SPRING 2025
VOL. 20 – NO. 1

a record of
MEDICAL PROGRESS

JLGH

The Journal of Lancaster General Hospital

Penn Medicine
Lancaster General Hospital

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See page 29 for an update from the Lancaster Medical Heritage Museum.

FROM THE EDITOR'S DESK

Collaboration for Community Health

Corey D. Fogleman, MD, FAAFP
Editor in Chief

March is Women's History Month, a chance to reflect on some of our most inspiring leaders and the lessons we can draw from their legacies. One such woman was Antonia Coello, born in Fajardo, Puerto Rico, in 1944. Raised by a single mother and hampered by a chronic medical condition for which her family could not afford appropriate care, she was nevertheless a precocious student. By the time she was a teenager, she was determined to help children like herself by going to medical school, and after winning a scholarship, she matriculated to the University of Puerto Rico.

Her family endured further hardships, including the death of her dear aunt to what should have been a preventable kidney failure. Resolved to better understand the barriers inherent in the organ transplant system, Antonia completed medical school near the top of her class, then residency and fellowship, before joining the U.S. Public Health Service Commissioned Corps and becoming an instrumental leader in the early days of the AIDS epidemic.

Along the way, she changed her name, and Dr. Antonia Novello went to work at the National Institutes of Health to streamline and bring balance to the organ transplant process, to help correct inequities and decrease barriers.

When she was sworn in as the 14th Surgeon General of the United States in 1990, she was the first woman and first person of Hispanic heritage to hold that office. She introduced many to the concept of harm reduction. Vowing that it was her mission to protect the underserved, she was instrumental in creating policies to limit the tobacco industry from targeting children, among other accomplishments.

In 2017, when Dr. Novello spoke at the Perelman School of Medicine Martin Luther King, Jr. Health Equity Symposium, she noted a growing sentiment — in light of federal policies — that health disparities might worsen, that our most vulnerable patients might be at risk. Many now, in 2025, hear the echoes of those concerns as we try to come to terms with threatened cuts to social services, as well as to research and education. Will we soon see a drawdown to insurance coverage for our nation's most economically disadvantaged?

Dr. Novello called on those of us who are privileged with opportunity to never forget our responsibility, to think broadly, to challenge ourselves to never take off our public health hats. Paraphrasing Yehuda Bauer, the Jewish historian who wrote extensively about the insidious growth of Nazi fascism, Dr. Novello warned, "Thou shalt not be a victim, thou shalt not be a perpetrator, but, above all, thou shalt not be a bystander."

"We know there is value in being a part of one another's lives, asking one another where and how we can lend a hand, sharing our resources and insights."

We know there is value in being a part of one another's lives, asking one another where and how we can lend a hand, sharing our resources and insights. To decrease risk to and negative repercussions for vulnerable populations, perhaps we must begin at home, reinforcing the connections within our own community.

We can work locally to ameliorate the hardships and obstacles our neighbors experience. We can aid in municipal- and state-level decision-making by reaching out to our own legislators to advise them regarding

our opportunities and responsibilities. These are just a few of the meaningful ways we can reinforce that we care about and see value in one another.

It is with this inspiration in mind that I'm particularly excited about the scholarship featured in this issue of *The Journal of Lancaster General Hospital.* Several reports detail local work by colleagues and leaders to connect patients with the best care, to understand unique problems, and to try to find common ground.

First, Dr. Meghan Dermody reports the results of a study of transcarotid artery revascularization (TCAR) in standard-risk patients. She is a national co-principal investigator of the Safety and Efficacy Study for Reverse Flow Used During Carotid Artery Stenting Procedure (ROADSTER) Phase 3 trial and, as such, recently presented at the Vascular InterVentional Advances Conference.

No intervention comes without risk. With carotid artery stenosis, one such risk is embolization during or immediately after revascularization. While TCAR has already been an option for patients considered high risk for stroke during treatment for arterial stenosis, Dr. Dermody's work, conducted here at Penn Medicine Lancaster General Health, demonstrates that TCAR is safe and effective at treating stenosis in standard-risk patients as well.

Next, a team of researchers — including LG Health's Research Director of Trauma and Acute Care Surgery, Dr. Lindsey Perea — report on a multi-year project to prevent hay-hole falls in Lancaster and surrounding areas. Their work seems to have reduced the incidence of traumatic injury and has likely saved countless lives. Much of Central Pennsylvania has benefitted, and the Anabaptist Youth Trauma Prevention Consortium hay-hole cover design should be made widely available, as they suggest in this important article.

"To decrease risk to and negative repercussions for vulnerable populations, perhaps we must begin at home, reinforcing the connections within our own community."

Further, Dr. Hehidy Paulino presents pearls from a recent geriatrics conference, and pharmacists Isabelle Lawler and Michelle Link Patterson present important updates regarding opioid-induced constipation.

We must remain true to our moral compass. And as you join me in celebrating the scholars featured here, I invite you to use what you read to continue caring for our friends and neighbors in Lancaster and beyond.

JLGH Winter 2024 Recap

Q&A for Extended Learning

The Winter issue of The Journal of Lancaster General Hospital *offered articles on pre-exposure prophylaxis and non-occupational post-exposure prophylaxis, anti-obesity pharmacotherapy, firearm safety, thyroglossal duct cysts, and other practice recommendations. Review the questions and answers below to see how much you remember from the issue. Need a refresher? All issues of* JLGH *are available at JLGH.org.*

Q

What tests should be conducted prior to starting pre-exposure HIV prophylaxis? Why are these important?

A

Clinicians should test for syphilis, gonorrhea, chlamydia, reduced renal function, and hepatitis B and C, because results of these tests can impact medication selection.

Q

According to CDC and Department of Health and Human Services guidelines, what criteria must an individual meet to be a candidate for non-occupational post-exposure HIV prophylaxis?

A

Patients must present within 72 hours of an encounter with substantial risk of HIV acquisition from a source-patient known to be HIV positive.

Q

Lifestyle interventions should be advised for all patients with obesity. At what BMI do clinical practice guidelines recommend that pharmacotherapy be considered in addition to these interventions?

A

The recommendations are for patients with a body mass index (BMI) ≥27 kg/m^2 with weight-related comorbidities (diabetes, hypertension, dyslipidemia, etc.) or with a BMI ≥30 kg/m^2.

Q

How many suicides by firearm occurred in 2023 in Lancaster County? What new resource is available to health care providers to help combat death by firearm?

A

In 2023, there were 37 suicides by firearm in the county. The new firearm safety initiative, led by Lancaster General Hospital and community partners, is designed to educate clinicians and provide gun locks and educational materials for patients.

Q

Diagnosis of thyroglossal duct cysts (TGDCs) is primarily clinical. What imaging studies can assist in defining the cyst's extent and rule out other conditions?

A

Ultrasound, computed tomography scan, and magnetic resonance imaging can all be used. Ultrasound is particularly useful due to its ability to distinguish TGDCs from other cystic or solid neck masses.

Q

New Endocrine Society guidelines call for limiting vitamin D supplementation beyond the daily recommended intake for the general population. Which groups does this guidance suggest supplementation may benefit?

A

Children aged 1-18 years, pregnant people, adults older than 75 years, and adults with prediabetes.

Safety and Effectiveness of TCAR in Standard-Risk Patients

Meghan Dermody, MD, FACS, FSVS
National Co-Principal Investigator, ROADSTER 3 Clinical Trial
Chief, Division of Vascular Surgery, Penn Medicine Lancaster General Hospital

Since gaining Food and Drug Administration (FDA) approval in 2015, transcarotid artery revascularization (TCAR) has become an increasingly utilized operative technique to treat patients with significant carotid stenosis. This hybrid procedure utilizes a common carotid artery cutdown with 8-French arterial sheath access, which is then connected to an 8-French sheath in the common femoral vein to establish cerebral flow reversal. This provides distal embolic protection during carotid stent placement. (See Fig. 1 and reference the Spring 2019 issue of *JLGH* for an article further detailing this procedure.[1])

Because the TCAR procedure — including the neuroprotection system and stent used for the procedure — had not undergone rigorous evaluation in the form of a randomized-controlled trial, there remained stipulations regarding the type of patients for which it could be used and how to obtain institutional reimbursement.

Initially, the Centers for Medicare and Medicaid Services (CMS) required patients to have at least one anatomic and/or physiologic criteria putting them at high surgical risk for carotid endarterectomy (CEA). Additionally, all patient outcome data had to be entered into a national database of vascular surgical procedures, called the Vascular Quality Initiative-TCAR Surveillance Project.

Using this data, a large review was published in the *Journal of Vascular Surgery* in 2021 looking solely at patients deemed standard risk for surgery who underwent either CEA or TCAR.[2]

The authors performed a 3:1 propensity-matched analysis of nearly 15,000 patients who had CEA and 5,000 patients who had TCAR. There was no statistically significant difference between stroke rates at 30 days. The TCAR stroke rate was notably 1.4%. This publication helped support the FDA label expansion to include standard-risk patients in April 2022.

Following suit, in October 2023, CMS changed its stance in National Coverage Determination 20.7 to state that any patient with ≥50% symptomatic or ≥70% asymptomatic stenosis, regardless of surgical risk, could obtain reimbursement for CEA, TCAR, or transfemoral carotid stenting. While there are stipulations, this now allows specialists to offer any revascularization modality to patients with significant carotid stenosis.

PRIOR TCAR CLINICAL TRIALS

When obtaining informed consent, vascular surgeons must discuss the perioperative stroke risk associated with carotid revascularization. The typical quoted rate is based on the largest randomized-controlled trial published on carotid interventions, CREST,[3] which demonstrated that patients undergoing CEA had a post-procedure stroke risk of 2.3%. Thus, this rate has remained the standard against which other interventions have been compared.

The ROADSTER study was the original investigative device exemption trial of TCAR, which enrolled 141 patients considered high risk for surgery.[4] The overall stroke rate was 1.4% at 30 days in the patients who followed through on the protocol, the so-called "intention-to-treat" (ITT) population.

