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ALSO IN THIS ISSUE

CLINICAL cme

Focus on POCUS

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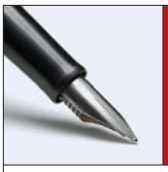

LETTER FROM THE EDITOR-IN-CHIEF

The Time for Urgent Care Clinicians to Embrace Bedside Ultrasound is Here

Ultrasound captured me from the start. It happened during a night shift on my emergency medicine clerkship at Hurley Hospital in Flint, MI. I remember picking up a phased array probe for the first time and the astonishment I felt when that beating heart appeared in black and white on the screen when I pressed the probe against the patient's gel-laden chest. I had seen ultrasound images online before, but this was different. I was watching someone's heart contract while they talked to me. I kept asking him more questions and half listening as I meandered clumsily across his abdomen in search of his gallbladder and spleen.

I didn't really examine why I was so enthralled by the images of his viscera at that moment. I just knew it was deeply satisfying to watch the vital organs, which were regularly hard at work in the background, on center stage in real-time. However, as I went through my residency training and began to learn to use point-of-care ultrasound (POCUS) for more specific clinical indications (and how to hold the probe properly), it became clear why scanning patients felt so good: it added limitless objective data to something which is inherently subjective—clinically assessing patients. POCUS proponents commonly say that "ultrasound is an extension of the physical exam." However, this is a tremendous understatement. In reality, ultrasound expands the potential of the physical exam exponentially.

Since the dawn of medicine, it has been a defining desire of physicians to get more abundant, reliable, meaningful objective data from our patients. And doctors have historically taken extreme measures for this information. Hippocrates, for instance, famously would taste his patients' urine as a method of diagnosing diabetes. Many centuries later, the French physician René Laennec, inspired by the same hunger for data, developed the first stethoscope. It was merely a wooden tube that could be placed between the clinician's ear and the patient's chest, but it revolutionized the physical exam. A century later, William Roentgen's discovery of the medical application of x-rays allowed clinicians to see inside living patients for the first time without an incision. X-ray, however, had limitations and risk. Both physicians and patients were ready for ultrasound. And through improvements in technology over recent decades, ultrasound machines have moved to the bedside.

In November 2018, *JUCM*[1] published an introduction to POCUS written by James Hicks, MD. In his article, Dr. Hicks made a compelling case for the appropriateness and value of POCUS in urgent care centers, citing improved patient experience, increasing portability, and affordability in addition to the wealth of useful clinical data provided. However, despite the many benefits of POCUS which exist, UCs and clinicians have generally been slow to invest in ultrasound for use at the bedside. The reasons generally come down to finances and politics.

It is true that UCs operate on tight budgets and thin margins and that ultrasound machines remain relatively costly (anywhere from about $2,000 to up to $200,000 for full function, radiology department quality models). It is also true that territorial disputes can erupt when non-radiologists experiment with performing, interpreting, and billing for imaging studies. POCUS, however, is a tool that our physician forebearers would have made sacrifices to the gods for and, unfortunately, we have mostly failed to access its enormous potential in UC because of some red tape and logistical barriers.

Parallels can be found in the story of telemedicine in UC. Prior to COVID-19, relatively few UCs invested in telemedicine because these services were largely not reimbursed equitably. Despite lack of reimbursement, however, the use of telemedical services always has made practical sense for the management of many acute issues. Now, since H.R. 6074[2] passed earlier this year, telehealth services have begun to be reimbursed by nearly all payers. Many UCs who had steered away from telemedicine previously had to scramble to get a telehealth infrastructure up and running. Conversely, UCs who had already incorporated telemedicine into their service lines were well positioned to pivot when in-center volumes plummeted.

Similarly, while there may not currently be a strong "business case" for POCUS in UC today, its practical clinical value is

undeniable. Even within this current pandemic, POCUS has again demonstrated power and versatility in the bedside assessment of patients with suspected COVID-19. Investigators studying the use of ultrasound have already identified characteristic findings in patients with coronavirus infection: scattered B-lines and peripheral consolidations, to name a few.[3] In fact, in some cases, these lung findings on ultrasound have even been found to be present before PCR viral testing is reliably positive.[4]

Given the sensitivity of POCUS for COVID-19, perhaps then it would be more practical when patients show up for drive-through testing to have them roll down their car window and face away from us so we can scan their backs instead of swab their noses. Such a protocol may sound unusual, but scanning the lungs can be done from behind the patient, requires no supply chain of test cartridges, offers immediate results, and does not aerosolize the virus. And in a crisis, solutions must not be judged by their orthodoxy, but by their safety and efficacy.

Who knows what the next unforeseen events to drive changes in legislation for reimbursement in favor of POCUS will be? When they do occur, those UCs and providers who had already invested the time and money in acquiring and mastering POCUS will be well positioned to finally capitalize on the use of this amazing tool that Hippocrates would drool over.

We are devoting most of this issue to the review of this topic.

For those of you already using POCUS in your centers, congratulations for being at the vanguard of acute care medicine. And for those of you still waiting for the right time, it's now. ■

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CLINICAL

AHEAD IN *JUCM*

Urinalysis is one of the most common tests administered in urgent care—so much so that it could be easy to overlook the nuances that make it such a valuable asset. In the July/August issue of *JUCM*, we will bring you an original article that offers an evidence-based approach to optimizing use of dipstick urinalysis, microscopy, and culture while also addressing the question of whether asymptomatic bacteriuria should be treated.

DEPARTMENTS

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JUCM The Journal of Urgent Care Medicine (ISSN 19380011) supports the evolution of urgent care medicine by creating content that addresses both the clinical practice of urgent care medicine and the practice management challenges of keeping pace with an ever-changing healthcare marketplace. As the Official Publication of the Urgent Care Association and the College of Urgent Care Medicine, *JUCM* seeks to provide a forum for the exchange of ideas regarding the clinical and business best-practices for running an urgent care center.

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Urgent care established itself as a more-than-viable option for quality care when it's needed—today, not when your PCP or ENT can squeeze you in next week. One sticking point early on was that if the patient needed an x-ray, they probably would have been better served going to the emergency room. As time wore on and the field evolved, on-site x-rays became the norm (even a distinguishing characteristic).

Well, time is still marching on and the next phase of convenient imaging to offer on site may be about to have its moment (as **Joshua W. Russell, MD, MSc, FAAEM, FACEP** explained in his Letter from the Editor-in-Chief on page 1). So, we wanted to devote the bulk of this issue to a Focus on POCUS, in which we look at several applications of point-of-care ultrasound in the urgent care setting:

- *Utility of POCUS in Skin and Soft Tissue Infection (page 17), by* ***Chelsea M. Burgin, MD FAAFP*** *and* ***Dustin S. Morrow, MD FACEP*** – POCUS has been shown in studies to reduce clinician uncertainty in distinguishing between cellulitis and an abscess, facilitating earlier diagnosis, and treatment initiation—clearly a clinical advantage, but also one likely to give your patient a good experience that they'll remember the next time they or a family member need immediate care. With 14 million patients presenting with skin and soft tissue infections every year, this is a significant consideration.

  Dr. Burgin, who spearheaded our Focus on POCUS, is the medical director of MD360 Boiling Springs and the Director of MD360 Ultrasound, Prisma Health and Assistant Clinical Professor, University of South Carolina School of Medicine Greenville. Dr. Morrow is POCUS Enterprise Director, Prisma Health – Upstate; Division Chief of Emergency Ultrasound, Department of Emergency Medicine; Director of Ultrasound Education, and Clinical Assistant Professor, University of South Carolina School of Medicine Greenville.
- *Evaluating a Child for Pneumothorax in the Urgent Care Setting (page 29), by* ***Chelsea M. Burgin, MD FAAFP****;* ***Samantha C. Shelhoss, MSIV;*** *and* ***Robert L. Gates, MD, FACS FAAP*** – POCUS can help expedite critical diagnoses and interventions in patients presenting with chest trauma, especially when pneumothorax is in the differential. Here, the authors use a real-life case to illustrate the approach that helped lead to a good outcome for a 12-year-old boy who sustained chest trauma when he rolled his all-terrain vehicle.

  Ms. Shelhoss is a medical student of University of South Carolina School of Medicine Greenville. Dr. Gates is the director of the Pediatric Trauma Program at Prisma Health and councilor for the AOA honor medical society at the University of South Carolina School of Medicine Greenville.
- *Case Report: A Pregnant Woman with Upper Right Quadrant Pain (page 35), by* ***Chelsea M. Burgin, MD, FAAFP; Meaghan A. Standridge, MSIV; and Kacey Y. Eichelberger, MD*** – Pregnant women presenting to urgent care require special consideration regardless of what their specific complaint is. While few urgent care providers have advanced training in obstetrics, they have to be aware that every symptom, diagnostic tool, and prospective treatment affects not only the patient but also her unborn child. So, when an expectant woman presented with right upper quadrant pain, bedside ultrasound was indispensable in helping to narrow down the cause and get the patient on the road to the right intervention.

  Ms. Standridge is a medical student at the University of South Carolina School of Medicine Greenville. Dr. Eichelberger is chair of the Department of Obstetrics and Gynecology, as well as site principal investigator for the National Institute of Child Health and Human Development (NICHD)'s Maternal-Fetal Medicine Unit (MFMU) Network trials.
- *Urgent Perspectives: Point-of-Care Ultrasound in Urgent Care: A Game Changer for the Practice—and the Practitioner (page 12), by* ***Chelsea M. Burgin, MD, FAAFP*** – Dr. Burgin's expertise in working with POCUS began with a curiosity that blossomed into fascination early in her career. In this editorial, she explains how what she has discovered by pursuing it paints a picture of new opportunities for urgent care (both clinically and from a business perspective.)

In addition to the rich, POCUS-focused content, we reserved space for ongoing and emerging concerns relevant to the urgent care provider and operator. Clearly, the ongoing COVID-19 pandemic is among them. So, we're grateful to **Tracey Q. Davidoff, MD, FCUCM** for offering her perspective on how to keep our wits about us with the onslaught of information and misinformation that overloads our ears and inboxes on a daily basis. You can read Dealing with an Epidemic of Information in the Midst of a Pandemic on page 14.

Dr. Davidoff is an urgent care physician in Lake Buena Vista, FL, vice president, College of Urgent Care Medicine, and a longstanding member of the *JUCM* Editorial Board.

The pandemic and POCUS both figure prominently in this month's Abstracts in Urgent Care section (page 38), in which Dr. Burgin and **Yijung Russell, MD** offer the key points of

new articles on CPR guidelines in the era of COVID-19, characteristics of COVID-19 in the pediatric population, POCUS from a primary care perspective, and more. Dr. Russell practices in the Department of Emergency Medicine at Amita Health Resurrection Medical Center in Chicago.

We're also pleased to continue to present original research in this issue. Our latest offering, The Effect—or Non-Effect—of Rapid Medical Evaluation Programs on Resident Education (page 22) examines whether provider-in-triage training adds to, detracts from, or has little effect on emergency medicine resident education. We're grateful to **David Jones, MD, MBS, MCR, FACEP; Gabbie Gioia, MD, BA; Philip Graber, MD; Amber Lin, MS; Mary Tanski, MD, MBA; Ryanne J. Mayersak, MD, MS; James A. Heilman, MD, MBA;** and **Joshua Kornegay, MD** for granting us the opportunity to share their work with you.

Dr. Jones is assistant professor of emergency medicine; associate residency director, emergency medicine; and emergency education scholarship fellowship co-director, Oregon Health & Science University (OHSU). Dr. Gioia is also at the OHSU School of Medicine. Dr. Graber is in the Department of Emergency Medicine, URMC. Ms. Lin is in the OHSU Department of Emergency Medicine. Dr. Tanski is associate professor and interim chair, OHSU Department of Emergency Medicine. Dr. Mayersak is assistant professor and associate residency director in the OHSU Department of Emergency Medicine. Dr. Heilman is associate professor in the OHSU Department of Emergency Medicine. Dr. Kornegay is assistant professor; associate residency program director; and simulation director, OHSU Department of Emergency Medicine.

Finally, in Revenue Cycle Management (page 48), **Monte Sandler**, executive vice president, revenue cycle management for Experity, dispels the notion that keeping you billing operation "in house" offers you more control over the process.

A Note of Appreciation for Our Peer Reviewers

We rely on the urgent care professionals who volunteer to serve as peer reviewers to ensure the content we publish is relevant and unbiased. For their work in reviewing content for the April, May, and June issues of this year, we thank:

- **Barbara Chambers**
- **Terence Chang, MD, FAAFP**
- **Sal D'Allura, DO, FAAFP**
- **Tracey Quail Davidoff, MD, FACP, FCUCM**
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Learning Objectives
1. To provide best practice recommendations for the diagnosis and treatment of common conditions seen in urgent care
2. To review clinical guidelines wherever applicable and discuss their relevancy and utility in the urgent care setting
3. To provide unbiased, expert advice regarding the management and operational success of urgent care practices
4. To support content and recommendations with evidence and literature references rather than personal opinion

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- **Michael B. Weinstock, MD**
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CONTINUING MEDICAL EDUCATION

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Utility of POCUS in Skin and Soft Tissue Infection (page 17)

1. **For identification of an abscess compared with physical exam alone, POCUS has been found to have:**
   a. A sensitivity of approximately 96% and a specificity of 83%
   b. A sensitivity of 70% and a specificity of 30%
   c. A sensitivity of 98% and a specificity of 99%
   d. There are no reliable data sets to measure this

2. **What characteristics would indicate treatment failure or development of an abscess in a patient with cellulitis?**
   a. Worsening pain
   b. Swelling
   c. Erythema
   d. All of the above

3. **Which of the following is not considered an abscess "masquerader"?**
   a. Baker's cyst
   b. Hematoma
   c. Sebaceous cyst
   d. Scar tissue

A Pregnant Woman with Upper Right Quadrant Pain (page 29)

1. **Classic presentation of acute fatty liver of pregnancy includes which of the following?**
   a. Edema in the extremities
   b. Nonspecific abdominal pain
   c. Hyperlipidemia
   d. Hyperglycemia
   e. All of the above

2. **Differential diagnosis for acute biliary disease in pregnancy should include which of the following?**
   a. Appendicitis
   b. Ascending cholangitis
   c. Pancreatitis
   d. All of the above

3. **POCUS of the right upper quadrant involves assessing for the presence of:**
   a. Gallstones or sludge
   b. Gallbladder wall thickening
   c. Pericholecystic fluid
   d. Sonographic Murphy's sign
   e. All of the above

Evaluating a Child with Chest Trauma for Pneumothorax in the Urgent Care Setting (page 35)

1. **Differential diagnosis for pneumothorax should include each of the following *except:***
   a. Chest wall contusion
   b. Hemothorax
   c. Diaphragm rupture
   d. Pulmonary nodule

2. **The benefits of POCUS vs chest x-ray in evaluation of pneumothorax include which of the following?**
   a. Cost effectiveness
   b. Convenience of use
   c. Lack of ionizing radiation
   d. All of the above

3. **A 2018 Cochrane Review determined that overall specificity of POCUS for detecting PTX was 99% in adults and 91% in children. Sensitivity in the pediatric population was found to be:**
   a. 10%
   b. 28%
   c. 62%
   d. 92%

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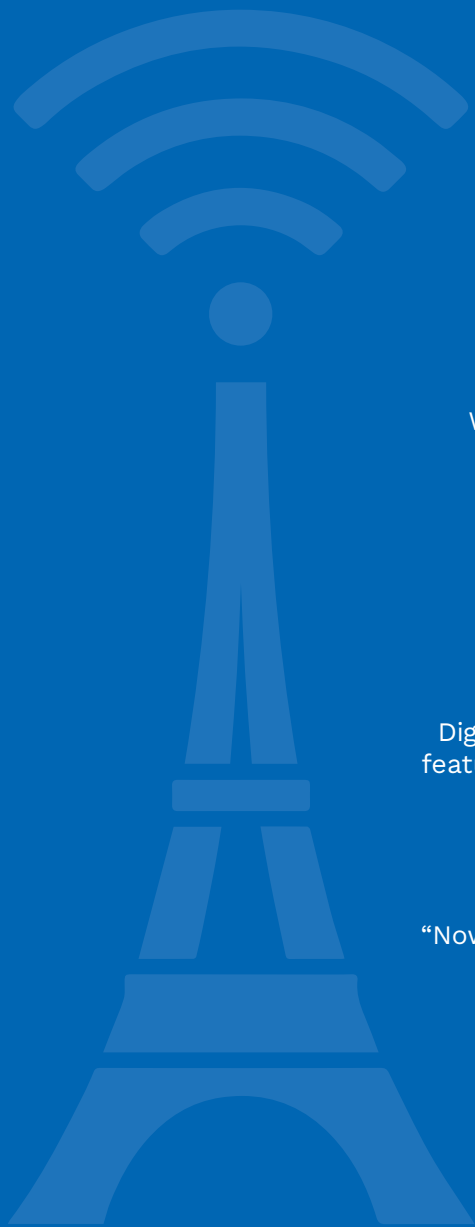

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The New Normal

LAUREL STOIMENOFF, PT, CHC

Since the COVID-19 pandemic took hold I have received multiple emails from every organization that I have done business with over the past decade. Each one at some point uses "unprecedented times" in the narrative. As time progresses and we transition from *hunkering down* to *easing up*, we are seeing the ubiquitous *unprecedented* replaced by *the new normal*.

