JUCM®
THE JOURNAL OF URGENT CARE MEDICINE®

JUNE 2024
VOLUME 18, NUMBER 9

URGENT CARE ASSOCIATION

COLLEGE OF URGENT CARE MEDICINE

www.jucm.com

The Official Publication of the UCA and CUCM

Vital Signs: Pay Attention to Tachycardia Before Discharge

ALSO IN THIS ISSUE

The power of PCR in your hands

Results delivered at the point of care in under 30 minutes

CLIA WAIVED

EUA

True PCR results in under 30 minutes

Portable, deployable, and scalable

PCR accuracy

Instrument free - no capital investment, service contracts, maintenance or calibration

visby medical™

For more information: 1-833-GoVisby (1-833-468-4729)
Visit our website at visbymedical.com or scan this QR Code.

The Visby Medical Respiratory Health Test has not been FDA cleared or approved, but has been authorized for emergency use by FDA under an EUA for use by authorized laboratories. This product has been authorized only for the detection and differentiation of nucleic acid from SARS-CoV-2, influenza A, and influenza B, not for any other viruses or pathogens; and the emergency use of this product is only authorized for the duration of the declaration that circumstances exist justifying the authorization of emergency use of in vitro diagnostics for detection and/or diagnosis of COVID-19 under Section 564(b)(1) of the Federal Food, Drug, and Cosmetic Act, 21 U.S.C. § 360bbb-3(b)(1), unless the declaration is terminated or authorization is revoked sooner.

It's Time for Us to Get Involved

Roger Hicks, MD

I live in the foothills of the Sierra Nevada in Northern California, where, like numerous other parts of the world, extreme weather events are becoming increasingly routine occurrences. The "hot days" are hotter and more abundant, and the droughts are more severe. In turn, this has precipitated more wildfires, which lead to problematic smoke and hazardous air quality.

When I opened my urgent care (UC) clinic 24 years ago, I never thought that I would be caring for climate change refugees, yet that is exactly what happened in the fall of 2018. The Camp Fire, fueled by the extreme climate forces mentioned above, displaced more than 50,000 residents of the town of Paradise and the surrounding communities. Many of those who were forced to evacuate their homes had to flee so quickly they didn't have an opportunity to gather their important belongings, including medications. The fire burned down the refugees' homes, workplaces, doctors' offices, and pharmacies and caused the emergency evacuation of their fire-damaged hospital.

I suspect some of you have also served climate change refugees at your clinics—perhaps without even realizing it. Consider the families displaced during any of the increasingly powerful hurricanes that have ravaged the Gulf Coast in recent years or those who've become ill from exposure when extreme heat waves or ice storms cripple the power grid. Millions are affected by events such as these each year in U.S. and worldwide, and it's during these times of stress and displacement that unexpected medical needs very often arise. I believe that our duty extends beyond serving these patients when they present to our UC centers in this context. It is time for the urgent care community to get involved upstream and take action to mitigate the cause of all these tragedies: climate change itself.

Despite any political rhetoric, there is no longer credible doubt that human activity contributes to climate change, and climate change affects human health.[1] The effects are myriad, and climate change is a threat multiplier for health problems. Climate change produces increasingly frequent extreme heat events, extreme weather, drought, food-borne diseases, the spread of vector-borne diseases, and mental health issues. Air pollution—whether caused by emissions from power plants, internal combustion engines, or forest fires—is synergistic with extreme heat and disproportionately affects children, pregnant women, and people with lung or cardiac problems.[2,3,4]

Climate change is not only leading to deleterious effects on human health, but is also affecting our ability to deliver healthcare as well, including in urgent care.[5] We have seen this unfold in the form of forced healthcare facility closures and emergency evacuations due to extreme weather, flooding, and fire, which have caused disruptions for patients and healthcare personnel alike.[6]

As healthcare professionals, we have the good fortune and responsibility of a "bully pulpit" because we are implicitly trusted by our patients and the public at large in ways few others experience. By virtue of the work we do, we are also more aware than those in the general population of the specific health effects of climate change as we see their consequences with our own eyes.

Urgent care has experience coming through when facing uncertain times. Most recently, we stepped up during the pandemic. While many doctors' offices and clinics were telling people with COVID-related concerns to stay away, we kept our doors open. It was the right thing to do, and in so doing, we earned the public's trust. This position raised awareness of the vital role UC plays in our healthcare system and society as a whole. We have the opportunity to position ourselves similarly with respect to responding to climate change. And our patients and the planet are counting on us to take this responsibility seriously.

Make a Change

While we are experiencing the harsh effects of climate change, in recent years, we've also seen that with techno-

Roger Hicks, MD, FCUCM, is the Medical Director of Dignity Health's Sierra Nevada Urgent Care Clinic, a member of the College of Urgent Care Medicine's Board of Directors and its Clinical Response Committee, and represents the college on the Steering Committee of the Medical Consortium on Climate and Health.

logical advances, a clean energy future is achievable. This is not a fringe movement any longer; there are already many communities around the world engaged in this transition. However, like the tobacco industry before it, the fossil fuel industry is undermining progress by deceiving the public about the side effects of its products. But we are clearly at stage in human history where there is little doubt that the negative impacts of burning more fossil fuels far outweigh the benefits, especially as many cleaner, viable alternatives now exist.

"The ways in which we can be involved are truly endless"

Increasingly within medicine, healthcare professionals, who note the undeniably negative impacts of climate change on the health of our population, have become engaged. For example, organizations, such as the Medical Society Consortium on Climate and Health, which represents more than 50 medical societies and more than 700,000 healthcare professionals, have led a counteroffensive in lobbying for policies that might abate climate change.[7] The American College of Emergency Physicians has pledged to combat the climate crisis through education, research, advocacy for public policy, and has taken steps to reduce the carbon footprint of their own facilities.[8] The American Board of Pediatrics has developed a Maintenance of Certification module on climate, health, and equity and is the first board to offer such content.[9] Citing the devastating effects on health, over 200 peer reviewed journals in the life sciences, including the *New England Journal of Medicine*, have recently called on world leaders to take emergency action to halt climate change.[10,11]

These organizations, which represent clinicians, are taking these positions because the impact of climate change on public health is now so apparent. However, creating legislation and policy that slows the progress of climate change is not only good for the health of our citizens but also fiscally sound. Interventions that reduce fossil fuel emissions can also save money by reducing overall healthcare spending, especially among the most vulnerable populations.[12]

3 Ways to Get Involved

It's time for the UC community to join the charge against climate change with our healthcare professional colleagues. This is such a multi-faceted and far-reaching issue that the ways in which we can be involved are truly endless. However, I want to suggest 3 specific ways in which the UC community can show our support for this cause immediately.

1. Incorporate curricula discussing the health effects of climate change into our specialty conferences. By educating ourselves and colleagues, we can begin to organize and inspire one another and then share these learnings with our patients and others in our community.
2. Lead by example by advocating for reducing the carbon footprint of our own clinics first.
3. Directly lobby our local, state, and federal government leaders for policies affecting the environment through the lens of the effects of sustainability on the health of our patients.

As urgent care did during the COVID pandemic, we must again step up to fight an even larger existential threat: the decreasing livability of the only planet we have. From our trusted position, acting against the ongoing climate change crisis is nothing short of our duty. We owe it to our patients. We owe it to ourselves. ■

References

1. TillerT, Schott C. The Critical Relationship between Climate Change Awareness and Action: An Origin-Based Perspective. ResearchGate. Accessed April 23, 2024. https://www.researchgate.net/publication/263142193/The_Critical_Relationship_between_Climate_Change_Awareness_and_Action_An_Origin-Based_Perspective.
2. Perera F, Nadeau K: Climate Change, Fossil-Fuel Pollution, and Children's Health. *New England Journal of Medicine*. 2022; 386:2303-2314
3. Perera F. Pollution from Fossil-Fuel Combustion is the Leading Environmental Threat to Global Pediatric Health and Equity: Solutions Exist. Int *J Environ Res Public Health*. 2017 Dec 23;15(1):16. doi: 10.3390/ijerph15010016. PMID: 29295510; PMCID: PMC5800116.
4. Bekkar B, Pacheco S, Basu R. Association of Air Pollution and Heat Exposure With Preterm Birth, Low Birth Weight and Stillbirth in the US. *JAMA Network Open.* 2020;3(6):e208243.
5. Tarabochia-Gast, A. T., Michanowicz, D. R., Bernstein, A. S. (2022). Flood risk to hospitals on the United States Atlantic and Gulf Coasts from hurricanes and sea level rise. *GeoHealth*, 6, e2022GH000651. https://doi.org/10.1029/2022GH000651
6. Salas, R. The Climate Crisis and Clinical Practice. *N Engl J Med*. 2020; 382:589-591
7. Medsocieties for Climate & Health website. Accessed March 20, 2024. https://medsocietiesforclimatehealth.org/about/
8. American College of Emergency Physicians website. Impact of Climate Change on Public Health and Implications for Emergency Medicine. Accessed March 20, 2024. https://www.acep.org/patient-care/policy-statements/impact-of-climate-change-on-public-health-and-implications-for-emergency-medicine
9. Patel L, Byron L, Maher, K. Integrating Climate Change Education Into Board Certification For Pediatricians: A Model For Other Specialties. *Journal of Climate Change and Health*. 2022, Volume 5,100093, ISSN 2667-2782
10. Atwoli L, Baqui A, Benfield T, Bosurgi R, Godlee F, Hancocks S, et al. Call For Emergency Action to Limit Global Temperature Increase, Restore Biodiversity, and Protect Health. *N Engl J Med.* 2021; 385:1134-1137
11. Wise J. Climate Crisis: Over 200 Health Journals Urge World Leaders To Tackle "Catastrophic Harm". *BMJ* 2021; 374:n2177
12. Markandya A, Sampedro J, Smith SJ, et al. Health Co-Benefits From Air Pollution And Mitigation Costs Of The Paris Agreement: A Modelling Study. *Lancet Planet Health*. 2018;2(3):e126-e133.

CME CONTENT

DELIVERED

JUCM CME Subscription

- Includes 11 mailed copies of the Journal, each containing 3 CME articles
- ACCME accredited through the Institute of Medical and Nursing Education
- 33 articles available annually, each providing up to 1 *AMA PRA Category 1 Credits*™
- Individual and bulk corporate subscriptions available

Begin your journey or sharpen your skills while earning your CME credits with IUCM — the proven leader in practical mastery for urgent care professionals.

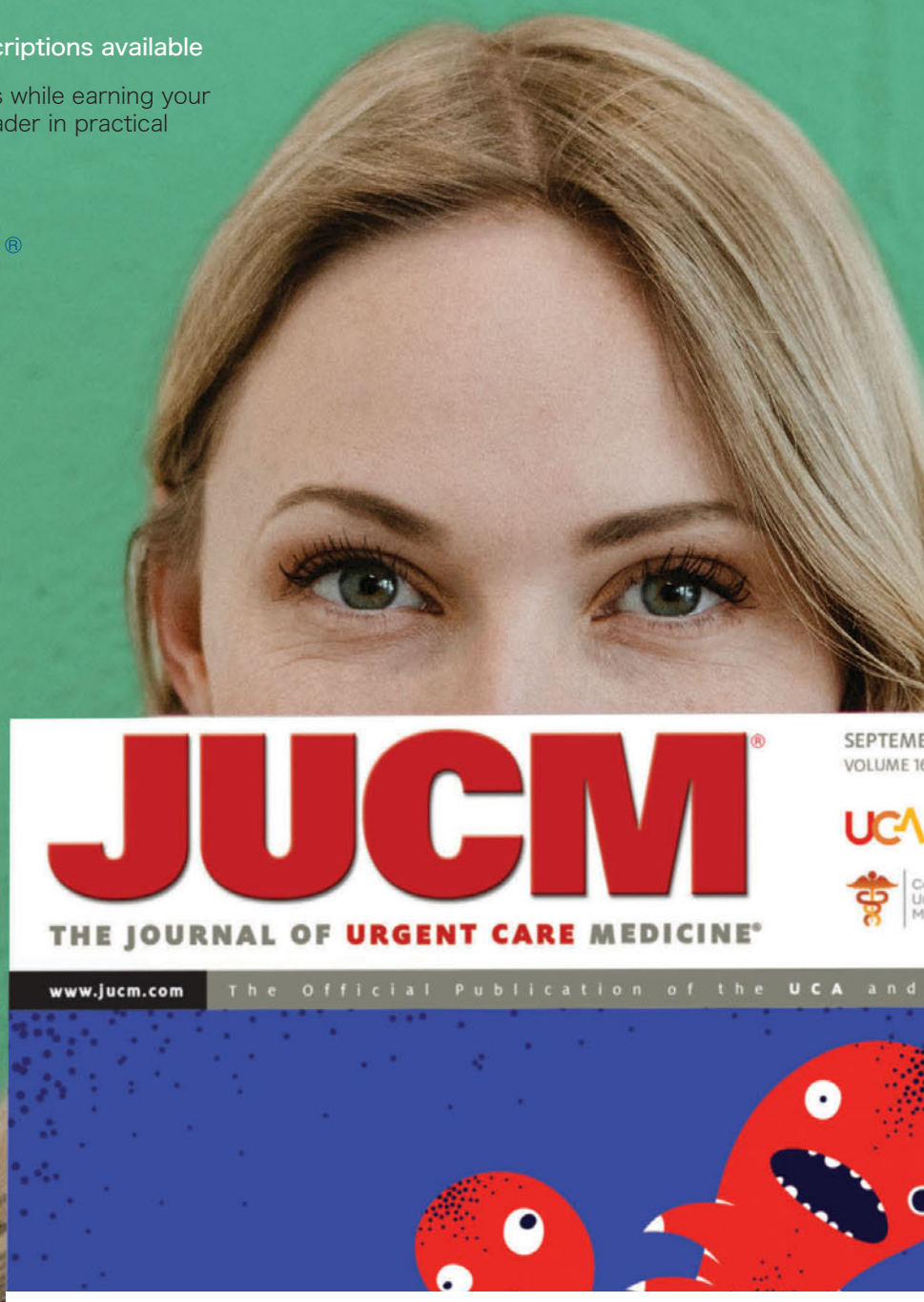
IUCM®
INSTITUTE OF URGENT CARE MEDICINE

LEARN MORE

IMNE
Institute for Medical and Nursing Education

Accreditation Statement: This activity has been planned and implemented in accordance with the accreditation requirements and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of the Institute for Medical and Nursing Education (IMNE) and the Institute of Urgent Care Medicine. IMNE is accredited by the ACCME to provide continuing medical education for physicians. The IMNE designates this journal-basedCME activity for a maximum of 3 AMA PRA Category 1 Credits™ per issue.

Physicians should claim only the credit commensurate with the extent of their participation in the activity.



urgentcarecme.com | 844-814-9135 | ablachford@urgentcarecme.com

Metrix® COVID-19 Test

A MOLECULAR LAB ANYWHERE AND EVERYWHERE

High quality test results do not have to come at a high cost. The Metrix® molecular platform is a portable and versatile diagnostic solution designed for the point-of-care. This novel technology removes the cost barriers associated with molecular testing, empowering healthcare professionals with the ability to improve clinical outcomes by providing accurate and immediate test results to patients **ANYWHERE** and **EVERYWHERE**.

For more information, visit metrixmolecular.com or call 800-332-1042

aptitude Metrix® COVID-19 Test

Provided by SEKISUI DIAGNOSTICS

JUCM®
The Official Publication of the UCA and CUCM
June 2024 | VOLUME 18, NUMBER 9

ORIGINAL RESEARCH

FOLLOW *JUCM* ON SOCIAL MEDIA

LinkedIn

JUCM: Journal of Urgent Care Medicine

X

@TheJUCM

DEPARTMENTS

TO SUBMIT AN ARTICLE:

JUCM utilizes the content management platform Scholastica for article submissions and peer review. Please visit our website for instructions at http://www.jucm.com/submit-an-article

JUCM®

EDITOR-IN-CHIEF
Joshua W. Russell,MD, MSc, ELS, FCUCM, FACEP
editor@jucm.com

MANAGING EDITOR
Julie Miller
jmiller@jucm.com

SENIOR EDITOR, PRACTICE MANAGEMENT
Alan A. Ayers, MBA, MAcc

SENIOR EDITOR, CLINICAL
Michael B. Weinstock, MD

SENIOR EDITORS, RESEARCH
Albert Botchway, PhD
Ariana M. Nelson, MD

EDITOR, PEDIATRICS
Brittany Wippel, MD

EDITOR, IMAGES
Lindsey Fish, MD

EDITOR, ECG IMAGES
Benjamin Cooper, MD, MEd, FACEP

CONTRIBUTING EDITOR, ABSTRACTS
Ivan Koay, MBChB, FRNZCUC, MD

SENIOR ART DIRECTOR
Tom DePrenda
tdeprenda@jucm.com

BRAVEHEART PUBLISHING

11 E Sundial Circle, PO Box 5156, Carefree, AZ 85377

PUBLISHER AND ADVERTISING SALES
Stuart Williams
swilliams@jucm.com • (480) 245-6400

CLASSIFIED AND RECRUITMENT ADVERTISING
Danielle McDade
danielle.mcdade@communitybrands.com • (860) 574-1221

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.

Publication Ethics and Standards
JUCM adheres to industry standards for academic medical journals regarding ethical behavior on the part of authors, editors, reviewers, and staff. Authors should review and understand these guidelines to avoid misconduct in manuscript preparation and submission. The following definitions are provided to guide individuals in adhering to these declarations.

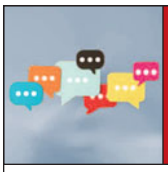
Study Design and Ethics of Research Involving Human Subjects
Research must be conducted to appropriately address the research question while strictly adhering to ethical standards for investigations involving human subjects. *JUCM* affirms the standards for research ethics outlined by the World Medical Association (WMA) in the Declaration of Helsinki, 1964 and its subsequent amendments (last updated 2018). Prospective authors are encouraged to review the Declaration prior to undertaking research, with consideration for conducting appropriate informed consent and whether intended subjects are considered a vulnerable population. Submissions to *JUCM* must comply with the principles of the Declaration (www.wma.net/policies-post/wma-declaration-of-helsinki-ethical-principles-for-medical-research-involving-human-subjects). Research involving human subjects must comply with the respective Institutional Review Board (IRB) standards. Use of an independent IRB is acceptable for authors within an organization without an IRB. To determine if planned investigations fall within the definition of "human subjects research," consult the National Institutes of Health (NIH) decision tool for clarification: https://grants.nih.gov/policy/ humansubjects/hs-decision.htm. Manuscripts describing research involving human subjects must include a statement of approval or exemption for the study from an appropriate IRB or other research ethics committee. *JUCM* conforms to standards for research misconduct laid forth by the Office of Research Integrity (ORI) within the U.S. Department of Health and Human Services (HHS). The ORI specifies the following as instances of misconduct in proposing, performing, or reviewing research, or in reporting research results with the definitions cited on its website "Research Misconduct" accessed June 29, 2020, https://ori.hhsgov/definition-misconduct
(a) Fabrication is making up data or results and recording or reporting them.
(b) Falsification is manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record.
(c) Plagiarism is the appropriation of another person's ideas, processes, results, or words without giving appropriate credit.
(d) Research misconduct does not include honest error or differences of opinion.

Editorial Decision-Making
JUCM aims to publish original manuscripts relevant to urgent care practice. Decisions regarding publication are made by multilevel editorial review with consideration for clarity, originality, and audience value. Publication decisions must subsequently be corroborated through the process of peer review. Authors may appeal rejections by resubmitting a revised manuscript with a detailed description of the changes and their grounds for appealing. In the event of publication of a manuscript where errors are subsequently identified, *JUCM* will promptly issue a written correction as appropriate. Concerns regarding errors can be addressed to editor@jucm.com.

Disclaimer
JUCM The Journal of Urgent Care Medicine (JUCM) makes every effort to select authors who are knowledgeable in their fields. However, JUCM does not warrant the expertise of any author in a particular field, nor is it responsible for any statements by such authors. The opinions expressed in the articles and columns are those of the authors, do not imply endorsement of advertised products, and do not necessarily reflect the opinions or recommendations of Braveheart Publishing or the editors and staff of JUCM. Any procedures, medications, or other courses of diagnosis or treatment discussed or suggested by authors should not be used by clinicians without evaluation of their patients' conditions and possible contraindications or dangers in use, review of any applicable manufacturer's product information, and comparison with the recommendations of other authorities.

Advertising Policy
Advertising must be easily distinguishable from editorial content, relevant to our audience, and come from a verifiable and reputable source. The Publisher reserves the right to reject any advertising that is not in keeping with the publication's standards. Advertisers and advertising agencies recognize, accept, and assume liability for all content (including text, representations, illustrations, opinions, and facts) of advertisements printed, and assume responsibility for any claims made against the Publisher arising from or related to such advertisements. In the event that legal action or a claim is made against the Publisher arising from or related to such advertisements, advertiser and advertising agency agree to fully defend, indemnify, and hold harmless the Publisher and to pay any judgment, expenses, and legal fees incurred by the Publisher as a result of said legal action or claim.

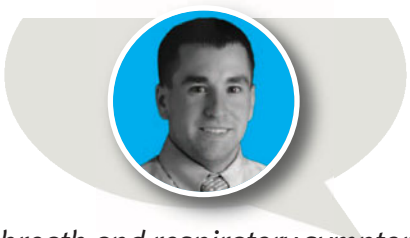
Address Changes
JUCM printed edition is published monthly except for August for $50.00 by Braveheart Group LLC, 11 E Sundial Circle, PO Box 5156, Carefree, AZ 85377. Standard postage paid, permit no. 372, at Lancaster, PA, and at additional mailing offices. POSTMASTER: Send address changes to Braveheart Group LLC, 11 E Sundial Circle, PO Box 5156, Carefree, AZ 85377.
Email: address: change@ jucm.com



URGENT INTERACTIONS

"We teach what we need to learn most."
— Joshua W. Russell, MD, MSc, ELS, FCUCM, FACEP
JUCM Editor in Chief
Speaking at the Urgent Care Association Convention

"There are 3 reasons to document: to inform future providers; for billing purposes; and for legal protection. The documentation is our argument. It is the 'if the gloves fit' moment."
— Michael Weinstock, MD
JUCM Senior Clinical Editor
Speaking at the Urgent Care Association Convention



"Shortness of breath and respiratory symptoms are some of the most common reasons patients seek medical attention. Clinicians should have a safe and efficient way of developing a differential diagnosis and evaluation of the benign and the life-threatening causes of dyspnea."
— Evan Price, DO
Author of Dyspnea in the Urgent Care: Differentiating Benign From 'Can't Miss' (page 13)

A WORD OF THANKS

The Journal of Urgent Care Medicine would like to thank the dedicated group of urgent care professionals listed below who graciously contributed their time and insight to review recent articles for publication. The peer reviewer status is worthy of inclusion on your curriculum vitae, so if you're interested in becoming a peer reviewer, reach out to the *JUCM* team at: editor@jucm.com.