While the ROADSTER study was underpowered, and thus the stroke rate in patients who stayed on protocol was not considered statistically significant, TCAR was preliminarily considered at least as safe as CEA. The FDA approved it for use in high-risk patients in 2015.

Although there has been strong interest regarding whether TCAR can be used in standard-risk patients, conducting an adequately powered randomized-controlled trial would require enrolling at least 100,000 patients, and thus this prospect has remained unfeasible. Yet, in 2020, the results of the ROADSTER 2 clinical trial demonstrated a 30-day stroke rate of 1.9% in the ITT population.[5] In this study of 692 patients, all considered high risk for surgery, a subset analysis of 632 patients who followed the prescribed dual antiplatelet and statin protocol showed the stroke

rate was 0.6%. This is the lowest stroke rate ever reported for any carotid revascularization trial.

Once the FDA approved TCAR for use in standard-risk patients, another clinical trial was required to prove its safety and efficacy in this patient population. Given our early adoption of TCAR at Lancaster General Hospital (LGH), our excellent patient outcomes, and our well-established research infrastructure, LGH was selected as a site for enrollment into ROADSTER 3.[6] As a national co-principal investigator, I had the privilege of presenting the 30-day outcomes of ROADSTER 3 at the Vascular InterVentional Advances conference in November 2024.[7]

METHODS

ROADSTER 3 is a prospective, single-arm, multicenter, post-approval study that enrolled 344 patients over 48 sites in the United States between September 2022 and June 2024. Patients had to be considered standard risk for surgery and have anatomy suitable for TCAR. Octogenarians were therefore excluded.

The study's primary endpoint was the composite rate of stroke, death, and myocardial infarction (S/D/MI) through 30 days post-procedure plus the ipsilateral stroke rate from days 31 through 365. The incidence of cranial nerve injury (CNI) within 30 days was a powered secondary endpoint. Events were adjudicated by an independent clinical events committee.

Patients had a National Institutes of Health Stroke Scale assessment and medication review performed by a study coordinator independent to the clinical team; this was completed within 24 hours of TCAR, again at 30 days, and at one year. If a CNI was detected, a six-month assessment was also performed.

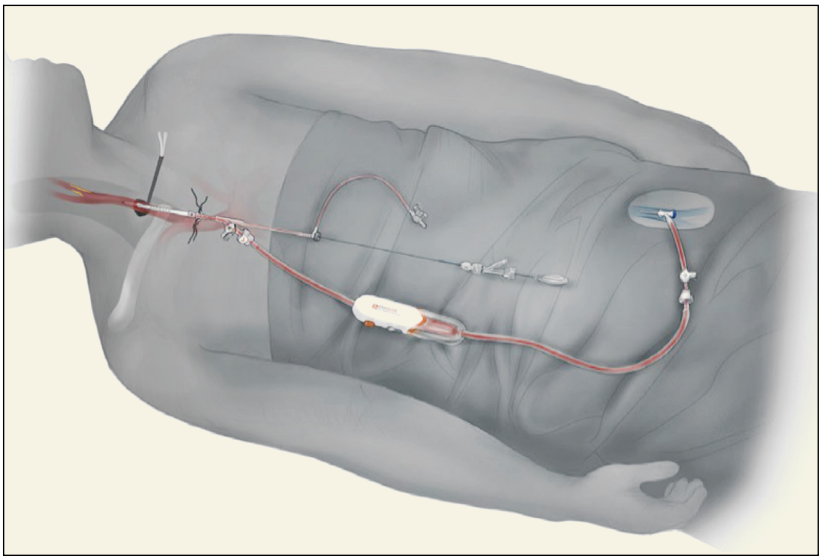

Fig. 1. With sheath access in the common carotid artery and femoral vein, a filter device is connected to each during the TCAR procedure to create an arteriovenous shunt with reversal of flow from the brain. This eliminates the possibility of plaque or thrombotic debris from entering the brain while crossing the lesion with a wire, performing angioplasty, and placing a stent.

RESULTS

A total of 344 patients enrolled in the study. Of these, 24 patients deviated from the protocol, 16 due to medication non-compliance, leaving 320 patients in the per protocol (PP) cohort. Most of the patients (55.1%) were between 70-79 years old; 42.8% were female. The majority of patients were asymptomatic, but of the 15.7% who were symptomatic, 23.5% had experienced their neurologic event within two weeks of having the procedure done.

A majority of patients (75.3%) had a baseline stenosis of 70% to 89%. The mean lesion length was 23.3 mm, and 64.2% of lesions had calcification. Most cases (85.2%) were performed under general anesthesia. The average procedure time was 56.6 minutes, and average flow reversal time was 9.0 minutes. There were no reported episodes of intolerance to flow reversal.

In the intention-to-treat population, the composite rate of S/D/MI at 30 days was 0.9%. There were no deaths or cardiac events. Thus, the 30-day stroke rate was also 0.9%. Three individuals undergoing TCAR experienced a post-procedure stroke; one of these was considered major ischemic, one minor ischemic, and one major hemorrhagic. All stroke events occurred in patients who had been asymptomatic before having the TCAR performed.

The patient who experienced a major ischemic stroke had stent thrombosis on post-operative day 1. This patient was taken back to the operating room for open thrombectomy and balloon angioplasty of the stent, which remained patent at 30 days.

The major hemorrhagic event occurred in a patient who presented on post-operative day 9 with intracranial hemorrhage. Dual antiplatelet medications were held which moved the patient off protocol. Table 1 on page 6 shows the 30-day outcomes in both the ITT and PP populations.

Two patients experienced voice hoarseness post-TCAR. Both cases of CNI resolved within six months. Only

seven access site complications occurred, three of which self-resolved without intervention. Four patients had an access site dissection requiring repair with either additional stent or balloon angioplasty. None of these access site complications resulted in a stroke or CNI.

CONCLUSION

While TCAR is already considered an appropriate option for patients deemed to be at high risk for carotid artery-associated ischemic stroke, in the first-ever, independently adjudicated, prospective study evaluating TCAR in standard-risk patients, we have found it safe and effective at treating stenosis without incurring increased risk of stroke.

The composite S/D/MI rate of 0.9% is lower than in our high-risk population, as we'd expect. When looking at the subset of patients who were able to complete their postprocedural medication protocol, that rate drops to 0.6%, which is the lowest stroke rate ever reported in the literature.

We are over halfway through completion of one-year follow-up; final data are expected in late 2025. We have also started enrolling patients in a five-year follow-up arm to determine stent patency and neurologic events over time.[8]

It is prudent to keep this data in mind when having shared decision-making discussions with patients being offered carotid revascularization. TCAR is now an appropriate option to consider for both high-risk and standard-risk patients here in Lancaster.

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Table 1. 30-Day Outcomes of the ROADSTER 3 Trial

Parameter	ITT (n = 344)	PP (n = 320)
Stroke	0.9% (3)	0.6% (2)
Death	None	None
Myocardial Infarction	None	None
Stroke/Death/Myocardial Infarction	0.9% (3)	0.6% (2)

ITT = intention-to-treat cohort; PP = per protocol cohort

Results of a Multi-Part Trial Designed to Reduce the Incidence of Traumatic Hay-Hole Falls

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Hay-hole fall injuries are a unique problem among rural Anabaptist communities, particularly for the pediatric population. In Pennsylvania, many farms have two-story bank barns that have grain and hay on the upper level of the barn, with an animal feeding area — composed of dirt or concrete — 8 to 10 feet below.[1]

Hay holes are rectangular openings on the second floor of these barns that are used to drop feed to the ground level and to ventilate the barn (see Fig. 1 on page 8). Without these hay holes, barn temperatures rise and become potential fire hazards. However, these hay holes contribute to falls among the Anabaptist population and can be fatal for children.

Anabaptist youth, including those in Amish, Old Order Mennonite, and Brethren communities, actively participate in work on the farm or are present on the farm when parents and older siblings are working. As they are recruited to assist with agricultural work, particularly on farms, injuries are more prevalent.[2-6] One study revealed the risk of any injury for those children who work on farms is three times that of children who do not work on farms.[7]

The Centers for Disease Control and Prevention reports that agricultural occupations are among the most hazardous occupations in the United States: 33 children are injured in farm-related accidents every day, and a child dies in a farm-related accident once every three days.[2] Registry data from Penn Medicine Lancaster General Health and the Penn State Health Milton S. Hershey Medical Center, including case reports of 53 falls over the course of 15 years, demonstrate that hay-hole falls are rarely fatal but are more likely than urban injuries to be associated with craniofacial trauma.[8]

Hay-hole covers may be employed when hay holes are not in use, but covers themselves pose a problem because they may restrict the airflow during summer months. Thus, a concern about the increased risk of high heat and fire may explain why barn owners do not already employ this injury-prevention mechanism. Thus, the goal of two studies conducted by our team was to determine if an alternative hay-hole cover, designed to be safe and yet allow for ventilation, would be adopted for use by farmers and barn owners.

The Anabaptist Youth Trauma Prevention Consortium (AYTPC) assembled in 2015 to address the issue of hay-hole falls in the Anabaptist communities in South Central Pennsylvania. This task force included family and emergency medicine physicians, nurses, educators, trauma leaders, and representatives from the Pennsylvania Amish Safety Committee (PASC) made up of leaders from the local Lancaster community.[1]

The AYTPC presented two hay-hole cover models for feedback at a countywide Farm & Family Safety Day initiative. The favored model consisted of a 1¼-inch-diameter thick-walled steel conduit pipe frame with a meshed, nylon netting interior (see Fig. 2 on page 9).

