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The Value of Repeat Vital Signs

I'm just going say it: We should repeat vital signs more often in urgent care. But from the odd looks I get whenever I work with a new medical assistant, I realize that asking for vitals to be rechecked isn't common practice among my colleagues; it may even be frankly contrarian. So, before I lose you, I'll concede that one set of vital signs is more than enough for the vast majority of our patients.

However, there are two scenarios when repeating vital signs can help protect our patients—and ourselves—from looming badness:

1. If there is one (or more) significantly abnormal value
2. If the patient has a high-risk complaint and/or poor underlying health status and initially normal vitals

Repeating vital signs in these scenarios dramatically improves our ability to delineate between emergencies and non-emergencies.

In the simplest conceptual terms, a medical emergency is a situation where the natural history of a condition is rapid decline without intervention. The appendix ruptures without surgery in cases of appendicitis. Myocardium infarcts without reperfusion when patients suffer a coronary occlusion.

In true cases of emergency, patients deteriorate over time and their vitals will follow suit.

This is why the delta is what matters most. Worsening vital signs dramatically increase the probability of an emergent diagnosis, whereas vitals that normalize conversely reduce the chances of an emergency.

The latter is what we observe much more often in UC. A young man presents anxious and in pain after twisting his ankle and his initial blood pressure is 170/100 with a heart rate of 120. But after a negative x-ray, ibuprofen, and ice, he's feeling calmer and more comfortable. You repeat the vitals and his pulse is 65 and blood pressure is 110/70. His catecholamine surge has simmered, and the vitals reflect this.

Or you see a 6-year-old boy with a fever of 39°C and heart rate of 160. Sure, the tachycardia is probably related to the fever from a common viral illness. But without giving an antipyretic and repeating his vitals, how can you be certain? In a vaccinated and well-appearing child, a benign diagnosis is assuredly more likely, and you'd expect his temperature and pulse to improve in such cases. If they don't, that's meaningful and should prompt reconsideration of the presumptive diagnosis. But, if we never recheck his heart rate, a single recorded pulse of 160 will be a damning data entry for the rare cases which turn out to be early sepsis or myocarditis.

The Hazards of Abnormal Vitals

A number of emergency department-based studies support the notion that abnormal vital signs at discharge are harbingers of negative outcomes.[1,2] The number of abnormal vital signs has also been shown to be correlated with risk of subsequent hospital admission after ED discharge.[3]

It's also worth noting that even if we don't intervene, abnormal vital signs should normalize in patients without serious acute pathology. This is due a statistical phenomenon called *regression toward the mean*. We've all seen this unfold, but it's important to give it a name and recognize it.

Regression Toward the Mean

I first learned about regression toward the mean (RTM) as a wide-eyed medical student during a frigid January in the ED of Hurley Hospital in Flint, MI. I recall working with a grizzled, gray-haired attending named Dr. Barish. He swore at me and had a glass eye, but he was a great teacher. Shortly into my time with Dr. Barish, I noticed that he repeated the vitals on every patient he was discharging if the previous values weren't normal. Each time the tech returned to report the new vital signs, they'd always improved.

"How'd you know his blood pressure was going to be better?" I asked after our tech recited a near normal blood pressure in a young man with a URI who had previously been quite hypertensive.

"It always is." he replied curtly. "It's called regression toward the mean. Look it up!"

I did, and learning about this phenomenon has been one of the more powerful principles affecting my ability to assess patients for the presence of emergent conditions.

Simply put, RTM states that, in a stable patient, a recheck of any abnormal vital sign is more likely to be closer to normal than the previous value. This is because all vital signs fluctuate moment to moment—even when the patient in front of you is perfectly healthy. Each of these vital signs will produce some-

"Urgent care is an ideal setting for taking care of most stable patients with acute issues."

thing like a standard normal distribution of readings if measured continuously. You probably know this better as a "bell curve." The laws of probability state that, in a patient without significant pathology, if one measurement is extreme (ie, far from the mean) then the next measurement is more likely to be closer to, or regress toward, the mean. And the more extreme/abnormal the first observation is, the more likely it is that the next value will be closer to normal.

This phenomenon isn't limited to vital signs. For example, RTM offers an explanation, outside of superstition, why uttering the words "quiet" when the clinic is slow predictably precedes a subsequent rush of patients. Urgent cares tend to be busy places. If a center is relatively empty at any given moment, chances are it will naturally get busier in short order. (Feel free to share this with your staff next time you're unfairly maligned for a burst of work coming after you let the "Q word" slip.)

Similarly, we've all seen dismayed parents try to explain how their child, who is now doing cartwheels in the exam room, was crying inconsolably with ear pain at home. The decision to seek care was made at the peak of pain intensity and subsequently the pain intensity has regressed toward the mean level for a mild infection.

Pain intensity for benign medical issues will most often improve without treatment. Importantly though, RTM occurs with repeat measurements in any normal distribution of data, so if pain or vitals are worsening with repeat checks this suggests the "mean" for that patient is concerningly outside the normal range. This is why persistent "pain out of proportion" (POOP) is a red flag pattern for serious and life-threatening diagnoses.

High-Risk Scenarios

This brings me to the second group for whom it is essential to repeat vital signs: patients with high-risk complaints and/or poor underlying health status. These are the patients with complaints for which an emergent diagnosis must be considered (eg, chest pain, abdominal pain, syncope, etc.).

For each of these presentations, there are both benign and dangerous conditions in the differential. Additionally, patients of advanced age or with severe immunocompromise or chronic, multisystem organ disease have an increased likelihood of serious pathology, regardless of their complaint.

Patients with a reasonably high risk of a dangerous diagnosis don't belong in UC, but that doesn't mean that such patients never show up at our doorstep. In assessing which patients with high-risk complaints require immediate referral to the ED, vital signs represent the most valuable objective data readily available. If the patient is stable, we have some time to gather more information. If they're not, we need to get them out right away.

Checking for trends in vitals represents a simple tool with the most potential for quickly differentiating emergent and nonemergent presentations. In a stable patient, abnormal vital signs should improve when repeated. This is actually the definition of clinically stable. I often hear the phrase "vitals are stable" used to describe patients when only a single set of vitals has been taken. But stability cannot be determined with fewer than two data points.

Imagine an asthmatic patient presents with shortness of breath and wheezing, for example. If their respiratory rate improves from 36 to 20 with a nebulizer treatment, you can feel reassured that they probably have a mild (and UC-manageable) asthma exacerbation. But if the respiratory rate, oxygen saturation, and/or heart rate worsen, then they are unstable, by definition, and dangerous conditions such as pulmonary embolism or heart failure warrant further consideration.

Identifying unstable patients is an essential skill for ensuring patient safety in UC because we can't definitively care for such patients. If there's a hint that a patient is at risk of short-term decompensation, our priorities must immediately shift away from making a provisional diagnosis toward supporting the patient until they can get to the local ED. Unstable patients almost always need more resources than we have to offer.

Urgent care is an ideal setting for taking care of most stable patients with acute issues. But for patients with abnormal vital signs and higher-risk scenarios, it's worthwhile to make sure the situation is truly stable and that the patient is in the right place to get care. The good news is that it doesn't take much to make sure of this. We just need to pay attention to abnormal vitals, use the basic tools we have, and take just a little extra time to ensure things aren't going in the wrong direction. ■

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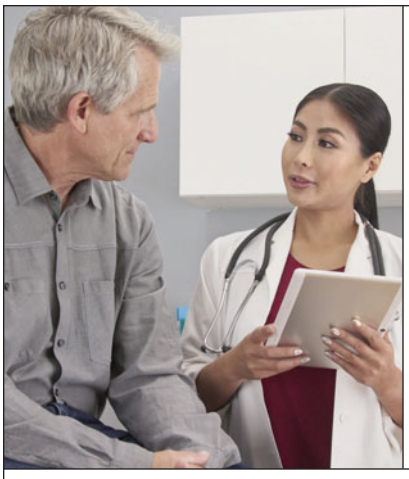

CLINICAL

IN THE DECEMBER ISSUE OF *JUCM*

After a brief downturn during the height of the COVID-19 pandemic, the rate of sexually transmitted infections in the United States picked up right where it had left off—which is to say, at epidemic levels. At the same time, STI specialty clinics that had been mainstays for treatment in decades past are in shorter supply than ever before. And with asymptomatic infections being common, the need for proactive screening has never been greater. What could (and should) be urgent care's role?

DEPARTMENTS

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Mission Statement
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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Discomfort of one type or another accompanied by fever may be the quintessential urgent care presentation. And while upper respiratory infection may be the most quintessential among them, bias toward assuming it's the most likely to be occurring in a given patient could be a costly mistake for the patient and for the urgent care provider and operator. It's essential to maintain a broad differential until all the facts (ie, data) are in.

This is demonstrated eloquently in this issue's cover article, When a Fever Is Not a URI: If It's Not in the Differential, It Won't Be in the Diagnosis by **Samidha Dutta, DO** of Adena Urgent Care and Apogee Hospitalist Group; **Clay Marsh, OMS-IV**, University of Pikeville–Kentucky College of Osteopathic Medicine; and **Michael Weinstock, MD**, emergency medicine attending physician, Adena Health System, director of research and CME, Adena Health System, professor of emergency medicine, adjunct, The Wexner Medical Center at The Ohio State University, risk management section editor for the Emergency Medicine Reviews and Perspectives (EM RAP) podcast, executive editor of the Urgent Care MAX (UC MAX) podcast, and senior clinical editor, *JUCM, The Journal of Urgent Care Medicine*. The article starts on page 13.

Sinusitis is certainly a common diagnosis in the urgent care setting. Unfortunately, prescribing antibiotics for those patients is also more common than it really should be. Large-scale initiatives by the Urgent Care Association and other organizations have been somewhat effective in improving antibiotic stewardship industry-wide, but surely there are things that would be at least as effective at the institutional level. That's the premise of this month's original research paper, anyway. **Amy Rasmussen, DNP, FNP-C** pursued answers to the question of whether educational sessions could promote more mindful prescribing among providers at a particular facility. Turn to page 27 and read Antibiotic Prescribing Patterns for Sinusitis in an Urgent Care and Convenience Care Setting: A Quality Improvement Project to read what she discovered.

Of course, "common" presentations are as likely as not to feature an unexpected twist. One is described in An Unusual Case of Third and Fourth Metacarpophalangeal Joint Dislocations Following a Fall (page 19). As authors **Leonard A. Powell, DO, MS, FACOFP, CMD** and **Chad E. Richmond, DO** explain, the urgent care provider's ability to manage such injuries often determines whether the patient can be treated at the urgent care level rather than referred to the emergency room or an orthopedist. Dr. Powell is associate professor of geriatric medicine and osteopathic manipulative medicine at Rowan University. Dr. Richmond is a physician at Inspira Health.

Maintaining a high level of acuity has become a major concern in urgent care. The rate at which you can keep patients on site for safe, efficient lower-cost care directly affects the industry's place in the U.S. healthcare system. A patient's ability to get x-rays on site is an important part of that picture, so to speak. This begs an essential question, as raised by **Alan Ayers, MBA, MAcc** in the title of this month's Health Law and Compliance feature. You can read Who *Can* Take X-Rays in an Urgent Care Center? starting on page 23. Mr. Ayers is president of Experity Consulting and senior editor, practice management for *JUCM*.

As you know, the Urgent Care Association's strength lies in its membership, in terms of both individual entities and the group as a whole. It could be easy to take the benefits that members experience for granted, though. So, we appreciate the perspective UCA President **Max Lebow, MD, FACEP, FACOEM** shares in a guest editorial, Why My Urgent Care Group Joined UCA—and Why Yours Should, Too on page 9.

Another article from a guest contributor can be found on page 54 in the form of our monthly Revenue Cycle Management column. In Where Do You Start When Starting Your Urgent Care?, **Heather Real** reminds us that selecting the right location for a new urgent care operation should be more about measurable factors than which neighborhoods are generating local buzz or will allow the manager to avoid the freeway on their way home. Ms. Real is an urgent care consultant for Experity.

Finally, we thank **Ivan Koay, MBChB, FRNZCUC, MD** for summarizing new literature on when it's truly necessary to treat fever, how to distinguish viral from bacterial conjunctivitis, scapular fractures and blunt chest trauma in children, the relative merits of sterile vs nonsterile gloves for laceration repair, the best approaches to antibiotic stewardship when treating children, and the latest on post Paxlovid rebound (Abstracts in Urgent Care, page 41). Dr. Koay is an urgent care physician; RNZCUC Examiner; Education Faculty for the RCSI Fellowship of Urgent Care Medicine; and Head of Faculty na hÉireann Royal New Zealand College of Urgent Care. ■

Call for Peer Reviewers

In every issue of *JUCM*, there are select articles on which we ask members of our peer review panel to comment. It's one step we take in trying to ensure that all the content we publish is relevant, clearly communicated, and free of bias. We're grateful for their contributions.

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Why My Urgent Care Group Joined UCA—and Why Yours Should, Too

MAX LEBOW, MD, FACEP, FACOEM

The Urgent Care industry is at an inflection point. From barely earning a footnote in the Affordable Care Act 12 years ago to becoming a vital part of the nation's healthcare delivery system, Urgent Care center operators and providers can be proud of our accomplishments. Yet even now, many healthcare leaders at the highest levels have failed to recognize the importance and potential benefits of bringing the Urgent Care industry to the table as a full partner.

Some of this changed during the COVID-19 pandemic. While other healthcare facilities and private medical offices either closed or significantly reduced services, America's Urgent Care centers remained open, performing the vital services of COVID screening and testing, as well as providing treatment for acute and chronic illnesses unavailable elsewhere.

Recognition of the importance of Urgent Care has advantages and disadvantages. With increased visibility comes increased scrutiny from government entities, policymakers, and within the House of Medicine.

This is where membership in the Urgent Care Association becomes important. Through the years, the UCA has built relationships with organizations like the CDC and local and state health departments, legislators, and policymakers at all levels and partnered with industry leaders to continually promote the Urgent Care industry. The voice of the UCA is strong, and its strength comes from its members. By joining the UCA, your group will join this voice and benefit from its collective power, ensuring that our Urgent Care centers remain strong and have a say in our future evolution to improved healthcare quality and access both here and abroad.

Aside from the advocacy benefits of joining UCA, there are dozens of reasons your group should join. Among them:

- **Educational Resources** – UCA offers the most comprehensive menu of educational resources for Urgent Care medicine, for both providers and managers. Many presentations offer CME, and most are free to members.
- **Benchmarking Reports** – These UCA-produced reports are the most in-depth and comprehensive study of the Urgent Care ecosystem. The data presented establish Urgent Care benchmarks to help organizations develop meaningful key performance indicators and aspirational goals.
- **Conferences and Online Events** – At the Annual Urgent Care Convention, regional conferences, and online meetings, UCA members stay abreast of national, regional, and local trends and changes in the UC environment so your UC group can plan for the future.
- **UCAccess** – This important resource collates healthcare headlines, articles, and recently published studies that impact the Urgent Care industry, keeping UCA members informed of the latest events in the practice and management of Urgent Care centers of all sizes.
- **Regular Publications** – Though not owned by the UCA, *The Journal of Urgent Care Medicine* is the official publication of the Association and is the first peer-reviewed journal dedicated to the practice of Urgent Care medicine. *Urgent Caring* is published by the College of Urgent Care Medicine (CUCM) and includes free CME and discusses topics important to providers.
- **Accreditation Services** – Urgent Care accreditation is an evolving standard for payers looking for a way to differentiate quality Urgent Care centers. This also offers specialty accreditation of occupational medicine and pediatric Urgent Care centers.
- **Affiliation with the College of Urgent Care Medicine** – The College offers even more educational resources. CUCM also offers an Urgent Care Medicine Fellowship to those physicians and APPs who have shown dedication, commitment, and excellence to our specialty.

Whether your Urgent Care group has one clinic or 100, you will reap great rewards by joining me and others in becoming members of the Urgent Care Association. Together, our voices will ensure that Urgent Care continues to grow and takes its place as a leader in healthcare delivery. ■

Max Lebow, MD, FACEP, FACOEM is President of the Urgent Care Association.