Robert Dums
Frank Fannin
Joan Finno
Tom Gibbons
Dominic K. Hardatt
Jeannie Kenkare
Hal Kramer
Benjamin Mati
Sean McNeeley
Richard Morgera
Emily Pierson
Kevin Rahner
W. Bradley Strauch
Graig Straus
Joseph Toscano
Brandon Wiese
Mary Ann Yehl
Edward Zompa

Have a comment? Interested in sharing your perspective on a topic that appeared in *JUCM*? Not all letters will be published. Letters may be edited for length and clarity.
Send your letters to: editor@jucm.com

URGENT CARE ASSOCIATION®

THANK YOU
Corporate Members

DIAMOND MEMBERS

controlthedose · McKESSON · EXDION Humane Technology · EXPERITY®

HIPPO EDUCATION · Pfizer · RapidRad

PLATINUM MEMBERS

Solv.

GOLD MEMBERS

Abbott · BD · BIOMÉRIEUX · Cepheid A better way. · HEALTHTRACKRx

National UC Realty a Division of Zelnik Realty Group · NUANCE · QuidelOrtho

SILVER MEMBERS

3bExam · AMRAD Medical · CHEMBIO DIAGNOSTICS, INC. · MEDLINE · PixCell MEDICAL

reckitt · UPFRONT · VERSÉA Health · XpertDox

BRONZE MEMBERS

Abyde · ANAVASI DIAGNOSTICS · BLUE RIDGE IMAGING TECHNOLOGIES · binx · cue

EB MEDICINE · HENRY SCHEIN® · KONICA MINOLTA · Lesro Seating the Way You Want It™ · LISTER

LUMOS DIAGNOSTICS · MIDLAND Urgent Care Design-Build · ProficientRx · RevSpring · SMART MEDICAL SOLUTIONS Your Medical Supply Solution

TLC DME LLC DME Specialists DME Solutions · UC Max · Urgent ACO

UCA's Corporate Members suppoort the advancement and long-term success of Urgent Care. Visit urgentcareassociation.org/partners/corporate-membership to learn more about the Corporate Member program.

Please Show Me That I'm Wrong

Lou Ellen Horwitz, MA

I like to think that I usually have a pretty good read on Urgent Care, but I am currently mystified by something and need your help.

For as long as I can remember, everyone in Urgent Care has chanted a common refrain: "We need a seat at the table!" In the beginning, we were too small to make enough noise to be heard and way, way too tight on funds to even think about hiring a lobbyist. There wasn't much we could do back then to get a seat in the rooms where healthcare's biggest decisions are made.

Time passed, Urgent Care grew, and the Urgent Care Association (UCA) also grew. We started issuing position statements and even got a TRICARE pre-authorization rule changed—but we still didn't have a true "seat at the table."

Then COVID came, and we all learned how important that seat really was. Not having our voices heard impacted our ability to care for patients. Our ongoing pleas to the Centers for Disease Control and Prevention were mostly ineffective, and every one of your centers had to beg for inclusion in local planning and resources.

By 2022, UCA had survived COVID's impacts and decided we were finally ready to make a real run at getting that seat at the table. We engaged a Washington, D.C., lobbying firm, built and shared a comprehensive plan for our advocacy efforts and finally got the attention of Congress and others. We have been making significant progress toward fair payment at last.

Here's where the mystery arrives. Now that we are making progress, it seems like we have almost no commitment from all of you to push this through. So, I am confused. Do you not care about getting a seat at the table anymore?

Here's what I mean:

- When we invest in software to make it easy to contact your congressperson and send out an alert—almost no one does it.
- We've launched 3 major campaigns asking for financial support so we can keep this up for the long term—and almost no one responds.
- At first we thought we were asking for too much money—$100 per center was our first try. We lowered that to $10 this year—and still almost no one responds.

Maybe you didn't want to help with lobbying costs? It's hard to see immediate return on that investment, and we get that. So we asked for support in creating a national-level public relations campaign for Urgent Care *next year*—and so far, *almost no one has responded*. We went to our vendor members to see if they could help out—and almost no one has responded.

All of the stars have finally aligned: We are big enough to matter, we have a plan, we have a lobbyist, we have points on the board, and all we need is a little financial support from everyone—but you don't seem to want to give it. Not even $10. So, I am at a loss.

I am asking for feedback to help us understand if we are doing something wrong, or if you no longer care about this, or if you want to do it on your own, or you don't understand or trust what we are doing, *or is it something else?*

To me, it would be utterly tragic to finally get some traction, see our first finish line, and choose to (or have to) walk away. I cannot imagine going to the UCA Board of Directors and telling them that we were wrong and that focusing on getting fair payment isn't what you want us to prioritize, but I'm starting to have to think about it in the face of all of the evidence.

Changing policy takes a long time, and without a collective commitment, we are going to run out of funds. The progress we have made so far will be for nothing. I can guarantee you the Urgent Care leaders of the future will never forgive us.

Please show me I'm wrong and that this is not how the story ends. Please scan the QR code provided to vote with your wallet. ■

Lou Ellen Horwitz, MA is the chief executive officer of the Urgent Care Association.

CONTINUING MEDICAL EDUCATION

Release Date: June 1, 2024
Expiration Date: May 31, 2025

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

Accreditation Statement
This activity has been planned and implemented in accordance with the accreditation requirements and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of the Institute for Medical and Nursing Education (IMNE) and the Institute of Urgent Care Medicine. IMNE is accredited by the ACCME to provide continuing medical education for physicians. The IMNE designates this journal-based CME activity for a maximum of 3 *AMA PRA Category 1 Credits™*.

Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Planning Committee
- **Joshua W. Russell, MD, MSc, ELS, FCUCM, FACEP**
  Member reported no financial interest relevant to this activity.
- **Michael B. Weinstock, MD**
  Member reported no financial interest relevant to this activity.
- **Alan A. Ayers, MBA, MAcc**
  Member reported no financial interest relevant to this activity.
- **Steve Weinman, MSc, RN, CEN, TCRN**
  Member reported no financial interest relevant to this activity.

Disclosure Statement
The policy of IMNE requires that the Activity Director, planning committee members, and all activity faculty (that is, anyone in a position to control the content of the educational activity) disclose to the activity participants all relevant financial relationships with ineligible companies. Where disclosures have been made, conflicts of interest, real or apparent, must be resolved. Disclosure will be made to activity participants prior to the commencement of the activity. IMNE also requires that faculty make clinical recommendations based on the best available scientific evidence and that faculty identify any discussion of "off-label" or investigational use of pharmaceutical products or medical devices.

Instructions
To receive a statement of credit for up to 1.0 *AMA PRA Category 1 Credit*™ per article, you must:
1. Review the information on this page.
2. Read the journal article.
3. Successfully answer all post-test questions through UrgentCareCME.com.
4. Complete the evaluation.

Estimated Time to Complete This Educational Activity
This activity is expected to take 3 hours to complete.

Fee
There is an annual subscription fee of $145.00 for this program, which includes up to 33 *AMA PRA Category 1 Credits*™.

Email inquiries to info@urgentcarecme.com

Medical Disclaimer
As new research and clinical experience broaden our knowledge, changes in treatment and drug therapy are required. The authors have checked with sources believed to be reliable in their efforts to provide information that is complete and generally in accord with the standards accepted at the time of publication.

Although every effort is made to ensure that this material is accurate and up-to-date, it is provided for the convenience of the user and should not be considered definitive. Since medicine is an ever-changing science, neither the authors nor IMNE nor *The Journal of Urgent Care Medicine* or any other party who has been involved in the preparation or publication of this work warrants that the information contained herein is in every respect accurate or complete, and they are not responsible for any errors or omissions or for the results obtained from the use of such information.

Readers are encouraged to confirm the information contained herein with other sources. This information should not be construed as personal medical advice and is not intended to replace medical advice offered by physicians. IMNE and *The Journal of Urgent Care Medicine* will not be liable for any direct, indirect, consequential, special, exemplary, or other damages arising therefrom.

CONTINUING MEDICAL EDUCATION

JUCM CME subscribers can submit responses for CME credit at **UrgentCareCME.com**. Post-test questions are featured below for your convenience. This issue is approved for up to *3 AMA PRA Category 1 Credits™*. Credits may be claimed for 1 year from the date of this issue.

Dyspnea in the Urgent Care: Differentiating Benign From 'Can't Miss' (page 13)

1. Which type of testing is most likely to be available in urgent care to help clinicians diagnose patients presenting with dyspnea?
a. Chest radiography
b. Electrocardiogram
c. Pulse oximetry
d. All of the above

2. Dyspnea developing gradually over days to weeks can signify what?
a. Heart failure
b. Anemia
c. Pneumonia
d. Any of the above

3. Of these, which is *not* a cardiac cause of dyspnea?
a. Congestive heart failure
b. Anxiety
c. Acute coronary syndrome
d. Pericarditis with pericardial effusion

Urgent Care Evaluation and Management Of Injury to the Ulnar Collateral Ligament of the Thumb (page 26)

1. What is a typical mechanism of injury in gamekeeper's thumb?
a. A penetrating fish hook injury
b. Abduction and hyperextension of the thumb
c. A direct blow to the wrist
d. A laceration with a retained foreign body

2. What common mechanism can cause injury to the ulnar collateral ligament of the thumb?
a. A fall while skiing with hyperextension of the thumb (skier's thumb)
b. Abduction and hyperextension of the thumb while playing sports
c. Repetitive hyperextension of the thumb, such as when twisting the necks of fowl and small game (gamekeeper's thumb)
d. A blow to the thumb during athletic activities, which causes extreme abduction
e. All of the above

3. If stress testing the injured hand for laxity causes the patient much pain, what action can be taken to facilitate the exam?
a. Injection of lidocaine
b. Referral to emergency department
c. Referral to primary care provider
d. Apply fiberglass cast

Intraoral Angioedema After Olanzapine Overdose: A Case Report (page 34)

1. What is olanzapine typically prescribed to treat?
a. Schizophrenia and other psychotic conditions
b. Sleep apnea
c. Oral infection
d. All of the above

2. How often do antipsychotic medications lead to oral angioedema?
a. Rarely
b. 20% of patients
c. 30% of patients
d. More than 40% of patients

3. The most severe complication of angioedema is:
a. Stutter
b. Tardive dyskinesia
c. Dental infection
d. Airway obstruction

Symptom:

Excessive Claim Rejections and Denials?

Prescription:

Leverage Experity's Expert Billers and Coders

- Believe it or not, if there's a single incorrect digit, code, or field in a claim, the claim will be rejected or denied – and impair your revenue cycle.
- You need billers that understand the importance of accuracy, insurance verification, and the payer processes that expedite payment.

RCM Challenges? There's a cure for that.

When your billing process causes you pain, Experity RCM provides a cure. Our team can identify the source and get your business back to better financial health. You can streamline your financial operations with our proven RCM solution, from contracting and credentialing to analytics and resolution – and every step in between.

At Experity, we're committed to developing revenue cycle management prescriptions to help you meet your financial goals – so you can feel better about billing.

GET STARTED

CME: This peer-reviewed article is offered for AMA PRA Category 1 Credit.™
See CME post-test questions on page 11.

Dyspnea in the Urgent Care: Differentiating Benign From 'Can't Miss'

Urgent Message: Patients commonly present with respiratory symptoms in the urgent care setting and not infrequently complain of some degree of shortness of breath—or dyspnea. It is critical for clinicians to have comfort with the clinical assessment and appropriate use of diagnostic resources for the dyspneic patient. Identifying patients requiring immediate emergency department referral is an important skill.

Evan Price, DO; Eric Patten, MD; Shakil Hossain, DO; Michael Weinstock, MD

Citation: Price E, Patten E, Hossain S, Weinstock M. Dyspnea in the Urgent Care: Differentiating Benign From 'Can't Miss.' *J Urgent Care Med.* 2024; 18(9):13-21

Introduction

Dyspnea has a broad differential of worrisome diagnoses ranging from flash pulmonary edema and pneumothorax to more benign conditions such as viral upper respiratory infection (URI) and asthma. This article will cover the "can't miss" diagnoses that may present to the urgent care (UC) center and review recommendations for the diagnosis of chronic obstructive pulmonary disease (COPD), asthma, and pneumonia. Patient descriptions of dyspnea (**Table 1**) in conjunction with the history, physical exam, and testing will often lead clinicians to a diagnosis within 1 of 5 distinct categories:

- Airway
- Pulmonary
- Cardiac
- Systemic
- Central

Descriptors of the Term 'Dyspnea'

The descriptions and timing of a patient's dyspnea are crucial in determining the most likely etiology and ruling out the more critical diagnoses. However, there is a significant variation in the understanding of much of this terminology, which may vary between the patient and the clinician.[1] Wheezing, coughing, and fine crackles may point clinicians to a primary parenchymal or bronchial cause of dyspnea, such as asthma or COPD,

Author affiliations: Evan Price, DO, Adena Medical Center. **Eric Patten, MD,** Adena Medical Center. **Shakil Hossain, DO,** Adena Medical Center. **Michael Weinstock, MD,** Adena Medical Center, The Ohio State University College of Medicine, Journal of Urgent Care Medicine. Authors have no relevant financial relationships with any ineligible companies.

Table 1. Dyspnea Descriptions

Dyspnea Descriptions	Patient Description
Orthopnea	Symptoms when lying flat
Paroxysmal nocturnal dyspnea	Intermittent dyspnea at night, improves when standing or walking
Exertional	Worse with physical activity, relieved with rest
Bendopnea	Worse by leaning forward, improved with sitting up
Platypnea	Worse with sitting up, improved when supine
Breathlessness	Sensation of dyspnea with no clear exacerbating factors

but can also be caused by heart failure or a foreign body in the airway. The axiom that "all that wheezes is not asthma" applies to this reality. If a patient denies "shortness of breath" while sitting on the exam table in the UC, they may still answer affirmatively when asked the follow-up question regarding dyspnea with exertion or orthopnea.

History

Apart from general questions regarding onset and duration of symptoms, the history should probe for inciting triggers, alleviating factors, exposures, timing, onset, associated symptoms, descriptors of discomfort, and exposures (to smoking, chemicals, fumes, dust, etc.). Onset occurring within a few minutes to hours of presentation should raise considerations for acute coronary syndrome (ACS), anxiety, bronchospasm, pulmonary embolism (PE), pneumothorax (PTX), or foreign body aspiration. Dyspnea developing gradually over days to weeks can signify heart failure, anemia, or pneumonia. Malignancy causing anatomical obstruction of the respiratory tree may create progressive dyspnea which develops over months to years. Past diagnoses for causes of dyspnea (such as COPD or interstitial lung disease/pulmonary fibrosis), hospitalizations, response to treatments, and chart review of results of previous testing can also narrow the differential. Prematurely concluding, however, that a prior condition is responsible for the patient's current presentation is an example of several common forms of cognitive biases, "premature closure" and "diagnosis momentum," which can lead clinicians astray.[2]

Exam

Breathing Patterns

In addition to a focused lung exam, observation of breathing patterns can suggest a variety of conditions.[3] For example, clinicians may observe the ability of the patient to comfortably ambulate in the UC clinic and speak in full sentences. When anxiety is producing dyspnea, for instance, the patient may have normal or even-pressured speech and be restless or pacing in the exam room, whereas non-psychogenic causes often impair comfortable speech and movement. The use of the accessory muscles of respirations (indicated by retractions or nasal flaring) is ominous and may indicate impending respiratory failure. The Kussmaul respiratory pattern is characterized by fast, deep breaths that occur to compensate for severe metabolic acidosis as can be seen in diabetic ketoacidosis (DKA), sepsis, and renal failure.[4] Cheyne-Stokes respirations, rare in UC, are characterized by cyclic episodes of rapid breathing followed by a period of apnea and can be seen in patients with coma, severe strokes, and end-stage heart failure.[5,6] Prolonged expiratory phase suggests lower airway obstructive disease, like COPD or asthma.[7,8]

Chest Wall And Neck

The chest wall should be examined for signs of trauma as well as the pattern of rise and fall. The neck should be examined for masses which may compress the airway or tracheal deviation. Patients with an upper airway obstruction, such as a foreign object or severe airway swelling due to croup, epiglottitis, or abscesses, may have stridor, drooling and may be sitting in a "tripod" position to maintain airway patency.[9]

Lungs

Diffuse expiratory wheezing with decreased aeration suggests exacerbation of obstructive processes in patients with history of asthma, COPD, or chronic bronchitis, but can also be heard in heart failure.[7,8] Unilateral decreased breath sounds may be present with a pneumothorax or pleural effusion.[10]

Cardiovascular

The cardiovascular exam may reveal murmurs from valvular disease, gallop patterns of heart sounds suggestive of heart failure, or abnormal rate or rhythm, which may all cause a sense of dyspnea.[11]

Figure 1. ECG Changes Associated Associated with Dyspnea

Ischemic Changes	Arrhythmia	Sinus Tachycardia
ST-elevation or depression or T-wave inversion/flattening: Suggestive of acute myocardial ischemia, especially if present in contiguous leads. **Wellens' syndrome:** Inverted or biphasic T waves in V2-V3 (may extend to V1-6) which indicates critical stenosis in the left anterior descending coronary artery.[15,16] **de Winter T-Wave pattern:** Tall, prominent, symmetrical T waves in precordial leads with upsloping ST-segment depression, an absence of ST elevation in precordial leads, and reciprocal ST-segment elevation in aVR.[17] This pattern is an anterior ST-elevation myocardial (STEMI) equivalent.[15]	**Heart block:** Conduction delays through the atrioventricular (AV) node resulting in significant bradycardia can occasionally cause dyspnea.[18] **Atrial fibrillation:** Dyspnea is a frequently presenting symptom reported in patients with atrial fibrillation.[19] **Supraventricular tachycardia (SVT):** Dyspnea, present in nearly 40% of cases, is the third most common presenting symptom in patients with paroxysmal SVT.[20,21]	While highly non-specific, sinus tachycardia is the most common ECG finding in pulmonary embolism (PE) and is seen in 44% of cases. The S1-Q3-T3 pattern is more specific for right heart strain and PE but is less commonly seen.[22]

Right Axis Deviation	Low Voltage/Electrical Alternans
This is suggestive of right heart strain and can be seen in COPD, PE, pulmonary hypertension. Right ventricular hypertrophy, resulting from chronic right heart strain can present with "Lead I sign" (the presence of a near-isoelectric P wave with QRS amplitude < 1.5 mm and T wave amplitude < 0.5 mm in lead I).[23,24]	Low voltage is non-specific and can be associated with hyperinflation (eg, COPD/asthma) and thick chest wall from large habitus. When patients have dyspnea, pleural or pericardial effusions are important considerations. If pericardial tamponade is present, electrical alternans may be seen.[25]

Abdominal

Abdominal exam may demonstrate liver enlargement or hepatojugular reflux which is suggestive of volume overload/heart failure. A distended abdomen from ascites, constipation, or bowel obstruction may cause dyspnea by limiting diaphragmatic excursion.[11]

Extremities

Bilateral lower extremity edema can suggest heart failure, whereas unilateral extremity swelling in a patient with dyspnea should raise concern for deep vein thrombosis (DVT) and concomitant pulmonary embolism (PE).[12]

Testing

The testing most readily available in the UC setting includes chest radiography (CXR) and electrocardiogram (ECG) as well as pulse oximetry, point-of-care (POC) blood glucose, and possibly blood laboratory testing (either immediately available via POC testing or as rapid send-outs to an affiliated lab). The use of bedside ultrasonography (ie, point-of-care ultrasound [POCUS]) has also been shown to improve diagnostic accuracy in the evaluation of patients with undifferentiated dyspnea, if available.[13]

Chest Radiography

CXR is routinely available in UC and can demonstrate suggestive findings in cases of pneumonia, pneumothorax, pulmonary edema, heart failure, or malignancy. Chronic conditions, such as COPD, also have associated findings of hyperinflation such as flattened diaphragms, "dark" lungs from destruction of lung parenchyma, and enlarged retrosternal space (on lateral views).[14]

Electrocardiogram

Many ECG findings can be suggestive of a concerning diagnosis, however, conversely, patients with dangerous etiologies for dyspnea may also have a normal ECG. **Figure 1** reviews ECG findings to evaluate, which can offer clues to a patient's dyspnea.

Finger-Stick Glucose Measurement

Dyspnea may be a presenting symptom in patients with DKA. Kussmaul respirations may be experienced as dyspnea when patients are compensating for metabolic acidosis. A capillary blood glucose is usually an appropriate screening test, although euglycemic DKA can occur, and it is important to note that in cases of high clinical suspicion, DKA must still be considered even without severe hyperglycemia.[26]

Table 2. POCUS Findings[13]

Ultrasound Finding	Finding Description	Clinical Finding
A-lines	Pleural reflection artifact of horizontal lines	Normal lung inflation
Lung Sliding	Pleural sliding with inspiration/expiration	Normal lung inflation/No pneumothorax
B-lines	Vertical lines arising from the pleura	Intraparenchymal fluid/pulmonary edema
Hepatization/consolidation	Dense lung tissue resembling hepatic tissue	Pneumonia
Pleural effusion	Extra-parenchymal fluid	Heart failure, parapneumonic effusions, malignancies
Right ventricular bowing/failure	Enlarged right ventricle or collapsed on cardiac ultrasound	Pulmonary embolism
McConnell's Sign	Right ventricle free wall hypokinesis	Pulmonary embolism

Pulse Oximetry

Pulse oximeters measure the oxygen concentration via detection of hemoglobin saturation within the blood. Most manufacturers claim accuracy within 3% of the actual value. Oxygen saturations below 88-90% define hypoxemia and suggest that patients require supplemental oxygen to maintain adequate oxygen delivery to tissues.[27] Patients with new hypoxemia generally require hospital admission and benefit from emergent referral to the emergency department (ED). This is typically most safely accomplished by activating emergency medical services (EMS) as such patients require monitoring and supplemental oxygen while awaiting more definitive evaluation and treatment.

