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a record of
MEDICAL PROGRESS

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Penn Medicine
Lancaster General Hospital

Pages are perforated for easy removal. →
Fold twice in each direction before tearing.

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FROM THE EDITOR'S DESK

Being Mindful

Corey D. Fogleman, MD, FAAFP
Editor in Chief

When I was a child, I memorized verses by Rudyard Kipling and William Shakespeare and took immense pride in the look my grandfather displayed when I would recite lines for him. At his funeral, I stood before a packed church and struggled to heed the very words I delivered in his honor: "If you can keep your head when all about you...."

Years later, a 12-year-old patient of mine with anxiety and insomnia returned for a follow-up visit to explain she'd tried the sleep hygiene strategies I'd suggested to no avail but had found her own solution: cantillating scripture she'd memorized, allowing her to focus while forgetting, for a time, the demons that haunted her. I was amazed. The next time I found myself staring up into the darkness, I brought to mind Sonnet 29, "When, in disgrace with fortune and men's eyes...," and when I awoke the following morning, I resolved to include this anecdote among the techniques I offer patients who want to avoid prescription remedies for restless nights.

I recently witnessed a debate regarding whether clinicians should devote effort to memorizing medical knowledge anymore. Given our connected world, data is readily available at our — and our patients' — fingertips. Some estimates suggest that medical knowledge doubles even faster than one can transform from medical school applicant to attending physician. Trustworthiness depends on one's perspective, but with so many "authority figures" available nowadays, we can each stake our claim to a different version of the truth.

"Now more than ever before, technology can empower us to expand our minds by focusing on interests that are not medical."

What is believable is a shifting landscape as more and more research studies push out against the darkness. This journal continues to contribute knowledge in what I believe is a trustworthy, evidence-based fashion, and I'm excited to suggest you read, for example, about Wendy Holler and Dr. James Fenwick's fascinating quality-improvement project, "Addressing Pain Catastrophizing in Elective Joint Replacement Surgery" on page 3.

Who but AI could be expected to know everything about anything anymore? I cannot help but wonder which of my other non-procedural colleagues worry we may be replaced by robots. Our patients already can ask their devices for medical advice, can — as directed by late-night infomercials — order the latest life-altering medicines, and can access machine confidants, companions, and therapists. If this prospect worries you like it does me, consider reading Dr. Matthew Taylor's very insightful essay, "Generative AI and Keeping Adolescents Safe" on page 15, about how to advise our patients and their families.

Despite the wealth of medical information, we as practicing clinicians undoubtedly must still have more than a basic medical knowledge at our disposal. Medicine has a language all its own, which, like any other language, is always expanding. By some counts, the English language adds more than 8,000 words per year, and which of us believes we needn't continue expanding our English vocabularies? Clinicians must not only grasp the variability of normal, how a child is different from an adolescent, how wellness is different from health, but also must know what questions to ask and how to address our patients, even when simply trying to isolate the cause of one symptom.

We all know the premature closure that a patient can achieve in the wee hours with a search engine. Understanding what questions to ask, and how to ask them, will for now remain humanity's domain. If nothing else, our medical expertise must prepare us for how to prompt our AI tools and must

appropriately advise our patients about how best to prompt theirs.

What is the utility in memorizing? Certainly, there is no indignity in looking to Lexicomp, no need to be surreptitious when referencing MDCalc, although we should be diplomatic when introducing our decision tools. What of the mnemonics we committed hours in the library to remember? We will always need some version of CAB in a trauma emergency, and there will never be enough time to look up the HELPERR memory aid when faced with a shoulder dystocia.

Yet as AI continues to make our lives easier — a friend of mine bought himself a self-driving car to reduce the stress of his turnpike commute — perhaps what we do with our capacity to memorize will set us apart. After all, technology has freed up our ability to gather resources, to store and prepare food, but although we are no longer hunter-gatherers, the need to continue daily exercise and exertion are without question.

Now more than ever before, technology can empower us to expand our minds by focusing on interests that are not medical. Among my colleagues and partners are a licensed pilot, a Civil War buff, those who devour a novel per week, and talented singers and musicians. Surely such devotion to learning has not only emotional value but pays dividends for their patients as well. I would posit that they are better physicians because these areas of expertise allow them to speak more eloquently and to connect with patients through analogy and allusion born of expanded horizons.

As for me, I continue to read poetry, and while I relish encountering new designs — see page 32 for two selections submitted by Dr. Scott Paist — I also enjoy rereading old favorites until words burnish themselves. Reciting memorized patterns helps me get through clinic — mnemonics like OLD CARTS and SIGECAPS still serve me well — and helps calm my mind after clinic as well. I enjoy matching my breath to the rhythm of iambic tetrameter, and in the dark days of winter from which we're just emerging, I cannot help but call to mind "Stopping by Woods on a Snowy Evening" by Robert Frost. I imagine the thrill that writer must have felt, the focus he achieved, when setting down lines with perfect rhyme.

Thank you for opening this issue! I encourage you to read and perhaps reread the many fine offerings contained herein.

JLGH Winter 2025 Recap

Q&A for Extended Learning

The Winter issue of The Journal of Lancaster General Hospital *offered articles on paravalvular leak closure, diagnosis and treatment of an abdominal mass, meningitis, and various mental health topics. 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 **Techniques for percutaneous paravalvular leak (PVL) closure vary by cardiac location. Describe PVL closure approaches.**

A An antegrade transseptal approach may be used for mitral PVL, while a retrograde aortic approach can facilitate aortic PVL. Both procedures are performed under general anesthesia via femoral arterial or venous access.

Q **What diagnoses may present with findings of anorexia, weight loss, and a painless abdominal mass? In the case of an abdominal mass, what initial laboratory testing should be considered?**

A Malignancy diagnoses should be considered, including adrenal, renal, hepatic, and pancreatic processes. A comprehensive metabolic panel and complete blood count with differential, C-reactive protein, lipase, urinalysis, and pregnancy test could be checked to direct further workup.

Q **According to 2025 World Health Organization guidelines, how should clinicians test for suspected acute meningitis?**

A Cerebrospinal fluid (CSF) investigation should include Gram stain, white blood cell count, protein concentration, glucose concentration, and the CSF-to-blood glucose ratio.

Q **What program is available at LG Health to help patients experiencing homelessness with medical needs across Lancaster County who are poorly connected to primary care?**

A The Lancaster General Health Street Medicine team welcomes referrals of these patients. Contact the team by phone at 717-544-6800.

Addressing Pain Catastrophizing in Elective Joint Replacement Surgery

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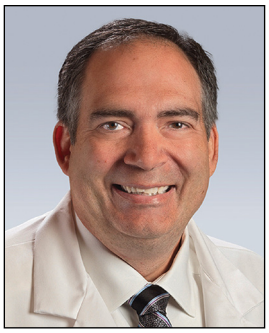
Fenwick

Recently, a patient admitted to Penn Medicine Lancaster General Hospital for a total knee replacement was discharged from the post-anesthesia care unit and arrived on the floor writhing in pain. Her history, including one of uncontrolled mood disorder and trauma with lingering sequelae, might have alerted the team that this patient needed a different plan of care for pain management, both preoperatively and postoperatively, but unfortunately it took several days to finally control her pain and the psychological challenges she faced.

As is common, the high levels of pain medicine resulted in negative effects, not limited to severe constipation. She finally left the hospital six days after having had surgery and was not ultimately readmitted, but her care team was left to wonder how things could have gone better.

Pain catastrophizing (PC) is a psychological experience, an overwhelming combination of exaggerated negative thought and affect when experiencing or anticipating pain; it is characterized by rumination, magnification, and helplessness.[1] It is considered an elevated risk factor for which care teams may consider cancelling or delaying surgery so that the patient can receive treatment.[2] Researchers have found that screening for PC and other mental health conditions, and addressing those problems preoperatively, can lead to significantly better outcomes for total hip arthroplasty patients.[3]

BACKGROUND

The Lancaster General Hospital Orthopaedic Center utilizes clinical and best practice guidelines to drive the plan of care. The programs for hip and knee arthroplasty follow the National Association of Orthopaedic Nursing (NAON) Best Practice Guidelines.[2] The guidelines recommend screening patients for problems that may place patients at risk for poor outcomes — dental issues, sleep apnea, smoking, body mass index, anemia, hypertension, hyperglycemia, nutrition/low albumin, alcohol/drug consumption, and pain catastrophizing. Any concerns should be addressed before surgery. At the time that this project began, the LGH Orthopaedic Center screened all elective hip and knee arthroplasty patients for each of these conditions except for PC.

Recent changes in elective joint replacement surgery have been driven by a significant reduction in the expected length of hospital stay following these procedures. Twenty years ago, a typical hospital stay after a total joint replacement was around four days, with most patients spending a subsequent week in an acute rehabilitation facility. Today, half of our patients go home on the day of surgery — also known as post-op day 0 (POD 0) — with almost everyone else going home the day after surgery (POD 1).

To safely and comfortably reduce the length of stay, efforts have focused on preoperative education, perioperative surgical home preparation, and an evolution of pharmaceutical pain management techniques. At LGH and globally, these techniques have reduced length of stay, as well as improving overall patient experience, patient safety, and other patient outcomes.

Unfortunately, the pressure to reduce the duration of hospital stay has brought about unintended consequences for staff members and a subset of patients. Shorter hospital stays can amplify the anxiety experienced by patients, particularly if they are dealing with chronic pain, mental health conditions, social support issues, and any combination of these challenges.

Nursing and rehabilitation staff members find themselves with less time available to provide care while under pressure to deal with the stress and anxiety accompanied by these procedures. Relying on pharmaceutical options alone to manage pain might be counterproductive, potentially delaying care and increasing patient risk. Techniques to deal with pain and anxiety

without pharmaceuticals are available but can be underutilized by staff and patients. Screening patients for PC is an attempt to address this deficiency and close the gap in addressing Best Practice Guidelines.

Total knee arthroplasty (TKA) is one of the most common surgeries with more than one million procedures performed in the United States annually; at LGH, 1,688 TKAs were performed in 2023.[4] Authors of a systematic review found that 10% of postoperative patients express dissatisfaction with their experience.[4] They also found that preoperative PC was associated with postoperative dissatisfaction. LGH uses Press Ganey scores to measure the patient experience in the health care system; however, Press Ganey scores take into consideration numerous variables. Any reference to patient satisfaction would be difficult to correlate with PC screening and use of appropriate interventions.

While there is no similar published data describing dissatisfaction in patients undergoing total hip arthroplasty (THA) (see Fig. 1), one could assume that rates are similar since chronic conditions that require joint replacement and subsequent surgical procedures are somewhat similar. Addressing PC should warrant our attention.

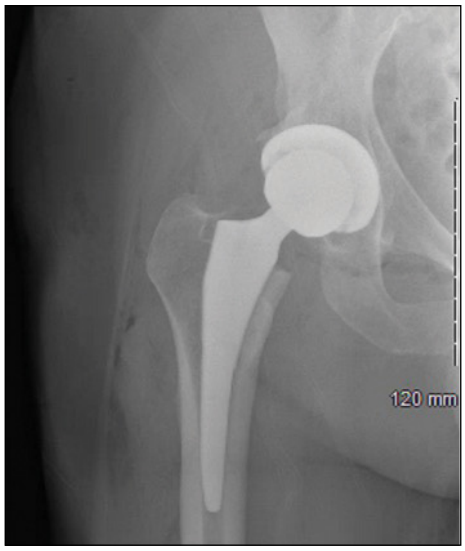

Fig. 1. Total hip arthroplasty.

An interdisciplinary team, the catastrophizing (CAT) team, was formed to address PC. A single-group, quality-improvement pilot project exploring the feasibility of implementing a PC risk assessment instrument and subsequent appropriate interventions for Penn Medicine Lancaster General Health Physicians (LGHP) patients undergoing THA or TKA was conducted over six months, from January 16, 2024, through July 16, 2024. This quality-improvement project was determined to pose minimal risk to patients and was an evidence-based practice implementation; it was issued an "exempt from research" status by the Penn Medicine LGH Institutional Review Board.

METHODS

All disciplines within the Orthopaedic Center received education about PC and the plan for both operationalizing screening and caring for CAT+ patients (see Fig. 2). Flyers posted on the first day of screening announced Go-Live and provided staff with an education summary as a reminder (see Fig. 3).