CONTINUING MEDICAL EDUCATION

Release Date: November 1, 2022
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Target Audience
This continuing medical education (CME) program is intended for urgent care physicians, primary-care physicians, resident physicians, nurse-practitioners, and physician assistants currently practicing, or seeking proficiency in, urgent care medicine.

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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- **Steve Weinman, MSc, RN, CEN, TCRN**

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When a Fever Is Not a URI: If It's Not in the Differential, It Won't Be in the Diagnosis (page 13)

1. **Donor-derived infections, opportunistic bacterial and fungal infections, hemophagocytic lymphohistiocytosis, and disseminated viral infections would indicate which category of infectious causes of fever?**
   a. HIV/AIDS
   b. Immunocompromise
   c. Nosocomial
   d. Travel-associated

2. **Which of the following is most often associated with Fournier's gangrene?**
   a. Colorectal source
   b. Cutaneous infection
   c. Local trauma
   d. Urogenital source

3. **Which of the following is/are a risk factor for necrotizing soft tissue infection?**
   a. Diabetes
   b. Immunocompromise
   c. Obesity
   d. All of the above

An Unusual Case of Third and Fourth Metacarpophalangeal Joint Dislocations (page 19)

1. **Metacarpophalangeal joint dislocations typically occur due to:**
   a. Contact sports
   b. Fall on an outstretched hand
   c. Workplace injury
   d. Automobile accidents

2. **"Simple" dislocations:**
   a. Manifest as bayonet positioning of the proximal phalanx dorsal to the metacarpal shaft
   b. Involve interposition of the volar plate and sesamoid bones
   c. Occur because of hyperextension of the proximal phalanx of the metacarpal head and flexion of the corresponding interphalangeal joint
   d. Require closed reduction

3. **"Complex" dislocations:**
   a. Manifest as bayonet positioning of the proximal phalanx dorsal to the metacarpal shaft
   b. Occur because of flexion of the corresponding proximal interphalangeal joint
   c. Occur because of hyperextension of the proximal phalanx of the metacarpal head and flexion of the corresponding interphalangeal joint
   d. Require closed reduction

Who *Can* Take X-Rays in an Urgent Care Center? (page 23)

1. **To obtain a license, a prospective radiologic technologist must pass the American Registry of Radiologic Technologists' national certification exam and at least:**
   a. Hold a high-school diploma
   b. Have a 2-year (Associate's) degree (prescribed curricula)
   c. Have a Bachelor's degree (prescribed curricula)
   d. There is no specific academic requirement besides passing the certification exam

2. **What proportion of urgent care patients require an x-ray?**
   a. 7%
   b. 10% to 15%
   c. 18% to 23%
   d. 26%

3. **The most obvious answer to the scarcity of registered radiologic technologists in urgent care is to:**
   a. Standardize a pay scale that recognizes level of education and years of experience
   b. Change relevant laws and regulations to allow limited-scope x-ray technicians to work in urgent care centers without direct physician supervision
   c. Require physicians to perform x-rays
   d. Require advanced-practice providers to perform x-rays

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When a Fever Is Not a URI: If It's Not in the Differential, It Won't Be in the Diagnosis

Urgent message: Fever in patients presenting to UC is often attributable to viral infections, urinary tract infections, otitis media, cellulitis, or pneumonia. When the source is not apparent after the initial evaluation, however, it is important to expand the differential in order to avoid missing less common, serious diagnoses.

SAMIDHA DUTTA, DO; CALEB MARSH, OMS-IV; and MICHAEL WEINSTOCK, MD

Citation: Dutta A, March C, Weinstock M. When a fever is not a URI: if it's not in the differential, it won't be in the diagnosis. *J Urgent Care Med.* 2022;17(2):13-16.

Case Presentation

A 74-year-old man with a history of Parkinson's disease and diabetes presented with 2 days of fever and fatigue. He denied cough, rhinorrhea, shortness of breath, chest pain, headache, dysuria, or sore throat. He had no indwelling lines or implanted medical devices. He denied alcohol, tobacco, and injection drug use.

His vitals were temperature of 39.2°C (102.6°F), pulse 90, respiratory rate 20, BP 139/72 and oxygen sat 98% on room air.

The remainder of his general physical exam was unremarkable with no obvious source of infection. Given his age and high fever without a source, the urgent care provider encouraged further evaluation.

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Etiologies of Fever

In an urgent care setting, most fevers will have a clear source, commonly from a respiratory or urinary tract infection. But what should the UC provider do if the febrile patient denies cough, rhinorrhea, shortness of breath and urinary symptoms? The most important diagnostic tool remains a thorough history and exam.

Expanded Fever History

- How was the fever measured (ie, oral vs temporal vs rectal)? Does it meet the criteria for a fever, ie, 38°C (100.4°F)?
- How long has the fever been present and has there been a response to antipyretics?
- Has previous testing already been performed?

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Table 1. Categorization Of Infectious Causes of Fever[2,3]

Category	Definition	Common Infections
Nosocomial	Infection that occurs at least 48 hours after hospital admission or within 3 days of discharge or 30 days postoperatively[4]	Healthcare-associated pneumonia including ventilator-associated pneumonia (if recently intubated), *Clostridium difficile* infection, fungemia, catheter-associated infection, decubitus ulcer, septic thrombophlebitis
Immunocompromise	History of hematopoietic or solid organ transplant, use of immunosuppressive medications for treatment of autoimmune conditions, active metastatic or hematologic malignancy	Donor-derived infections, opportunistic bacterial and fungal infections, hemophagocytic lymphohistiocytosis, disseminated viral infections (eg, HSV, CMV, EBV)
HIV/AIDS	Opportunistic pathogens dependent on CD4 counts and use of antiretroviral medications	Acute retroviral syndrome, toxoplasmosis, tuberculosis, *Cryptococcus*, HHV-8 infection, endemic fungal mycoses (eg, histoplasmosis, coccidioidomycosis)
Travel-associated	Infections related to endemic organisms specific to region of travel	Enteric fevers, leptospirosis, hepatitis A, traveler's diarrhea, viral hemorrhagic fevers, typhoid, yellow fever, zoonotic infections, Whipple's disease
Other	History of IV drug use, close animal contacts, high-risk sexual history, occupational exposures, history of heavy alcohol use	Aspergillosis, Q fever, brucellosis, *Chlamydia psitacci*, cat scratch disease, pelvic inflammatory disease, syphilis, bacterial endocarditis, epidural abscess, hepatitis B, hepatitis C, necrotizing fasciitis (including Fournier's gangrene of the perineum)

- Is there associated headache, chest pain, abdominal pain, pelvic pain, rash, back pain, or weight loss?
- Has there been an exposure to others with fever (meningitis, COVID-19)?
- Has there been a travel history with possible exposure to a tropical disease or tick-borne illness?
- Was there recent antibiotic use (eg, *C diff*)?
- What is the patient's immunization status and are there risk factors for immunosuppression (eg, treatment for cancer, autoimmune disease, chronic steroid use, diabetes, tobacco use)?
- Could it be a "drug fever?" Review medications and consider anticholinergic or stimulant toxicities (such as anticonvulsants, certain antidepressants, some antiemetics), serotonin syndrome, and neuroleptic malignant syndrome
- In the social history, specifically investigating for:
  - Injection drug use as a risk factor for spinal epidural abscess (SEA), endocarditis, pulmonary abscess or cutaneous or deep space abscess
  - Alcohol-use disorder with consideration of aspiration pneumonia or hyperthermia from withdrawal
  - Sexual history may reveal pelvic inflammatory disease, tubo-ovarian abscess, HIV/AIDS, syphilis

Expanded Fever Physical Exam

- HEENT – Ears (speculum and external ear, including the mastoid); oropharynx (erythema/exudate/tonsillar enlargement/abscess/laryngeal tenderness or hoarseness), nose (discharge)
- Neck: lymphadenopathy, nuchal rigidity
- Chest: Skin (including breast exam), lung auscultation
- Heart: Murmur, tachycardia, presence of a rub
- Abdomen: Inspection (for surgical incisions, distention) and palpation in all quadrants and costovertebral angles (CVA)
- Pelvic/GU: Scrotum/labia and perineal skin, prostate, penile or cervical discharge
- Extremities: Swelling, erythema, ulcerations
- General skin: Rashes (erythroderma, petechiae, vesicular, necrotic)

Broad categories of fever etiologies include:[1,2]

- Infectious
- Autoimmune/inflammatory
- Malignancy
- Other
  - Hyperthyroidism
  - Venous thromboembolism (VTE) or thrombotic thrombocytopenic purpura (TTP)
  - Drug fever
  - Serotonin syndrome
  - Malignant hyperthermia
  - Neuroleptic malignant syndrome

Infectious

Types of infection can be further broken down based on factors such as recent travel, HIV status, recent hospitalization, and immune status. **Table 1** shows definitions and causes of the different types of fevers caused by different types of infections.[2]

Etiologies of infectious disease that may be more challenging to identify include bacterial endocarditis, lung abscess, SEA/diskitis, meningitis, brain abscess, and necrotizing soft tissue infection (NSTI). Including these in the differential allows for further exploration and possibility of diagnosis at the initial visit.

Neoplasm

Common neoplastic conditions causing a prolonged fever include leukemia, lymphoma (both Hodgkin's and non-Hodgkin's), Castleman's disease, lymphoproliferative disease, multiple myeloma, myelodysplastic syndrome, renal cell carcinoma, hepatocellular carcinoma, ovarian cancer, and colorectal cancer.[1,2] Fever may occur in these patients due to pyrogenic cytokine production or spontaneous tumor necrosis.[2]

Autoimmune

Autoimmune diseases, such as autoimmune lymphoproliferative syndrome, are typically type 1 interferon driven responses. Whereas autoinflammatory disorders, such as periodic fever syndromes are driven by innate disorders of immunity that dysregulate interleukin responses. Measuring inflammatory markers is a nonspecific diagnostic tool but can still be useful in determining whether an inflammatory response is occurring.[2]

The most common inflammatory conditions causing prolonged fever include rheumatoid arthritis, rheumatic fever, adult-onset Still's disease and polymyalgia rheumatica.[1] Autoimmune conditions can often be identified based on presenting symptoms, age of the patient, personal and/or family history of other autoimmunity. For example, adult-onset Still's disease, other variants of rheumatoid arthritis, and systemic SLE predominate in younger patients, whereas temporal arteritis/giant cell arteritis and PMR syndromes are more common in elderly patients.[1]

Table 2. Signs and Symptoms of NSTI[14]

Erythema	66%-100%
Pain beyond erythema	73%-98%
Swelling	75%-92%
Crepitus or necrosis	0%-31%
Induration	12%-45%
Bullae	23%-45%
Fluctuance	11%
Fever	32%-53%
Hypotension	11%-18%

Other

Other etiologies include thromboembolic disorders, endocrinopathies, drug- and toxin-induced fevers and idiopathic. When evaluating an undifferentiated patient without a clear etiology of elevated temperature, obtain a history of currently prescribed medications as well as OTC medications. Nearly one third of febrile episodes secondary to drug reactions are due to beta-lactam antibiotics.[2] Specifically, drug reaction with eosinophilia and systemic symptoms (DRESS) presents with severe rash, fever, facial edema, lymphadenopathy, eosinophilia, and end organ damage. It may progress to more serious complications, such as Stevens-Johnson syndrome and toxic epidermal necrolysis, if left untreated. Serotonin syndrome may occur from the co-administration of multiple selective serotonin reuptake inhibitor medications or the additive effect of multiple serotonin-affecting medications (eg, tramadol, linezolid), with or without the simultaneous use of monoamine oxidase inhibitors.[2]

Case Resolution

A more thorough exam showed an 8-12 cm area of tenderness, warmth, erythema in the perineum with several areas of necrosis concerning for NSTI/Fournier's gangrene. Labs revealed an elevated lactate but no leukocytosis. CT imaging confirmed Fournier's gangrene and associated abscess formation. The patient was started on broad-spectrum antibiotics and taken to the operating room emergently for debridement.

A thorough skin exam, including the GU and perineal region, performed in UC may have expedited the diagnosis and subsequent definitive management with surgery.

Fournier's Gangrene

Fournier's gangrene is a rapidly progressing form of necrotizing soft-tissue infection of the perineal, genital, and perianal region.[5] The most common locations for initial infection include a colorectal source (30%-50%), a urogenital source (20%-40%), cutaneous infection (20%) or local trauma.[6] It was thought to be a polymicrobial infection of unknown origin that occurred in otherwise healthy men.[5,7] However, subsequent observations have proven that women can also be affected. Fournier's gangrene is most likely to occur in patients with underlying risk factors including diabetes, alcoholism, hypertension, smoking, immunosuppressive disease, and malignancy.[8,9] The mortality rate has remained unchanged over the past 25 years, remaining around 20%.[10]

NSTI can be broadly classified into two categories:

- **Type I** – most common (55%-75% of NSTIs)
  - Polymicrobial (average of four different organisms)
  - Common locations: Trunk and perineal area
  - Risk factors: Immunocompromise, renal insufficiency, diabetes, obesity
  - *Clostridia perfringens* now less common
- **Type II** – *S pyogenes* +/- *S aureus* - Less common than type I
  - Occurs in healthy, young, immunocompetent patients
  - Usually affects the extremities
  - Injection drug use is a risk factor for type I and II

Symptoms and physical exam findings commonly seen in Fournier's gangrene include erythema, localized tenderness and pain, and edema of the perineal region, fluctuance, systemic signs (eg, fever and hemodynamic compromises) and subcutaneous crepitation. Patients who have signs of severe sepsis upon admission have a significantly higher risk for mortality.[11]

Initial symptoms may be subtle and superficially undetectable, as the infection is not cellulitis (superficial) but is located in deeper soft tissues. (See **Table 2.**) NSTI, accordingly, is often not diagnosed (14%-35% of cases) on initial presentation, which significantly contributes to the associated morbidity and mortality.[12,13]

Although the diagnosis of Fournier's gangrene is primarily a clinical diagnosis via surgical exploration of the affected tissue, certain imaging modalities can be used if the presentation is atypical; however, surgery should not be delayed for imaging. The most sensitive imaging modality for evaluation of NSTI is CT scan. It can also prove useful for defining the extent of disease.[15]

Management consists of three main therapies: rapid and aggressive surgical debridement of the necrotized tissue, hemodynamic support including fluids and possible vasopressors, and administration of broad-spectrum parenteral antibiotics.[6,16,17] Early, aggressive debridement has been associated with improved survival.[18-20]

Conclusion

The case described here involved a patient with a high fever without an easily identifiable source. The patient was referred to the ED due to his advanced age and comorbidities, where a diagnosis of Fournier's gangrene was suspected after the clinical exam and confirmed with CT imaging. Though the diagnosis for a fever not from an easily identifiable source may be difficult and require an expanded differential and testing, in this case, in the UC setting, with limited diagnostic tools, this diagnosis could have been made with a simple expanded physical exam. Providers must rely on a thorough clinical evaluation and broad differential to reduce the risk of serious outcomes for patients with true fever and no readily apparent etiology. ■

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Case Report

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An Unusual Case of Third and Fourth Metacarpophalangeal Joint Dislocations

Urgent message: Metacarpophalangeal dislocations involving digits other than the thumb or index finger may be somewhat atypical, but are known to occur as a result of a fall on an outstretched hand—a common precedent to an urgent care visit. Familiarity with management of such injuries precludes the need to refer the patient.

LEONARD A. POWELL, DO, MS, FACOFP, CMD and CHAD E. RICHMOND, DO

Abstract

Metacarpophalangeal (MCP) joint dislocations typically occur in a dorsal fashion following trauma, most commonly a fall causing hyperextension of the joint. Hyperextension of the MCP joint may lead to avulsion of the volar plate from the metacarpal head or neck. Additionally, fractures of the base of the proximal phalanx or metacarpal head are seen in up to half of cases. The index finger is the most involved location of MCP dislocations, followed by the thumb; it is quite uncommon for the third or fourth digits to be involved. This case concerns a 76-year-old man with a dislocation trauma to the third and fourth MCP joints. Successful closed reduction was performed in the urgent care center at the time of initial presentation.