It is important to note that inaccurate readings are common with pulse oximeter devices, particularly if wave form monitoring is unavailable. Frequent causes of falsely abnormal fingertip pulse oximeter readings include poor perfusion/cold extremities, darker skin tones, and nail polish.[28] Placing concerning oximetry readings within the patient's overall clinical context and using alternate sites of measurement (eg, alternate hand, ear lobes, forehead) can minimize likelihood of inappropriate interpretation of false results.

Point-of-Care Ultrasound

Although many UC centers currently do not have access to bedside ultrasound (ie, POCUS), it is frequently utilized in the inpatient and ED setting and can provide abundant information helpful for narrowing the differential diagnoses for undifferentiated dyspnea. POCUS has been shown to improve diagnostic accuracy when compared to standard clinical pathways alone in the assessment of dyspnea.[29,30,31] **Table 2** summarizes important POCUS findings related to the evaluation of dyspnea and their associated significance.

Airway

Dyspnea associated with drooling and/or stridor is suggestive of upper airway involvement. This can be identified with simple observation and does not require lung auscultation. Airway compromise is important to identify quickly to prevent delays in EMS activation. Airway obstruction may progress rapidly, making definitive airway management (eg, intubation or surgical airway options) more challenging for the emergency clinicians and risky for the patient.

Many different conditions can create obstruction in the upper airways. Important considerations for airway causes for UC clinicians to include in the differential diagnosis are as follows:

- **Foreign body aspiration** often occurs in toddlers and young children when placing objects such as small toys, coins, and beads in their mouths. Certain foods such as small nuts and berries are not recommended in this age range due to aspiration risks. Foreign body obstruction from aspiration is far less common in adults. Imaging with chest and neck radiographs can assist with localizing radiopaque foreign bodies, such as coins, but are less sensitive for identifying aspirated organic material.[32]
- **Peritonsillar abscess (PTA) or retropharyngeal abscess (RPA)** may cause upper airway compromise in severe cases. Oropharyngeal abscesses present more insidiously over days and typically are associated with fever, sore throat, dysphagia, trismus, muffled speech ("hot potato voice"), unilateral peritonsillar or posterior pharyngeal erythema, and swelling. RPA is predominantly a disease of childhood. In patients with PTA, significant uvula deviation is an ominous finding and portends greater risk of impending airway compromise.[33]
- **Oropharyngeal aspiration** commonly occurs secondary to dysphagia and should be suspected in

patients with previous cerebral vascular accident, neuromuscular disorders (eg, myasthenia gravis), or dementia. Onset of dyspnea usually occurs seconds to minutes after aspiration. A CXR may demonstrate opacities consistent with pneumonitis. Antibiotics are not indicated for aspiration alone without signs of pneumonia (eg, fever, progressive cough, etc.).[34]

- **Angioedema** results from the leaking of fluid from the vasculature into an interstitial space and may be mediated by histamine or bradykinin.[35] Angioedema is among the most common allergic disorders requiring hospitalization.[36] Drug induced angioedema is most commonly related to ACE inhibitors (ACEi) and, to a lesser extent, angiotensin receptor blockers and can develop at any time during treatment but most commonly will occur within the first week of use.[37] Affected patients present with external face, lips, mouth, throat, or extremities affected. Both hereditary angioedema and ACEi related angioedema can rapidly progress to airway compromise requiring intubation.[38] The most appropriate treatment of angioedema is determined by the underlying cause. Prompt referral to the ED is recommended for severe or progressive cases where the airway is at risk of compromise.[39] Imaging and labs are not required, and the diagnosis of angioedema is entirely based on characteristic exam findings.
- **Epiglottitis** historically was caused most commonly by *Haemophilus influenzae (H. flu)* in children, however, with the advent of vaccination against *H. flu,* the demographics of the illness have shifted towards adulthood. Patients with epiglottitis often present with fever, a muffled voice, low-pitched stridor, and dyspnea.[32] Lateral neck radiographs may demonstrate inflammation of the epiglottis, including the classic "thumbprint" sign, but are insensitive and should not delay referral to the ED via EMS when epiglottitis is suspected. Diagnosis is confirmed via laryngoscopic visualization of the epiglottis in a controlled setting.[40]
- **Croup** is usually seen in young children during the fall and winter months related to viral URI and can present with dyspnea and stridor as well a "barky" or "seal-like" cough. Croup is diagnosed clinically, and treatment consists of systemic corticosteroids, typically dexamethasone, in all cases. Inhaled nebulized racemic epinephrine has been shown to have short term symptomatic benefits in moderate to severe croup (ie, patients with consistent stridor).[41] Hot steam and humidified air have not been shown to offer significant benefit.[42] However, the long-held wisdom of cold air relieving symptoms of croup has limited evidence to support its adjunctive role.[42]
- **Vocal cord dysfunction** can mimic upper airway disease. Symptoms include periodic noisy breathing, dyspnea, and cough. It is a diagnosis of exclusion and should be suspected when a patient has refractory symptoms despite appropriate treatments. Triggers include airborne irritants, physical exertion, psychologic conditions, rhinosinusitis, gastroesophageal reflux disease, and certain medications. Definitive diagnosis is via endoscopic evaluation.[43]

Pulmonary

Chronic obstructive lung diseases are a spectrum of disease states including asthma, chronic bronchitis, and emphysema. Patients with obstructive lung disease exacerbations present with end-expiratory wheezing, cough, and dyspnea.[7]

- **Asthma** is generally experienced in young adults and adolescents who have typically not been exposed to chronic parenchymal destruction and generally present with discrete flares related to environmental triggers, allergens, or respiratory infections. Asthma exacerbations are often more acute than COPD.[44]
- **COPD** is generally experienced in older patients with prolonged smoking history of greater than 30 years and presents with dyspnea, sputum production, and cough secondary to emphysema or chronic bronchitis. Onset is gradual with exacerbations linked to infectious etiologies, allergic, or idiopathic. Physical exam findings will show patients in mild-moderate distress, end-expiratory wheezing, and cough. Clinicians may see chronic changes of COPD on CXR such as hyperinflation.[8] COPD is a frequent cause of UC visits and hospitalizations. Patients suffering from more severe disease are at a high risk of mortality and recurrent hospital admission.[45] Treatments of obstructive lung disease flares are similar regardless of underlying etiology and include a combination of short-acting bronchodilators via inhaler or nebulizer and corticosteroid.[46] Unlike the treatment of asthma exacerbation, antibiotics have been shown to decrease the severity and associated risks of COPD exacerbation.[47]
- **Pneumonia** is an infectious process of one or both

lungs. Onset is typically gradual over several days. Pneumonia is a clinical diagnosis consisting of suggestive symptoms, such as productive cough and fever, and clinical signs, like tachypnea and abnormal breath sounds. A CXR, while not perfectly sensitive, may show variable types of infiltrates depending on the etiology. In addition to bacterial infections, fungal and viral etiologies as well as tuberculosis warrant consideration.[48] The 2019 American Thoracic Society and Infectious Disease Society of America guidelines recommend antibiotic selection based on the likely pathogens. Patients without recent hospitalization or other risk factors for healthcare-associated pneumonia should be treated with antibiotics according to guidelines for community-acquired pneumonia. Antibiotic selection should also be driven by patients' underlying co-morbidities.[34]

- **PE** is a cause of dyspnea that warrants consideration given its heterogenous manner of presentation and relatively high associated morbidity and mortality. Symptoms and signs suggestive of PE include tachycardia, tachypnea, cough, hemoptysis, and dyspnea. Risk calculators such as the Wells score and Pulmonary Embolism Rule Out Criteria (PERC) rule have been validated to risk stratify patients when PE is considered. If the patient is PERC-negative in UC, generally no further testing for PE is needed, however, caution should be advised in such cases if no alternate cause of dyspnea can be determined.[49] D-dimer, which is rarely immediately available in the UC setting, can be used to exclude PE in low- and moderate-risk patients. In high-risk patients, computed tomography angiography of the pulmonary arteries is recommended to confirm or exclude the diagnosis.[50]
- **PTX** occurs when air becomes trapped in the pleural space. Classically, presentation is a sudden, sharp, ipsilateral, pleuritic pain with associated dyspnea. Patients are typically at rest during the occurrences, which may occur after blunt or penetrating chest trauma or spontaneously.[10] Auscultation may reveal decreased or absent breath sounds. CXR is less sensitive than ultrasound or computed tomography for PTX but can demonstrate a lack of peripheral lung markings and a visible edge of the visceral pleura.[51] When PTX is identified in UC, patients should be referred to an ED immediately, however, for a small PTX in a clinically stable patient, EMS activation may be unnecessary. Depending on the size and severity of symptoms, recent evidence has shown that small pneumothoraces (< 2 cm on CXR or < 32% of ipsilateral lung field on CXR) do not benefit from tube thoracostomy and can be monitored with serial radiography.[52,53]

Cardiac

Cardiac causes of dyspnea include congestive heart failure (CHF), acute coronary syndrome (ACS), pericarditis with pericardial effusion, cardiac valvular disease, and cardiac dysrhythmia.

- **CHF and CHF exacerbations** are common cardiac causes of dyspnea. Nearly all patients with CHF will report some degree of dyspnea. Other less universal CHF symptoms include orthopnea, paroxysmal nocturnal dyspnea, and peripheral swelling. Physical exam findings suggestive of CHF include extra heart sounds (ie, gallop), rales, jugular distension, and pitting edema of the lower extremities.[54] CXR may show pulmonary edema and/or pleural effusions, which may contribute to dyspnea. In addition to clinical findings, an elevated B-natriuretic peptide laboratory value is suggestive of the diagnosis, which can be confirmed by echocardiography.[55]
- **ACS** can present with significant dyspnea. While ACS most commonly is associated with chest pain as well, it may occur without chest pain/discomfort in women, diabetics and the elderly.[56] In patients who are dyspneic from a suspected cardiac etiology, rapid ECG is critical for risk stratification. Suggestive ECG findings for coronary occlusion/ischemia include ST-T wave abnormalities. Comparison with a prior ECG is highly valuable, when available.[15] **Figure 1** represents many ECG findings in patients who present with dyspnea.
- **Pericarditis, pericardial effusion, and tamponade** may all present with dyspnea. Pericarditis most commonly presents with sharp, pleuritic chest pain; improvement in the pain with leaning forward is also suggestive of the diagnosis. Pericarditis with effusion can occur after viral infections, but also can be related to autoimmune disease, renal failure, or malignancy.[57] Dyspnea associated with pericarditis should raise concern for pericardial effusion and pericardial tamponade. Signs of pericardial tamponade include tachycardia, hypotension, jugular venous distension, and pulsus paradoxus. If tamponade is present, the ECG may demonstrate electrical alternans and a low QRS voltage, but a normal ECG does not exclude the

diagnosis.[57] While not widely available in UC, POCUS is particularly helpful for ruling out pericardial effusion. Cases of symptomatic pericardial effusion are treated with decompression via pericardiocentesis or pericardial window.[58] Patients with pericarditis without significant effusion can be managed with non-steroidal anti-inflammatory drugs or colchicine as outpatients.[59,60]

- **Valvular heart disease** represents a broad category of disorders. Among the valvular disorders aortic stenosis (AS) and mitral regurgitation (MR) are most commonly associated with complaints of dyspnea. In AS, patients may demonstrate pulsus parvus et tardus, crescendo-decrescendo systolic murmur, and left ventricular hypertrophy on ECG. MR, on the other hand, causes a diastolic murmur. Valvular disorders are identified and scored in severity on echocardiogram. Both AS and MR have significant associated morbidity and mortality if untreated.[61] In recent decades, the advent of intravascular approaches to valvular heart procedures have allowed for many more patients than previously to be considered candidates for valve repair or replacement.[61]

Systemic

Dyspnea may be experienced by patients as a result of systemic illness, especially those that result in disruption of pH, predominantly in cases of metabolic acidosis, and/or impairment of oxygen delivery to the tissues.[62] Patients with these conditions will increase their respiratory rate in an effort to compensate for the underlying derangement.[63]

When tachypnea is identified, etiologies of metabolic acidosis should be considered including uremia (eg, renal failure), lactic acidosis (eg, sepsis and other forms of shock or salicylate poisoning), or ketoacidosis (eg, diabetes).[64] Anemia is a well-established cause of dyspnea via the compromised ability of the blood to transport and deliver oxygen to the tissues.[65,66] While the severity of anemia required to cause dyspnea is variable and without the existence of well-defined cut-offs, it has been demonstrated that the more severe the anemia the more likely a patient is to be dyspneic.[67] Physical exam as a non-specific method by which anemia can be assessed with patients often appearing pale. Conjunctiva pallor is useful to assess for presence of anemia with one study showing it can often rule out significant anemia.[67]

Central

Acute central causes of dyspnea can be seen in psychogenic disorders such as anxiety, panic disorders, and post-traumatic stress disorder as well as in primary central-nervous system disorders.

Psychogenic disorders may present with dyspnea, though this can also occur with medical conditions as well.[68] The diagnosis of these conditions is clinical, requiring a thorough history taking and physical examination as laboratory testing and imaging are non-diagnostic and reserved for ruling out alternative underlying conditions.[69] Patient's describing episodes of rapid breathing associated with specific behavioral triggers, such as certain social interactions, may be important clinical clues.[70]

High-altitude periodic breathing presents with dyspnea characterized by alternating periods of apnea and hypopnea followed by hyperventilation and is encountered more frequently at higher elevations and in patient's completing more rapid ascents.[71] This Cheyne-Stokes breathing pattern can also be seen in terminal/end-stage congestive heart failure.[4,71]

Conclusion

While the causes of dyspnea are broad, many patients who complain of shortness of breath can be adequately assessed and triaged in the UC setting. The systems-based framework of categorizing the differential for patients with dyspnea presented in this article offers a simple and easy-to-apply tool for UC practice. For many conditions, definitive treatment and/or reassurance in UC is appropriate after a thorough clinical evaluation and consideration of the broad list of differential diagnoses outlined herein. Despite the limited available diagnostic capabilities, many patients can be adequately risk stratified with clinical assessment and the POC diagnostic tools available in UC such that discharge home with appropriate follow-up and return precautions is safe and reasonable. Therefore, it is important for UC clinicians to develop comfort with systematically reviewing the differential diagnoses that may lead to complaints of shortness of breath to both avoid over-testing lower risk patients and misdiagnosing the rarer "can't miss" presentations. ■

Manuscript submitted January 21, 2024; accepted May 6, 2024.

References

1. von Leupoldt A, Balewski S, Petersen S, et al. Verbal descriptors of dyspnea in patients with COPD at different intensity levels of dyspnea. *Chest*. 2007;132(1):141-147. doi:10.1378/chest.07-0103 + Scano G, Stendardi L, Grazzini M. Understanding dyspnoea by its language. *Eur Respir J*. 2005;25(2):380-385. doi:10.1183/09031936.05.00059404)

2. Croskerry P. Achieving quality in clinical decision making: cognitive strategies and detection of bias. *Acad Emerg Med*. 2002 Nov;9(11):1184-204. doi:

10.1111/j.1553-2712.2002.tb01574.x. PMID: 12414468. (Accessed 12/10/23)
3. Morgan W C, Hodge H L . 1998, February 15. Diagnostic evaluation of Dyspnea. *Am Fam Physician*. Accessed at https://www.aafp.org/pubs/afp/issues/1998/0215/p711.html#afp19980215p711-b2 (Accessed 1/5/24)
4. Shahid W, Khan F, Makda A, Kumar V, Memon S, Rizwan A. Diabetic Ketoacidosis: Clinical Characteristics and Precipitating Factors. *Cureus*. 2020 Oct 04;12(10):e10792. (Accessed 12/10/23)
5. Yamaoka-Tojo M. Is It Possible to Distinguish Patients with Terminal Stage of Heart Failure by Analyzing Their Breathing Patterns? *Int Heart J*. 2018;59(4):674-676. (Accessed 12/10/23)
6. Kim Y, Kim S, Ryu DR, Lee SY, Im KB. Factors Associated with Cheyne-Stokes Respiration in Acute Ischemic Stroke. *J Clin Neurol*. 2018 Oct;14(4):542-548. (Accessed 12/11/23)
7. Wise R. Chronic obstructive pulmonary disease (COPD) - pulmonary disorders. Merck Manual Professional Edition. https://www.merckmanuals.com/professional/pulmonary-disorders/chronic-obstructive-pulmonary-disease-and-related-disorders/chronic-obstructive-pulmonary-disease-copd
8. Ruvuna L, Sood A. Epidemiology of Chronic Obstructive Pulmonary Disease. *Clin Chest Med*. 2020 Sep;41(3):315-327. doi: 10.1016/j.ccm.2020.05.002. PMID: 32800187.
9. Hammer J. 2004. Acquired upper airway obstruction. *Paediatric Respiratory Reviews*, *5*(1), 25-33.
10. Hallifax RJ, Goldacre R, Landray MJ, Rahman NM, Goldacre MJ. Trends in the Incidence and Recurrence of Inpatient-Treated Spontaneous Pneumothorax, 1968-2016. *JAMA*. 2018 Oct 9;320(14):1471-1480. doi: 10.1001/jama.2018.14299. PMID: 30304427; PMCID: PMC6233798.
11. Maganti K, Rigolin VH, Sarano ME, Bonow RO. Valvular heart disease: diagnosis and management. *Mayo Clin Proc*. 2010;85(5):483-500. doi:10.4065/mcp.2009.0706
12. Kahn, S. R. (1998). The clinical diagnosis of deep venous thrombosis. *Archives of Internal Medicine*, *158*(21), 2315. https://doi.org/10.1001/archinte.158.21.2315
13. Qaseem A, Alguire P, Dallas P, et al. Appropriate Use of Point-of-Care Ultrasonography in Patients With Acute Dyspnea in Emergency Department or Inpatient Settings: A Clinical Guideline From the American College of Physicians. *Ann Intern Med*. Published online April 27, 2021. Accessed January 5, 2024. doi:10.7326/M20-7844.
14. Cardinale L, Volpicelli G, Lamorte A, Martino J; Andrea Veltri. Revisiting signs, strengths and weaknesses of Standard Chest Radiography in patients of Acute Dyspnea in the Emergency Department. *J Thorac Dis*. 2012 Aug;4(4):398-407. doi: 10.3978/j.issn.2072-1439.2012.05.05. PMID: 22934143; PMCID: PMC3426742.
15. Writing Committee, Kontos MC, de Lemos JA, et al. 2022 ACC Expert Consensus Decision Pathway on the Evaluation and Disposition of Acute Chest Pain in the Emergency Department: A Report of the American College of Cardiology Solution Set Oversight Committee. *J Am Coll Cardiol*. 2022;80(20):1925-1960. doi:10.1016/j.jacc.2022.08.750
16. Coutinho Cruz M, Luiz I, Ferreira L, Cruz Ferreira R. Wellens' Syndrome: A Bad Omen. Cardiology. 2017;137(2):100-103. doi:10.1159/000455911. Accessed December 28, 2023.
17. Littmann L. (The Dressler - de Winter sign of acute proximal LAD occlusion. *Journal of Electrocardiology*. 2018;51(1), 138–139. https://doi.org/10.1016/j.jelectrocard.2017.08.024. Accessed 1/12/24.
18. Williams S. A 62-year-old woman with dizziness and palpitations. *J Urgent Care Med*. Published August 29, 2018. Accessed March 22, 2024. Available from: https://www.jucm.com/62-year-old-woman-dizziness-palpitations/
19. Paulus Kirchhof, Stefano Benussi, Dipak Kotecha, et al. 2016 ESC Guidelines for the management of atrial fibrillation developed in collaboration with EACTS. *Eur Heart J*. 2016;37(38):2893-2962. doi:10.1093/eurheartj/ehw210.
20. Yetkin E, Ozturk S, Cuglan B, Turhan H. Clinical presentation of paroxysmal supraventricular tachycardia: evaluation of usual and unusual symptoms. *Cardiovasc Endocrinol Metab*. 2020 May 15;9(4):153-158. doi: 10.1097/XCE.0000000000000208. PMID: 33225230; PMCID: PMC7673777.
21. Colucci RA, Silver MJ, Shubrook J. Common types of supraventricular tachycardia: Diagnosis and management. A*m Fam Physician*. Published online October 15, 2010. Accessed from https://www.aafp.org/pubs/afp/issues/2010/1015/p942.html.
22. Ullman, E., Brady, W. J., Perron, A. D., Chan, T., Mattu, A. Electrocardiographic manifestations of pulmonary embolism. *Am J Emergency Med*. 2001;*19*(6), 514-519.
23. Goudis CA, Konstantinidis AK, Ntalas IV, Korantzopoulos P. Electrocardiographic abnormalities and cardiac arrhythmias in chronic obstructive pulmonary disease. I*nt J Cardiol*. 2015;199:264-273.
24. Gupta P, Jain H, Gill M, Bharaj G, Khalid N, Chaudhry W, Chhabra L. Electrocardiographic changes in Emphysema. World J Cardiol. 2021 Oct 26;13(10):533-545. doi: 10.4330/wjc.v13.i10.533. PMID: 34754398; PMCID: PMC8554360.
25. Jesper K. Jensen, Steen Hvitfeldt Poulsen. Cardiac tamponade: A clinical challenge. European Society of Cardiology. https://www.escardio.org/Journals/E-Journal-of-Cardiology-Practice/Volume-15/Cardiac-tamponade-a-clinical-challenge. Accessed 3/23/24.
26. Nasa P, Chaudhary S, Shrivastava PK, Singh A. Euglycemic diabetic ketoacidosis: A missed diagnosis. *World J Diabetes*. 2021 May 15;12(5):514-523. doi: 10.4239/wjd.v12.i5.514. PMID: 33995841; PMCID: PMC8107974.
27. Chan, E. D., Chan, M. M., Chan, M. M. Pulse oximetry: understanding its basic principles facilitates appreciation of its limitations. *Respiratory Med*. 2013; 107(6), 789–799. https://doi.org/10.1016/j.rmed.2013.02.004. Accessed 12/26/23.
28. Silverston P, Ferrari M, Quaresima V. Pulse oximetry in primary care: factors affecting accuracy and interpretation. *Br J Gen Pract*. 2022 Feb 24;72(716):132-133. doi: 10.3399/bjgp22X718769. PMID: 35210248; PMCID: PMC8884444.
29. Gerald Gartlehner, Gernot Wagner, Lisa Affengruber, et al. Point-of-Care Ultrasonography in Patients With Acute Dyspnea: An Evidence Report for a Clinical Practice Guideline by the American College of Physicians. *Ann Intern Med*.2021;174:967-976. Epub 27 April 2021. doi:10.7326/M20-5504. Accessed 3/23/24.
30. Murali A, Prakash A, Dixit R, Juneja M, Kumar N. Lung ultrasound for evaluation of dyspnea: a pictorial review. *Acute Crit Care*. 2022 Nov;37(4):502-515. doi: 10.4266/acc.2022.00780. Epub 2022 Nov 21. PMID: 36480902; PMCID: PMC9732207. Accessed 3/23/24.
31. Sosland, Rachel P., and Kamal Gupta. "McConnell's sign." *Circulation*, vol. 118, no. 15, 7 Oct. 2008, https://doi.org/10.1161/circulationaha.107.746602. Accessed 3/23/24
32. Pfleger A, Eber E. Management of acute severe upper airway obstruction in children. *Paediatr Respir Rev*. 2013 Jun;14(2):70-7. doi: 10.1016/j.prrv.2013.02.010. Epub 2013 Apr 16. PMID: 23598067. Accessed 12/26/23
33. Jenkins IA, Saunders M. Infections of the airway. Paediatr Anaesth. 2009 Jul;19 Suppl 1(Suppl 1):118-30. doi: 10.1111/j.1460-9592.2009.02999.x. PMID: 19572851; PMCID: PMC7168042. Accessed 12/26/23
34. Metlay JP, Waterer GW, Long AC, Anzueto A, Brozek J, Crothers K, Cooley LA, Dean NC, Fine MJ, Flanders SA, Griffin MR, Metersky ML, Musher DM, Restrepo MI, Whitney CG. Diagnosis and Treatment of Adults with Community-acquired Pneumonia. An Official Clinical Practice Guideline of the American Thoracic Society and Infectious Diseases Society of America. *Am J Respir Crit Care Med*. 2019 Oct 1;200(7):e45-e67. doi: 10.1164/rccm.201908-1581ST. PMID: 31573350; PMCID: PMC6812437.
35. Depetri F, Tedeschi A, Cugno M. Angioedema and emergency medicine: From pathophysiology to diagnosis and treatment. *Eur J Intern Med*. 2019 Jan;59:8-13. doi: 10.1016/j.ejim.2018.09.004. Epub 2018 Sep 13. PMID: 30220453. Accessed 1/9/24
36. Lin RY, Cannon AG, Teitel AD. Pattern of hospitalizations for angioedema in New York between 1990 and 2003. *Ann Allergy Asthma Immunol*. 2005 Aug;95(2):159-66. doi: 10.1016/S1081-1206(10)61206-9. PMID: 16136766. Accessed 1/9/24
37. Brown T, Gonzalez J, Monteleone C. Angiotensin-converting enzyme inhibitor-induced angioedema: A review of the literature. *J Clin Hypertens* (Greenwich). 2017 Dec;19(12):1377-1382. doi: 10.1111/jch.13097. Epub 2017 Oct 10. PMID: 28994183; PMCID: PMC8031276. Accessed 1/8/24
38. Kazandjieva J, Christoff G. Angioedema as a systemic disease. *Clin Dermatol*. 2019;37(6):636-643. doi:10.1016/j.clindermatol.2019.07.035 Accessed 12/27/23
39. Macy E. Practical Management of New-Onset Urticaria and Angioedema Presenting in Primary Care, Urgent Care, and the Emergency Department. *Perm J*. 2021 Nov 22;25:21.058. doi: 10.7812/TPP/21.058. PMID: 35348101; PMCID: PMC8784078.
40. Isakson M, Hugosson S. Acute epiglottitis: epidemiology and Streptococcus pneumoniae serotype distribution in adults. *J Laryngol Otol*. 2011;125(4):390-393. doi:10.1017/S0022215110002446
41. Johnson DW. Croup. BMJ Clin Evid. 2014 Sep 29;2014:0321. PMID: 25263284; PMCID: PMC4178284. Accessed 12/28/23
42. Siebert JN, Salomon C, Taddeo I, Gervaix A, Combescure C, Lacroix L. Outdoor Cold Air Versus Room Temperature Exposure for Croup Symptoms: A Randomized Controlled Trial. *Pediatrics*. 2023;152(3):e2023061365. doi:10.1542/peds.2023-061365
43. Deckert J, Deckert L. Vocal cord dysfunction. *Am Fam Physician*. Published online January 15, 2010. Accessed from https://www.aafp.org/pubs/afp/issues/2010/0115/p156.html. Accessed January 6, 2024.
44. Dharmage SC, Perret JL, Custovic A. Epidemiology of Asthma in Children and Adults. Front Pediatr. 2019 Jun 18;7:246. doi: 10.3389/fped.2019.00246. PMID: 31275909; PMCID: PMC6591438.
45. Lindenauer PK, Dharmarajan K, Qin L, Lin Z, Gershon AS, Krumholz HM. Risk Trajectories of Readmission and Death in the First Year after Hospitalization for Chronic Obstructive Pulmonary Disease. Am J Respir Crit Care Med. 2018 Apr 15;197(8):1009-1017. doi: 10.1164/rccm.201709-1852OC. PMID: 29206052; PMCID: PMC5909167.
46. Leuppi JD, Schuetz P, Bingisser R, et al. Short-term vs Conventional Glucocorticoid Therapy in Acute Exacerbations of Chronic Obstructive Pulmonary Disease: The REDUCE Randomized Clinical Trial. *JAMA*. 2013;309(21):2223–2231. doi:10.1001/jama.2013.5023
47. Siddiqi A, Sethi S. Optimizing antibiotic selection in treating COPD exacerbations. *Int J Chron Obstruct Pulmon Dis*. 2008;3(1):31-44. doi: 10.2147/copd.s1089.