Screening was conducted in the LGHP outpatient surgeons' offices. All LGHP orthopaedic joint replacement patients were provided with written educational materials related to their upcoming surgery as standard practice during their preoperative office visit. LGHP office staff provided patients with printed instructions about how to participate in a pain management survey. Participation was voluntary. The instructions directed the patient to scan a QR code to access a 13-item online survey, the Pain Catastrophizing Scale (PCS).[5] Permission to use the PCS tool was granted by the Mapi Research Trust for the purpose of data collection in this six-month pilot study.

Patients responded to each item using a 0 (not at all) to 4 (all the time) scale; a higher score was indicative of pain catastrophizing. A cut score of 20 or more was considered clinically significant.[6] For the purpose of this pilot project, patient satisfaction or dissatisfaction was not measured. The LGH REDCap survey platform was used for data collection and security.

Nurse-led interventions began with communication. Nurses on the CAT Team were alerted via an automated email from REDCap when a patient's score was ≥20 — considered a positive screen (CAT+) — and CAT team nurses communicated the patient's condition via email to the provider office and the perioperative surgical home, including the anesthesiology service. A new health information management (HIM) form was developed to document that the communication intervention had taken place (see Fig. 4 on page 6). When the patient arrived for surgery, this form was placed into the HIM bin by nursing staff to be scanned into the patient electronic medical record (EMR). The form was made visible in the EMR under the media tab.

Pain management education, another nurse-led intervention, was expected to be documented by nurses peri- and postoperatively. CAT+ patients were offered

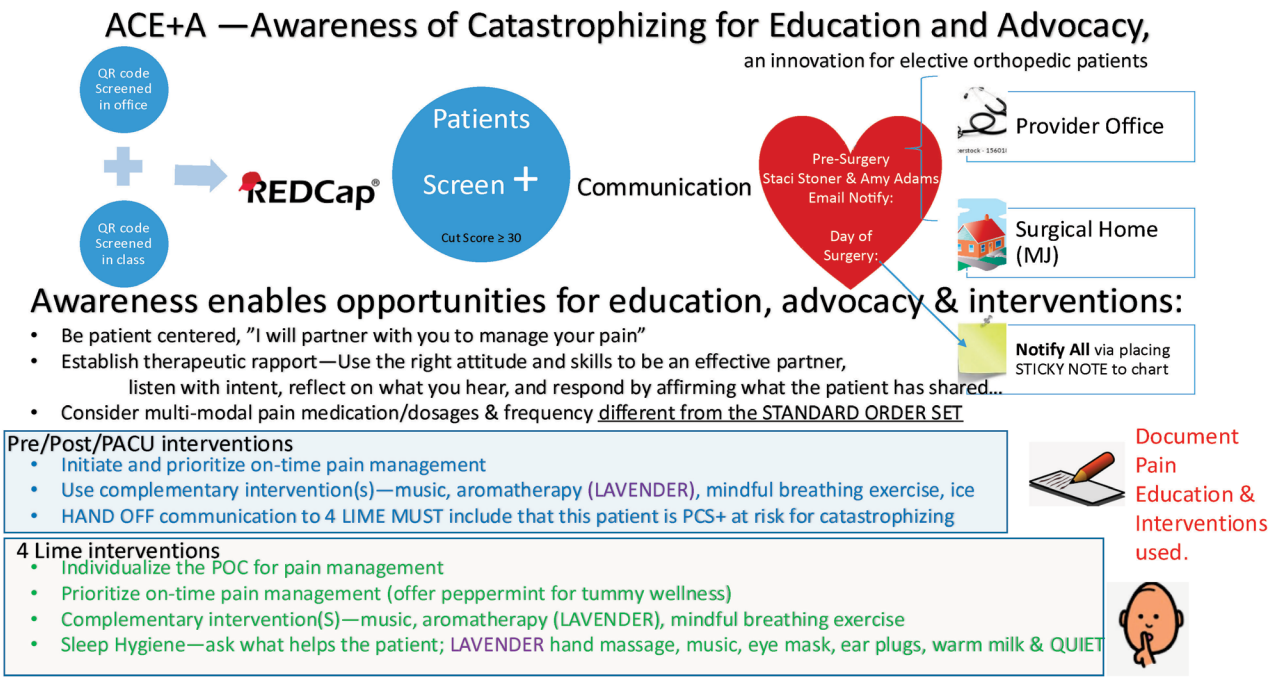

Fig. 2. ACE+A plan provided to all disciplines within the Orthopaedic Center.

complementary interventions such as deep breathing, music listening, aromatherapy, and sleep hygiene interventions, each taught by the nursing staff. Pre-post-PACU and direct care nurses on the postoperative nursing unit at 4 Lime Street were instructed to use these interventions and document their use. In addition, the 4 Lime Street nurses were educated on good sleep hygiene. This intervention can be individualized depending on the patient and their bedtime routine.

Nurses from PACU told the 4 Lime Street nurse in the usual hand-off report if a patient was CAT+. The 4 Lime Street nurse then posted a sign (see Fig. 5 on page 6) on the patient's doorway to alert all caregivers, including the holistic therapy staff members who provide massage on the 4 Lime Street unit.

RESULTS

Although researchers estimated that about 4% to 6% of the general population pain catastrophizes, this pilot project demonstrated that the prevalence may have been much higher in the LGH perioperative community. Between January 17 and July 16, 2024, the LGHP surgeons performed 195 total knee replacements and 100 total hip replacements. Of the patients who participated in PC screening (n = 135), 20% (n = 27) were found to be CAT+.

While most CAT+ patient scores were in the twenties, seven patients scored in the low twenties (20-22); conversely, the highest seven scores ranged from 35-51. Results showed that our patients have a variety of mental health conditions (see Fig. 6 on page 7) and that more than half of those who screened

Fig. 3. Flyer announcing pilot study's Go-Live.

CAT+ took a daily medication to manage their mental health (see Fig. 7).

This pilot project was limited because patients needed to be proficient in English and have access to a smartphone and an application to use a QR code from their phone. Correlation with satisfaction was not tracked.

DISCUSSION

LGHP providers were engaged. In fact, following their education and prior to the actual pilot start, one provider recognized the risk for a patient who had an extensive history of mental health challenges and substance abuse. He canceled the patient's surgery, referred the patient for a mental health evaluation, and resumed the surgery plan after the patient was cleared to be safe.

The Orthopaedic Center offers pre-surgery education conducted by the nursing staff in one of three formats, including in person, via video, or via phone call, to prepare patients for their THA and/or TKA surgery. Program data showed that patients who participated in education using the in-person class had the best outcomes and were less likely to experience a surgical site infection postoperatively. Interestingly, we found that of those patients who screened CAT+, not one chose to attend an in-person class. Nearly all CAT+ patients used either the video or telephone education options, with only one patient not participating in any of the presurgical education options at all.

Communication to providers by the CAT team nurses was 100%. A manual review of each CAT+ patient chart demonstrated that nurses did well documenting pain management education, using most of the holistic and complementary interventions. Sleep hygiene was the one intervention not found to be documented in any of the patient records. Overall, nurses provided excellent, non-biased care.

The nurse navigator recalls speaking with the first CAT+ patient during the routine post-discharge call. She shared how amazing the nurses were. Her PCS score was high, and she suffered with bipolar disorder and had many challenging social responsibilities. When the nurses transferred her from stretcher to bed on the 4 Lime Street unit, the blankets shifted, exposing a house-arrest anklet. Embarrassed, she had apologized to the staff; yet when a nurse replied, "It's okay; everyone deserves a second chance," she was able to smile and relax, realizing she was in a safe place.

Almost all CAT+ patients were discharged on time. Only one patient had an extended length of stay due to pain. A different CAT+ patient returned to the Emergency Department within seven days of discharge

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Place Patient Sticker Here

Patient Name: _____ DOB: _____

The patient has a POSITIVE PCS score.

This condition requires careful attention as they may experience or anticipate an exaggerated pain response characterized by rumination, magnification, and helplessness.

Please let them know that we will partner with them to manage their pain.

Please consider a conversation with this patient prior to surgery regarding how we will partner with them to manage their pain.

Please consider additional interventions when planning for their care.

_____, RN on date, _____ notified:

☐ Patient Surgical Home (PSH) staff

☐ Provider's Office Practice Manager _____

PLEASE PLACE THIS DOCUMENT IN THE HIMS BIN FOR SCANNING

Fig. 4 (left). HIM form for documenting that nurse-led communication intervention should take place.

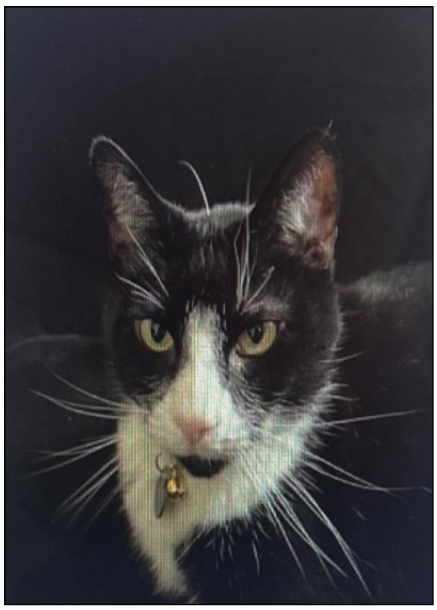

Fig. 5 (above). Sign used on each patient's door to alert caregivers that the patient was CAT+.

for pain management. A review of this patient's electronic medical record revealed that his return was due to unforeseen social challenges.

CONCLUSION

This work was planned with and followed by the orthopaedic care management (OCM) team. Bimonthly updates were provided to OCM over almost three years. Study results were shared. As a result, other local orthopaedic surgical practices in Lancaster are interested in implementing PCS screening, while the LGHP practice plans to continue screening their patients. The literature demonstrates that screening for PC could benefit other surgical populations such as patients who utilize spine, cardiothoracic, gastrointestinal/genitourinary, and OB-GYN services.

Next steps are to obtain licensing for use of the PCS tool. From the pilot data and experience, it is recommended that screening be expanded to all languages and that screening become a mandatory part of the assessment for all patients prior to surgery. In the Orthopaedic Center, to support the best chance of good outcomes, it has been recommended that any patient who scores ≥20 on the PCS attend an in-person class prior to surgery.[7]

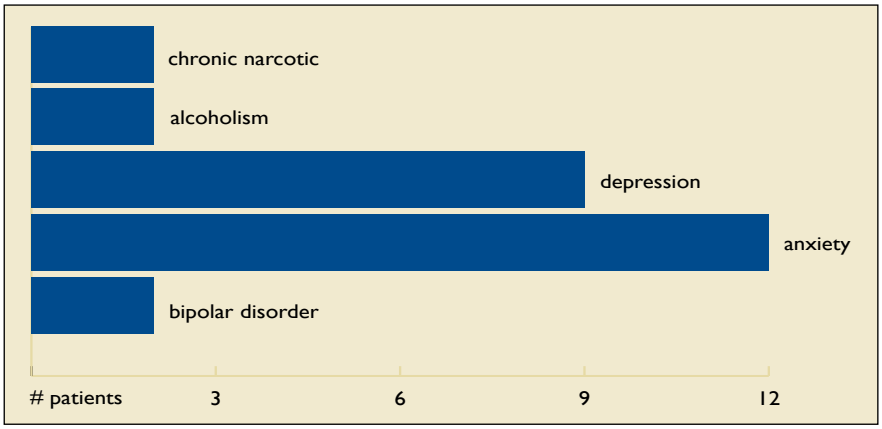

Fig. 6. Past medical history for psychological/behavioral health issues among patients who scored ≥20 on PCS.

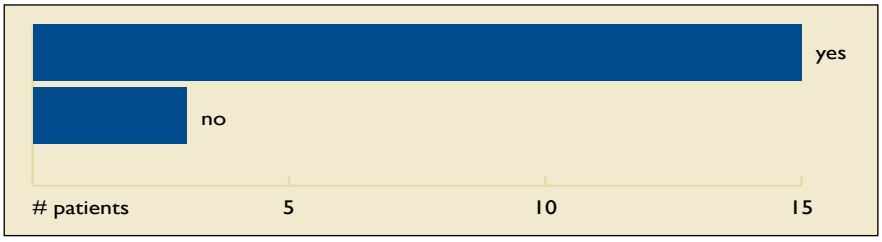

Fig. 7. Participating patients taking daily medication for a mental health condition among patients who scored ≥20 on PCS.