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Introduction

Metacarpophalangeal joint dislocations are typically traumatic injuries following a fall on an outstretched hand due to hyperextension of the affected joint.[1] Hyperextension of the MCP joint may sometimes lead to avulsion of the volar plate from the metacarpal neck at the time of dislocation. Fractures of the base of the proximal phalanx or metacarpal head are seen in up to half of cases.[2] A careful diagnosis and treatment of affected structures, as well as ruling out surgical emergencies such as compartment syndrome, are essential to restoring prior function of the affected hand.

Patient Information

A 76-year-old male presented to the urgent care clinic 24 hours postinjury for evaluation of pain and swelling in the right hand following a fall on ice outside of his home. He had no history of trauma or injury to the hand prior to the fall. He had no significant or contributory past medical or surgical history, except for unreported age-related osteoarthritis. He takes no medications and denies any significant alcohol, tobacco, or drug use. He lives at home with his wife and is func-

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Figures 1a and 1b. Prereduction.

tionally independent in his activities of daily living and instrumental activities of daily living.

Clinical Findings

The patient's vital signs were stable and afebrile. On presentation, he was noted to have significant soft tissue swelling and moderate ecchymosis about the right hand. The swelling was most evident to the dorsum of the right hand, and diffuse. Some of this extended into the fingers throughout.

The patient had full sensation and good capillary refill, but limited range of motion due to the swelling, and dislocations with deformity. He had a mild but obvious deformity to the third and fourth digits of the right hand, as well as a small abrasion. He demonstrated no signs of infection or bacterial cellulitis, despite the delay in initial presentation.

Imaging of the right hand showed extensive soft tissue edema and dislocation of the third and fourth MCP joints with a small avulsion fracture arising from the third metacarpal head.

Closed reduction of the dislocations was performed in the urgent care at the time of the patient's presentation with direct pressure over the dorsal aspect of the proximal phalanx, with the wrist in slight flexion. The fourth digit reduced more easily than the third digit in this instance.

The patient's soft tissue swelling was a slight limiting factor, but edema reduced significantly with reduction alone. The patient's tendon function was fully intact after reduction, and he was otherwise neurovascularly intact before and after reduction. Postreduction imaging showed proper reduction of the third and fourth MCP joints. See **Figures 1a, 1b, 2a, and 2b.**

Discussion

Anatomically, the MCP joint is a condyloid joint; the proximal phalanx is composed of a shallow and concave surface with a congruent cam-shaped metacarpal head. Muscular sesamoid attachments are embedded in the volar plate and serve as the point of attachment for muscles such as the adductor pollicis brevis and flexor pollicis brevis muscles.

Injury to the MCP can be classified as simple, due to subluxation, or complex, involving interposition of the volar plate and sesamoid bones or metacarpal head entrapment due to displaced natatory ligaments distally or the superficial transverse metacarpal ligament proximally.

Figures 2a and 2b. Postreduction.

Dorsal dislocations may be identified as simple or complex:

- Simple dislocations occur because of hyperextension of the proximal phalanx of the metacarpal head and flexion of the corresponding proximal interphalangeal joint.
- Complex dislocations manifest as bayonet positioning of the proximal phalanx dorsal to the metacarpal shaft and skin dimpling in the proximal palmar crease.

Volar dislocations show extensor lag and dorsal skin depression proximal to the base of the proximal phalanx.

Imaging

Lateral and oblique views of the hand are best to observe dislocations. Joint space widening can indicate interposition of the volar plate. Entrapment of sesamoid bones in the MCP joint is diagnostic of complex dislocation.

Management

Treatment is dictated based on severity of the dislocation. Closed reduction and immobilization involve applying direct pressure over the dorsal or volar aspect of proximal phalanx. Open reduction involves surgery and should be deferred to orthopedic or hand specialty surgeons. Post-treatment complications that can arise include joint stiffness, post-traumatic arthritis, or osteonecrosis.[3]

Case Resolution

The patient underwent closed reduction with a good result of MCP alignment on x-rays. He was also placed in a compression bandage. Volar splinting was avoided due to further fall risk and age-related osteoarthritis comorbidity. He was referred to a hand surgeon for further follow-up and management. He demonstrated no neurovascular compromise either before or after reduction.

Conclusion

Metacarpophalangeal joint dislocations occurring in digits other than the index finger or thumb are especially uncommon. Treatment with closed reduction when appropriate and follow-up with orthopedic surgery should be performed. ■

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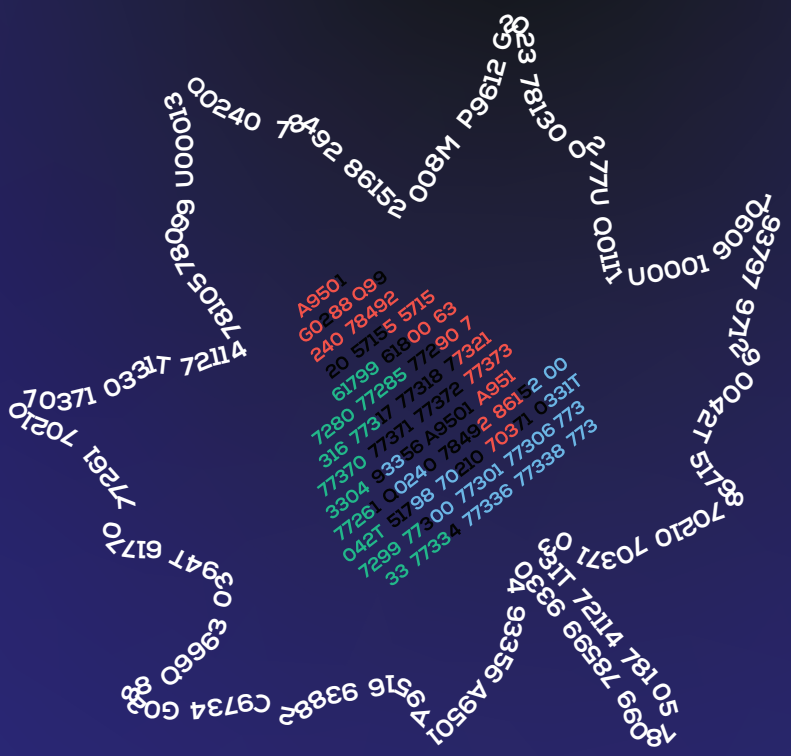
Autumn Leaves & Medical Coding Costs



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Who *Can* Take X-Rays in an Urgent Care Center?

Urgent message: Given that x-ray is a differentiating feature of "urgent care" and the current challenges in recruiting and retaining licensed RTs, a logical question for urgent care operators is the extent to which x-ray tasks can be delegated.

ALAN A. AYERS, MBA, MAcc

"The only people who can touch an x-ray machine are those who are certified to do so…."

That's what some states say to the question of who may take an x-ray at a medical facility, including an urgent care center. As a result, a physician may not delegate their certification or qualifications to a noncertified person. Nearly all states require a licensed radiologic technologist (RT) to take x-rays and prohibit others from doing so.[1] In fact, only a handful of states (see **Figure 1**) do not impose any regulatory restrictions in this area.[2]

Here, we explore the rules concerning who may use an x-ray machine to take images, as well as some thoughts on common-sense solutions to the issue.

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Background

To obtain a license, a prospective RT must have a 2-year (Associate's) degree (prescribed curricula) and pass the American Registry of Radiologic Technologists' national certification exam.[3]

RTs learn multiple modalities, including CT, MRI, fluoroscopy, and mammography; however, in urgent care, they only utilize basic x-ray.[3] Radiographers must also maintain a high degree of accuracy in radiographic positioning and exposure technique, and maintain knowledge of radiation protection and safety. Due to the fact that only about 10% to 15% of urgent care patients require an x-ray, there's an insufficient amount of volume to keep an RT busy full-time. As a consequence, RTs are expected to also serve as medical assistants. Medical assisting is a lower skill at a lower wage. It's a physically demanding job that many RTs do not care to do. A trained RT would rather work in a facility, such as a hospital, where their entire skillset can be utilized.

The Issue

The limited number of x-rays taken in urgent care facilities creates high turnover and hinders the operator's ability to easily hire RTs. A shortage of RTs that predated the pandemic has exacerbated the problem.[4]

Because of this, many urgent care centers are put in a situation where they're unable to offer x-rays altogether or on certain days of the week, which strips them of their "value add" of keeping patients out of the ED as well as their competitive differentiation over a primary care office or a retail clinic—neither of which typically have x-ray capabilities. Lack of x-ray capability can also delay important diagnoses, inconvenience the patient, and diminish the provider's diagnostic confidence.

Logical Solutions

Physicians are permitted to take x-rays in many states, which is the best solution for the independent, physi-

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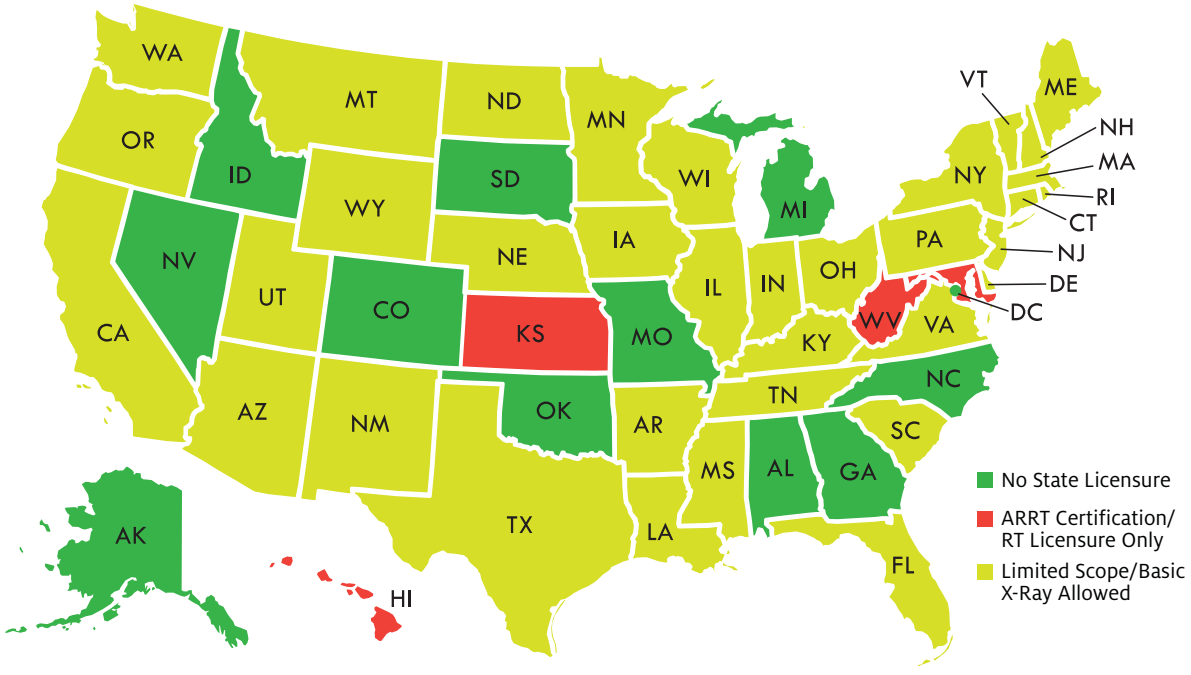
Figure 1. X-Ray Regulations by State



cian-owned urgent care. But increasingly, urgent care centers are staffed by physician assistants and nurse practitioners. Because of this, the most logical solution would be to allow PAs and NPs to take x-rays. It stands to reason that if a physician can take x-rays, and if a PA or NP can practice within the scope of the supervising physician's practice (or, in some states, independently), with appropriate training, an NP or PA should likewise be allowed to take x-rays.

At this point, states have said that a PA or NP can perform whatever procedures a physician can do *unless otherwise prescribed*. Therefore, if a state, such as New York, states that "only licensed practitioners or licensed radiologic technologists, may position patients, set techniques or apply radiation to patients," a PA or NP cannot take an x-ray.[5] In fact, New York state regulations provide:

> Nurses, nurse practitioners, secretaries, receptionists, physician assistants, medical assistants, or respiratory therapists may NOT position patients, move the x-ray source, set techniques, or expose patients unless they are licensed and currently registered as radiologic technologists with this Department.[5]

Limited-Scope X-Ray

Many states provide for a "limited scope x-ray technician" or "basic x-ray machine operator" certification with lesser requirements than a fully certified RT. The American Society of Radiologic Technologists defines limited x-ray machine operator (LXMO) as "an individual other than a radiologic technologist who performs diagnostic x-ray procedures on selected anatomic sites. LXMOs have a different scope of function in radiology and the types of exams they are permitted to perform.[6] This person could satisfy the need in urgent care centers. Owners could staff an LXMO and pay the person less than a licensed RT. This person could also assist with other functions in the urgent care.

However, in some states, such as Illinois, an LXMO may require an RT to work under a physician's supervision.[7] This restricts their use in centers that are staffed by PAs and NPs. In addition, some states limit the parts of the body of which a limited radiologic technologist can take an image.[8]

Video Supervision and Telemedicine

Another solution is that an RT could oversee a medical assistant by video. In effect, the medical assistant would be the "hands" of the remote RT.[9] Such a model has

been considered, and was used in some circumstances during the pandemic.

The American College of Radiology's CT and MR Accreditation Program requirements specify that the supervising physician is responsible for ensuring that a physician is present and immediately available when intravascular contrast material is administered to patients. However, on March 31, 2020 CMS issued an Interim Final Rule that, among other provisions, temporarily modified CMS direct supervision requirements in certain circumstances. The rule stated that "the virtual presence of the physician through audio/video real-time communications technology will be allowed during this emergency period when use of such technology is indicated to reduce exposure risks for the beneficiary or health care provider," provided the administration is done in communication with an immediately available technologist, nurse, or advanced practice provider.[10]

It is possible to configure an x-ray machine remotely. However, as a matter of safety and to limit radiologic overexposure, manufacturers install a manual switch to create the actual x-ray exposure. As a result, even if a medical assistant could position a patient based on the remote RT's instruction, the MA would still be required to operate the machine. But again, states lay out the duties of the RT which involve physical (hands-on) positioning of the patient, and these duties cannot be delegated and cannot be performed over video.[11]

This "TeleRT" model would allow performing remote x-ray procedures with the licensed technologist off site and the medical assistant being directed via video link by the x-ray technician.[12] As one author noted:

> "The delivery of medical services through digital devices is increasing during the novel coronavirus pandemic as doctors, patients and insurers embrace the opportunity to deliver and receive healthcare remotely. With widespread adoption, we can expect that telehealth is now a bedrock of medical care."[13]

Regulatory Changes

The most obvious answer to this issue is to change the laws and regulations to allow limited scope x-ray technicians to work in urgent care centers without direct physician supervision.

There is precedent for relaxed standards in the COVID-19 pandemic. In fact, such action has been contemplated for decades.[14]

The National Institutes of Health noted that regulators and payers rapidly lowered implementation barriers to telemedicine-related services during the pandemic.[14] A New York court said "[s]ome latitude may be accorded an administrative agency in areas where scientific or other specialized knowledge is required for action."[15]

Legislative advocacy can bring about a change in lawmakers' perspective. Education and greater awareness of the issue can help lawmakers understand this important issue.

Conclusion

A specific change for urgent care scenarios would be significant, and yet it is not a great departure from what has been allowed in the past in particular circumstances. Given the success of telemedicine during the pandemic, there are really no obstacles to instituting this change for x-rays in urgent care centers. ■

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Acknowledgment: This article was reviewed by Ron Boucher, MD, FACR, Chief Medical Officer, Experity Teleradiology.

The December issue will feature another article on x-ray in urgent care, with a more detailed analysis of Limited Scope X-Ray Certification.

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Antibiotic Prescribing Patterns for Sinusitis in an Urgent Care and Convenience Care Setting: A Quality Improvement Project

Urgent message: Inappropriate antibiotic prescribing in the outpatient setting has been a longstanding public health challenge. An educational session implemented in a large Midwestern healthcare system group of urgent care and convenience care clinics resulted in a statistically significant reduction in antibiotic prescribing for acute sinusitis and a statistically significant increase in antibiotic guideline adherence.

