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THE BODY KEEPS THE SCORE

A Book Review

Corey D. Fogleman, MD, FAAFP

Editor in Chief



In this issue of *JLGH*, we feature two articles describing medical trauma, one of many risks our patients face. This prompted me to take Dr. Cherise Hamblin's advice¹ and reread *The Body Keeps the Score*, the 2014 bestseller by Bessel van der Kolk. In it the author posits that many of the depressive, anxious, disorganized emotional symptoms we as clinicians have come to label as aspects of bipolar disorder or major depression are in fact linked to trauma. Further, we can treat these and the accompanying somatic concerns by addressing the physical as much as the psychological self.

This theory has merit. More than 50% of people who seek psychiatric care report having been physically abused, abandoned, neglected, or sexually abused as children, or have witnessed these atrocities within their own families. Further, more than 600,000 cases of child abuse and neglect are substantiated each year in this country; in Pennsylvania alone, there are more than 4,000 such cases every year.²

Certainly, trauma's prevalence is wide reaching, and it can have any number of long-term effects, including severing connections or limiting the development of those connections that allow accurate interpretation of body systems. This can lead to hard-to-diagnose somatic concerns.

The trauma-based theory suggests that adaptive mechanisms, learned or stumbled upon, innate or executed, may be the source of many of the symptoms we as clinicians see in our patients. Individuals may lose — or experience breakdown of the basic ability to manage — control of their bowels, bladder, appetite, and social connections, and the failure to regulate basic functions can impact so many aspects of our lives. Obesity, drug use disorder, and the capacity to attend to school, job, or family responsibilities all may follow.

This theory is not necessarily in opposition to the organ-based disease model of mental health, one that suggests patients with generalized anxiety have an intrinsic chemical imbalance. Yet, is it a sign of success that one in 10 Americans now takes antidepressants? One wonders how well pharmacological agents may work in the long run. Whom among us isn't worried that the side effects of the antipsychotics we prescribe might not be worth the benefit they provide? Do these agents themselves interfere with our capacity for maturity and creating connections?

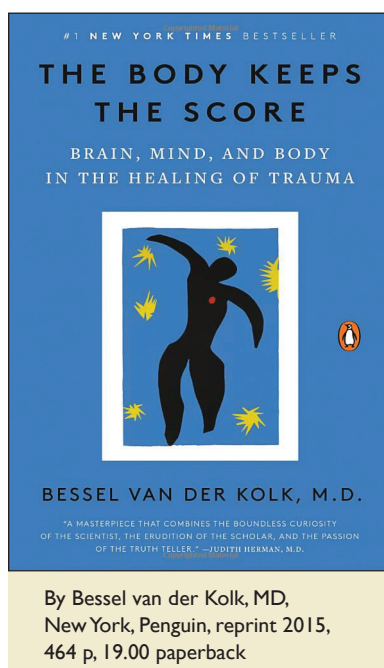
Thus, it would seem, many patients who present with psychiatric and/or somatic concerns may be harboring a trauma history. What should we be asking? This is certainly a social determinant of health.

Questions to probe further might include: "Who do you count on in your everyday life?" "When you are sick, who helps comfort and connect you to medical care?" and "Who do you confide in?" When referencing one's maturation, we might inquire about who in the family was affectionate, who treated the patient like they were special, and who made and enforced the rules. Further, it may be worth asking what features of a patient's history they think helps define them.

Van der Kolk's research reinforces that our brains are designed to function within social groups. Thus, mirror neurons explain some of our capacity to feel empathy, to synchronize our mood and language, to connect. Trauma treatment might entail finding ways

to reactivate and safely mirror and be mirrored by others, to feel grounded in the present and with purpose.

One of the most compelling aspects of this trauma-based theory is how Van der Kolk champions our capacity to recalibrate the autonomic nervous system and aspects of our "lizard brain," where emotional



reactions are out of reach of our logical mind. His research and writing suggest opportunities for treatment, many unconventional. Means to monitor and enhance heart rate variability may help restore mind-body connections within us. Further, breath exercises, chanting, martial arts, and group activities that activate personal rhythms – like drumming and dancing – help us coordinate with social networks and reconnect and reorganize.

There is still a role for cognitive behavioral therapy, the most well-studied and well-documented psychological technique, but just as valuable may be interventions that improve mindfulness, utilize therapeutic touch, and activate the body. Therefore, Van der Kolk advocates eye movement desensitization and reprocessing (EMDR) and activities such as dance, yoga, martial arts, and crafting.

Anecdotal evidence even suggests that improv-theater and acting workshops may help patients across the spectrum of psychiatric disease to achieve

breakthroughs when it comes to reconnecting the body and mind.

Like any writer who knows his area intimately, this author pulls back the curtain, yet readers may well appreciate the light he shines on the politics that have shaped updates to the *Diagnostic and Statistical Manual of Mental Disorders*. Overall, however, this text – now celebrating its 10th year in publication – continues to offer insights nearly any clinician will value. It is well worth the read.

I hope you'll enjoy the trauma-informed care articles that follow, along with all this issue of *JLGH* to offer!

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JLGH SPRING 2023 RECAP

Q&A for Extended Learning

The Spring issue of The Journal of Lancaster General Hospital offered scientific reports on colorectal cancer screening and fall risk screening, and recommendations from pediatric medical organizations on radiography and antibiotic use in children. Review the questions and answers below to see how much you remember from the issue. Need a refresher? All issues of JLGH are available online at JLGH.org.

Q In Summer 2022, LG Health partnered with other Lancaster organizations to study Black men's perceptions about colorectal screenings. Noted barriers to screening included fear and mistrust in health care systems, fear of cancer diagnosis, cost concerns, and the invasiveness of a colonoscopy. List the three key interventions suggested to improve screening for the Black community.

A The best results come from combining techniques to increase each of these: 1. Interest on the part of the patient being screened. 2. Access to screening. 3. Screening recommendations from providers.

Q Falls are a serious threat to the health and well-being of the aging population. Which of the following is NOT a useful intervention to decrease the risk of falls?

1. Medical review and update.
2. Ophthalmology/optometry referral.
3. Lifestyle changes such as better hydration and enhanced physical activity.
4. Vitamin C supplementation.
5. Occupational/physical therapy referral.

A The answer is:

4. Vitamin C supplementation. In appropriate patients, *Vitamin D* supplementation can reduce risks.

Q The AAP Choosing Wisely campaign suggests that radiographs should not be obtained in children with presumed bronchiolitis, croup, asthma, or first-time wheezing. Why not?

A While rarely yielding important positive findings, radiographs expose patients to radiation, increase the cost of care, and prolong emergency department lengths of stay. Additionally, radiography performed in the absence of significant concerns is associated with antibiotic overuse.

EMERGING TICKBORNE DISEASES IN PENNSYLVANIA

A Case Discussion and Summary of a Department of Health Advisory

Pratiti Roy, MD

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In August, a 55-year-old woman presents to your Lancaster County clinic complaining of fever, diffuse joint pain, and chills. She started having these symptoms yesterday. She denies shortness of breath, chest pain, or rash. She is an avid hiker who claims she scrupulously checks herself for ticks after every outdoor excursion and has not noted any bug bites recently. She is otherwise healthy and up to date on all her preventive care. At home she has had temperatures up to 103°F. In your office, her vitals are normal. Her exam is otherwise unremarkable. You order a complete blood count, comprehensive metabolic panel, and Lyme panel. Her results come back showing a mild leukopenia and slightly elevated transaminases. Her Lyme testing is negative.

EMERGING TICKBORNE ILLNESSES

Borrelia miyamotoi infection is also known as hard tick relapsing fever.¹ The bacteria implicated here is closely related to *Borrelia burgdorferi*, the pathogen that

causes Lyme disease, and is spread by the same vector, *Ixodes scapularis* – commonly known as the blacklegged tick or deer tick. The Pennsylvania Department of Health recently issued an advisory warning about an increase in *B. miyamotoi* infections² in the state after researchers reported that 1% of adult deer ticks in the state are carriers of *B. miyamotoi*.

Like *B. burgdorferi* infections, *B. miyamotoi* infections are spread through a tick bite. However, while *B. burgdorferi* transmission requires a tick be attached for between 36-48 hours to transmit the infection, *B. miyamotoi* can be transmitted within 24 hours of attachment.³ In addition, while *B. burgdorferi* is transmitted to a tick while feeding from an infected host, *B. miyamotoi* can spread via vertical transmission from mother to egg, which means a larva that has not yet fed can potentially spread the disease.³ Thus, while *B. burgdorferi* tends to spread throughout the spring and summer, *B. miyamotoi* infections peak in July/August, when larvae are most prevalent¹ (see Fig. 1). These tick larvae are incredibly small – the size of a poppy seed (see Fig. 2 on page 36) – which makes them difficult to detect.

Patients infected with *B. miyamotoi* also present in a way that is unique from patients who are infected with *B. burgdorferi*. Usually, patients with *B. miyamotoi* will complain of fever accompanied by arthralgias, headache, chills, and fatigue. Gastrointestinal symptoms, rash, and dyspnea are much less common than in patients with *B. burgdorferi* infection. Common lab findings in a patient with *B. miyamotoi* infection include leukopenia, thrombocytopenia, and elevated transaminases.² Notably, in

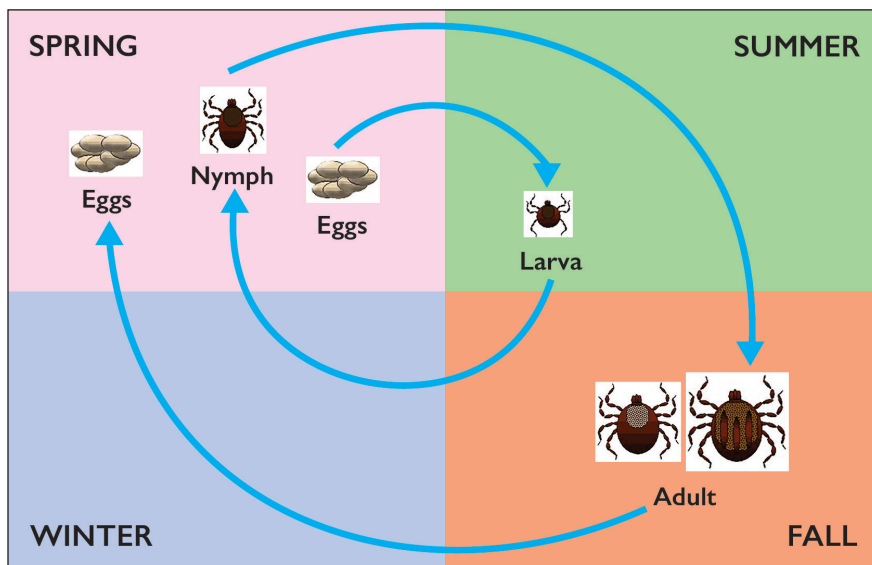


Fig. 1. The lifecycle of a tick, showing larvae most prevalent in summer. Adapted from CDC sources.

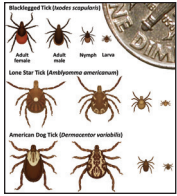
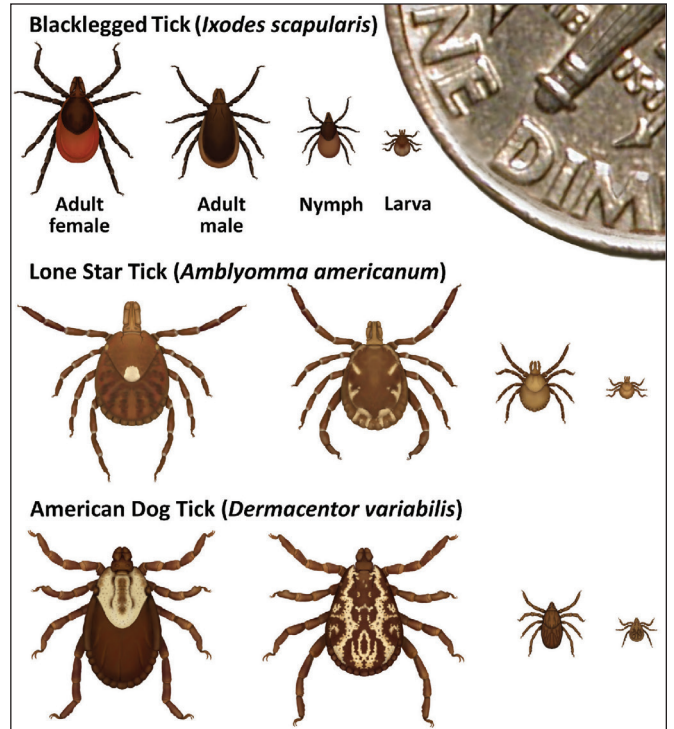


Fig. 2. The actual size of tick larvae is incredibly small – the size of a poppy seed, as seen at left. The same figure is enlarged at right to show markings and stages of common tick species. Figure from cdc.gov/ticks/life_cycle_and_hosts.html.



an immunocompetent patient, symptoms tend to be milder and more self-limited; there also does not tend to be relapse of the fever or any other chronic symptoms. In an immunocompromised patient, there is the potential for central nervous system involvement, although this is not commonly seen.³

Commercial testing is available, but it is separate from standard tickborne illness panels. At Penn Medicine Lancaster General Health, the test is available as a send-out polymerase chain reaction (PCR) test that can take days to weeks to come back. The recommended treatment in patients with *B. miyamotoi* is two to four weeks of doxycycline.² In pediatric and pregnant patients, amoxicillin is an appropriate alternative.³ Improvement should be noted within 72 hours; the Jarisch-Herxheimer reaction is a possibility. While post-exposure prophylaxis is available to prevent *B. burgdorferi* infection, this has not been shown to be useful against *B. miyamotoi*.