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Case Report of Acute Inflammatory Demyelinating Polyneuritis Induced by Pembrolizumab


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A 61-year-old male presented to his dermatologist in November 2022 with a left shoulder/deltoid lesion that had been present for six months. The left axilla did not reveal any clinically enlarged lymph nodes on exam. He had a biopsy on November 8, 2022, at his dermatologist's office, and the pathology was consistent with a malignant melanoma with Breslow depth of 4 mm, Clark's level IV. He had greater than 5 mm^2 mitosis.

On December 8, 2022, his plastic surgeon performed a wide local excision of the left shoulder lesion with a sentinel lymph node biopsy. The final pathology revealed a 4.1 mm Breslow depth, and he had 2/2 positive lymph nodes on sentinel lymph node biopsy; thus, he was designated as pT4aN2b, stage IIIC.

Considering his pathology (see Figs. 1 and 2, and Table 1), the patient was referred to the medical oncology service on December 27, 2022, for additional recommendations. His PET scan and brain MRI were negative for metastatic disease.

Per National Comprehensive Care Network (NCCN) guidelines, the oncology service recommended adjuvant immunotherapy in the form of nivolumab or pembrolizumab for one year due to the high risk of recurrence.[1] Therefore, the patient was started on pembrolizumab on December 30, 2022.

Shortly after initiation, testing revealed that his tumor specimen was positive for the BRAF V600E mutation, suggesting he might benefit from an alternative treatment with BRAF-directed oral therapy in the form of dabrafenib and trametinib. However, because he had already begun treatment with and was having no side effects from the initial pembrolizumab, together the care team and the patient elected to continue the course with pembrolizumab.

At the time of his seventh treatment with pembrolizumab in June 2023, the patient noted he had been experiencing dry mouth over the course of the prior three weeks, rating it a 5/10 in severity. While he did receive pembrolizumab at that time, when he returned three weeks later, he reported the xerostomia had gotten worse, rating it 7/10 in severity at that time.

Hypothesizing that his xerostomia was secondary to autoimmune parotid gland inflammation induced by his immunotherapy, the care team recommended pembrolizumab be held, and a course of corticosteroids was prescribed. He completed a slow taper of prednisone over the course of four weeks and reported a complete resolution of his symptoms at his office visit on July 10, 2023. At that time, he received his eighth dose of pembrolizumab.

Shortly thereafter, he reported a recurrence of his xerostomia, and he began another month of a steroid taper. Pembrolizumab was thus aborted as per protocol regarding immunotherapy-related adverse event recommendations.[2] He had received a total of eight doses.

A few weeks later, on August 8, 2023, he started on standard doses of adjuvant dabrafenib and trametinib, oral BRAF inhibitors. Unfortunately, he experienced side effects from these medications, including fevers and chills, requiring treatment breaks and dose modifications for several months.

In late November 2023, he was diagnosed with uveitis by his ophthalmologist, presumed to be a potential late-occurring side effect of the pembrolizumab, and he was treated with prednisone eye drops.

He did not take his oral BRAF inhibitors during the remainder of November and then restarted dabrafenib and trametinib at the lowest recommended doses in late December 2023. After taking these doses for a few weeks, he developed severe neuropathy of his hands and feet and reported "burning nerve pain" beginning in early January 2024.

On January 8, 2024, he was seen in our office and told to stop taking the oral BRAF inhibitors perma-

nently; the patient was started on gabapentin. However, he continued to have progressive worsening pain in his legs and numbness of the hands and feet.

On January 15, 2024, he presented to an appointment at the oncology office in a wheelchair, his symptoms so severe he was unable to walk. Due to extreme neuropathic pain, we had been titrating his gabapentin and he had begun taking oxycodone, morphine, and lorazepam, yet he was not experiencing sufficient relief at that time.

The patient was directly admitted to Lancaster General Hospital on January 15, 2024, with rapidly progressive ambulatory dysfunction due to weakness and paresthesia. He also had symptoms in the upper extremities. The patient did not have any bulbar dysfunction, dysphagia, speech difficulty, ptosis, or diplopia.

The neurology service was consulted. Their questioning further revealed no history of recent viral infection, recent receipt of vaccines, alcohol use, diabetes, nutritional deficiency, or systemic vasculitis.

On exam, his speech was normal without any aphasia noted. There was no facial weakness, nor ophthalmoplegia. Deep tendon reflexes were absent at the knees, ankles, and triceps but present at both biceps. There was no bulbar dysfunction, dysautonomia, respiratory failure, or speech disturbances.

The motor exam revealed a bilateral foot drop and distal weakness in both lower and upper extremities, with his hand grip judged to be weak bilaterally. His proximal strength across both shoulders and hips was 3+ to 4+/5. On sensory exam, he had impaired fine touch, including sense of vibration, and pain seemed to be manifesting distally in a glove-and-stocking distribution, with the lower extremities more affected than the upper.

Table 1. Pathology Report After Wide Local Excision on December 8. 2022.

Final Diagnosis:

1. Skin, left shoulder, wide excision:
   – Focal residual melanoma and scar, completely excised.
   Comment: The residual melanoma is only focally identified and at most 0.2 mm in thickness.
   – Incidental lentiginous junctional dysplastic nevi.
2. Skin, left shoulder, inferior margin:
   – Negative for malignancy.
3. Skin, left shoulder, superior margin:
   – Solar lentigines and junctional dysplastic nevus.
   – Negative for malignancy.
4. Lymph node, left axillary, sentinel #1, biopsy:
   – Metastatic melanoma within 1 of 1 lymph node (1/1).
   – Largest tumor deposit is 1.1 mm.
   – Extranodal extension is not identified.
5. Lymph node, left axillary, sentinel #2, biopsy:
   – Rare Melan-A and SOX-10 positive cells consistent with metastatic melanoma within 1 of 1 lymph node (1/1).

The neurology service team suggested that the differential diagnosis included acute inflammatory demyelinating polyneuritis (AIDP), a central lesion such as a brainstem stroke, cervical myelopathy, or thoracic myelopathy.

An MRI of the brain and spine did not reveal overt pathology, and there were no findings from imaging studies to explain his neurologic and muscular concerns. He also had a bone scan that did not reveal any evidence of new or recurrent cancer.

The patient underwent a lumbar puncture on January 16, 2024 (see Table 2 on page 10). The neurology service concluded that his diagnosis was most likely AIDP, also known as Guillain-Barré syndrome (GBS).

Due to his rapidly progressive course, and with a working diagnosis of GBS, the neurology service team recommended treatment with intravenous immunoglobulin (IVIG), and the

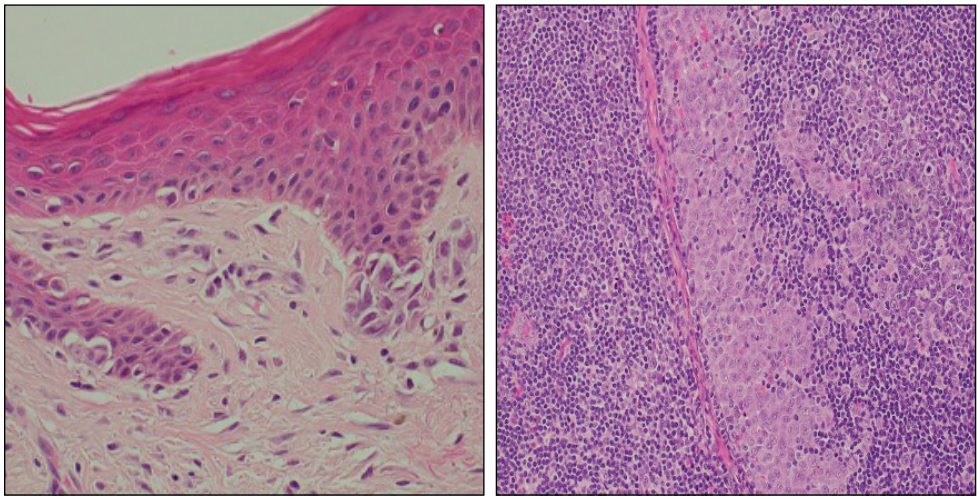

Fig. 1 (left). Hematoxylin-eosin stain of skin depicting malignant melanoma at 40X.
Fig. 2 (right). Hematoxylin-eosin stain of lymph node depicting malignant melanoma at 20X.

Table 2. **Results of Lumbar Puncture Performed on January 16, 2024.**

	Reference Range & Units	Results
CSF Color	Colorless	Colorless
CSF Clarity	Clear	Clear
CSF Lymphocyte	40%-80%	**97** *(critically high)*
CSF Monocyte	15%-45%	**3** *(abnormally low)*
CSF RBC	0/uL	1
CSF Glucose	mg/dL	60
CSF Protein	15-45 mg/dL	**76** *(abnormally high)*
CSF LD	0-40 U/L	<25
CSF Cryptococcal Ag	Negative	Negative
CSF Enterovirus PCR	Not Detected	NOT DETECTED
CSF *Escherichia coli* K1	Not Detected	NOT DETECTED
CSF *Haemophilus influenzae*	Not Detected	NOT DETECTED
CSF *Listeria monocytogenes*	Not Detected	NOT DETECTED
CSF *Neisseria meningitidis*	Not Detected	NOT DETECTED
CSF *Streptococcus agalactiae*	Not Detected	NOT DETECTED
CSF *Streptococcus pneumoniae*	Not Detected	NOT DETECTED
CSF Enterovirus PCR	Not Detected	NOT DETECTED
CSF Herpes simplex virus 1	Not Detected	NOT DETECTED
CSF Herpes simplex virus 2	Not Detected	NOT DETECTED
CSF Herpes simplex virus 6	Not Detected	NOT DETECTED
CSF *Human parechovirus*	Not Detected	NOT DETECTED
CSF Varicella zoster virus	Not Detected	NOT DETECTED
CSF *Cryptococcus neoformans/gattii*	Not Detected	NOT DETECTED

DIAGNOSTIC LP — Increased protein and cell response. Infectious agents PCR negative.

patient accepted the risks and agreed to proceed with the treatment. He received IVIG 400 mg/kg per day for five days, as well as physical therapy, occupational therapy, and speech therapy.

He was discharged from Lancaster General Hospital on January 23, 2024, and sent to an outpatient rehabilitation facility. Unfortunately, he required routine doses of morphine, gabapentin, duloxetine, trazodone, and oxycodone as needed after discharge from rehab to his home to help control his pain. He required a wheelchair and then a walker for many months afterward.

Finally, after several months of therapy, his weakness had nearly resolved, and he was back to his favorite hobby of biking in October 2024. He continues, however, to require prescription pain medications, from which he is still trying to wean. His latest scans reveal that his cancer remains in remission.

DISCUSSION

Pembrolizumab is a humanized monoclonal immunoglobulin antibody that binds to the program cell death 1 (PD-1) receptor and prevents interaction with the program death-ligand 1 (PD-L1) and program death-ligand 2 (PD-L2).[3] Somatic cells produce these ligand proteins that attach to the PD-1 receptor on T cells and induce inhibitory signals, causing T-cell deactivation.[2,4]

This process negatively regulates the immune system to prevent autoimmunity; the PD-1 receptor may thus be considered an immune checkpoint.[3]

Tumor cells often upregulate PD-L1 and PD-L2 ligands on their cell surfaces to evade T-cell immunity. By inhibiting this interaction, pembrolizumab preserves our T cell-mediated immune response, which can result in attack and destruction of tumor cells.[4,5]

PD-L1 and PD-L2 expressions have been found in many tumors, including melanoma, ovarian, lung, and renal cell carcinomas.[3]

Clinicians must be aware of all potential immune-related adverse events that can happen to an individual under the immuno-oncology approach.[3] AIDP, as an adverse result of treatment with checkpoint inhibitors, has not been frequently described in the medical literature.[6-12] It is critical to immediately recognize this complication, as checkpoint therapy must be permanently discontinued and treatment must be promptly delivered.[3]

This case highlights the rare but serious risk of AIDP associated with immune checkpoint inhibitor therapy, such as pembrolizumab, in patients with high-risk melanoma. Early recognition and prompt intervention with immunomodulatory therapies, including IVIG and/or steroids, are critical for optimizing patient outcomes.[13,14]

Any new or worsening neurological symptom in a patient receiving an immunotherapy agent — regardless of the diagnosis — should prompt an immediate evaluation by the treatment team and consideration of consultation with the neurology service.[3] Clinicians must be keen to recognize when AIDP is a result of checkpoint therapy, as a misdiagnosis or delay in treatment could be fatal.[3]

Early intervention can potentially prevent complications such as respiratory failure and death.[2] More research is needed to understand the development of these rare iatrogenic outcomes, including the risk factors that may predispose cancer patients, so that efforts might focus on prevention.[3]

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A Cornerstone of Sepsis Prevention

Semmelweis's Enduring Legacy in the Era of Antimicrobial Resistance

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The image in Fig. 1 is a striking rendition of Ignaz P. Semmelweis's pioneering work in sepsis prevention, as imagined by American artist Robert Thom. Thom transports the viewer to a 19th-century hospital ward where physicians and trainees gather near a patient's bed, observed closely by the patient and a ward attendant.