PMID: 18488427; PMCID: PMC2528209.
48. Htun TP, Sun Y, Chua HL, Pang J. Clinical features for diagnosis of pneumonia among adults in primary care setting: A systematic and meta-review. *Sci Rep*. 2019 May 20;9(1):7600. doi: 10.1038/s41598-019-44145-y. PMID: 31110214; PMCID: PMC6527561.
49. Kline JA, Courtney DM, Kabrhel C, et al. Prospective multicenter evaluation of the pulmonary embolism rule-out criteria. *J Thromb Haemost*. 2008;6(5):772-780. doi:10.1111/j.1538-7836.2008.02944.x
50. Freund Y, Cohen-Aubart F, Bloom B. Acute Pulmonary Embolism: A Review. *JAMA*. 2022 Oct 4;328(13):1336-1345. doi: 10.1001/jama.2022.16815. PMID: 36194215.
51. Noppen M. Spontaneous pneumothorax: epidemiology, pathophysiology and cause. *Eur Respir Rev*. 2010 Sep;19(117):217-9. doi: 10.1183/09059180.00005310. PMID: 20956196; PMCID: PMC9487279.
52. Brown SGA, et al. Conservative versus Interventional Treatment for Spontaneous Pneumothorax. *N Engl J Med*. 2020 Jan 30;382(5):405-415
53. MacDuff A, Arnold A, Harvey J; BTS Pleural Disease Guideline Group. Management of spontaneous pneumothorax: British Thoracic Society Pleural Disease Guideline 2010. Thorax. 2010 Aug;65 Suppl 2:ii18-31. doi: 10.1136/thx.2010.136986. PMID: 20696690.
54. Jessup, M., & Brozena, S. (2003). Heart failure. *New England Journal of Medicine*, *348*(20), 2007–2018. https://doi.org/10.1056/nejmra021498
55. Inamdar AA, Inamdar AC. Heart Failure: Diagnosis, Management and Utilization. *J Clin Med*. 2016 Jun 29;5(7):62. doi: 10.3390/jcm5070062. PMID: 27367736; PMCID: PMC4961993.
56. Brieger D, Eagle KA, Goodman SG, Steg PG, Budaj A, White K, Montalescot G; GRACE Investigators. Acute coronary syndromes without chest pain, an underdiagnosed and undertreated high-risk group: insights from the Global Registry of Acute Coronary Events. *Chest*. 2004 Aug;126(2):461-9. doi: 10.1378/chest.126.2.461. PMID: 15302732.
57. Imazio, M., Gaita, F., LeWinter, M. Evaluation and treatment of pericarditis. *JAMA*. 2015; *314*(14), 1498. https://doi.org/10.1001/jama.2015.12763
58. Roy CL, Minor MA, Brookhart MA, Choudhry NK. Does this patient with a pericardial effusion have cardiac tamponade? *JAMA*. 2007 Apr 25;297(16):1810-8. doi: 10.1001/jama.297.16.1810. PMID: 17456823.
59. Adler Y, Charron P, Imazio M, et al. 2015 ESC Guidelines for the diagnosis and management of pericardial diseases: The Task Force for the Diagnosis and Management of Pericardial Diseases of the European Society of Cardiology (ESC)Endorsed by: The European Association for Cardio-Thoracic Surgery (EACTS). *Eur Heart J*. 2015;36(42):2921-2964. doi:10.1093/eurheartj/ehv318
60. Ismail TF. Acute pericarditis: Update on diagnosis and management. *Clin Med* (Lond). 2020 Jan;20(1):48-51. doi: 10.7861/clinmed.cme.20.1.4. PMID: 31941732; PMCID: PMC6964178.
61. Pittman RN. Regulation of Tissue Oxygenation. San Rafael (CA): Morgan & Claypool Life Sciences; 2011. Chapter 4, Oxygen Transport. Available from: https://www.ncbi.nlm.nih.gov/books/NBK54103/
62. Fenves AZ, Emmett M. Approach to Patients With High Anion Gap Metabolic Acidosis: Core Curriculum 2021. *Am J Kidney Dis*. 2021;78(4):590-600. doi:10.1053/j.ajkd.2021.02.341
63. Lactic acidosis. (2015). *New England Journal of Medicine*, *372*(11), 1076–1079. https://doi.org/10.1056/nejmc1500327
64. Boutou AK, Stanopoulos I, Pitsiou GG, Kontakiotis T, Kyriazis G, Sichletidis L, Argyropoulou P. Anemia of chronic disease in chronic obstructive pulmonary disease: a case-control study of cardiopulmonary exercise responses. *Respiration*. 2011;82(3):237-45. doi: 10.1159/000326899. Epub 2011 May 11. Erratum in: Respiration. 2011;82(6):521. PMID: 21576921.
65. Weckmann G, Kiel S, Chenot JF, Angelow A. Association of Anemia with Clinical Symptoms Commonly Attributed to Anemia-Analysis of Two Population-Based Cohorts. *J Clin Med*. 2023 Jan 24;12(3):921. doi: 10.3390/jcm12030921. PMID: 36769569; PMCID: PMC9918126.
66. Cote C, Zilberberg MD, Mody SH, Dordelly LJ, Celli B. Haemoglobin level and its clinical impact in a cohort of patients with COPD. *Eur Respir J*. 2007 May;29(5):923-9. doi: 10.1183/09031936.00137106. Epub 2007 Jan 24. PMID: 17251227.
67. Kalantri A, Karambelkar M, Joshi R, Kalantri S, Jajoo U. Accuracy and reliability of pallor for detecting anaemia: a hospital-based diagnostic accuracy study. *PLoS One*. 2010;5(1):e8545. Published 2010 Jan 1. doi:10.1371/journal.pone.0008545
68. American Psychiatry Association. Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, (DSM-5). 2013.
69. Kyriakoulis P, Kyrios M. Biological and cognitive theories explaining panic disorder: A narrative review. *Front Psychiatry*. 2023 Jan 30;14:957515. doi: 10.3389/fpsyt.2023.957515. PMID: 36793941; PMCID: PMC9924294.
70. Narat Srivali, Lauren Tobias, 1037 Central sleep apnea due to high altitude periodic breathing, *Sleep*, Volume 46, Issue Supplement. May 2023, Page A455, https://doi.org/10.1093/sleep/zsad077.1037
71. Andreas S, Hagenah G, Möller C, Werner GS, Kreuzer H. Cheyne-Stokes respiration and prognosis in congestive heart failure. *Am J Cardiol*. 1996;78(11):1260-1264.

Avoiding Common Pitfalls in Urgent Care Site Selection

Urgent Message: Location and accessibility are keys to success for any urgent care. Operators must avoid common pitfalls when evaluating a site for their next venture.

Alan A. Ayers, MBA, MAcc

Citation: Ayers, A. Avoiding Common Pitfalls in Urgent Care Site Selection. *J Urgent Care Med.* 2024; 18(9):22-25

Experience tells us that friendly service, competent providers, short wait times, and efficient operations drive long-term business success in urgent care. However, an urgent care center may never get the chance to deliver if it first undervalues the retail mantra of "location, location, location."

The physical home of an urgent care center is simultaneously a powerful marketing tool and passive traffic generator. All other metrics aside, a highly visible and easily accessible center in the right location will almost certainly outperform one that's less favorably positioned, particularly when a market is overcrowded with healthcare competition.

With this in mind, choosing the right location is perhaps the most important first step when starting or growing an urgent care business. Doing so, of course, is easier said than done. In fact, doing everything "right" on paper isn't always enough. Operators must navigate myriad pitfalls that don't appear in the data to ensure their location is ideally suited for long-term success.

What's In a Location?

Choosing the "right" location for an urgent care may seem like simple task at first. A well-maintained space in a well-populated neighborhood or business district sounds ideal. A former medical office that's already built out or a physician-entrepreneur's vacancy in a shopping center investment makes sense. However, today's competitive healthcare landscape necessitates a complex analysis of the location in terms of the prospective and its trade area.

Operators must evaluate the site's physical traits, such as proximity to high-traffic roads and visible signage, as well as drivers of patient utilization, such as characteristics of the surrounding population. Determining the extent of competition from other healthcare providers in the area is also essential.

More than Population Density

It goes without saying that a practice cannot survive if there are not enough people nearby to potentially access

Author affiliations: Alan A. Ayers, MBA, MAcc, is President of Experity Consulting and Senior Editor of *The Journal of Urgent Care Medicine.*

it. The number of people in a geography is referred to as "population density." But it's not just the presence of people that matters—it's the *presence of people you can serve* that matters.

Typically when looking at population density, we start by calculating the population per urgent care—the number of total people divided by the number of urgent cares in your target market. A higher number—preferably greater than 20,000—means less competition. Yet, as the number descends into saturation, it means the urgent care will have to "steal away" patients from existing centers rather than adding a service that hasn't previously existed. It takes far longer to change consumer behavior than to meet a need that has been lacking.

Opeators must also understand the population within that density. Urgent care utilization has historically been highest among working adults age 25-54, who receive health benefits from their jobs, who have rising and/or above average incomes, and who have school-aged children at home.

Competing Healthcare Locations

Even with a healthy patient population, an urgent care will struggle to succeed in a market that is already amply served by other healthcare providers. Therefore, operators must carefully evaluate the prevalence of competition in the area immediately surrounding their target location.

Clearly, this includes traditional urgent care centers. However, limited scope, orthopedic-focused, and pediatric urgent cares must also be accounted for. Private physicians and outpatient providers affiliated with local health systems must also be considered. Some patients may prefer to schedule a visit with their primary care provider when they need treatment for injury or illness rather than visiting urgent care.

When competition is present and it becomes necessary to "win" patients from the competition, site selection should create opportunities to out-position the competition through better signage visibility, a location that intercepts patients (thus cutting off the competitor), out-marketing and out-executing.

An Algorithmic Approach

By regressing urgent care visit data against market and site factors, models have been developed that "predict" urgent care performance for a location. But such models are packed with assumptions including that the hours, services, staffing, patient experience, in-network insurance, and all other operational factors will be similar to, if not better than, the sample set of centers from which the model was created. The more an operator deviates from the norm, the less predictive the model will be for their business case.

Understanding Patient Behavior Through Aggregated Cell Phone Data

In the United States, 97% of adults, age 18-49, own a smartphone.[1] Because smartphones have the ability to constantly track the user's location through GPS, cell tower triangulation, and public wi-fi, aggregated and anonymized cell phone data provides invaluable data as to patient movement. This data can be accessed via subscription and viewed in a mapping application (called a "geospatial platform") that incorporates data such as demographics, traffic counts, retailers and urgent care competitors.[2]

Cell phone data enhances site selection by understanding the actual "draw" of a retail zone (say, a strip mall anchored by a chain grocery) by mapping where visitors come from, how often they visit, how long they stay, and where they go afterward. Rather than assume patients live in 3-5 mile concentric circles around a point, more accurate analysis can be performed on a "polygon" that includes 85% of frequent visitors to an area.

Additionally, the data can illustrate the routes people travel to/from a location including days of week and time of day, enabling a new urgent care entrant to intercept the patients of other providers.

To counter privacy concerns, it's important to note that users only see anonymous aggregate data, and applications cannot connect a cellphone location with a specific consumer. The platforms also doesn't use the data it collects to advertise to consumers.

References:
1. Consumer Affairs website. How many Americans own a smartphone 2024. March 6, 2024. Accessed at https://www.consumeraffairs.com/cell_phones/how-many-americans-own-a-smartphone.html#:~:text=in%20the%20U.S.-,Age,and%20over%20own%20a%20smartphone.
2. University of Florida Warrington College of Business. Due Diligence. December 1, 2022. Accessed at https://warrington.ufl.edu/due-diligence/2022/12/01/mobile-location-data-is-reshaping-commercial-real-estate/

The Fallacy of 'Doing Everything Right'

Operators must understand that choosing a location for a new urgent care clinic is a delicate game—part science, part art. While doing the work to research a location and its population is essential, the results alone do not guarantee success. Choosing the right urgent care location goes beyond checking the boxes of the above metrics.

Incorrectly, many operators believe that finding a lo-

cation that meets patient volume and demographic criteria is a recipe for instant success. In reality, the process is far more nuanced. A clinic can struggle even when doing everything "right" on paper due to several significant pitfalls that are often overlooked. These can derail even the best-laid plans, and avoiding such pitfalls is crucial to the success of a new urgent care.

"It takes far longer to change consumer behavior than to meet a need that has been lacking."

Urgent Care Location Pitfalls to Avoid

Finding a prospective location that meets the recommended benchmarks for population size and the right demographics is elating. However, that doesn't mean the area is a suitable home for a new urgent care clinic.

The following pitfalls apply to all locations—including those appearing to be strong candidates by the numbers. Operators should be aware of these flaws and avoid locations where they are present.

Areas Lacking Adjacent Retail or Retail Synergy

The right neighbors can be a boon or barrier for urgent care success. Typically, retailers adjacent to a thriving clinic have high traffic volumes and longer visit times. In the "Amazon economy" the one surviving weekly shopping destination remains the local supermarket. Thus, a supermarket that attracts around 100,000 annual customers who shop for over a half hour would be an ideal neighbor. Such traffic suggests nearby visitors aren't just popping in and out. Perhaps more importantly, it indicates individuals and families frequent the location for personal shopping.

By contrast, a clinic in a strip mall surrounded by businesses like car dealerships, art galleries, or other infrequent "stop-and-go" locations won't draw as much interest or have as much exposure to potential patients.

As stated by the International Council of Shopping Centers (ICSC), patients won't alter their established behaviors to seek out your center. If a more convenient alternative is available, they'll often choose it. Urgent cares must meet patients where they are and make the decision to seek care both convenient and obivous.[1]

Too Much Medical Competition

As mentioned, any given area can only support a finite number of healthcare providers. If your target urgent care location is surrounded by too many other urgent cares, hospitals, primary care offices, or freestanding emergency rooms, it will be a struggle to ramp-up and maintain adequate patient volumes.

Patients are creatures of habit and usually don't want to risk trying something new when they're sick. The majority of patients won't change their behaviors to visit a new clinic unless it is overwhelmingly more convenient.

Physical and Psychological Barriers

Certain physical barriers weigh negatively on an otherwise favorable location. These include a high density of interstates, rivers, large expanses of undeveloped land, and any other artificial or natural feature that limits the population of your medical trade area. Proximity to other businesses or major roadways also impacts patient volumes. Lack of a stoplight or a difficult left turn may deter patients if there are easier options available. From the patient's perspective, a clinic that is easy to reach or visible from a main road is favorable to one that is hard to find.

Psychologically, many features can deter potential patients from choosing your urgent care. Poor street lighting, a change in appearance between buildings in the area, local crime levels, and ethnic composition all come into play. Some psychological factors require local knowledge. A location may look convenient on a map, but out of habit people often will not cross city, state or school district boundaries, drive around an airport, cemetery or golf course, or go to areas that seem unsafe.

Poor Curb Appeal

The aesthetic of your urgent care clinic should be inviting and evoke feelings of trust and comfort in potential patients at first glance. An otherwise great location with poor curb appeal can lose traffic as patients will perceive it's a poor quality operation.

Though you may not always have control over the outward-facing appearance of your urgent care, curb appeal should be considered when selecting a location. Avoid poorly maintained sites that appear rundown or dated or whose look doesn't match the necessary professionalism of an urgent care. If a site seems relatively "cheap," you'll usually get what you pay for.

Obstructed Ingress/Egress

If patients consider accessing care at your urgent care

EMR/PM | BILLING | PATIENT ENGAGEMENT | TELERADIOLOGY | **CONSULTING**

LEVERAGE OUR URGENT CARE STARTUP EXPERTISE TO BUILD A STRONG FOUNDATION FOR YOUR BUSINESS

EXPERITY STARTUP CONSULTING

Developing an urgent care center from the ground up isn't easy! It takes months of planning with hundreds of important decisions to make. Missing a step can result in thousands of dollars in lost revenue. You need a partner you can trust.

Experity's consultants will help you plan, open, and execute a winning business strategy. From site selection and financial plans to regulatory compliance, we think of everything, so you don't miss a beat.

- **Access 1,500-task workplan**
- **Set reliable financial projections**
- **Create a business plan and secure financing**
- **Select the best possible location**
- **Focus on compliance**
- **Get contacting and credentialing support**

GET STARTED

ExperityHealth.com | 815.544.7480

EXPERITY®

WHEN YOUR OPERATING SYSTEM IS PURPOSE-BUILT FOR URGENT CARE, YOU SUCCEED.