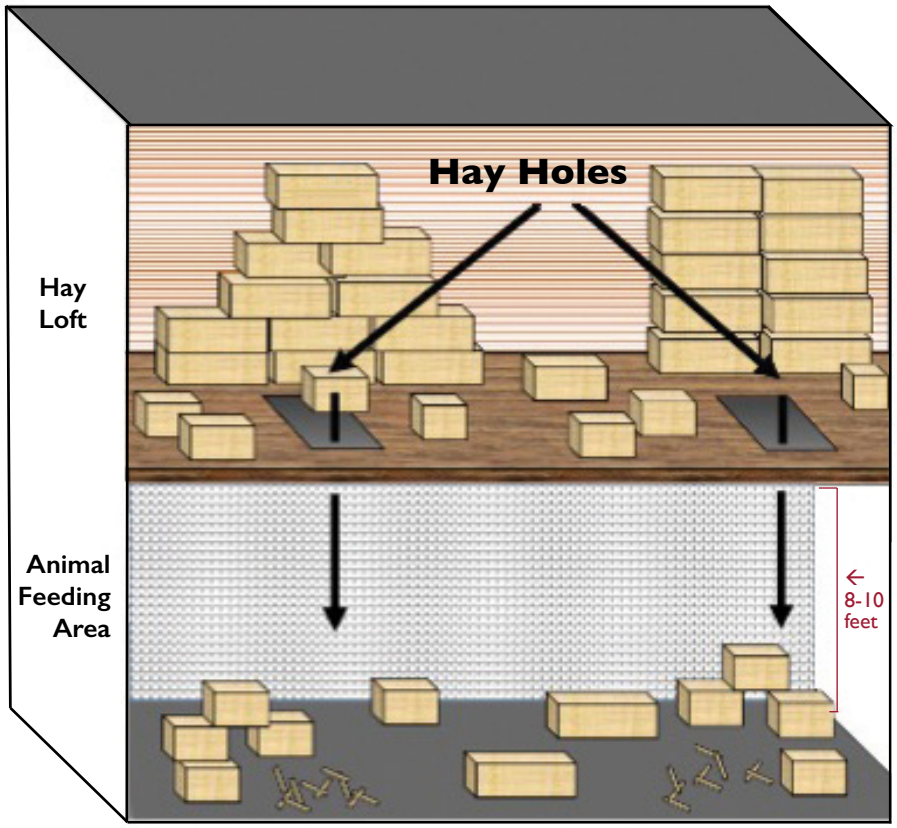

Fig. 1. Hay-hole schematic.

This model has a breaking point of 719 ft-lb and can support at least 620 pounds during net static loading.

The cover is hinged on one side of the hay hole to allow the hay hole to open and close as needed. In addition, the cover is equipped with a removable lining such that in the summer, just the mesh cover is used to allow for air to move through and ventilate the loft (see Fig. 2). In the winter, when there is less concern about entrapped heat, an additional black tarp lining can be added.

This model was selected by the Anabaptist community at a Lancaster Farm & Family Safety Day, receiving overwhelming positive feedback due to its durability and ability to ventilate the hayloft, providing safety without increasing the risk for fire.

METHODS AND RESULTS

Hay-Hole Cover Distribution Pilot Phase

A hay-hole cover distribution pilot phase was conducted during the winter of 2015-2016 and was accompanied by a before-and-after survey, meant to help characterize use of the hay-hole cover and determine whether the covers had resulted in a change in incidence of injury. A sample of 25 hay-hole covers was distributed to barn owners throughout Lancaster County for a three-month testing period, and subsequent survey followed.

Out of the 25 barn owners included in the first sample group, 23 (92%) completed the presurvey and 19 (76%) completed the postsurvey. In the presurvey, 61% of recipients reported at least one hay-hole fall had occurred on their farm, with 29% (n = 4) resulting in serious injuries.[1] A median of one (1-2) hay-hole fall per residence and a median of three (2-4) hay holes per property were reported.

Cover Distribution Study Phase

The hay-hole cover distribution study phase was conducted later that same year. This was performed in the same manner, with a before-and-after survey designed to characterize whether covers were used and to determine the effect of their use.

An additional 206 hay-hole covers were distributed throughout eight counties in South Central Pennsylvania. The farms receiving covers were in Lancaster, Lebanon, Cumberland, Chester, York, Berks, Dau-

phin, and Adams counties — identified in Lancaster General Hospital trauma registry data and PASC as regions with an incidence of hay-hole injuries.

Although our studies have focused efforts on South Central Pennsylvania, because most Anabaptist communities are settled in this region, Anabaptists can be found in all but three Pennsylvania counties.[9,10]

When including those who received hay-hole covers in both the pilot and study phases, there were a total of 231 hay-hole covers distributed (n = 231), and 54 barn owners completed presurveys for the study. At least one hay-hole fall was reported by 52% of these recipients leading up to the distribution, and 46% of recipients reported they had had more than one fall at their farm.

Postsurvey revealed a 97% compliance rate with cover installation, and no hay-hole falls were documented after installation of the new cover.

POST HOC ANALYSIS

Several years after completion of this hay-hole cover distribution study, we conducted a post hoc review of data comparing the six-year period before the distribution of hay-hole covers to the five-year period after the distribution of hay-hole covers to determine whether there was a decrease in hay-hole falls in South Central Pennsylvania.[2]

We conducted a retrospective review of all trauma patients admitted to Lancaster General Hospital from January 1, 2011, to December 31, 2021, with a hay-hole fall. Data from the hospital's trauma registry and individual electronic medical records were stratified by phase: Before Implementation of Hay-Hole Covers: 1/2011-12/2016 and After Implementation of Hay-Hole Covers: 1/2017-12/2021.

The results of this post-hoc analysis demonstrate that 49 patients met the inclusion criteria, 41 of whom were members of the Anabaptist community, according to an electronic chart review.

Further analysis shows that 32 patients sustained a hay-hole fall before distribution of the hay-hole covers, and 17 patients sustained a fall after the distribution and use of hay-hole covers. Thus, LGH data demonstrate that 5.3 patients per year presented with a hay-hole fall before the distribution, while 3.4 patients per year presented after the distribution, a 35.9% relative risk reduction in the number of hay-hole falls in the region after distribution of 231 hay-hole covers.

The mean age of patients presenting to LGH with trauma related to a hay-hole fall increased from 11.5 years before cover implementation to 22.4 years after cover implementation ($p = 0.035$), meaning that fewer children fell through hay holes after covers were implemented in these communities. There were no significant differences in gender, mortality, or injury patterns (head bleed, concussion, spinal fracture, facial fracture, loss of consciousness, skull fracture, or lower and upper extremity fractures) between the two time periods. However, males made up the majority of hay-hole falls both before and after cover implementation.

Fig. 2. Hay-hole cover model favored by the Amish community.

DISCUSSION

Hay-hole covers with the capacity to ventilate can decrease falls and injuries. Given the decreased incidence of hay-hole falls in South Central Pennsylvania following the distribution of hay-hole covers to barn owners, as well as the increased mean age in which these falls occurred, it is reasonable to conclude that these covers were well received by the Anabaptist community. This study's authors won the Eastern Association for the Surgery of Trauma's 2017 Cox Templeton Injury Prevention Competition.

While there is no formal plan for sale or distribution, Lancaster County Farm & Family Safety Day events are an opportunity for barn owners to inquire about hay-hole covers. Periodically, grants allow the AYTPC to provide these covers to interested farmers at no cost.

In addition, the hay-hole cover model may be adapted in other rural communities across the country and could prevent hay-hole falls throughout a more widespread area.

The trauma department at Lancaster General Hospital continues to collaborate with different hospital departments as well as with the Anabaptist community to promote safety and reduce injuries. Our collaboration and research allow us to learn more about injury patterns and characteristics to provide better patient care and prevent injuries in our community.

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Amish Home Remedies and the Research Surrounding Them — Part 1

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This two-part report examines the composition and efficacy of "folk" remedies used by the Amish of Lancaster County. While not a complete list of the plants used, the report seeks to educate medical practitioners regarding Amish practices to help guide patient interviews and prescription recommendations.

INTRODUCTION

An Amish patient with a history of cirrhosis presents to the emergency department with fatigue, shortness of breath, and weight gain. The patient is admitted to the ICU for sepsis complicated by cirrhosis. However, he continues to decline; the patient's wife believes this is because of antibiotics and gives the patient an extract used by members of the community to aid in liver health.

Soon, the extract bottle is examined by the team, who notes the tincture contains 90% alcohol and may be implicated in the patient's decline. Once the extract is discontinued, the patient's liver function tests begin to trend downward, and he can be safely discharged to home health.

This anecdotal story is all too common in Lancaster, Pennsylvania. It illuminates the need to better understand what supplements and alternative treatments patients are taking. The U.S. supplement market generates $30 billion in yearly revenue, contributing to our community's health. Exploring alternative therapies may provide opportunities for research.[1]

With the ever-changing landscape of modern medicine, it is our duty as practitioners to understand the effects alternative therapies and underutilized treatment options have on our patients. This review is meant to promote understanding of the home remedies of the Lancaster County Amish community.

METHOD

In this qualitative research, 22 members of the Amish community of Lancaster County were interviewed and ingredients of "natural remedies" were examined to better illuminate home medical practices, especially the composition of some remedies. The interviews took place from February 2022 to July 2024. The individuals interviewed were not asked to provide their names and were assigned an arbitrary number at the beginning of the interview to ensure anonymity.

The interviews were conducted at individuals' farms, and interviewers began by asking what common ailments were experienced by family members and how ailments are treated at home. Additionally, if known, the active ingredients were cataloged; the literature was subsequently consulted to establish what the scientific community has determined to be the supported indications, contraindications, and adverse effects to consider.

Families were not included if they did not have their home church located in Lancaster County. This was done to ensure consistent information was gathered, as the uses and ingredients of "home remedies" reported by the Lancaster Amish community might vary from those remedies used by others in other locations. This review is in no way comprehensive. Attempts have been made to describe the pertinent ingredients, along with adverse effects, method of action (if known), contraindications, and indications for use.

This study was found to be exempt by the ATSU-Kirksville IRB according to 45CFR46.104 (d)(2)(i). IRB Number: #JK20220314-001.

DISCUSSION

Yarrow Root

Among those interviewed, yarrow root (*Achillea millefolium*, see Fig. 1) was one of the most frequently mentioned plants, noted in 16 of 20 interviews. The genus name is derived from Homer's mention that Achilles used this plant among his troops to stop bleeding.

Fig. 1. Yarrow root (*Achillea millefolium*).