AMY K. RASMUSSEN, DNP, FNP-C

Citation: Rasmussen AK. Antibiotic prescribing patterns for sinusitis in an urgent care and convenience care setting: a quality improvement project. *J Urgent Care Med*. 2022;17(2):27-33.

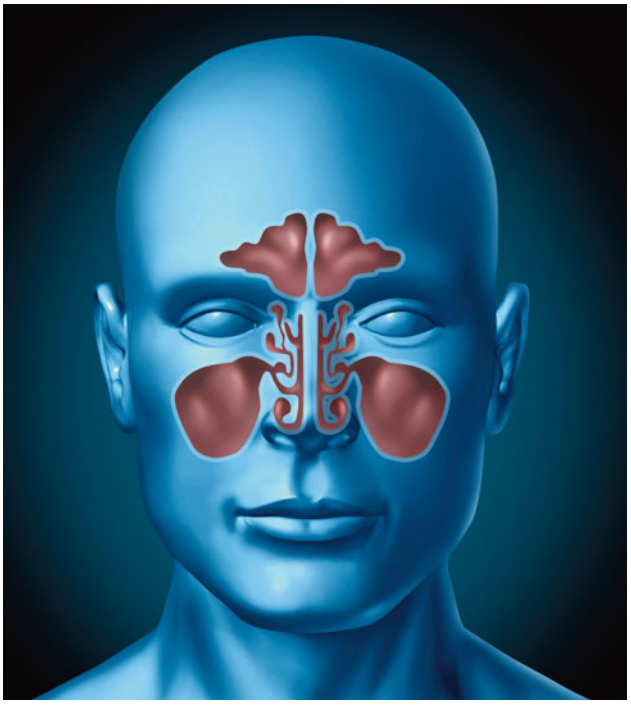
Abstract

Background: Inappropriate antibiotic prescribing in the outpatient setting is a longstanding problem and a public health challenge. Despite clear antibiotic guidelines and educational campaigns, antibiotics continue to be overprescribed for sinusitis in urgent care centers. However, there is evidence that antibiotic stewardship interventions can improve guideline adherence to manage sinusitis.

Objective: Determine the effect of an educational program on provider antibiotic prescribing practices.

Methods: This study used a one-group, pre- and post-study design and Levin's Change Theory Model to determine if an educational intervention decreased inappropriate antibiotic prescribing for sinusitis for providers practicing in Midwest urban urgent care and convenience care clinics. Incidentally, timing of this study provided an opportunity to compare prescribing practices between in-person and virtual care environments.

Results: Comparing each of the calculated values of z to critical or table value of z, which is +/-1.96 for an α of .05, there was a statistically significant reduction of antibiotic prescribing after the educational intervention and a statistically significant improvement in guideline adherence for diagnosis and treatment. The education



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"Even with current prescribing guidelines, inappropriate prescribing is influenced by providers' lack of knowledge, attitudes regarding antibiotic use and resistance, and patient expectations and pressures to prescribe."

intervention resulted in a 22.8% (z=10.32, p=0.000) reduction in inappropriate antibiotic prescribing and a 6.1% (z=1.95, p=0.025) increase in antibiotic guideline adherence. Additionally, there were 16.2% (p=0.001) fewer antibiotics prescribed for sinusitis during virtual care visits when compared with in-person visits.

Conclusions: The statistically significant reduction in inappropriate antibiotic prescribing for sinusitis and increase in antibiotic guideline adherence suggests provider-targeted education to be an effective intervention. The COVID-19 pandemic provided an unexpected opportunity to explore the prescribing patterns of the same providers in virtual and in-person environments.

Key words: Acute sinusitis, antibiotic resistance, antibiotic stewardship, quality improvement

Background

Antibiotic Use

Each year in the United States, 80 million prescriptions are written for antibiotics and 30% of those prescriptions are written for viral respiratory illnesses that should not be treated with antibiotics.[1,2] Most of these prescriptions are written in outpatient care settings; of these, urgent care has the highest antibiotic prescribing rate.[3] Studies have shown that about 80% of the antibiotic prescriptions written in urgent care centers each year are for sinusitis, a respiratory tract infection (RTI) that usually resolves without treatment.[3-5] Inappropriately prescribed antibiotics in the outpatient setting have been a longstanding problem that continues to be a public health challenge.

Sinusitis is a common RTI that causes inflammation of the mucosal lining of the nasal passage and paranasal sinuses and is the most common complaint in outpatient urgent care centers each year in the U.S.[6,7] Symptoms include runny nose, congestion, facial pain and pressure, headache, sore throat, and cough.

Treatment for acute viral sinusitis is focused on symptom management, with symptoms typically resolving in 7 to 10 days.

Centers for Disease Control and Prevention guidelines can help in differentiating between acute viral sinusitis and acute bacterial sinusitis.

Sinusitis is generally considered to have a bacterial etiology if symptoms persist more than 10 days without improvement; the patient experiences worsening symptoms over 3 to 4 days (such as new onset of fever, daytime cough, or nasal discharge after initial improvement); or symptoms are severe, such as fever of 102°F or higher, purulent nasal discharge, or facial pain.[1] In these circumstances, antibiotic treatment is appropriate.

Sinusitis accounts for 11.1% of over 2.7 million urgent care visits each year.[2,7] Ninety-eight percent of sinus infections are viral, and current national guidelines do not recommend antibiotics in treating acute viral sinusitis.[8]

Resistance and Stewardship

The overuse and inappropriate prescribing of antibiotics is associated with increased healthcare costs, unnecessary adverse drug effects, and the emergence, persistence, and transmission of antibiotic-resistant organisms, like methicillin-resistant *Staphylococcus aureus* (MRSA).[4,9,10] Antibiotic-resistant organisms cause more than 2.8 million infections and 35,000 deaths in the United States each year.[1] Infections caused by antibiotic-resistant organisms cost patients an estimated $35 billion in lost wages and contribute $20 billion to excess healthcare costs.[1]

Inappropriate use of antibiotics can have serious consequences. Antibiotic resistance is associated with antibiotic exposure and patient nonadherence to prescribed antibiotic regimens. Studies suggest that up to 40% of patients fail to complete the full course of antibiotic treatment.[11] Antibiotic reactions, along with unwanted and uncomfortable effects from medications, are also the most common cause of adverse drug events resulting in physical, mental, and functional injuries.[12] Using antibiotics when they are not necessary can decrease their effectiveness and reduce options for treating infections.

Antibiotic stewardship programs are designed to promote appropriate use of antibiotics, improve patient outcomes, and decrease the spread of resistant organisms.[13] There is evidence that antibiotic stewardship interventions can improve guideline adherence to manage sinusitis diagnoses.[7]

Targeted education on appropriate use of antibiotics for sinusitis is needed in urgent care settings to help reduce inappropriate antibiotic prescribing.

Inappropriate use of antibiotics in urgent care centers

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is a costly problem that contributes to increased healthcare costs, increased antibiotic resistance, and exposing patients unnecessarily to antibiotics and their side effects.[1,2,11] Studies suggest that even with current prescribing guidelines, inappropriate prescribing is influenced by providers' lack of knowledge, attitudes regarding antibiotic use and resistance, and patient expectations and pressures to prescribe.[14,15] Understanding what influences this practice is imperative in order to design effective interventions.[3]

Clinical Question

For urgent care and convenience care providers, does the implementation of an antibiotic stewardship training and education program reduce the number of unnecessary prescribed antibiotics for sinusitis over a 2-month period of time, compared with no training or education?

Literature Search

A systematic literature search was conducted in PubMed, MEDLINE, and Cumulative Index to Nursing and Allied Health Literature (CINAHL). Abstracts of relevant papers were reviewed and hand searching of other relevant publications was used to identify additional sources. The Cochrane Library was also searched for additional publications. Finally, the CDC and Infectious Disease Society of America (IDSA) websites were searched for additional publications relevant to the clinical question.

A broad search strategy was used to locate current prescribing habits of antibiotics for respiratory illnesses. Keywords and search terms that were used alone and in combination that related to the clinical question were: antibiotic stewardship, sinusitis, provider, urgent care, and acute respiratory illness. The search strategy used Medical Subject Headings (MeSH).

The initial search resulted in over 5,000 articles; to identify relevant publications, inclusion criteria included: date range of 2014 to 2021, adults 18 to 65 years of age, full-text, peer-reviewed, English language, and outpatients.

The search excluded publications that discussed the pediatric population, as well as literature related to inpatient settings, chronic illnesses such as cystic fibrosis or acute exacerbation of chronic obstructive pulmonary disease, and pneumonia. This search resulted in 29 relevant publications; the Cochrane Library resulted in two additional articles.

Results were manually checked for duplicates and for articles that were outside of the search parameters. Reference sections of relevant publications were also reviewed. The comprehensive literature review of PubMed, MEDLINE, CINAHL, the Cochrane Library and government websites resulted in adequate literature to support the clinical question.

Table 1. ICD-10 Codes

J01.0	Acute maxillary sinusitis
J01.1	Acute frontal sinusitis
J01.2	Acute ethmoidal sinusitis
J01.4	Acute pansinusitis
J01.9	Acute sinusitis, unspecified

Design And Methods

Setting

An educational antibiotic stewardship intervention was implemented at 10 urgent care clinics and seven convenience care clinics at a Midwest urban healthcare network using the Lewin's Change Theory. Due to the COVID-19 pandemic, the urgent care setting developed a virtual urgent care platform in the summer of 2020 to treat and diagnose those patients that did not want traditional in-person visits. The virtual platforms are managed by the same providers in the urgent care and convenience care clinics. The virtual urgent care clinic was used to capture some of the post study data.

Study Design

The project used a one-group pre/poststudy design to determine if an education intervention decreased inappropriate antibiotic prescribing among urgent care and convenience care providers (medical doctors [MDs], physician assistants [PAs], and nurse practitioners]NPs]) through the increased use of prescribing guidelines for sinusitis. Antibiotic prescribing data were collected retrospectively from patient records dated January 1, 2020 through February 29, 2020, to establish a pre-intervention baseline. After the project education intervention, comparison data were collected from the same time period in 2021 (January 1 through February 28) to account for the seasonality of RTI.

Population

The provider population included all providers (MDs, PAs, and NPs) from the network of urgent care and convenient care clinics. The clinics are staffed with 76 full and part-time MDs, PAs, and NPs and 64 casual MDs, PAs, and NPs. Each clinic utilized the same EMR and was part of the same healthcare organization. All providers floated among the 10 urgent care clinics and seven con-

Table 2. Pre- vs Postintervention Comparison

	Antibiotic Given?		Guidelines Followed?	
	Pre	Post	Pre	Post
Yes	485	288	333	281
No	10	95	162	102
Total	495	383	495	383
	98.0%	75.2%	67.3%	73.4%
	22.8% Decrease		6.1% Increase	
	z=10.32, p=0.000		z=-1.95, p=0.025	

Z-value calculated using the hypothesis test for proportional binomial data.

venience care clinics. Providers' experience level ranged from new graduates to experienced providers.

Sampling

The sample included adult patients treated for acute sinusitis from January 1, 2020, through February 29, 2020, and January 1, 2021, through February 28, 2021. Inclusion criteria were a) age 18 or older and b) diagnosed with acute sinusitis using five ICD codes (**Table 1**). Patients were excluded from the study if they had a concomitant infection (ie, acute otitis media, strep pharyngitis) which might influence the antibiotic choice. During the pre- and poststudy periods, there were 495 and 383 patients diagnosed with acute sinusitis based on the International Classification of Disease (ICD) codes before and after the educational intervention, respectively.

Procedures

Phase 1

Baseline retrospective chart audit

A retrospective chart audit was conducted to establish a baseline of the prescribing rate and guideline use for the urgent care and convenience care providers. The information technology (IT) department at the healthcare organization provided an electronic report to identify a list of patients who met inclusion criteria (ICD sinusitis codes, patients >18-years-old, treatment received at one of the urgent care or convenience care clinics, and date range of January 1, 2020, through February 29, 2020). These initial data provided 532 patient charts for review.

The student investigator performed all chart reviews. The CDC sinusitis clinical treatment guideline presented in the educational session was used as a benchmark to determine inappropriate prescribing of antibiotics (ie, antibiotic is not needed, the wrong antibiotic is prescribed, or the wrong dose is given or the antibiotic is prescribed for the wrong length of time).

For each chart reviewed, an Excel spreadsheet was used to collect data. Data recorded were 1) Was an antibiotic prescribed? (yes/no) and 2) Were CDC sinusitis guidelines followed? (yes/no). Charts that showed concomitant infection during the visit, which could have influenced antibiotic choice, were eliminated from the study. After review, 495 charts were appropriate for the prestudy data collection.

Phase 2

Antimicrobial stewardship education

Education was provided to urgent care and convenience care providers at a department staff meeting on December 13, 2020. The meeting was conducted via Microsoft Teams. Eighty-nine providers (64% of urgent care/convenience care providers) attended the meeting. All providers had access to the educational handouts, as well as a recording of the presentation. The educational PowerPoint content covered purpose and selection of antibiotics for sinusitis, the significance of overuse of antibiotics, antibiotic effect on resistance, and evidence-based treatment guidelines from the CDC on treating sinusitis. The presentation lasted 20 minutes.

Posteducation chart audit

Because sinusitis is most prevalent in the winter months, posteducation data were collected from January 1, 2021, through February 28, 2021, to match the prestudy data from the previous year. The data collection process was identical to the retrospective data collection, and 113 patient charts were appropriate for review. Eighteen charts were eliminated due to concomitant infection that required antibiotic treatment, leaving a total of 95 charts. Given the large discrepancy between the pre and post patient visit data, the student investigator had to address the issue of low in-person clinic encounters.

To improve access to care during the pandemic, the healthcare organization where the study took place launched a virtual urgent care synchronous (real-time) platform in August of 2020. An asynchronous (no real-time interaction between patient and provider) telehealth platform existed prepandemic; however, patient usage was minimal. Using the same inclusion criteria, the IT department identified an additional 310 patient records from the virtual care environments data. After review, 288 virtual visits were appropriate for the study. A total of 383 charts were deemed appropriate for post study analysis.

Results

Pre-intervention data were compared to postintervention data (**Table 2**), looking specifically at the overall number of antibiotics prescribed for sinusitis and adherence to sinusitis CDC guidelines.

Antibiotic prescribing pre- and postintervention showed a decrease of 22.8% (z=10.32, p=0.000). Antibiotic guideline adherence showed an increase of 6.1% (z=1.95, p=0.025). Comparing each of the calculated values of z to critical or table value of z, which is +/- 1.96 for an α of .05, there was a statistically significant reduction of antibiotic prescribing after the educational intervention and a statistically significant improvement in guideline adherence for diagnosis and treatment.

The outcome objective for this project was to have at least a 5% reduction in inappropriately prescribed antibiotics for sinusitis by urgent care and convenience care providers when comparing pre- and poststudy; this was met.

The second goal was to have at least 85% of the providers utilize an evidence-based antibiotic recommendation guideline for treatment of sinusitis. The data showed a statistically significant improvement from the prestudy data, though only 73.4% of providers used the antibiotic guidelines, indicating that the objective was not met.

This study provided a unique opportunity to compare prescribing practices between in-person and virtual care environments. A comparison was made between provider antibiotic prescribing rates postintervention and between in-person visits (n=95) and virtual visits (n=288). In-person antibiotics given was 87.4% (n=83), and virtual visit antibiotics given was 71.2% (n=205). There was a statistically significant reduction, 16.2% (p=0.001) (**Table 3**), in antibiotics prescribed when comparing in-person to virtual care visits.

Table 3. Postintervention Antibiotic Prescribing—In-Person vs Virtual

	Antibiotic Given?	
	In-Person (n=95)	Virtual (n=288)
Yes	83 (87.4%)	205 (71.2%)
No	12 (12.6%)	83 (28.8%)
z=3.17; p=0.001		

Protection Of Human Subjects

The project directly involved the urgent care and convenience care providers and indirectly affected the patients at the clinic sites. The provider names were kept anonymous during the collection of retrospective chart review and poststudy chart review data. All information used for this project was kept on a secured flash drive. All research data obtained from the EMR were collected and recorded in a deidentified manner on an Excel spreadsheet. Any sharing of project information was through encrypted email. The Institutional Review Board (IRB) process at the university and the healthcare organization where the study took place was followed.