- Improve business and clinical efficiency
- Streamline and monitor patient experience
- Take the stress out of billing
- Ensure high-quality teleradiology overreads
- Dive deeper into business analytics

EXPERITY®

ExperityHealth.com | 815.544.7480

50%
OF URGENT CARE CLINICS RUN ON EXPERITY

150M+
PATIENTS SEEN ON EXPERITY

$3B
COLLECTED FOR RCM PATIENTS IN LAST 5 YEARS

EMR/PM
BILLING
PATIENT ENGAGEMENT
TELERADIOLOGY
CONSULTING
BUSINESS INTELLIGENCE

Find out why 50% of urgent care businesses choose Experity.

EMR/PM | BILLING | PATIENT ENGAGEMENT | **TELERADIOLOGY** | CONSULTING

FAST, QUALITY OVERREADS YOU CAN TRUST

EXPERITY TELERADIOLOGY

Want to expand your x-ray services without the cost of a full-time radiologist? With Experity Teleradiology, you get accurate reads quickly from board-certified radiologists.

- **Industry-leading routine results in 2 hours or less**
- **Stat reads in 60 minutes or less**
- **99.94% read accuracy**
- **Coverage 365 days-a-year**
- **Improved quality of care**
- **Service designed for your practice**

GET STARTED

ExperityHealth.com | 815.544.7480

EXPERITY®

but experience hassle getting to the front door, they'll likely opt for a more accessible alternative. This means your location of choice must be easy to reach. While an urgent care isn't a daily use convenience like a quick serve restaurant or gas station that requires direct ingress and egress, we do know that barriers like right turn-only lanes or long medians that block patients from entering from the opposite side of the road negatively impact volume.

Similarly, your location must have adequate parking to accommodate visitors at peak times. Parking is typicaly regulated by municipal code based on the building square footage at 5 to 6 spaces for every 1,000 square feet. For most centers, this means having between 15 and 20 dedicated parking spaces, which should be sufficient for staff and patients based on arrival of 4 patients per hour.

Of course, not all parking is created equal. A retail center may have an ample parking lot that is enticing at first. However, consider the placement of the spaces. If they are far from your entrance, this could pose a problem for patients seeking care for an illness or injury. Convenience is key, so be sure your location has enough parking spots close to your door. In a multi-tentant strip or building, "reserved" patient parking near the front door is even better.

Signage Restrictions

Signage is a vital marketing tool for urgent care—especially when paired with high traffic levels either on nearby roadways or at neighboring retailers. Each time someone sees your urgent care's signage, it is a free reminder that you are there to provide care when they need it. Over time, this puts your clinic top-of-mind when they experience a health event.

Depending on your chosen location, you may have little control over the type of signage you can install. The amount of signage available is typically regulated by municipal code that allows so many square feet of signage per square feet of building elevation.

Signage that is difficult to spot or too small to read negatively impacts volume. Before signing an agreement to move into a new location, ensure there are no excessive restrictions on the size and type of signage you can install. If a property owner won't allow you to have prominent, branded signage that is visible day and night, this is a red flag.

Wrong Size Space

The size of your urgent care clinic is another key consideration. Perhaps you've found a great location by all other metrics, but it is smaller than the recommended 2,800 to 3,500 square feet for an urgent care.

"From the patient's perspective, a clinic that is easy to reach or visible from a main road is favorable to one that is hard to find."

If the space is too small, the number of patients you can treat in a day may be limited. Patients may also experience longer wait times since there are fewer treatment rooms, be uncomfortable in a cramped waiting room, or you may be forced to compromise on the services you can offer. A small space is also problematic during peak times, such as flu season, when you must be prepared to treat more patients than usual.

Conversely, if the space is too large, your clinic will incur higher costs than necessary. If you don't have enough patients to fill the space, the recommendation is to build out only the square footage needed for your business operation and "firewall" the back for storage or future expansion.

Conclusion

Finding the right urgent care location is a challenge that all operators must embrace. Putting in the work to research the area's population, demographics, and competition is a vital first step. However, a location that meets benchmarks for these metrics can still fail.

Urgent care operators must carefully navigate the pitfalls that are difficult to quantify with data to identify a beneficial location for a new clinic. Knowing these warning signs and avoiding problematic features when selecting a location can improve your chance of success and your ability to deliver high-quality care in your community. ■

References

1. International Council of Shopping Centers website. How to Choose Where to Open. March 15, 2024. Accessed at https://www.icsc.com/news-and-views/icsc-exchange/how-to-choose-where-to-open.

CME: This article is offered for AMA PRA Category 1 Credit.™
See CME Quiz Questions on page 11.

Urgent Care Evaluation and Management Of Injury to the Ulnar Collateral Ligament of the Thumb (Gamekeeper's Thumb)

Urgent Message: With hyperabduction and hyperextension of the thumb, the ulnar collateral ligament may be stretched or torn, or may avulse a segment of bone from its insertion point. Radiographic imaging of suspected "gamekeeper's thumb" must be obtained to evaluate for an associated fracture, which may change the decision for conservative vs surgical management.

Omar Jafry, MS-3; W. Bradley Strauch, MD

Citation: Jafry O, Strauch WB. Urgent Care Evaluation and Management Of Injury to the Ulnar Collateral Ligament of the Thumb ('Gamekeepers Thumb'). *J Urgent Care Med.* 2024; 18(9):26-29

Editor's Note: *While the images presented here are authentic, the patient case scenarios are hypothetical.*

Questions for the Clinician at the Bedside

1. What is the root of the term "gamekeeper's thumb"?
2. What are modern-day mechanisms of injury to the ulnar collateral ligament?
3. How is the physical exam performed when gamekeeper's thumb is suspected?
4. Is the best management medical or surgical?

Clinical Scenario

A 32-year-old man presents to the urgent care with pain at the metacarpal-phalangeal (MCP) joint of the thumb, sustained the previous week when he was skiing and fell with hyperextension of the thumb. The pain is worse with range of motion, but he denies any numbness, wounds, wrist pain, or other injuries.

Physical exam reveals a hand that is normal in appearance without evidence of swelling, erythema, or wounds. Palpation of the MCP joint of the right thumb reveals pain on the medial (ulnar) aspect and with valgus testing. Laxity of the right thumb is present when comparing range of motion between both thumbs, and there is a defined endpoint. There is no pain with palpation of the interphalangeal joint or over the anatomical snuff box. Neurovascular is intact with 2+ radial pulse.

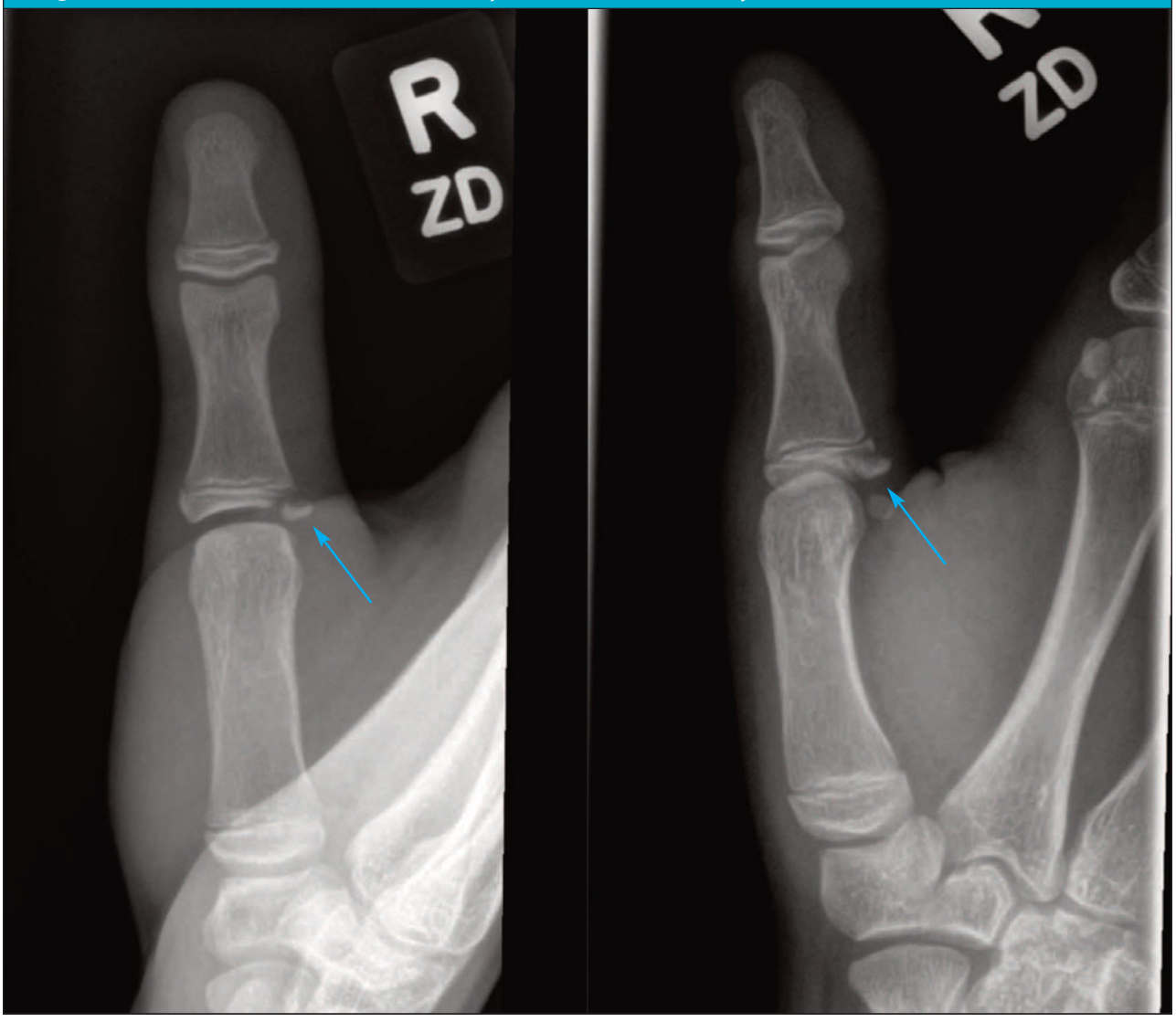
A thumb x-ray is performed, which shows an avulsion fracture of the proximal ulnar aspect of the proximal phalanx or "gamekeeper's fracture."

Discussion Of The Evaluation And Management Of 'Gamekeeper's Thumb' (also 'Skier's Thumb')

The typical mechanism of injury of the ulnar collateral ligament (UCL) of the thumb is by forced hyperextension and hyperabduction of the thumb. With severe hyperextension, the UCL can be torn or may avulse bone at the insertion of the UCL at the ulnar aspect of the proximal phalanx base (**Image 1**, **2**). The moniker for this injury, "gamekeeper's thumb," originated from

Author Affiliations: Omar Jafry, MS-3, University of Pikeville-Kentucky College of Osteopathic Medicine. **W. Bradley Strauch, MD,** Adena Orthopedic and Spine Institute, Chillicothe, Ohio. Authors have no relevant financial relationships with any ineligible companies.

Image 1-2. Avulsion Fracture at the Proximal Aspect of the Proximal Phalynx of the Thumb



the injuries of gamekeepers who would develop chronic degeneration of the UCL of the MCP when twisting the necks of fowl and small game.

Today, a UCL injury commonly occurs when a skier falls, and the thumb undergoes hyperabduction and hyperextension with a ski pole in hand ("skier's thumb"). This injury can also occur in other sports including rugby, soccer, or basketball.[1]

Understanding the Anatomy

The bones of the thumb are held in place by ulnar and radial collateral ligaments located on the ulnar and radial aspect of each phalanx, respectively. With hyperabduction and hyperextension of the thumb, the UCL may be stretched, torn, or may avulse a segment of bone from its insertion at the proximal aspect of the proximal phalanx (**Image 3**). The ulnar collateral ligament originates at the head of the metacarpal bone. The most common site of avulsion is at the distal aspect of the UCL (where it attaches to the base of the proximal phalanx),[2] which is called a gamekeeper's fracture.

History

Knowing the mechanism of injury is the most important element of the history; the first step is to inquire about a fall with a mechanism of hyperabduction and hyperextension of the thumb.[2] Repetitive strain on the UCL can also cause strain or tear at its insertion sites.

One telltale sign of a UCL injury is pain localized to the ulnar aspect of the MCP joint worsened with range of motion.

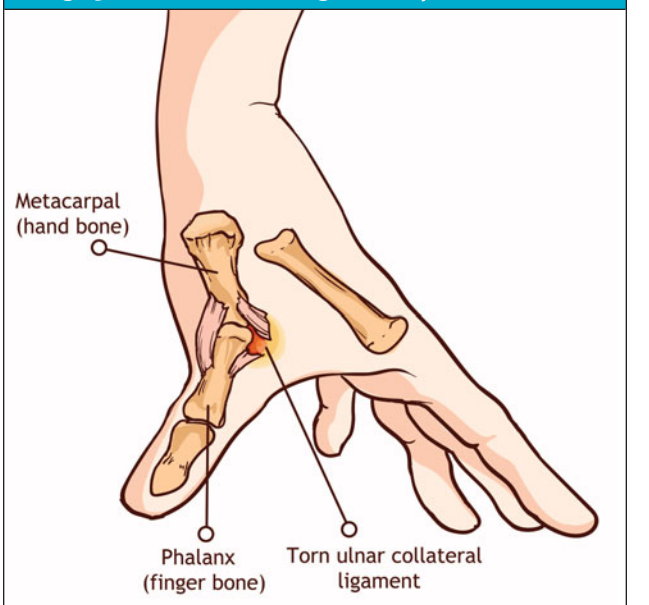
Physical Exam

First, assess the integrity of the skin and check for swelling. Generally, the area of greatest pain with palpation is over the ulnar aspect of the MCP joint. Also, make sure to check the radial collateral ligament of the thumb and the extensor and flexor tendons of the thumb MCP and interphalangeal joint for better localization. The next step is to examine the proximal and distal joints, including the anatomic snuff box, which is a triangular depression evident on the dorsal radial aspect of the wrist with extension of the thumb. Since the radial nerve and radial artery run through the snuffbox, the next step is check for neurovascular status by assessing gross sensation as well as vascular status with documentation of radial and/or ulna pulse and capillary refill of the tip of the thumb.

Checking stability of the thumb in an acute care setting is unlikely to change management and will often result in significant pain; this test can be safely deferred.[1] If testing is done, use a valgus stress test (radial deviation of the MCP joint) to check for laxity. Note that there are various degrees of laxity in finger joints, so comparison to the opposite side may be helpful. If performing stress testing of the joint, make sure to do so *after* x-ray results are available to ensure there is not an avulsion fracture.

Finally, assess wrist and finger range of motion and strength testing bilaterally (thumb stability, grip strength, and pinch strength). Usually there will be weakness with resisted pinch testing.

Image 3. Ulnar Collateral Ligament Sprain



"Radiographic imaging of suspected gamekeeper's thumb must be obtained to evaluate for an associated fracture."

Imaging

Radiographic imaging of suspected gamekeeper's thumb must be obtained to evaluate for an associated fracture, which may change the decision for conservative management vs surgical repair. However, a 3-view x-ray typically is normal if there is simply a sprain or tear of the UCL. With repetitive injury, the x-ray may show degenerative changes at the MCP joint. With UCL rupture, there is an associated bony avulsion present, occurring 20-30% of the time.[3]

Indications for Referral to the Emergency Department

Consider the following for referral to the emergency department:

- Intractable pain
- Open fracture
- Concern for other associated injury

Management In the Urgent Care

Place a thumb spica splint or orthoglass splint/brace to immobilize the thumb. If there is a concern for a complete rupture or an associated fracture, the patient should be referred to orthopedics or hand surgery.[4] With significant pain, consider a combination of acetaminophen and a non-steroidal anti-inflammatory medication (NSAID). Acetaminophen and NSAIDs can be used together, and alternating is not necessary as acetaminophen is metabolized/excreted by the liver and NSAIDS by the kidneys.

If conservative management is the initial approach, advise follow-up with primary care or orthopedics/hand specialist in 5-7 days.

Indications for conservative management include:[5]

- Partial, non-displaced UCL tears

- Minimally displaced fractures
- Associated fractures without displacement

Recommendations include 4-6 weeks of immobilization with a well-fitting thumb spica brace, gamekeeper's brace or fiberglass cast with a periodic 2-week follow-ups to assess for pain and stability.[2,5] If pain has decreased with the immobilization, range of motion exercises may be initiated.[2] If there is a concern the patient will require surgical intervention, orthopedic follow-up can occur in the same time span. If there is an associated fracture, more rapid follow-up is advisable.

Samora et al. conducted a systematic review of 14 articles, compromising 293 thumbs—with 200 acute and 93 chronic injuries—with outcomes measured over 2 years of follow-up, including pain, range of motion, key-pinch strength, and stability. Findings showed nonoperative management often failed, though there was no harm with using conservative therapy first.[3]

Surgical indications vary, but surgery is usually indicated for a significantly rotated and/or displaced fracture, a large displaced intra-articular fracture, a complete rupture of the UCL in an active person, persistent laxity and/or pain after a trial of immobilization, or a Stener lesion. A Stener lesion occurs when a complete UCL tear results in the interposition of the aponeurosis of the adductor pollicis muscle between the metacarpophalangeal joint and the torn UCL. Also, it is suspected when a tender nodule around the UCL is palpated during exam and there is no firm endpoint on stress testing. Surgical techniques include UCL repair and autograft UCL reconstruction for chronic injury without a significant difference between the groups; surgical management is frequently successful with a low rate of complications.[5]

Next Level Urgent Care Pearls

Patients who depend upon the thumb for competitive athletics or vocation may benefit from primary referral to sports medicine/orthopedics/hand specialist instead of primary care.

- Ensure there is immobilization with a dedicated thumb spica splint, which may not be achieved with a volar or ulnar gutter splint.
- Assess the radial collateral ligament in addition to the UCL.
- If stress testing for laxity causes too much pain, an injection of lidocaine may allow for a better exam.
- Compare to the contralateral thumb as there is a significant amount of baseline laxity (which varies from person to person)
- Assess for a Stener lesion where the UCL displaces proximally and appears as a tender nodule around the UCL—note that swelling at the base of the thumb may also be from scar tissue formation.[2]
- Surgical therapy has a good success rate with minimal complications.[4]

Red Flags and Legal Pitfalls

- Injury to the UCL may be missed by inexperienced providers.
- Consider the possibility of trauma to the scaphoid, extremities, head or neck.
- Injury to the scaphoid should be assessed with palpation of the anatomic snuff box. If a scaphoid injury is suspected, immobilization of the thumb and wrist is necessary.
- Discuss conservative or surgical management.

Clinical Scenario Conclusion

The patient was placed in a Velcro thumb spica brace, NSAIDs were recommended for pain control, and the patient was referred to orthopedic hand surgeon where the pros and cons of operative treatment were discussed. The patient decided to pursue surgical management and regained full use of his thumb with no operative or postoperative complications.

Takeaway Points

- A typical mechanism of injury to the UCL is hyperabduction and hyperextension of the thumb.
- With a tear of the UCL or avulsion fracture, there will be laxity upon valgus stress testing.
- Initial management of a UCL sprain is usually conservative, though surgical management will sometimes be necessary.
- Surgical management is frequently successful with a low rate of complications. ■

Manuscript submitted March 5, 2024; accepted April 25, 2024.

References

1. Madan SS, Pai DR, Kaur A, Dixit R. Injury to ulnar collateral ligament of thumb. *Orthop Surg*. 2014;6(1):1-7. doi:10.1111/os.12084
2. Chang AL, Merkow DB, Bookman J, Glickel S. Thumb Metacarpophalangeal Joint Ulnar Collateral Ligament Injuries: Management and Biomechanical Evaluation. *J American Academy of Orthopaedic Surgeons*. 31(1):p 7-16, January 1, 2023. DOI: 10.5435/JAAOS-D-22-00112
3. Samora JB, et al. Outcomes after injury to the thumb ulnar collateral ligament—a systematic review. *Clin J Sport Med*. 2013; 23:247-254
4. Daley D, Geary M, Gaston RG. Thumb Metacarpophalangeal Ulnar and Radial Collateral Ligament Injuries. *Clin Sports Med*. 2020;39(2):443-455. doi:10.1016/j.csm.2019.12.003
5. Giddins GE. The non-operative management of hand fractures. *J Hand Surg Eur Vol*. 2015;40(1):33-41. doi:10.1177/1753193414548170

Using AI to Detect Myocardial Infarction

Take Home Point: The use of an occlusive myocardial infarction (OMI) artificial intelligence (AI) electrocardiogram (ECG) model has the potential to improve identification of acute coronary syndrome (ACS) by enabling timely and accurate detection of OMI regardless of the presence ST-segment elevation.

Citation: Herman R, Meyers H, Smith S, et. al. International evaluation of an artificial intelligence-powered electrocardiogram model detecting acute coronary occlusion myocardial infarction. *Eur Heart J Digit Health*. 2023 Nov 28;5(2):123-133. doi: 10.1093/ehjdh/ztad074

Relevance: One-third of non–ST-elevation myocardial infarction (NSTEMI) patients have an acute OMI. NSTEMI patients often experience delays in revascularization as the guidelines from American Heart Association (AHA) and American College of Cardiology (ACC) do not recommend immediate revascularization in patients without STEMI criteria. This can lead to poor outcomes in patients with OMI but without STEMI findings on ECG.

Study Summary: This was a retrospective study with 4 stages: 1) development of an OMI AI model for the detection of acute OMI using single-standard 12-lead ECGs as input ("derivation cohort"); 2) evaluation of a blinded AI model in a geographically distinct test set spanning Europe and the United States; 3) comparison of an AI model with the criteria detecting OMI using 12-lead ECGs; and 4) performance analysis of an AI model in several subgroups. The primary outcome was the AI model's ability to identify patients with angiographically confirmed OMI using only single-standard 12-lead ECGs. The 18,616 ECGs from 10,543 patients (age 66± 14 years, 65.9% males, 22.9% OMI) with clinically validated outcomes were included in the AI model development.

The authors evaluated 3,254 ECGs from 2,222 patients (age 62± 14 years, 67% males, 21.6% OMI) on the AI ECG model. The OMI AI model achieved an area under the curve (AUC) of 0.938 in identifying the primary outcome. This corresponded to an accuracy of 90.9% with a sensitivity of 80.6% and a specificity of 93.7%. Using STEMI criteria to detect OMI, on the other hand, which had an 83.6% accuracy, but only a 32.5% sensitivity. The model performance was comparable in both EU and US patients. The model was superior to conventional STEMI criteria for identifying OMI and comparable with interpretation by specialized ECG experts in detecting invasively confirmed OMI.