Yarrow contains a pyrrolizidine alkaloid called *achilleine*, which acts as a hemostatic.[2] It is used by patients in Amish communities for pain, bleeding, and digestion. While clinical studies are sparse, it may decrease perineal pain, edema, and ecchymosis in women undergoing an episiotomy.[3]

The Amish community uses an ointment containing this extract applied topically. The plant contains caffeoylquinic acid derivatives, which are phytochemicals responsible for antioxidative actions, as well as other chemicals with antibacterial, antiplasmodial, anti-inflammatory, and pain-relieving properties.[4]

It should be noted that yarrow contains the ketone and monoterpene thujone, which can act as a GABA receptor antagonist. This substance has been known to cause a mild, short-lived dermatitis, but is perhaps best known as the component of absinthe once thought to be responsible for causing psychoactive effects; this attribute is no longer thought to be accurate.

When yarrow is used topically, the levels of these substances are not thought to be high enough to cause toxicity.[4] While more human studies are needed, patients should be educated about the possibility of dermatitis and advised against oral ingestion.

Complete Tissue

Topical creams and balms containing herbals and plant derivatives may be employed by Lancaster County community members to treat infections, back pain, and other ailments. One of these is "complete tissue" or "complete bone and tissue," which contains white oak bark, marshmallow, black walnut, grave root, skullcap, slippery elm bark, aloe vera, lobelia, vitamin E, beeswax, and wormwood. Black walnut and wormwood are discussed in detail below.

Black Walnut

Black walnut (*Juglans nigra*, see Fig. 2) may also be used for several different problems, including back pain and inflammation, as well as promoting wound healing.

Included in most topical compounds that were identified during this study, black walnut contains many chemicals that appear to be anti-inflammatory and may act as antitumor, antiviral, antioxidant, antiallergic, antiatherogenic, and antinociceptive; it is thought to reduce cholesterol absorption and work as an antimicrobial against gram-positive bacteria.[5]

Fig. 2. Black walnut (*Juglans nigra*).

Its antimicrobial effects vary by the geographic location from which the black walnut is procured, so it is impossible to make formal recommendations about its use as an antimicrobial unless local procurement is extensively studied.

The *Juglans* genus has also been identified as the most common cause of allergic reactions among those who are sensitive to tree nuts in the United States and Japan.[6] It is thus imperative to educate patients about what to look for when considering an allergic reaction.

If a patient is known to have a tree nut allergy, it would be best practice to provide a prescription for epinephrine, as the ingredients in many emollients are known to contain *Juglans* derivative, despite it not always being listed as an ingredient. Overall, its safety and recommended dosing have not been well studied.

Wormwood

Wormwood (*Artemisia absinthium*, see Fig. 3) has been employed in many cultures and was mentioned as a stomach reliever in Pedanius Dioscorides' first-century text, *De Materia Medica.*

In 2007 the crusade against absinthe concluded — in the United States it had been banned since 1912 — and in the years since, this plant has been under research for treatment in inflammatory-based gastrointestinal conditions such as Crohn's disease.[7] The increase in interest may have been revitalized after the 2015 Nobel Prize in Medicine was awarded for the discovery of the chemical compound artemisinin in wormwood's close relative *Artemisia annua*, also known as mugwort.

Wormwood has antiparasitic properties, affecting both the larvae and egg stages of development. It is believed to bind iron and break down peroxide bridges, creating free radicals; these, in turn, disrupt parasitic proteins. Additionally, like yarrow, it contains the GABA antagonist thujone.

This plant has been shown to have procognitive effects and antidepressive actions in animal studies, and it can eliminate *Staphylococcus aureus* and *Pseudomonas aeruginosa* in vitro.[8] Interestingly, the essential oils made from this plant have been found to act as a sort of insect repellent, a possible organic alternative to DEET-containing repellents.[9]

Regarding safety, neither internal nor external therapeutic ranges have been established. The adverse effects associated with wormwood are thought to be due to the thujone toxicity; it can antagonize chloride channel GABA receptors and thereby potentiate both tremors and seizures.[10] Since α-thujone is more potent than β-thujone, ingestion of an improperly prepared tincture can increase these risks.

Fig. 3. Wormwood (*Artemisia absinthium*).

The results of the largest study on this plant suggest that wormwood should not be taken by a patient with a history of gastrointestinal ulcers or liver disease, or who is nursing or pregnant.[10] Due to the risk of seizures, a patient with a history of seizures should be advised to avoid ingestion. Skin irritation does not appear to be common, so patients may use it topically.[11]

St. John's Wort

St. John's wort (*Hypericum perforatum*, see Fig. 4 on page 14) — named for its tendency to bloom on John the Baptist's birthday, June 24 — is used by many to treat depression, insomnia, and attention-deficit hyperactivity disorder (ADHD). It is thought to inhibit the reuptake of serotonin, norepinephrine, and dopamine, and may even act as a weak monoamine oxidase inhibitor.

While the prevalence of mental health diagnoses in the communities interviewed is unknown, some Amish family members stated that depression or anxiety would be treated with St. John's wort before

assistance would be sought from a licensed physician.

A classic inducer of cytochrome P450 (CYP) enzymes — mainly 1A2, 2D6, and 3A4 — this agent is superior to placebo for the treatment of depression in some trials; it may have a smaller side effect profile than selective serotonin reuptake inhibitors (SSRIs).[12]

Despite some studies showing its efficacy, a systemic review acknowledges that we do not have a full understanding of St. John's wort's side effect profile.[13] Additionally, although it may be used more frequently in European countries, we do not yet know the optimal daily dosing regimen; long-term studies are lacking.

Fig. 4. St. John's wort (*Hypericum perforatum*).

As noted above, St. John's wort induces CYP enzymes, which can alter the metabolism of drugs like warfarin or digoxin; opiates may also be converted into a more potent form when CYP enzymes are induced. Yet, St. John's wort is well tolerated. A study in 1994 involving 3,250 patients found that only 2.4% had side effects, of which gastrointestinal issues, fatigue, restlessness, and allergic reactions were the most common.[14] St. John's wort is not safe in pregnancy or during lactation.[15]

Burdock

Burdock (*Arctium,* see Fig. 5) has been used since ancient times for its potent antioxidant effects. The Amish commonly pick this plant in the spring and dry it to have on hand throughout the year.

It is used topically for wounds, unless there is an accompanying infection, or it can be taken as a tea for gastrointestinal issues, circulation issues, as a diuretic, and for generalized body pain. Although said to be well tolerated, burdock may cause dermatitis, so it is appropriate to watch for erythema.

Fig. 5. Burdock (*Articum*).

Burdock has many active ingredients, the majority of which act as free radical scavengers.[16] Research suggests it may promote blood circulation to the skin and act as an antidiabetic. It may also act as an inhibitor of pancreatic carcinoma; however, none of these effects have been well studied in humans.[17]

Aqueous burdock may treat osteoarthritis by increasing the cellular proliferation of human mesenchymal stem cells, which can, in turn, induce chondrogenesis.[18] Generally, this plant is considered safe, making the risk of misuse and adverse effects extremely low.[17]

Horsetail

Horsetail (*Equisetum arvense,* see Fig. 6) is collected and taken for both pain and generalized inflammation. It is a part of many compounds for aches and pains commonly used by members of the Amish community.

This plant has an extremely potent anti-inflammatory action, inhibiting T-cell proliferation and decreasing CD69 and IL-2 surface receptor expression, which in turn decreases production of interferon gamma and tumor necrosis factor alpha.[19]

Horsetail should be used cautiously, as it may cause profound hyponatremia.[20] Lab work may be indicated if a patient is using horsetail continuously and has abnormal signs and symptoms.

Additionally, case reports implicate horsetail in transient liver function test elevation; horsetail should be avoided in patients with preexisting liver injury or cirrhosis.

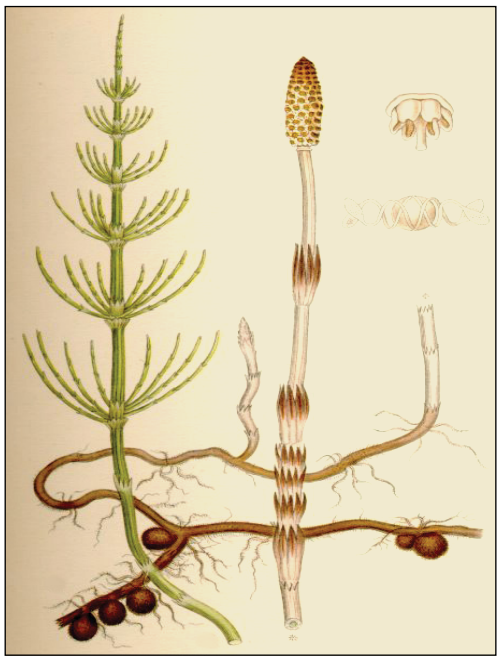

Fig. 6. Horsetail *(Equisetum arvense).*

CONCLUSION

Often, patients will pursue alternative therapies. To serve communities such as the Amish, drug interactions and proper dosing should be established, with the goal of preventing harm and giving accurate recommendations regarding risks and benefits.

Practitioners should understand these therapies and be prepared to offer recommendations based on the best available evidence. In part 2, we will continue to discuss the compounds introduced in these interviews.

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Identifying, Preventing, and Treating Opioid-Induced Constipation

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INTRODUCTION

Opioid-induced constipation (OIC) occurs in approximately 50% of patients receiving opioid therapy and is somewhat independent of opioid dose, route, or length of treatment.[1,2] Patients are at an increased risk of developing OIC if they are elderly, female, or unemployed, and if they have pain and immobility with injury, metabolic abnormalities, or bowel obstructions.[2,3] OIC may present immediately after the initiation of opioids or can develop over time with prolonged use.

Patients may report straining and/or incomplete emptying, as well as nausea, vomiting, bloating, and abdominal pain. OIC may also present with alternating episodes of diarrhea and constipation. The Rome IV diagnostic criteria (see Table 1) can be used to diagnose OIC, and the Bristol Stool Scale can be used to classify the form of feces. Imaging is not warranted for OIC unless a patient presents with alarm symptoms, such as weight loss, positive fecal occult blood tests, iron deficiency, or a family history of colorectal cancer.[3] Patients taking opioids should be regularly screened for the signs and symptoms of OIC.