Members have been reaching out to ask or hypothesize on what the new normal will be. No matter what, all seem to agree that it will indeed be *new* and urgent care BC (before COVID) is forever changed. Patients will undoubtedly return. We are already seeing it in our weekly surveys. But will they return at a traffic trajectory needed to support the costs of operating a bricks-and-mortar operation? Urgent care centers are already responding.

Here are just a few humble predictions.

- The relaxation of telemedicine payment criteria in response to the pandemic will reverse somewhat, but not to its prior levels. Urgent care centers will continue to implement and refine their telehealth capabilities to respond to an uptick in consumer acceptance, facilitate load balancing across sites, and supplement revenue.
- The value-based care model will gain greater traction as owners and operators seek opportunities to replace a portion of their revenue with a stable, non-volume-dependent source.
- Environmental modifications and heightened infection control procedures, not unlike those being implemented by hotels, including social distancing, will be needed to ensure patients feel safe to return. A survey of 500 U.S. consumers conducted by Sage Growth Partners and Black Book Market Research assessed consumer concerns during the COVID-19 pandemic.[1] It found that 21% of respondents felt unsafe and 39% were unsure if they felt safe in an urgent care center. In response, urgent care centers are re-evaluating policies and procedures and will sharpen marketing messages to emphasize quality, cleanliness, and patient safety.
- Pharmacies and pharmacists will become new competitors as state regulators and government payers seek to increase care delivery and immunization sites in response to a perceived need and strong retail lobbying efforts.
- UCCs and UCA will proactively plan for what's next, including increased testing, screening, and immunizing, if and when a COVID-19 vaccine becomes available. The pandemic inspired the industry to coalesce as never seen before. The unified voice and heightened collegiality that manifested will be essential as we emerge from this crisis.

These are merely speculations. The future has yet to be written. We need to work together to ensure urgent care centers are well positioned as essential healthcare destinations.

"UCA is working to support the urgent care heroes who not only respond clinically, but also navigate payment, financial relief, and other administrative hurdles."

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Register at www.ucaoa.org/Convention. ■

Laurel Stoimenoff, PT, CHC is Chief Executive Officer of the Urgent Care Association .

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Point-of-Care Ultrasound in Urgent Care: A Game Changer for the Practice—and the Practitioner

CHELSEA BURGIN, MD

Knowledge, wisdom, and passion were key players in my pursuit of a career in medicine. As point-of-care ultrasound (POCUS) incorporates both the science and the art of medicine, it has rekindled my passion for medicine, greatly expanding my clinical knowledge.

A few weeks ago, a young man presented complaining of 24 hours of shortness of breath and chest pain. His triage painted the picture of a panic attack. After completing the history and physical exam, I rolled the small ultrasound cart into his room. Within 90 seconds evidence of focal pneumonia was seen on the ultrasound image, despite a clear chest x-ray.

Talk about a game changer.

The Knowledge

Ultrasound has been used to promote informed medical decision-making for over 7 decades. Dr. John Wild, regarded as the father of medical ultrasound, was driven to advance diagnostic imaging as he sought a different approach to evaluate bomb victims with suspected bowel injury. At the time, the military was interpreting sound wave patterns to identify armor defects on battle tanks. He transposed this technology to collect information from high-frequency sound waves hitting the small bowel and echoing back to the device.

By the 1950s, Wild was implementing his sonographic device to distinguish normal from abnormal soft tissue in cancer diagnostics. Now fast forward to 7 years ago, when the World Health Organization [WHO] published its second edition of the *Manual of Diagnostic Ultrasound*. It states, "Ultrasound is a core technology for diagnostics and remains one of the safest. Clinical effectiveness is enhanced when [it is] used properly."

The focused assessment with sonography in trauma (FAST) was one of the first widespread applications of bedside ultrasound; today its utilization is saving lives worldwide. Since the innovation of the FAST exam in the 1990s, emergency clinicians have been using ultrasound for safe and immediate diagnostic information when evaluating for conditions ranging from retinal detachment to renal colic.

There is power in this knowledge. As urgent care clinicians, we know when a patient complains of shortness of breath, there is a broad differential. A few of the potentially critical differential diagnoses include pneumonia, pneumothorax, and congestive heart failure, just to name a few. And ultrasound offers *yes* or *no* answers to each of these specific diagnoses.

The Wisdom

It is rewarding to have the wisdom to embrace innovations in science and apply them within an appropriate clinical context. Adopting bedside ultrasound in the urgent care environment affords answers to daily questions like: Is there an abscess? Is there a foreign body? Knowing the presence or absence of these conditions offers considerable guidance toward the next step in care. It is a relief for clinicians and patients alike to avoid I&D on cellulitis. The gratification is high when a nonpalpable splinter is visualized. This provides clarity regarding the utility of pursuing procedural removal ourselves vs referral to a specialist or watchful waiting.

The Passion

I can only speak for myself, but after a decade of urgent care life, I feel the need to learn new techniques to feed my clinical passions. Ultrasound fosters this. Three core concepts can encapsulate my journey of learning, incorporating, and teach-

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ing bedside ultrasound: *Innovation. Perseverance. Integrity.*

- *Innovation.* Ironically**,** ultrasound, though long-established technology, is actually modernizing medicine. Rationing ionizing radiation as a value is on the rise. As medicine changes, I too must change. It is quite possible that as the electronic medical record has reformed medicine in the last decade, ultrasound will prove to be a transformative force in this decade. The growing proficiency among first-year medical students in the use of ultrasound was my initial inspiration to put a focus on POCUS.
- *Perseverance.* Ultrasound is not like learning a new language; it *is* a new language. In essence, supersonic sound waves come in contact with tissues and bounce back to the probe where they are measured and reformatted to create a two-dimensional image out of 256 shades of gray. The interpretation of these images and elucidation of patterns can become quite sophisticated.
- *Integrity.* Ultrasound provides images of what is within our patients. With these pictures comes tremendous information. Information invites interpretation. Our interpretation then adds nuance to the care plan. The reality is, although I am passionate about ultrasound and teach it to medical students, residents, and colleagues, and use it in clinical care most shifts, it is not always the right tool. It is equipment-, operator-, and patient-dependent. The utility of POCUS is limited and not designed to replace a comprehensive radiology tech ultrasound with radiologist interpretation. Two clinical examples of natural limitations of ultrasound in general: it will not differentiate cellulitis from soft tissue edema, nor will it decipher pulmonary edema from a nonfocal pneumonia. The limitations of POCUS must be kept in mind.

The gestalt I apply to determining if ultrasound has clinical utility involves asking the following questions: 1) Is the question answerable by ultrasound? 2) Do I understand the medical literature for this ultrasound application? 3) Can I capture quality images and interpret them? 4) Will I be able to responsibly integrate these findings into patient management?

The versatility and clinical utility account for the recent rise in bedside ultrasound, especially in acute care settings. Bedside ultrasound has become an extension of my physical exam as a UC clinician. It is incredibly gratifying to ultrasound patients; it offers an opportunity to spend more time at the patient's bedside, and improves the patient experience.

As my knowledge, wisdom, and passion grow toward the utility of POCUS in urgent care, I am compelled to share my experience. It is my hope that this issue of *JUCM* will demystify POCUS and that you will begin to understand my enthusiasm for new applications of this old technology. ■

Dealing with an Epidemic of Information in the Midst of a Pandemic

We are in an unprecedented time in medicine as we face a pandemic of an emerging viral disease spreading rapidly across the world. Information regarding the COVID-19 pandemic is also expanding at lightning speed. This leads to an overabundance of information which can alter our decision-making abilities. This editorial will help the reader develop a plan to manage excessive information and misinformation.

TRACEY Q. DAVIDOFF, MD, FCUCM

We've all about had it. Too many patients, too many worried well, not enough PPE, testing kits, and the never-ending, ever-changing flow of information.

We are at an unprecedented time in the information age. News travels faster than light speed, traversing the globe in the blink of an eye. We hear of celebrities, professional athletes, and politicians testing positive for coronavirus seemingly every hour. The latest count of total infected and deceased pops up on my Twitter every few hours.

Journalists, politicians, medical professionals, business leaders, family members, and even the guy next door have a take on the pandemic. The latest and (not so greatest) news is pounding your brain from TV, email, social media, your employer, your neighbors, and overheard conversations 24/7. It's like trying to take a sip of water from Niagara Falls.

How do we sort through it all?

Information overload, also referred to variously as infobesity, infoxication, information anxiety, and information explosion, can be defined simply as a situation when one receives too much information about a subject. Although getting *enough* information to make informed decisions is a good thing, getting *too much* information can result in a significant reduction in decision-making quality.

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Imagine the process of deciding where to have dinner. If there are two local restaurants, the choice is easy. You go to the one with the best reviews. But what if there are 400 local restaurants with five-star reviews? This makes the decision harder and it's easy to get frustrated and just resort to the easier choice of fast food.

Misinformation is also running rampant right now. By the strictest definition, misinformation means that the giver of information is deliberately giving wrong information for some sort of secondary gain. However, inadvertent misinformation can also occur in situations when the accuracy of information is difficult to verify. Before you know it, even with the best of intentions, well-meaning people pass along incorrect information.

Here are a few examples of misinformation I have heard from both patients and healthcare providers:

- You can get coronavirus from popping bubble wrap because it was made in China by infected workers.
- You can get a rapid test for coronavirus for $50 from a person who is going door to door testing people.
- Children don't get the disease, but they carry it, so stay away from all children.
- The virus doesn't like heat, so as soon as the weather warms up, we'll be good.

So how do we deal with the massive influx of information about COVID-19 when the science, and therefore societal consequences, of this pandemic are evolving so rapidly?

The first and most critical step one can take to determine if information is accurate is to *consider the source*. Information that comes from word of mouth, social media, 24-hour news outlets, and even our own government officials should be confirmed with a reputable (and, ideally, peer-reviewed), source and not assumed to be accurate.

You can likely trust information coming from a high-ranking clinician in your healthcare organization, especially if that information is in print, such as a protocol. Be sure the information references organizations like the CDC, WHO, a state or local health department, or randomized controlled, peer-reviewed studies from reputable institutions. Use the internet to confirm the information on multiple platforms to ensure it is accurate.

Carefully review any published data. Remember that this is an emerging disease, and any scientific studies or findings are likely preliminary. In normal situations, changes in treatment and evaluation of disease processes require years of study, with multiple randomized-controlled studies that are prospective, and data that are reproducible. There simply has not been enough time for this to occur with COVID-19. Most studies available at this time are retrospective, with small numbers of participants, and are therefore difficult to draw reliable conclusions from.

In most cases, years of clinical trials are necessary to determine if a therapy is safe and effective. One example would be estrogen for perimenopausal women. Many studies showed benefit and the science made sense, but ultimately it was determined that routine estrogen therapy was actually more risky than beneficial.

Also recall the case of Oxycontin. Early publications suggested that this was the end to chronic pain and, seemingly miraculously, without any addiction issues. Those studies, however, were sponsored by the manufacturer who had a vested interest in their product's success. This is a prime example of misinformation.

Remember that desperation and *stress can affect your decision-making*. Excessive cognitive load, ie, excessive information, can worsen the stress already inherent in a pandemic situation. We are already overstressed, anxious, and wary of what the future will bring. We are worried about our families and friends, our patients, and the economic aspects of this pandemic.

Excessive information can add to that stress. When making decisions based on newly acquired information, stop and think for a minute about the basis for that decision. Again, consider the source, vet it carefully, take a deep breath, then make the decision.

Consider *unplugging from social media*. Although it's great to hear how everyone is doing, to see an uplifting dog or cat video, or a humorous meme, you are likely to get more misinformation from social media than anywhere else. If you do stay plugged in, don't add to the information overload. Avoid pandemic information altogether and stick to making connections with family and friends, especially those who are isolated. This will improve your emotional well-being without adding to information overload.

Uncertainty can lead to heightened tension and stress, in any scenario. A pandemic is a situation of tension and stress on steroids! Most of us have not lived through anything like this before and have no basis for comparison. Remember, everyone is as fearful of the unknown as much as you are. Be a voice of reason. Filter the information, review it carefully, and adopt a reasonable approach.

Above all, don't panic. We will get through this, and like every human crisis before, we will rise to the challenge, and overcome. ■

Editor's Note

As Dr. Davidoff noted, there are *reliable* sources of information about the COVID-19 pandemic. The Centers for Disease Control and Prevention, for one, offers a robust menu of documents to help educate both clinicians and patients (most of which are downloadable for your use). We offer a sampling below.

For healthcare providers

- Non–COVID-19 Care Framework
  Available at: https://www.cdc.gov/coronavirus/2019-ncov/hcp/framework-non-COVID-care.html
- Potential Exposure at Work
  Available at: https://www.cdc.gov/coronavirus/2019-ncov/hcp/guidance-risk-assesment-hcp.html
- Infection Control Guidance
  Available at: https://www.cdc.gov/coronavirus/2019-ncov/hcp/infection-control-recommendations.html
- Coronavirus Disease 2019: Ten Clinical Tips
  Available at: https://www.cdc.gov/coronavirus/2019-ncov/hcp/clinical-tips-for-healthcare-providers.html

For patients

- Prevent the Spread of COVID-19 if You Are Sick
  Available at: https://www.cdc.gov/coronavirus/2019-ncov/downloads/sick-with-2019-nCoV-fact-sheet.pdf
- Important Information About Your Cloth Face Covering
  Available at: https://www.cdc.gov/coronavirus/2019-ncov/downloads/cloth-face-coverings-information.pdf
- How to Safely Wear and Take Off a Cloth Face Covering
  Available at: https://www.cdc.gov/coronavirus/2019-ncov/downloads/cloth-face-covering.pdf
- CDC Protects and Prepares Communities
  Available at: https://www.cdc.gov/coronavirus/2019-ncov/communication/print-resources.html?Sort=Date%3A%3Adesc
- How to Protect Yourself and Others
  Available at: https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/prevention-H.pdf
- What You Should Know About COVID-19 to Protect Yourself and Others
  Available at: https://www.cdc.gov/coronavirus/2019-ncov/downloads/2019-ncov-factsheet.pdf

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Utility of POCUS in Skin and Soft Tissue Infection

Urgent message: Point-of-care ultrasound (POCUS), just starting to become more prevalent in the urgent care setting, facilitates improved diagnostic and interventional clinical decision-making by aiding the clinician in discerning between cellulitis, abscess, or both.