Validity

The statistically significant results suggest that the educational intervention aimed at reducing inappropriate antibiotic prescribing of sinusitis using evidence-based guidelines from the CDC was effective in reducing inappropriate antibiotic prescribing for sinusitis. Specific measures were implemented to preserve the integrity of the data and reduce threats to the internal and external validity of the study.

To promote internal validity of the independent variable (provider education), the antibiotic stewardship education was administered by only the student investigator. The data collection tool remained consistent to avoid changes in the collection procedure. To promote external validity, inclusion and exclusion criteria were used to clearly define the population being studied.

Limitations

This study had several limiting factors.

First, with the poststudy data collected, the student investigator cannot determine if the antibiotic stewardship education presented to the providers was the sole influence for the decrease in antibiotic prescribing and increase in guideline adherence. Outside influences that may have contributed to the study results could have come from attendance at educational conferences, webinars, professional journal articles, or the use of other antibiotic stewardship guidelines for sinusitis.

Second, the study's 2-month observation period fol-

lowing the intervention, January through February 2021, is insufficient to understand the sustainability of the decreased antibiotic prescribing.

Third, the COVID-19 pandemic may have had a significant impact on the research validity.

Fourth, the asynchronous virtual environment provided guideline adherence recommendations to prompt the provider in making a decision on whether or not an antibiotic was warranted. This could have contributed to providers following guideline adherence and not prescribing antibiotics for sinusitis infections.

Fifth, the intervention was implemented with urgent and convenience care providers within a healthcare organization, excluding primary care providers and clinics associated with the network.

This study was in process prepandemic and continued during the pandemic. As a result, many individuals who may have typically sought care in an urgent care or convenience care setting may have elected to not have their symptoms treated. This could result in a study with a sample that is less representative of the target population, risking the generalizability of the research. Also, there could have been patient pressure experienced in the in-person visits compared to the virtual visits, resulting in increased prescribing.

Discussion

Pre-intervention data were compared to postintervention data, looking specifically at the overall number of antibiotics prescribed for sinusitis and adherence to sinusitis CDC guidelines. Antibiotic prescribing pre- and postintervention showed a decrease of 22.8% ($z=10.32$, $p=0.000$). Antibiotic guideline adherence showed an increase of 6.1% ($z=1.95$, $p=0.025$).

The statistically significant results suggest that the educational intervention aimed at reducing inappropriate antibiotic prescribing of sinusitis using evidence-based guidelines from the CDC was effective in reducing inappropriate antibiotic prescribing for sinusitis.

Significance of Findings

The project used a one-group pre- and poststudy design to determine if an education intervention decreased inappropriate antibiotic prescribing among urgent care and convenience care providers through the increased use of prescribing guidelines for sinusitis. The results were consistent with findings found in the literature review that showed evidence of a decrease in antibiotic prescribing, which suggests provider-targeted education to be an effective intervention.

The study was in process pre COVID-19 pandemic and continued during the pandemic. As a result, many individuals who may have typically sought care in an urgent care or convenience care setting may have elected to not have their symptoms treated. This caused a large discrepancy between pre and postpatient visit data. To address the issue of low in-person clinic encounters, virtual care visits for sinusitis were used in the post study data collection. The study data showed that patients were more likely to receive an antibiotic in an in-person visit compared to virtual care visits.

Implications for Future Projects

Inappropriately prescribed antibiotics in the outpatient setting have been a longstanding problem, and continue to be a public health challenge. Given the lack of new antibiotics, increased antibiotic stewardship efforts have been undertaken to prevent and slow antibiotic resistant infections.[2]

This quality-improvement project suggests an education intervention can reduce the rate of inappropriately prescribed antibiotics; however, the 2-month study period does not reflect sustainability of continued antibiotic prescribing practice.

This project focused solely on sinusitis. Future studies broadening the scope of the educational intervention to include all other conditions for which antibiotics are frequently prescribed may be beneficial in improving inappropriate prescribing.

To further advance effective evidence-based antibiotic stewardship efforts, future projects should focus on implementation and sustainability strategies within ambulatory settings, especially urgent care and convenience care settings. With the increased use of telehealth and virtual care, there is also a need for studies that explore prescribing practices between in-person and virtual visits, as well as factors that influence provider prescribing in these settings.

Conclusion

Inappropriate use of antibiotics is associated with increased healthcare costs, unnecessary adverse drug effects, and the emergence, persistence, and transmission of antibiotic-resistant organisms.[4,9,11] Antibiotic stewardship programs are designed to promote appropriate use of antibiotics, improve patient outcomes, and decrease the spread of resistant organisms.[13] The results of this study are consistent with other similar studies found in the literature and suggest that antibiotic stewardship education is an effective intervention in influencing provider antibiotic prescribing for viral sinusitis in the urgent care setting. This study included

providers working in the urgent care and convenience care clinics in a single healthcare organization during the COVID-19 pandemic and there were changes to healthcare-delivery systems, including the transition from in-person to virtual visits. This had an impact on postintervention data collection and may have confounded the results; however, it also provided an unexpected opportunity to explore the prescribing patterns of the same providers in the different care environments. In addition, the timeframe for this study was insufficient to understand whether the improvements would be sustained. Because of these limitations, the findings from this study cannot be generalized to other infection types or care settings, and therefore future research is needed. ■

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Is It Appendicitis? The Role of Clinical Scoring Systems, Labs, and Diagnostic Imaging

Urgent message: Ultrasound can provide essential data in the urgent care evaluation of suspicion of acute appendicitis, by facilitating a rapid diagnosis and immediate and appropriate decisions regarding management.

ANDREW ALAYA, MD, Msc

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Introduction

Appendicitis is thought to be the result of luminal obstruction due to various etiologies (such as lymph node hyperplasia, coprolites, or parasites) which lead to increased mucus production and bacterial overgrowth. This results in wall tension and eventually necrosis and potentially perforation.[1]

Appendicitis is one of the most common causes of acute abdominal pain requiring urgent surgical intervention. For this reason, caution should be exercised in patients in whom appendicitis is suspected; in short, it should not be missed. Appendicitis affects males more than females (lifetime risk of 8.6% vs 6.7%, respectively).[2]

Though common, appendicitis still presents as a diagnostic challenge—especially in females of childbearing age, due to similarities in the clinical representation of appendicitis and gynecological abnormalities. In pregnancy, it is the most common nonobstetric surgical emergency, with an incidence of 6.3 per 10,000 pregnancies during the antepartum period that increases to 9.9 per 10,000 postpartum.[3]

In the United States, more than 300,000 appendectomies are performed each year. Due to the extensive use of CT scan, in less than 10% of these appendectomies does the removed appendix turn out to be normal.[4] In Europe, on the other hand, diagnosis is often made clinically, resulting in higher laparoscopy rate and higher negative appendectomies (up to 32%).[5]

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If untreated, appendicitis can result in perforation. The perforation rate of appendicitis is 16%-40%, highest in the younger age group (40%-57% in patients <50 years of age), and between 55% and 70% in patients 50 and older. The mortality rate of perforated appendicitis is around 5%.[6] Acute pelvic pain, defined by the sudden onset of abdominal pain with particular intensity, is related to a wide variety of diseases.

The presence of vague or altered clinical signs can make it difficult to diagnose acute appendicitis. This

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Table 1. Accuracy of History and Physical Examination Findings in the Diagnosis of Acute Appendicitis

	Adult[11]		Child[12]	
	Positive likelihood ratio	**Negative likelihood ratio**	**Positive likelihood ratio**	**Negative likelihood ratio**
Right lower quadrant pain	7.3-8.5	0-0.28	1.4	NA
Rigidity	3.8	0.82	NA	NA
Psoas sign	2.4	0.90	3.2	0.70
Periumbilical pain	3.2	0.5	1.8	0.70
Obturator sigh	NA	NA	3.5	0.73
Rovsing sign	NA	NA	3.5	0.72
Absent/decreased bowel sounds	NA	NA	3.1	0.6

NA, not available

can be due to the large variations in the location of the appendix. Diagnosis is more complicated in pregnant women due to concurrent maternal physiologic and anatomic changes.[7]

The clinical diagnosis of appendicitis is based on the classic anamnesis such as: McBurney's, Blumberg's, Rovsing's, obturator, and psoas signs during the physical examination, together with fever and elevated inflammation values from laboratory tests.

Clinical signs and symptoms are more helpful in confirming the diagnosis rather than ruling it out when absent.

The clinical diagnosis of appendicitis is not always easy and can be challenging, involving a combination of clinical, laboratory, and radiological findings.

The use of laboratory investigations such as total leukocyte count, differential leukocyte count, C-reactive protein, and others are thought to be sensitive but lack sufficient specificity.[8] Ultrasound is thought to be a useful modality after the introduction of graded compression by Puylaert[9] in diagnosis of appendicitis. Ultrasound is operator-dependent and in the right hands is considered to have the same accuracy as CT scan for the diagnosis of acute appendicitis.[10]

History and Physical Examination

One of the most important functions of urgent care diagnosis is an accurate patient history. A patient must always be asked about the time of onset of symptoms, site of pain, medical history, and current medications. Physical examination for the known signs of appendicitis such as a positive McBurney's sign, psoas sign, obturator sign, and Rovsing sign are essential.

The signs and symptoms that best rule in acute appendicitis in adults are right lower quadrant pain, abdominal rigidity, and radiation of periumbilical pain to the right lower quadrant with positive likelihood ratio of 7.3-8.5, 3.8, and 3.2 respectively.[11] In children however, absent or decreased bowel sounds, a positive psoas sign, a positive obturator sign and positive Rovsing sign are the most reliable for ruling in acute appendicitis with positive likelihood ratio of 3.1, 3.2, 3.5 and 3.5, respectively.[12] **Table 1** presents the likelihood ratios of various signs and symptoms in adults and children.

When a patient complains of a change in the location of pain from the upper abdomen to the right lower abdominal quadrant, this is most often associated with acute appendicitis. This is due to a "shift" of periumbilical or epigastric pain (visceral) to the right lower quadrant (somatic) pain when the parietal peritoneum becomes involved with the inflammatory process.[13]

Care must be taken when it comes to children and adolescents. History and physical examination must be taken according to the patient's age and developmental stage. Experience in clinical diagnosis is very important, especially when it comes to small children. Absence of nausea and vomiting, abdominal tenderness, and leukocytosis rules out appendicitis with 98% accuracy.[14]

The location of the appendix is very important. In pregnant women, the appendix may be displaced cranially due to the enlarged uterus, resulting in pain felt in the upper abdomen rather than in the right lower quadrant. Symptoms of nausea, vomiting, and abdominal pain can be difficult to distinguish from pregnancy-related symptoms.[3]

Moreover, depending on the location of the inflammatory process such as along the psoas muscle, pain may be perceived in the lower back, thigh, or knee and not on the right anterior abdominal wall. This makes diagnosis of acute appendicitis in pregnant women

Table 2. Advantages and Disadvantages of Imaging Modalities in Patients with Suspected Acute Appendicitis

Modality	Advantages	Disadvantages
Ultrasound	• High sensitivity/specificity in expert operator • Cost effective • Noninvasive • No patient preparation • No patient discomfort • Quick	• Highly operator dependent • Limited evaluation in case of overlying intestinal gas, adiposity, and pregnancy
CT scan	• High sensitivity/specificity • Short examination time • Possibility of secondary findings and differentials • Optimal treatment planning • Good visualization of anatomy	• Radiation exposure • Risk associated with contrast agent administration
MRI	• High sensitivity/specificity • High soft tissue contrast • Contrast agent is not always necessary • Secondary findings and differentials	• Comparatively longer examination time • Susceptibility to artifacts • Higher costsLimited availability

challenging. Delay in the diagnosis of acute appendicitis may lead to increased mortality and morbidity rates for both mother and fetus. It is very important to diagnose acute appendicitis as early as possible; at the same time, care must be taken to avoid negative appendectomy due to misdiagnosis.

Laboratory Tests

There are no specific laboratory parameters specific to diagnosing acute appendicitis. Individually, white blood cell (WBC) count, leukocytosis/neutrophilia, and an elevated serum concentration of C-reactive protein (CRP) are considered and widely used for this purpose; however, they are nonspecific signs of inflammation.[15]

These parameters are also high in healthy pregnant women.[14] Nevertheless, it has been shown that WBC count value of higher than 18x109/L is one of the most important parameters for the diagnosis of acute appendicitis in pregnant women.[16]

Laboratory tests are helpful when combined with clinical signs and symptoms and clinical decision rules or in combination with imaging studies as part of a structured evaluation of the patient and patient management.[15] Body temperature should be measured, and urinalysis should be performed. At the same time, a pregnancy test should be done in females of childbearing age.[10]

These tests serve to rule out several differential diagnoses of right lower quadrant pain such as urolithiasis, urinary tract infection, and ectopic pregnancy. In females with unclear clinical presentation, gynecological consultation should be considered. A digital rectal examination is of low diagnostic benefit and need not be performed.[17]

Scoring Systems

Many scoring systems have been developed so that an investigation can be done objectively and independent of the clinical experience of the examiner in suspected diagnosis of acute appendicitis.

The most commonly used scoring systems are the Alvarado score (1986) and the Appendicitis Inflammatory Response (AIR) score (2008).[18] Many countries do not generally use scoring systems like these as part of routine clinical practice to aid in the diagnosis. The Alvarado score system has a 99% sensitivity but is only 43% specific. This is because of the setting of the threshold. If the threshold is increased from 5 to 7, the specificity increases to 81% at the cost of a lower sensitivity, down to 82%. That is why the Alvarado score system is most useful for ruling out appendicitis, rather than diagnosing it. The AIR score has a sensitivity of 92% and a specificity 63%[18].

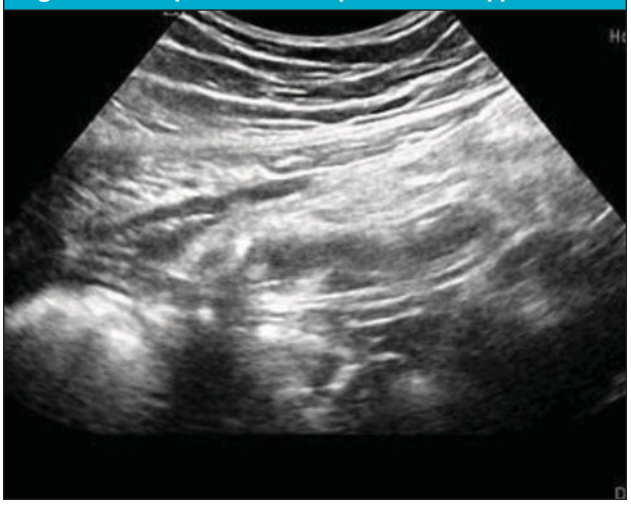
The use of a scoring system alone for the diagnosis of acute appendicitis is not recommended by the World Society of Emergency Surgery (WSES),[19] which prefers a stepwise diagnostic approach pathway depending on age, sex, and clinical signs and symptoms of the patient.

Imaging

Ultrasound, CT, and MRI are the imaging modalities used to evaluate a patient with suspected appendicitis;

Figure 1. Obese patient with suspected appendicitis.

Figure 2. Adult patient with suspected acute appendicitis.



each has its relative merits and drawbacks (see **Table 2**).

Since the beginning of the millennium, in the United States CT scanning has been considered as the gold standard for diagnosing appendicitis.[19]

Many organizations such as the National Cancer Institute, the American Academy of Pediatrics , and the American College of Radiology recommend ultrasound as the initial imaging modality, especially in children and pregnant women.[20] However, ultrasound is operator-dependent, and its diagnostic accuracy depends on the skills and experience of the operator. This places ultrasound at a disadvantage compared with other modes of imaging.