Opioids cause OIC by activating *mu*-opioid receptors outside the central nervous system.[5] This peripheral activation leads to inhibition of gastric emptying and peristalsis in the gastrointestinal tract. As a result, there is increased absorption of fluids and delayed absorption of medications, ultimately leading to hardened stools. In addition, opioids impact the defecation reflex through increased anal sphincter tone while diminishing rectal sensations.[3,6]

Patients with medication-induced constipation should be encouraged to stay hydrated by consuming one-and-one-half to two liters of water per day, incorporate soluble fiber in their diet (see Fig. 1 on page 18), and schedule toileting.[2,3,7] When increasing fiber intake or adding fiber supplements, no more than 25-30 grams should be consumed per day, as this may lead to a bloated sensation.[3] In addition, patients should be encouraged to exercise regularly, as these lifestyle modifications encourage bowel motility.

LAXATIVES

At the initial prescription of opioids, patients should be prescribed laxatives to prevent OIC. All types of laxatives, except bulk-forming laxatives, can be used as initial therapy.[3] According to the guidelines of the American Gastroenterological Association (AGA) Institute, first-line agents to prevent and treat OIC are traditional laxatives.[9] Stimulant laxatives, including senna and bisacodyl, are commonly used and can be purchased over-the-counter. Docusate, a stool softener, can be used in combination with stimulant laxatives and is available as a combination tablet with senna.

Additionally, patients can take osmotic laxatives daily to aid in the treatment and prevention of OIC. The osmotic laxative polyethylene glycol is available over-the-counter, whereas lactulose requires a prescription. Saline laxatives, such as magnesium citrate, are fast acting and may be beneficial in OIC as they provide quick relief in 30 to 180 minutes.[3]

Magnesium citrate can cause electrolyte abnormalities, volume overload, and elevated sodium, phosphate, or magnesium if a patient has cardiac or renal dysfunction.[10] Bulk-forming laxatives should be avoided because they can distend the colon and increase peristalsis, and they can result in worsening abdominal pain and bowel obstruction.[3]

PERIPHERALLY ACTING *MU*-OPIOID RECEPTOR ANTAGONISTS (PAMORAS)

In laxative-refractory cases of OIC, the use of more direct-acting agents may be warranted. PAMORAs antagonize peripheral *mu*-opioid receptors,

thereby helping to reverse OIC.[3,11] They are less likely to cross the blood-brain barrier because they are less hydrophobic than naltrexone, but patients should be monitored for symptoms of opioid withdrawal such as anxiety, chills, and hyperhidrosis while taking these medications.[1,3,11] There are three PAMORAs approved for use in OIC: methylnaltrexone, naloxegol, and naldemedine. In addition, alvimopan, which is currently approved for postoperative ileus, can be used off-label for OIC.[9]

The AGA Institute guidelines recommend the use of a PAMORA for OIC rather than no treatment.[12] When considering the initiation of a PAMORA, patients must have been on opioids for a minimum of four weeks to be considered candidates.[7] Before initiation of PAMORAs, all maintenance laxatives should be discontinued.[3]

Methylnaltrexone (Relistor®), as its name implies, is an N-methylated version of naltrexone that does not cross the blood-brain barrier. Patients may see a response to the medication within four hours of administration, while others may require repeat dosing if receiving higher daily morphine equivalencies.[13] It is administered at 450 mg orally once daily or 12 mg subcutaneously once daily, with dose adjustments for moderate to severe hepatic impairment and severe renal impairment. Patients should be instructed to take oral methylnaltrexone with water at least 30 minutes before their first meal of the day. Subcutaneous methylnaltrexone injection sites should be rotated daily and administered in the upper arm, abdomen, or thigh.[11]

Subcutaneous methylnaltrexone is also indicated for OIC in patients receiving palliative care with inadequate laxative response and is dosed based on weight in this population.[7,11] Patients may experience mild to moderate abdominal pain and flatulence.[13] The use of methylnaltrexone for more than four months has not been studied, and use should therefore be limited to a short period of time.[11]

Table 1. Opioid-Induced Constipation Diagnosis Criteria[4]

1. New, or worsening, symptoms of constipation when initiating, changing, or increasing opioid therapy and must have ***two or more*** of the following:
   a. Straining during more than 25% of defecations.
   b. Lumpy or hard stools (Bristol Stool Form Scale 1-2) with more than 25% of defecations.
   c. Sensation of incomplete evacuation with more than 25% of defecations.
   d. Sensation of anorectal obstruction/blockage with more than 25% of defecations.
   e. Manual maneuvers needed to facilitate more than 25% of defecations (such as digital evacuation or support of the pelvic floor).
   f. Fewer than three spontaneous bowel movements per week.
2. Loose stools are rarely present without the use of laxatives.

Naloxegol (Movantik®) is a pegylated derivative of naloxone which limits the drug's ability to cross the blood-brain barrier.[14] The effectiveness of naloxegol was determined in two phase 3 randomized control trials. For OIC, it is dosed 25 mg by mouth daily, and a dose reduction to 12.5 mg may be needed in those who do not tolerate the full dose.[7] Dose reduction is required for renal impairment, as altered renal function can impair the clearance of naloxegol and lead to increased drug exposure and increased side effects. It should also be avoided in patients with severe hepatic impairment.

Patients should be instructed to take naloxegol on an empty stomach one hour before or two hours after their first meal of the day. This medication can be crushed and administered via a nasogastric tube. Naloxegol should not be used with strong cytochrome P450 3A4 (CYP3A4) inhibitors such as clarithromycin and ketoconazole, and dose adjustments should be made with moderate CYP3A4 inhibitors and CYP3A4 inducers.[7] In addition, potential drug-drug interactions may occur with grapefruit due to hepatic drug metabolism via CYP3A4.[7,15] Side effects appear to be dose related, with the most common being gastrointestinal: abdominal pain, diarrhea, nausea, and vomiting.[14]

Naldemedine (Symproic®) was approved by the Food and Drug Administration (FDA) in 2017 and is the newest PAMORA on the U.S. market. It acts on *delta*- and *kappa*-opioid receptors, in addition to *mu*-opioid receptors.[9] Naldemedine is dosed at 0.2 mg by mouth once daily. Studies have demonstrated that impaired renal function does not require dose reductions, but naldemedine should not be used in patients with severe hepatic impairment as the drug's safety has not been studied in this population.[7,16] Patients can be instructed to take naldemedine with or without food.

Naldemedine is a major substrate of CYP3A4, P-glycoprotein, and uridine diphosphate-glucuronosyltransferase 1A3, which may lead to numerous potential drug-drug interactions.[17] The use of strong

CYP3A4 inducers (e.g., dexamethasone, carbamazepine, phenytoin, phenobarbital, rifampin) should be avoided, as they can reduce the effectiveness of naldemedine. Conversely, the concurrent use of moderate and strong CYP3A4 inhibitors can increase naldemedine levels, potentially leading to heightened adverse reactions. Drugs that inhibit P-glycoprotein can increase the bioavailability of naldemedine, whereas inducers may decrease it. Therefore, careful monitoring is recommended when these inducers and inhibitors are used alongside naldemedine.[7]

PAMORAs as a class are contraindicated in peptic ulcer disease, diverticulosis, colon cancer, and bowel obstruction.[3] If a suboptimal response to PAMORAs occurs after three days, laxative therapies may be added to the patient's regimen.[3] The most common adverse effects associated with PAMORAs are gastrointestinal effects, including abdominal pain, flatulence, nausea, and diarrhea. If a patient experiences severe, persistent diarrhea or discontinues opioid therapy, PAMORAs should be halted.[11]

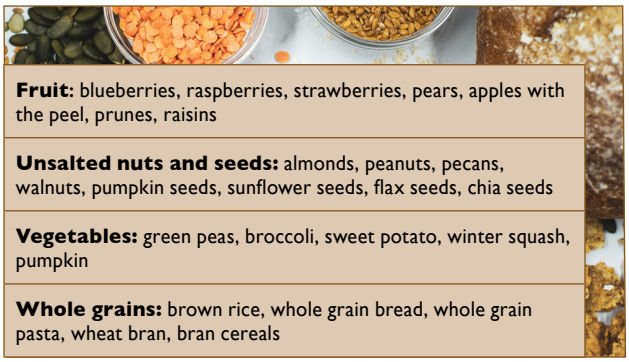

Fig. 1. Foods high in fiber.[8]
Background photo from Formulate Health via Flickr, licensed under CC BY 2.0.

ADDITIONAL AGENTS

Lubiprostone (Amitiza®) is a type-2 chloride channel activator. It works by increasing the fluid secretion in the gastrointestinal tract and, as a result, increases tone, enhances peristalsis, and increases movement of the small bowel and colon.[3] This medication was the first medication approved for OIC in adults taking opioids for non-cancer pain.[18]

Lubiprostone's efficacy has not been established in patients taking methadone, and it is believed that the mechanism of action of methadone may cause lubiprostone to be ineffective.[7] Recommended dosing for OIC is 24 mcg orally twice daily. Dose adjustments are required in moderate to severe hepatic impairment.[19]

Patients should be instructed to take lubiprostone with food and water to decrease nausea, a common side effect along with diarrhea and abdominal cramping.[5,7,19] Patients who are also taking antihypertensive medications may experience dyspnea, syncope, and hypotension with the first dose, and taking this medication while seated may reduce the effects of orthostasis.

The risk of orthostasis may be increased in those experiencing diarrhea or vomiting. Trials of lubiprostone as long as 13 months have shown it to be well tolerated.[7] The AGA Institute guidelines make no recommendations for the use of lubiprostone for OIC due to limited consistent evidence and low quality of evidence for use.[12]

Prucalopride (Motegrity®) is a selective serotonin type 4 receptor agonist that works by inducing giant migrating contractions and encouraging proximal colonic and gastropyloro-duodenal movement. In addition, patients with delayed gastric emptying may benefit from prucalopride, as it helps to increase gastric emptying.[20] The FDA-approved indication for prucalopride is chronic idiopathic constipation, but this medication has been used off-label in OIC.[20] It is dosed at 2 mg by mouth once daily for OIC, and dose adjustments should be made for severe renal dysfunction.