The literature does not provide guidelines on whether clinicians should treat empirically or wait for test results. On the one hand, the test results can take so long to return that waiting for a result could potentially delay treatment by weeks. In addition, *Ixodes* can carry multiple pathogens, thus co-infection is a concern in treating any tickborne illness.⁴ The benefit of doxycycline is that it treats not only *Borrelia* infections, but it also treats anaplasmosis, a common co-infection

in *Ixodes* ticks.⁴ However, it is also worth noting that in many immunocompetent patients, this appears to be a self-limited illness without known long-term repercussions. An analysis of serum samples of people living in New England found that 5% to 10% of participants had a prior infection with *B. miyamotoi* with minimal to no symptoms and thus had never sought or received treatment with no long-term consequences.⁵ In the absence of clear recommendations, treating empirically seems like the safer option; shared decision-making should be employed.

The Pennsylvania Department of Health advisory also includes updates on two other tickborne diseases:



Fig. 3 (left). Rocky Mountain Spotted Fever rash. Photo from cdc.gov/dotw/rmsf/index.html.

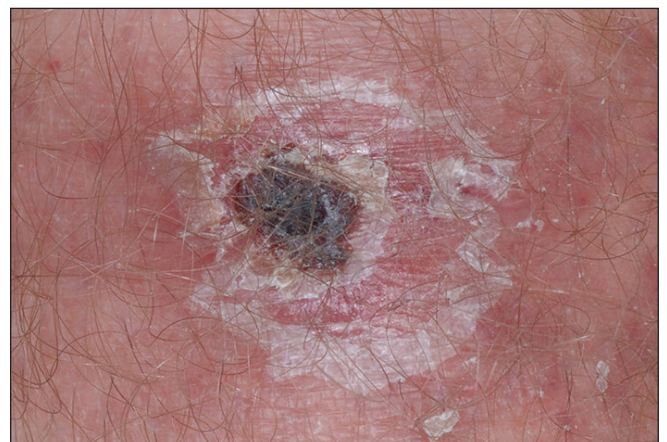


Fig. 4 (right). Spotted fever rickettsiosis eschar. Photo from cdc.gov/otherspottedfever/healthcare-providers/index.html.

Heartland virus and Spotted fever rickettsiosis. These two diseases were previously unheard of in Pennsylvania, as their vectors – the lone star tick and the gulf coast tick, respectively – could not be found here. However, due to climate change, there has been northward expansion of these ticks' range,⁶ and it is valuable to be aware of the diseases these ticks carry.

A patient infected with the Heartland virus, spread by the lone star tick, can present with fever, fatigue, anorexia, nausea/vomiting, diarrhea, and/or headache. Treatment consists of supportive care. Lab results will show leukopenia, thrombocytopenia, and elevated transaminases. Testing for Heartland virus is available by coordination with the Centers for Disease Control and Prevention (CDC). In Pennsylvania, clinicians should contact the Pennsylvania Department of Health for help. A lone star tick in southeastern Pennsylvania has been found to have Heartland virus, but thus far there have been no cases of human infection in the Commonwealth.²

Spotted fever rickettsiosis is caused by the bacteria *Rickettsia parkeri*, a bacteria related to *Rickettsia rickettsia*, which causes Rocky Mountain Spotted Fever (RMSF). *R. parkeri* is spread by the gulf coast tick, which was first found in Pennsylvania in 2022. The illness course of Spotted fever rickettsiosis tends to be less severe than RMSF, but the presenting symptoms are similar: maculopapular rash (see Fig. 3), fever, headaches, and myalgias. One distinguishing factor is the presence of an inoculation eschar (see Fig. 4) – a

necrotic lesion that forms around the site of the tick bite. This eschar is generally not present in RMSF. Like RMSF, if there is suspicion for Spotted fever rickettsiosis, it is best to start treatment with doxycycline empirically (100 mg twice daily for five to seven days in adults). While commercially available PCR testing for RMSF exists, testing for *R. parkeri* can only be done through coordination with the CDC, with assistance from the Pennsylvania Department of Health.²

CASE DISCUSSION

To return to our initial case of presumed tickborne infection, testing this patient reveals she is positive for *B. miyamotoi*. Treatment with doxycycline is initiated, and she completes two weeks without missing any doses. Your patient's symptoms resolve, and at her follow-up she is fully recovered and states she will be more liberal with bug spray when she goes hiking.

As a clinician, it can be challenging to stay up to date on tickborne diseases. Climate change is creating warmer and more humid conditions that allow both for northward creep of ticks that used to have a more southern range and for increased activity in those areas where ticks are endemic.⁷ We are living in a world where the incidence of diseases like Lyme disease and RMSF are increasing alongside emerging tickborne infections that we are just starting to understand. Both the CDC and the Pennsylvania Department of Health have helpful guidelines on diagnosis and management of tickborne diseases; they are updated frequently.^{3,8}

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TENOSYNOVITIS AND LYMPHANGITIS IN THE SETTING OF MPOX INFECTION

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INTRODUCTION

Mpox, previously called monkeypox, is a viral disease in the same genus as smallpox. The disease was first noted in monkeys in a Danish laboratory in the 1950s. Mpox was considered rare and was confined to central and western Africa prior to the 2022 global public health emergency. In general, mortality is low; however, individuals who are very young or immunocompromised are more likely to die or have severe illness.¹

The classic presentation includes flu-like symptoms followed by a characteristic rash. The rash usually begins as macules and progresses to umbilicated papules, vesicles, pustules, and finally scabs. It can be on the extremities, genitals, chest, and/or face.

The 2022 Mpox global public health emergency was unique in that flu-like symptoms were not always present, but when present, could occur before, after, or concomitantly with onset of the rash. Mpox is spread through direct contact, with the most recent outbreak being transmitted primarily through sexual contact.¹ Vertical transmission from mother to fetus is also possible. The incubation period for the disease is 3-17 days.^{1,2} The individual is contagious until the rash has healed.

Individuals with a rash consistent with Mpox or who have known or suspected exposure should be tested. Mpox cases were first noted in Europe in May 2022 and quickly spread to the United States, including Lancaster, with incidence of infections reaching a peak in August 2022.³

CASE

At the height of the Mpox epidemic in the summer of 2022, a 51-year-old male presents via email to his primary care provider with a lesion on his left distal index finger which he reports has been present for three days. He is concerned about Mpox infection, as he has sex with men and, although he is married, he does have a new sexual partner as of two weeks ago. His recent sexual partner reports being negative for Mpox; however, it is unknown if the partner was tested.

The patient had been healthy until this presentation; his only medications are emtricitabine/tenofovir disoproxil fumarate (Truvada®) for HIV prophylaxis and hydroxyzine as needed for insomnia. He has no flu-like symptoms nor symptoms suggesting lymphadenopathy. He sends a day 3 photo via the online health portal, which was reviewed by his provider. (See Fig. 1 for photos showing progression of an Mpox finger lesion.) He receives reassurance from his provider, who recommends follow-up as needed.

On day 5, he sends another photo to his PCP and is instructed to go to an urgent care center for Mpox testing. When he presents to urgent care on day 6, the lesion appears pustular and is unroofed for Mpox testing. The patient is also started on an outpatient course of trimethoprim-sulfamethoxazole. Polymerase chain reaction (PCR) testing on day 6 confirms Mpox within four days.

On day 8, he reports he has been abstaining from sex and has stopped taking his Truvada®; it is unclear if the patient did this on his own or by recommendation from a physician.

By day 9, the patient has developed mild pain at the site of the lesion, and on day 10, the patient presents to his PCP office with a second lesion on his left wrist, although he has no other systemic symptoms. His PCP performs an incision-and-drainage, which yields only minimal serous drainage and no improvement in pain. On day 13, the patient's pain worsens and is unrelieved by ibuprofen. It is reported that the patient's husband has tested negative for Mpox.

The patient is reevaluated in the office on day 14, after again submitting photos via the online health portal. The exam is concerning for necrosis at the site of the initial lesion, superimposed cellulitis, and tenosynovitis with lymphangitis extending up the entire left upper extremity (see Fig. 2 on page 40). An X-ray reveals no evidence of osteomyelitis. His PCP recommends referral to the emergency department for evaluation and pain control.

The patient is subsequently hospitalized and treated with IV piperacillin-tazobactam (Zosyn[®]) and vancomycin. Infectious Disease and Orthopedics are consulted. Blood cultures are negative, bloodwork shows negative inflammatory markers, and a complete blood count is notable because it shows no leukocytosis.

Oral tecovirimat is started on day 15, and a C-reactive protein test is slightly elevated for the first time during his hospitalization. Orthopedics service recommends observation. Vancomycin is stopped, as the patient had a negative MRSA swab. The patient begins to experience pain relief by day 17.

On day 18, IV Zosyn[®] is stopped, and the patient is discharged on oral Vantin[®] and TPOXX[®] to complete a 14-day course per Infectious Disease recommendations. The patient's complete blood count and comprehensive metabolic panel are within normal limits at discharge. Inflammatory labs are not repeated as the patient is improving overall.

At his transition-of-care appointment on day 23, the patient's left finger pain is much improved. The necrotic lesion on his left finger and left wrist are healing. He is noted to have three additional lesions on his right lower extremity that are crusted and asymptomatic. Follow-up three months later at his PCP reveals that the patient has recovered completely.

DISCUSSION

The differential diagnosis for this case included an alternative viral infection such as hand, foot, and

mouth disease, as well as molluscum contagiosum. These seem less likely due to characteristic physical exam findings of a bacterial infection and positive Mpx testing of the lesion.

Other sexually transmitted infections (STIs) could have been implicated, and although STI testing was not performed, testing could have ruled out primary syphilis and other STIs. Studies suggest a high rate of concurrent STIs among individuals diagnosed with Mpx, so testing might have been appropriate even after Mpx was confirmed.² An autoimmune etiology was unlikely, as this patient did not have a personal history of autoimmune disorders.

The unique aspect of this case is the development of tenosynovitis, lymphangitis, and necrosis associated with the Mpx lesion. Ultimately, these complications were due to a secondary bacterial infection; this conclusion is supported by clinical improvement with antibiotic therapy.

Necrosis and lymphangitis characteristic of bacterial infection was a rare occurrence in the 2022 pandemic of Mpx. In an international case series, soft tissue infections only occurred in 18 individuals out of 528 patients with Mpx. The case series did include individuals with HIV (who were mostly gay and bisexual men), but the study did not indicate if the 18 individuals with soft tissue infections had HIV nor whether their HIV was appropriately treated.² The patient in this case did not have HIV and was appropriately on Truvada[®] for preexposure prophylaxis. He was taking

it as prescribed prior to his Mpx infection; therefore, it is highly unlikely he was immunocompromised by an active HIV infection.