CHELSEA M. BURGIN, MD, FAAFP and DUSTIN S. MORROW, MD, FACEP

Introduction

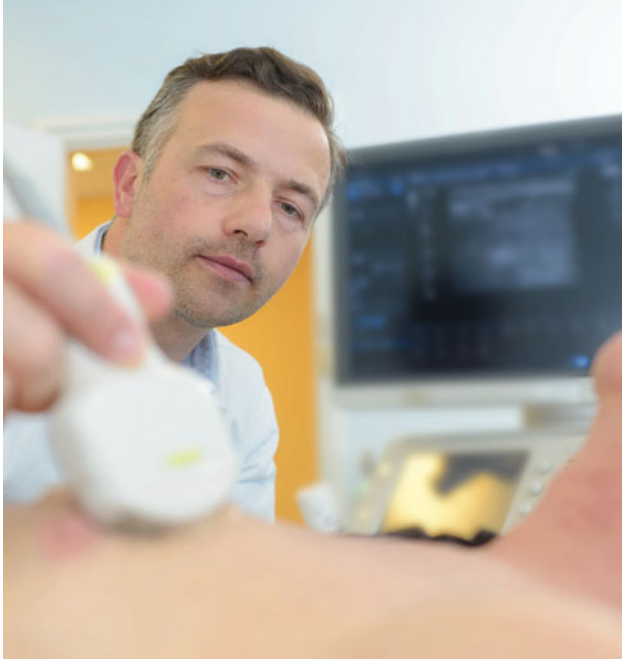
Each year in the United States around 14 million patient encounters present with skin and soft tissue infections (SSTIs). A detailed history and focused exam differentiate between cellulitis and/or abscess the majority of the time. However, there are scenarios when it is challenging to distinguish among cellulitis, an abscess, or a combination of the two. POCUS has been shown to reduce clinician uncertainty in treatment for SSTIs while altering management up to half of the time.[1-5]

Background

While use of POCUS is on the rise in urgent care centers, emergency medicine physicians have incorporated the use of bedside ultrasound for the detection of abscesses in SSTIs for the past two decades (though perhaps considerably less time in nonteaching community hospitals).[6-8] POCUS has been found to have a sensitivity of 91.1% - 96.2% with a specificity of 76.9% - 82.9%[3,9] for the identification of an abscess, compared to physical exam alone. The POCUS application for SSTI is favorable to patient outcomes as it improves diagnostic accuracy for ruling in abscess while reducing unnecessary incision and drainage when abscess is ruled out.

Discussion

POCUS is an emerging technology that can advance the urgent care clinician's management of SSTIs. The application of soft tissue ultrasound for infection requires elementary skills that are easy to learn and apply in practice



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when used to distinguish abscess from cellulitis. Even a clinician who is a novice in the use of POCUS may readily differentiate tissue edema (cellulitis) from a pocket of fluid (abscess) on ultrasound image after minimal training under good mentorship for quality assurance.[10]

Accurately identifying the presence or absence of an abscess has significant treatment implications. Cellulitis proves clear indication for antimicrobial therapy,

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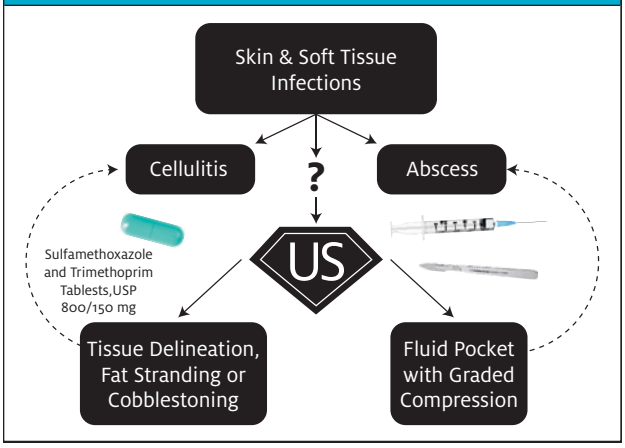
Figure 1. Shifting from the paradigm of "cut then see" to "see then cut" when uncertain about the decision to incise and drain.



whereas an abscess requires incision and drainage.

A practice-altering meta-analysis published in the *BMJ* in 2018 provides patient-centered guidelines after thorough review of the role of antimicrobials for simple abscesses. Complicated SSTIs with systemic signs, deep tissue infection, or hidradenitis suppurativa were not considered in these guidelines. High-quality evidence recommendations highlighted the use of TMP-SMX or clindamycin for simple abscess in addition to incision and drainage based on the findings of a 5% absolute reduction risk of SSTI treatment failure at 1 month and an 8% absolute reduction risk of reoccurrence at 3 months.

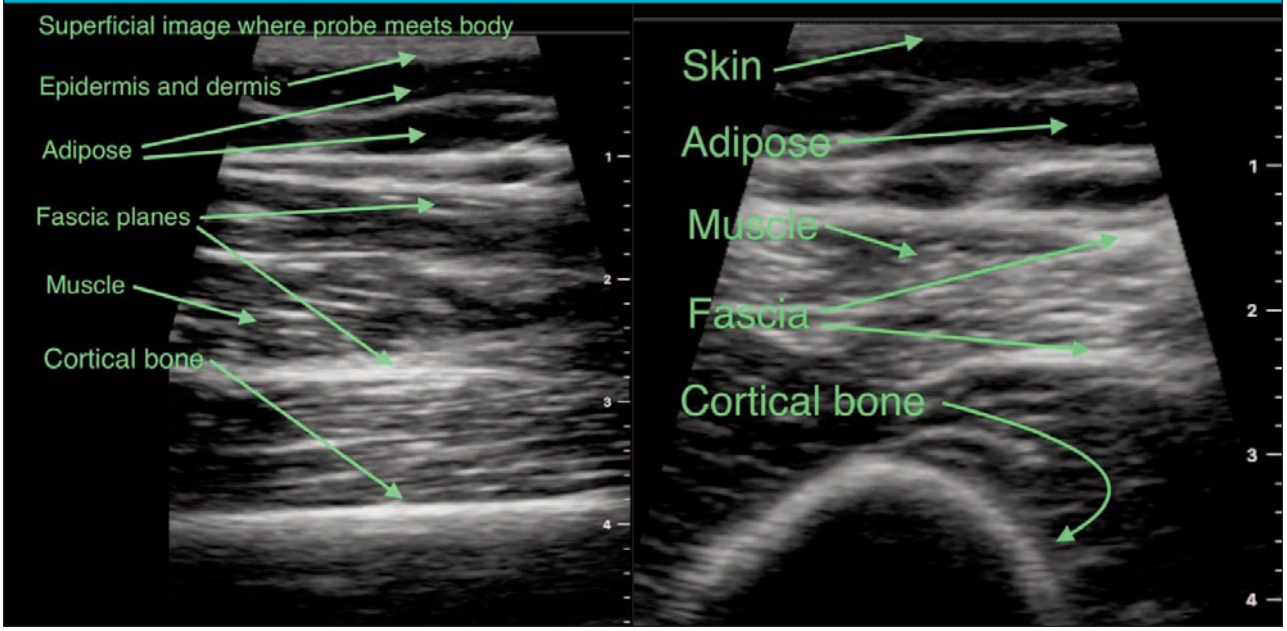
In contrast to control patients not treated with antimicrobials, an additional (high-quality evidence) finding reported clindamycin had a 10% higher risk of diarrhea, while (moderate-quality evidence) TMP-SMX was found to have a 2% higher risk of nausea. Due to the high prevalence of MRSA (49% - 88%) and failed treatment, the recommendation (moderate-quality evidence) was made against the use of early and later generation cephalosporins compared to TMP-SMX or clindamycin.[11]

In addition to these guidelines, local prevalence of resistant bacteria and MSSA need also be considered.

In acknowledgement of the aforementioned clinical guidelines, the role of POCUS is not to determine the presence or absence of benefit from pharmacotherapy. Rather, the role of POCUS is to clarify in the clinical decision-making process whether or not the addition of surgical intervention is of medical necessity. It is time for urgent care clinicians to advance from a *cut then see* approach to one of *see then cut*. Answering this question accurately is arguably the most invaluable in the pediatric population affected by SSTI. POCUS may assist in the avoidance of unnecessary consternation for both patient and parent often accompanying a procedure.

Another opportunity to highlight the indication for

Figure 2. Healthy skin and soft tissue in long and short axis.



POCUS is when initial treatment fails by antimicrobial therapy alone. It is important to appreciate how SSTIs exist on somewhat of a spectrum. Over time, cellulitis may progress from soft tissue edema into more focal fluid collection(s) like an abscess. The diagnosis of cellulitis by physical exam alone or with the addition of POCUS merits clear education from the clinician to the patient or guardian as worsening pain, swelling, or erythema may imply treatment failure or the development of an abscess—at which point re-evaluation would be imperative.

Normal Skin And Soft Tissue

The inter-lumen blood-filled space of arteries and veins are anechoic (the ultrasound term to describe a fluid state). This lack of color is the result of absorbed sound waves and a lack of echo wave production. Many soft tissue structures have varying densities in more of the gray scale, such as adipose and muscle. These have hypoechoic tendencies on ultrasound image, typically more gray than black. On the other extreme of the grayscale, dense structures such as fascia and cortical bone create echo waves, sound waves that come in contact with the structure and bounce back to the probe triggering bright white or hyperechoic markings on the ultrasound image. Differentiating hypoechoic soft tissue by pattern recognition is key.

Moving from superficial to deeper structures, ultrasound characteristics on healthy skin and soft tissue layers are as follows: the epidermis and dermis are hyperechoic and typically thin, crowded at the top of an ultrasound image by the gel-probe interface. The subcutaneous adipose also has significant variability in thickness depending on body habitus. On ultrasound, adipose is hypoechoic (dark gray to near black) in the subcutaneous regions, appearing like a tight connection of overlapping oblique ovoid structures outlined by fine hyperechoic lines (bright lines of inter-adipose connective tissue). Under the adipose layer, there are fascial planes and muscle tissue which in long axis are fibrous and in short axis appear like prime filet mignon. Muscle sits just superficial to hyperechoic cortical bone. Due to the nature of bone and how it reflects sound waves, there are reliable shadow patterns deep to bone on any ultrasound image on.

Cellulitis

Early cellulitis on ultrasound appears as a mere delineation or blurring of previously sharp borders of normal soft tissue planes; this is often best determined by evaluating an unaffected area on the patient and comparing it to the affected area. This can easily be done by scanning proximal or distal to the area of concern or by scanning the same region on the contralateral side. Unaffected skin and soft tissue have distinct patterns.

Figure 3. Examples of cobblestones and cobblestoning as seen on ultrasound in cellulitis.

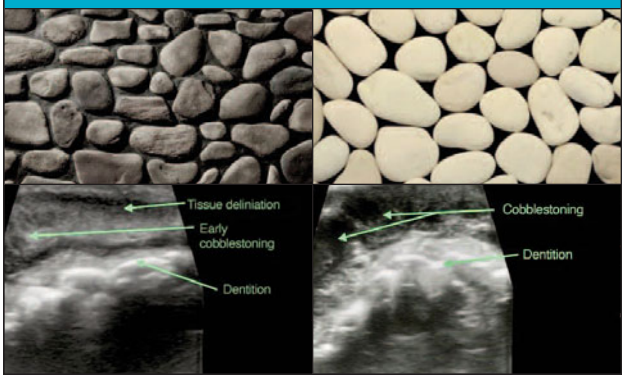
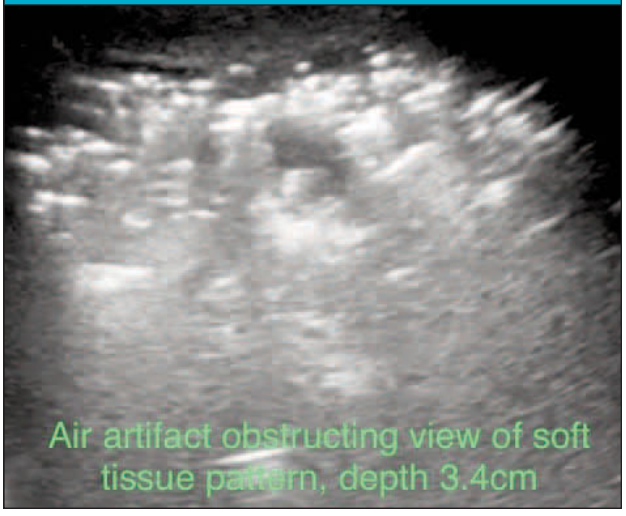


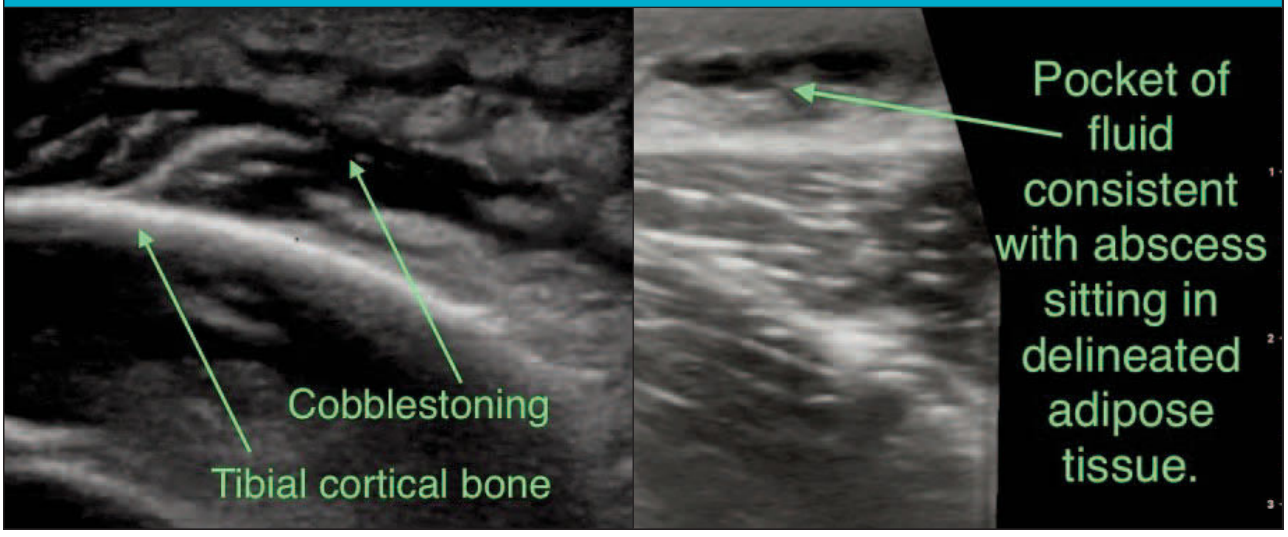
Figure 4. An example of necrotizing fasciitis.



On the infection continuum, cellulitis transitions from delineation into more fat stranding and then into mature cellulitis which appears as edema in the interstitial space between adipocytes. Mature cellulitis has a classic cobblestone appearance. As in the images of cobblestones in **Figure 5**, note that the more hyperechoic round globules of subcutaneous adipose are separated by a slightly irregular lattice of anechoic or hypoechoic fluid.

Cobblestoning is not pathognomonic for cellulitis. Masqueraders of cellulitis on ultrasound include local allergic reactions or CHF-related edema; all three present with cobblestoning. POCUS is most helpful when used

Figure 5. Cellulitis compared to a small abscess surrounded by early cellulitis.



"As a first-line clinician, the urgent care provider can utilize POCUS to refine medical decision-making and advance patient care."

as an adjunct to the patient history and physical exam.

Necrotizing fasciitis is an alarming, rapidly progressive disease process that needs to be quickly evaluated for when history and physical exam raise the concern. Aligning with crepitus on palpation of the affected skin and soft tissue, subcutaneous air can be seen on ultrasound. *Air is a nightmare* for sound wave imaging on all applications with the exception of lung, particularly if emphysematous tissue is suspected. In SSTI, timely transfer reduces morbidity and mortality.[12,13]

Abscess

On ultrasound, an abscess is a greater consolidated collection of hypoechoic fluid. In comparison to cellulitis which appears to have small avenues of interstitial fluid in network, an abscess is the result of potential fluid coalescence into a greater volume found typically within the loose connective tissue layer of subcutaneous adipose. Abscess contents such as purulent matter with swirling debris and loculation can be seen on ultrasound.

Graded compression is one technique of probe manipulation used to differentiate an abscess from one of its lookalikes. It is achieved by intermittently delivering significant pressure through the probe over the area of concern, evaluating for compressibility. Soft tissue edema does not "squish" whereas a pocket of fluid does.

Special Considerations

As noted, POCUS is excellent at discerning a pocket of fluid from tissue edema; however, a diligent urgent care clinician utilizing POCUS will remain alert to keep these key points in mind:

- Cellulitis; does the clinical context support infection, local swelling from an allergic reaction, or more diffuse swelling as seen in CHF or low serum protein disorders?
- Does the clinical context and POCUS exam provide evidence for an abscess? Cyst? Hematoma? Herniated bowel? Lymph node? Pseudoaneurysm?
- Does the ultrasound image look strange or like a nighttime picture without flash of a field glowing with fireflies? Think necrotizing fasciitis. Call the surgeon.