The use of prucalopride is contraindicated in intestinal perforation or obstruction, obstructive ileus, and severe inflammatory gastrointestinal tract conditions.[4] The most common side effects are gastrointestinal upset, including abdominal pain, nausea, and diarrhea.[4,20]

Patients should be monitored for new or worsening suicidal ideations and depression, as well as severe, persistent diarrhea. If these develop, medication therapy should be stopped.[4] Due to a lack of evidence to support its use, the AGA Institute guidelines make no recommendation for the use of prucalopride.[12]

CONCLUSION

OIC is a common side effect of opioids and should be prevented and treated promptly as it can lead to decreased quality of life. Initially, patients should use lifestyle modifications and laxatives to prevent OIC, although bulk-forming agents should be avoided due to the potential worsening of constipation. Patients who are refractory to traditional laxatives may trial PAMORAs after four weeks of opioid therapy.

These agents can cause undesired side effects of

opioid withdrawal and gastrointestinal upset, and therefore patients should be monitored regularly while receiving these agents. Patients should stop treatment with PAMORAs if persistent or severe diarrhea occurs. Alternatively, lubiprostone or prucalopride can be used off-label to treat patients with OIC, although limited data exist for the use of these agents in this patient population.

Overall, a personalized approach that considers each patient's unique circumstances, including their specific opioid regimen and overall health status, is essential for effectively managing OIC. Regular screening for OIC and a multifaceted approach involving dietary modifications, lifestyle changes, and pharmacological interventions can help optimize treatment outcomes and improve patients' quality of life.

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PEARLS OF EDUCATION

Guiding Graceful Aging of the Older Adult

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The following are pearls from a recent continuing education event at Penn Medicine Lancaster General Health. "Guiding Graceful Aging of the Older Adult" included a variety of presentations, with evidenced-based, multidisciplinary recommendations and referral resources to engage patients and their family members as partners in their care.

This event was sponsored by the Kenneth and Pamela Brubaker Center for Geriatric Learning Endowment and co-sponsored by the Philadelphia College of Osteopathic Medicine. These pearls are offered here to increase the reach of this in-person training, published with the intention of helping our community of clinicians better care for our patients.

DEPRESCRIBING FOR THE GERIATRIC PATIENT

Polypharmacy, defined as the use of five or more medications, often leads to redundant prescriptions with inappropriate or no indications, increasing the risk of adverse effects such as falls, disability, or death. Common side effects of patients who experience polypharmacy are sleeping issues, anxiety, depression, weakness, and dizziness. These complaints often prompt a prescribing cascade, additional medication being prescribed to treat side effects caused by a preceding medication, further contributing to the problem.

Deprescribing is a planned and supervised approach to dose reduction or discontinuation of potentially harmful medications. Tools like the American Geriatric Society (AGS) Beers Criteria® provide guidance regarding potentially inappropriate medications in older adults and advise that caution be exercised with medications that can cause sedation and increase bleeding, as well as with anticholinergics.[1] Guidance for deprescribing is also available from resources such as Deprescribing.org.

Deprescribing doesn't mean entirely eliminating medications, but reducing to efficiently optimize symptom management. When deprescribing, it is advisable to focus on reducing one medication regimen at a time, involve specialists in discussion as needed, and consider the specific adverse effects to be addressed, such as sedation.

Utilizing every patient visit to review medication lists and setting clear expectations about the deprescribing process can help patients feel more comfortable with medication changes.

CHRONIC KIDNEY DISEASE IN THE GERIATRIC PATIENT

Physiological decline in renal function typically begins in the fourth decade of life but almost never progresses to end-stage renal disease. With age come significant gross changes in the kidneys, including a 30% reduction in size by the eighth decade and a loss of renal mass by 300 grams by the ninth decade, often accompanied by renal parenchymal cysts.

Estimates of glomerular filtration rate (GFR) have evolved over time, from the Cockcroft-Gault equation in 1976 to more recent equations like the chronic kidney disease epidemiology (CKD-EPI) calculator, which does not include race as a factor. Creatinine-based GFR calculations, while common, may not accurately reflect muscle mass variability among patients, making cystatin C a preferred marker for GFR estimation, particularly when confirmation is necessary.[2]

Unique causes of kidney disease in older adults include medication-related issues, volume depletion, sepsis, acute cardiovascular events, systemic illness, and obstructive uropathy. Management in this population requires careful consideration of medication adjustments, with certain medications like renin-angiotensin system blockers, nonsteroidal anti-inflammatory drugs, sodium-glucose cotransporter 2 inhibitors, metformin, and diuretics often needing to be held during sick days due to the increased risk of adverse events. Elderly individuals are more susceptible to adverse drug events at lower doses than younger adults, necessitating renal dosing adjustments.

The initial workup for older adults with suspected kidney disease typically includes assessing GFR, electrolytes, and the albumin-to-creatinine ratio. Risk assessment tools such as the Kidney Failure Risk Index, available on platforms like MD Calc, can aid in determining the need for nephrology consultation, par-

ticularly in cases of advanced CKD and during abrupt declines in GFR.

CAPACITY EVALUATION: WHAT, WHY, HOW

The University of Toronto's Aid to Capacity Evaluation (ACE), when used in the inpatient setting, serves as a valuable resource for assessing the capacity to make informed decisions about health and treatment options. Capacity, in this context, refers to the ability to comprehend relevant information about illness and proposed treatments, and to make decisions that align with one's own values and preferences.

Determining capacity is crucial for various legal matters, as outlined by Pennsylvania laws, including making financial decisions, giving medical treatment consent, selecting a level of care, appointing an agent, executing living wills and testamentary wills, driving, amending prior documents, understanding prognosis, exercising voting rights, and making end-of-life decisions.

However, capacity evaluations often involve balancing competing interests, such as financial and legal responsibilities, patient and family obligations, and medical considerations. It's essential to differentiate between choice as opposed to assent, and to discern whether there is understanding and appreciation.

Importantly, when patients demonstrate capacity, they retain the right to make decisions, even if they are perceived as unwise.

ACE offers a structured approach to assessing individuals' decision-making abilities, ensuring that their autonomy and rights are respected within the bounds of the law and ethical considerations. It includes questions to assess the patient's understanding of their medical diagnosis, the proposed treatment and alternatives, and the consequences of accepting or not accepting these treatment options, as well as specific questions about autonomy and mental health (see box below). It is nonproprietary and can be accessed online; practicing with it before use is encouraged.[3]

ACE Sample Questions

The Aid to Capacity Evaluation (ACE) questionnaire involves asking a series of seven questions in a conversational style.The interviewer should first have addressed barriers to communication, including vision and hearing problems as well as language barriers.

The interviewer should continuously disclose information about the disease and treatment options to assess understanding, using the patient's own words if possible to describe disease and treatment. Scoring is not based on whether the interviewer agrees with the patient; this can be challenging, so interviewers should practice ahead of time.

1. What medical problem do you have?
2. What treatment options are there to help you?
3. What other options do you have?
4. Can you refuse or can we stop using the proposed treatment?
5. What could happen if you accept this treatment?
6. What could happen to you if you don't accept this treatment?
7. If the person's decision is affected by depression or psychosis: Can you help me understand why you have decided to accept or refuse treatment? Do you deserve this?

DEMENTIA ASSESSMENT AND MANAGEMENT FOR THE PRIMARY CARE PROVIDER

By 2050, the U.S. population is projected to include more than 89 million individuals aged 65 years and older. While aging brings wisdom and accumulated knowledge, it can also be accompanied by declines in cognitive processing speed, multitasking ability, reasoning, abstraction, and word-retrieval efficiency. Despite these changes, functional abilities are generally preserved, even if patients may find tasks more challenging.

Dementia, characterized by cognitive or behavioral symptoms in multiple domains, poses a substantial challenge to aging populations. The differential diagnosis of cognitive changes includes various types of dementia, including Alzheimer's disease, vascular dementia, dementia with Lewy bodies, and Parkinson's disease-associated dementia.

Early evaluation of memory concerns involves a comprehensive assessment. Obtain a history from both patient and informant — including medical history, functional status, medication review, and a review of psychological symptoms — and perform a physical examination and cognitive testing. Initial workup typically includes laboratory tests such as a thyroid hormone level, vitamin B_{12} level, comprehensive metabolic panel, and complete blood count, plus assessments for other nutritional deficiencies, urinalysis, and neuroimaging for select cases.

Management of dementia includes optimizing contributing factors and comorbidities, disclosing the diagnosis, coordinating caregiver support, managing behavioral and psychological symptoms, and conducting advance-care planning.

Pharmacological options include cholinesterase inhibitors such as donepezil, rivastigmine, galantamine, and

N-methyl-D-aspartate receptor antagonists like memantine. More recently, monoclonal antibodies have proven useful. The use of psychoactive medications like antidepressants and antipsychotics requires careful consideration, particularly in advanced stages of dementia.

Resources such as Penn Medicine LGHP Alzheimer's and Memory Care, LGHP Geriatrics, and the Lancaster County Office of Aging play a vital role in providing comprehensive care for individuals with dementia.

EMERGING INSIGHTS INTO THE GENETIC BASIS OF ALZHEIMER'S DISEASE

Alzheimer's disease (AD), the most common cause of dementia globally, is characterized by cortical atrophy, amyloid and tau protein deposition, and insidious cognitive decline, primarily affecting episodic memory and language. Biomarkers such as CSF tau and CSF amyloid, as well as changes in hippocampal volume, may begin to show up 8-15 years before a clinical diagnosis of the disease.

Recent advances in AD treatment include monoclonal antibodies like aducanumab and lecanemab-irmb, which target amyloid deposition. These have been shown to slow cognitive decline, although eligibility criteria include eliminating the possibility of vascular dementia; potential side effects include an increased risk for brain bleeding and swelling.