Editor's Comments: The authors acknowledge that the study is not generalizable to a broader population of asymptomatic patients with other potential cardiac pathology. The model was not designed for other clinical endpoints such as mortality or major adverse cardiovascular events (MACE). This study does highlight the potential use of technology to aid daily clinical decision making. ■

Prepared by Ivan Koay MBChB, MRCS, FRNZCUC, MD; Urgent Care Physician and Medical Lead, Kings College Hospital Urgent Treatment Centre, London; Convenor Ireland and UK Faculty of the Royal New Zealand College of Urgent Care; Independent Assessor European Reference Network, Andalusian Agency for Healthcare Quality

Effects of Artificial Intelligence Assistance to Radiologist

Take Home Point: Artificial Intelligence (AI) assisted chest radiography (CXR) interpretation is not reliably helpful for radiologists at this time. The study suggests that predicting which radiologists will benefit from AI assistance is also unpredictable.

Citation: Yu F, Moehring A, Banerjee O, et. al. Heterogeneity and predictors of the effects of AI assistance on radiologists. *Nat Med*. 2024; 30(3): 837–849.

Relevance: As AI becomes more commonly integrated into clinical medicine, radiology has become one of the specialties of greatest interest for early adoption. However, there are still ongoing questions regarding its reliability in clinical practice and clinician's ability to use AI safely and effectively.

Study Summary: This was a study investigating the predictors of heterogeneous treatment effects of AI assistance in radiology. The authors measured the performance of 140 radiologists with and without AI assistance on 15 chest X-ray diagnosis tasks. Participants received training on the assistive AI system before starting the experiment. They were shown examples AI predictions, which would help them calibrate their interpretation of AI predictions

and inform their incorporation of AI.

The authors analyzed 324 patient cases and 15 pathologies with corresponding AI predictions among the participants. They found the existence of radiologist heterogeneity in treatment effects, which has substantial implications for both absolute and relative performance. It underscored the inadequacy of a one-size-fits-all approach to AI assistance and emphasized the importance of individualized strategies to maximize benefits and minimize potential harms. The years of experience, subspecialty, and familiarity with AI tools of the radiologists did not reliably predict how the radiologist would perform with AI assistance. Importantly, the researchers found that radiologists who initially performed poorly without AI assistance did not necessarily improve when provided with AI assistance compared to their higher-performing counterparts. ■

Editor's Comments: The authors' findings contradict prior studies about the role of experience in predicting how much radiologists might benefit from AI-assistance based on their experience. They admitted that the randomization of treatment conditions in the experiment prevented the analysis of temporal trends in radiologists' response to AI assistance. They were also unable to assess whether radiologists improved in incorporating AI prediction. This study is a good starting point for working to determine how the incorporation of AI will affect performance of various types of clinicians, so that any unforeseen risks may be better anticipated in premature application of this technology. ■

Sterile Water Injections for Pain Relief in Renal Colic

Take Home Point: In this study, intradermal sterile water injection (ISWI) had similar efficacy, faster pain relief, and lower need for rescue analgesia compared with diclofenac, paracetamol, and tramadol for the management of acute renal colic.

Citation: Az A, Sogut O, Akdemir T, et. al. Intradermal Sterile Water Injection: Safe and Effective Alternative for Relief of Acute Renal Colic in the Emergency Department. *J Emerg Med.* 2024 Feb;66(2):83-90. doi: 10.1016/j.jemermed.2023.10.014.

Relevance: Non-opioid methods to relieve pain for patients presenting to urgent care (UC) and emergency departments (ED) with renal colic is an important goal. Limited safe, effective, and widely available analgesic options for this painful condition exist.

Study Summary: This was a randomized, single-blinded, single-center study of patients admitted to an ED in Turkey due to renal colic. Patients were randomly assigned to 4 groups for intervention. The authors compared the efficacy of ISWI to intramuscular (IM) diclofenac (DI), IV paracetamol (PARA), and intravenous (IV) tramadol (TRAM). The patients receiving ISWI had injections of (0.5 mL per injection) at 4 different points around the most painful flank area. Other patients received 75 mg IM diclofenac, 1 g IV paracetamol, or 100 mg IV tramadol, respectively. Pain intensity was measured using a visual analog scale (VAS) before treatment and then at 15, 30, and 60 minutes after treatment.

The authors enrolled 320 participants (n=80 for each group). Somewhat surprisingly, they found VAS scores 15 and 30 min after treatment were significantly lower in group ISWI than in groups DI, PARA, and TRAM. ISWI was associated with faster pain relief than each of the other treatments. Fewer patients in the ISWI group required rescue analgesia compared with those in the tramadol group as well, but there was no difference between the ISWI group and those in the DI and PARA group in needing rescue analgesia.

Editor's Comments: This study has limited generalizability due to its single-center methodology. There was no comparison of ISWI in combination to other analgesics, which would more likely mirror a real-world application. The results of this study build on growing evidence that ISWI is a safe alternative to pharmacological therapies for treatment of renal colic and other pain conditions such as lower back, neck, and joint pain—although the mechanism for this effect remains unclear. While further evaluation of ISWI use in the UC setting would be helpful, there seems to be little risk in integrating this into practice, but only as part of a multimodal analgesia strategy. ■

Is There an Optimal Time for Influenza Vaccinations for Young Children?

Take Home Point: The birth month of a child influences the timing of a child's regular visits for preventative care. Children born in October were more likely to be vaccinated in October and least likely to contract influenza.

Citation: Worsham C, Bray C, Jena A. Optimal timing of influenza vaccination in young children: population-based cohort study. *BMJ* 2024;384: e077076 http://dx.doi.org/10.1136/bmj-2023-077076

Relevance: Influenza vaccination is particularly important for young children, who are at elevated risk of severe infection and complications of influenza.

Study Summary: This was a population-based cohort study of commercially insured children aged 2-5 who were vaccinated for influenza. Data was collated from a database of 30-40 million Americans covered by employer-sponsored health insurance plans each year. The authors evaluated rates of influenza diagnosis according to a vaccinated child's birth month. They examined whether young children tended to have annual visits near their birthday, calculating the proportion of children whose visits occurred within 2 weeks of their birth month. Finally, they compared distributions of vaccination timing across birth months.

The authors identified a total of 1,261,164 children, of whom 819,223 children received influenza vaccination between August 1 and January 31 of a given flu season. Overall timing of influenza vaccination followed a similar pattern each year, while timing of the peak of influenza diagnoses varied. October was the most common month for children to be vaccinated (37.3%). Children born in October had the lowest probability of being diagnosed with influenza (2.7%), whereas children born in August had the highest probability (3.0%). Being born in October versus August therefore was associated with an aOR of 0.88 for contracting influenza during early childhood.

Editor's Comments: Generalizability of results may be limited as all children were commercially insured. Given the seasonality of influenza has deviated from historical patterns since the arrival of COVID-19, these findings, while compelling and logical, may be of more historic significance. Regardless, this points to an important trend for clinicians caring for children to be aware of: birth month affects timing of health maintenance visits, which in turn may have other myriad other unintended effects. ■

Effective Communication Improves Antibiotic Stewardship

Take Home Point: The use of standardized communication templates with caregivers resulted in a trend towards more appropriate antibiotic prescribing for pediatric pharyngitis and a significant decrease in inappropriate antibiotics for acute otitis media (AOM)

Citation: Nedved A, Bizune D, Fung M, et. al. Communication Strategies to Improve Antibiotic Prescribing in Pediatric Urgent Care Centers. *Pediatr Emerg Care*. 2024 Apr 1;40(4):265-269. doi: 10.1097/PEC.0000000000002977

Relevance: Family expectations are commonly cited as a barrier by UC clinicians for following antibiotic stewardship guidelines.

Study Summary: This was a quality improvement project led by the Society for Pediatric Urgent Care (SPUC), the Centers for Disease Control and Prevention (CDC), Children's Mercy Kansas City, Children's National Hospital, and the Antibiotic Resistance Action Center. Participants were recruited via SPUC e-mails, newsletters, and webinars from free standing pediatric UC clinics. Participants were given a standardized diagnosis-specific script to use during their consultations, with the first script for AOM followed by other scripts for otitis media with effusion (OME) and pharyngitis. These scripts were introduced at staggered intervals to participants at monthly webinars, which were compulsory for participation in the project.

The authors recruited 104 participants from 14 UC clinics. In data collected from 1,183 encounters during the study period, 9.5% (n = 113) had OME diagnoses, 34.1% (n = 403) had AOM, and 56.4% (n = 667) had pharyngitis diagnoses. Clinicians prescribed antibiotics in 36 (31.9%) encounters for OME, 402 (99.8%) encounters for AOM, and 142 (21.3%) encounters for pharyngitis. Following the intervention period, inappropriate prescribing for AOM decreased from 34.3% at the beginning of the study to 8.8% (P = 0.02) by the end of the study. For pharyngitis, inappropriate antibiotic agent and prescribing antibiotics with a negative test trended downward from 3.9% and 5.3% to 0% and 0%, respectively (P = 0.17 and 0.21). However, inappropriate antibiotic prescribing practices in OME encounters trended upward from 30.8% to 46.7% (P = 0.34).

Editor's Comments: There is some limited generalizability in this study due to the self-selection of clinician participants, who are likely more motivated to pursue improvements in antibiotic stewardship than the average UC clinician. Additionally, all clinicians practiced in pediatric specific UC centers. However, this study does suggest that improving our communication around the rationale for antibiotic avoidance in appropriate cases can affect caregiver understanding of pediatric illnesses. Using preformatted scripts as were used in this study may make these conversations, which can be tiresome and frequent, less burdensome for UC clinicians. ■

Does My Patient Need Colchicine in Allopurinol Dose Escalation for Gout?

Take Home Point: Placebo therapy was non-inferior to colchicine in preventing gout flares in the 6-month initiation of allopurinol treatment.

Citation: Stamp L, Horne A, Mihov B, et. al. Is colchicine prophylaxis required with start-low go-slow allopurinol dose escalation in gout? A non-inferiority randomized double-blind placebo-controlled trial. *Ann Rheum Dis* 2023; 82:1626–1634

Relevance: Gout flares can occur during initiation of urate-lowering therapy, hence the current recommendation for concurrent colchicine use as prophylaxis by both the British Society for Rheumatology and European Alliance of Associations for Rheumatology.

Study Summary: This study was a placebo controlled, randomized, double-blind study conducted in 2 centers. Participants recruited were adults with gout defined by the 2015 American College of Rheumatology. Participants were randomized in a 1:1 ratio to colchicine 0.5mg daily or placebo. All participants also were concurrently started on a urate lowering regime of 50mg daily in those with eGFR<60mL/min/1.73m² and 100mg daily in those with eGFR≥60mL/min/1.73m². The allopurinol dose was increased monthly until their serum urate was <0.36mmol/L for three consecutive visits. Colchicine or placebo wa continued daily for the first 6 months of the study period.

The authors randomly assigned 200 participants to each arm of the study (n=100 for each arm). They found that although there were more flares in the placebo group, it did not meet the non-inferiority margin. The number of gout flares per month between baseline and month 6 was 0.61 (0.47 to 0.74) in the placebo group compared with 0.35 (0.22 to 0.49) in the colchicine group, mean difference 0.25 (0.07 to 0.44) with a non-inferiority p=0.92. Over the entire 12-month study period, there was no difference in the mean number of gout flares per month.

Editor's Comments: The study omitted patients with severe chronic kidney disease and may not be generalized to this population. There was also no quantification of flares and relied on subjective patient reports. While these findings do cast doubt on the use of prophylactic colchicine during initiation of allopurinol, it was a relatively small study. It importantly does highlight that gout flares are unfortunately common during the initiation of urate lowering therapy. ■

CME: This article is offered for AMA PRA Category 1 Credit.™
See CME Quiz Questions on page 11.

Intraoral Angioedema After Olanzapine Overdose: A Case Report

Urgent Message: Patients may present to an urgent care facility with intraoral angioedema, a life-threatening emergency that requires referral to an emergency department in any case with rapid progression or concerns for airway involvement. This case report describes angioedema from olanzapine, an antipsychotic prescription drug.

Chantelle Petterson, BDS, Benjamin Fu, MD, BDSc (HONS), MPhil, FRACDS (OMS)

Citation: Petterson C, Fu B. Intraoral Angioedema After Olanzapine Overdose: A Case Report. *J Urgent Care Med.* 2024; 18(9):34-36

Key Words: angioedema, olanzapine, overdose, case report

Abstract

Introduction: Angioedema is swelling of the deeper layers of the skin or mucosa and is often related to an allergic reaction. It commonly presents in the face and oral cavity with the most severe complication being airway obstruction. Olanzapine is an atypical antipsychotic medication. There have been multiple case reports of angioedema related to olanzapine, as well as other atypical antipsychotic medications, previously reported in the literature.

Clinical presentation: A generally healthy 30-year old female presented to a rural medical center with significant tongue and floor of mouth swelling after unintentional overdose on the olanzapine prescribed by her general physician. Her airway was patent at the time of her presentation. She also had a new orofacial twitch and stuttering speech. No other precipitating causes of the patient's symptoms were identified.

Case resolution: The patient was transferred to an urban hospital where she was treated for possible anaphylactic type reaction as well as for likely tardive dyskinesia. After the patient's airway was deemed safe, she was discharged for outpatient follow-up. At the time of follow-up, she had complete resolution of her symptoms and swelling.

Conclusion: While not commonly reported, antipsychotic medications may lead to oral angioedema. Angioedema can lead to airway impingement, and imme-

Author Affiliations: Chantelle Petterson, BDS, Waikato Hospital, New Zealand. **Benjamin Fu, MD, BDSc (HONS), MPhil, FRACDS (OMS),** Oral and Maxillofacial Surgery Department, Waikato Hospital, Te Whatu Ora, New Zealand. Authors have no relevant financial relationships with any ineligible companies.

Figure 1. Intraoral Photograph Demonstrating Significant Tongue and Floor Of Mouth Swelling

Figure 2. Intraoral Photograph Demonstrating Bilateral Floor of Mouth Swelling

diate referral to an emergency department (ED) is indicated if there is any concern for impending compromise of the airway.

Introduction

Olanzapine is a second-generation atypical antipsychotic drug commonly prescribed for treatment of schizophrenia and other psychotic conditions. The olanzapine medication datasheet reports drug related adverse reactions of angioedema very rarely (<0.01%) and dyskinesia commonly (≥1%–10%).[1] Angioedema refers to the restricted swelling of subcutaneous or mucous membranes that occurs most commonly as an allergic response. Frequent causes include insect bites/stings, medications, and foods. Angioedema commonly affects the face and oral cavity with the most severe complication being airway obstruction.[2]

Angioedema secondary to antipsychotic medication has been described in several case reports previously published in the literature. Case reports describing angioedema reactions secondary to antipsychotic medication include those related to trifluoperazine,[3] haloperidol,[4,5] and respiradone.[6,7] Olanzapine has also been implicated in several reported cases with more widespread edema[8,9] and in a post-marketing surveillance study.[10] Because patients may present to an urgent care (UC) facility with this issue, it is important that clinicians are aware of antipsychotic prescription medication as a possible precipitant for what otherwise may be deemed idiopathic angioedema.

Case Report

A 30-year-old female who was otherwise healthy presented to a rural medical center with sublingual swelling and orofacial/tardive dyskinesia, thought initially to be caused by a dental infection. Her sublingual swelling began 10 days prior. She had seen her primary care physician with symptoms of psychological distress prior to her symptoms beginning and was prescribed oral olanzapine 10mg daily. However, the patient did not take the medication as prescribed and reported taking up to 40mg at a time on at least 1 occasion. She had no known allergies, and this was her first time being exposed to the medication.

Clinical Findings

On physical examination, the patient was afebrile and had normal vital signs. She had generalized fullness in the submental region bilaterally, a notable orofacial twitch and a verbal tic, best characterized as stuttering. She had no drooling, stridor, or other signs of airway compromise. Her tongue and floor of mouth were elevated with prominent sublingual glands (**Figure 1**, **2**). There was no purulence seen intraorally, and no teeth were tender or mobile.

Urgent Care Management

The patient was then referred to the emergency department at the regional urban referral center in New Zealand where she was seen by an oral and maxillofacial surgery (OMFS) specialist.

Diagnostic Assessment

On laboratory evaluation, the C-reactive protein level was normal (<1mg/L) as were the remainder of the blood tests, apart from mild leukocytosis. A dental pan-

oramic radiograph and a computer tomography (CT) scan with contrast were obtained, which did not show evidence of deep space infection or periapical dental disease. The OMFS specialists, in collaboration with review by neurology, psychiatry, and general medicine specialty teams, concluded that the diagnosis was allergic angioedema secondary to olanzapine overdose.

Therapeutic Intervention and Outcomes

The patient was admitted for monitoring. The psychiatry team recommended discontinuing olanzapine and initiated a series of benztropine intramuscular (IM) injections over a period of 48-hours to treat her dyskinesia. Oral benztropine was continued for 2 weeks after hospital discharge. She was prescribed a benzodiazepine, lorazepam, in lieu of any further antipsychotic medication for her ongoing mental health symptoms. Once her airway risk was deemed to be resolved, she was discharged. At an outpatient telehealth follow-up visit, her dyskinesia, verbal difficulties, and swelling had all fully resolved.

Discussion

Olanzapine is an atypical antipsychotic medication that was approved by the U.S. Food and Drug Administration for the treatment of bipolar disorder and schizophrenia in the late 1990s.[11] Although the patient did not have a diagnosis of these conditions, she was prescribed olanzapine and did not take the medication as instructed, but rather at significantly higher doses. Olanzapine, like other several other antipsychotic medications, appears to be capable of triggering angioedema,[4,5,8] although this is the only known case report of olanzapine as a single agent causing predominantly oral angioedema.

The frequency of angioedema associated with antipsychotic medications appears to be low.[10] It is unclear if the inappropriately high dosing may have contributed to an increased risk of angioedema in this case. It is, however, likely that the patient's tardive dyskinesia was related to the supratherapeutic dosing.

Dyskinesia and other extrapyramidal symptoms (EPS) caused by antipsychotic medications occur less frequently with the atypical antipsychotics, such as olanzapine, than with first-generation antipsychotics (eg, haloperidol). However, dose escalation has been associated with an increased risk of EPS, even with the atypicals.[12] Unlike other forms of EPS, in the majority of cases, tardive dyskinesia is a permanent condition and does not resolve after withdrawing the medication.[13]

Fortunately, the patient's swelling and EPS resolved in this case, and airway intervention was not needed. However, it is important for UC clinicians to be aware of the medications that can trigger serious reactions, even if rare, so that they may be discontinued and patients may be counseled to avoid them again in the future.

Ethics Statement

The patient gave consent for the publication of this case. She encouraged her story and photographs to be shared in order to help clinicians to help patients with similar conditions.

Takeaway Points

- Having familiarity with the common and uncommon adverse reactions to medications is an important knowledge base to hone for UC clinicians.
- While angioedema secondary to antipsychotic medication use is uncommon, patients may present to UC facilities with intraoral swelling without a clear alternative etiology.
- Due to the risk of airway compromise when oral angioedema occurs, it is crucial for clinicians to be familiar with escalation pathways and local hospital specialist availability to ensure such patients are referred to centers capable of managing the airway when there is oral swelling. ■

Manuscript submitted September 25, 2023; accepted April 24, 2024.

References

1. Pharmco N.Z. Ltd. Zyprexa data sheet 1997. Revised 2023. Available at: https://medsafe.govt.nz/profs/datasheet/z/zyprexatabzyprexazydiswafer.pdf.
2. Long BJ, Koyfman A, Gottlieb M. Evaluation and Management of Angioedema in the Emergency Department. *West J Emerg Med*. 2019 Jul;20(4):587-600.
3. Osman M, Edwards D, Kilduff M. Trifluoperazine-induced angioedema. *Case Rep Psychiatry*. 2014;2014:140329.
4. Strain A. Angioedema of the tongue due to haloperidol. *Am J Emerg Med*. 2022 Mar;53:284.e5-284.e6.
5. AlMadhyan AB. Angioedema associated with haloperidol. *Int J Health Sci (Qassim)*. 2015 Jan;9(1):76-8.
6. Güneş F, Batgi H, Akbal A, Canatan T. Angioedema - an unusual serious side effect of risperidone injection. *Clin Toxicol (Phila)*. 2013 Feb;51(2):122-3.
7. Samra GS, Kant S, Chow R. Risperidone induced angioedema with concurrent EPS symptoms: a case report and review of literature. *J Community Hosp Intern Med Perspect*. 2018 Apr 17;8(2):80-83.
8. Cook EA, Shipman D, Fowler TG. Whole-body edema with olanzapine: A case report and literature review. *Ment Health Clin*. 2020 Sep 30;10(5):291-295.
9. Tatar ZB, Oflaz S, Baran B. A case of late-onset angioedema associated with clozapine and redevelopment of angioedema with olanzapine. *J Clin Psychopharmacol*. 2014 Aug;34(4):523-5.
10. Biswasl PN, Wilton LV, Pearcel GL, Freemantle S, Shakir SA. The pharmacovigilance of olanzapine: results of a post-marketing surveillance study on 8858 patients in England. *J Psychopharmacol*. 2001 Dec;15(4):265-71.
11. Food and Drug Administration Prescribing Information for Olanzapine. Accessed at: https://www.accessdata.fda.gov/drugsatfda_docs/label/2010/020592s057,021086s036,021253s045lbl.pdf
12. Farah A. Atypicality of atypical antipsychotics. Prim Care Companion J Clin Psychiatry. 2005;7(6):268-74.
13. Kiriakakis V, Bhatia KP, Quinn NP, Marsden CD. The natural history of tardive dystonia. A long-term follow-up study of 107 cases. Brain. 1998 Nov;121 (Pt 11):2053-66.

Original Research

Return Visits and Hospitalization Rates of Adult Patients Discharged with Tachycardia After an Urgent Care Visit: A Retrospective Cohort Study

Urgent Message: Patients discharged from an urgent care clinic with tachycardia were found to have significantly higher odds of return visits to the urgent care and emergency department as well as higher odds of being admitted to the hospital within 7 days compared to non-tachycardic patients.