To avoid deception from SSTI masqueraders, be cognizant of a full differential and then place ultrasound examination findings in clinical context. For example, POCUS would not differentiate cellulitis from local swelling after a bee sting or spider bite; both present as soft tissue edema with mature findings of cobblestoning. An appropriate question to answer with POCUS in the context of a bite or sting would be, *Is there a pocket of fluid accumulating within the tissue edema?*

Table 1. Abscess and Abscess Masqueraders

	Characteristics on Ultrasound Image
Abscess	Anechoic to hypoechoic background, +/- heterogenic swirling. Responsive to graded compression
Baker's cyst	Smooth well circumscribed anechoic ovoid area with thin hyperechoic margins
Infected cyst	Hypoechoic to isoechoic, uniform heterogeneity. Minimal graded compression
Hematoma	Anechoic to hyperechoic variable due to solidification, relatively homogenic
Herniated bowel	Organized circular tissue planes with thicker hyperechoic walls and peristalsis
Lymph node	Well circumscribed, may present with a hypoechoic halo, vasculature within seen on color Doppler. No graded compression
Pseudoaneurysm	Use of color Doppler will reveal isogenic material with color around it in a circumscribed fashion

Application Guidelines For SSTI Image Acquisition

1. Record 6-second video clips sweeping the board side of the probe over the affected area at least twice, the second 90° from the first, typically in long and short axis relative to muscle and bone beneath. Remember, one view is no view.
2. With the point of interest centered in the image, provide graded compression to test for compressibility and swirling debris; capture this in a brief clip.
3. Turn on color Doppler and record a final clip to assess for embedded and adjacent vasculature. Do not compress the probe for this clip, as veins easily compress and can be obliterated from the image.
4. Consider a static image where calipers can be used to measure depth below the surface, as well as height and length.
5. Take time to label clips and images for future reference and quality assurance; this is a billable procedure.
6. If needed for comparison, and especially helpful in early SSTI, scan normal-appearing skin and soft tissue over the same region on the contralateral side.

Conclusion

The application of SSTI ultrasound to identify and discern a pocket of fluid from tissue edema is well supported in the medical literature. As a first-line clinician, the urgent care provider can utilize POCUS to refine medical decision-making and advance patient care. It is important to keep SSTI POCUS within its evidence-based medicine scope of practice; for example, ultrasound of local swelling from a bee sting or spider bite will not distinguish allergic from infective tissue edema but is effective at determining if a pocket of fluid or abscess has developed. Implementing POCUS as a tool will guide a prudent clinician in their delivery of excellent patient centered care. ■

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Summary

- POCUS has been found to have a sensitivity of approximately 96% and a specificity of 83% for identification of an abscess vs physical exam alone.
- Worsening pain, swelling, and erythema all indicate treatment failure or development of an abscess in a patient with cellulitis.
- Masqueraders of cellulitis on ultrasound include local allergic reactions or CHF related edema; each presents with cobblestoning.

Original Research

The Effect—or Non-Effect—of Rapid Medical Evaluation Programs on Resident Education

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Urgent message: With significant overlaps in clinical staff, patient population, and provider training between emergency medicine and urgent care, valuable insights relevant to urgent care can be gleaned from understanding the effect of incorporating provider-in-triage training into emergency medicine resident education.

Abstract

Background: To improve emergency department efficiency and relieve patient crowding, many institutions have placed a provider in the ED triage area to treat and discharge low-acuity patients. The impact of these programs in academic and teaching EDs on resident education has had limited research.

Methods: A provider-in-triage or Rapid Medical Evaluation (RME) program was implemented at an academic ED with a 3-year residency program in February 2017, staffed with an emergency medicine attending physician. EM attending and resident physicians completed a validated 5-point Likert scale survey 4 months after the launch of this program to assess its impact on resident education. Descriptive statistics were performed on the survey results. ED operational metrics were also collected before and after implementation of this program.

Results: There was an overall 76% response rate for the survey (79% residents and 73% attendings). Among attending physicians there was a positive perceived impact associated with the RME program on ability to teach, quality of care, patient satisfaction, decreased interruptions, patient throughput, and general physician wellness. This group also endorsed a perceived neutral impact on resident performance of focused history and physical exam, resident application of diagnostic testing, resident differential diagnosis generation, resident minor procedural skills, resident low-acuity patient care, resident patient interactions, and resident patients seen per shift. Operational ED metric outcomes postimplementation included: ED length of stay (LOS) decreased by 31 minutes (from 272.8 to 241.8 minutes in ESI 4-5 [CI 14 to 48 minutes, P=0.001]); door-to-decision time decreased by 13 minutes (from 198 to 185 minutes in ESI 4-5 [CI 1.5 to 24.5 minutes, p=0.029]); and patients who left without being seen (LWBS) decreased by 1.5% (CI 1 to 2%, p<0.001).

Conclusion: Implementation of a provider-in-triage program at an academic ED resulted in improvements in ED operational metrics with limited perceived negative effects on the emergency medicine clinical resident education experience.

Introduction

Crowding is a major barrier to timely and effective patient care in emergency departments. Crowding occurs when the demand for care exceeds the ability to supply it in an efficient fashion. This is often due to inpatient bed availability (patient boarding), increased patient complexity requiring longer stays in the ED, and overall decrease in the number of EDs.[1] According to the Institute of Medicine Report, *Hospital-Based Emergency Care: At a Breaking Point*, ED crowding was noted to be a cause of error and a risk to patient safety. Additionally, adverse events are more likely to occur due to crowding and thus

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patient safety is at risk.[1] Mahler, et al established that crowding resulted in emergency medicine residents evaluating fewer patients and performing fewer procedures; however, they concluded that no noticeable decrement to resident education was noted.[2] Due to crowding, lower-acuity patients have had long waits to see an emergency provider and leave without being seen by a provider at a higher rate than higher-acuity patients.

In an effort to improve wait times, patient satisfaction, and LWBS rates, many community and academic EDs have introduced programs to more rapidly triage, evaluate, and treat low-acuity patients in designated areas such as triage rooms so rooms necessary for critically ill and injured patients requiring a higher level of care. Current research has demonstrated that provider-in-triage programs improve ED time-based metrics such as door-to-provider time, total ED length of stay, and decreased LWBS rates.[3-5]

The effect of provider-in-triage programs at academic and teaching EDs on emergency medicine resident education has not been well established. Evaluating and treating lower-acuity patients without resident involvement in a provider-in-triage model limits the volume of lower-acuity patients being cared for by resident physicians. The aim of this study was to evaluate how a provider-in-triage program impacts perceived emergency medicine resident education. We hypothesize that a provider-in-triage program will improve ED time-based metrics for lower-acuity patients while having a minimal impact on emergency medicine resident education.

Table 1. Emergency Department Metrics Pre- vs Post- Rapid Medical Evaluation Implementation

Outcome measure	Pre-RME implementation	Post-RME implementation	Mean difference (95% CI)	p-value
LOS (minutes)				
ESI 1-3	437.8	433.0	4.8 (-25.5 to 35.0)	0.742
ESI 4-5	278.8	241.8	31 (14.0 to 48.0)	0.001
Door-to-decision time (minutes)				
ESI 1-3	262.9	273.8	-10.9 (-23.6 to 1.8)	0.089
ESI 4-5	198.0	185.0	13.0 (1.5 to 24.5)	0.029
Percent LWBS	4.3	2.8	1.5 (1.0 to 2.0)	<0.001

RME, rapid medical evaluation; LOS, length of stay; ESI, Emergency Severity Index; LWBS, Left Without Being Seen

Table 2. Educational Perceived Impact by Attending Physician Based on Resident Year of Training After Rapid Medical Evaluation Implementation

	Attending's perceived impact by residency year Median (IQR) N=27			
Area of Impact	Residency year 1	Residency year 2	Residency year 3	p-value*
Ability to perform a focused history and physical exam	3 (3 to 3)	3 (3 to 3)	3 (3 to 3)	0.51
Application of diagnostic testing	3 (2 to 3)	3 (2 to 3)	3 (3 to 3)	0.06
Generation of a differential diagnosis	3 (3 to 3)	3 (3 to 3)	3 (3 to 3)	0.74
Minor procedure skills	3 (2 to 3)	3 (2 to 3)	3 (3 to 3)	0.10
Care of low-acuity patients	2 (2 to 3)	3 (2 to 3)	3 (2 to 3)	0.53
Patient interactions	3 (3 to 3)	3 (3 to 3)	3 (3 to 3)	0.10
Number of patients seen on a given shift	3 (2 to 3)	3 (2 to 3)	3 (2 to 3)	0.37
Impact of expedited workup by RME physician on resident involvement/care of those patients	3 (2 to 3)	3 (2 to 3)	3 (2 to 3)	0.03

1=very negative; 3=neutral; 5=very positive; IQR, interquartile range; RME, Rapid Medical Evaluation
*Friedman chi-square test (nonparametric paired test for more than two groups)

Methods

The emergency department studied is part of an academic medical center and has an annual combined patient volume of 51,000 patients in the adult and pediatric emergency departments. In February 2017, we implemented a provider-in-triage program called the

Table 3. Educational Perceived Impact by Resident Physicians Based on Resident Year of Training After Rapid Medical Evaluation Implementation

	Resident's perceived educational impact overall and by residency year of implementing a rapid medical evaluation median (IQR)				
Area of impact	Overall N=22	R1 n=6	R2 n=6	R3 n=10	p-value *
Ability to perform a focused history and physical exam	3 (3 to 3)	3 (3 to 3)	3 (3 to 3)	3 (3 to 4)	0.72
Application of diagnostic testing	3 (2 to 3)	3 (2 to 3)	3 (3 to 3)	3 (3 to 3)	0.70
Generation of a differential diagnosis	3 (3 to 3)	3 (3 to 4)	3 (3 to 3)	3 (3 to 3)	0.68
Minor procedure skills	3 (3 to 4)	3.5 (3 to 4)	3 (3 to 3)	3 (3 to 4)	0.38
Care of low-acuity patients	3 (2 to 3)	3.5 (3 to 4)	3 (2 to 3)	2.5 (2 to 3)	0.21
Patient interactions	4 (3 to 4)	4 (3 to 4)	3.5 (3 to 4)	4 (3 to 4)	0.95
Number of patients seen on a given shift	3 (3 to 4)	3.5 (3 to 4)	3 (3 to 4)	3 (3 to 3)	0.42
Impact of expedited workup by RME physician on resident involvement/care of those patients	3 (3 to 4)	3 (3 to 4)	3.5 (2 to 4)	3.5 (3 to 4)	0.77

1=very negative; 3=neutral; 5=very positive; IQR, interquartile range; RME, Rapid Medical Evaluation
*Kruskal-Wallis test

"rapid medical evaluation" (RME) program to improve time-based ED metrics.

The RME program included staffing a dedicated attending physician, ED nurse, and ED technician to staff our five-room triage area from 2 PM to 8 PM, Monday through Friday. This was determined to be the busiest time period in the ED based on previous data collected around patient arrival times and occupancy heat maps. The RME provider expeditiously evaluates, treats, and discharges appropriate patients triaged to Emergency Severity Index (ESI) level 4 or 5, as these patients historically experience the longest wait times and are more likely to leave without being seen. Additionally, RME providers also initiate workups on higher-acuity patients to expedite appropriate testing and treatment until a room became available.

A survey was developed using a 5-point Likert scale with questions based on the ACGME Milestones for Emergency Medicine, as well as prior work from Nicks, et al.[6] A read-aloud technique was used to validate the survey and was trialed on affiliate faculty not directly involved in the study. The survey was completed by faculty and resident emergency physicians 4 months after RME program implementation. All surveyed faculty and residents had worked in the ED in the 4 months prior to implementation. Surveys were anonymous and collected on a voluntarily basis with no compensation for participation. Data were collected in February 2017 (prior to implementation) and over 6 weeks between June and September 2017.

Descriptive statistics (median, IQR) were generated for each question from the survey and were evaluated both for individual resident classes (PGY1, PGY2, PGY3), for overall resident perception, and for attending physicians. Raw frequency tables were generated for each question. A Friedman chi-square test was used to test for consistency across each resident class. A Kruskal-Wallis test was used to test for differences in perceived impact between respondents of different resident classes. A Wilcoxon two-sample test was used to compare the perception of the RME program impact on education between residents and attending physicians.

In addition to subjective survey data, ED operational metrics were collected using Tableau v.10.4 (Seattle, 2017). Metrics studied included Length of Stay (LOS, minutes), Door-to-Decision Time (DTDT, minutes) and percent Left Without Being Seen (LWBS). Outcome measures were confined to adult ED and patients were stratified by ESI level (1-3 for high acuity, 4-5 for low acuity). Outcome measures were compared for preimplementation and postimplementation of RME program using a two-sample t-test. Institutional IRB approval was granted prior to conducting the survey.

Results

In this study, 66 residents and faculty were identified as working in the ED both before and after RME imple-

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mentation in February 2017. Of these 66 physicians, the response rate was 79% (26/33) for residents and 73% (24/33) for attending physicians for an overall response rate of 76% (50/66). Fifty-three percent of respondents identified as male and 47% as female.

ED metrics were collected at 4 months postimplementation and compared with pre-RME implementation metrics. **Table 1** shows the ED metric effect of implementing the program.

The faculty EP-perceived impact on resident education by PGY level is shown in **Table 2** and **Figures 1** and **2**.

The impact of RME on PGY1 residents (n=6), PGY2 residents (n=6), and PGY3 residents (n=10) is demonstrated in **Table 3** and in **Figures 1** and **2**. Across all three resident classes, there was a positive perception of how RME impacted patient interactions ($p<0.01$). Comparison of differences in resident perceptions by training level were found not to be statistically significant as seen in **Table 3**.

Impact of the RME program on resident and attending performance, as well as physician wellness, faculty teaching time, overall quality of care, and patient turnover was also evaluated and compared. The results are illustrated in **Table 4** and show a statistically significant improvement ($p<0.001$) on residents' general interaction with patients with perceived improvement across the board in other categories. Residents and attendings generally agreed about the impact of the RME program on resident education as seen in **Table 4**.

Figure 1 and **Figure 2** show the distribution of responses by attending EPs and resident EPs.

Table 4. Comparison of Resident and Attending Perceptions of the Impact of the RME Program

Area of impact	Attending median (IQR) N=34	Resident median (IQR) N=26	p-value*
Ability to perform a focused history and physical exam	3 (3 to 3)	3 (3 to 3)	0.05
Application of diagnostic testing	3 (2 to 3)	3 (3 to 3)	0.06
Generation of a differential diagnosis	3 (3 to 3)	3 (3 to 3)	0.04
Minor procedure skills	3 (2 to 3)	3 (3 to 4)	0.01
Care of low-acuity patients	3 (2 to 3)	3 (2 to 3)	0.23
Patient interactions	3 (3 to 3)	4 (3 to 4)	<0.01
Number of patients seen on a given shift	3 (2 to 3)	3 (3 to 4)	<0.01
Impact of expedited workup by RME physician on resident involvement/care of those patients	3 (2 to 3)	3 (3 to 4)	<0.01
Physician wellness	4 (4 to 5)	4 (4 to 5)	0.50
Faculty teaching time	4 (3 to 5)	4 (3 to 4)	0.36
Overall quality of care	4 (4 to 5)	4 (3 to 5)	0.92
Patient throughput	4 (4 to 5)	5 (4 to 5)	0.18

1=very negative; 3=neutral; 5=very positive; IQR, interquartile range; RME, Rapid Medical Evaluation *p-value from Wilcoxon two-sample test