It is also notable that the patient did not develop a rash in the typical anogenital or oral regions, which is the usual site of inoculation for Mpx. While his sexual practices and exposure were not discussed in detail, the specifics of this case support the conclusion that any contact site on the skin can lead to development of the characteristic Mpx rash. This patient also developed a

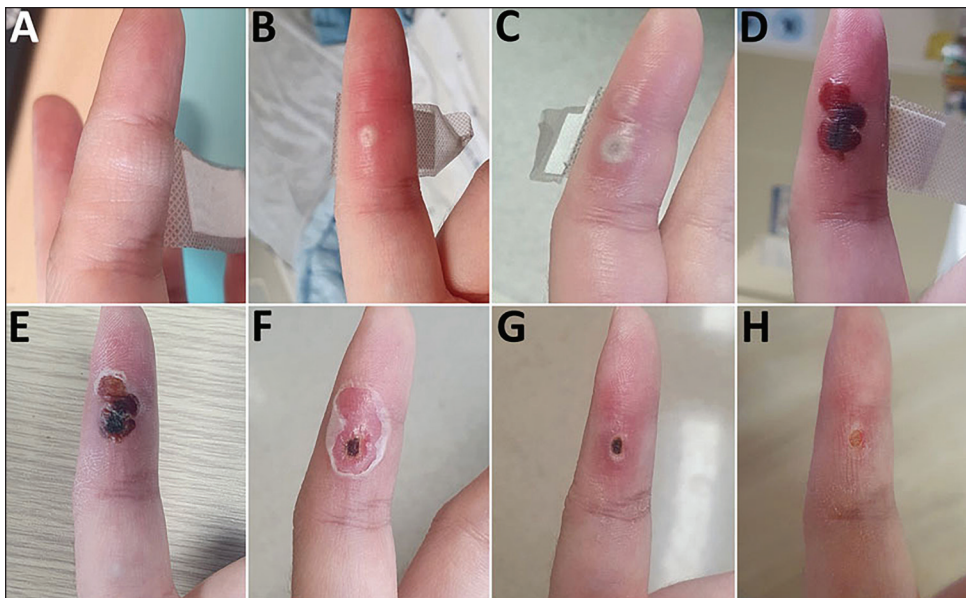


Fig. 1. Photos showing progression of Mpx finger lesion, similar to that on patient's left distal index finger: A) day 1; B) day 6; C) day 8; D) day 18; E) day 22; F) day 25; G) day 34; H) day 40. Photos from <https://wwwnc.cdc.gov/eid/article/29/5/23-0028f1>.

secondary bacterial infection that undoubtedly contributed to his pain. The fact that his rash-related pain was unrelieved with over-the-counter medication is one reason why hospitalization was necessary for this patient, and in fact, pain is often a reason for inpatient care of patients with Mpox.²

Among the 30,286 cases as of March 2023, there were 38 deaths in the United States due to Mpox.¹ Additional history is not available for these cases, so it is unknown to what extent other concomitant conditions contributed to these deaths. The low case fatality rate is likely due to the less virulent strain of Mpox that affected most patients in the United States.⁴ Severe illness and death are more likely to occur in immunocompromised individuals. Our patient met criteria for severe illness as he required hospital admission for IV pain medications and antibiotics. However, it should be noted that he was relatively healthy with no other chronic conditions.

This case highlights that although it is unusual, health care providers should be aware of the potential to develop secondary bacterial infections with Mpox lesions. It should also be noted that patients who are on antiretroviral therapy for HIV do not appear to have increased complications or hospitalizations when contracting Mpox during this outbreak.⁴

As stated previously, it is common for patients to have a concomitant STI, including a new diagnosis of HIV, at the time of Mpox diagnosis, so STI and HIV screening is indicated for all individuals with sus-



Fig. 2. Day 14 photos showing cellulitis and tenosynovitis.

pected Mpox. This patient provided almost daily pictures of his finger lesion which allowed his primary care providers to consistently monitor his progression. Health care providers can utilize available technology to remotely monitor patients with potentially transmissible pathogens.

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TRAUMA-INFORMED CARE INITIATIVE IN THE NICU

Nurse Perspectives

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INTRODUCTION

Trauma is a distressing event or circumstance experienced by an individual that results in adverse effects, impacting function and well-being.¹ Trauma-informed care (TIC) is an emerging intervention approach in health care that recognizes the impact of trauma and, in turn, provides environments that are safe, respectful, and welcoming for infants, family, and staff.²

The stressful environment of the neonatal intensive care unit (NICU), while supporting vulnerable children, can be negatively impactful on nurses working in this setting; they are primary caregivers of a vulnerable population.^{3,4}

Daily NICU stressors for infants include separation from parents, repetitive painful procedures, constant change of caregivers, continuous noise, harsh lighting, and noxious smells.⁵ Parents and families may experience trauma as they fear for their infants' survival, are deprived of a "normal" start to their children's lives, and feel uncertainty and a lack of control regarding the future. The stress from this trauma may impact a parent's health and well-being during the NICU experience.^{1,6} Parents may feel overwhelmed by the technologically advanced equipment, tubes, and medical procedures, and may experience emotional challenges or disruptions in roles and occupations.⁷⁻⁹

Increasing health care providers' knowledge about TIC in the NICU may increase the quality of care and promote better outcomes for those involved in the treatment process. Nurses are uniquely positioned to play a role in the implementation of a TIC approach with infants and families in the NICU.

This is a two-part study in which we:

1. Aimed to determine by a *quantitative analysis* if an educational intervention could improve NICU nurses' awareness of trauma and perspectives about TIC.

2. Assessed by a *qualitative analysis* if NICU nurses incorporate a TIC approach into their practice after completing the TIC educational intervention.

METHODS

Study Design

Part one of our study utilized a quantitative, one-group pretest-posttest design that collected participant demographics, ascertained participants' familiarity and utilization of TIC, and tested participants' knowledge of TIC. Pretesting began in March 2021 and posttest was completed in May 2021. The goal was for participants to take the pretest, complete the educational module, and complete the posttest in one sitting; while not all participants were able to do that, they all completed these tasks within three weeks of initiating them. We compared scores on the knowledge portion of the pretest to results on the posttest.

Part two used a qualitative phenomenological design to solicit perspectives of NICU nurses one year after participating in the TIC educational intervention using interview transcriptions and fieldnotes. The interviews took place in February 2022. Interviews were conducted by student researchers and lasted approximately 30 minutes. The interviews were audio recorded and transcribed via Zoom.

All participants gave informed consent to take part in the study, which was reviewed and approved in March 2021 by both the collaborating institution's (Protocol Number: 2021-13) and Elizabethtown College's (IRB Net ID:1729146-1) institutional review boards.

Materials

Materials for the first part of the study included a pretest that contained three questions about work demographics, asking how many years the participant

worked as a nurse, how many years they worked in the NICU, and what shift they worked most of their hours. The pretest continued with 15 questions, including 10 knowledge-based questions, one familiarity question, and three utilization questions. Questions followed multiple-choice, true/false, and five-point Likert-scale formats (see Fig. 1). Participants completed the pretest, TIC educational intervention, and posttest during working hours.

Upon completing the pretest, participants viewed a 30-minute TIC educational intervention in the form of a self-guided PowerPoint presentation with 39 slides designed by the NICU Developmental Care Team (DCT). The Developmental Care Team is a team of health care professionals who specialize in infant development. The team – which is chaired by NICU therapists, includes nursing staff, and exists independently of this study – regularly provides staff education and trainings, and creates new NICU initiatives.

Content of the PowerPoint presentation was based on current literature and included the definition of TIC, physiological symptoms of stress, and trauma that infants, parents, and professionals may face in the NICU setting.

Finally, participants completed a 16-question posttest, including 15 questions identical to the pretest: 10 knowledge-based questions, one familiarity question, three utilization questions, and one interest question. One additional question gauged participant perception of the educational intervention (see Fig. 1). The cooperating institution's NICU, DCT, and researchers collaborated to create the pretest and posttest.

Participants

We recruited participants for part one of the study using purposeful sampling. The inclusion criteria required participants to be NICU nurses employed by the institution.

The DCT recruited volunteers as participants for part two of the study using purposeful sampling. The part two inclusion criteria required participants to be nurses who participated in the first part of the study and continue to be employed by the institution and work in the NICU.

Emails with links were sent to all the nurses currently working in the NICU. The DCT shared the importance of the information via the nurse manager's weekly email and through personal interactions, yet the timing was challenging because the census in the NICU was very high at that time and there had been tremendous turnover. There were no incentives.

Data Collection

Each participant in part one of the study received an email with a link to access the pretest via Research Electronic Data Capture (REDCap®), a highly secure platform designed to build and manage online surveys and databases.¹⁰ After pretest submission, REDCap® granted participants access to a TIC educational training module link designed by the DCT and researchers. Participants received a third link with access to the posttest after completion of the training module.

In part two of the study, four qualitative unstructured interviews were the primary means of obtaining participants' perspectives of TIC in the NICU. Zoom interviews, which occurred in February 2022, one year after participants completed the educational intervention, were audio recorded and transcribed. We assigned participants with unique identifiers to maintain confidentiality.

Verification Strategies

The scarcity of validated tools that would fulfill our research question resulted in the development of an instrument unique for this study.¹¹ The DCT and researchers reviewed the survey to confirm all questions were relevant, mutually exclusive, and had comprehensive response scales.

We used a team-based approach to code the interview transcriptions.^{12,13} Triangulation of data analysis in this case means we used:

1. Member checking to ensure that our results represented participants' experiences and perspectives.
2. Reflexivity to help verify our interpretation of findings.
3. Bracketing to reduce the potential harmful effects of unidentified preconceptions that may have been related to the research topic.

Data Analysis

For part one of this study, we analyzed the data using paired sample t-tests in the Statistical Package for the Social Sciences (SPSS) software, calculated each subject's score for the pretest and posttest, then used SPSS to convert data into a histogram to determine whether data achieved the criteria for normality.¹⁴ Paired sample t-tests assessed the change and the statistical significance between scores. We labeled results as statistically significant if $p < .05$.

For part two we discovered emergent themes from participant interviews using manual, open coding to analyze the data through the interview transcriptions.

Fig. 1. Pretest and Posttest Questions

1. What are the four Rs of trauma-informed care?
 - a. Realize, Recognize, Respond, Replay
 - b. Realize, Recognize, Respond, Resist
 - c. Realize, Recognize, React, Replay
 - d. Read, Rest, Relax, Run
2. In relation to trauma-informed care, ACE stands for:
 - a. Adverse childhood experiences
 - b. Advanced clinical education
 - c. Adverse chronic effects
 - d. Attitude care encourage
3. Studies have reported that preterm infants experience about ___ stressful procedures per day.
 - a. 3 b. 6
 - c. 10 d. 16
4. It is important to provide visual stimulation for preterm infants in order to facilitate brain development.
 - a. True b. False
5. NICU stress can result in:
 - a. Changes in brain structure
 - b. Changes in biological set-point circuitry (i.e., HPA axis), aberrations in stress responsivity and stress-sensitive behaviors
 - c. Predisposition to a number of neuropsychiatric and behavioral disorders
 - d. a and b
 - e. a, b, and c
6. Research has identified negative developmental effects of NICU stress in infants through the age of:
 - a. 3 years old b. 12 months old
 - c. 7 years old d. 6 months old
7. Which of the following are the core measures for age-appropriate care in the NICU?
 - a. The healing environment, pain and stress prevention, protected sleep, activities of daily living, family collaborative care
 - b. Thermoregulation, pain and stress prevention, respiratory management, nutrition, skin protection
 - c. Thermoregulation, nutrition, protected sleep, family-centered rounds, clustered cares
 - d. Thermoregulation, family-centered rounds, clustered cares, infant-driven feeding, promoting skin to skin
8. Research shows that signs and symptoms of PTSD experienced by parents of infants in the NICU can be delayed up to ___ months after the infant's birth.
 - a. 1-3 b. 13-18
 - c. 2-5 d. 6-12
9. Nurses experiencing high levels of personal stress are at greater risk for developing which of the following?
 - a. Post-traumatic stress disorder
 - b. Compassion fatigue
 - c. Depression
 - d. Chocolate-dependency
10. Moral distress is a precursor to clinician burnout.
 - a. True b. False
11. How familiar are you with trauma-informed care in the NICU?
 - 1-Not familiar at all, 2-Vaguely familiar, 3-Somewhat familiar, 4-Familiar, 5-Very familiar
12. When caring for *infants* in the NICU, I incorporate a TIC approach.
 - 1-Rarely, 2-Seldom, 3-Occasionally, 4-Frequently, 5-Always
13. When interacting with *parents* of infants in the NICU, I incorporate a TIC approach.
 - 1-Rarely, 2-Seldom, 3-Occasionally, 4-Frequently, 5-Always
14. I am intentional in using strategies to manage my work-related stress.
 - 1-Rarely, 2-Seldom, 3-Occasionally, 4-Frequently, 5-Always
15. How interested are you in learning more about trauma-informed, age-appropriate care in the NICU?
 - 1-Not interested, 2-If necessary, 3-Slightly interested, 4-Interested, 5-Very interested

Additional Pretest Questions

- How many years have you worked as a nurse?
- How many years have you worked as a NICU nurse?
- What shift do you work (majority of your hours)?

Additional Posttest Question

16. How much did this PowerPoint increase your understanding of trauma-informed care in the NICU?
 - a. Unchanged
 - b. Somewhat
 - c. Unsure
 - d. Very significantly

Answers to knowledge-based questions: 1-b; 2-a; 3-d; 4-False; 5-e; 6-c; 7-a; 8-d; 9-b; 10-True

We used descriptive field notes to supplement and support our understanding of the emergent themes, along with thematic content analysis to analyze transcribed interview data and field notes. An inductive/open coding approach to data analysis allowed us to provide a description of the entire dataset and all potential themes that emerged.