A negative ultrasound finding may not suffice to rule out appendicitis.[21] Moreover, obesity is a problem for ultrasound. Patients who are overweight (BMI >30 kg/m^2) are more likely to undergo a CT scan (see **Figure 1**), as ultrasound will not be helpful for such patients.[21] This is due to the fact that ultrasound waves cannot attenuate the fat layer, not reaching and visualizing the appendix for accurate diagnosis.

Urgent Care Disposition

In an urgent care setting, it is important to estimate the pre-image likelihood of appendicitis to facilitate the appropriate diagnostic workup and necessary referrals. Using scoring systems such as AIR and Alvarado scores, patients are categorized as low risk, intermediate risk, or high risk.

Patients categorized as low risk are discharged with appropriate safety netting, whereas high-risk patients are referred directly to the hospital as they are likely to require surgery. Intermediate-risk patient are those who can benefit from diagnostic imaging.[22]

The overall sensitivity and specificity of ultrasound in the diagnosis of appendicitis are 76% and 95%, respectively.[23] In one meta-analysis, the sensitivity and specificity of ultrasound in diagnosis of acute appendicitis were even higher, at 91% and 97%.[24]

According to WSES,[20] ultrasound in combination with clinical parameters may improve the diagnostic sensitivity and specificity and reduce the need for CT scanning in adult patients with suspected acute appendicitis (see **Figure 2**). In the case of pediatric and young adult patients, ultrasound is the initial imaging study of choice for the diagnosis of acute appendicitis.

MRI may play a role in avoiding radiation dose from CT scanning in children and pregnant women with inconclusive ultrasound findings. A prospective study performed by Kinner, et al[25] compared MRI and CT scanning, and showed similar diagnostic accuracy of acute appendicitis—85.9% sensitivity and 93.8% specificity for unenhanced MRI, 93.6% and 94.3% for contrast-enhanced MRI, and 93.6% and 94.3% for CT scanning, respectively.

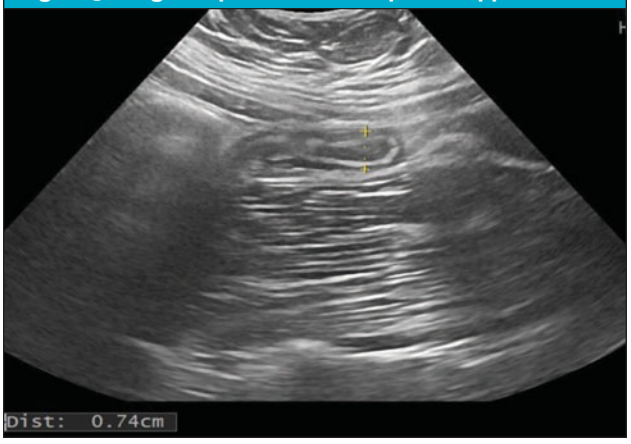
The cost and availability of MRI often prevent its use as the initial imaging investigation in the cases of suspected acute appendicitis.

In females, a transvaginal examination can be done to rule out diseases of the female genitalia such as ovarian

torsion,[26] symptomatic ovarian cysts, or an ectopic pregnancy[27] and diagnosing appendicitis if a transabdominal ultrasound did not yield a definitive diagnosis.

Acute appendicitis is the most common cause of an acute abdomen during pregnancy.[3] Ultrasound is the modality of choice when it comes to pregnancy. In the first and second trimester of pregnancy ultrasound has a good diagnostic yield (see **Figure 3**); however, in the third trimester, ultrasound is limited due to the changes of the anatomy in pregnant women at this stage of pregnancy.[3] This is due to the enlargement of the uterus displacing the appendix from the lower right quadrant to the upper right quadrant over the course of the pregnancy.

Figure 3. Pregnant patient with suspected appendicitis.



Treatment

In the diagnosis and treatment of acute appendicitis, there is increasing discussion of the possibility of nonsurgical treatment, of the optimal timing of surgery, and of the appropriate postoperative care.[28]

According to the WSES, the Society of American Gastrointestinal Endoscopic Surgeons (SAGES), and the European Association for Endoscopic Surgery (EAES), appendectomy is the treatment of choice for uncomplicated acute appendicitis in all age groups.[28] Recently, many publications have documented the successful conservative treatment of uncomplicated appendicitis with antibiotics in children and adults. This approach was first proposed by Harrison in 1953, but is attracting increased attention.[28] Current evidence is insufficient to enable the detection of any advantage for conservative treatment and surgery remains the treatment of choice for acute uncomplicated appendicitis. Moreover, surgery should not be delayed by more than 12 hours in children and adolescents, patients over age 65, or patients with comorbidities.[29]

There is no standard evidence-based approach to the treatment of complicated acute appendicitis. In principle, it can either be treated with urgent surgery or managed conservatively (ie, with antibiotics alone or with the interventional placement of drain). The morbidity and efficacy of conservative management are still debatable, however, and further studies are needed to determine the best way to treat complicated appendicitis in consideration of the patient's risk factors and clinical condition.[30]

Complications

The main concerning complication of acute appendicitis is perforation as this may lead to abscesses, peritonitis, bowel obstruction, sepsis, and even fertility problems in females. The rate of perforation in adults ranges from 17% to 32%.[31] Perforation may lead to the extended use of antibiotics and more severe postoperative complications. The risk factors for perforation include age over 65, immune suppression or acquired immune deficit, and pregnancy. Perforation risk is directly associated with the time from onset of diagnosis and surgery.[32] Demonstration of an appendicolith on an ultrasound is highly associated with perforation if not treated with early appendectomy.[28] In the risk factor group of patients with high leukocyte counts, CRP values are correlated with the risk of gangrenous appendicitis. In pregnant women, appendectomy can be carried out safely in all three trimesters. Miscarriage is more common in complicated appendicitis (20%) than in uncomplicated appendicitis (1.5%).[33]

Conclusion

Appendicitis can present itself as acute or complicated acute. Diagnosis is based on imaging findings and clinical presentation. Ultrasound is the first choice for the diagnosis of appendicitis but has the disadvantage of being dependent on the skills and experience of the operator. When ultrasound is not conclusive, such as in patients having a high BMI, CT scan may be considered. In pregnant women, MRI should be performed if available. Treatment is currently based on surgical intervention, although future research looks to focus on conservative measures. To date, antibiotic treatment has demonstrated efficacy in the short term but recurrence is likely in the long term. Laparoscopy has surgical advances as it enables patients same-day discharge, fewer complications, shorter recovery times, and low cost. ■

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ABSTRACTS IN URGENT CARE

- Fever: To Treat or Not to Treat?
- Distinguishing Viral from Bacterial Conjunctivitis
- Scapular Fractures and Blunt Chest Trauma in Children
- Sterile vs Nonsterile Gloves for Laceration Repair
- Bronchiolitis Care: An Update
- Antibiotic Stewardship and Children
- Post Paxlovid Rebound

IVAN KOAY, MBCHB, FRNZCUC, MD

What Are the Consequences of Treating Adult Fever?

Take-home point: Fever therapy in adults does not seem to affect the risk of death and serious adverse events.

Citation: Holgersson J, Ceric A, Sethi N, et al. Fever therapy in febrile adults: systematic review with meta-analyses and trial sequential analyses. *BMJ*. 2022;378:e069620.

Relevance: This paper attempts to determine whether treatment of a fever in adults, either with antipyretics or cooling, affects outcomes.

Study summary: This was a systematic review with meta-analysis investigating the evidence supporting fever therapy in relation to outcomes of mortality, adverse events, and quality of life in adult patients. The authors searched all relevant databases and included randomized clinical trials including adults diagnosed as having fever of any origin.

The authors found 3,273 publications matching their inclusion criteria, with 23 trials involving 5,140 patients included for final assessment. Eleven studies assessed different antipyretic drugs, 11 trials assessed physical cooling, and eight trials assessed the combination of antipyretic drugs and physical cooling.

Sixty-four percent of patients analyzed had an infectious etiology of fever. The researchers found that fever therapy did not affect the risk of death or serious adverse events in febrile adults whether the fever was related to infectious or noninfectious causes. There was insufficient evidence to confirm or reject the hypothesis that fever therapy influences quality of life or nonserious adverse events.

Editor's comments: The predominant limitation of the study was the low level of evidence of the included trials. Given the pressure to treat fevers when they occur, this study provides some modicum of reassurance that doing so is unlikely to be harmful. ■

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Does My Patient Have Bacterial or Viral Conjunctivitis?

Take-home point: Clinical findings suggestive of bacterial conjunctivitis include mucopurulent discharge and simultaneous otitis media, while those of viral origin include pharyngitis, preauricular lymphadenopathy, and contact with other individuals with conjunctivitis.

Citation: Johnson D, Liu D, Simel D. Does this patient with acute infectious conjunctivitis have a bacterial infection? The rational clinical examination systematic review. *JAMA*. 2022;327(22):2231-2237.

Relevance: Distinguishing viral from bacterial conjunctivitis remains a challenging prospect for many practitioners, which explains the high variance in prescribing ocular antibiotics in such cases.

Study summary: This systemic review and meta-analysis evaluated the prevalence of viral vs bacterial conjunctivitis in adults and children. The authors determined likelihood ratios (LR) for clinical findings which could help differentiate viral from bacterial etiologies. An OVID-MEDLINE literature review was performed to identify research enrolling patients with viral conjunctivitis, bacterial conjunctivitis, or both.

The authors screened 80 articles, ultimately including 32 in their meta-analysis. Multiple findings reached statistical sig-

nificance in terms of ability to predict the etiology of conjunctivitis. They found certain clinical features associated with a higher likelihood of bacterial conjunctivitis, including mucopurulent ocular discharge (sensitivity 0.76, specificity 0.66, with a positive LR of 2.1) and concurrent otitis media (sensitivity,0.24, specificity 0.91, and a positive LR of 2.5).

Regarding viral conjunctivitis, coexisting pharyngitis had a sensitivity of 55% to 58% and specificity of 89% to 94%, with a positive LR of 5.4 to 9.9. Preauricular lymphadenopathy had a sensitivity of 17% to 31% and a specificity of 93% to 94%, with a positive LR of 2.5-5.6. Contact with another person with conjunctivitis showed a sensitivity 18% and a specificity of 93%, with a positive LR of 2.5. Additionally, the prevalence of bacterial conjunctivitis in children was substantially higher than that of viral conjunctivitis, whereas viral conjunctivitis was more common in adults.

Editor's comments: The meta-analysis was limited by a relatively small number of studies of relatively poor quality. None of the positive likelihood ratios reached a level where they could definitively rule-in a bacterial etiology. No reported findings could clinically exclude bacterial conjunctivitis with sensitivity reasonable to assure a viral etiology. ■

Scapular Fractures Following Blunt Chest Trauma in Children

Take-home point: Pediatric scapular fractures are rare and are often associated with other intrathoracic injury.

Citation: Fonacier F, Chan H, Ugalde I. Pediatric scapular fractures and associated injuries following blunt chest trauma. *Am J Emerg Med*. 2022;52(2022):196–199.

Relevance: Scapular fractures are rare after chest trauma in children, but when discovered should prompt urgent care providers to consider referral to a trauma center given the significant likelihood of other serious associated injury.

Study summary: This was a retrospective cohort study from the study site's trauma registry, a tertiary pediatric trauma hospital in the United States. Cases involving more than 12,000 pediatric patients were analyzed. Of those, 1,405 patients had both chest x-ray and CT. The primary outcome was the presence of scapular fractures, while secondary outcomes were the presence of other concurrent intrathoracic injuries (eg, pulmonary contusion/atelectasis, pneumothorax, hemothorax, rib fracture, other fracture, vascular injury, mediastinal injury, diaphragm rupture). The authors identified 60 patients with scapular fractures; 73.3% were scapular fractures noted on CT only (and missed on chest x-ray). Of this group, scapular fracture was the only isolated injury in just 4.5% of patients. The most common associated injuries were other fractures, lung contusion, and pneumothorax. The majority of the scapular fractures occurred in the scapular body (61%), followed by the coracoid process (20%), scapular spine (13%), and acromion process (6.6%).

"Pressure from the parent, travel, and prolonged or atypical symptoms were frequently cited reasons for prescribing antibiotics in cases of URI."

Editor's comments: Scapular fractures made up only 0.5% of all pediatric blunt trauma noted in these institutions. The use of CT scan to diagnose scapular fractures in the study limits its generalizability to most UC operations. Nevertheless, the high rate of associated thoracic injuries should prompt concern for more serious mechanism and highlight the need for higher level of care when x-ray identifies a scapular fracture. ■

Do We Need a Sterile Setup for Laceration Repair?

Take-home point: In this large, multicenter randomized controlled trial, no reduction in wound infection rate was observed with the use of sterile gloves and dressings.

Citation: Zwaans J, Raven W, Rosendaal A, et al. Non-sterile gloves and dressing versus sterile gloves, dressings, and drapes for suturing of traumatic wounds in the emergency department: a non-inferiority multicentre randomised controlled trial. *Emerg Med J*. 2022;39:650–654.

Relevance: Sterile gloves and dressings have been traditionally used for wound repair because of a theoretical concern for increased risk of wound infection with the use of nonsterile materials. Prior studies have failed to validate this practice.

Study summary: This was a multicenter, single-blinded, emergency department-based randomized controlled trial in the Netherlands, designed to evaluate for noninferiority of nonsterile gloves and dressings vs sterile gloves, dressings, and drapes for suturing of traumatic wounds. A simple 1:1 randomization was used without any stratification factors. Materials used in both protocols included chlorhexidine for disinfection, lidocaine 1% for anesthesia, sterile sutures (Ethilon nylon suture size 3.0 to 6.0 and Vicryl 3.0 to 5.0), and sterile instruments. Differing arms of the study were the use of sterile vs nonsterile dressings and gauzes, boxed gloves, and the use of sterile (fenestrated) drapes in the sterile protocol only. The primary outcome was wound infection.

The authors recruited 1,480 patients within the sterile

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(n=747) or nonsterile (n=733) groups. Wound infection rates in the sterile treatment group were 6.8% (95% CI 4.0% to 7.5%) vs 5.7% (95% CI 5.1% to 8.8%) in the nonsterile treatment group. More infected wounds were located on the lower extremity (20.2% vs 12.2%) and patients were more likely to be using immunosuppressants (6% vs 1.5%).

Editor's comments: Although interesting results were noted, the study was halted earlier than expected and underpowered for demonstrating noninferiority as planned. However, this was a large, multicentered study with very similar rates of infection between sterile and nonsterile setups. This corroborates prior studies which have failed to show a benefit of using sterile gloves. The role of other elements of sterile technique such as hand scrubbing, masks, caps, gowns were not investigated. ■

Updates in Bronchiolitis: Supportive Care Alone Is Still Best

Take-home point: The primary treatment options for bronchiolitis remain supportive care and selective use of hydration and oxygen in dehydrated or hypoxic infants.

Citation: Dalziel S, Haskell L, O'Brien S, et al. Bronchiolitis. *Lancet*. 2022;400(10349):392-406.

Relevance: Despite evidence that supportive measures should be the mainstay of treatment for bronchiolitis, providers continue to pursue infective treatment strategies, including the use of steroids and bronchodilators.

Study summary: This was a review of literature regarding present knowledge regarding bronchiolitis, its pathophysiology, clinical presentation, assessment, diagnostic investigation, and therapeutic management. The authors searched the Cochrane Database for systematic reviews and PubMed for scientific articles in English only.

Bronchiolitis typically affects infants and young children presenting with signs of respiratory distress and lower respiratory tract infection and is diagnosed clinically after a typical viral prodrome. Serious bacterial infections associated with bronchiolitis are rare. Routine testing of urine, viral swabbing, blood, and imaging is not recommended. Supportive care with hydration and respiratory support are the foundations of bronchiolitis management. The authors found no evidence supporting a benefit of epinephrine or inhaled bronchodilators (eg, albuterol) in reducing either hospital admissions or length of stay for hospitalized patients. There was no evidence of benefit of oxygen in infants with bronchiolitis without hypoxemia. There was no reduction in hospital admissions with corticosteroids. There was also no clear clinical benefit of antivirals when prescribed.