Familial AD may be caused by a single genetic mutation; non-familial AD is more likely due to multiple factors, a combination of genetic and environmental contributors. Understanding the genetic underpinnings of Alzheimer's disease, and the interplay of lifestyle and society, aids in risk assessment and personalized management strategies.

Those with one first-degree relative with AD have an increased risk of developing the disorder (relative risk = 1.73), while those with two or more first-degree relatives with AD have an even greater chance (relative risk = 3.98). Genetic testing, particularly for the apolipoprotein E gene, is helpful when preparing to offer lecanemab, but should be accompanied by genetic counseling.

Despite advancements in treatment and understanding of the disease process, dementia remains a significant public health concern, necessitating a multidisciplinary approach including medical, social, and lifestyle interventions to optimize patient outcomes. Clinicians' focus should remain on maximizing the underlying health status and encouraging a healthy lifestyle, including good diet and exercise.

WOUND CARE BASICS

To effectively address and prevent the recurrence of various types of wounds, clinicians must understand their underlying causes and employ appropriate treatment strategies.

When treating, ensuring a moist wound environment facilitates fibroblast migration to the wound edges, which promotes healing. Biofilm, characterized by a thick yellow appearance and a "wax paper sheen," prolongs the inflammatory phase of wound healing, thus should be debrided surgically or with medical options like collagenase, such as SANTYL™.

- *Venous Stasis Ulcers:* Lifestyle modifications can help prevent and manage venous stasis ulcers (see Fig. 1), so patients must be counselled about the value of reducing sodium, walking regularly, achieving a healthy weight, and elevating the legs during rest. Compression stockings, like an Unna boot, are essential for both treatment and recurrence prevention, but caution is necessary in patients with peripheral artery disease.

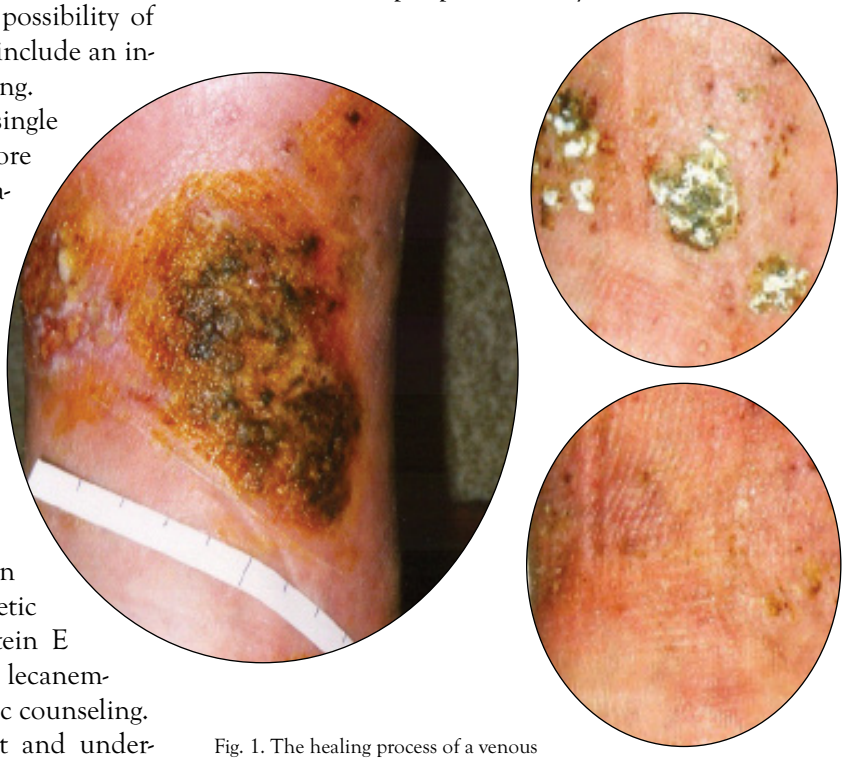

Fig. 1. The healing process of a venous stasis ulcer of the lower leg: above left, at initial presentation; top right, after 3½ months of therapy; bottom right, after 4½ months of therapy.
Photos by Prof. Dr. med. Gerd Hoffmann, CC BY-SA 3.0 DE, via Wikimedia Commons.

- *Diabetic Ulcers:* Management of diabetic ulcers involves addressing various factors. Pressure on the wound itself must be minimized, but compression of the limb may aid in healing. Efforts should be made to appropriately manage sensory neuropathy, impaired immunity, and nutrition.

  Smoking, obesity, improper footwear, and lifestyle risks must be addressed. Treatment modalities may include debridement, as well as total contact casts, diabetic air casts, and long-term proper footwear. Podiatry evaluations should be performed at each primary care visit, and patients should maintain foot hygiene and moisturization.
- *Pressure Injuries:* Prevention and treatment of pressure injuries involve relieving pressure on bony prominences and ensuring mobilization. Special attention should be paid to pressure relief and changing the patient's lying surface to prevent location ulcers, such as the "recliner bottom."
- *Sitting Ulcers:* Utilizing the Braden Scale for predicting pressure sore risk can guide preventive measures and treatment. For stage 1-3 ulcers, zinc-oxide barriers, moisturizers, and cocoa butter can aid healing, while stages 3-4 may require enzymatic debriding agents like SANTYL™ or specialized wound dressings such as Hydrofera Blue®, Ag foam silicone, or Iodosorb™.

In addition to these treatments, ensuring adequate intake of nutrients such as zinc, vitamin C, and protein is essential for collagen support and overall wound healing. By addressing the root causes of wounds and implementing appropriate management strategies, health care providers can effectively treat existing wounds and reduce the risk of recurrence, ultimately improving patient outcomes.

PREVENTATIVE SCREENINGS FOR ADULTS AGED 65+

There is value in screening for many cardiovascular and metabolic conditions, including hypertension, hyperlipidemia, abdominal aortic aneurysm, diabetes, obesity, mental health and substance use disorders, as well as osteoporosis, hepatitis, and vision and hearing problems.

The primary goal of cancer screening is to prevent death from cancer by detecting it at an early, treatable stage. The U.S. Preventive Services Task Force recommends regular colorectal and breast cancer screening for eligible individuals, recognizing that the benefits may take more than 10 years to manifest. Tools like the ePrognosis website at eprognosis.ucsf.edu and the Lee Schonberg Index aid in estimating prognosis and informing decisions about cancer screening.

Clinicians should be able to describe the risks and benefits of trying to detect asymptomatic cancer. In general, it is only necessary if 1) the patient would have developed symptoms during their lifetime, and 2) earlier treatment will reduce morbidity and/or mortality.

In the United States, we have created what may be called "a screening paradox," meaning that healthy older patients are often under-screened, while those in poor health are often over-screened. Deciding when to stop screening for cancer and other conditions means being able to compare life expectancy with lag time to benefit.

Based on average life expectancy, the benefits are outweighed for breast cancer when a woman reaches 74 years, for colon cancer when a person reaches 75 years, and for prostate cancer when a man reaches 69 years. Remember, though, that no patient is average, so comorbid conditions or exceptionally good health can make stopping screening appropriate at younger or older ages.

Many patients are receptive to discontinuing cancer screening if advised by a trusted physician. However, it is common for patients to underestimate their life expectancy and the potential benefits of screening. Using the right language is crucial, so consider emphasizing that a test may not help a patient live longer rather than suggesting they may not live long enough to benefit.

Having open and honest communication, along with shared decision-making, can empower patients to make informed choices about screening options.

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CASE REPORT FROM THE EMERGENCY DEPARTMENT

A Case of Acquired Methemoglobinemia

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OBJECTIVE

While methemoglobinemia is a rare diagnosis, it is a potentially life-threatening condition.[1] The following case report of acquired methemoglobinemia emphasizes the importance of maintaining a wide differential diagnosis in patients presenting with refractory acute hypoxic respiratory failure, cyanosis, and topical lidocaine use. As part of the case presentation, the etiology, pathophysiology, and treatment of methemoglobinemia are reviewed.

CASE PRESENTATION

A 56-year-old male with a past medical history of essential hypertension, bicuspid aortic valve status post aortic valve replacement, chronic bronchitis, chronic cigarette abuse, and gastroesophageal reflux disease (GERD) presents to the Emergency Department (ED) with dizziness, headache, shortness of breath, and cyanosis. The patient reports he awakened to let his dog out the night prior to admission and felt dizzy and more short-of-breath than baseline. He and his wife have noticed his lips and fingers are purple, and he checked his pulse oximetry at home and found his level to be 70% on room air.

Upon arrival to the ED, his hypoxia is worse and he is placed on high-flow nasal cannula. He is tachycardic, dyspneic, and cyanotic.

A review of his history reveals he is compliant with prescribed inhaled corticosteroids and a long-acting beta-agonist, and has a therapeutic INR on Coumadin® one week before his presentation to the ED.

He relates that he has previously undergone hospitalizations for hypoxia, which improved with steroids and antibiotics. Of note, during the most recent admission, he required high-flow nasal cannula in the intensive care unit due to hypoxic respiratory failure and cyanosis after a syncopal event while in the garage with space heaters. A carbon monoxide level had been checked during that admission and was normal, yet it had been checked 24 hours after being hospitalized.

Although he is not on any newly prescribed medications, he reports that he has been using over-the-counter lidocaine patches, sometimes two or three at a time, over the past 8-12 months for chronic knee pain.

He works in landscaping but denies any recent significant exposures to unusual chemicals, nor illicit drug use. He has functioning carbon monoxide detectors in his home, and it is notable that his wife does not have similar symptoms. He has not recently traveled outside the area nor consumed well water. He smokes about 10 cigarettes per day and does not use oxygen at home.

The ED workup includes an elevated D-dimer at 0.82 µ/mL (normal ≤0.4 µ/mL), and an INR in the therapeutic range. Lactic acid is normal. Troponins are elevated at 38.33 ng/dL but a repeat check has no delta at 38.36 ng/dL. The initial EKG shows no significant changes from baseline. An ABG is normal for someone on supplemental oxygen, yet the respiratory therapist notes the blood is very dark in color, "almost the color of chocolate." A lactate level, to evaluate for cyanide poisoning, is negative.