RESULTS

Participant Demographics

The final analysis for part one of the study included a total of 45 nurses who completed both the pretest and posttest; the only institution NICU nurses who did not participate were those who were part of the Developmental Care Team and three participants who were excluded from the demographic analysis due to not completing the demographic survey. Years of experience as a nurse ranged from one to 10-plus, with 53.3% of participants working for more than 10 years. Nurses had a wide range of experience working in the NICU, with one participant working less than one year to 42.2% of participants working over 10 years. Over half the nurses (55.6%) primarily worked during the night shift, while the rest (44.4%) were employed during the day.

Participants in part two of the study included four nurses. Years of experience ranged from six to nine years, and NICU experience ranged from two to seven years. Three participants worked full time, while one worked part time. Three participants worked the day shift, and one worked the night shift.

Part One Findings

Results are based on answers from the pretest and posttest questions. We disseminated findings categori-

cally in the following areas: familiarity, knowledge, utilization, and interest.

After completion of the educational intervention, posttest results indicated increases in familiarity. In response to the question, *How familiar are you with trauma-informed care in the NICU?*, posttest scores increased from 2.2% to 44.4%, revealing a gain of 42.2%.

Ten knowledge-based questions on the pretest and posttest addressed the educational module content. The results highlight a significant increase in the number of correct answers selected in the posttest compared to the pretest. The mean score on the pretest was 50.2%, whereas the mean score on the posttest was 86%, resulting in a change of 35.8%. The paired sample t-tests revealed that the difference between the pretest and posttest scores was statistically significant at $p < .001$.

Regarding utilization, there was a self-reported increase in incorporating a TIC approach with both infants and parents. An equal number of participants in the pretest reported they occasionally and frequently (37.8%) used a TIC approach when working with infants, whereas 66.7% of participants reported in the posttest that they frequently did, a 28.9% gain. Additionally, 26.7% of participants noted in the pretest that they frequently use a TIC approach when working with parents, and in the posttest 64.4% noted that they frequently do, a gain of 37.7%. Because of caregivers' susceptibility to trauma, we asked participants how often they use strategies to mitigate their stress in the workplace. In the pretest 33.3% reported they frequently do, and in the posttest 48.9% indicated they frequently do, a 15.6% increase.

The final question on the posttest gauged subject perception of personal growth in understanding TIC



Fig. 2. Emerging themes and subthemes from qualitative analysis.

after the educational intervention. All participants noted some increase in their understanding of TIC in the NICU. Overall, results of the posttest demonstrated an increase in nurses' familiarity, knowledge, and understanding of TIC utilization. The overall mean score on the pretest questions was 54%, whereas the mean score on the posttest questions was 98% resulting in an overall improvement from pretest to posttest of 44%.

Part Two Findings

Three overarching themes and six subthemes surfaced from the qualitative analysis (see Fig. 2). The first theme that emerged from interviews was an increased *awareness of trauma* that took place in the NICU. One participant noted, "I'm definitely more aware of the impact trauma has on the infants and the long-term outcomes it has." The participant also shared that the TIC educational intervention was "rejuvenating to my practice." All participants stated that this new knowledge and awareness allowed them to better help parents form bonds with their babies.

The second theme that emerged encompassed *changes in practice* after participating in the TIC training module. Participants noticed significant changes in their practice when working with infants, parents, and fellow nurses. One participant explained they were less task oriented and more engaged in their care of infants. Following the TIC intervention, the participant noted that nurses had an even greater awareness of infant stress which led to the incorporation of specific techniques, including hand hugs and positive touch.

Participants also identified changes in their interactions with parents since implementing TIC practices into the NICU. Two participants discussed how they promoted awareness of TIC by hanging encouraging posters and signs in the parent lounge, getting the chaplain more involved, and staying connected with parents.

All participants described an increase in support and encouragement for one another in the NICU since the implementation of TIC practices. Said one participant, "I feel like everyone's been supportive of checking in with coworkers to see if they need anything."

While participants reported most staff members were receptive to implementing TIC and learning more about the topic, barriers to TIC practice included some resistance to change and new routines in the NICU. Two participants discussed "push back" from health care professionals about making changes to

their practice and explained that it took longer to implement TIC protocols when some staff were hesitant. Another barrier noted was the impact the COVID-19 pandemic had on staffing shortages, which increased the workload for the nurses.

The third emerging theme was the importance of ongoing *TIC education* in the NICU. Participants mentioned how helpful additional TIC continuing education had been in the past year. It is worth noting that after part one of this study, the DCT provided ongoing education through monthly "tidbits" to remind participants about different TIC principles, as well as information about the importance of staff self-care.

All participants indicated they provided education to other nurses, especially new staff, as well as to the parents. Two participants said they educated parents on TIC strategies for infants; this included explaining how positive touch could help calm infants before or after care.

Participants received continuing education during a competency day training that occurred one year after the initial TIC educational intervention. This training day provided a review and follow-up information from the previous educational module about implementing TIC into practice in the NICU. All participants found this training helpful.

DISCUSSION

This study supports TIC educational interventions as effective means of increasing NICU nurses' knowledge of TIC that may lead to practice changes promoting improved infant, family, and staff outcomes. This is consistent with a previous study where subjects who participated in a brief TIC curriculum increased their knowledge about the effects of trauma, leading to comfort and empathy during patient interaction.¹⁵

The mean of the pretest scores for our study was low (50.2%), congruent with other studies that reflect health care professionals' limited knowledge and perceived confidence in TIC.¹⁶⁻¹⁸ Low levels of TIC knowledge are associated with professionals' judgmental attitudes toward mothers.¹⁸ Developing an awareness of TIC could therefore improve the relationship between health care workers and patients.

Emerging themes from the interview transcripts provided detailed information in relation to the research questions. Our findings indicate that many of the nurses had not received prior education about TIC. A variety of changes occurred in practice after the TIC module, including increased pain management

strategies, improved communication and relationships between staff and parents, increased interdisciplinary collaboration, and additional continuing education opportunities.

The results are consistent with limited available literature detailing NICU staff knowledge of TIC and the implementation of TIC practices in the NICU. A gap remains, however, in the current health care literature regarding TIC and best practice in the NICU. This inquiry supports the idea that TIC educational interventions may be an effective strategy to increase NICU staff knowledge of TIC and may promote best practice in the NICU.

The participants in our study may have understood how to consider and address a client's trauma history during treatment but may not have been accustomed to the nomenclature surrounding this treatment, as indicated by the dramatic increase in scores for "incorporating TIC to daily practice" and using "strategies to mitigate stress at workplace."

Our findings suggest that the TIC educational module allowed participants to gain a broader understanding of the trauma infants' and families' experience in the NICU, and the potential lifelong impacts of trauma. Our findings are consistent with literature showing that, although fundamental aspects of nursing reflect the principles of TIC, more training would be beneficial to increase health care workers' knowledge of TIC practice.^{16,17,19}

Understanding the parents' experience in the NICU, and any post-traumatic stress disorder (PTSD) symptoms they may have, is an integral piece of fostering mother-infant relationships.²⁰ Increased understanding of the parent experience, as well as potential PTSD symptoms, allows nurses to better help parents. Participants became more aware of how traumatic the NICU experience can be for parents and how training helped nurses recognize potential trauma triggers.

Participants in our study reported significant changes regarding their practice one year after receiving TIC education, including the positive impact the TIC initiative and educational intervention had on relationships between staff members. Participants reported that nurses have been checking in on one another more often and were even more likely than before to step in to help each other.

A second noted change in practice was an increased effort to address infant stress, including being even more intentional than before about taking infants' stress and comfort levels into consideration dur-

ing daily care times. Our findings suggest that participation in a TIC educational module, like the one used in this study, may influence NICU staff to implement TIC approaches into care.

A third change in practice the participants identified was the way they addressed infant pain management: they implemented positive touch and hand hugs to improve quality of care and reduce stress levels for infants during their care times. A previous study found that utilizing hand hugs as well as positive touch in a NICU allowed infants to feel comforted during care times.²¹

A final change participants noted was the impact changes in practice had on parents in the NICU. Intermittent hand hugs by staff members in the NICU allow parents to have a sense of solace, knowing their infants are being cared for.²² Participants in the study also reported being more supportive of parents who were eager to be involved in their infants' care by providing hand hugs and participating in rounds. Current literature demonstrates that parents should be involved in their infants' care and should rely on staff for support during their stay.²³

Trauma-Informed Care Education

Our findings suggest a need for further education and training, and that nurses trained in TIC could take on roles of educators to both colleagues and patients. Research supports that time constraints can be a barrier to implementing TIC into practice,¹⁷ thus our findings indicate that consistent education about TIC is helpful, as it promotes awareness about using a TIC approach in daily practice.

Implications for Best Practice

The findings of this study suggest important implications for best practice, specifically that a TIC educational module may be an effective way to increase awareness of trauma in the NICU, implement TIC principles into the care of infants and parents, and change staff interactions and self-care practices. Participants reported many changes in their practice, which may help to reduce and mitigate the negative effects of trauma.

Participants also noted an increase in support between staff members, and between parents and staff members. Limitations to providing best practice can include some of the barriers identified by participants, including staffing issues, resistance to change, and the COVID-19 pandemic.

Implications for Future Research

Several opportunities exist for future research on this topic. To determine if certain health care workers are more predisposed to being knowledgeable about or incorporating TIC into practice, and to increase the breadth of knowledge regarding TIC in the NICU, future research should involve both quantitative and qualitative designs.

Further quantitative studies using TIC educational modules might facilitate understanding of the utility of TIC by NICU nurses and other health care providers via larger numbers of participants, as well as greater geographic diversity of pooling and sampling methods, such as randomization and controls, to increase generalizability of findings. Future research should also involve several types of educational modalities to determine what delivery is most effective in portraying TIC information.

Limitations and Strengths

In discussing the validity of the results, we must also consider the limitations of this study. The sample size was small with only 45 nurses. Further, we did not collect demographic information, therefore the diversity of participants remains unknown. The study lacked a control group for comparison of results which impacted the validity and strength of the study. Lastly, the pretest and posttest were not pilot tested prior to implementation. The test consisted of only 10 knowledge-based questions, which may not accurately capture whether a nurse has full knowledge on the topic of TIC. Future studies utilizing a rigorously tested tool would further confirm the results of this study.

Despite these limitations, we took steps to strengthen the results of the study, including ensuring rigor and trustworthiness. We used team-based coding, triangulation, peer debriefing, reflexivity, and member checking to increase reliability.

Regarding the qualitative study, we chose participants who volunteered for the study, which may have led to selection bias. We also chose participants based on their participation in a previous study, which may have led to researcher bias and skewed results. The small sample size threatens the validity and generalizability of the results. A final limitation was the potential for retrospective bias, as some of the reflections from the participants were about the initial TIC educational module, which took place a year before interviews.

CONCLUSION

It is fundamental that health care professionals have knowledge surrounding the topic of TIC and utilize this approach in treatment to protect infants, caregivers, and themselves. Findings from this study support the idea that TIC educational interventions have the potential to significantly change NICU nurses' knowledge of TIC and incorporation of these techniques in practice.

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LG Health CME On Demand Lectures Count Toward New DEA Licensing Requirements

The Drug Enforcement Administration (DEA) and Substance Abuse and Mental Health Services Administration (SAMHSA) recently released materials related to the new Medication Access and Training Expansion Act. Starting June 27, 2023, the Act will require new or renewing DEA registrants to complete a total of at least eight hours of accredited continuing education on the treatment and management of patients with opioid or other substance use disorders *before renewal of their license*.

Penn Medicine Lancaster General Health's Continuing Medical Education department offers recorded CME hours that count toward the DEA requirement. Providers can access this at lancastergeneralhealth.org/health-care-professionals-for-physicians/continuing-medical-education. The lectures, available in the CME On Demand "Featured" section, include: Buprenorphine Use in Long Term Care, Management of Chronic Generalized Musculoskeletal Pain, Treating Pain in the Patient with SUD, and Opioid Act 124 Update 2021.

Providers excluded from the eight-hour requirement include:

1. All practitioners that are board certified in addiction medicine or addiction psychiatry from the American Board of Medical Specialties, the American Board of Addiction Medicine, or the American Osteopathic Association.
2. All practitioners that graduated in good standing from a medical (allopathic or osteopathic), dental, physician assistant, or advanced practice nursing school in the United States within five years of June 27, 2023, and successfully completed a comprehensive curriculum that included at least eight hours of training on:
 - a. Treating and managing patients with opioid or other substance use disorders, including the appropriate clinical use of all drugs approved by the Food and Drug Administration for the treatment of a substance use disorder; or
 - b. Safe pharmacological management of dental pain and screening, brief intervention, and referral for appropriate treatment of patients with or at risk of developing opioid and other substance use disorders.
3. All practitioners who completed DATA-Waived trainings ("X-waiver" for buprenorphine) in the past.