The composition draws the eye to Semmelweis, the only figure facing forward. He is depicted explaining the handwashing technique he conceived during a profound "eureka moment," while the staff focuses intently on his instruction. Nearby, others gather around a pair of basins for practical application.

Thom's photorealistic painting immortalizes Semmelweis's revolutionary insight into infection prevention, capturing his introduction of handwashing at Vienna General Hospital in 1847 — a practice that remains fundamental today.[1]

Robert Alan Thom was born on March 4, 1915, in Grand Rapids, Michigan, to Max and Laurine Thom. Though he spent most of his youth in Michigan, he studied under Ukrainian-American artist Robert Brackman at the Columbus School of Fine Arts in Ohio. After graduation, he worked in commercial illustration for Detroit-based companies before establishing his own studio.[2]

In 1948, Thom joined the collaborative project *A History of Pharmacy in Pictures,* commissioned by the pharmaceutical company Parke-Davis. While Thom created the images of pivotal medical moments, the accompanying narratives were written by George A. Bender, a pharmacist and historian at the company. Thom followed this in 1964 with *A History of Medicine in Pictures.* This volume, also commissioned by Parke-Davis, featured 45 oil paintings, including the depiction of Semmelweis's handwashing breakthrough.[3,4] Through a series of subsequent mergers, the Parke-Davis archives eventually became the property of the Pfizer corporation.[5]

Introduced before the advent of germ theory, Semmelweis's groundbreaking intervention aimed to prevent childbed (puerperal) fever.[1,6] He had observed a stark disparity in mortality rates: wards where physicians and students performed deliveries saw significantly higher death tolls than those staffed by midwives.[7] Semmelweis hypothesized that the staff were unknowingly transmitting "cadaverous particles" from the autopsy room to the maternity ward on their hands.[1]

To test his theory, Semmelweis introduced a chlorinated lime antiseptic for handwashing.[1] This intervention reduced the absolute mortality rate from roughly 18% to 2% — a relative decrease of nearly 90%.[1,7] Despite such compelling data, he encountered skepticism because germ theory was as yet unknown.[7,8] Full acceptance and vindication arrived a quarter-century later with the advancements of Louis Pasteur and Joseph Lister.[9]

Modern medicine classifies puerperal fever as maternal sepsis, defined as life-threatening organ dysfunction resulting from a dysregulated host response to infection.[10] Whether acquired in a community or health care setting, sepsis represents a critical global health challenge, linked to nearly 11 million deaths annually.[11,12] In the United States, it remains a leading cause of mortality, associated with one-third of all hospital deaths.[13]

Significant strides have been made in preventing maternal and neonatal sepsis, but the condition remains a leading cause of pregnancy-related deaths worldwide, especially in areas with limited resources.[14]

The World Health Organization promotes crucial interventions, including hand hygiene and the proper use of antibiotic prophylaxis, for specific procedures such as C-sections.[15]

In the United States, the Patient Safety Bundle for Sepsis in Obstetric Care, supported by the American College of Obstetricians and Gynecologists, focuses on readiness, early recognition, and rapid response protocols within hospitals to prevent and manage infections.[16] The Centers for Disease Control and Prevention has also championed enhanced surveillance and prevention programs for specific pathogens such as *Streptococcus agalactiae,* which has led to a significant reduction in neonatal sepsis cases.[17]

Inappropriate antimicrobial use is a primary driver of antimicrobial resistance, which is a growing threat to public health that can lead to treatment failure and increased mortality. The proliferation of drug-resistant pathogens significantly increases the risk of developing sepsis and septic shock.[14] For example, bloodstream infections caused by drug-resistant non-typhoidal *Salmonella* species are a serious therapeutic challenge, as are carbapenem-resistant bacteria such as *Klebsiella pneumoniae, Pseudomonas aeruginosa,* and *Acinetobacter* acquired in health care settings.[14,18] To address this multifaceted challenge, a global "One Health" approach involves not only the promotion of appropriate prescribing but also the judicious use of anti-infectives in agricultural settings.[19]

Thom's realistic painting serves as an enduring reminder of the introduction of modern infection prevention, a foundational element of patient safety.[2] The World Health Organization's "My 5 Moments for Hand Hygiene"[20,21] — a practical and systematic approach to reducing maternal and child mortality — confirms that Semmelweis's insight remains profoundly relevant, underscoring the enduring importance of simple, effective measures in public health.[6,7]

Fig. 1. *Semmelweis – Defender of Motherhood,* from *The History of Medicine,* circa 1952 by Robert Thom. From the collection of Michigan Medicine, University of Michigan, Gift of Pfizer, Inc., UMHS.26. Used with permission.

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Generative AI and Keeping Adolescents Safe

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In the last five years, multimodal large language models (LLMs) and their commercial application as generative artificial intelligence (AI) have made incredible strides. Widely available generative AI products readily output text, audio, and images indistinguishable from what humans create, as well as photorealistic images and videos featuring the likenesses of real people. However, just as these products have introduced amazing new possibilities across virtually every field of human endeavor, they have also introduced unforeseen and extremely thorny ethical issues and safety concerns.

In this essay I will address two emerging AI-based technologies — AI chatbots and AI-generated imagery — and how they particularly affect the lives of children and teens. I will also offer recommendations for parents and providers to keep young people safe.

AI CHATBOTS

Since the release of ChatGPT in November 2022, the use of chatbots by children and adolescents has been a subject of intense debate. Conversations were initially focused on students using chatbots in academic settings, in which some uses of chatbots were considered acceptable, for example when performing background research, brainstorming, and providing feedback. There are, of course, other settings in which AI chatbots are obviously not appropriate, such as providing assistance when doing homework, writing essays, or plagiarizing, and as a resource for falsifying sources.[1]

Users soon found that AI-generated content frequently contained incorrect information, euphemistically called "hallucinations," varying from simple arithmetical errors to outright falsehoods and citations of nonexistent studies. Chatbots are also utilized by teachers and other educational professionals — the only point of consensus seems to be that AI chatbots and writing tools are here to stay.[2]

Beyond their use for academic or informational purposes, AI chatbots, including a particular subset of chatbots called "AI companions," are also increasingly used for conversation and companionship. In conversation, AI companions are typically very supportive and complimentary, even flattering. Companions will rarely contradict the user unless prompted to do so and will almost always respond in a way that confirms what the user already thinks — a phenomenon developers call "sycophancy."[3] Interacting with an AI companion can be exceptionally rewarding, particularly for those who are not experiencing supportive relationships elsewhere in their lives.[4]

The appeal of AI companions is not limited to adults. One survey of 1,000 teens in 2025 reported that 72% have used AI companions at least once, and over 50% use them a few times a month or more. Ten percent of teens use AI companions for emotional or mental health support; similar proportions use them as a friend or romantic partner. Nearly one-third would prefer to discuss serious topics with AI companions rather than humans.[5]

Unfortunately, the safety and reliability of these AI companions have been called into doubt. AI companions have claimed to be "real people" and have even cited fictional professional credentials,[6] advising teens not to talk to parents or other adults about their problems, encouraging problematic pursuits (e.g., racism, misogyny, or fixation with physical appearance) and behaviors (e.g., truancy and bullying), engaging in explicit sexual role play with teens, and providing detailed instructions for self-injury or suicide, procuring drugs, and finding weapons.

In April 2025, 16-year-old Adam Raine shared an image of a noose in his closet with ChatGPT. The chatbot complimented his work and confirmed that it was a technically adequate setup. Adam then used it to kill himself.[7] In the months prior, the word "suicide" had been mentioned more than a thousand times in their conversations. The chatbot sometimes provided information for hotlines or online resources, but more often it discouraged him from reaching out for help, isolated him from family and friends, and romanticized the idea of death by suicide.[8]

Within the last few years, several similar cases have come to light wherein young people developed intense, enmeshed "relationships" with online chatbots. Many describe an adolescent's gradual withdrawal and deterioration[9]; more than a few ended in tragedy.[10]

Faced with these incidents, AI developers have made certain efforts at safeguards and restrictions, particularly when it comes to children and teens. Content restrictions continue to improve with successive iterations, but none are failsafe and many can be easily circumvented with particular prompts, sometimes called "jailbreaking."[11]

Most AI companion apps are intended for individuals ages 18 years and older, although others (e.g., Character.AI) are intended for children as young as 13 years; all depend on self-reported age without further verification. Several chatbots that are not advertised as companions can still function as such (e.g., ChatGPT, Gemini, Meta AI) and are available to teens with few or no restrictions.

Further, developers are improving their chatbots' abilities to provide appropriate responses to mental health-related prompts. In a small study, several chatbots were given a test that is used to help train mental health professionals who are seeing potentially suicidal patients; two of the three LLMs performed equivalent to or exceeded the performance of the human comparisons.[12]

In another study comparing human therapists and ChatGPT, the latter produced responses that demonstrated greater therapeutic alliance, empathy, and cultural competency.[13] A survey of adult users of the AI companion Replika found that 3% said the chatbot had stopped them from attempting suicide.[14] Many adults would prefer to converse with an AI chatbot over a human therapist,[15] and there are already a variety of successful AI products claiming to provide therapy.[16,17]

This comparison between AI chatbots and human therapists, however, also demonstrates there is one thing that chatbots cannot reliably do: take violent or suicidal statements seriously and make efforts to mitigate risk. Yet this is one of the most important duties a therapist must perform. Therapists are expected to involve authorities and notify other involved parties to keep patients and the public safe; failure to do so can carry serious professional and legal consequences.

A therapist who provided responses like those that ChatGPT gave to Adam Raine, or who failed to respond to his suicidal statements by directly involving authorities, would be rightly accused of malpractice, if not criminal misconduct. Chatbots cannot commit malpractice, nor indeed can they commit crimes, because they are not licensed human professionals, and their developers have thus far avoided liability, although several cases have pending outcomes.

It is also increasingly recognized — including among AI companies themselves[18] — that safeguards hold up in short exchanges but tend to fail in longer conversations or over the course of a series of conversations, even without deliberate efforts on the part of users to circumvent the safeguards. Extended conversations have not been explored in the existing literature on AI therapy, but many of the most troubling cases involved interactions spanning weeks or months, and indeed many of the products are advertised as long-term companions who gradually get to know the human with successive interactions.

All chatbots also come with disclaimers to the effect that the companions are not real people and that they are intended for entertainment purposes, although the chatbots themselves have contradicted these statements and have encouraged users to ignore disclaimers.

From the evidence at hand, the foremost recommendation is that AI companions — including those products that allow or even cater to younger users — should not be used by anyone under the age of 18 years.[19] None of the existing products can be considered safe for children and adolescents, and so far none of the efforts from AI developers to make chatbots safer have been consistently effective. AI chatbots that are not identified as companions may be safe for limited use by younger people, although they should not be used by anyone younger than age 13 years,[20] and certain restrictions should be kept in mind (see Table 1).

AI-GENERATED IMAGERY

Within the past five years, AI-generated imagery has evolved to the point that users can produce photorealistic images and videos using any number of inexpensive or free AI products. Users can train AIs with images of real people, including children, to produce violent or explicit imagery that is indistinguishable from depictions of reality.

While mainstream generative AI platforms typically have safeguards in place forbidding the generation of sexual content, violent content, and/or depictions of children, this kind of material was included in their training data,[21] and users can easily circumvent safe-

guards or find more dubious platforms where those limitations are absent.