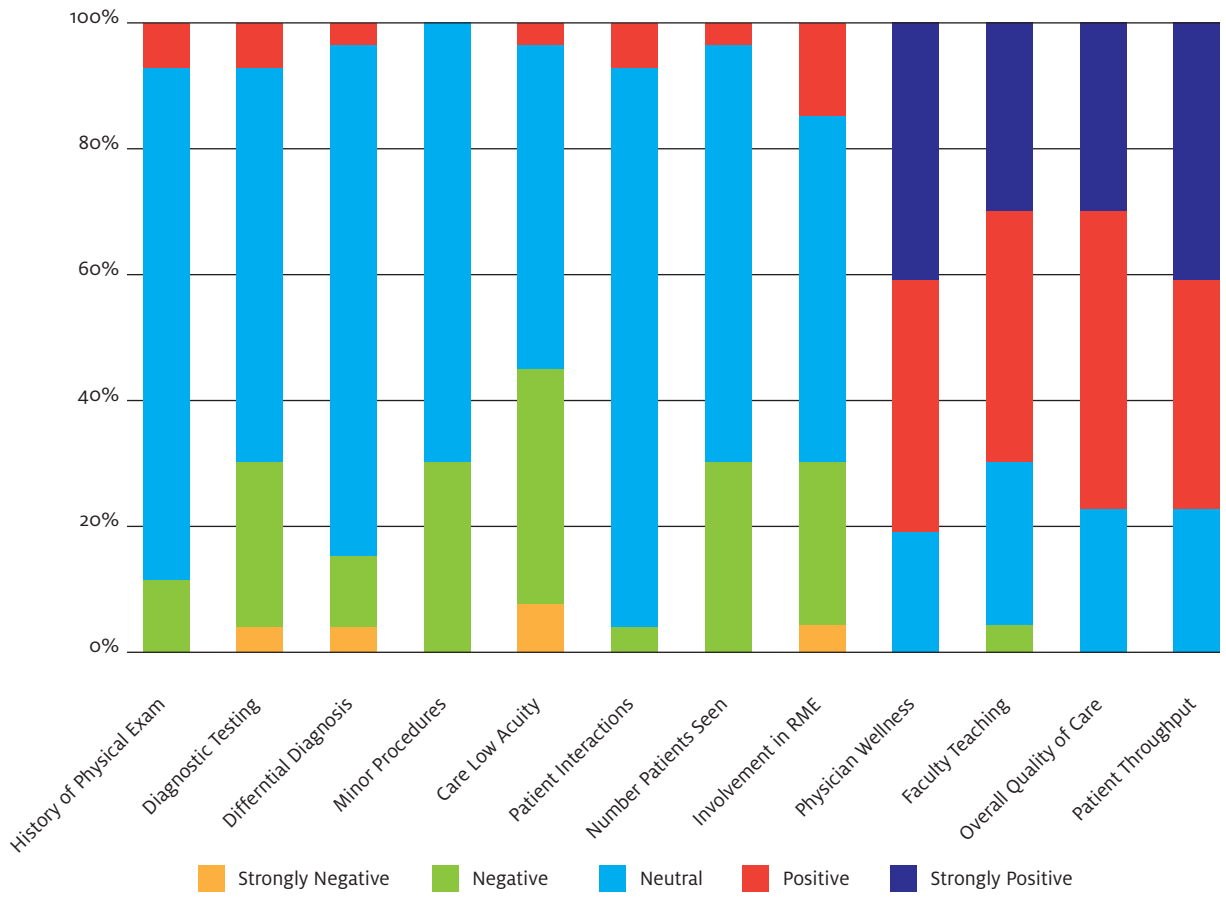
Discussion

In academic and teaching emergency departments, crowding is a common problem that impedes clinical care, efficiency, and education. While certain provider-in-triage programs have been shown to improve clinical care and patient throughput,[1] it is important these do not negatively impact resident education. In their prospective cross-sectional survey study on attending triage physicians' effect on resident education, Nicks et al's accumulated data suggested increased patient satisfaction at the cost of resident education related to formulating a differential diagnosis, diagnostic ordering, and medical decision-making.[4] The RME program implemented in the academic medical center ED described here demonstrates the ability to improve clinical ED metrics without the perception of negatively impacting education.

The RME program had a positive effect on a variety of ED operational measures. The assessed ED benefits included a statistically significant decrease in length of stay, door-to-decision time, and percent of patients left without being seen, particularly for patients in the ESI 4-5 categories. Improvement in wait times in the ED is correlated with increased patient satisfaction. The reduction in the percent of patients who leave without being seen contributed to increased access to ED patients.

By collecting subjective data from RME, attending physicians, and residents from all PGY years, we were able to assess the perceived impact of the RME program on resident education. Both faculty and residents

Figure 1. Perception of Impact of Changes to Resident Education Due to Implementation of RME: Attending Physicians



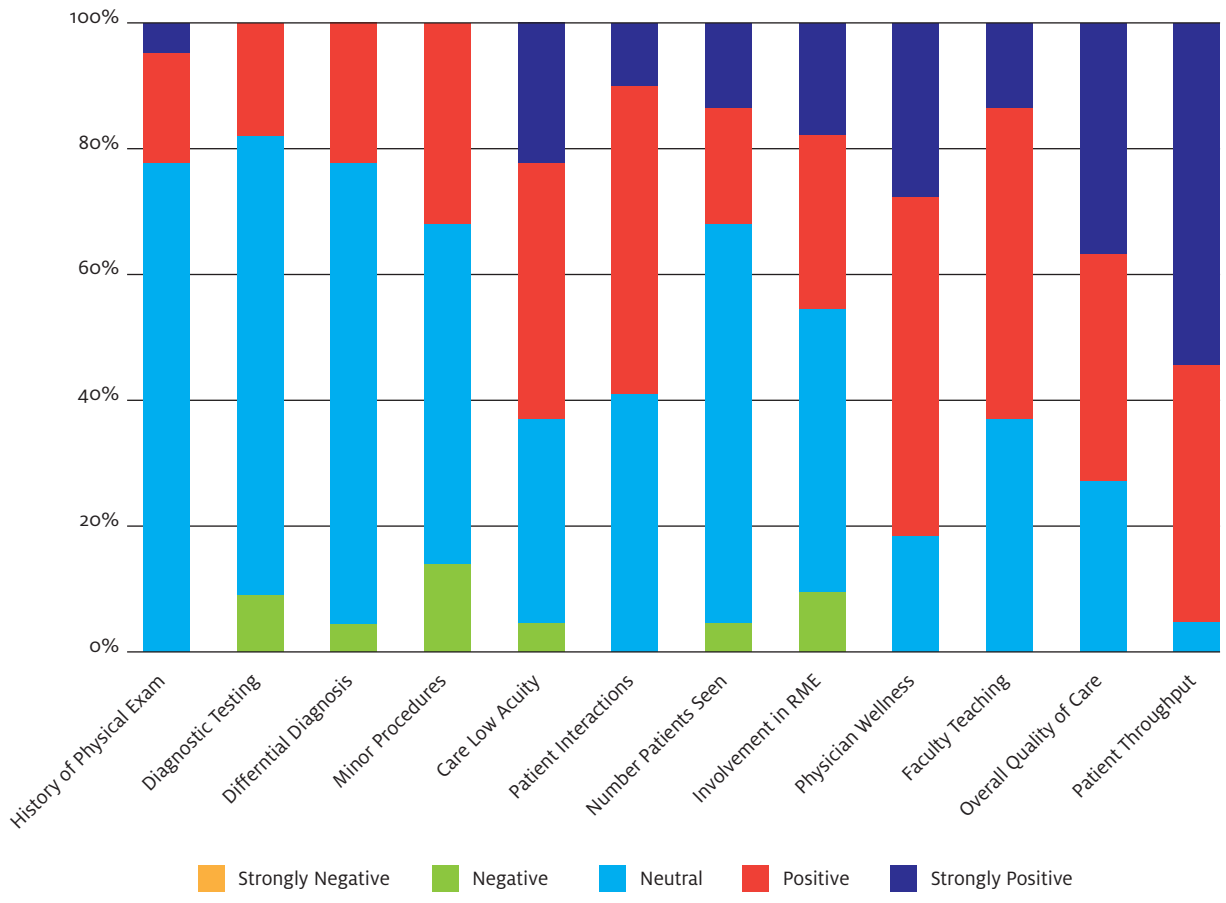
responded that there was a positive effect on faculty's ability to teach residents during acute shifts, overall quality of care provided, patient throughput, and physician wellness. There were also no significant detrimental effects on resident performance at all three experience levels. The positive effects are likely due to a variety of reasons, including treating and focusing on higher-acuity patients, having the flexibility with time and rooms to treat patients more appropriately, and not feeling rushed to turnover ED rooms as quickly.

Overall, both EP and residents responded that the RME program had a neutral to positive impact on various ACGME milestones, indicating that this program improved ED quantitative metrics without negatively affecting resident education. By rapidly evaluating ESI 4-5 patients, RME programs efficiently and effectively decrease length of stay, door-to-decision time, and percent of patients who leave without being seen, while increasing throughput in the ED and overall bed availability for higher-acuity patient and improving overall physician wellness and teaching opportunities without causing any detriment to resident education. Given some slight negative perceptions regarding resident involvement with lower-acuity patients being an important aspect of EM training, future studies should address how best to integrate residents and students into the RME structure as providers.

Limitations

This is a small, single-site study and is subject to inherent issues with survey study design, including post-hoc recollection and the potential for recall bias.

Figure 2. Perception of Impact of Changes to Resident Education Due to Implementation of RME: Resident Physicians



Due to its subjective nature, there is also limitation in the data collected around the RME impact on resident education.

Furthermore, there is variation in RME program designs and implementation, as well as resident programs nationally, which potentially decreases the external validity of this study. However, given the dearth of prior research into the educational effect of a rapid medical evaluation program, our study addresses a significant void in our collective understanding of the impact of such programs. Further research is needed to generalize data for other academic medical centers and to confirm there is no deficit to resident education through RME program implementation.

Conclusion

Implementation of a rapid medical evaluation program improved ED operational metrics without a significant negative impact on resident education. ■

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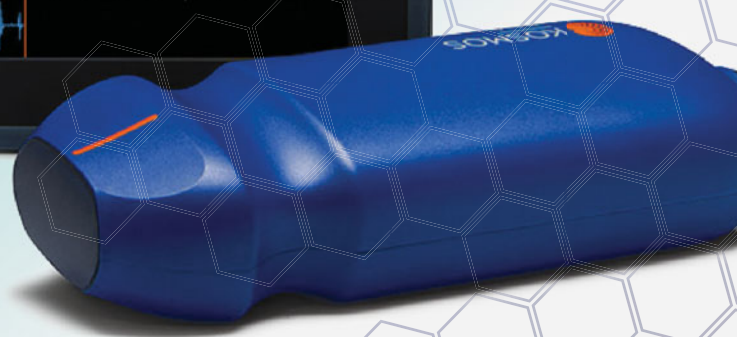

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Evaluating a Child with Chest Trauma for Pneumothorax in the Urgent Care Setting

Urgent message: The differential diagnosis is broad for patients presenting with chest trauma. Bedside ultrasound can expedite critical diagnoses and intervention(s) when pneumothorax is in the differential.

CHELSEA M. BURGIN, MD, FAAFP; SAMANTHA C. SHELHOSS, MSIV; and ROBERT L. GATES, MD, FACS, FAAP

History

A 12-year-old male rolled an all-terrain vehicle (ATV) in the woods, sustaining head, torso, and extremity injuries. He was helmeted, but lost consciousness for an uncertain amount of time. His father found him and provided initial care at home. Because of persistent headache and vomiting, his father brought him to a local urgent care facility several hours later. In addition to the headache and vomiting, he reported some chest pain, abdominal pain, and leg pain. The child had no relevant past medical history or known drug allergies.

The patient was alert and interactive on arrival, with a Glasgow Coma Scale (GCS) of 15. There were no facial injuries or extremity deformities evident. Cranial nerve examination was normal. The cervical spine had no bony tenderness and normal range of motion. He had multiple abrasions to the left occiput, left flank, and posterior left knee. Breath sounds were clear bilaterally. The abdomen was tender with guarding in the upper quadrants, was not distended, and there was no abdominal ecchymoses. He was able ambulate with a normal gait.

Temperature	98.6° F
Heart rate	97
Blood pressure	134/82
Respiratory rate	18
Pulse oximetry	99%

Initial Intervention

The patient's primary survey was reassuring. C-spine was cleared based upon clinical exam. However, the abdominal exam raised concern for solid organ injury. While awaiting emergency medical transport services, the urgent care clinician conducted a brief point-of-care ultrasound (POCUS) to evaluate for pneumothorax

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Differential Diagnoses	
Differential diagnosis	Classic presentation
Chest wall contusion	Palpable chest discomfort
Hemothorax	Basilar diminished breath sounds and dullness to percussion
Lung contusion	Nonreproducible chest pain, dyspnea, tachypnea, tachycardia
Pneumothorax	Sudden onset of dyspnea and chest pain, with or without trauma; increased incidence with thin, male adolescents
Rib fracture	Dyspnea, worsening chest wall pain on inspiration
Cardiac tamponade	Elevated JVD, hypotension, and pulsus paradoxus
Diaphragm rupture	Chest and abdominal pain, increased respiratory effort, abdominal tenderness; more commonly left sided
Abdominal solid organ injury	Flank ecchymoses (Grey Turner sign) suggestive of retroperitoneal hemorrhage; periumbilical ecchymoses (Cullen's sign) suggestive of intraperitoneal hemorrhage; guarding, rigidity, and tenderness
Intestinal injury	Abdominal guarding, rigidity, and tenderness

(PTX), given evidence of torso injury, as suggested in the Advanced Trauma Life Support (ATLS) guidelines.

Thoracic POCUS

A shimmering hyperechoic line bordered by ribs was appreciated at each lung apex. Lung sliding was noted bilaterally, indicating the visceral and parietal pleura were gliding against each other. Based upon these findings, PTX was thought to be unlikely.

Follow-Up

The patient was transported via EMS to the nearest pediatric trauma center. His FAST exam and CT head were both negative. Given the severity of concussion, he was admitted for observation and had an uneventful stay. He was discharged the following day.

Discussion

Chest injury is among the most common causes of trauma-related deaths, preceded only by head and abdominal injury.[1] Bedside ultrasound assessment in trauma is a validated extension of the physical exam and can offer immediate answers to specific, important questions such as: *Is there a pneumothorax? Is there fluid in the chest cavity? Is there a pericardial effusion or tamponade? Is there free fluid in the abdomen?*

This discussion highlights the benefits of POCUS when evaluating for PTX. It has been reported that one in five major traumas has an associated PTX. Rapid identification and treatment of PTX can be lifesaving.[2] While the urgent care clinician may be well versed in treating minor injuries, major injuries can present a challenge in terms of prioritizing assessments and intervention. An injured patient who is in severe pain can easily distract a clinician from careful assessment of the ABCs. The use of POCUS can allow for expedited identification of PTX who may be otherwise difficult to assess due to pain/anxiety.[3]

Thoracic POCUS Step-by-Step

A bedside ultrasound evaluation for PTX can be done in a matter of seconds. Lung POCUS can be conducted with the patient supine or sitting. To conduct a PTX ultrasound exam, follow these steps on each side of the chest:

- Place a linear or curvilinear probe on the patient's anterior upper chest, lateral to the sternum.
- In a sagittal plane with probe marker pointed to the patient's head, align probe between the second and third ribs. Rib confirmation is done by identifying the accompanying shadow as in **Figure 1**.
- Use fine motor adjustments to maneuver the probe to center the hyperechoic pleural line between the ribs, which will border the image on its left and right.
- Reduce depth to 3-8 cm to center the pleura between the top and bottom of the ultrasound image.
- Rotate the probe slightly if needed to view the pleural line parallel to the top and bottom of the screen.
- Look for the shimmering line referred to as "ants marching on a log" indicating the parietal and vis-

ceral pleura are both visualized, sliding along each other. The clearest image is when the sound waves are perfectly perpendicular to the pleura.
- Record and label 4-8 second clips capturing lung sliding over each lung.

Pearls
- A PTX will appear as a static hyperechoic line because the parietal pleura has lost contact with the dynamic visceral pleura, thus eliminating the shimmer.
- B-Mode is an additional method to evaluate the dynamic process of respiration in lung tissue. (See **Figure 2**.)
- A "lung point" is when the ultrasound image captures both the presence of static and dynamic lung activity at the pleural line, signifying where the dynamic visceral pleura separates from the static parietal pleura. The "lung point" is the only definitive finding for PTX, but is rarely identifiable.