Providers do not need to send a new certificate to the DEA.

PEDIATRIC MEDICAL TRAUMATIC STRESS AND TRAUMA-INFORMED CARE

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Editor's note: This article overviews the concept of trauma-informed care; details of treatment are beyond its scope. Case reports are offered throughout to help readers reflect on some of their patients, recognize how medical and other trauma can be negatively impactful, and remind them to be thoughtful during medical traumatic events.

Pediatric medical traumatic stress (PMTS), defined as responses to medical events that include post-traumatic stress symptoms, can occur after any medical intervention.¹ Children and adolescents who have poorly managed pain, who undergo repeated procedures, or who experience frightening or invasive treatments are at greater risk.² Many children do well after medical interventions, such as blood draws, suturing, abscess drainage, wound care, or surgery, but others may struggle.

ADVERSE CHILDHOOD EXPERIENCES

Experiences in childhood have a significant effect on subsequent physical health, mental health, and developmental trajectories.³ Traumatic experiences in childhood can negatively alter developing neurological systems, affecting executive function, creating mental

health challenges, and placing children at risk for developing learning disabilities.^{4,7} The long-term effects of adverse childhood events (ACEs) may be altering the health of more than two-thirds of adults in the United States.⁸ Reducing exposure to childhood trauma and mitigating post-trauma effects would significantly reduce adult morbidity and mortality.⁹

About 34 million children younger than 18 years of age — or almost half of American children — have experienced at least one potentially traumatic early childhood experience.¹⁰ Adverse childhood experiences were first defined in 1998, and the list of potential adversities was expanded to 22 by the National Child Traumatic Stress Network (see Table 1).¹¹

Adverse childhood experiences can affect health outcomes, both in the short and long term.¹² ACEs can permanently damage the brain and negatively impact the developing neurological and cognitive systems.⁷ Adversity is common, and symptoms of trauma overlap with the symptoms of other pediatric conditions, therefore the health care provider should consider trauma in the differential diagnosis for patients with developmental, mental health, behavioral, and physical symptoms.³

Table 1. Potential Adverse Childhood Experiences

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|---|---|
| <ul style="list-style-type: none">• Sexual Abuse• Physical Abuse• Emotional Abuse• Neglect• Domestic Violence• Impaired Caregiver• Parent Divorce or Separation• Sexual Assault/Rape• Physical Assault• War• Community Violence• School Violence | <ul style="list-style-type: none">• Separation from Family Member• Death of Loved One• Illness/Medical Trauma• Serious Injury or Accident• Natural Disaster• Kidnapping• Forced Displacement• Interpersonal Violence• Bullying• Other Trauma Including Sex Trafficking |
|---|---|

Source: National Child Traumatic Stress Network¹¹

Children with a history of ACEs are at greater risk to develop medical traumatic stress and may also experience re-traumatization after medical events.¹³ A history of psychological trauma and ACEs can cause amplification of pain and delayed medical recovery.¹⁴⁻¹⁶ Strategies to mitigate the damaging effects of early childhood trauma may promote resilience.¹⁷

PEDIATRIC MEDICAL TRAUMATIC STRESS

Pediatric medical traumatic stress is common among injured/ill children and is often associated with elevated distress, noncompliance, and poor health outcomes.¹⁸ PMTS occurs when aspects of the child’s medical care are traumatic and defined as responses to medical events that include post-traumatic stress symptoms.¹³ For example, researchers found that circumcision has long-lasting traumatic effects; boys who had been circumcised were more sensitive to pain than uncircumcised boys, and circumcised boys had a greater vaccination response, which may represent a post-traumatic stress disorder triggered by the painful event of vaccination.¹⁹ For many children, injury or

medical interventions such as procedures or invasive treatments may be potentially traumatizing and/or re-traumatizing.

Providers who care for children must be aware of different types of medical traumatic stress. First, although screening for ACEs is an important part of the medical evaluation, screening itself may be traumatizing or re-traumatizing and lead to further pathology or limited follow-up.²⁰ Further examples may include using restraints on a person who has been sexually abused or placing a child who has been abandoned in a seclusion room.

Factors that may increase the risk for PMTS include undermanaged or undertreated pain, repeated procedures, receiving a serious diagnosis, or experiencing invasive treatments.² Children with ACEs or a history of trauma may be especially at risk for developing PMTS or re-traumatization after medical procedures.¹³

The effects of traumatic medical procedures and treatments can be mitigated by being thoughtful to the child’s and family’s experience of medical care and being mindful of ways to reduce the painful aspects

CASE 1

Ava, a clinically well-appearing, previously healthy 3-week-old, presented with fever. Lumbar puncture was ordered.



Ava’s mom was present during lumbar puncture, where primary prevention included nurses providing Sweet-ease® via pacifier and Child Life services providing neuroprotective care.

Ava did not move or cry while the spinal needle was inserted; spinal fluid was obtained without complication.



Pain and stress were minimized, and the mother was part of the collaborative care, which helped Ava tolerate the lumbar puncture with no observed discomfort or stress. This minimized her risk for negative consequences.



CASE 2

Alex, a 10-year-old with autism, arrived for an outpatient elective oral procedure. He agreed to the procedure and was cooperative in the waiting area, but when his name was called, he changed his mind and didn’t want to proceed. His mother and the nursing staff tried to convince him, but he continued to refuse. The staff suggested he be held down and given ketamine.



The anesthesiologist recognized that physically restraining the patient and administering IM ketamine was potentially harmful.

Although inconvenient, the anesthesiologist recommended rescheduling until a more patient-centered approach could be agreed upon. Child Life services should be included in the planning of Alex’s procedure when rescheduled.



of the procedure or treatment.³ Health care providers should ask about fears and worries for both the patient and caregivers, as well as maximize pain management and provide comfort measures by using both non-pharmacological strategies and medications when appropriate. It is also important that family and caregivers are heavily involved in the child's care, and the entire health care team should work together to ensure their ability to provide effective support.^{2,3}

NEUROPROTECTIVE CARE

Stress can lead to maladaptive brain alterations, which can negatively affect outcomes associated with medical treatment and well-being. Thus, it is important that health care providers and health care systems caring for infants and children understand neuroprotective care. The stress of medical interventions can also lead to maladaptive brain alterations and may negatively impact the potential to maximize health outcomes and well-being.²¹

Neonatal intensive care units (NICUs) nationally and internationally have developed frameworks of neuroprotective care.² These strategies are intended to protect infants' brains and their future development from the potentially traumatic effects of the NICU.²² These strategies of neuroprotective care have recently been introduced into older age groups, such as pediatric cardiac ICUs.²³

The five core practices of neuroprotective care include: minimizing pain and stress, promoting activities of daily living, establishing a healing environment, protecting sleep, and supporting family collaborative care.²² Clustering nighttime care when possible, teaching patients to manage pain with non-pharmacologic coping strategies, monitoring the sound in patients' rooms, and encouraging families to be present during procedures and bedside rounds are a few examples of neuroprotective care.

Post-traumatic symptoms can be correlated with the level of pain a child endures and the level of stress the family feels during the hospitalization.²⁴ Individual components of neuroprotective care can reduce the risk of PMTS and improve consequences of medical intervention.² Simple non-pharmacological pain and stress management may be able to prevent the negative consequences of child pain and family stress.²⁵

TRAUMA-INFORMED CARE

Trauma-informed care (TIC) is defined by the National Child Traumatic Stress Network as medical care

CASE 3

Fifteen-year-old Susan presented to a headache clinic with her mother after referral by Cardiology. She suffered from chest and abdominal pain, in addition to headaches. Extensive evaluations were normal.



Questioning uncovered longstanding emotional, physical, and sexual abuse by the biological father four years prior, before they moved out of the house.



The unrecognized symptoms of Susan's abuse led to unnecessary evaluations, a delay in definitive treatment, and a likely amplification of her trauma effects.

Susan was referred to Adolescent Medicine and Psychiatry. After developing an aggressive treatment plan with Psychiatry, her symptoms slowly improved.



in which all health care teams assess, recognize, and respond to the effects of traumatic stress on children, caregivers, and even health care providers. Practicing trauma-informed care means being aware of trauma-related symptoms, promoting an emotionally safe environment of care, and offering interventions to mitigate the effects of trauma exposure.¹⁷

In the health care setting, TIC focuses on the prevention, identification, and assessment of trauma; response to trauma; and recovery from trauma.³ It can be categorized into three main areas:

1. Primary prevention of trauma and promotion of resilience.
2. Secondary prevention and intervention for those exposed to potentially traumatic experiences. This includes caregivers, siblings, and health care workers.
3. Tertiary care for children who display symptoms related to traumatic experiences.³

The August 2021 clinical report on TIC by the American Academy of Pediatrics suggests health care providers and organizations caring for children organize

TIC into five strategies: awareness, readiness, detection and assessment, management, and integration.³

Awareness

Children living in an environment with a secure relationship that is safe, stable, and nurturing will develop skills that prevent or ameliorate the effects of cumulative traumas.²⁶ Toxic stress may occur when children experience adverse events in the relative absence of protective relationships, which can result in long-lasting or lifelong impairments.²¹ Reports suggest up to 80% of children and their family members develop trauma-related symptoms after a life-threatening illness, injury, or painful procedure.²⁷

Further, it is important for health care workers to recognize certain populations may be at greater risk of experiencing trauma and may lack an environment with secure relationships. Children who have suffered child maltreatment, immigrant and refugee children, children living in poverty, and children of underrepresented racial, ethnic, and religious groups are examples of these populations.³ In addition, children at greater risk for PMTS include preterm infants, children with chronic medical conditions, and those with serious injury or illness.²⁸

Readiness

Readiness requires health care workers have a compassionate approach that does not suggest blame, while at the same time understanding the context of a child’s community and the strengths and weaknesses of the caregivers. Building on family protective factors and emphasizing strengths rather than deficits is a fundamental part of TIC.³

Services that focus on supporting self-regulation and self-efficacy, as well as on a caregiver’s strengths when providing guidance, help ready the patient for what may be a potential traumatic experience. (See Case 4 for an example.)

Detection and Assessment

Caring for patients at risk for experiencing trauma can necessitate having protocols and practices in place to help identify and address safety concerns. Detection involves both surveillance and formal screening, and can include purposeful triage, history-taking, examination, and differential diagnoses. Mitigating the stress of a painful procedure can include understanding certain fears, optimizing pain management and comfort measures, and encouraging caregivers to pro-

CASE 4

Robert, a 12-year-old admitted with fever and dehydration, withdrew when attempts were made to place an IV line.



Questioning revealed his parents are divorcing. Also, Robert had been an inpatient at 18 months old and restrained during multiple IV line attempts.



The team concluded Robert had PMTS symptoms related to divorce and past medical trauma. Child Life services provided coping strategies and discussed distraction.

Robert’s mother became more supportive when she realized his vulnerability. The IV was placed. He and his parents would benefit from future support.



vide effective support.³ Recognizing that a patient may be having trouble moving forward with a procedure, then pausing and assessing fears, might help optimize a potentially traumatic experience and minimize long-lasting negative effects.

Management

Psychoeducation is the first step in management and may include a basic explanation of how trauma can affect a child’s behavior. This simple step may help move a caregiver from frustration to empathy.³

Anticipatory guidance given by health care providers can help families begin to address the effects of trauma as soon as possible.³ For example, a pediatric patient and their family admitted to the hospital following injuries sustained after a trauma may benefit from some education regarding the signs and symptoms of post-traumatic stress disorder and how to seek help if needed.

It is important that children and their families feel emotionally safe and respected.³ An example would be to approach children in a slow and calm manner,

allowing them to sit with the caregiver while using a higher pitched voice, which might ease a child's tension. Individuals with a history of trauma are more sensitive to tone of voice, and low tones may imply danger and stimulate defensive responses.^{29,30}

Integration

Integrating knowledge about trauma into policies, procedures, and daily practice is the next step in creating a trauma-informed medical milieu.³¹ Educating all team members, developing community partnerships, and addressing the trauma experiences of staff are examples of TIC integration.

One example of integrating TIC is implementing a chaperone policy to provide guidance and awareness to help patients and families feel safe. Additionally, guidelines about a maximum number of IV attempts and necessitating the documentation of difficult IV insertions may underscore the need for appropriate training and re-training. Further, Child Life services, when made a regular part of the health system team, can help bridge gaps in care.