Editor's comments: There continues to be ambiguity around the definition for bronchiolitis, as it relies on clinician assessment. Regardless, bronchiolitis continues to be a disease in which testing and therapies outside of clinical assessment and standard supportive measures fail to affect outcomes. ■

Pediatric Urgent Care Providers' Approach to Antibiotic Stewardship

Take-home point: Parental expectation of receiving an antibiotic prescription is the most common barrier to appropriate prescribing.

Citation: Hamdy R, Nedved A, Fung M, et al. Pediatric urgent care providers' approach to antibiotic stewardship: a national survey. *Pediatr Emer Care*. 2022;38: 1446-1448.

Relevance: Treatment of pediatric patients can be challenging. Appropriate antibiotic prescribing requires balancing the health needs of the child and the expectations of the parents.

Study summary: This was part of an ongoing quality improvement project aimed to reduce inappropriate antibiotic prescribing by the Society for Pediatric Urgent Care, the Antibiotic Resistance Action Center at the George Washington University Milken Institute School of Public Health, the Office of Antibiotic Stewardship of the Centers for Disease Control and Prevention, and Children's Mercy Hospital Kansas City. A pre-implementation survey of pediatric urgent care providers was done and reported in this paper.

The authors reported 99.3% (156 of 157) participant responses to the survey from 23 sites nationally. Of those, 73% were from board-certified general pediatricians. Fifty-three percent of respondents reported that their urgent care center provided guidelines for prescribing antibiotics for acute respiratory tract infections. Sixty percent reported prescribing antibiotics for the treatment of nonspecific upper respiratory infections in fewer than 10% of cases. Pressure from the parent, travel, and prolonged or atypical symptoms were the next most frequently cited reasons for prescribing antibiotics in cases of URI. Ninety-eight percent of respondents agreed or strongly agreed that antibiotic stewardship interventions are important for optimizing antibiotic use in urgent care. Provider continuing education (83%) and published local guidelines (80%) were the most frequently reported strategies to improve antibiotic prescribing practice.

Editor's comments: This was a small survey-based study, but it is most noteworthy for actually surveying urgent care clinicians. The findings should come as no surprise to anyone who works in urgent care. The findings support the perceived need to improve parent education, provider education, and prescribing guidelines. ■

COVID-19 Abstract

Virologic Rebound Following Paxlovid Treatment

Take-home point: Virologic rebound after nirmatrelvir-ritonavir (Paxlovid) therapy for early stage COVID-19 infection is associated with high viral load and culturable virus.

Citation: Boucau J, Uddin R, Marino C, et al. Characterization of virologic rebound following nirmatrelvir-ritonavir treatment for COVID-19. *Clin Infect Dis*. 2022;ciac512.

Relevance: With the introduction of medications to treat COVID-19, it becomes more likely that UC providers will see complications associated with these therapies.

Study summary: This was a subset case report of seven individuals who were part of the Post-vaccination Viral Characteristics Study (POSITIVES) cohort—a longitudinal study of individuals with COVID-19 infection. The subjects were ambulatory individuals treated within 5 days of symptom onset with nirmatrelvir-ritonavir and who experienced recurrent symptoms after initial resolution or recurrent antigen test positivity after testing negative. Medical chart review for initial COVID-19 diagnostics and nirmatrelvir-ritonavir treatment course, home-based rapid antigen test results, and past medical history, including the presence of immunosuppressing conditions were recorded.

All seven participants were fully vaccinated and had received at least one booster dose. All seven reported symptom improvement and conversion to negative home-based antigen testing following treatment. Six participants had symptom recurrence, and one had repeat antigen test positivity during an asymptomatic screen. Symptoms recurred a median of 9 days after initial positive test, or 4 days after completion of treatment. Virologic rebound after treatment was associated with high viral load and, in a subset of individuals, culturable virus.

Editor's comments: This was a very small case series; therefore, precise estimates of culture positivity, duration of viral shedding, or incidence of drug resistance cannot be made. The risk of recurrent COVID symptoms with nirmatrelvir-ritonavir use cannot be ascertained from this small, nonrandomized study, but it is a phenomenon worth counseling patients about as a possibility. ■

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INSIGHTS IN IMAGES

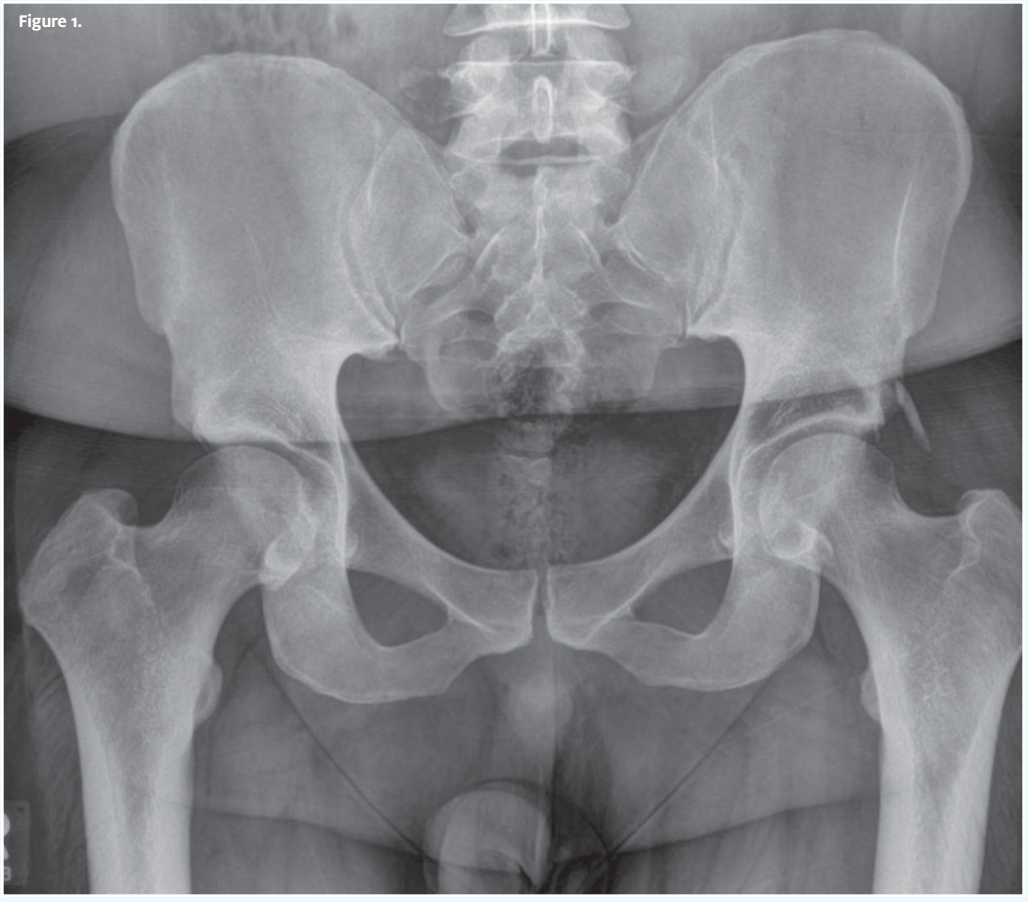
CLINICAL CHALLENGE: CASE 1

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 e-mail the relevant materials and presenting information to *editor@jucm.com*.

A 40-Year-Old with Back Pain After a Fall

Figure 1.



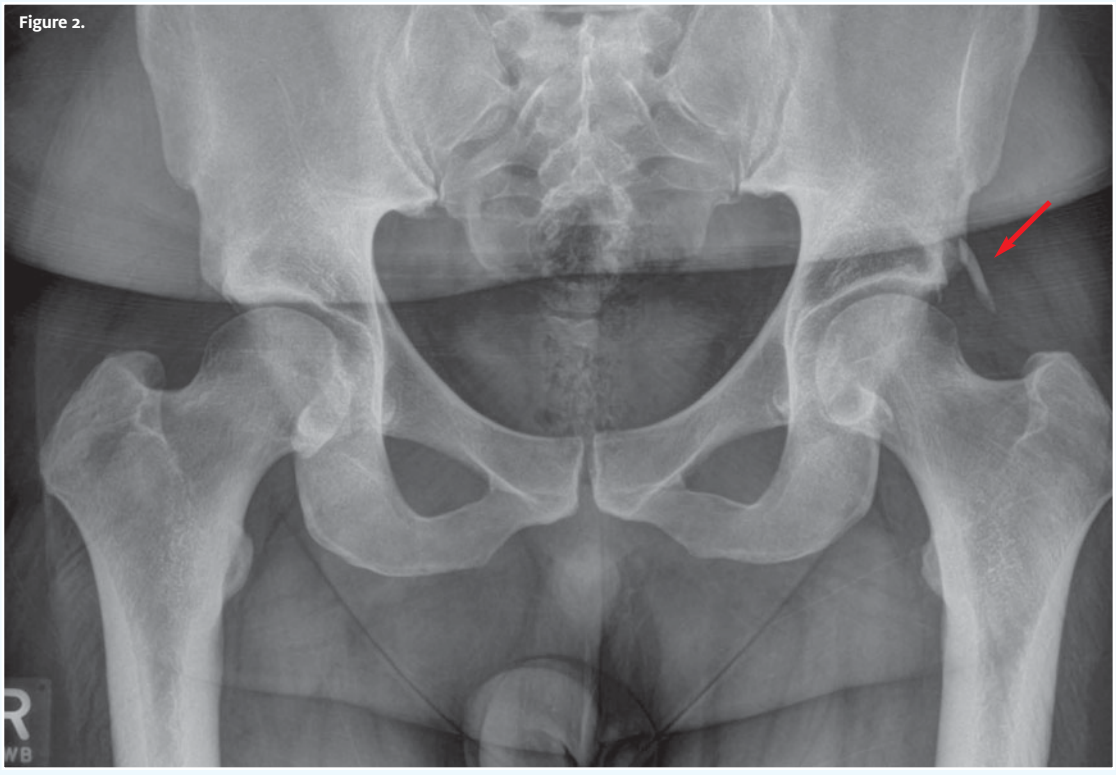
Case

The patient is a 40-year-old male who presents to urgent care with lower-left back pain after an alumni soccer game during his high school reunion weekend.

View the image taken 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

- Accessory ossicle
- Unfused ossification center
- Avulsion fracture of the anterior inferior iliac spine

Diagnosis

The image shows an irregular crescentic fragment adjacent to the anterior inferior iliac spine (bone donor site). The correct diagnosis is an avulsion fracture, anterior inferior iliac spine.

Learnings/What to Look for

- Typically, pelvic and hip apophyseal injuries occur in the 14- to 25-year age range
- Usually kicking sports such as soccer are involved, though such injuries are also seen in gymnasts and athletes who engage in jumping sports (such as in track and field)
- Anterior inferior iliac spine avulsion fractures are commonly the result of sudden contraction of the rectus femoris

Pearls for Urgent Care Management

- Treatment is most often nonoperative and includes initial bedrest, ice, and activity modification
- Hip flexed for 2 weeks with the position lessening stretch of the rectus femoris muscle and apophysis
- Follow with guarded weightbearing for 4 weeks and careful return to activity as full recovery may take 4 months

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

A 9-Year-Old Girl with a New Rash on Her Face


Figure 1.

Case

A mother brings her 9-year-old girl daughter to your urgent care center because she's concerned about a rash that developed on the girl's face over the past week. On examination, you find a fine, scaly, pigmented plaque with pink and violaceous hues. The lesion has a linear configuration. The patient and her family have a history of atopy, but the girl is well-appearing and has no systemic symptoms.

View the image 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

- Cutaneous larva migrans
- Lichen striatus
- Lichen planus
- Linear cutaneous lupus erythematosus

Diagnosis

This patient was diagnosed with lichen striatus, an uncommon, self-limited skin disorder of unknown origin that most commonly occurs in children 5 to 15 years of age. In this patient, the vertical, flesh-colored, linear pattern along the facial lines of Blaschko helps to make the visual diagnosis.

Learnings/What to Look for

- There are few linear rashes in childhood. It's important to understand the characteristics of the rash and look for other systemic findings to differentiate from other linear lesions
- The rash of lichen striatus features erythematous or flesh-colored smooth or scaly papules, sometimes with vesicopapules, in a narrow linear pattern along the lines of Blaschko
- Lichen striatus is more common in patients with atopic backgrounds, such as those with a personal or family history of atopic dermatitis, asthma, or allergic rhinitis. The rash most commonly occurs on the extremities, but can also occur on the trunk, buttocks, and face. Trauma, drug use, immunization, hypersensitivity reactions, viral infections, and pregnancy have been identified as potential causes of lichen striatus

Pearls for Urgent Care Management

- The urgent care provider should differentiate lichen striatus from other rashes that feature linear patterns. Cutaneous larva migrans is caused by worm infection and more often serpiginous and associated with outdoor travel. Linear lichen planus is more common in adults, more violaceous, and may have scattered lesions in addition to linear formation. Linear cutaneous lupus erythematosus is a lupus variant most common in children and often associated with other systemic or mucocutaneous features of lupus
- Lichen striatus is self-limited and no treatment is necessary. Topical steroids or emollients can be used to treat itching if it is present, but are typically not needed
- The lesions typically resolve in several months without scarring, although sometimes hypopigmentation is present. Dermatology follow-up is recommended for lesions that feature other unique characteristics or that don't resolve after several months

Acknowledgment: *Images and case presented by VisualDx (www.VisualDx.com/JUCM).*

CLINICAL CHALLENGE: CASE 3

An 83-Year-Old Female with CHF, A-Fib, and New-Onset Confusion and Syncope

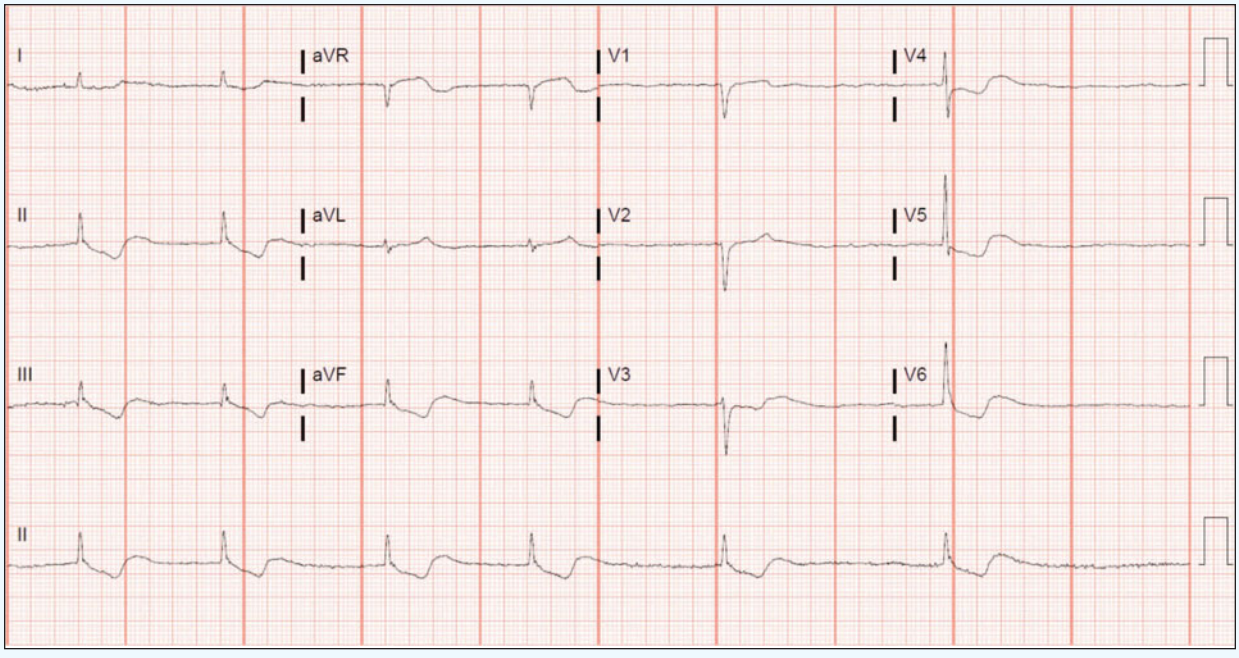


Figure 1. Initial ECG

An 83-year-old female with past medical history of congestive heart failure and atrial fibrillation presents to urgent care with confusion and syncope. She reports intermittent dizziness, but denies chest pain or shortness of breath. There is no evidence of trauma on exam.