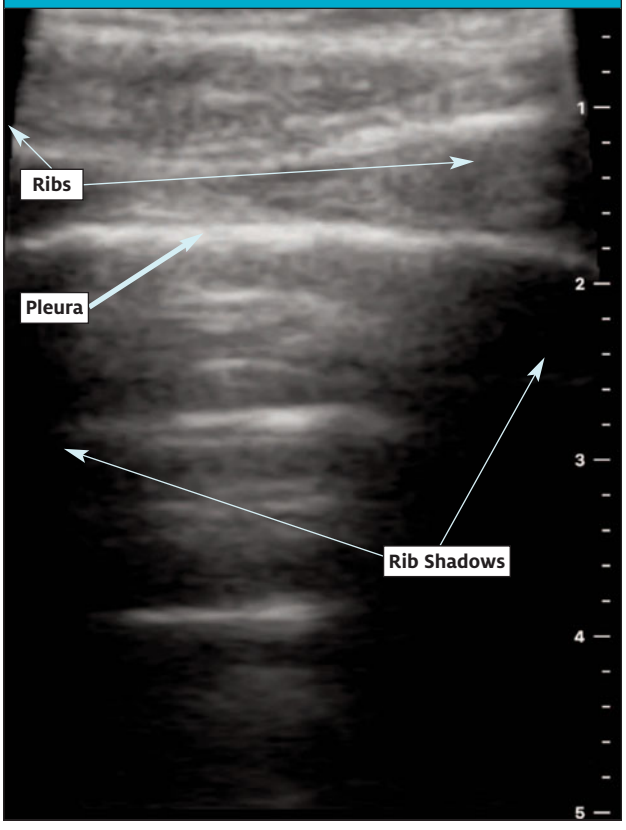
In addition to assessment for traumatic PTX, thoracic POCUS can be used when assessing for spontaneous PTX (SPTX). In adult males, the incidence of SPTX is approximately six times greater than in women. Among children, SPTX is more common in males as well, peaking in the adolescent years.[4] Thin men are believed to be predisposed to SPTX due to increased transpulmonary pressures at lung apices. In addition, the rapid growth of these young men can cause relative ischemia in the pulmonary vasculature leading to bleb formation.[5] The presence of lung blebs further increases the risk of SPTX.

POCUS vs chest x-ray (CXR) in evaluation of pneumothorax

The benefits of POCUS include cost effectiveness, convenience of use, and lack of ionizing radiation. This is especially valuable for the pediatric population, in whom limiting radiation exposure is particularly desirable.

In the setting of blunt chest trauma, thoracic ultrasound is superior to CXR when identifying PTX.[3,7] Lung sliding is the only criteria necessary to rule out PTX on ultrasound. Lung sliding is the dynamic visualization of air movement at the pleural line in standard B-mode on ultrasound. In M-mode, a still image easily portrays the difference between aerated lungs and PTX. "Sandy beach" is the term used to describe the appearance of dynamic lung tissue under the static soft tissue of the chest wall. Normal lung sliding is depicted in **Figure 2A**. Conversely, "barcode sign" is the term used to describe the lack of movement as seen in **Figure 2B**.

Figure 1. B-Mode. Normal parietal and visceral pleura centered between ribs.

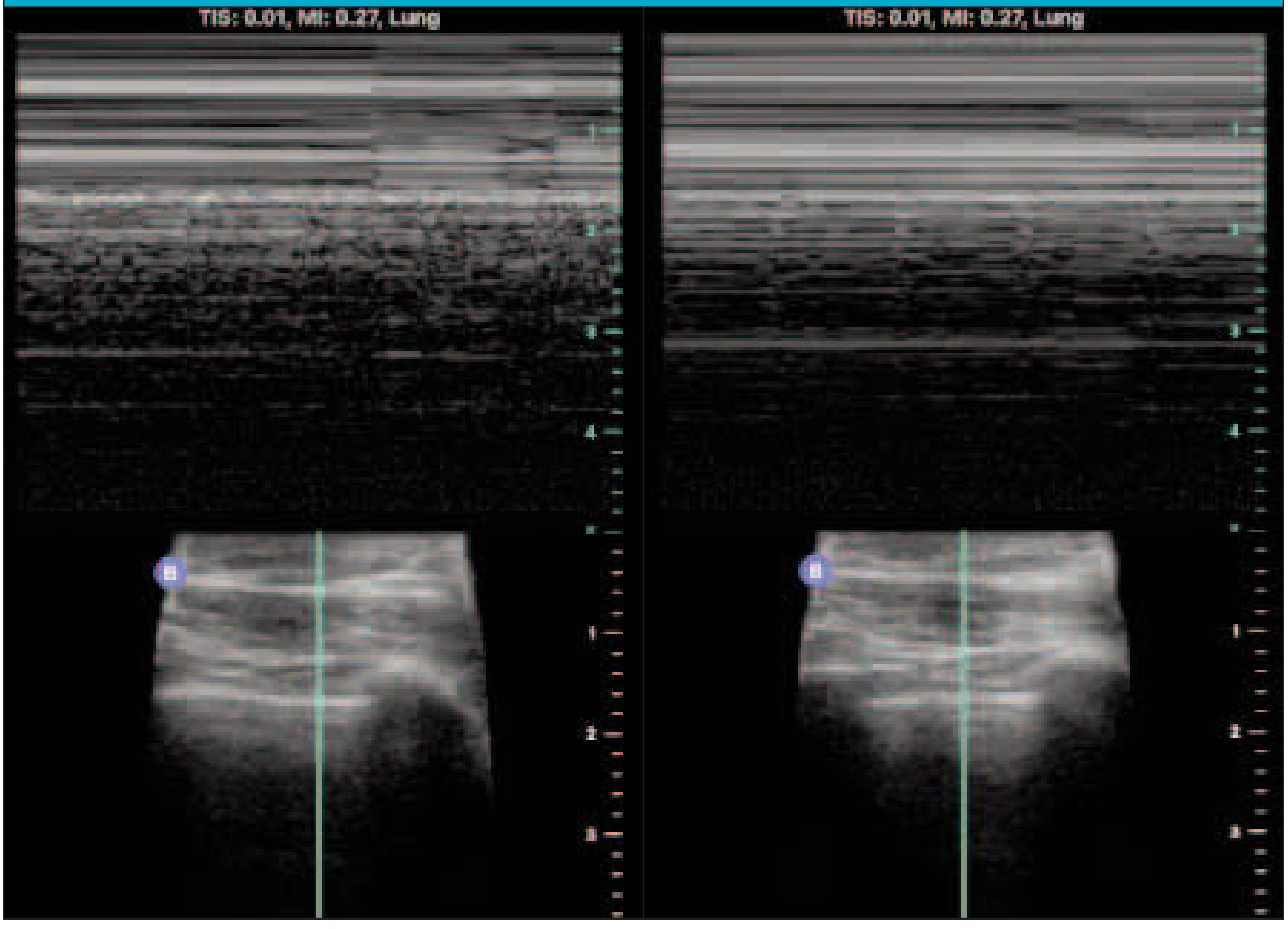


There is a robust body of literature confirming the value of POCUS when evaluating for PTX. A 2010 review of four prospective observational studies compared POCUS with CXR in the evaluation of 606 patients with suspected PTX after blunt trauma. The sensitivity of ultrasound was 86% to 98% and specificity was 97% to 100% for detecting PTX. In contrast, the CXR had 100% specificity but sensitivity ranged from 28% to 75%.[3]

A 2018 Cochrane Review of 34 studies including 8,635 patients determined that overall specificity of POCUS for detecting PTX was 99% in adults and 91% in children. The sensitivity was 96% overall—however, importantly, only 62% in the pediatric population. They cautioned that a negative POCUS does not rule out PTX in children and that clinical suspicion must still be maintained.[6]

In a 2014 meta-analysis, thoracic ultrasound was shown to have a higher diagnostic accuracy compared with CXR for detection of PTX. This analysis evaluated

Figure 2. M-Mode. A: "Sandy beach" indicating inflated lung tissue with parietal and visceral pleura. B: "Barcode sign" indicating the presence of PTX with only the parietal pleura captured in the image.



65 separate studies involving more than 5,000 patients who had thoracic POCUS performed by emergency physicians. Findings included a higher sensitivity in the diagnosis of PTX compared with CXR. They postulated that some of the improved sensitivity may have been related to the clinician's familiarity of the mechanism of injury and the patient's clinical condition.[7]

Following the diagnosis of PTX, needle decompression in urgent care while awaiting EMS can be considered if the patient is in extremis. As an extension of the physical exam, thoracic POCUS is an easy-to-learn exam which can facilitate the evaluation for PTX among UC patients.

Summary

- Lung POCUS is a straightforward exam that can rapidly identify or exclude PTX.
- Strong evidence suggests lung POCUS is more sensitive than CXR (especially in adults) in identifying PTX.
- Benefits of POCUS include lack of radiation, decreased cost, and time savings in the hands of an experienced clinician.

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This crisis is unlike anything any of us have ever experienced. Your dedication, your courage and your never-wavering commitment to caring is what will carry us through. Thank you for your tireless effort on this fight of our lives – **you are our heroes of healthcare!**

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CME: This article is offered for *AMA PRA Category 1 Credit*.™
See **CME Quiz Questions** on page 9.

A Pregnant Woman with Upper Right Quadrant Pain

Urgent message: When a pregnant patient presents to urgent care with right upper quadrant pain, initial bedside ultrasound screening for gallbladder disease can facilitate interventions and expedite follow-up care.

CHELSEA M. BURGIN, MD, FAAFP; MEAGHAN A. STANDRIDGE, MSIV and KACEY Y. EICHELBERGER, MD

History

A 25-year-old nulliparous female 24 weeks pregnant presented 4 hours after onset of nausea, vomiting, and right upper quadrant pain. She was feeling weak with an acid taste in her mouth. She reported being in good health and having an unremarkable pregnancy, with routine prenatal care. She had a normal fetal anatomy ultrasound at 23 weeks gestation. No trigger food, travel, or substance exposure was identified. Family history was negative for biliary disease.

Physical Examination

Her face was ashen, she was lying on the cart clasping an emesis bag. Mucus membranes were dry. Heart rate was regular and without excess heart tones. Lungs were clear to auscultation. Abdomen was gravid 24 cm above the umbilicus. There was no abdominal rigidity, guarding or rebound tenderness; she had no McBurney's point tenderness although her Murphey's sign was positive.

Temperature	97.4° F
Heart rate	76
Blood pressure	108/69
Respiratory rate	18
Pulse oximetry	100%

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Point-of-Care Ultrasound

Bedside ultrasound showed good fetal movement and a measured heart rate of 154. Laying the patient in the left decubitus position simplified locating her gallbladder; brief sweeps in both long and short axis revealed a single large hyperechoic structure near the gallbladder neck with an accompanying posterior shadow. There was no pericholecystic fluid. The anterior wall of her gallbladder measured <3 mm, sonographic Murphey's equivocal and the common bile duct (CBD) was not visualized. These findings were consistent with cholelithiasis.

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Table 1. Differential Diagnoses

Differential Diagnosis	Classic Presentation
Acute fatty liver of pregnancy	Third trimester anorexia, headache, malaise, nausea, nonspecific abdominal pain, vomiting; progressive to jaundice, ascites, DIC, hypoglycemia and encephalopathy
Appendicitis	Diffuse periumbilical pain localizes to RLQ (though atypical RUQ pain may be seen in later gestation); anorexia, fever, nausea, vomiting. Exam findings: McBurney's/psoas/obturator/Rovsing signs; rebound and guarding
Ascending cholangitis	Jaundice, fever, RUQ pain (Charcot's triad); altered mentation and hypotension (Reynold's pentad)
Biliary colic	Intermittent nausea and vomiting, dull RUQ pain; provoked by fatty food
Bowel obstruction	Gradual onset of nausea, vomiting, cramping and obstipation. History of abdominal surgeries, malignancy, inflammatory bowel disease. Exam findings: abdominal distention
HELLP Syndrome (hemolysis, elevated liver enzymes, low platelets)	Variable presentation, though after 20 weeks gestation: colicky abdominal pain, nausea, vomiting, malaise; evidence of hypertension such as altered mentation, headache, vision changes
Myocardial Infarction	Varying symptoms, can include chest pressure, diaphoresis, dyspnea, dyspepsia, nausea, emesis
Pancreatitis	Acute onset of epigastric pain, nausea, or vomiting; exam findings of fever, hypotension, hypoxemia, tachypnea, tender epigastrium
Preeclampsia	Variable; headache, abdominal pain, peripheral edema, hyperreflexia/ankle clonus, visual changes, seizures (end stage); exam findings of elevated blood pressure after 20 weeks' gestation
Preterm labor	Menstrual-like cramping, contractions, low back ache, pressure in pelvis/vagina, spotting
Uterine rupture	Sudden onset of abdominal pain; exam findings of signs of shock with hypotension, uterine tenderness, non-reassuring fetal heart tones

Follow-up

The patient was transferred to the emergency department where she had labs including liver function testing and lipase which came back normal. Formal ultrasound confirmed cholelithiasis without cholecystitis. She received IV fluids and antiemetics and felt much better.

Per consultation with OB and general surgery, outpatient follow-up was advised. Cholecystectomy was postponed until 2 months postpartum. She had a successful vaginal delivery at 40 weeks 1 day gestation. Shortly after her cholecystectomy she returned to tolerating her normal diet.

Discussion

Gallbladder disease occurs in 20 million individuals in the United States, and is common in gravid women. The most common gallbladder disease in pregnancy is cholelithiasis, occurring in up to 3% of pregnancies. Risk factors include female sex, increased age, obesity, high serum lipid levels, as well as genetic predisposition.[1,2] Women are at an increased risk during pregnancy due to the effects of progesterone and estrogen on the body.

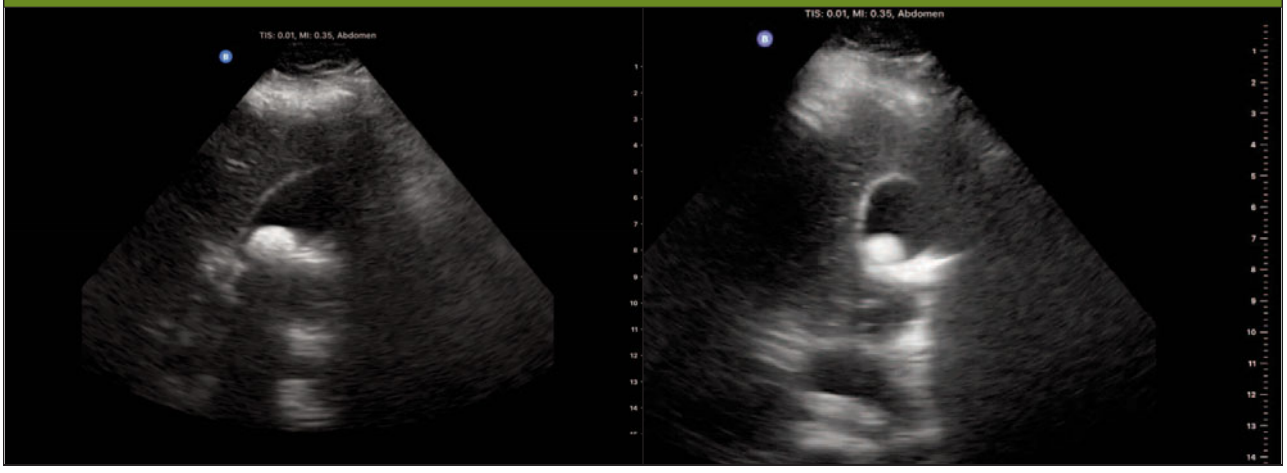
Estrogen increases cholesterol secretion while progesterone reduces soluble bile acid secretion which leads to an increase in gallstone formation. Progesterone also slows emptying of the gallbladder.[2] Both estrogen and progesterone naturally increase as gestational age advances, therefore increasing the risk of gallstone formation with advanced maternal age. Multiparous women have a higher risk of gallstone development (19%) compared to their nulliparous counterparts (7%).[1]

Biliary colic presents in pregnancy much like non-gravid patients,[6] with constant or intermittent pain in the RUQ that may radiate to the shoulder or scapula. The pain frequently presents as sudden onset often associated with eating, particularly after consumption of a high-fat meal. In general, biliary diseases in pregnancy are considered complicated.

In pregnancy, POCUS can help to identify gallstones, although more serious etiologies (**Table 1**), still need to be excluded.

Conditions with high morbidity and/or mortality such as acute cholecystitis, appendicitis, ascending cholangitis, HELLP, myocardial infarction, preeclampsia, and pancreatitis deserve careful consideration even in the presence of cholelithiasis seen on POCUS. The literature supports the utilization of POCUS in a variety of specific clinical scenarios to assess for a number of pathologic processes; however, each application needs

Figure 1. Gall stone with posterior shadowing in the neck of the gall bladder.



to be used within the indications and guidelines supported by evidence-based medicine. In the presentation of RUQ pain with or without pregnancy, the personal and family history, risk factors, exam findings, and ancillary tests all add to the clinical decision-making process.