Child Life Services

A Certified Child Life Specialist is credentialed by the Association of Child Life Professionals. These individuals earn bachelor's degrees and receive special training in the developmental impact of pediatric injury and illness. The American Academy of Pediatrics has determined that Child Life services are essential to overall health care services for children and families, thus funding for their services should be included in the hospital operating budget.³²

The January 2021 American Academy of Pediatrics policy statement on Child Life Services further indicates that Child Life programs are an important component of pediatric hospital-based care. Certified Child Life Specialists collaborate with the entire health care team to promote coping skills and minimize the adverse effects of hospitalization and other potentially stressful situations. Child Life services are associated with improved quality and decreased cost, as well as overall patient and family experience.³²

SUMMARY

Pediatric medical trauma is one of many potential adverse childhood events. Medical interventions can be traumatic for children, but health care teams can work to mitigate the potential for PMTS.

It is vital that health care providers understand the frequency with which ACEs occur in the pediatric population and the value of inquiring about past events. A history of ACEs may increase the risk of PMTS and can cause chronic, and at times, disabling symptoms. Understanding the history of a patient's ACEs may help to reduce the risk of unnecessary tests when evaluating ongoing symptoms and help to institute appropriate treatment without delay. Knowing a patient's history of ACEs may also aid the health care team as it works to mitigate the risk of PMTS and re-traumatization.

Being aware of the risks for and implications of trauma will help augment risks. Simple neuroprotective strategies, such as encouraging parents and caregivers to be present and a part of medical procedures, can help minimize risk and maximize health outcomes.

Certified Child Life Specialists are experts in TIC and play a vital role in the care of children. Their expertise and knowledge of neuroprotective care strategies can significantly improve the overall outcome for children and families, and can reduce the risk of PMTS. By creating a TIC culture, we can improve the health, safety, and satisfaction of our patients and their families.

CASE 5

A sister and brother, ages 8 and 11, were backseat passengers in a motor vehicle accident. They both could recall the event; no injuries were identified in the ED. Their parents, who were both in the car, died at the scene.



Child Life services was involved in the overall care from the beginning and helped with interventions to mitigate further trauma.



A multidisciplinary approach was utilized to begin interventions and set up ongoing support.

Secondary prevention and intervention is needed, not only for the patients, but also for family members, friends, and health care providers.



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Breathe Better Together

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Editor’s note: This is the third in a series of articles detailing the work of the Center for Health Care Innovation at Penn Medicine Lancaster General Health (CHCI-LG Health). The center works with providers and administrators to reimagine health care delivery to improve patient outcomes. One focus of CHCI-LG Health is to scale solutions that have already been piloted elsewhere in the Penn Medicine health system.

BACKGROUND

Chronic obstructive pulmonary disease (COPD) is the third most common cause of death in the United States, after heart disease and cancer. At Penn Medicine, 6,500 patients with COPD were admitted to hospitals throughout the system within a 12-month period in Fiscal Year 2019. Of every five patients hospitalized with COPD, one is readmitted within 30 days. Thus, innovations to decrease the risk for readmission would presumably improve patient health and save patients and the health care system time and resources.

Breathe Better Together (BBT) is one such initiative, first piloted at the Center for Health Care Innovation in Philadelphia, CHCI-LG Health’s sibling organization. BBT is a text-based remote monitoring program to decrease hospital readmissions in patients with COPD. The Philadelphia project team believed it could increase the number of days that COPD patients remain out of the hospital by helping patients identify their symptoms early and putting mechanisms in place to prevent hospitalization before they became necessary.

The Philadelphia program included the design and implementation of an urgent home nurse visit program component called Penn Cavalry. Among the innovations, patients were asked via text message to self-evaluate their breathing. The patient texting component was powered by Way to Health, a Penn Medicine platform that provides the tech infrastructure for sustainable behavior change interventions. The average patient engagement rate is 70% to 80% across its various texting programs.

Once texted, patients could respond by selecting from among three multiple-choice options. A patient’s

response of “C” – indicating they felt their breathing was worse than usual – initiated an escalation model, whereby a respiratory therapist, also known as a pulmonary navigator, would call the patient to further evaluate. After triaging the patient, the therapist would confirm a plan of care under the direct oversight of a BBT pulmonologist. This assessment could include sending a Penn Cavalry nurse to the patient’s home for a same-day urgent visit for further evaluation. Patients could also access their care team through a previously provided phone number; these calls would forward to the on-call pulmonologist after hours and on weekends.

The 30-day rehospitalization rate of the 178 high-acuity patients enrolled in BBT fell during the first calendar year from 30% to 17% – nearly reaching the 15% rehospitalization rate of all patients with COPD admitted to a Penn Medicine hospital. The team saw the same improvement the following year. It was clear these early interventions were having an impact on readmissions.

APPLICATION IN LANCASTER

Impressed by these outcomes, an LG Health project team integrated a similar tool into the Pulmonary Workgroup’s ongoing larger performance improvement project. This project’s mission is to achieve a “zero-hospitalization” rate for COPD patients by decreasing exacerbation-related admissions, as well as readmissions.

Patients were highly engaged (87.5%) in the CHCI-LG Health Way to Health texting component. As in Philadelphia, patients in the Lancaster program were asked to self-evaluate, and a response of “C” – or “Call” – again prompted an initiation model if they wanted a respiratory therapist to contact them. Calls could result in further assessment.

Different resource limitations and opportunities have given rise to a CHCI-LG Health model that is different from the Philadelphia design. In the CHCI-LG Health program, Christopher Addis, MD, provides direct physician support to pulmonary navigators during weekdays from 8:00 a.m. to 4:00 p.m. After hours,

patients are directed to their PCP's office or to call 911 for emergent issues.

If a situation is non-emergent but needs clinical help, the pulmonary navigator places a referral for a same-day visit by the community paramedics team, which sends a community paramedic to the patient's house for further evaluation. During the initial LG Health pilot, eight patients received visits from the community paramedics.

Patients may also need education or equipment support. For example, if patients are being seen in the home by ancillary services providers, pulmonary navigators may request home health nurses coordinate education or may reach out to equipment vendors to visit the patient at home to evaluate the issue. For patients with socioeconomic requirements, navigators can place a referral to the Ambulatory Collaborative Care Team for educational support and guidance. Identifying social determinants of health and matching them to external partners who might be able to help has been part of the project team's attempts at optimizing opportunities to standardize care and increase efficiencies. Certainly, if the pulmonary navigator determines the need is emergent, a 911 call can be placed.

Finally, patients in the LG Health program are enrolled for 45 days and then discharged from the program back to the exclusive care of their primary care team. This contrasts with the Philadelphia program, which transfers patients to the Lung Center for continued oversight and care.

RESULTS

During LG Health's initial BBT pilot, January through June 2021, the project team enrolled 46 unique patients out of 321 identified. At the end of the pilot, the team observed a 6% reduction in hospital visits and a 30-day readmission rate of 23.5%. There were also 21 readmission "saves" among 12 patients. Readmission is considered saved by the pulmonary navigator when the navigator feels the patient would have gone to the emergency department without the intervention. This translated to an estimated savings of \$10,000 to \$12,000 per save.

FUTURE DIRECTIONS

LG Health's BBT pilot program is currently in Phase II, with a goal to enroll 200 patients. To reach this goal, the team expanded parameters to include non-LGHP patients with providers at Union Community Care (Union). In addition, the team will attempt to reach non-English-speaking patients, thus CHCI-

LG Health BBT champions are focused on adapting education and outreach to Spanish speakers. To date, one Spanish-language patient has completed the 45-day program, and six Union patients are enrolled.

Phase II will also include an interactive voice phone component. This is the result of an insight in the first six months of the pilot that some patients opted out because they were not comfortable with texting or did not have a cell phone. The voice option will call the patient daily with the same check-in question they would receive through text and will allow the patient to use their phone's keypad to select a response.

To date in Phase II, text engagement remains high at 83.7%. The team has noted a 10.5% 30-day hospital readmission rate and three emergency department saves among 153 enrolled patients. The rate of patients called within 30 minutes of a call request or a text message indicating an intervention need has been 100% to date.

DISCUSSION

The BBT project team at LG Health believes one of the major contributing factors to the success of its program is the strong relationship the respiratory therapist begins to build with patients while they are still in the hospital. This relationship focuses on getting to know the patient, providing individualized education, often-times meeting with them more than once while they are still in the hospital, and understanding and anticipating the additional and possibly nonmedical factors that could become barriers to the patient's health.

The escalation pathway, built to provide support with the help of various partners after the pulmonary navigator first makes contact, provides reassurance to patients that they will get support around those barriers; in essence, it becomes a trust pathway between the patient and the health system that serves them. If successful, the BBT pilot may serve as a model for outreach programs directed at patients with other disease states and in other service lines.

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Vitamin B, Hypertriglyceridemia, Warfarin, and What Meds to Take with Food

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In 2022, Penn Medicine Lancaster General Health Ambulatory Pharmacy Services developed a new resource to help guide LG Health providers when choosing and prescribing pharmaceuticals for our patients. The idea was to produce one-page primers about specific drugs, or groups of drugs, noting recommended therapies, dosing, risk factors, and other important considerations.

Each “Pearl of the Week” (POTW), as we’ve named them, is offered as a PDF and includes related graphics to create interest while highlighting the most important information.

Pharmacy Pearl of the Week

More than 30 Pearls are now available on topics such as Gout Management, Non-Steroidal Anti-Inflammatory Drug (NSAID) Safety, Human Immunodeficiency Virus Pre-Exposure Prophylaxis (HIV PrEP), Patch Therapies, Asthma and Diabetes medications, and many more.

This quiz was developed using information from past Pearls. To access all Pearls in their entirety, visit Pearls of the Week under the Pharmacy section of the StarNet Physician page.

QUESTIONS

1. Many patients require or take vitamins to supplement their diet. The “proper” name for Vitamin B1 is Thiamine. What are the “proper” names of the other available forms of vitamin B – B2, B3, B5, B6, B7, B9, and B12?
2. Well-known secondary contributing factors to hypertriglyceridemia (HTG) include obesity, uncontrolled diabetes, hypothyroidism, and kidney and liver disease, but some medications can contribute as well. List at least three medications that can con-

tribute to HTG, along with the pharmacotherapy recommended for patients aged 40-75 years with moderate HTG and an atherosclerotic cardiovascular disease risk of $\geq 7.5\%$.

3. Warfarin, a high-risk anticoagulant, is commonly used for those in whom direct oral anticoagulants are contraindicated or cost prohibitive. Thus, it is vital to counsel patients about the international normalized ratio (INR), as well as ensure they know the correct dose/regimen.
 - a. List three examples of warfarin drug-drug interactions that *increase* the INR.
 - b. List three examples of warfarin drug-drug interactions that *decrease* the INR.
 - c. List three drug-food interactions that *decrease* the INR.
4. Properly counseling patients on whether to take medications with or without food is important to improve medication absorption and efficacy, and in some cases to lessen the risk of side effects. How would you counsel patients on the following medications? Should they be taken with food or not?
 - a. Oral iron.
 - b. Protease inhibitors.
 - c. Hydroxychloroquine.
 - d. Sucralfate.
 - e. NSAIDs.

ANSWERS

1. The “proper” name for Vitamin B2 is Riboflavin; B3 = Niacin, B5 = Pantothenic acid, B6 = Pyridoxine, B7 = Biotin, B9 = Folic acid, and B12 = Cyanocobalamin. See Fig. 1 on page 58 for more information related to Vitamin B2; similar information about all the B vitamins is available via the Pearls of the Week on the Physician/Pharmacy StarNet page.



B2 (Riboflavin)

Activity: Beta-oxidation of fatty acids (energy production)
Dietary Sources: Milk, eggs, meats, fish, green vegetables
Deficiency: Sore throat, cheilitis, glossitis, dermatitis
Dietary Supplement: 100 mg PO 1-2x/day
Migraine Prevention: 400 mg PO daily

Fig. 1. From September 16, 2022 Pearl of the Week: Know Your Vitamin B's.

HTG Category	TG Level	Pharmaco-therapy	Non-Pharm
Moderate	150-499 mg/dL (fasting or non)	Statin [#]	- Address secondary factors
Severe (pancreatitis risk)	≥500 mg/dL (fasting)	Statin [§] Omega-3 fatty acids Fibrates*	- Address secondary factors - Very low-fat diet - Avoid carbs & alcohol

Statins are recommended for those aged 40-75 years with moderate HTG and an ASCVD risk of ≥7.5% in which secondary factors have been addressed/controlled

Fig. 2. From November 18, 2022 Pearl of the Week: Hypertriglyceridemia.