Vitoria Regina Nunes Maia, MD; Ryan Loh, PhD; Michael Weinstock, MD; Lindsey E. Fish, MD

Citation: Maia VRN, Loh R, Weinstock M, Fish LE. Return Visits and Hospitalization Rates of Adult Patients Discharged with Tachycardia After an Urgent Care Visit: A Retrospective Cohort Study. *J Urgent Care Med.* 2024; 18 (9):37-41

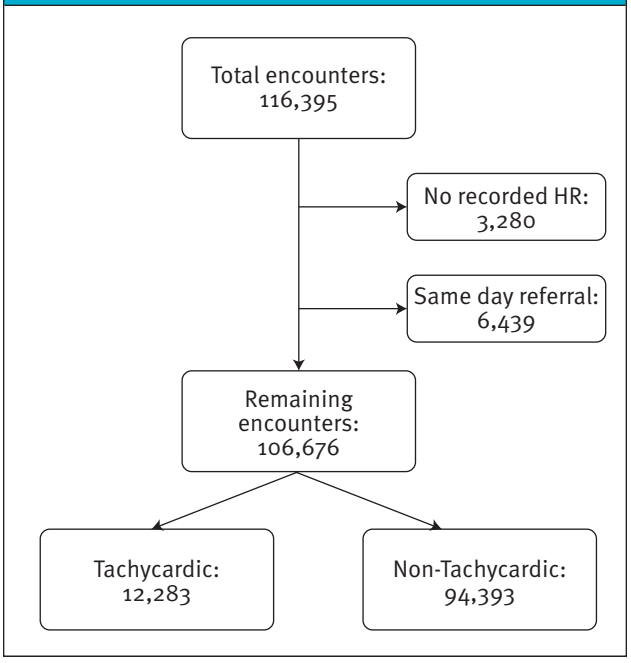
Abstract

Introduction: Adult patients discharged from the emergency department (ED) with tachycardia have been shown to be at short-term risk of increased morbidity and mortality. We aimed to identify if a similar association exists in adult patients discharged with tachycardia from an urgent care (UC) clinic.

Methods: We conducted a retrospective cohort study of all adult visits where the patient was discharged from a single site UC clinic from 2016-2022. In the study, 106,676 adult patient visits were included. Patients were divided into 2 groups: tachycardic (last recorded heart rate ≥100 beats per minute [BPM]); and non-tachycardic (last recorded heart rate of <100 BPM). Primary outcomes were return visit to the UC or ED within 7 days

Author affiliations: Vitoria Regina Nunes Maia, MD, Department of Internal Medicine, Hospital Santa Rosa de Lima, Serra Negra, Sao Paulo, Brazil. **Ryan Loh, PhD,** Behavioral Health Services, Denver Health and Hospital, Denver, Colorado. **Michael Weinstock, MD,** Department of Emergency Medicine, Adena Health System and Department of Emergency Medicine, The Wexner Medical Center at The Ohio State University, Chillicothe, Ohio. **Lindsey E. Fish, MD,** Department of General Internal Medicine, Denver Health and Hospital and Division of General Internal Medicine, University of Colorado School of Medicine, Denver, Colorado.

Figure 1. Patient Encounter Exclusion Process



of discharge and hospital admission within 7 days discharge.

Results: Statistically significant differences were noted between the tachycardic and non-tachycardic groups for return visits to UC or ED (11.67% vs 8.5%, p<0.0001) and hospital admissions (0.91% vs 0.38%, p<0.0001). This corresponded to 1.46 greater odds that tachycardic patients would have a return visit to either UC or the ED within 7 days of discharge compared to non-tachycardic patients. The odds ratio (OR) for hospital admission within 7 days was 2.86 when comparing tachycardic to non-tachycardic patients.

Discussion: Patients discharged from the UC clinic with a heart rate ≥100 BPM had significantly higher odds of returning to either the UC or ED and being admitted to the hospital within 7 days of discharge from the index UC visit.

Introduction

Heart rate (HR) is used in the risk stratification criteria of many acute-care guidelines utilized in urgent care (UC) clinic settings based on evidence extrapolated from research conducted among emergency department (ED) patients. Examples of how HR is used to risk stratify patients for various life-threatening conditions include the Systemic Inflammatory Response Syndrome score/sepsis criteria, Pneumonia Severity Index score, and Pulmonary Embolism Rule-Out Criteria score.[1-7] Each of these criteria utilize an upper limit HR, which, if a patient exceeds, results in a "point" going towards a higher overall risk associated with the condition of concern.

Tachycardia in patients age 18 and older is defined as a heart rate greater than 100 beats per minute (BPM). There are many forms of tachycardia, and tachycardia can result from a heterogenous mix of underlying etiologies including arrhythmias, myocarditis, acute coronary syndrome, pulmonary emboli, hypoxemia, hypoglycemia, dehydration/hypovolemia, sepsis, anemia, medication and stimulant use, alcohol withdrawal, anxiety, pain, and fever.[8]

Being discharged from the ED with abnormal vital signs has been associated with increased short-term morbidity and mortality, with 1 study correlating it with higher rates of unanticipated death at 7 days.[9] Vital signs, including HR, are highly dynamic and vary continuously throughout each day and phase of life, with the threshold for being "abnormal" ill-defined. However, it is of great clinical utility to have an easily assessable biomarker if it can be used to identify patients at risk for serious adverse outcomes. [10-11] Additional ED-based studies have demonstrated that tachycardia was the most common abnormal vital sign among adults who experienced an unanticipated death within 7 days after an ED visit.[12-13]

Given the concerning association between ED discharge of tachycardic patients and increased short-term morbidity and mortality in adult patients, we aimed to identify if a similar correlation existed in adult patients discharged with tachycardia from a UC clinic. Such an association would be especially valuable in the UC setting as vital signs are among the few objective pieces of clinical data available to UC clinicians. Additionally, the UC setting represents an increasingly common site of care for patients with undifferentiated symptoms; clinicians in this setting are often forced to evaluate patients with great rapidity. Therefore, any quickly available objective data point that might suggest that a patient is at increased risk of a short-term adverse outcome would be valuable for the assurance of UC patient safety.

Methods

Project methodology was reviewed by the Denver Health and Hospital Authority Quality Improvement Committee, authorized by the Colorado Multiple Institutional Review Board at the University of Colorado, Denver, and given a waiver after being determined non-human subject research.

Table 1. Patient Demographic Characteristics of Included Urgent Care Visits by Tachycardic and Non-Tachycardic Cohort, as Well as Unique Patient Characteristics

	Total Encounters	HR ≥100	HR <100	Total Patients
N	**106,676 (%)**	**12,283 (%)**	**94,393 (%)**	**45,862 (%)**
Sex				
Female	66,138 (62.0%)	7,555 (61.51%)	58,583 (62.06%)	25,674 (55.98%)
Male	40,504 (37.97%)	4,724 (38.46%)	35,780 (37.91%)	20,171 (43.98%)
Unknown/Other	34 (0.03%)	4 (0.03%)	30 (0.03%)	17 (.03%)
Age Category				
18-25	19,794 (18.56%)	2,826 (23.01%)	16,968 (17.98%)	9,799 (21.37%)
26-35	23,287 (21.83%)	2,962 (24.11%)	20,325 (21.53%)	10,914 (23.80%)
36-45	21,599 (20.25%)	2,704 (22.01%)	18,895 (20.02%)	9,108 (19.86%)
46-55	18,096 (16.96%)	1,907 (15.53%)	16,189 (17.15%)	7,158 (15.61%)
56-65	14,407 (13.51%)	1,307 (10.64%)	13,100 (13.88%)	5,383 (11.74%)
66+	9,493 (8.9%)	577 (4.7%)	8,916 (9.45%)	3,500 (7.63%)
Ethnicity/Race				
Hispanic	77,057 (72.23%)	8,302 (67.59%)	68,755 (72.84%)	31,286 (68.22%)
NH - AI/AN	937 (0.88%)	155 (1.26%)	782 (0.83%)	335 (0.73%)
NH - Asian	3,278 (3.07%)	361 (2.94%)	2,917 (3.09%)	1,498 (3.27%)
NH - Black	4,143 (3.88%)	517 (4.21%)	3,626 (3.84%)	1,960 (4.27%)
NH - Native Hawaiian	48 (0.04%)	9 (0.07%)	39 (0.04%)	22 (0.05%)
NH - Other Pacific Islander	53 (0.05%)	5 (0.04%)	48 (0.05%)	28 (0.06%)
NH - White	19,896 (18.65%)	2,779 (22.62%)	17,117 (18.13%)	9,929 (21.65%)
NH - OMUD	570 (0.53%)	76 (0.62%)	494 (0.52%)	361 (0.79%)
OMUD ethnicity	694 (0.65%)	79 (0.64%)	615 (0.65%)	443 (0.97%)

** N - number; HR - heart rate; AI - American Indian; AN - Alaskan Native; NH - non-Hispanic; OMUD - other/missing/unknown/decline.

This is a retrospective cohort study utilizing the electronic health record data (EHR) at our single site UC center, the Federico F. Peña Southwest Urgent Care Clinic (PUCC). PUCC is a Federally Qualified Health Center located in a largely Hispanic neighborhood affiliated with Denver Health and Hospital Authority (DHHA). DHHA is an urban safety-net health system, serving one-third of the population of Denver, comprised of a safety-net hospital, 10 federally qualified community health centers, and 19 school-based clinics.

Primary analysis included adult patients (age 18 and older) who presented to PUCC between the dates of April 18, 2016 (date clinic opened), and December 31, 2022. We excluded patient encounters for whom no HR was recorded in the EHR and encounters for patients who were referred immediately to an ED by the UC provider. The remaining encounters represented patients who were discharged home, and those were divided into 2 groups: those with a last recorded heart rate of ≥100 bpm ("tachycardic"); and those with a last recorded HR <100 bpm ("non-tachycardic") (**Figure 1**). Predetermined primary outcomes for each of these groups included a combined outcome of return visit to either a UC clinic or ED within the DHHA system within 7 days and hospital admission at DHHA within 7 days. The predetermined secondary outcome was death within 7 days, which was assess based on Colorado public health records and EHR data collaboration as described by Simpson et. al.[14]

Statistical analyses were performed using encounter-based data, which meant that multiple visits by the same patient were all treated as discrete, separate encounters. To account for repeated visits, generalized estimating equations were used with logit link function to model each individual patient visit, while accounting for the correlation of outcomes in the same patient. Univariate chi-squared values are reported for each of the demographic variables in the final model. Demographic variables included for analysis were sex, age, and ethnicity/race and were based on the information gathered during the first encounter in the included period.

Results

In total, there were 106,676 included UC encounters during the study period, which occurred among 45,862 unique patients. Demographic characteristics between the tachycardic and non-tachycardic patient encounter groups were not statistically analyzed (**Table 1**). When

Table 2. Odds Ratios for Return Visits to an Urgent Care Clinic or Emergency Department and Hospital Admission Within 7 Days of Initial Urgent Care Visit by Multivariable Analysis for Tachycardia With Covariates of Sex, Age, and Ethnicity/Race

	Return Visit Odds Ratio *(95% CI, p-value)*	Hospital Admission Odds Ratio *(95% CI, p-value)*
Tachycardic vs Non-Tachycardic	1.46 *(1.36-1.56, p<0.0001)*	2.86 *(2.29-3.56, p<0.0001)*
Sex: Female vs Male	0.9 *(0.85-0.94, p<0.0001)*	0.71 *(0.58-0.86, p=0.0006)*
Increasing Age	1.006 *(1.004-1.007, p<0.0001)*	1.04 *(1.04-1.05, p<0.0001)*
Ethnicity/Race: NH White vs non-NH White	0.94 *(0.88-1.003, p=0.0601)*	0.76 *(0.58-0.99, p=0.0423)*

CI - Confidence Interval; NH - non-Hispanic

holding all other factors constant, there were significant differences between the tachycardic and non-tachycardic groups for the odds of return visits to either a UC clinic or ED within 7 days (11.67% vs 8.5%) and hospital admission within 7 days (0.91% vs 0.38%). There were only 11 deaths within 7 days of UC discharge among the entire cohort (1 in the tachycardic group [0.01%] and 10 in the non-tachycardic group [0.01%]). Given the extreme rarity of this outcome, statistics were not analyzed on this outcome.

In the multivariable analysis controlling for the effects of sex, age, and ethnicity/race to examine return visits to either an UC or ED within 7 days of the initial UC visit, the odds that a tachycardic patient would return was 1.46 times higher (OR=1.46 [95% CI, 1.36 – 1.56], p<0.0001) than the odds a non-tachycardic patient would return. In the multivariable analysis controlling for the effects of sex, age, and ethnicity/race, examining hospital admissions within 7 days of the initial UC visit, the odds that a tachycardic patient would be admitted were 2.86 times higher (OR=2.86 [95% CI, 2.29 – 3.56], p<0.0001) than non-tachycardic patients. Individual odds ratios for the covariates of sex, age and ethnicity/race were also calculated (**Table 2**).

Discussion

Among the over 100,000 adult patient encounters reviewed from our UC clinic, we found that patients who were discharged from the UC with tachycardia had increased rates of return visits to UC and ED settings as well as increased rates of hospital admission within the subsequent week. The number of deaths among this cohort of patients was too few to determine if there was a significant difference in risk of death among patients in each group. Further studies, ideally larger and multicenter, are needed to determine if any association exists between tachycardia at discharge from UC and mortality given how rare of an occurrence short-term mortality is following a UC visit. Our finding of increased odds of return visit and hospital admission is consistent with previous studies showing increased risk of return visits, morbidity, and death in patients discharged from an ED setting with abnormal vital signs.[9-13]

While not the primary covariates of interest, the demographic covariates included in our analyses did significantly affect the odds of the primary outcomes occurring. Both male sex and increasing patient age were significantly associated with increased odds of both UC or ED revisit and hospital admission. Non-Hispanic White patients had the lowest relative odds of admission within 7 days and a trend toward lower rates of revisit compared with the other ethnicities/races. Increasing age and Hispanic ethnicity have previously been shown in the ED literature to correlate to increased return visits, whereas male sex has a lower rate of return visits in the ED literature.[15-17]

This study sought to determine if a similar association existed between adverse clinical outcomes and the presence of tachycardia at discharge from the UC clinic. The potential clinical implications of these findings are significant. First, this suggests clinical utility for UC providers to be attentive to the HR of patients and, in the cases of tachycardia, repeat the measurement to determine if the HR is remaining persistently elevated. Persistent tachycardia and/or tachycardia upon discharge appears to be a risk factor for increased short-term healthcare utilization, a finding that has also been demonstrated in studies of discharged ED patients.[18-20] Increased rates of return visits to UC clinics and EDs, as well as hospital admissions, may additionally increase the financial burden to both patients and the healthcare system. Further research is needed to determine how tachycardia at UC discharge might best be addressed to optimize patient safety.

Limitations

There are several limitations to the findings of our study. First, our analysis was performed among patients seen at a single UC clinic within 1 healthcare system; this may limit the ability to generalize these findings to other UC practices and other geographic locations. For instance, the included study population of the UC clinic during the study period was nearly 73% Hispanic; this may not reflect the demographics of other UC clinics. Additionally, the data does not include UC or ED return visits and admissions that may have occurred outside of our healthcare system. This was a retrospective grouped analysis, and there was no matching between tachycardic and non-tachycardic cohort patients. While we included demographic covariates, there may be other factors including clinical conditions such as fever, comorbid conditions, access to primary care, etc. that may impact the findings. Given the retrospective design, there was no standardization for the number of times vital signs were recorded, and therefore, the true value for patients' HR at the time of UC discharge was extrapolated from the last HR data point entered by the clinical staff. Finally, UC or ED visits after discharge were used as a surrogate for adverse outcomes and short-term morbidity, however, this may not always be the case. The reason for UC or ED utilization after the index visit was not available, and therefore, it is unclear to what extent these may have been expected revisits (eg, wound check, suture removal, etc.) vs revisits related to morbidity associated their condition or other complications.

Conclusion

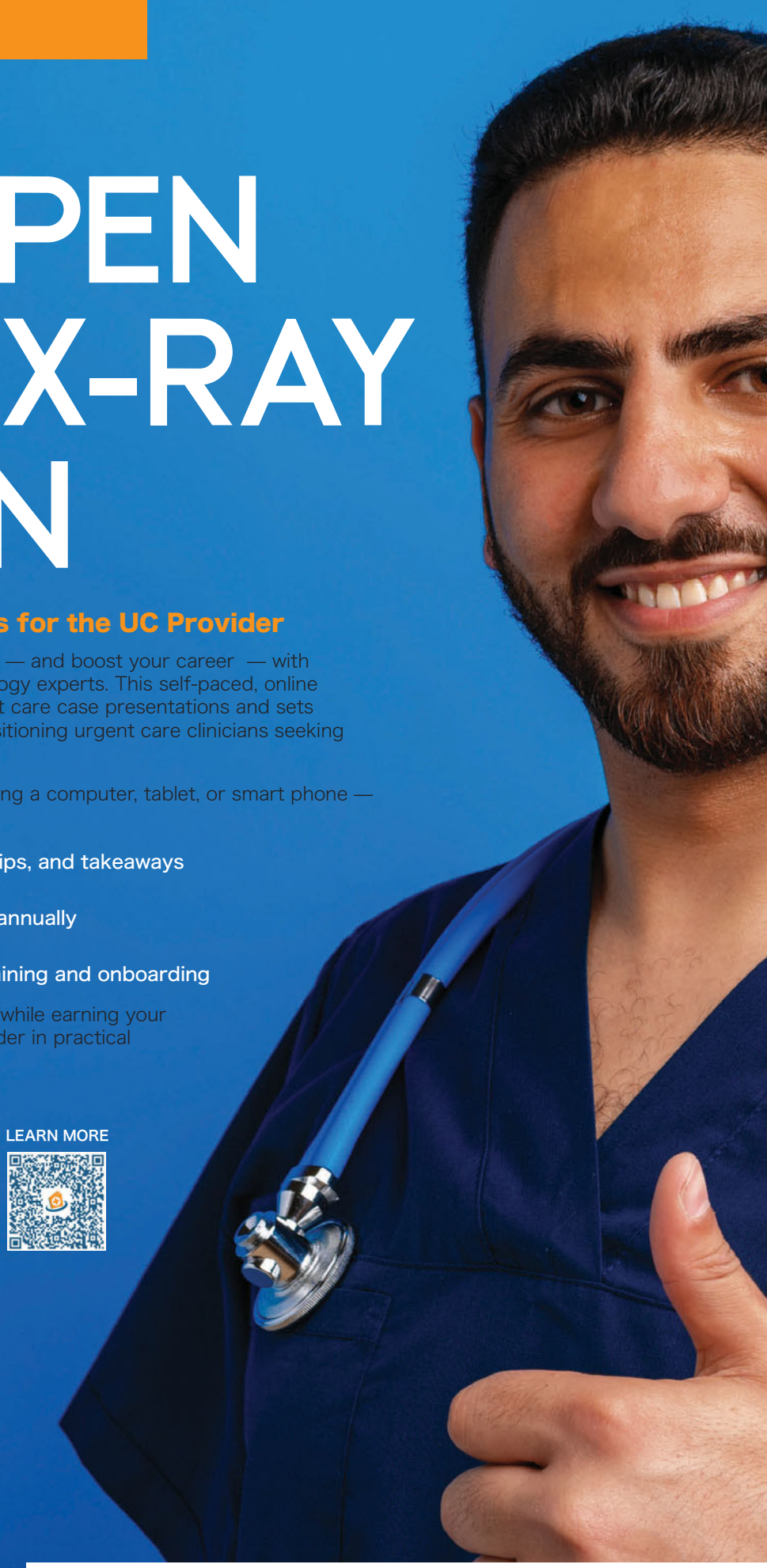
Patients discharged from the UC clinic with a HR ≥100 BPM were found to have a significantly higher odds of returning to the UC or visiting the ED within 7 days as well as higher odds of being admitted to the hospital within 7 days compared to patients with a HR <100 BPM when discharged from UC. ■

Manuscript submitted January 29, 2024; accepted May 7, 2024.