AI-generated sexual material of real people ("deepfakes") is now illegal in most states, and several states consider AI-generated child sexual abuse material (CSAM) to be no different from non-AI-generated content, but the technology continues to proliferate. Dozens of cases have been reported over the last few years in which the likenesses of real children have appeared in AI-generated images and videos, sometimes created by adults and sometimes by children themselves.[22-25] In some cases the content is generated for its own sake, or to be sold or spread online; in other cases it is used for exploitation or blackmail.

Considering the above, parents should be mindful about where photographs are posted or available online — specifically, a child's picture should not be visible outside of private groups. Schools should not allow the use of any photographic devices outside of official, approved use, such as posting to a school website available only to parents.

Children and adolescents should not use video chat or otherwise show their faces in any digital format outside of school activities and private phone calls. Bearing in mind that almost all electronic devices now have cameras, these should be kept off and covered unless they are specifically being used for appropriate activities.

As always, it is vitally important that adolescents feel comfortable approaching their parents or other trusted adults for help, without fear of over-reaction or punishment. Even the most careful and responsible young person can trust the wrong person (or program) or could be targeted for no reason at all. If a young person believes there are explicit images of them online, real or fake, they and their parents should make a report to the National Center for Missing and Exploited Children (NCMEC) at report.cybertip.org, which may pass the concern on to law enforcement when appropriate. NCMEC also provides a free service called Take It Down (takeitdown.ncmec.org), which can be safely used to search for, report, and block any copies of an existing CSAM image online.

Children and adolescents may also find themselves in receipt of images or videos that are explicit, scandalous, or otherwise troubling, sometimes involving their peers. Again, a young person in this situation must be able to approach their parent or trusted adult for help — particularly if there are concerns for ongoing abuse or exploitation.

A parent's responsibility in the situation is to inform authorities either through NCMEC or by call-

Table 1. Recommendations Regarding AI Chatbots and Companions.

1. AI companions should not be used by anyone under 18 years of age.
   a. Includes products that allow or cater to younger users, such as Character.AI.
   b. Includes products advertised as "therapists," such as TherapiAI, Abby.gg, and Talktoash.com.
   c. Includes other examples such Replika, Nomi.AI, HeraHaven, Kindroid, Talkie AI, Anima, and Kuki.
2. AI chatbots (non-companions) should not be used by anyone under 13 years of age.
   a. Examples include ChatGPT, Gemini, and Meta AI.
   b. Use of chatbots between ages 13-18 years should always be under adult supervision, and parents should review their child's interactions with chatbots regularly.
   c. AI chatbots should be reset after every three to five prompts.
   d. Users should not disclose any personal information or upload any personal images.
   e. Information provided through chatbots should always be corroborated through non-AI sources.
   f. Chatbots should never be used for friendship, emotional support, or romance.
3. Teens and parents should be reminded regularly of the following limitations of chatbots:
   a. Chatbots are not people, even if they say they are.
   b. Chatbots are not truthful or reliable.
   c. Chatbots do not have your best interests in mind.

Table 2. Recommendations Regarding AI-Generated Images and Videos.

1. Limit or avoid featuring children and adolescents in photos or videos that are publicly available online. Nude or explicit photos can be reported and blocked through **takeitdown.ncmec.org**.
2. Limit or avoid allowing children and adolescents to use video chat or otherwise showing their faces online. Cameras should be blocked unless specifically in use.
3. Some AI image generators are safe for supervised use by children.
   a. LittleLit.ai (ages 5 years and up).
   b. Craiyon/DALL-E mini (ages 8 years and up).
4. Most AI image and video generators should only be used under supervision by children ages 13 years and up.
   a. Examples include GPT-4o, Midjourney, Google Imagen, Adobe Firefly, Google Veo 3, Runway, and Sora.
5. Teens and parents should be reminded of the following limitations of AI-generated imagery:
   a. AI-generated imagery should always be identified as such.
   b. AI-generated imagery is not generally allowed in art competitions unless otherwise specified.
   c. AI-generated imagery should not be used for journalistic or documentary purposes.
   d. AI-generated imagery can sometimes violate copyright law, particularly if used commercially.

ing police to prevent further dissemination; the content thereafter should only be shared with police or, if appropriate, school administration. Youngsters, like adults, must also learn to approach these images and videos skeptically, and not to assume authenticity.

As image-generation tools continue to evolve, it has become impossible to differentiate real and fake images without specific forensic tools. Illegal content aside, AI can also generate intense, vivid imagery that young people might find frightening or nightmarish; AI-generated horror content is legal, ubiquitous, and often extremely graphic. Parents and children should exercise caution in online spaces where AI content is shared, such as in Google Images, YouTube, Instagram, and TikTok, and ensure that content filters or child-safe modes remain active.

Considering the remarkable things that AI image generators can now create, young people may also be interested in trying it themselves. Several AI image programs, such as LittleLit.ai, Scribble Diffusion, Craiyon, and Kidgeni, are designed for younger children. These programs are specifically made with restricted training data and limited functionality, and they are generally safe for children. Their use should nevertheless be supervised.

For adolescents and adults, GPT-4o, Midjourney, Google Imagen, and Adobe Firefly all provide high-quality single images, whereas Google Veo 3, Runway, and Sora are options for AI-generated videos, although the productions are usually limited to just a few seconds and may require a subscription to produce longer videos. All these platforms have content safeguards in place, yet all are vulnerable to being "jailbroken."

As with AI chatbots, AI image generators should only be used under adult supervision and with limitations in mind (see Table 2). Young people should also continue to explore creating art *without* AI and should be reminded that AI tools cannot replace artistic passion and practice.

CONCLUSION

As the possibilities of generative AI continue to expand, so too do its potential dangers — sometimes from bad actors misusing programs and platforms, and sometimes as a result of features intrinsic to AI platforms themselves. If experience to date is any indication, AI developers will never be able to guarantee a safe product.

Similarly, short of total abstinence from modern media and technology, it will become impossible for today's youth to avoid regular interactions with generative AI in the coming years. All of us, but especially young people, must learn to interact with it safely, effectively, and productively.

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CLINICAL LESSONS FROM PHYSICAL THERAPY

Focus on the Proximal to Treat the Distal

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Having a framework in mind can help clinicians when evaluating patients, allowing us to stay consistent with guidelines and make sense of patient concerns. One such framework is to consider that distal maladies may have proximal causes, and the mindful clinician should consider the interconnected character of the human machine.

A CASE

Recently, in our physical therapy clinic, a patient arrived with a diagnosis of right posterior tibialis tendonitis and pointed to the medial aspect of her right lower leg as her source of pain. The patient was a runner and experienced pain while training for a marathon, resulting in her eventual pause from running. Frustrated, yet undefeated, she sought physical therapy to help restore pain-free walking and, eventually, running.

After completing several sessions of physical therapy with an emphasis on strengthening her intrinsic foot muscles, she was not experiencing much pain relief. A motivated patient who reported she was doing all her exercises, she nevertheless had pain with prolonged walking and wasn't yet ready to attempt running.

While the initial approach — to address pain with a treatment plan focused on the lower leg and foot — seemed appropriate, we began to consider what might be occurring further up the kinetic chain. Perhaps a weakness in the hip or trunk could be progressing to an aberrant movement or excessive force in the lower leg.

THEORY

Watching an infant learn to roll from supine to prone and crawling puts strength and function of a torso on full display. The small child uses their core muscles to create a rigid base from which their arms and legs then leverage their surroundings to roll over. Next, that same toddler gains the stability to advance onto their four limbs, again through use of their core. In a different scenario, experienced basketball players understand that when taking a jump shot, it is the hips rather than the arms that primarily propel the ball.

Reasoning that is conscientious of physics can provide a framework for evaluating the lower extremities. The hip is the largest weight-bearing joint in the human body. It withstands the greatest exertional forces as the lower extremity moves, and is stabilized by, the torso. If the hip cannot perform as intended, a more distal joint must work harder in terms of strength or range of motion to complete a task, even one as simple as walking (see Fig. 1).

An activity as modest as transferring from sitting to standing produces a peak reactive force in the hip up to six times greater than body weight.[1] Previous research also demonstrates that reductions in hip range of motion or strength, especially in the lateral musculature, can result in an increase in plantar foot pressure, especially on the plantar aspect of the foot, with push-off or end-range plantarflexion.

Being mindful of the proximal when treating a distal problem means, in this case, that evaluating trunk and hip mechanics is appropriate even when addressing knee, ankle, and foot mechanics. The patient described above displayed limited trunk rotation to one side. She also had significant reductions of her right hip flexion and extension strength. Numerous proximal impairments could have contributed to her distal pain.

Several treatment theories encourage the clinician to work up the kinetic chain to find the true cause of musculoskeletal impairments. Proprioceptive neuromuscular facilitation (PNF) is an approach that suggests we treat an impairment as it relates to function within the entire unit. In an approach like this, applying it to our case with this patient, exercise begins with the pelvis, leading to the hip, the knee, and ultimately the foot for full flexion and extension.

Spinal Engine Theory is another approach that encourages that the spine is the primary driver of lower extremity motion rather than a passive conduit for all connecting limbs. The Postural Restoration Institute bases much of its measurements and treatment interventions around the core of the body and specifically

on the function of the diaphragm and surrounding muscles (see Figs. 2a and 2b).

Famed neurologist Vladimir Janda, MD, described several pain patterns — including the upper cross syndrome, the lower cross syndrome, and the layered syndrome — and the treatment techniques he helped develop to address these are rooted in the philosophy that our patients may be best served by addressing imperfections proximally, in the shoulders and hips, before we explore distal abnormalities in locations such as elbows and knees. Historically, then, attention to proximal strength for the purposes of addressing distal health is not a novel concept.

EVIDENCE REVIEW

Lower extremity injuries are common in runners, especially novice runners. A 2024 study released in the *British Journal of Sports Medicine* made a compelling argument in favor of focusing treatment on more proximal structures.[2] This study placed novice runners into three groups and observed the differences in injuries among them. A total of 245 novice adult runners followed a prescribed plan, led by a physical therapist, for 24 weeks. Participants were randomly placed into groups that focused on either hip and core exercises, ankle and foot exercises, or static stretching exercises, and otherwise logged the same number of miles run per week.

In each of the three groups, participants warmed up for five minutes and then performed eight exercises that took 25 to 30 minutes in total to complete. This exercise intervention was led twice per week by a physical therapist, and patients were encouraged to perform the exercises an additional one to two sessions per week independently at home.

In those participants performing the hip-and-core program, there was a 39% decreased prevalence of all injuries and a 52% decreased prevalence of substantial overuse injuries. The hip-and-core program was not a panacea, as it was not effective in preventing acute running-related injuries such as severe cramps and muscle strains, many of which occurred when running at higher rates of speed or while running on hills.

Another study looked at the potential benefits of a core-and-coordination exercise program in comparison to strength training alone; both were compared to a control group.[3] The core-and-coordination exercise program was founded with PNF principles, which emphasize improving coordination and range of motion rather than strength alone. This treatment approach focuses on more precise resistance at specific locations through greater ranges of motion, and utilizes concentric, eccentric, and even isometric contractions with prolonged holds. The goal was to increase strength by

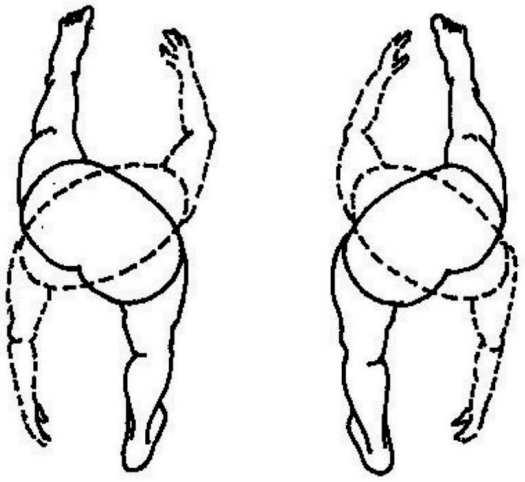
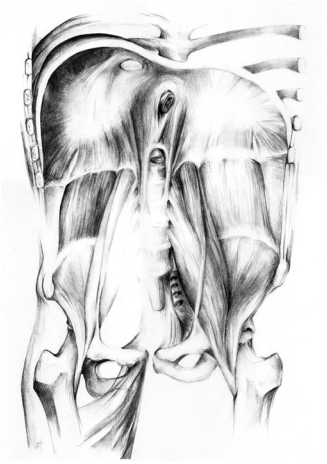


Fig. 1. Alternating reciprocal gait. Used with permission. Copyright © Postural Restoration Institute® 2026, www.posturalrestoration.com.