2. Medications known to contribute to hypertriglyceridemia can include hormone-related drugs such as tamoxifen, immune-related drugs such as interferon, as well as beta-blockers. See Fig. 2 for a chart showing that statins are the pharmacotherapy recommended for patients aged 40-75 years with moderate HTG and an atherosclerotic cardiovascular disease risk of ≥7.5%.
- 3a. Three medications that interact with warfarin to *increase* the INR are amiodarone, metronidazole, and sulfamethoxazole/trimethoprim.
- 3b. Three medications that interact with warfarin to *decrease* the INR are carbamazepine, phenobarbital, and ritonavir.
- 3c. Three foods high in vitamin K content that *decrease* the INR include broccoli, green tea, and liver.
Additional information about warfarin interactions is available in the July 29, 2022 Pearl of the Week.
4. The answers below derive from Fig. 3, which – though not exhaustive – sorts common medications into categories taken “with food” vs. on an “empty stomach.”

- d. Sucralfate should be taken on an empty stomach an hour or more before eating so that the medication can effectively coat and line the stomach and heal gastric ulcers.
- e. NSAIDs should be taken with food to avoid GI ulceration.

With Food		
Acarbose (with first bite of meal)	Itraconazole <u>caps/tabs</u> (high-fat meal)	Phosphate binders (mechanism of action)
Allopurinol (GI intolerance)	Ivabradine (increased absorption)	Protease inhibitors (GI intolerance)
Carvedilol <u>ER and IR</u> (orthostasis)	Metformin (GI intolerance)	Rivaroxaban (doses ≥20 mg)
Dronedarone (increased absorption)	NSAIDs (GI ulceration)	oral Steroids (GI intolerance)
Hydroxychloroquine (or glass of milk)	Orlistat (during or 1 hour after)	Tamsulosin (30 min after)
Empty Stomach		
Bisphosphonates* (≥30 min prior + water)	<u>oral</u> Iron (≥1 hour prior)	<u>oral</u> Semaglutide (≥30 min prior)
Efavirenz (limited bioavailability)	Isoniazid (take with food if GI upset)	Sucralfate (≥1 hour prior)
Entecavir (separate by ≥2 hours)	Itraconazole <u>solution</u> (limited bioavailability)	<u>oral</u> Tacrolimus (limited bioavailability)
Gemfibrozil (≥30 min prior)	Levofloxacin <u>solution</u> (1-2 hours after meal)	Zafirlukast (separate by ≥2 hours)
H2RAs & PPIs (30-60 min prior)	Levothyroxine (≥30 min prior)	Zaleplon (reduced absorption)

Fig. 3. From January 13, 2023 Pearl of the Week: Food or No Food?

- a. Oral iron is recommended to be taken on an empty stomach at least one hour before food to maximize absorption. However, this is likely to cause stomach upset and nausea. Many recommend taking oral iron with food to improve medication adherence.
- b. Protease inhibitors should be taken with food to avoid GI intolerance.
- c. Hydroxychloroquine should be taken with food or milk to avoid GI intolerance.

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Studies in the Division of Cardiothoracic Surgery

Heather Madara

Regulatory and Outreach Manager

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Madara

Editor's note: This is the 15th in a series of articles from the Penn Medicine Lancaster General Health Research Institute that describes ongoing research studies. Other active studies have been described in previous issues of this journal. The Research Institute wishes to recognize a first-time principal investigator included in this article, Dr. Jeremy McGarvey (LeAAPS) from Cardiothoracic Surgery.

Physicians who wish to refer patients for any of the studies mentioned below are encouraged to contact the Research Institute at 717-544-1777. Other members of the Lancaster General Health staff who are conducting research and wish to have their studies described here are encouraged to contact the offices of JLGH at 717-544-8004.

SPONSORED STUDIES

LeAAPS: Left Atrial Appendage Exclusion for Prophylactic Stroke Reduction Trial

Sponsor: AtriCure

Principal Investigator: Jeremy McGarvey, MD

It is already known that closing the left atrial appendage during open heart surgery helps reduce the risk of stroke and embolism in patients with atrial fibrillation (AF). The goal of the LeAAPS trial is to examine if this intervention will prevent future strokes in patients who have risk factors for AF but have not been diagnosed with the condition.

This trial is a prospective, randomized, blinded, superiority trial being conducted at over 200 sites worldwide. The objective of this trial is to evaluate the effectiveness of left atrial appendage exclusion for the prevention of ischemic stroke or systemic arterial embolism in subjects undergoing cardiac surgery who have risk factors for atrial fibrillation and ischemic stroke. The AtriClip is FDA approved for use in patients with AF, but the use of it in patients without diagnosed AF is investigational.

Eligible patients are randomized to either receive the atrial clip or to not receive the atrial clip during open heart surgery. The study team collects data at reg-

ular intervals post procedure to determine safety and efficacy. Participants can expect their participation to last for about five years from enrollment to study end.

Lancaster General Health plans to enroll 100 patients into the study, with seven already enrolled at the time of this article.

EVOLVE-MI: A Pragmatic Randomized Multicenter Trial of Evolocumab Administered Very Early to Reduce the Risk of Cardiovascular Events in Patients Hospitalized with Acute Myocardial Infarction

Sponsor: Amgen

Principal Investigator: Marjan Mujib, MD

EVOLVE-MI is a randomized, multicenter trial sponsored by Amgen. The study compares the addition of evolocumab (a PCSK9 inhibitor) to standard lipid therapy in patients hospitalized with an acute coronary syndrome (ACS). The sponsor aims to evaluate the effectiveness of evolocumab specifically in patients hospitalized with non-ST-segment elevation myocardial infarction (NSTEMI) and ST-segment elevation myocardial infarction (STEMI).

Effectiveness will be determined by the percentage change from baseline LDL-C, total myocardial infarction events, total arterial or coronary revascularization procedures, total ischemic strokes, time to first and total events related to MI, and time to all-cause mortality.

The study plans to enroll about 4,000 participants across all sites. Lancaster General Health plans to enroll 14 participants, with nearly half of that goal already enrolled at the time of this article.

CLASS-HF: Consistently Assess Signs and Symptoms of Heart Failure

Funded by: Abbott

Lead Site: Illinois State University

Principal Investigator: Lisa Rathman, CRNP

This investigator-initiated study is the result of a collaboration across four institutions: Illinois State

University (lead site), University of Colorado, University of North Carolina at Greensboro, and Penn Medicine Lancaster General Health.

Evaluating the functional class of heart failure for patients is a highly subjective process based upon the provider's impression of the patient's physical limitations. The study investigators created an NYHA Classification Guide in an effort to establish a more reliable and accurate assessment of functional class.

Eligible heart failure patients will have their functional class assessed using the NYHA Classification Guide. Separately and without awareness to the result of the provider's assessment, the participant will complete a six-minute walk test (6MWT) using the "gold standard 6MWT." Accuracy of the NYHA Classification Guide will be assessed by comparing the provider's functional class determination and the result of the 6MWT.

More than 100 participants will be enrolled across the four sites in this part of the study, with approximately 30 participants being enrolled at LG Health.

In the subsequent part of the study, interested providers will be recruited to utilize the NYHA Classification Guide for 30 days. At the end of the 30-day

period, they will communicate via survey any barriers to implementation, along with its effectiveness and usability to the study team. This part of the study will inform the study team on the ease of implementation of the NYHA Classification Guide.

A total of three providers will be involved in this part of the study, and LG Health plans to enroll 10 providers.

Active Clinical Studies at Lancaster General Health

A complete list of active clinical studies at Lancaster General Health is available online. To access the most current list, scan the QR code, or find the link on the Resources/Links page at JLGH.org. To make a referral to any study on the list, call the Penn Medicine Lancaster General Health Research Institute at 717-544-1777.



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HAVE AN IDEA FOR A STORY? WE WANT TO HEAR FROM YOU.

The Journal of Lancaster General Hospital is looking for human interest stories including, but not limited to, staff experiences, patient experiences, and anything else that might be educational for our readers — the medical staff of Penn Medicine Lancaster General Health. If you have an idea for a story, scan the QR code at left or visit our website at JLGH.org to share your idea.

Recommendations from the Society for Cardiovascular Angiography & Interventions, and Pediatric and Neuroscience Nurses Associations

Alan S. Peterson, MD

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This is my 41st article on Choosing Wisely from the American Board of Internal Medicine (ABIM) Foundation. As noted in previous issues of *JLGH*, each specialty group is developing “Five or More Things That Physicians and Patients Should Question.”

All items are developed to encourage discussion between physicians and their patients about which tests and procedures are best in each case. Additional resources are available online at choosingwisely.org.

RECOMMENDATIONS FROM THE SOCIETY FOR CARDIOVASCULAR ANGIOGRAPHY & INTERVENTIONS

1. Routine stress testing after percutaneous coronary intervention (PCI) without specific clinical indications should be avoided. In patients who have undergone successful revascularization with PCI and are symptom free, routine screening by a stress test can lead to the performance of additional procedures with little clinical benefit. Testing therefore should be generally limited to patients with changes in clinical status (e.g., new symptoms or decreasing exercise tolerance).¹

2. Patients who are post-coronary artery bypass graft (CABG) and post-PCI who are asymptomatic, or who have normal or mildly abnormal stress tests and stable symptoms not limiting quality of life, should avoid coronary angiography. For most patients who have been completely revascularized with PCI or CABG and are now symptom free, routine coronary angiography is unlikely to identify additional blockages that, if treated, will lead to improvements in quality of life. Angiography should therefore be limited to patients with changes in clinical status.

3. Patients with stable ischemic heart disease who are unwilling to undergo revascularization or are not candidates for revascularization based on comorbidities or individual preferences should avoid coronary angiography for risk assessment. Physicians should discuss the goal of angiography with patients before it is performed, including the possible role for revascularization with bypass surgery or coronary intervention. For patients unwilling or unable to undergo revascularization, the need for angiography is less compelling.

4. Asymptomatic patients with no evidence of ischemia or other abnormalities on adequate non-invasive testing should avoid coronary angiography. These patients are at very low risk for cardiac events, and coronary angiography is unlikely to add appreciable prognostic value.

5. Stable, asymptomatic patients with normal or only mildly abnormal adequate stress results should avoid PCI. For patients with stable ischemic heart disease, in the absence of symptoms, there is limited clinical benefit to PCI unless performed on a lesion with demonstrable hemodynamic significance (fractional flow reserve ≤ 0.8) or causing a significant amount of ischemia as assessed by non-invasive stress testing. Rare exceptions would be a significant left main coronary artery lesion or a $> 90\%$ proximal lesion in a major coronary artery.²

RECOMMENDATIONS FROM PEDIATRIC AND NEUROSCIENCE NURSES ASSOCIATIONS

The following offers “eight things nurses and patients should question.” The list compiles suggestions from the American Pediatric Surgical Nurses Association, the American Association of Neuroscience Nurses, and the Society of Pediatric Nurses.

1. A head CT to assess for shunt failure in children with hydrocephalus should not routinely be ordered. Because CT is the usual mode of imaging for children with hydrocephalus, these patients have a much higher cumulative radiation exposure than the average population. That increases their risk of cancer. Consider using head ultrasounds when there is an open fontanel or a rapid-sequence MRI scan to reduce the amount of ionizing radiation exposure to pediatric patients with a ventricular shunt. A rapid-sequence MRI is less expensive than a formal MRI and comparable in cost to a CT scan. Because the rapid-sequence MRI is quick, sedation is not needed, which further reduces costs and medical risks of sedation. A CT scan can be used for emergencies and if the child has implanted metal or a device that is not compatible with an MRI.

2. Neurologically healthy children who have a simple febrile seizure should not routinely be ordered an

EEG. Febrile seizures are the most commonly occurring seizures in the first 60 months of life. Attention should be directed at finding the cause of the fever and treating it. An EEG has not been shown to predict recurrence of febrile seizures or future epilepsy in patients with simple febrile seizures. An EEG can be ordered for children that present with afebrile seizures, complex febrile seizures, and in children with neurological insult.³

3. Diazepam should not be administered for muscle spasms following spine surgery in the elderly. Treatment of these spasms should include both pharmacologic and non-pharmacologic interventions. Diazepam can be problematic due to its long half-life and many active metabolites. Benzodiazepines have consistently been associated with falls in the aging population and should be avoided. Effective non-pharmacologic interventions for use include heat, cold, repositioning, and massage.

4. Lumbar puncture opening pressure should not be used as a reliable measure of intracranial pressure in children with severe chronic headache. Lumbar puncture pressure measurement can vary with patient position and level of the manometer, and anesthetic agents can also cause false readings. An intracranial monitor measures intracranial pressure over time as the patient goes about daily activities. Inaccurate readings can lead to unnecessary surgeries and medical treatments.