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

(Case presented by Jonathan Giordano, DO, MEd, McGovern Medical School Department of Emergency Medicine, UTHealth Houston.)

THE RESOLUTION

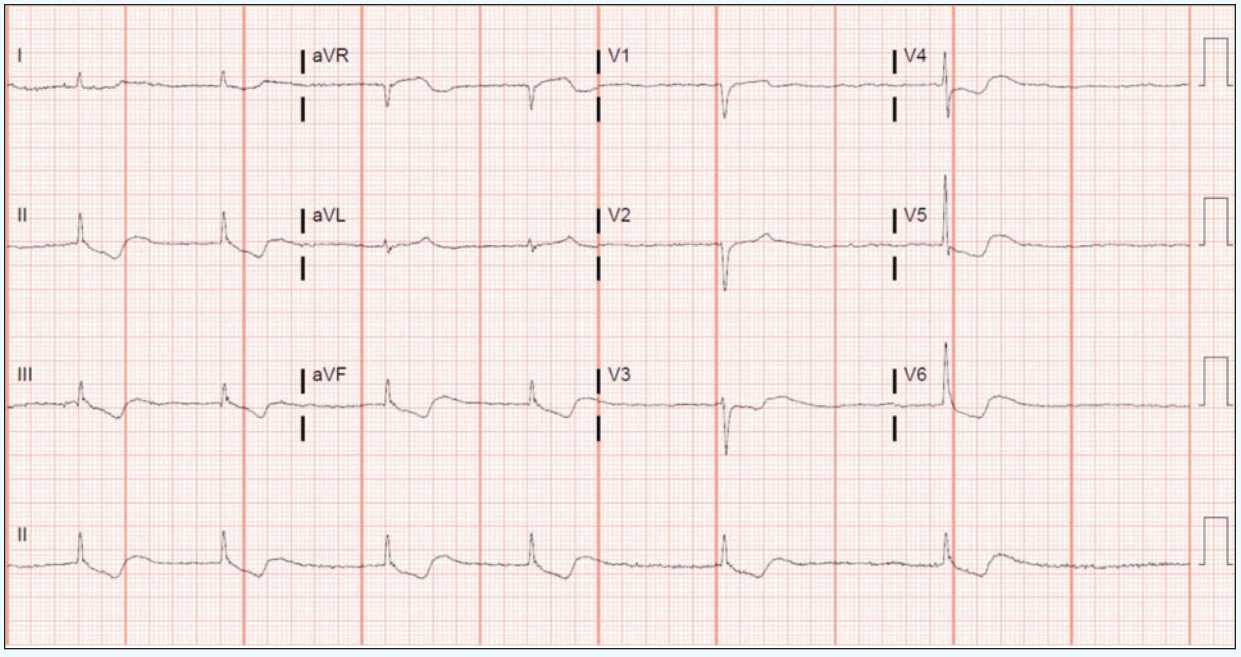


Figure 1. Initial ECG

Differential Diagnosis

- Hyperkalemia
- Hypokalemia
- Digoxin toxicity
- Myocardial infarction
- Myocarditis

ECG Analysis

This ECG shows atrial fibrillation with a rate of 36 bpm. There is a narrow QRS interval followed by downsloping, "scooped" ST-segments predominantly seen in the anterolateral and inferior leads (resembling Salvadore Dalí's mustache)—a finding that does not necessarily imply toxicity. These scooped ST-segments are followed by a biphasic t-wave, with an initial negative deflection and terminal positive deflection.

Overall, the findings of slow atrial fibrillation and the scooped ST-segments are consistent with digoxin toxicity.

Derangements in serum potassium can cause a variety of changes to the ECG. ECG changes due to hyperkalemia include peaked T-waves, P-wave flattening, prolonged PR interval, widened/abnormal QRS morphology, bradyarrhythmias, and a sine wave appearance. Changes due to hypokalemia include prolongation of the PR interval, ST depressions, T-wave flattening/inversion, U-waves, and an appearance of a long QT interval (due to fusion of the T- and U-waves).

The combination of features that favor digoxin toxicity include atrial fibrillation, narrow complex QRS interval, and a "scooped" morphology of the ST-segments. While ischemia and/or myocarditis can cause ST-segment changes, neither the history nor the ST-segment morphology supports these diagnoses.

Discussion

Digoxin is a cardiac glycoside most commonly used in the management of systolic heart failure and atrial arrhythmias. It is a reversible inhibitor of the Na-K ATPase pump, primarily in the myocardium, leading to increased intracellular calcium and enhanced contractility. In toxic doses, digoxin can cause a multitude of arrhythmias owing to increased automaticity, shortened refractory period, and decreased AV nodal conduction.

Digoxin toxicity can cause virtually any dysrhythmia, but common dysrhythmias associated with digoxin toxicity are: frequent PVCs, slow atrial fibrillation, sinus bradycardia, junctional rhythm, atrial tachycardia, AV blocks, and ventricular tachycardia (bidirectional or polymorphic).

Digoxin toxicity can be acute (accidental or nonaccidental overdose) or chronic, typically associated with renal failure, drug-drug interactions, or supratherapeutic dosing. Digoxin toxicity affects multiple organ systems and can manifest clinically as nausea/vomiting, anorexia, blurry vision, yellow/green color disturbances, seeing halos, palpitations, syncope, confusion, dizziness, hallucinations, and fatigue.

THE RESOLUTION

The mainstay of treatment is digoxin-specific antibody fragments (Fab) and is indicated with cardiac manifestations of toxicity. Additionally, concurrent derangements to serum potassium can be seen in digoxin toxicity and must be carefully monitored/managed.

Learnings/What to Look for

- Downsloping, scooped ST-segments resembling Salvadore Dalí's mustache are a common ECG effect of digoxin and do not (in and of themselves) imply toxicity
- Digoxin toxicity can cause virtually any dysrhythmia, and toxicity is a life-threatening condition
- A careful medication history should be taken to help identify potential digoxin toxicity
- Digoxin toxicity can present with both cardiac and extracardiac manifestations

Pearls for Urgent Care Management

- Urgent care patients in whom digoxin toxicity is a possibility should be emergently transferred to a facility capable of administering digoxin-specific antibody fragments
- Serum digoxin levels do not always correlate with degree of clinical toxicity
- Identify potential concomitant potassium derangements early in the resuscitation and correct them
- Intravenous atropine or transcutaneous cardiac pacing may be used in patients with high-grade symptomatic AV blockade

Resources

- Ehle M, Patel C, Giugliano R. Digoxin: clinical highlights: a review of digoxin and its use in contemporary medicine. *Crit Pathw Cardiol*. 2011;10(2):93-98.
- Gheorghiade M, Adams KF Jr, Colucci WS. Digoxin in the management of cardiovascular disorders. *Circulation*. 2004;109(24):2959–2964.

Case courtesy of ECG Stampede (www.ecgstampede.com).

ECG STAMPEDE

Where Do You Start When Starting Your Urgent Care?

HEATHER REAL

There are many reasons to start your own urgent care, whether it be feeding your entrepreneurial spirit, investing in an industry that has proven to be stable and growing (even amidst multiple economic crises in the last three decades), or responding to the needs of a community. For many, the reasons include at least some of these, and more.

Realizing the desire to take on this project is the first step; however, there are many very important tasks that need to be addressed before you can start counting down to opening day.

It simply cannot be stated enough that choosing the location of your urgent care is the decision that will most determine if, and by what margin, you will succeed. These efforts cannot be guided emotionally, by targeting the trendiest districts or sites that are closest to home. This must be considered expertly and scientifically, using tried-and-true data and metrics from the thousands of urgent cares that have come before you.

What qualifiable and quantifiable attributes make a site more likely to host a successful urgent care? While an operator's business acumen is also critical, even the best operators can't typically turn a bad site into a great one. It is easy to get lured in by the aesthetically desirable characteristics of a site; just don't forget to assess the critical factors that can't be seen, yet still must be studied.

The highest priority among them is determining what the payer landscape may look like. Just because you build the urgent care, does not mean the payers will offer you contracts with rates and terms that work for your business model; furthermore, it is not uncommon to find markets where payers are closing their networks to new urgent care operations. This may mean you have to get creative and be flexible to ensure your business will succeed. In some cases, an unfavorable review of the payer climate may provide little evidence that success can be realized here, and new markets should be studied. Your ability to drive revenue sits squarely with the collective quality of your chosen site.

Once you have identified the site and justified the business case, you'll need to take it to the bank, and in many cases the landlords, as well. You will need to compile personal financial information, as well as a detailed financial and business plan based on urgent care-specific models and with the help of industry experts.

This plan should blend your entrepreneurial spirit and your professional capabilities with custom projections based on the specifics of your startup. Ensuring you have prepared everything for the first pass will minimize delays at this stage.

In addition to addressing your initial investment, the operational expenses and thoughtfully prepared revenue projections will help to determine your working capital, or cash-on-hand needs.

Initial cash flows can be significantly impacted by delayed payer processes and visit volume ramp-up times. Knowing your baseline operating costs and developing a realistic reimbursement distribution for at least the first 6 months of operations will help you develop a solid financial plan to present to banks, investors, and/or landlords.

It is during this process that many operators find themselves overwhelmed by the financial needs of the startup project. With a general investment of $1.2 million, sometimes even more, it may take some time to understand the optimal allocation of these funds and to develop a plan to raise the required capital.

It doesn't hurt to shop around for a startup-friendly lending product with a lender who understands the distinctive economics of medical businesses. Most urgent care startups take advantage of Small Business Association products because of the lending benefits this program offers. Generally, startup operators are securing a loan that allows for 75%-90% project funding, up to 10-year loan terms, and capped interest rates—an increasingly appealing benefit in today's lending environment.

You are finally almost ready to kick off that opening day countdown. Most projects will require 8 to 12 months to prepare for

Heather Real is an Urgent Care Consultant at Experity. Heather has nearly 10 years' experience helping startup urgent cares all over the nation.

business operations, with most of that timeline eaten up by the process of contracting and credentialing with the payers. Every project is unique, however, and it's possible you could find yourself with a fully operational center before the effective dates on your payer contracts; resist the urge to throw the doors open to show off your new, shiny center and start taking care of those patients in need, though.

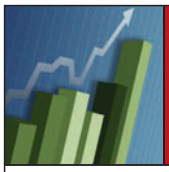
While the satisfaction of a job well done certainly feels amazing, it simply doesn't pay the bills; payer reimbursements will generate the bulk of your revenue and if those bridges are still being built when you open, even the most experienced billing specialists cannot compel insurance companies to pay on those visits. Remember, the carrying costs of a nonoperational, albeit functional, urgent care center are far less than the operational expenses of a functioning center. An out-of-network status can mean diminished visit volumes and reduced revenue per visit, overall negatively impacting your ability to generate revenue, while you're still incurring the same operational expenses as if you were in-network and realizing typical volume and revenue projections.

Opening prematurely will have immediate and longstanding impacts, as the patient's first experience using your center could be tainted with difficult out-of-network claims processing or paying cash for a visit that might otherwise be partially or fully covered by their insurance plan. Partnering with an experienced group of contracting and credentialing specialists can lessen these timeframes through their payer-specific application/process knowledge, as well as ensuring you get the best rates available to you.

"If you are considering launching your own urgent care, be sure to start at the beginning and know that there are industry-specific experts and resources ready to guide you through the entire process."

If you are considering launching your own urgent care, be sure to start at the beginning and know that there are industry-specific experts and resources ready to guide you through the entire process. Be thorough and methodical as you move through this process; there will be plenty of time to exercise urgency when you are running your successful urgent care center. ■

MEDICAL EQUIPMENT/SUPPLIES



DEVELOPING DATA

Urgent Care Is Correcting Course on Antibiotic Prescribing

Just 4 years ago, a Research Letter published by *JAMA Internal Medicine* painted an unflattering picture of the antibiotic prescribing habits in U.S. physician offices, urgent care centers, retail clinics, and emergency rooms.[1] Urgent care took its lumps along with other settings—but in response, collectively, also took the issue seriously and set to work on correcting course.

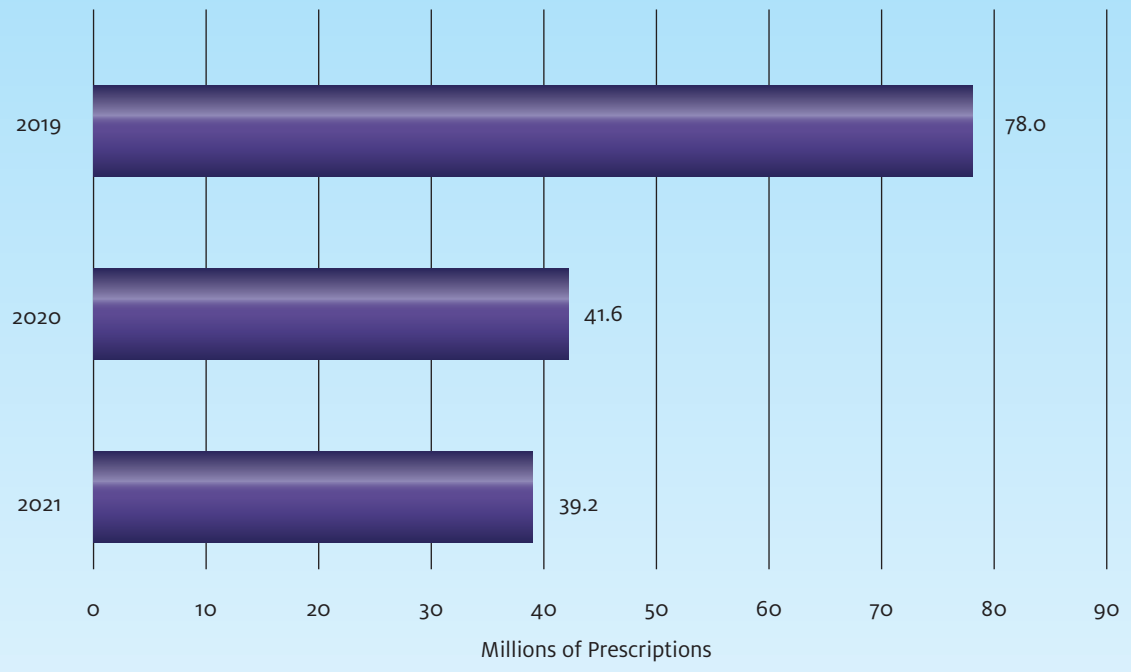
In introducing their Antibiotic Stewardship program, The Urgent Care Association and the College of Urgent Care Medicine noted that "there is a real need for comprehensive antibiotic stewardship across the healthcare industry" and called on "all urgent care providers to take ownership of their prescribing practices and understand the role they play in stewardship efforts."[2]

Judging from proprietary data collected by *JUCM*, it's evident that urgent care prescribers embraced the challenge. The graph below illustrates consistent (and dramatic) progress toward more responsible antibiotic prescribing over the past several years, reducing the overall number of prescriptions written by nearly half since the Research Letter was published. ■

References

1. Palms DL, Hicks LA, Bartoces M, et al. Comparison of antibiotic prescribing in retail clinics, urgent care centers, emergency departments, and traditional ambulatory care settings in the United States. September 18. Available at: https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/2687524. Accessed October 12, 2022.
2. The Urgent Care Association. Antibiotic Stewardship Commendation. Available at: https://www.ucaoa.org/Quality-Programs/Commendations/Antibiotic-Stewardship-Commendation. Accessed October 12, 2022.

POSITIVE TRENDS IN URGENT CARE ANTIBIOTIC STEWARDSHIP



Data source: *JUCM* 2019 Urgent Care Chart Survey; *JUCM* 2020 Urgent Care Chart Survey; *JUCM* 2021 Urgent Care Chart Survey.

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