POCUS is both sensitive and specific for assessing the presence of cholelithiasis as well as acute cholecystitis. These sonographic features are synonymous in the pregnant and nonpregnant patients.[2] Bedside ultrasound can help diagnose biliary pathology and expedite treatment.[3]

POCUS involves assessing for the presence of:

- Gallstones or sludge
- Gallbladder wall thickening (normal is <3 mm)
- Pericholecystic fluid
- Sonographic Murphy's sign
- Common bile duct (CBD) dilation (normal: <8 mm)

The last four features are characteristic signs of acute cholecysitis.[1,3,4]

Identifying the dilation of the CBD is the most technically challenging component of a limited RUQ sonographic exam, but is unlikely to be of benefit in patients with normal lab values, without sonographic Murphey's sign, who have a gallbladder wall thickness <3 mm, and have no pericholecystic fluid on POCUS.[3]

Ultrasound is the preferred imaging modality in pregnancy.[5] Ultrasound for cholecystitis is 85% sensitive in pregnancy and 95% specific, vs 91.7% sensitivity and 99.1% specificity with CT scan.[2]

Outcome of Case

With this particular patient, obtaining the POCUS allowed for direct visualization of a stone and empowered the clinician to provide supportive measures immediately. Keeping in context this patient's history, stable/afebrile vitals, and physical exam with additional ultrasonic measurements of a normal gall bladder wall thickness, and the absence of pericholecystic fluid, the clinician had sound reason to treat this pregnant woman with biliary colic in-house.

With her report of fetal movement, no uterine contractions or vaginal bleeding in addition to her ongoing stable vitals and clinical response to medical management, she had no indication for emergent transfer.

This scenario highlights a POCUS opportunity within the scope of urgent care to assist with providing specific answers in the face of acute biliary symptoms in and outside of pregnancy. Bedside ultrasound can reduce resource expenditure as well as reduce time to diagnosis and definitive care. It is important to acknowledge red flags in pregnant individuals who present with acute biliary disease as they are relatively high-risk individuals. UC clinicians may take an opportunity such as this to further patient advocacy and provide interspecialty continuation of care. ■

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ABSTRACTS IN URGENT CARE

- CPR Guidelines During the COVID-19 Pandemic
- Characteristics of COVID-19 in the Pediatric Population
- A Clinical Decision Rule for Predicting True Penicillin Allergy
- The Role of Antibiotics in Community-Acquired Pneumonia
- POCUS Overview: A Primary Care Perspective
- POCUS in Skin and Soft Tissue Infections

YIJUNG RUSSELL, MD and CHELSEA M. BURGIN, MD, FAAFP

Prioritizing Protecting Healthcare Workers During Resuscitation of COVID-19 Patients

Key Point: Priorities should be given to reducing provider exposure and lowering aerosolization risk while oxygenating/ventilating, and considering whether or not resuscitation is appropriate.

Citation: Edelson DP, Sasson C, Chan PS, et al. Interim guidance for basic and advanced life support in adults, children, and neonates with suspected or confirmed COVID-19. *Circulation*. April 9, 2020. [Epub ahead of print]

Relevance: Healthcare providers are already at increased risk of exposure during this time. It is important to take additional steps during resuscitation to minimize risk.

Study Summary: General principles of this article include:

1. Reduce provider exposure
   a. Patient's COVID status should be clearly stated
   b. All providers should don PPE
   c. Limit number of personnel in room
      – Consider mechanical compression vs manual compression
2. Lower aerosolization risk while oxygenating/ventilating
   a. Securely attach HEPA filter prior to administering breaths
   b. After defibrillation, intubate with cuffed tube ASAP
   c. Use provider and intubation approach most likely to succeed at first attempt
   d. Pause chest compressions to intubate
3. Consider whether or not resuscitation is appropriate
   a. Address goals of care early with patient or proxy ■

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COVID-19 Tends to Be Clinically Less Severe in the Pediatric Population

Key Point: Clinical manifestation in children were generally less severe than in adults; however, disease severity was inversely proportional to age.

Citation: Dong Y, Mo X, Hu Y, et al. Epidemiology of COVID-19 among children in China. *Pediatrics*. March 16, 2020. [Epub ahead of print]

Relevance: Numerous studies characterize the adult population with COVID-19. This study aims to characterize the disease in a pediatric population.

Study Summary: This study summarizes characteristics of 2,135 pediatric patients with confirmed or suspected COVID-19. The median age of patients was 7 and there was no difference in susceptibility between male and female patients. Of the cases studied, 94% were asymptomatic or of mild/moderate severity; 6% were severe/critical (in comparison to 18.5% in adults cited in this study). The highest proportion of severe/critical illness was found in age group <1 year (10%), which decreased with increasing age. For this study, the definitions were:

1. Asymptomatic: positive COVID-19 test with no symptoms
2. Mild: URI symptoms or isolated GI symptoms
3. Moderate: pneumonia without hypoxemia
4. Severe: dyspnea, PaO_2 <92%
5. Critical: ARDS with shock or other organ failure ■

Identifying Patients at Low Risk for True Penicillin Allergy

Key Point: Using a clinical decision rule, providers can identify patients at low risk for true penicillin allergy who do not need alternative antibiotics.

Citation: Trubiano JA, Vogrin S, Chua KYL, et al. Development and validation of a penicillin allergy clinical decision rule. *JAMA Intern Med*. March 16, 2020. [Epub ahead of print]

Relevance: Many patients report having a penicillin allergy—which often results in prescription of a broader spectrum or less effective antibiotic. A clinical decision rule which allows identification of patients at low risk for true penicillin allergy would allow them to use this family of antibiotic without need for formal allergy testing.

"In a feasibility study, family medicine residents and attending physicians received 16 hours of POCUS training, resulting in sufficient knowledge and skill to improve diagnostic efficiency and accuracy."

Study Summary: Six hundred twenty-two patients with a self-reported penicillin allergy underwent formal allergy testing. The authors then identified clinical variables that were associated with a true allergy and created the mnemonic **PEN-FAST**. In patients reporting a **PEN**icillin allergy:

- 2 points for <**f**ast years since last reaction
- 2 points for **a**naphylaxis/angioedema or **s**evere cutaneous reaction
- 1 point for reaction requiring **t**reatment

Add up the points for each risk factor and:

0 points: <1% risk of positive allergy test (very low)
1-2 points: 5% risk of positive allergy test (low)
3 points: 20% risk of positive allergy test (moderate)
4 points: 50% risk of positive allergy test (high)

The negative predictive value for the low-risk group was 96.3%. The PEN-FAST decision rule was externally validated in a retrospective cohort study of 945 patients. ■

A Second Look at Antibiotic Prescription for Community-Acquired Pneumonia

Key Point: Prescription of antibiotics did not result in statistically significant difference in treatment failure, return visits, or quality of life in the pediatric population.

Citation: Lipshaw MJ, Eckerle M, Florin TA, et al. Antibiotic use and outcomes in children in the emergency department with suspected pneumonia. *Pediatrics*. 2020 Apr;145(4).

Relevance: There is a high prevalence of viral pneumonia in the pediatric population, and low rates of treatment failure have previously been shown in children with CAP treated with placebo vs amoxicillin. However, antibiotic prescription remains commonplace in the acute care setting.

Study Summary: The authors studied the outcomes of 294 propensity score-matched pediatric patients with suspected CAP who did or did not receive antibiotics. The primary outcome was treatment failure as defined by 1) a return visit for CAP with hospitalization within 30 days of discharge, 2) a return visit with change in antibiotics within 30 days of discharge, or 3) change in antibiotics over the phone 7-15 days after discharge. The secondary outcome was quality of life, which included reported return-to-normal activity and presence/length of symptoms. The authors found that there was no statistically significant difference in treatment failure and quality of life between the two groups. ■

[Editor's note: Point-of-care ultrasound (POCUS) has become an extension of the physical exam in many acute care settings. We will be including abstracts that cover its many uses, contributed by Chelsea Burgin, MD in Abstracts in Urgent Care over the course of the next few issues of* JUCM.*]

POCUS Overview, a Primary Care Perspective

Key Point: Clinician-performed bedside ultrasound plays a valuable role answering specific questions regarding many different body systems in primary care.

Citation: Bornemann P, Barreto T. Point-of-care ultrasonography in family medicine. *Am Fam Physician*. 2018;98(4):200-202.

Relevance: Family medicine, like many specialties, is addressing POCUS like an extension of the physical exam. Ultrasound is an effective way to evaluate for disease processes like abscess, aortic aneurysm, cardiac failure, cholelithiasis, deep vein thrombosis, fractures, free fluid in the peritoneum, pericardial effusion, pneumothorax, pulmonary effusions, and retinal detachment.

Study Summary: The value and utilization of POCUS are rapidly expanding. POCUS increases patient satisfaction while decreasing time to diagnosis and reducing radiation exposure and cost. In a feasibility study, family medicine residents and attending physicians received 16 hours of POCUS training, resulting in sufficient knowledge and skill to improve diagnostic efficiency and accuracy. Ultrasound-guided procedures such as arthrocentesis,

thoracentesis, and venous access have shown to reduce rates of complications. In 2016, the American Academy of Family Physicians (AAFP) made a formal statement encouraging family medicine residency programs to incorporate POCUS as part of their graduate curriculum while the AAFP committed to providing more POCUS CME for clinicians at all levels. ■

POCUS in Skin and Soft Tissue Infections

Key Point: Ultrasound improves the accuracy of abscess identification in skin and soft tissue infections, frequently leading to changes in medical management.

Citation: Barbic D, Chenkin J, Cho DD, et al. In patients presenting to the emergency department with skin and soft tissue infections what is the diagnostic accuracy of point-of-care ultrasonography for the diagnosis of abscess compared to the current standard of care? A systematic review and meta-analysis. *BMJ Open*. 2017;7(1).

Relevance: Individuals with skin and soft tissue infections (SSTI) present frequently to urgent care centers, and at times it is challenging to identify the presence or absence of an abscess. POCUS is effective in identifying a pocket of fluid and improving medical decision-making.

"POCUS is an effective tool to rule out a pocket of fluid and prevent unnecessary incision and drainage in an SSTI presentation, when the clinician is uncertain about abscess vs cellulitis by history and physical examination."

Article Summary: In the greater majority of presentations for SSTIs, cellulitis and/or abscess is the clinical diagnosis. There is substantial overlap in abscess and cellulitis; however, the treatment paths differ. In this systematic review, 3,028 studies were evaluated; eight conducted from 1997 to 2016 were identified as good-to-excellent quality for inclusion criteria. A total of 747 patients underwent POCUS with a sensitivity of 96.2% and a specificity of 82.9% for the identification of an abscess. In an SSTI presentation, when the clinician is uncertain about abscess vs cellulitis by history and physical examination, POCUS is an effective tool to rule out a pocket of fluid and prevent unnecessary incision and drainage. ■

INSIGHTS IN IMAGES

CLINICAL CHALLENGE: CASE 1

In each issue, *JUCM* will challenge your diagnostic acumen with a glimpse of x-rays, electrocardiograms, and photographs of conditions that real urgent care patients have presented with.

If you would like to submit a case for consideration, please email the relevant materials and presenting information to *editor@jucm.com*.

A 28-Year-Old Male with a Persistent Dry Cough

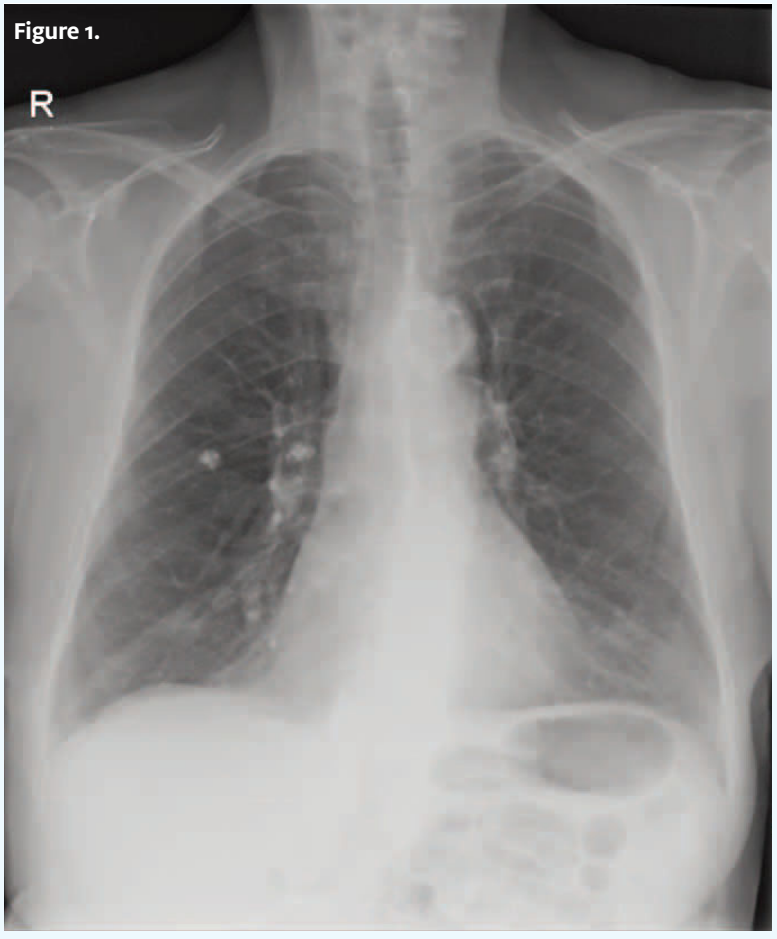

Figure 1.

Case

A 28-year-old male presents with complaint of a dry cough "forever." He admits to intermittent chest pain. Exam reveals decreased breath sounds on the right.

Review the image taken and consider what the diagnosis and next steps would be. Resolution of the case is described on the next page.

THE RESOLUTION

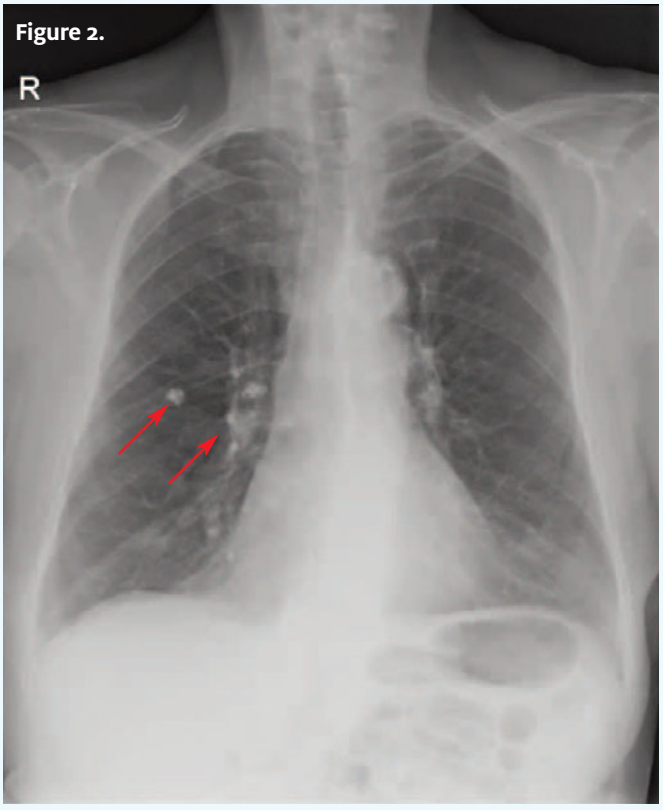

Figure 2.

Differential Diagnosis

- Lymphoma
- Myeloma
- Pyogenic meningitis
- Ranke complex

Diagnosis

This patient was diagnosed with Ranke complex from healed and calcified primary tuberculosis lesions. This was an incidental finding.