5. Stroke patients should not be ordered “formal” swallow evaluation unless they fail their initial swallow screen. Dysphasia occurs in 50% to 60% of acute stroke patients after a stroke. Swallow screening is critical in the rapid identification of risk of aspiration in patients presenting with acute stroke symptoms. The purpose of a swallowing screen is to identify those who do not need a formal evaluation and who can safely take food and medication by mouth. Note that the Toronto Bedside Swallowing Screening Test (TOR-BSST) has been validated for stroke patients and has shown high sensitivity and high negative predictive values for the early detection of dysphagia.⁴

6. Continuous cardiac-respiratory or pulse oximetry monitoring for children and adolescents admitted to the hospital should not be applied unless conditions warrant continuous monitoring based on objectively scored cardiovascular, respiratory, and behavioral parameters. When pulse oximetry and physiologic monitoring are used inappropriately, significant cost burdens can affect the entire health care system. Continuous bedside monitoring should not be used in place of hourly safety checks. Focused nursing assessments using a standardized early warning tool should be used to monitor changes in a pediatric patient’s status to identify de-

teriorations. High levels of false alarms can occur with continuous monitoring, causing alarm fatigue.

7. Routinely repeated labs of hemoglobin and hematocrit in hemodynamically normal pediatric patients should not routinely be done with isolated blunt solid organ injury. Clinical instability is defined by physiologic criteria such as age-specific tachycardia or hypotension, tachypnea, low urine output, altered mental status, or any significant clinical deterioration that warrants increased level of care and investigation.⁵

8. Hair at the surgical site including the hair on the patient’s head should not be removed, but if hair must be removed it should be clipped, not shaved. Removing hair at the surgical site has long been believed to be associated with an increased rate of surgical site infections because of razor-induced microtrauma. Post-operative wound infections increase the costs and length of hospital stay. Sometimes hair removal should be considered – for example, during emergent craniotomies or anytime a surgeon deems hair removal necessary for a surgical procedure. A razor should not be used, but hair should be removed by clipping or depilatory methods.⁶

CHOOSE WISELY WHEN IT COMES TO LOW-VALUE ADMINISTRATIVE PRACTICES

Since 2012, the Choosing Wisely campaign has helped clinicians and patients choose services that are high value and avoid those that may be unnecessary or harmful. The same principle should be extended to administrative practices, such as electronic health record documentation and risk-management requirements.

With the health care workforce increasingly stretched thin and stressed out, it is important to identify which administrative tasks are low value and could be changed or eliminated. This process involves three steps:

1. “Crowdsource” ideas for administrative reform by taking nominations from physicians and staff for tasks that are unnecessarily burdensome, don’t improve clinical quality, don’t address outcomes patients care about, or are duplicative or wasteful.
2. Determine which items can be changed or abandoned without violating external regulations (versus which would require regulatory reform), and take action to relieve burden.
3. Join other stakeholders to lobby payers or regulators to change burdensome mandates (e.g., accreditation, performance monitoring, insurance regulations).

By identifying low-value administrative tasks that are causing burnout, and then eliminating or changing them, organizations can save physicians and staff significant time and stress.⁷

Top Tips from Family Practice

NEW GUIDELINE ADDRESSES MANAGEMENT OF NONALCOHOLIC FATTY LIVER DISEASE

The American Association of Clinical Endocrinology last year published a new clinical practice guideline on the management of nonalcoholic fatty liver disease (NAFLD).⁸ The “biggest change” from the previous guidance, published five years ago, according to lead author Mary Rinella, MD, is “that we are explicitly recommending that people in high-risk categories get screened in primary care.” Highlights appear below; read the full guidelines online at doi.org/10.1016/j.eprac.2022.03.010.

The guidance continues to recommend against population-based screening for NAFLD. People at high risk for NAFLD, such as those with type 2 diabetes or medically complicated obesity, should be screened for advanced fibrosis. In addition, the guideline calls for a primary risk assessment with the index of liver fibrosis (FIB-4) to be performed every one to two years in patients with pre-diabetes, type 2 diabetes, two or more metabolic risk factors, or imaging evidence of hepatic steatosis. The FIB-4 score = age (years) x AST (U/L)/PLT (10⁹/L) x ALT ½ (U/L). This index classifies patients as being at low, intermediate, or high risk for liver fibrosis.

Patients with NAFLD who are overweight or obese should be prescribed a reduced calorie diet in a multidisciplinary setting because, according to the guideline, weight loss “improves hepatic steatosis, nonalcoholic steatohepatitis (NASH), and hepatic fibrosis in a dose-dependent manner.”

It is well known that alcohol consumption has a role in the progression of fatty liver disease. However, coffee – drinking at least three cups daily, either caffeinated or not – can also be associated with protection against advanced liver disease.

While noting the lack of approved medications for NAFLD, the guidance states that some drugs prescribed for comorbidities also benefit patients with NASH. These are glucagon-like peptide 1 agonist semaglutide (Ozempic), pioglitazone (Actos), and vitamin E supplementation in selected patients.

IMMUNIZATION UPDATE FROM THE ADVISORY COMMITTEE ON IMMUNIZATION PRACTICES⁹

The Advisory Committee on Immunization Practices (ACIP) of the Centers for Disease Control and Prevention (CDC) earlier this year updated its recommendations for immunizations in children, adolescents, and adults. Here’s what you need to know for your practice.

Children and Adolescents

- For influenza vaccination, new guidance recommends vaccinating individuals who are close contacts of severely immunocompromised patients who require a protected environment.
- For measles, mumps, and rubella vaccination, a newly licensed vaccine with the trade name Priorix has been added to the table of vaccine abbreviations and trade names. Routine MMR vaccination consists of a two-dose series, with the first dose administered at age 12-15 months and the second dose at age 4-6 years.
- For pneumococcal vaccination, a new 15-valent pneumococcal conjugate vaccine with the trade name Vaxneuvance has been added to existing available vaccines. All children should receive four doses of pneumococcal conjugate vaccine (either PCV13 or PCV15) at 2, 4, 6, and 12-15 months.
- For both routine and catch-up vaccinations, note that PCV15 can be used interchangeably with 13-valent pneumococcal conjugate vaccine in children who are healthy or have underlying conditions. No additional PCV15 vaccine is indicated for children who have already completed their age-appropriate PCV13 series.
- Clinicians should also be aware that the appendix contains several clarifying edits, with changes regarding dengue vaccine, egg-based influenza vaccines, hepatitis B vaccines, human papillomavirus vaccine, MMR vaccines, and varicella vaccine.

Adults

- For hepatitis B vaccination, a three-dose vaccine with the trade name PreHevbrio is now available. PreHevbrio is not recommended during pregnancy due to a lack of safety data. In addition, clarifying language states that people 60 years or older *with* known risk factors for hepatitis B infection *should* complete a hepatitis B vaccine series, while those 60 years and older *without* known risk factors *may* complete a vaccine series.
- For influenza vaccination, new language supports that for people 65 years and older who are undergoing routine vaccination, any one of the following is preferred:
 - > High-dose inactivated influenza vaccine.
 - > Quadrivalent recombinant influenza vaccine.
 - > Quadrivalent adjuvanted inactivated influenza vaccine.

If none of these vaccines is available, then any other age-appropriate influenza vaccine should be used.

- For pneumococcal vaccination, there are substantial changes regarding the use of PCV15 and PCV20 vaccines in people who previously received other pneumococcal vaccines (discussed in the Summer 2022 issue of this journal). It is suggested that practitioners utilize the agency's PneumoRecs Vax-Advisor Mobile App for help in determining which pneumococcal vaccines a person needs and when.
- Regarding polio vaccination, there are new recommendations for adults at increased risk of exposure to poliovirus:
 - > For those with no evidence of a complete polio vaccination series (i.e., at least three doses), practitioners should administer remaining doses (one, two, or three doses) to complete a three-dose series.
 - > For those with evidence of a complete polio vaccination series (i.e., at least three doses), practitioners may administer one lifetime IPV booster.

VEXAS SYNDROME

A recently discovered inflammatory disease known as VEXAS syndrome is more common, variable, and dangerous than previously understood, according to results from a retrospective observational study of a large health care system database. The findings, published in *JAMA*, found that it struck one in 4,269 men over the age of 50 in a largely white population and caused a wide variety of symptoms.¹⁰

Physicians first described VEXAS (vacuoles, E1-ubiquitin-activating enzyme, X-linked, autoinflammatory, somatic) syndrome in 2020. They linked it to mutations in the UBA1 (ubiquitin-like modifier activating enzyme 1) gene. The enzyme initiates a process that identifies misfolded proteins as targets for degradation.

VEXAS syndrome is characterized by anemia and inflammation in the skin, lungs, cartilage, and joints. These symptoms are frequently mistaken for other rheumatic or hematologic diseases. However, this syndrome has a different cause, is treated differently, requires additional monitoring, and can be far more severe.

A previous report found that the median survival was nine years among patients with a certain variant; that was significantly less than patients with two other variants. The 1996-2022 data comes from patients at 10 Pennsylvania hospitals. Other common findings included macrocytosis (91%), skin problems (73%), and pulmonary disease (91%). Ten patients (91%) required transfusions. VEXAS syndrome represents an example of a multisystem disease where patients and their symptoms get lost in the shuffle.

In the future, physicians should look out for patients with unexplained inflammation and some combination of hematologic, rheumatologic, pulmonary, and dermatologic clinical manifestations that either don't carry a clinical diagnosis or don't respond to first-line therapies. These patients will also frequently be anemic, have low platelet counts and elevated markers of inflammation in the blood, and be dependent on corticosteroids.

The disease can be partially controlled by multiple different anticytokine therapies or biologics. However, in most cases, patients still need additional steroids and/or disease-modifying antirheumatic agents. In addition, bone marrow transplantation has shown signs of being a highly effective therapy.

The prevalence is high enough that clinicians should consider that some of the patients with diseases that are not responding to treatment may in fact have VEXAS rather than "refractory" relapsing polychondritis or "recalcitrant" rheumatoid arthritis.

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This issue of JLGH features two
articles related to trauma-
informed care on pages 41 and
49. Art therapy is one of many
treatments that may benefit
victims of trauma. According to
the American Art Therapy
Association, art therapy
integrates creative expression
with applied psychological theory.
More information is available at
arttherapy.org.

INTERESTED IN WRITING FOR JLGH?

The following is a summary of the general guidelines for submitting an article to *The Journal of Lancaster General Hospital*. Details are located online at JLGH.org.

- Scientific manuscripts are typically between 2,500-4,500 words. Perspective articles are usually shorter; and photo quizzes average about 725 words plus illustrations.
- Medical articles should report research, introduce new diagnostic or therapeutic modalities, describe innovations in health care delivery, or review complex or controversial clinical issues in patient care.
- Reports of research involving human subjects must include a statement that the subjects gave informed consent to participate in the study and that the study has been approved by the institutional review board (IRB).
- Patient confidentiality must be protected according to the U.S. Health Insurance Portability and Accountability Act (HIPAA).
- The Journal of Lancaster General Hospital *does not allow chatbot tools such as ChatGPT to be listed as authors*. JLGH editors warn authors that the use of these tools can be high risk for plagiarism with inappropriate use of citations, and we require that use of such tools be disclosed.

Please contact the Managing Editor, Maria M. Boyer (717-544-8004),
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for further information.

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DID YOU KNOW, PHYSICIANS CAN EARN CATEGORY 2 CREDIT FOR READING JLGH?

American Medical Association Category 2 activities consist of self-directed learning or courses that have not been through a formal approval process. According to the Pennsylvania State Board of Medicine, this includes “learning experiences that have improved the care [physicians] provide their patients.” Reading authoritative medical literature – like *JLGH* – is one such activity. More information and the Pennsylvania Board of Medicine CME Reporting Form are available at LGHealth.org/CME. Physicians can also log credit through their [eeds](#) account online.



← Scan to access your [eeds](#) account.



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Upcoming CME Offerings at LG Health

Hospitalist Interprofessional Case-Based Conference
Wednesday, June 21, 12:30-1:00 p.m.

Department of Medicine Grand Rounds
Wednesdays, June 7 and Sept. 6, 12:00 noon-1:00 p.m.

CME On Demand

Hot Topics in Reproductive Endocrinology, by Christine Skiadas, MD, is now available on demand. Learn the modalities offered in fertility assistance and how to make referrals to LG Health’s clinic.

In-Person Only — Mandated Training for Act 31

Recognizing and Responding to Children at Risk: Suspected Child Abuse & Neglect Education for Hospital Staff, Sept. 19, 6:00-8:00 p.m.

This in-person, live event will be presented by Mary Theresa Baker, MD, board certified in child abuse pediatrics, and Robin M. Boyer, MSW, director of intake services at Lancaster County Children & Youth.

Space is limited. Registration deadline is Sept. 12. License information is required for registration. Only individuals registered in [eeds](#) prior to the training are eligible for attendance/credit. Per the state-approved education provider, attendees *must attend the full two hours* to receive credit. Those who arrive late or depart early will not receive credit. LG Health is not a state-approved provider of this education and therefore is not allowed to record the session.