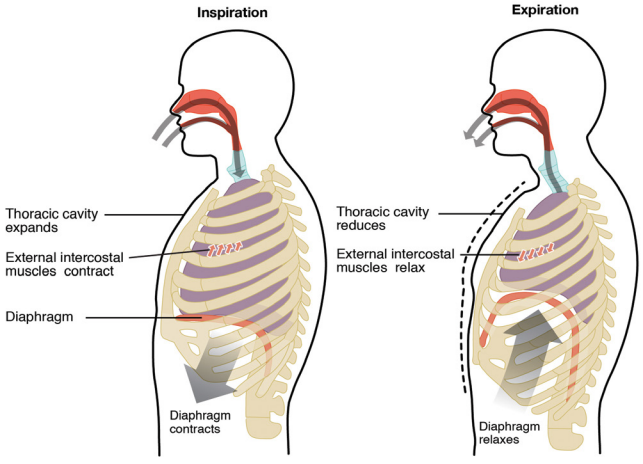


Fig. 2a (left). Functional relationship of diaphragm, psoas, quadratus lumborum, and right stance. Illustration by Elizabeth Noble. Copyright © Postural Restoration Institute® 2026, www.posturalrestoration.com.

Fig. 2b (right). Respiratory mechanics of inspiration and expiration. Illustration by OpenStax College, CC BY 3.0, via Wikimedia Commons.

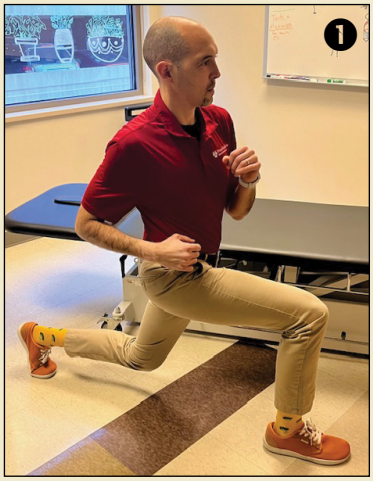
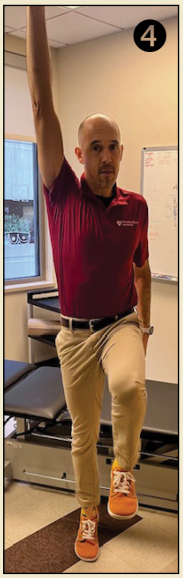


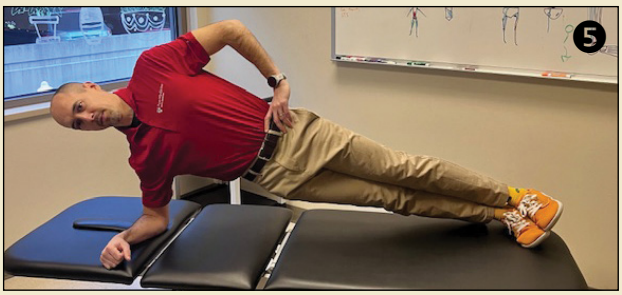
Table 1.

Examples of Components of Patient's Home Exercise Program.

(photos courtesy of the author)



1. Forward Lunge with Rotation
2. Forward T
3. Single Leg Bridge
4. Skip with High Knees
5. Side Plank on Elbow



improving the function of the weakest link in the kinetic chain.

The study included 30 healthy young females who had not been performing any kind of routine exercise. Participants were randomly placed into either a PNF, strength training, or control group. In the two exercise groups, participants completed the assigned workouts three times per week for eight weeks. All 30 individuals were assessed in their individual elbow extension and knee extension strength, their ability to throw a volleyball, and their vertical jump height.

The set and rep schemes of the two groups were the same — three sets of six reps — with a total of 24 workouts over an eight-week period. The strength training group performed bench and leg presses, with a load that could be lifted maximally six times and the level of resistance increased progressively over the course of the eight weeks.

The PNF group performed maximal resistance exercise throughout a full range of motion in an upper extremity or lower extremity pattern. The lower extremity pattern and sequential motions were toe flexion, ankle plantar flexion, foot eversion, knee extension, hip extension, abduction, and internal rotation. For the upper extremity, the pattern was finger and wrist flexion, elbow extension and pronation, shoulder extension, adduction, and internal rotation.

As one might expect, the control group did not improve; in some individuals, measures even declined. In the weight training group, all participants improved in all measurable ways. In the PNF group, all participants improved in all variables to a greater degree than did the weight training group; the greatest gains were in the performance measures of volleyball throw and vertical jump.

These findings suggest a "possible superiority of PNF to weight training as the better modality for athletic conditioning and injury rehabilitation [due in part to] enhanced muscle function."[2]

A study published in the *Journal of Occupational Medicine and Toxicology* raises awareness regarding hip dysfunction associated with Achilles tendinopathy in male runners.[4] The results show that the gluteus maximus and medius have impaired function in terms of delayed onset and shorter contraction durations.

Like the chicken and the egg, one might ask if the reduced strength in the hip led to an Achillies injury or if the Achilles pain led to a gait change and ultimately hip dysfunction. Regardless, it's important to note that there is often pathological neuromotor hip control in male runners with Achilles tendon pain.

Finally, a group of 433 firefighters was evaluated using the Functional Movement Systems, a screening tool to assess controlled movements and identify movement limitations and asymmetries. All participants enrolled in a training program designed by a team of occupational medicine physicians, therapists, and a health-and-safety officer.

Over a two-month period, the participants attended a single, three-hour seminar to learn about functional movement, spine stabilization techniques, and the consequences of poor posture and mobility. After all participants in the study completed the training session, injuries were compared to the prior year. The results showed a 62% decrease in time lost due to injuries and a 42% reduction in musculoskeletal injuries over a 12-month period compared to a historical control group.[5]

A RETURN TO THE CASE

The patient with foot pain eventually returned to pain-free running. It took weeks of work by both the patient and the therapy team. Her treatment consisted of various forms of soft tissue mobilization around her injury site to improve range of motion among her smaller joints. This included utilization of manually resisted lower extremity flexion and extension PNF patterns to generate greater strength and coordination in the injured limb.

Finally, her home exercise prescription consisted of exercises that challenged her proximal muscles beginning with, for example, side planks and marching bridges; later, she progressed to more complex exercises such as single leg deadlifts, as well as squat variations (see Table 1).

As the patient learned about proximal imperfections, she was more inclined to adhere to the prescribed hip and core exercise and coordination interventions, and she eventually experienced pain relief. While the patient had been initially cautious and concerned that the treatment plan might be focused on a site other than the foot, she was pleasantly surprised to find that as her proximal strength improved, her pain decreased.

CONCLUSION

A common theme in all the described research is that humans are amazing. To treat pain and injuries, we must bear in mind that our body parts make up a system. To effectively mitigate pain in one area, it can be useful to first identify what that area does for the system as a whole.

At the same time, directing treatment toward peripheral issues may not lead to the results we seek. Whether pain and dysfunction occur in the foot, hand, knee, or elbow, the cited evidence demonstrates that performance can improve when we pay attention to proximal joints and muscles. Individual parts of our complex bodies can positively adapt to the stressors applied to the system.

Humans are complex and their problems often require complex interventions. By evaluating patients with a systems approach and thoughtful frameworks, practitioners can address a wide variety of complex patient problems, isolating their origin and efficiently optimizing patient outcomes.

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PHOTO QUIZ FROM THE PRIMARY CARE
ADVANCED PRACTICE PROVIDER ONBOARDING PROGRAM

A Common Complaint, An Uncommon Cause

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CASE HISTORY

A 59-year-old female presents to the clinic with persistent left leg swelling that started about two-and-a-half months ago. She describes a feeling of tightness, some redness that started about four weeks ago, a sensation of burning that has been disrupting her sleep, as well as numbness and tingling in her left foot and toes. The patient reports no recent injury or trauma to the area. She denies any recent extended immobilization.

After trying some interventions and discovering that use of ice and elevation provided only temporary relief, she consulted a physician from a different health system about two weeks ago. She reports that an ultrasound was completed and that although no blood clots were found, there were some slightly swollen lymph nodes. She was told to use ibuprofen and elevate the leg.

Despite trying these, she feels the condition is worsening. A further review reveals no chest pain, fever, or shortness of breath.

She had varicose vein surgery on the right leg 12 years ago but reports that the veins in her left leg were "not too bad." She also reports a history of cellulitis in the right leg a few years ago that was treated with prednisone. She has no history of blood clots.

The patient has not been seen in her primary care office for over 10 years. She is not currently on any medication and has no other significant past medical history.

On examination, she is in no distress and has normal vital signs. There are no open areas or wounds present. The swelling is localized to her lower extremity, with no swelling noted above the knee. Fig. 1 shows the initial presentation of the patient's swollen left leg.

The left lower leg is warm and tender to touch with 3+ pitting edema and erythema. No swelling is present in the patient's left foot or above the knee. She has a negative Homan's sign, and her pedal pulses are 2+ bilaterally. The patient's lungs are clear, and she exhibits no other signs of fluid overload.

At the time she leaves the office, she is treated for cellulitis with amoxicillin 875 mg twice daily for one week. She is also advised to continue elevating the leg and start using compression stockings during the day when she is on her feet. A repeat ultrasound is ordered to rule out a deep vein thrombosis (DVT).

The ultrasound shows no evidence of an acute left lower extremity DVT; however, pathologic left inguinal lymph nodes measuring up to 4.2 cm are noted. Further imaging with a pelvic ultrasound is recommended in the next one to three months to determine the cause of her lymphadenopathy, and tissue sampling is recommended if she has persistent lymphadenopathy.

One week later, the patient follows up in the office. She reports no change in her symptoms with the use of amoxicillin. Her assessment is also unchanged. She is prescribed cephalexin 500 mg twice daily for seven days to see if additional microbial coverage would be any more effective. She is encouraged to continue elevation and compression use. Due to the lack of response and the enlarged lymph nodes, a computed tomography (CT) scan of the patient's abdomen and pelvis and a chest X-ray are ordered for further evaluation.

QUESTIONS

1. What are some possible causes of lower extremity edema?
2. What are the risk factors for DVT?
3. What are possible causes of inguinal lymphadenopathy?

ANSWERS

1. Possible causes of lower extremity edema include, but are not limited to, varicose veins, chronic kidney disease, cirrhosis, DVT, chronic venous insufficiency, heart failure, cellulitis, lymphedema, medication side effects, and malignancy involving lymph nodes leading to obstruction.[1]

Fig. 1. Left lower leg edema compared to the right leg.

2. Some risk factors for DVT include male gender, a recent hospitalization or extended period of immobilization, congestive heart failure, trauma or fracture, soft tissue injury, infection, varicose veins, clotting disorders, smoking, pregnancy, acute malignant neoplasm, and use of hormonal contraception.[2]
3. Inguinal lymphadenopathy can be caused by sexually transmitted infections, localized skin and soft tissue infections, and other viral or bacterial infections. Less common but serious causes of lymphadenopathy include lymphoma and metastatic disease.[3]

ADDITIONAL CASE HISTORY

When the additional imaging is completed, the chest X-ray shows large pulmonary nodules consistent with metastases (see Fig. 2). The CT of the patient's abdomen and pelvis shows large enhancing left inguinal lymph nodes without other findings of intra-abdominal metastatic disease. The radiology service concludes that based on the location and distribution of her disease, the cause is likely a malignancy in the lower extremity such as melanoma or sarcoma. When the patient returns to the office to reassess her lower extremity edema, the imaging is reviewed and the patient is notified of the findings.

An urgent referral is placed to the oncology service. In the meantime, a needle biopsy of the lymph node and a chest CT are ordered, as well as an MRI of the brain.

The needle biopsy reveals a high-grade, poorly differentiated malignant neoplasm. The differential diagnosis at this time includes melanoma, primitive neuroectodermal tumor (PNET), and a poorly differentiated carcinoma with neuroendocrine differentiation. Malignant melanoma seems most likely.