Learnings/What to Look for

- The x-ray shows a 0.9 cm right upper lobe anterior segment peripheral calcified granuloma and multiple right hilar calcified lymph nodes
- Primary tuberculosis consists of a primary inflammatory granulomatous peripheral and often subpleural lesion in periphery of lower part of upper lobes or upper part of lower lobes. Caseation necrosis usually follows with drainage of Mycobacterium tuberculosis to the regional hilar lymph nodes and systemic dissemination
- Primary granuloma and secondary hilar lymph nodes are collectively called Ghon's complex. In 95% of cases the disease is contained by the body immunity with subsequent healing, fibrosis, and calcification of primary granuloma and the secondary infected lymph nodes
- The healed calcified Ghon's complex is called Ranke complex

Pearls for Urgent Care Management and Considerations for Transfer

- Significance of the Ranke complex is from retained viable Mycobacterium tuberculosis bacteria in this calcified complex, which at times becomes a source of secondary active pulmonary tuberculosis

Acknowledgment: *Images and case provided by Experity Teleradiology (www.experityhealth.com/teleradiology).*

CLINICAL CHALLENGE: CASE 2

A 20-Year-Old Female with an Array of Gastro Symptoms

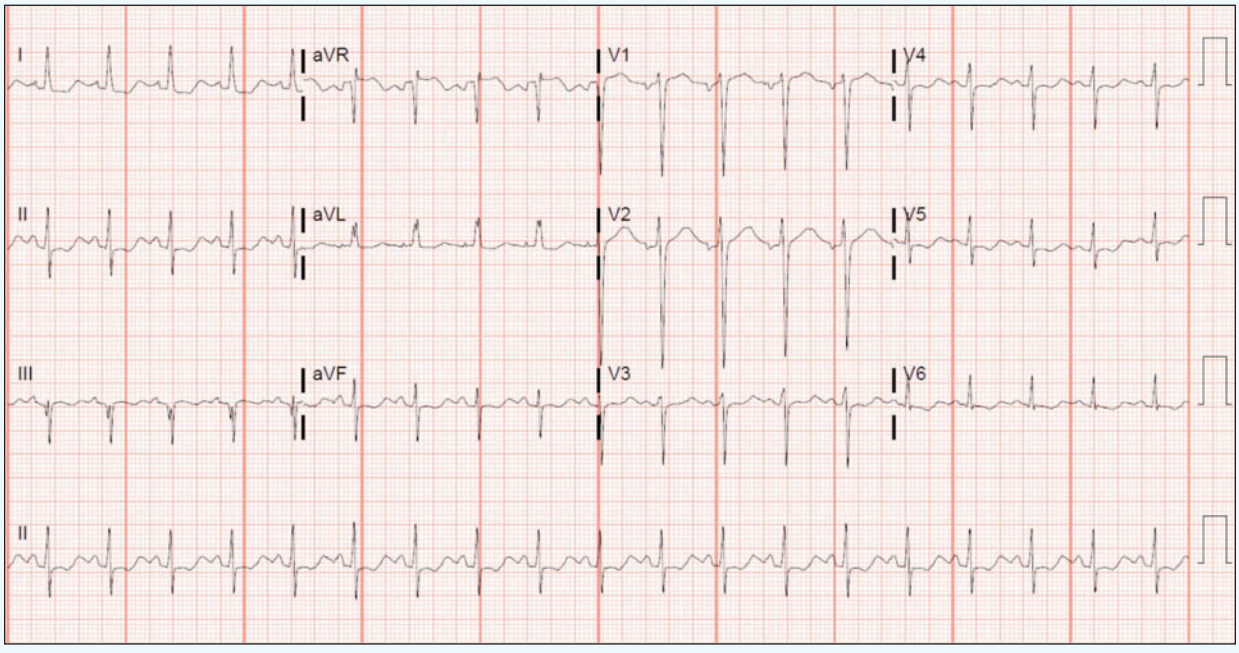

Figure 1.

Case

The patient is a 20-year-old female who presents to urgent care with 2 days of nausea, vomiting, crampy abdominal pain, and inability to tolerate anything PO. Her personal medical history is remarkable for type I diabetes mellitus.

View the ECG and consider what the diagnosis and next steps would be. Resolution of the case is described on the next page.

THE RESOLUTION

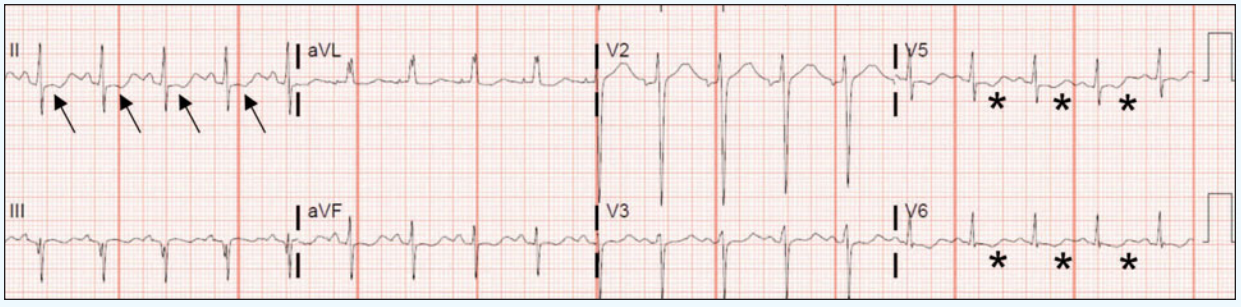

Figure 2. ST depressions are seen in multiple areas of this ECG, illustrated in lead II with arrows. V5 and V6 demonstrate T-wave inversion with prominent U-waves and a long QU interval (stars).

Differential Diagnosis

- ST-elevation myocardial infarction (STEMI)
- Non-ST-elevation myocardial infarction (NSTEMI)
- Hypokalemia
- Long QT Syndrome
- Digoxin toxicity

Diagnosis

The ECG reveals sinus tachycardia at a rate of 115 beats per minute. The increased amplitude and width of the P wave, ST depression, T wave inversion, and prominent U waves in V5 and V6, and apparent long QT (actually QU interval) all suggest the presence of hypokalemia. Prominent U waves will often give the appearance of a biphasic T wave ("down" then "up," as opposed to the more ischemic appearing "up" then "down" variety).

A note about tachycardia

Tachycardia is protective in patients with hypokalemia because as the heart rate decreases, the QT interval lengthens. With profound bradycardia and a long QT interval, the heart may depolarize, or ventricular ectopy may occur, while still in the repolarization phase. This "R-on-T phenomenon" (or R-on-U in this case) may induce polymorphic ventricular tachycardia, or torsades de pointes. Since tachycardia is protective for torsades de pointes, one treatment to intentionally accelerate the heart rate is overdrive pacing—which can be performed via pharmacologic means as well as transvenous or transcutaneous pacing. The presence of a malignant dysrhythmia is the only indication for rapid repletion of potassium. If cardiac arrest is imminent or has occurred, administer an initial infusion of 10 mEq IV over 5 minutes and repeat once if needed.

Learnings/What to Look for

- With moderate-severe hypokalemia, look for:
  - Increased width and amplitude of the P wave
  - Prolonged PR interval
  - T-wave flattening or inversion
  - ST depression
  - Prominent U-waves
  - Long QU interval
- In severe hypokalemia, patients develop ectopic beats, supraventricular tachyarrhythmias, and eventually ventricular arrhythmias (particularly torsades de pointes)

Figure 3. The QU Interval shown here is clearly longer than half of the R-R interval (a simple way to determine if the QT interval is long for the given rate).

Pearls for Urgent Care Management and Considerations for Transfer

- Hypokalemia is often accompanied by hypomagnesemia—don't forget to check and replace both to decrease the risk of ventricular arrhythmias
- Treatment of hypokalemia involves oral and/or parenteral routes, as well as identification and treatment of the underlying cause of the electrolyte disorder
- In the setting of hypokalemia and a prolonged QT interval (>500 msec), consider transfer to an emergency department or admitting facility where electrolytes can be replaced while the patient is monitored

Resources

- Diercks DB, Shumaik GM, Harrigan RA, et al. Electrocardiographic manifestations: electro-lyte abnormalities. *J Emerg Med*. 2004;27(2):153–160.
- Glancy DL, Wiklow FE, Rochon BJ. Electrocardiogram after 2 weeks of diarrhea. *Proc (Bayl Univ Med Cent)*. 2010;23(2):173–174.
- Levis JT. ECG diagnosis: hypokalemia. *Perm J*. 2012;16(2):57.
- 2005 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation*. 2005;112(24 Suppl):IV1-203

Acknowledgment: *Case presented by Catherine Reynolds, MD, Assistant Professor, Director of Student Clerkships, The University of Texas Health Science Center at Houston.*

CLINICAL CHALLENGE: CASE 3

A 24-Year-Old Female with a New, Unexplained 'Rash' on Her Leg

Figure 1.

Case

The patient is a 24-year-old woman who presents to urgent care with several linear lesions on her leg, accompanied by a burning skin sensation which developed days after starting a job as an outdoor bartender at a local beach resort.

Review the image above and consider what your diagnosis and next steps would be. Resolution of the case is described on the next page.

THE RESOLUTION

Figure 2.

Differential Diagnosis

- Irritant contact dermatitis
- Erythema multiforme
- Phytophotodermatitis
- Fixed drug eruption

Diagnosis

This patient was diagnosed with phytophotodermatitis, a cutaneous phototoxic eruption caused by the interaction of furocoumarins found in some common plants with solar UVA radiation. It is a common skin complaint in travelers to tropical regions.

Learnings/What to Look for

- Approximately 24 hours after plant contact with subsequent exposure to sunlight, a burning erythema develops. Limes, other citrus fruits, celery, figs, meadow grass, certain weeds, and oil of bergamot are frequently causative. In this patient's case, it was likely slicing and squeezing limes, lemons, and oranges for cocktails
- Exposure to the plant sap of wild parsnip (*Pastinaca sativa*; "poison parsnip"), common throughout the United States, can cause severe phytophotodermatitis
- There is no predilection for any age or ethnicity or either sex, although phytophotoder-matitis may be more noticeable in lighter skin phototypes

Pearls for Urgent Care Management and Considerations for Transfer

- Phytophotodermatitis is benign and self-limited. Treatment is supportive

Acknowledgment: *Images and case courtesy of VisualDx (www.VisualDx.com/JUCM).*

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The Myth of 'Control' with In-House Billing

MONTE SANDLER

We keep our billing in-house so we can control it. I guess I have heard this quote from people more than a thousand times. Unfortunately, 95% of the time it is just not true! Having your billing staff in the clinic may make you feel better but, in most cases, this is just a false sense of security. *Actually* being in control includes all of the following:

1. Knowing all your monthly metrics
   - *Days Sales Outstanding (DSO)*: The days of charges in accounts receivable (AR)
   - *Days to Bill*: The lag time between date of service and the date the claim is released to insurance
   - *Evaluation and Management (E/M) Weights*: The weighted average E/M level
   - *Average Revenue per Visit*
   - *Percentage of AR over 120 days*
2. Reviewing, monitoring, and reconciling daily claims submission to your clearinghouse and payers
3. Active AR management including monthly detail analysis of unpaid claims every 30-45 days
4. Monthly meaningful touches with documented notes of actions taken on specific claims outstanding to get the amounts paid and resolved
5. Monitoring and reconciling daily cash receipts

Experience tells us that a clinic's billing success is dependent on the specific people doing the work. If Jimmy or Suzy is doing the billing, there are no problems. Is this really control? What happens if Suzy quits or Jimmy gets hit by a bus?

In this situation, the knowledge resides with Jimmy and Suzy. Most urgent care organizations have no formal RCM policies and procedures. Few have documented best practices. Each of these people does the process/steps of RCM differently. If they leave for any reason, you have no RCM operations.

Monte Sandler is Executive Vice President, Revenue Cycle Management of Experity (formerly DocuTAP and Practice Velocity).

Why do you have more control of your RCM when it is outsourced?

1. You manage the outsourced team. Choose the right vendor and they'll make you look good.
2. All the RCM company's employees are trained in RCM utilizing a tested program.
3. Policies and procedures are well defined and used as a basis for the team member training.
4. The policies and procedures include best practices that ensure your RCM is being optimized.
5. Your outsourced company is committed to compliance and will assist you in making sure you are doing things in a compliant manner.
6. The assigned account manager is actively monitoring your metrics and front desk operations. This individual is your main contact point for RCM operations. They will make sure you have a pulse on your billing results.
7. The account manager works with the cash posting team to make sure your billing system is reconciled to your bank account, making year-end accounting easier.
8. The outsourced AR management team has an active AR management program that provides regular follow-up with detailed notes on outstanding claims.

The lists above are the tip of the iceberg in the ways that a well-organized, efficiently run RCM organization adds value to your business. In a customary environment, there are cost savings, as well. The current environment where clinics saw volumes plummet 60%+ in a matter of weeks due to the COVID-19 pandemic is a perfect illustration. The contingency fee model assures that as your revenue decreases, you are not stuck with a fixed cost model to running your RCM and having to do layoffs or furloughs to adjust.

The inverse is true with the onset of flu season each winter. In-house RCM organizations are faced with volume increases, resulting in the need for temporary help, which assuredly will not come from experienced, proficient staff.

If volume is down because of the pandemic, make the best of the time to work the old AR as hard as you can! The only way to collect is to do the follow-up and resubmissions. ■

DEVELOPING DATA

Urgent Care's Upward Trend of Rapid Testing Continues for Another Year

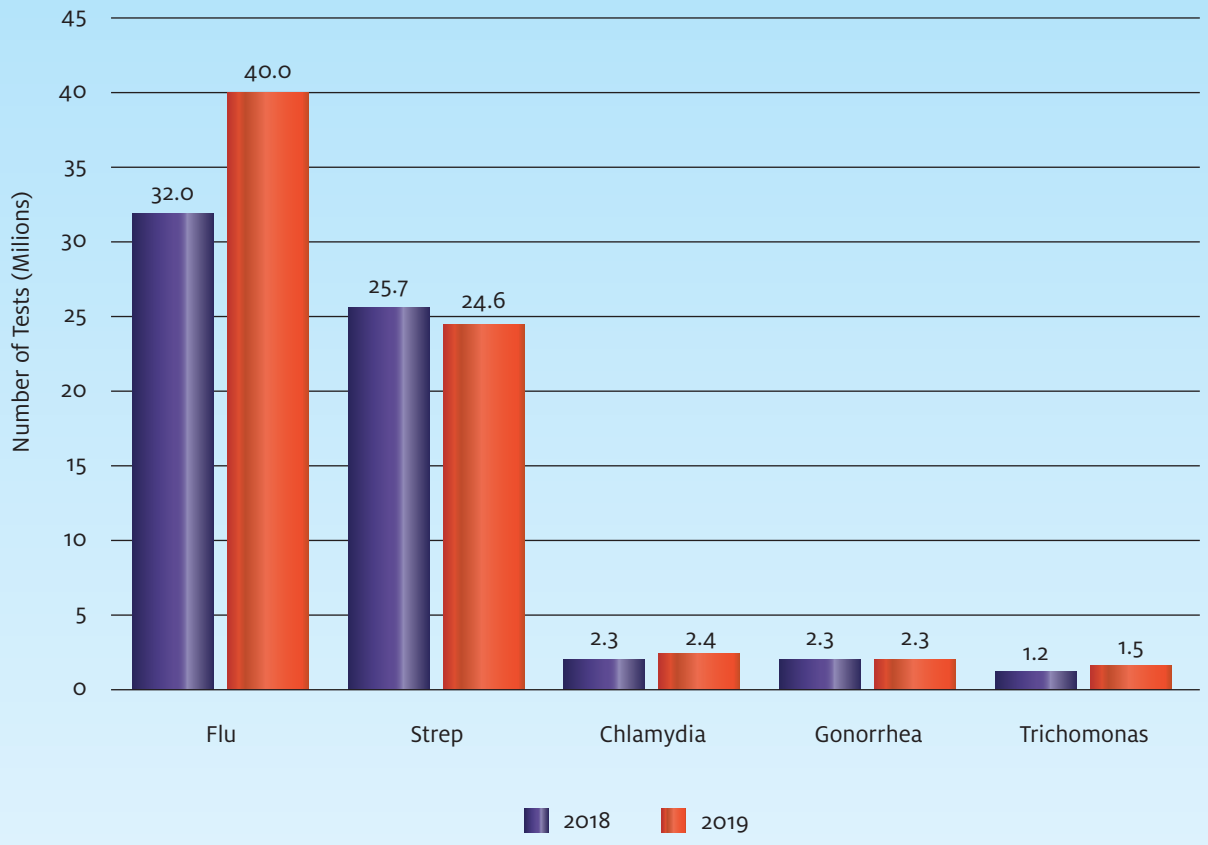
Convenience has always been the hallmark of the urgent care experience. A patient who wakes up feeling unwell doesn't want to wait a few days to see their primary care provider—especially if they have something that requires medication. And the best way to sort that out quickly is with a rapid test.

Patients certainly understand that, as the number of rapid tests performed in urgent care centers continues to grow.

Interestingly, while the total keeps climbing, the proportion of patients who have a particular rapid test done remains pretty consistent. Check out the graph below for more details. ■

RAPID TESTS DRAW PATIENTS TO URGENT CARE

Five Most Commonly Performed Rapid Tests in Urgent Care



Data source: *JUCM* 2019 Urgent Care Chart Survey and *JUCM* 2018 Urgent Care Chart Survey.

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