References

1. Bone RC, Balk RA, Cerra FB, Dellinger RP, Fein AM, Knaus WA, Schein RM, Sibbald WJ. Definitions for sepsis and organ failure and guidelines for the use of innovative therapies in sepsis. The ACCP/SCCM Consensus Conference Committee. American College of Chest Physicians/Society of Critical Care Medicine. *Chest*. 1992 Jun;101(6):1644-55. doi: 10.1378/chest.101.6.1644. PMID: 1303622.
2. Levy MM, Fink MP, Marshall JC, Abraham E, Angus D, Cook D, Cohen J, Opal SM, Vincent JL, Ramsay G; SCCM/ESICM/ACCP/ATS/SIS. 2001 SCCM/ESICM/ACCP/ATS/SIS International Sepsis Definitions Conference. *Crit Care Med*. 2003 Apr;31(4):1250-6. doi: 10.1097/01.CCM.0000050454.01978.3B. PMID: 12682500.
3. Fine MJ, Auble TE, Yealy DM, Hanusa BH, Weissfeld LA, Singer DE, Coley CM, Marrie TJ, Kapoor WN. A prediction rule to identify low-risk patients with community-acquired pneumonia. *N Engl J Med*. 1997 Jan 23;336(4):243-50. doi: 10.1056/NEJM199701233360402. PMID: 8995086.
4. Shah BA, Ahmed W, Dhobi GN, Shah NN, Khursheed SQ, Haq I. Validity of pneumonia severity index and CURB-65 severity scoring systems in community acquired pneumonia in an Indian setting. *Indian J Chest Dis Allied Sci*. 2010 Jan-Mar;52(1):9-17. PMID: 20364609.
5. Anurag A, Preetam M. Validation of PSI/PORT, CURB-65 and SCAP scoring system in COVID-19 pneumonia for prediction of disease severity and 14-day mortality. *Clin Respir J*. 2021 May;15(5):467-471. doi: 10.1111/crj.13326. Epub 2021 Jan 23. PMID: 33417280.
6. Kline JA, Mitchell AM, Kabrhel C, Richman PB, Courtney DM. Clinical criteria to prevent unnecessary diagnostic testing in emergency department patients with suspected pulmonary embolism. *J Thromb Haemost*. 2004 Aug;2(8):1247-55. doi: 10.1111/j.1538-7836.2004.00790.x. PMID: 15304025.
7. Kline JA, Courtney DM, Kabrhel C, Moore CL, Smithline HA, Plewa MC, Richman PB, O'Neil BJ, Nordenholz K. Prospective multicenter evaluation of the pulmonary embolism rule-out criteria. *J Thromb Haemost*. 2008 May;6(5):772-80. doi: 10.1111/j.1538-7836.2008.02944.x. Epub 2008 Mar 3. PMID: 18318689.
8. Mayuga KA, Fedorowski A, Ricci F, et.al. Sinus Tachycardia: a Multidisciplinary Expert Focused Review. *Circ Arrhythm Electrophysiol*. 2022 Sep;15(9):e007960. doi: 10.1161/CIRCEP.121.007960. Epub 2022 Sep 8. PMID: 36074973; PMCID: PMC9523592.
9. Sklar, David P., et al. Unanticipated death after discharge home from the emergency department. *Annals of Emergency Med*. 49.6 (2007): 735-745.
10. Candel, Bart GJ, et al. The Association Between Vital Signs And Clinical Outcomes In Emergency Department Patients Of Different Age Categories. *Emergency Medicine Journal*. 39.12 (2022): 903-911.
11. Ljunggren, Malin, et al. The association between vital signs and mortality in a retrospective cohort study of an unselected emergency department population. *Scand J Trauma Resusc Emerg Med*. 24.1 (2016): 1-11.
12. Gabayan, Gelareh Z., et al. Qualitative factors in patients who die shortly after emergency department discharge. *Academic Emergency Med*. 20.8 (2013): 778-785.
13. Chang CY, Abujaber S, Pany MJ, Obermeyer Z. Are vital sign abnormalities associated with poor outcomes after emergency department discharge? *Acute Med*. 2019;18(2):88-95
14. Simpson, Scott A., et al. A Mortality Surveillance Collaboration Between a Health System and Public Health Department. *American Journal of Public Health*. (2023): e1-e4.
15. Ling DA, Sung CW, Fang CC, Ko CH, Chou EH, Herrala J, Lu TC, Huang CH, Tsai CL. High-risk Return Visits to United States Emergency Departments, 2010-2018. West J Emerg Med. 2022 Oct 18;23(6):832-840. doi: 10.5811/westjem.2022.7.57028. PMID: 36409935; PMCID: PMC9683777.
16. Hutchinson CL, Curtis K, McCloughen A, Qian S, Yu P, Fethney J. Identifying return visits to the Emergency Department: A multi-centre study. *Australas Emerg Care*. 2021 Mar;24(1):34-42. doi: 10.1016/j.auec.2020.05.007. Epub 2020 Jun 24. PMID: 32593525.
17. Hu KW, Lu YH, Lin HJ, Guo HR, Foo NP. Unscheduled return visits with and without admission post emergency department discharge. *J Emerg Med*. 2012 Dec;43(6):1110-8. doi: 10.1016/j.jemermed.2012.01.062. Epub 2012 Jun 5. PMID: 22674038.
18. Quinten VM, van Meurs M, Olgers TJ, et al. Repeated vital sign measurements in the emergency department predict patient deterioration within 72 hours: a prospective observational study. *Scand J Trauma Resusc Emerg Med*. 2018;26(1):57.
19. Russell J. The Value of Repeat Value Signs. *J Urgent Care Med*. 2022;17(2):1-2.
20. Melrose G. It's About Time: Repeat Vitals and Long Waits. *J Urgent Care Med*. 2023; 17(5):1-2.

SHARPEN YOUR X-RAY VISION



Clinical X-Ray Fundamentals for the UC Provider

Learn new, or improve existing x-ray skills — and boost your career — with basic training presented by leading radiology experts. This self-paced, online course features the most common urgent care case presentations and sets you up for success. Ideal for new or transitioning urgent care clinicians seeking guidance on x-ray fundamentals.

Access this course anytime, anywhere using a computer, tablet, or smart phone — to fit your life and *learn your way.*

- Case reports with diagnostic tools, tips, and takeaways
- 25 *AMA PRA Category 1 Credits*™
- Additional 15 case bundle available annually
- Unlimited access for one year
- Group pricing available, with free training and onboarding

Begin your journey or sharpen your skills while earning your CME credits with IUCM — the proven leader in practical mastery for urgent care professionals.

IUCM®
INSTITUTE OF URGENT CARE MEDICINE

LEARN MORE

SCHOOL OF MEDICINE
CASE WESTERN RESERVE UNIVERSITY

Accreditation Statement: This activity has been planned and implemented in accordance with the accreditation requirements and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of Case Western Reserve University School of Medicine and Institute of Urgent Care Medicine. Case Western Reserve University School of Medicine is accredited by the ACCME to provide continuing medical education for physicians.

Physicians should claim only the credit commensurate with the extent of their participation in the activity.

urgentcarecme.com | 844-814-9135 | ablachford@urgentcarecme.com

CLINICAL CHALLENGE: CASE 1

Challenge your diagnostic acumen: Study the following x-rays, electrocardiograms, and photographs and consider what your diagnosis might be in each case. While the images presented here are authentic, the patient cases are hypothetical. Readers are welcome to offer their own patient cases and images for consideration by contacting the editors at editor@jucm.com.

60-Year-Old With Annoying Cough

Figure 1.

A 60-year-old man presents to urgent care complaining of an annoying cough for several months. He states that he frequently has sputum production with his cough. He denies any fever, chills, or other symptoms.

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

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

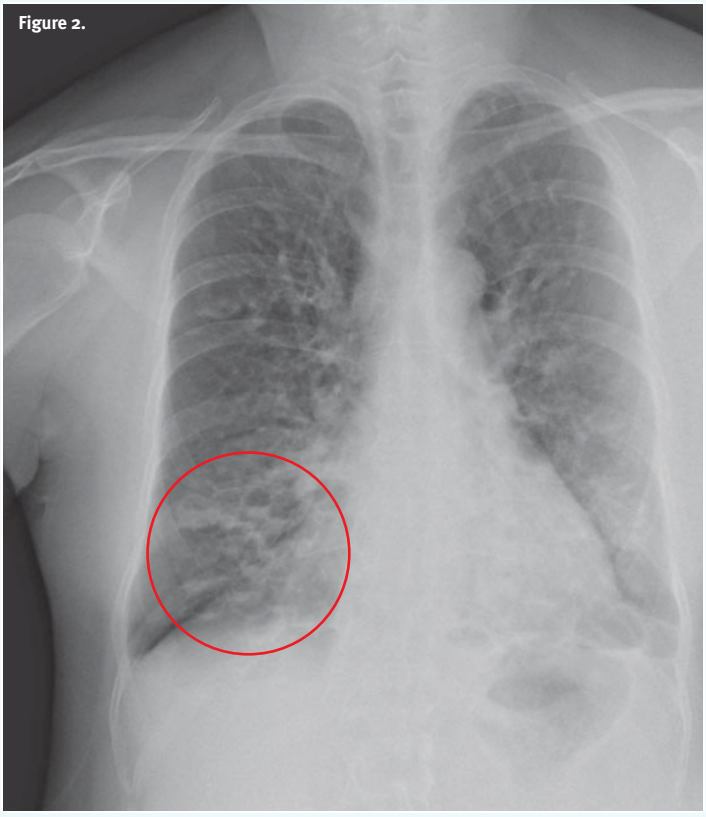


Figure 2.

Differential Diagnosis
- Atypical pneumonia
- Lower lobe cystic bronchiectasis
- Chronic obstructive pulmonary disease
- Pneumonitis

Diagnosis
The x-ray demonstrates multiple basilar thin-walled cystic collections with air fluid levels in the lung bases, right greater than left. The correct diagnosis is probable lower lobe cystic bronchiectasis. Bronchiectasis arises from chronic airway inflammation, which results in wall thickening and airway dilation.

What to Look For
- Lower lobe cystic changes are usually caused by bronchiectasis or cystic lung disease, each of which have many causes
- Patients with bronchiectasis will have cough, productive of mucopurulent sputum for months to years, frequently with exacerbations
- Patients with bronchiectasis may also complain of shortness of breath, wheezing, or pleuritic chest pain

Pearls for Urgent Care Management
- Acute bronchiectasis exacerbations are defined as clinical deterioration with at least 3 of the following symptoms for at least 48 hours: cough, sputum volume/consistency, sputum purulence, shortness of breath, fatigue, and hemoptysis
- A gram stain and sputum culture should be performed prior to initiating antibiotics
- Without recent culture information, first line antibiotic should be a fluoroquinolone
- Referral to pulmonology for further evaluation and treatment is warranted

29-Year-Old With Stinging Sensation


Figure 1.

A 29-year-old woman presents to urgent care for a painful rash that developed on her arm. It started 1 day after working on a landscaping project that involved pulling weeds under intense sunlight. On examination, an edematous, pink, scaly plaque and nearby erosions are seen on her right arm. The patient appears well and has no systemic symptoms.

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

Acknowledgment: Image and case presented by VisualDx (www.VisualDx.com/jucm).


Figure 2.

Differential Diagnosis
- Arthropod bites or stings
- Hogweed dermatitis
- Solar urticaria
- Sunburn

Diagnosis
The correct diagnosis in this case is hogweed dermatitis. Exposure to the giant hogweed plant (*Heracleum mantegazzianum*) can cause phytophotodermatitis, especially in sunlit environments. A toxic psoralen present in the sap, furocoumarin, is highly lipid-soluble and penetrates into the epidermis. Absorption of ultraviolet A by the psoralens leads to nucleic acid damage and formation of free radicals. Subsequent cell death leads to the quick formation of painful blisters.

What to Look For
- Preceding the skin lesions, the patient may experience a burning sensation. This is followed by erythema, edema, and vesicle formation within 24 hours of contact with the hogweed sap
- If severe, patients experience headaches and generalized fatigue; they may also complain of feeling hot
- Contact of the sap with the eyes can cause temporary or even permanent blindness
- Symptoms usually develop within 18-48 hours following contact with the sap and sunlight exposure, and symptoms may continue for a month
- The plant is large with a hollow stem, and children may be inclined to use it as a play telescope or sword

Pearls for Urgent Care Management
- Ensure the area has been cleaned with soap and water to remove all sap
- Initial treatment is with a topical steroid
- Use over-the-counter non-steroidal anti-inflammatories for pain management
- If the patient has severe wounds, demonstrating 2nd or 3rd degree burns, contact a burn center

CLINICAL CHALLENGE: CASE 3

15-Year-Old Gasping for Air

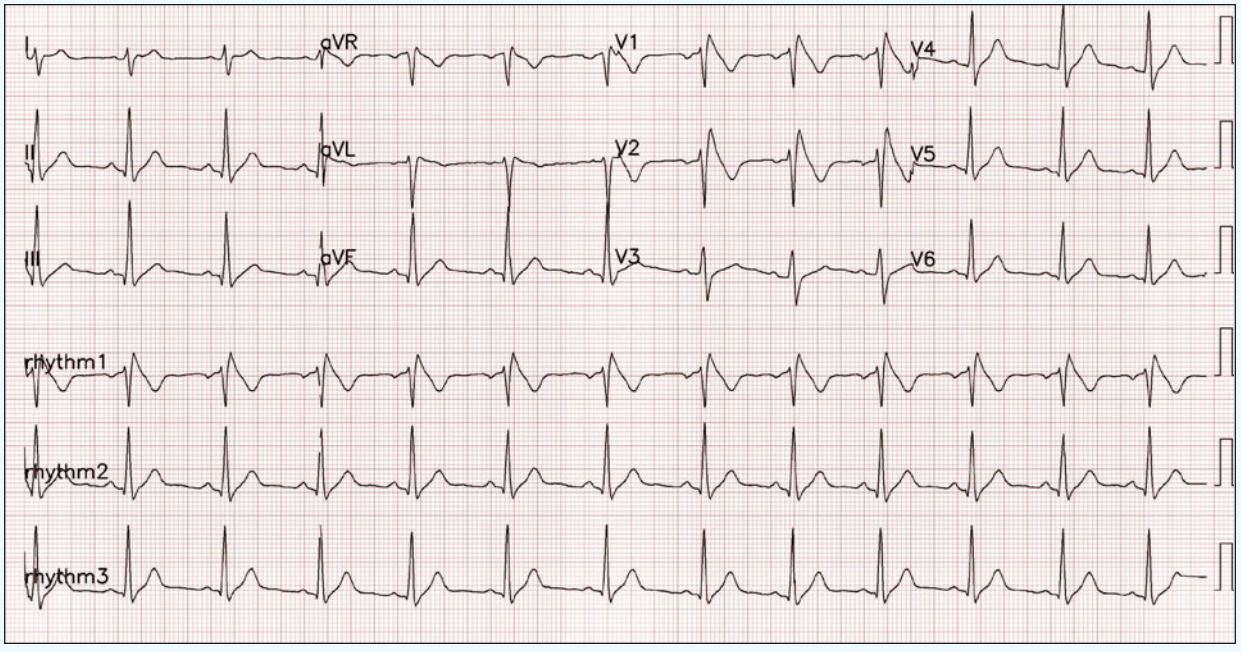


Figure 1: Initial ECG

A 15-year-old male with no significant past medical history presents after he was noted to be gasping for air and difficult to arouse after taking a nap. At the urgent care, an ECG is obtained.

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

Case presented by Erik Alvarado, MD, McGovern Medical School at the University of Texas Health Science Center at Houston.

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

ECG STAMPEDE

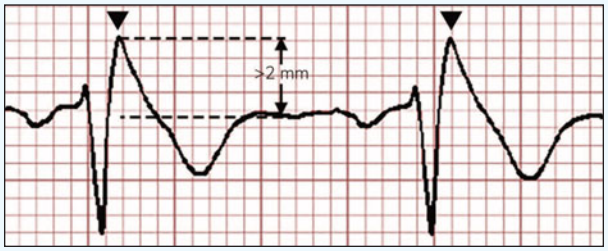


Figure 2: Coved-type Brugada pattern in V1 (arrowheads) with › 2 mm ST-segment elevation.

Differential Diagnosis

- Right bundle branch block (RBBB)
- ST-elevation myocardial infarction (STEMI)
- Brugada syndrome
- Hypokalemia
- Tricyclic antidepressant toxicity

Diagnosis

The correct diagnosis in this case is Brugada syndrome. The ECG reveals a normal sinus rhythm at a rate of 78 beats per minute, normal axis. The right-sided precordial leads (V1 and V2) have an rSR' appearance and a coved ST segment with › 2 mm elevation followed by an inverted T wave.

Discussion

First described in 1992 under the original name of "right bundle branch block, persistent ST segment elevation and sudden death,"[1] Brugada syndrome is a sodium channelopathy that can easily be misdiagnosed as a benign RBBB given the RSR' appearance in V1 and V2. However, upon closer inspection, the ST segments have a peculiar, coved appearance with a J point/ST-segment elevation › 2 mm, not seen in RBBB. Additionally, the QRS complex is narrow (‹120 msec), excluding RBBB. While there is ST-elevation in 2 contiguous leads, the absence of reciprocal ST-segment depressions in anatomically opposing leads (in this case, inferior leads II, III, and aVF) as well as the clinical context should prompt the clinician to consider alternative diagnoses. These findings describe a Type 1 Brugada pattern, which is now recognized as the only type to establish the diagnosis whether seen spontaneously or provoked by drug challenge (usually class I antiarrhythmics/Na+ blockade drugs).[2,3]

The ECG changes can be spontaneous or transiently provoked by fever or drugs[3] and should prompt transfer to an electrophysiology-capable center, especially in the context of syncope.

One interesting presentation for Brugada is nocturnal agonal respirations. Sudden death after these frightening gasps have been reported in Southeast Asia, where it was previously described as sudden unexplained nocturnal death syndrome (SUNDS). This phenomenon was previously known in the Philippines as *bangungut* —"to rise and moan in sleep;" in Japan as *pokkuri*—"sudden and unexpectedly ceased phenomena;" and in Thailand as *Lai Tai*—"death during sleep."[4] This unique presentation of syncope, as in this case, should prompt consideration of Brugada syndrome.

Regarding the other diagnoses listed in the differential, hypokalemia is known to cause a prolonged repolarization phase, leading to a long QT interval, U waves, or a wavy appearance of the repolarization phase secondary to T-U fusion. A tricyclic antidepressant overdose is known to cause findings of sodium channel toxicity including QRS widening, a right axis deviation, and a tall terminal R in aVR. Neither of these diagnoses are consistent with the findings in this ECG.

What to Look For

- The type 1, or coved-type Brugada pattern consists of an rSR' appearance in V1 and V2 combined with downsloping ST-segment elevation (›2mm) followed by a negative T wave.
- When seen in the context of syncope, nocturnal agonal respirations, or a family history of sudden cardiac death, the diagnosis of Brugada syndrome is suggested and the patient is at risk for fatal ventricular dysrhythmias.

Pearls for Initial Management, Considerations For Transfer

- The Brugada Pattern found on routine ECG in an asymptomatic patient does not necessarily warrant transfer, but a discussion for follow up with a cardiologist is prudent.
- If symptomatic, especially with syncope or abnormal breathing pattern, transfer to the emergency department with pacer pads in place.

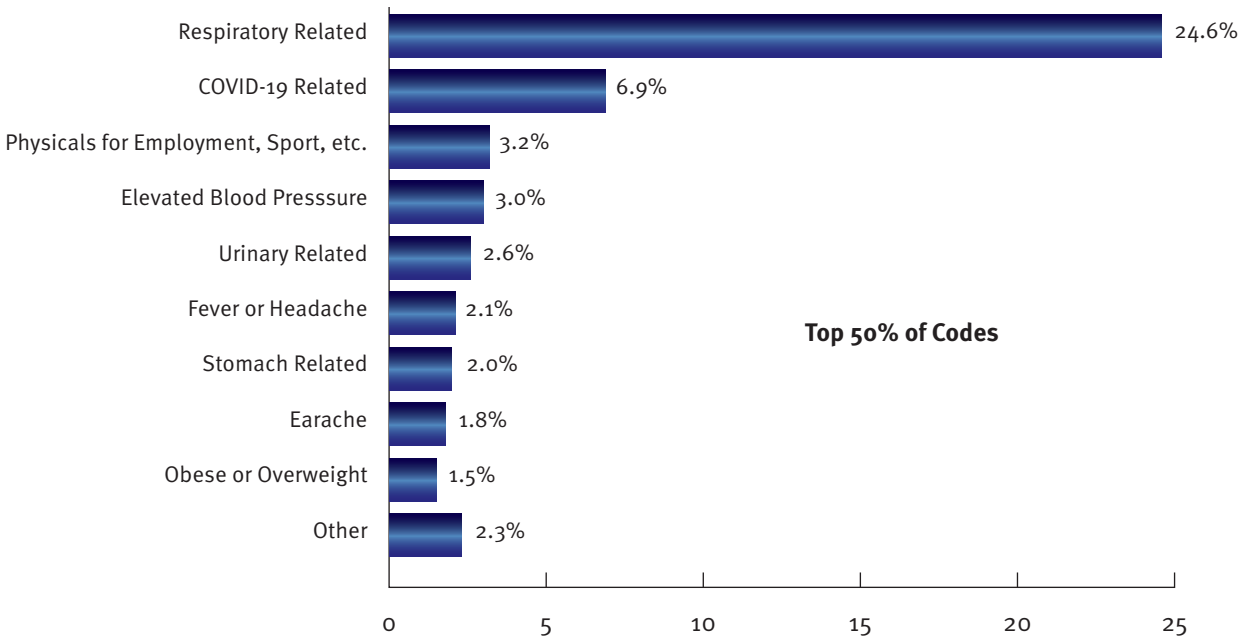
References

1. Brugada P, Brugada J. Right bundle branch block, persistent ST segment elevation and sudden cardiac death: a distinct clinical and electrocardiographic syndrome. A multicenter report. *J Am Coll Cardiol*. 1992;20(6):1391-1396. doi:10.1016/0735-1097(92)90253-J
2. Sieira J, Brugada P. The definition of the Brugada syndrome. *Eur Heart J*. 2017;38(40):3029-3034. doi:10.1093/eurheartj/ehx490
3. Marsman EMJ, Postema PG, Remme CA. Brugada syndrome: update and future perspectives. *Heart*. 2022;108(9):668-675. doi:10.1136/HEARTJNL-2020-318258
4. Antzelevitch C, Brugada P, Brugada J, Brugada R, Towbin JA, Nademanee K. Brugada syndrome: 1992-2002: A historical perspective. *J Am Coll Cardiol*. 2003;41(10):1665-1671. doi:10.1016/S0735-1097(03)00310-3

Categorization of Codes Most Frequently Used in Urgent Care

Alan A. Ayers, MBA, MAcc

TOP ICD-10 CODES USED IN URGENT CARE IN 2023 BY PERCENT OF ALL CODES



Note: Because multiple codes may be applied to a patient encounter, data is reported as a percent of total codes used.
Source: Experity, Inc. Electronic Medical Records Data from 1/1/2023 to 12/31/2023. Analysis by Alan Ayers.

International Classification of Disease (ICD) codes—maintained by the World Health Organization and published in the United States by the Centers for Medicare and Medicaid Services—standardize the categorization and reporting of patient diagnoses. Currently, U.S. healthcare operators use the ICD-10 edition. The analysis above examines 2023 urgent care visits logged by users of Experity's electronic medical record, revealing that 28,686 diagnosis codes were documented in urgent care patient medical records.

While it's logical to conclude this broad range of documented diagnoses reflects urgent care's standing as a "general practice," in actuality, urgent care is quite focused. In fact, the top 35 most frequently used codes represent 50% of all codes used in urgent care. These top ICD-10 codes are grouped and categorized in the chart above. ■

Alan A. Ayers, MBA, MAcc is President of Experity Consulting and Senior Editor of *The Journal of Urgent Care Medicine*.

Discover Experity CORE

FIND YOUR NEW EMR COMFORT ZONE

Tired of workarounds, inefficient software, and painful integrations?

While your EMR is predictable and comfortable, it may also come with costs like leaking revenue, sluggish growth, flat earnings, stress-related turnover, and low patient satisfaction.

With Experity EMR CORE, you can alleviate the costs and find your new comfort zone

- Super-efficient EMR and PE solution in a single offering
- User-friendly technology reduces staff and provider stress
- Simple contracts alleviate surprise charges
- Short implementation timeline reduces disruption
- Expert, always-on training and support, how and when you need it
- Improved clinic performance

Let Experity help you find your new EMR comfort zone, fearlessly.

GET STARTED

EXPERITY®