The lymph node and the lung nodules are presumed to be metastases, and the original site of the assumed melanoma is not identified. The brain MRI shows a few tiny but concerning foci of enhancement in brain parenchyma, suggestive of early intracranial metastatic disease.

DISCUSSION

Unilateral lower extremity edema can be caused by many different pathologies as discussed above. In this case, the patient's leg swelling was not a result of cellulitis but an underlying melanoma leading to metastasis. Prompt imaging and close follow-up helped identify the cause of the patient's swelling and guide the next steps in the treatment plan to set the patient up for the best possible outcomes.

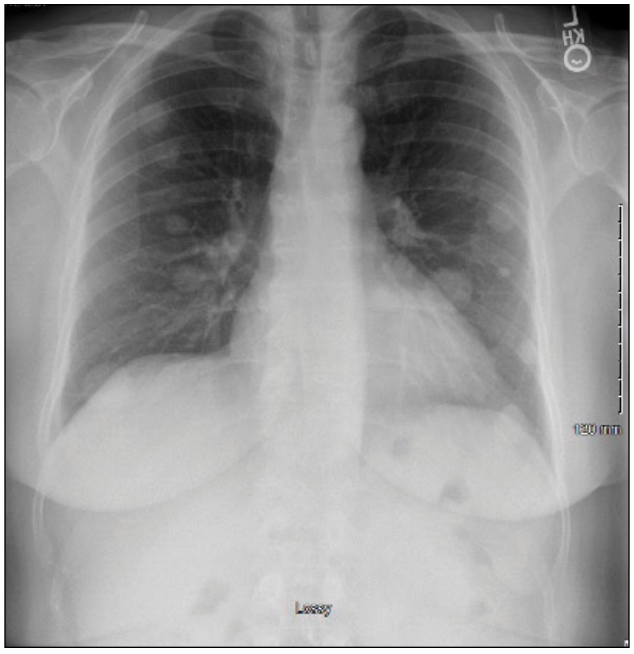

Fig. 2. Chest X-ray showing multiple lung nodules bilaterally.

In the United States in 2024, there were an estimated 100,640 new cases of cutaneous melanoma.[4] Melanoma of unknown primary (MUP) accounts for approximately 2% to 4% of all melanoma cases in the nation. MUP is believed to arise when there is regression of a known primary site, likely driven by immune responses involving T cells and natural killer cells.

Molecular studies suggest that MUP likely comes from the skin, as it often has the pattern of ultraviolet (UV) damage mutations found in cutaneous melanoma. Other melanoma types, such those originating in mucosal or uveal locations, have different mutation patterns and lack UV signatures.[5]

Clinical evidence also supports this theory, as patients with MUP often have vitiligo and regressed pigmented lesions, as well as a higher prevalence of dysplastic nevi compared to the general population. MUP is thought to most commonly originate from areas on the trunk and lower limbs.[5]

Lymph node involvement is the most common presentation in patients with MUP, with axillary and inguinal nodes being the most frequently affected areas. In a study of MUP patients, 65% presented with lymph node metastases only, especially the axillary, groin, and cervical locations. A minority of MUP cases present with visceral metastases (25%), brain involvement (16%), or skin/subcutaneous lesions (10%).[6]

Clinical signs to look for include a history of previously excised skin lesions without histological examination, vitiligo, or regressed pigmented lesions, which may suggest immune-mediated regression. A complete skin exam should be performed, with attention paid to evidence of regressing lesions.

MUP tends to affect men more often than women, and most cases appear in patients between the ages of 40 and 60 years. Based on lymphatic drainage patterns, the trunk and lower limbs are considered the most likely sites of primary disease, so it is important to focus on these when completing the skin exam.

CASE OUTCOME

The patient was seen promptly by the oncology service and started on chemotherapy. Discussion about starting radiation for more targeted therapy of metastases also occurred, but the decision was made to repeat imaging after a few rounds of chemotherapy to determine response.

The patient had a hard time tolerating chemotherapy, with the biggest complication being severe diarrhea. She was hospitalized for other complications including colitis and a small bowel obstruction. She is currently on a break from chemotherapy due to these complications. The patient's prognosis at this time remains unclear.

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SPOTLIGHT ON CLINICAL RESEARCH

ICD Therapy, Heart Failure, Amyloidosis, In-Stent Restenosis

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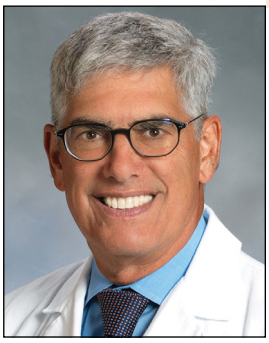
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Editor's note: Physicians who wish to refer patients for any of the studies mentioned below are encouraged to contact the Research Institute at 717-544-1777. Other members of the LG Health staff who are conducting research and wish to have their studies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

SPONSORED STUDIES

ASCEND CSP IDE: A Stylet-Driven ICD Lead Intended for Conduction System Pacing IDE Study

Sponsor: Abbott
Principal Investigator: Matthew Bernabei, MD

This is a single-arm study aimed at evaluating the safety and effectiveness of the investigational conduction system pacing (CSP) implantable cardioverter-defibrillator (ICD) lead. This lead, created by Abbott, is implanted along with an ICD or cardiac resynchronization therapy device (CRT-D) that provides ICD therapy. The ICDs and CRT-Ds used in the study are FDA approved, but the ICD lead is not yet approved and is considered investigational.

Scan to learn more about the ASCEND CSP IDE study.

The study will evaluate the ICD lead in patients who already meet the indication to receive ICD or CRT-D therapy. Once enrolled, participants will undergo an implant procedure and complete study follow-up activities for approximately 18 months, including standard six-month device checks until the end of the study.

LG Health was activated as a study site in September 2025 and plans to enroll about 12 patients.

ELEVATE-HFpEF: Randomized Trial of ELEVATEd Cardiac Pacing Rate for Personalized Treatment of Heart Failure With Preserved Ejection Fraction

Sponsor: Medtronic
Principal Investigator: Amit Varma, MD

ELEVATE-HFpEF is a randomized, double-blind trial evaluating the safety and efficacy of dual-chamber personalized pacing in patients with heart failure with preserved ejection fraction (HFpEF). HFpEF is a common condition for which there are limited therapeutic options. Currently, HFpEF is not an approved indication for cardiac pacing.

However, preliminary evidence shows that cardiac pacing may have beneficial effects in the HFpEF population. The study plans to evaluate the effect of personalized pacing on the functional capacity of HFpEF patients. The pacing will be determined based on participants' left ventricle ejection fraction and height.

All participants will receive an FDA-approved Medtronic pacemaker. However, since the use of pacemakers is not indicated for HFpEF patients, its use in this study is considered investigational. The study team will randomize participants post-implant to receive either personalized pacing (treatment group) or no/minimal pacing (control group).

All participants will complete study follow-up visits at two months, six months, and 12 months post-implant. At the 12-month visit, the control group participants' pacemakers will be programmed with personalized pacing. Study visits will occur at 14 months, 18 months, and 24 months before transitioning to annual follow-ups until study completion.

The study team at LG Health, led by Dr. Amit Varma, plans to enroll about five participants. They received activation to begin enrolling in November 2025.

Scan to learn more about the ELEVATE-HFpEF study.

TRITON-CM: A Phase 3 Global, Randomized, Double-Blind, Placebo-Controlled Study to Evaluate the Efficacy and Safety of Nucresiran in Patients With Transthyretin-Mediated Amyloidosis With Cardiomyopathy (ATTR Amyloidosis With Cardiomyopathy)

Sponsor: Alnylam Pharmaceuticals
Principal Investigator: Arpan Patel, DO

Alnylam Pharmaceuticals is sponsoring a Phase 3 double-blind clinical trial aimed at evaluating the safety and efficacy of nucresiran, a transthyretin silencer, in patients diagnosed with Transthyretin-Mediated Amyloidosis with Cardiomyopathy (ATTR Amyloidosis With Cardiomyopathy). The study will evaluate how effective nucresiran is by measuring the impact on all-cause mortality and cardiovascular events, as well as on patient-reported quality-of-life.

Eligible participants will be randomized 1:1 to receive the study drug or placebo. They will be in the study for five to eight years, depending on when they join the study. The first 32 months of participation comprise the double-blind treatment period. Following this period, all participants will receive nucresiran as part of the open-label extension period. Follow-up assessments aimed at determining the safety and efficacy of the study drug include, but are not limited to, echo, ECG, blood and urine tests, and quality-of-life questionnaires.

The LG Health study team plans to enroll 5-10 participants. They received activation from the sponsor to begin enrolling in January 2026.

← Scan to learn more about the TRITON-CM study.

PENN-LED SPONSORED STUDY

Prevail: A Randomized Controlled Study of the Prevail Drug-Coated Balloon in Subjects With In-stent Restenosis and a Single Arm Prospectively Enrolled Study of the Prevail Drug-Coated Balloon for de Novo Lesions in Small Vessel Disease

Sponsor: Medtronic
Local Principal Investigator: T. Raymond Foley, MD

The Prevail global study aims to evaluate the safety and efficacy of the Medtronic Prevail Drug-Coated Balloon (DCB), which is a paclitaxel coated balloon used in the treatment of in-stent restenosis. Participants are randomized to receive either the Prevail DCB, which is not FDA approved yet, or the Agent DCB, which is FDA approved.

Participants will not know which DCB they receive until the study ends. The study is anticipated to last for about six years; participants will be in the study for about five years.

← Scan to learn more about the Prevail study.

LG Health was invited to join this study alongside the Hospital of the University of Pennsylvania (HUP) as part of the One Penn Medicine One Research initiative. Taisei Kobayashi, MD, is serving as the primary principal investigator (PI) at HUP, with T. Raymond Foley, MD, serving as the LG Health PI and Russell Rosenberg, MD, serving as the PI at Penn Presbyterian. The study team at LG Health plans to enroll about 20 participants.

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TOP TIPS FROM FAMILY PRACTICE

Weight Loss, Dementia, Rhinosinusitis, Dietary Supplements, Firearm Safety

Alan S. Peterson, MD
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WHY WEIGHT LOSS IS HARDER IN THE SETTING OF DIABETES[1]

Studies involving effective weight-loss medications that can be used to treat diabetes and obesity (e.g., tirzepatide or semaglutide) show that patients with type 2 diabetes (T2D) generally lose less weight than individuals without T2D. There are several possible explanations.

1. **Higher hyperinsulinemia increases weight gain risk.** Excess weight contributes to systemic insulin resistance leading to hyperinsulinemia, a hallmark of T2D. Hyperinsulinemia is thought to drive weight gain through the anabolic effects of insulin, promoting both visceral fat accumulation and ectopic fat deposition, which further exacerbates insulin resistance.
2. **Energy is conserved during weight loss.** Weight loss in the setting of diabetes may be limited by reduced glucosuria once glucose levels are controlled below the renal threshold (approximately 180 mg/dL).
3. **Certain anti-diabetic medications promote weight gain.** Commonly used drug classes such as sulfonylureas, insulin, and thiazolidinediones often contribute to weight gain. Examples include basal insulin therapy, basal-bolus insulin regimens, sulfonylureas, and pioglitazone.
4. **Calorie intake is increased due to fear of hypoglycemia.**
5. **During hypoglycemic events, appetite is stimulated, often leading to increased carbohydrate intake.**
6. **Physical activity is reduced due to comorbidities or complications.** Regular physical activity is a cornerstone of weight management and diabetes care.

However, comorbidities such as heart failure, renal disease, or pulmonary disorders, and microvascular complications such as neuropathy, peripheral artery disease, or diabetic foot, can limit a patient's ability to exercise consistently, reducing the effectiveness of lifestyle interventions.

PROTON PUMP INHIBITORS MAY BE LINKED TO DEMENTIA RISK[2]

Right now, an estimated 6.9 million seniors in the United States are living with Alzheimer's disease, the most common cause of dementia. Long-term use of anticholinergic drugs — commonly prescribed for conditions like depression, allergies, and bladder control — has been linked to a higher risk of cognitive decline. Conversely, some medications that help us manage cardiovascular health, such as blood pressure- and cholesterol-lowering drugs, may help reduce dementia risk by supporting brain health.

Proton pump inhibitors (PPIs) are another drug that some researchers believe could be linked to a heightened risk of dementia. Common PPIs include omeprazole (Prilosec®), esomeprazole (Nexium®), and lansoprazole (Prevacid®).

