the urgency or importance of the paper needs to be really solid to justify us preprinting something, and no one has solved the problem that quality review, revision, and selection take time and effort, often at a time when editors are overextended anyhow.

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Editors should remember that validity and quality are probably more important than novelty; the latter is worthless if the usual review process is bypassed. You'll notice that even the biggest and most elite journals with the most resources made some astounding mistakes in their urge to be first out the gate.

LW: What about your views on open-access articles or the role of open-access journals during the pandemic—has this changed?

HW: Open access is an important publication model and potentially *the* scientific journal format of the future. Many of our customers delight in the fact that their accepted articles are accessible by anyone anywhere in the world. This is particularly important as we strive to connect with a diverse range of readers, many of whom do not have access to institutional subscriptions.

LW: Have you noticed any important changes or patterns in manuscripts?

MC: We have found the average quality of submissions on COVID is lower than our average. ... Busy and overloaded clinicians and researchers respond to, "Quick, let's find something to publish right now," rather than, "This is complicated and needs a lot of expertise and evaluation—what a drag."

LW: Do you think the ways in which clinicians are consuming articles have changed?

HW: Social media will continue to play an influential role in spreading the word about scientific papers. Today's readers want information in as concise a format as possible. We need to continue reconceptualizing the format of the medical jour-

nals and articles so that they will be accessible to tomorrow's readers.

MC: Probably, and that's not a good thing. It is human nature to overlook the weaknesses of preprints in particular, even when you are aware of it and promise yourself you won't succumb. The big journals have proven that wrong information can be promulgated, and clinicians have a hard time keeping in mind the separation between slow, thorough, high-quality peer review and the other kind. There is a reason that our peer-review process is the complex, slow test of veracity that it has been for some 200 years. What's more important: to treat the patient fast or to give them the right and beneficial treatment? During COVID as well as normal times, our top priority is first *do no harm*. And that can seldom be assured with the first preliminary studies of a potential treatment. ⊕

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