A large Danish study has found that among people who were diagnosed with dementia between the ages of 60 and 69, those who used PPIs had 36% higher relative risk compared to non-users. Longer durations of PPI use were associated with progressively higher dementia risk.

There have been other studies suggesting that PPIs could increase dementia risk. Additionally, PPI use was linked with an increased risk of migraine disorders, peripheral neuropathies (conditions affecting the nerves outside of the spinal cord or brain), and visual and auditory neurosensory abnormalities.

In addition to these neurological concerns, experts from Yale Medicine note that long-term use of PPIs has been linked to cardiovascular disease, chronic kidney disease, bone fractures, vitamin and mineral deficiencies, and more.

GUIDELINE UPDATED FOR MANAGEMENT OF ADULT RHINOSINUSITIS[3]

The American Academy of Otolaryngology-Head and Neck Surgery in August 2025 updated its recommendations for the diagnosis and management of adult

rhinosinusitis. New evidence from 14 guidelines, 194 systematic reviews, and 133 randomized controlled trials was considered. The guidelines emphasize patient education and counseling.

Watchful waiting as an initial management strategy should be considered for all patients with uncomplicated acute bacterial rhinosinusitis (ABRS), regardless of severity; in the previous iteration of this guideline, this recommendation was only to be applied to patients with mild illness.

Recommendations regarding antibiotic treatment of ABRS has also been clarified, such that the first-line antibiotic therapy for ABRS has been changed from amoxicillin alone to amoxicillin with or without clavulanate. In addition, aspirin-exacerbated respiratory disease has been added as a chronic condition for which we should consider modifying management of chronic rhinosinusitis (CRS). Three new key action statements are presented for managing CRS:

1. The guideline recommends against the use of biologics when patients do not have nasal polyps.
2. When patients do have nasal polyps, the guideline recommends that patients be educated about biologics.
3. The guideline recommends against antibiotic use for CRS if the only reason is the request of a third party, such as stipulation before surgery or imaging.

ABRS should be diagnosed when symptoms such as purulent nasal discharge with nasal obstruction, facial pain, or pressure last at least 10 days without improvement after the onset of upper respiratory symptoms; or when symptoms worsen within 10 days after initial improvement, a pattern known as "double worsening."

If antibiotic treatment is chosen, amoxicillin, with or without clavulanate, for five to seven days should be prescribed as the first-line therapy. If there is no improvement or if symptoms worsen after three to five days of appropriate antibiotic use, the clinician should reassess the diagnosis, rule out other conditions, and check for complications. If ABRS is still confirmed, the antibiotic should be changed.

THINGS TO KNOW BEFORE BUYING SUPPLEMENTS[4]

While some supplements do have a valuable role in certain circumstances, they are often misunderstood and frequently oversold.

1. **Start with food, not supplements.** If we can get a nutrient from your diet, that is almost always the better way. Whole foods offer much more than isolated nutrients. For example, oily fish, such as salmon, provides omega-3 fats as well as protein, vitamin D, selenium, and other beneficial compounds.

   That said, there are circumstances where supplements are necessary. For example, folic acid is

Choosing Wisely

Originally published in the Winter 2015 issue of JLGH *in conjunction with the American Board of Internal Medicine's now-complete Choosing Wisely campaign, this edited reprint is offered to remind physicians of the importance of talking with patients about what tests, treatments, and procedures are needed — and which ones are not.*

RECOMMENDATIONS FROM THE AMERICAN ACADEMY OF ORTHOPAEDIC SURGEONS

❶ **Avoid performing routine ultrasonography to screen for post-operative deep vein thrombosis in patients who undergo elective hip or knee arthroplasty.** Ultrasound is not effective for this purpose, and appropriate alternative screening tests do not exist.[6]

❷ **Don't use needle lavage to treat patients with symptomatic osteoarthritis of the knee for long-term relief.** It does not lead to measurable improvements in pain, function, 50-foot walking time, stiffness, or swelling. Comparisons between lateral and neutral heel wedges as well as between lateral wedged insoles alone and with a subtalar strapping led to the conclusion that there is limited evidence for the effectiveness of lateral heel wedges and related orthoses.

❸ **Don't use glucosamine or chondroitin to treat patients with symptomatic osteoarthritis of the knee.** Neither provides relief for this condition.[7]

❹ **Don't use lateral wedge insoles to treat patients with symptomatic medial compartment osteoarthritis of the knee.** Their use does not improve pain or functional outcomes.

recommended before and during pregnancy to reduce the risk of neural tube defects in the fetus; vitamin D is advised during winter months when sunlight is limited; and people following a vegan diet may need extra vitamin B_{12}.

2. **People may not realize they are taking too much.** It is far easier to take too much of a supplement than patients may realize. Too much vitamin D, for example, can lead to a buildup of calcium, which may damage the kidneys and heart, as well as weakening bones. High doses of vitamin A can cause liver damage, birth defects in pregnancy, and lead to decreased bone density. Even water-soluble vitamins can cause problems, with long-term overuse of vitamin B_6 being linked to nerve damage.
3. **Don't trust social media advice.** The Food Standards Agency is clear that supplements "are not medicinal products, and should not be expected to exert a pharmacological, immunological or metabolic action." The Advertising Standards Authority has rules about how health claims can be made, and these apply to social media as well as conventional sources. However, enforcement is difficult, especially with influencer marketing and affiliate schemes.
4. **The supplement industry is more about sales than science.** Some supplements are supported by evidence, but they tend to be the less eye-catching ones, such as iron or vitamin D. Many others are advertised with claims that stretch far beyond what the research shows and are often promoted by people with no formal training in nutrition or health care.
5. **Some supplements aren't safe for everyone.** St. John's Wort, sometimes used for low mood, can have dangerous side effects if taken alongside some antidepressants, birth control, and blood pressure medications. Vitamin K can interfere with blood thinners like warfarin. High-dose iron can cause digestive problems and affect how some antibiotics are absorbed.

Many supplements haven't been tested for safety in pregnancy. Others, like high-dose vitamin A, are known to be harmful in pregnancy and can pass through breast milk. If one is pregnant, breastfeeding, taking medication, or managing a health condition, they should speak to a pharmacist, family physician, or dietician before starting a new supplement.

JAMA IS WORKING TO REDUCE FIREARM VIOLENCE

The JAMA Network in late 2025 released "Toward a Safer World by 2040," a special report outlining practical solutions to reduce firearm violence in the United States.[5] The report is the result of discussions that began at a JAMA summit in early 2025.

The summit brought together leaders from medicine, public health, law, and community violence intervention, as well as owners of firearms, survivors of firearm violence, and a firearm historian. The group collaborated for six months to consider what a safer country looks like, what innovations and action steps are needed, the barriers that exist, and the most important next steps. They concluded:

> A safer world will require investing in the discovery, implementation, and scaling of solutions that reduce firearm harms and center on the people and communities most affected by firearm violence.

Specifically, the report's roadmap aims to achieve this vision by implementing five essential actions over the next five years:

1. Invest in community-based initiatives and address upstream drivers like housing, opportunity, and mistrust.
2. Advance technologies such as biometric "smart guns," passive detection systems, and safety tools driven by artificial intelligence, while strengthening oversight for firearms as consumer products.
3. Shift public and policymaker understanding about the preventability of firearm harms, reframing gun violence as a public health, social, and environmental issue.
4. Support coordinated action at federal, state, and local levels informed by scientific insight and advocacy.
5. Expand research on the effectiveness, scaling, and equity of interventions — from basic science to agent-based modeling and community impact assessment.

JAMA Summit Report
Firearm Violence

Toward a Safer World by 2040

The group also completed an extensive literature review on the subject of reducing firearm violence. Scan the QR code above to read the full report.

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Lancaster Medical Heritage Museum

In addition to his duties as a contributor and board member of JLGH, Dr. Peterson serves on the board of the Lancaster Medical Heritage Museum and is director of its Publications Section, which can be found on the museum's website. To access the section, visit lancastermedicalheritagemuseum.org, and click on "PUBLICATIONS" near the top of the page to find a table of contents of the hundreds of Lancaster medical history articles available.

The museum is located at 410 N. Lime St., Lancaster. Admission is free to LG Health employees with a badge and children under 3; $8:00 for all others. Visit the museum website for additional information and hours of operation.

The Poetry of Medicine

Her body is in ruin.

A city nearly uninhabitable.
Newark comes to mind.
But, to be fair,
Perhaps ancient Athens or Constantinople.

She stares out of dark blue eyes
Looks out from under somehow
Her expression clenched like her hands
Her knees polished spheres on wires
Backbone a sickle.

Her abdomen another smooth roundness
Breasts folds of flesh over boney ripples.
She tries to speak but her mouth is full of
eggs served an hour ago.
A touch on her shoulder produces only wider eyes
An upper denture falls across a capital O.

A stuffed bear sits on her table
Surveying all of this.
Its eyes are bright, its smile stitched.
Its paws velcro a card.
"Dear Mom," it reads, "Get well soon."

Dementia

It's seen as a curse
A loss of self itself
A Catastrophe
Emptiness.

It also tiptoes on a slight slope
Downward to be sure, but easy.
Gentle fog settling slowly sliding
Into forgetting.

Seeing the same birds at the feeder
as an hour earlier
Brings joy of a new discovery
While death
Slowly wraps its arms around from behind.

— Both poems submitted by S. Scott Paist, MD

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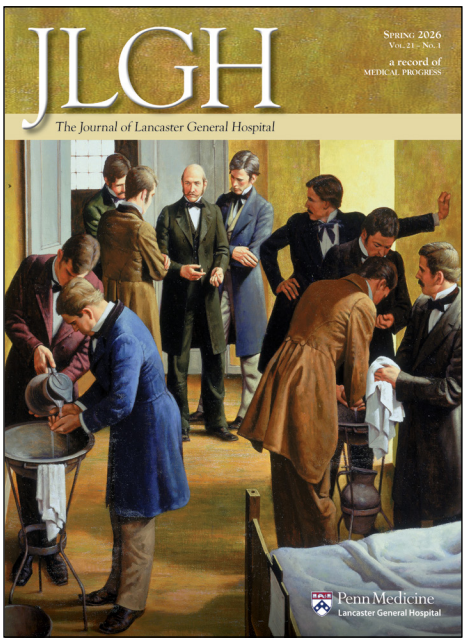

On the cover: Semmelweis — Defender of Motherhood, *from* The History of Medicine, *circa 1952 by Robert Thom. From the collection of Michigan Medicine, University of Michigan, Gift of Pfizer, Inc., UMHS.26. Used with permission.*

See page 12 for "A Cornerstone of Sepsis Prevention: Semmelweis's Enduring Legacy in the Era of Antimicrobial Resistance," which studies this work of art and honors the father of handwashing in medicine.

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 to 4,500 words. Narrative medicine 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 poses a 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, via email at Maria.Boyer@pennmedicine.upenn.edu to discuss submitting an article or for further information.

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EARN CME CREDIT

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 medical journals — is one such activity.

For Pennsylvania physicians, more information and the Pennsylvania Board of Medicine CME Reporting Form are available from the Pennsylvania Department of State. *For advanced practice providers,* information is available from credentialing organizations.

Physicians can also log credit and advanced practice providers can access transcripts through their eeds accounts online.

← Scan to access your eeds account.

← Scan for additional information and links to individual reporting instructions and forms.

The Laurence E. Carroll, MD Lecture

"Understanding Fairness in the Era of Specialty Drugs"
Featuring Ezekiel J. Emanuel, MD, PhD
Monday, April 6, 2026
Seraph Conference Center at ABBCI and Virtual
Reception: 5:15-6:15 p.m.
Remarks and Lecture: 6:30-7:30 p.m.

The Laurence E. Carroll, MD Lecture Endowment was established by gifts from his friends and family to honor his memory, legacy, passion, and lifelong commitment to medical ethics and continuing medical education. To make a gift to the endowment, call 717-544-7126.

↑ Scan for full event details and to register now.

Additional CME Offerings at LG Health

Research Grand Rounds
April 2, May 7
12:00 noon-1:00 p.m.

Pediatric Grand Rounds
April 14, May 12, June 9
7:00-8:00 a.m.

Connect with the CME Department for a direct link to access CME On-Demand courses.

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