A chest x-ray is negative for signs of acute heart failure or infection. A computed tomography (CT) angiogram had been completed six days prior and, because it was negative for any acute pathology, a repeat CT is not immediately repeated.

The carbon monoxide hemoglobin level is normal at 6% (normal for smokers is ≤7%), the oxyhemoglobin is low at 60.7% (normal range 90% to 99.9%), and the methemoglobin is elevated at 27.0% (normal range 0.0% to 1.5%).

After the ED team consults with Lehigh Valley Health Network toxicology, the patient is treated with a 2 mg/kg infusion of methylene blue. The patient's hypoxia, cyanosis, and shortness of breath rapidly improve (see Fig. 1), and a repeat methemoglobin completed approximately 60 minutes afterward is normal-

ized to 0.6%. The hospital medical team admits the patient for further evaluation and management with a request for consultation by a hematologist.

Given his complex past medical history of cyanotic and hypoxic episodes, glucose-6-phosphate dehydrogenase (G6PD) deficiency levels and cytochrome B5 reductase enzyme labs are sent to evaluate for congenital methemoglobinemia. A repeat echocardiogram (EKG) shows no new changes, and the patient maintains a stable pulse oximetry on room air with no new symptoms related to his chronic medical conditions.

While the congenital testing is pending, the suspected etiology of his methemoglobinemia is use of multiple lidocaine patches. He is advised to stop using lidocaine patches and is discharged to home in stable condition.

At his follow-up with a hematology service clinician, his G6PD and cytochrome B5 reductase enzyme levels are normal, ruling out common congenital etiologies.

DISCUSSION

While rare, methemoglobinemia is a potentially life-threatening condition if not treated promptly.[1] Methemoglobinemia is caused by an elevated level of methemoglobin in the blood, which diminishes the oxygen-carrying capacity of circulating hemoglobin. Hemoglobin's normal ferrous (Fe2+) state can be converted to the ferric (Fe3+) state by oxidizer agents such as lidocaine. This ferric species does not bind oxygen, decreasing the capacity to oxygenate tissues. Methemoglobin does occur in small amounts during routine delivery of oxygen to the tissue; in normal red blood cell function, levels are kept low through a reduction process utilizing the red blood cell enzyme cytochrome B5 reductase (Cyb5R).[2] Oxidizers can potentially diminish the natural reduction capacity of any individual.

Causes of methemoglobinemia can be congenital or acquired. Congenital methemoglobinemia most commonly is due to cytochrome B5 reductase deficiency, hemoglobin M disease, and G6PD deficiency.[1,3]

In acquired methemoglobinemia, exogenous substances increase the oxidation of hemoglobin to methemoglobin. Acquired methemoglobinemia can be due to use of dapsone, exposure to nitric oxide or nitrates in food or well water, or recreational inhalants like amyl or isobutyl nitrates. Another potential culprit is exposure to topical anesthetics such as benzocaine and lidocaine.[1]

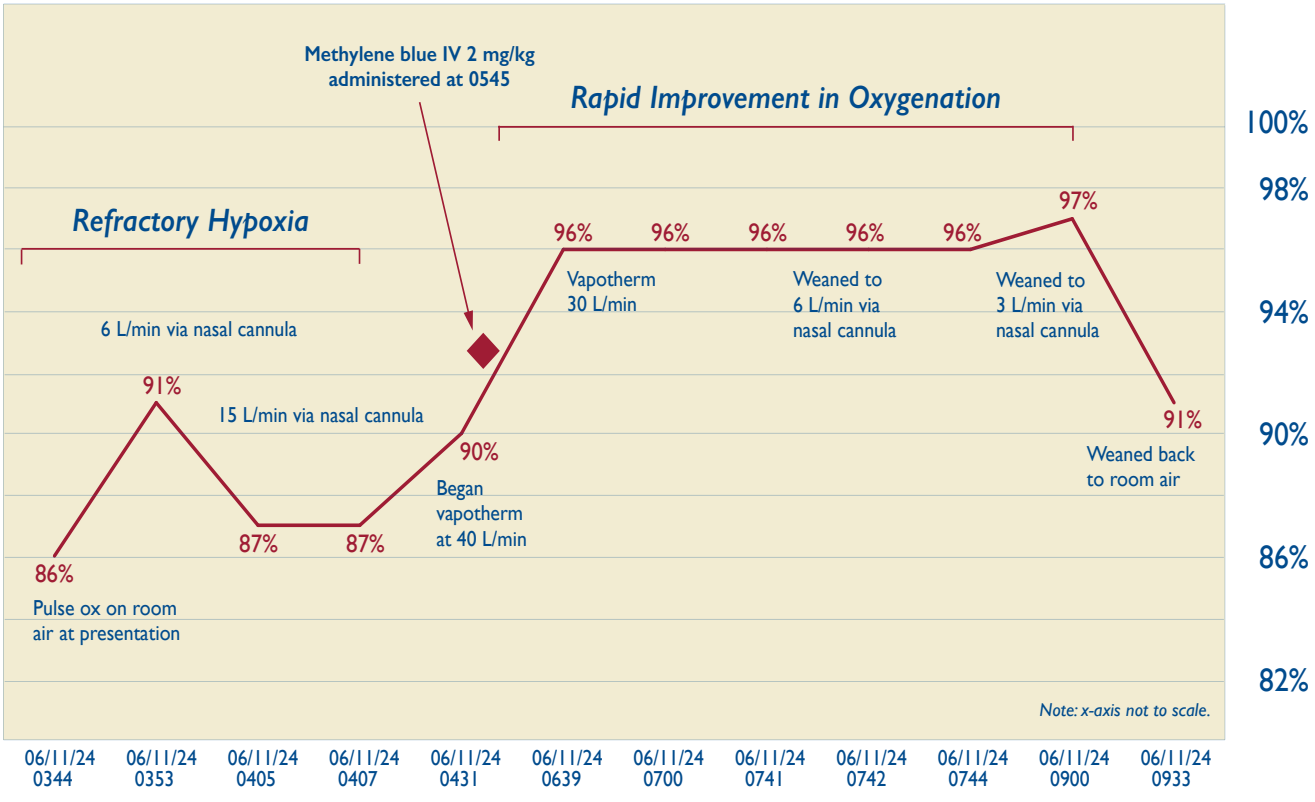

Fig. 1. Patient's pulse oximetry trend over time with methylene blue treatment.

Lidocaine has been commercially available for more than 70 years, and its potential as a cause of methemoglobinemia has been recognized for nearly as long.[4,5] Topical benzocaine use has dramatically decreased after being implicated as a cause of methemoglobinemia.[5]

Signs and symptoms of acquired methemoglobinemia are cyanosis, refractory hypoxia due to reduced oxygen binding capacity, dizziness, syncope, tachypnea, dark brown chocolate-colored blood, and death. Methemoglobin levels will be elevated.[6]

Treatment of acquired methemoglobinemia includes removal of the offending agent and supportive treatment with oxygenation. Methylene blue is the primary treatment of choice to decrease methemoglobin levels, as it can rapidly reduce hemoglobin from the ferric (3+) state back to the functional ferrous (2+) state. As demonstrated in this case, 2 mg/kg intravenously dosing is recommended[6]; rapid improvement of oxygen-binding capacity, and thus oxygen delivery to peripheral tissues, can occur.

Of note, caution must be taken with use of methylene blue in patients with G6PD deficiency, SSRI use, pregnancy, and renal failure. In G6PD deficiency, methylene blue may induce hemolysis and worsen methemoglobinemia, while methylene blue may precipitate serotonin syndrome in patients who are simultaneously using SSRIs. Methylene blue may also be teratogenic. An alternative option is ascorbic acid, but the reaction rate is slow and this agent may be ineffective when used alone.[6]

After administration of methylene blue, a follow-up methemoglobin level should be obtained 30-60 minutes later.[6]

CONCLUSION

Topical lidocaine is a valuable option for pain management as part of a multimodal treatment approach.[7] This case demonstrates that acquired methemoglobinemia is a rare but potentially life-threatening adverse condition to consider when evaluating a patient who presents with hypoxia and cyanosis.

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SPOTLIGHT ON CLINICAL RESEARCH

Research Infrastructure

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Editor's note: This is the 22nd in a series of articles from the Penn Medicine Lancaster General Health Research Institute that describes ongoing research studies. Members of the LG Health staff who are conducting research and wish to have their studies described here are encouraged to contact the JLGH editorial offices.

In the previous Spotlight on Research, we highlighted investigator-initiated research and provided guidance on how to turn a research question into a research study. Most research projects require additional infrastructure including data collection, data analysis, and recruitment.

The research team at LG Health is available to guide you through gaining access to these tools and how to use them effectively. We outline some of the most used tools below and provide examples of some current investigator-initiated studies making use of them.

REDCAP

REDCap (Research Electronic Data Capture) is a secure, web-based data-collection and management tool. Users can create databases using a variety of templates or build them from scratch. REDCap is fully customizable and allows users to tailor databases and surveys to meet the specific needs of their studies. REDCap has an intuitive drag-and-drop design and form-building tools that enable users to create and modify data-collection instruments without requiring extensive programming knowledge. Role-based access and control help streamline study operations for research teams and enhance data integrity.

REDCap ensures data accuracy, security, and compliance through features such as automated audit trails and real-time data validation. It is also designed to meet institutional regulatory standards and is HIPAA compliant.

Notable capabilities include electronic consenting, randomization, survey distribution, and data management. REDCap supports remote or electronic consent by allowing the collection of electronic signatures, enabling these processes for research studies. REDCap can randomize participants into various groups or interventions according to customizable parameters.

Surveys can be easily distributed via email, secure web links, or QR codes, with automated email notifications and reminders for participants or team members to help ensure timely data collection, follow-ups, and compliance. Branching logic can be applied in forms and surveys, allowing dynamic questions that adapt based on user responses, resulting in more personalized and efficient data collection.

When a research study ends, REDCap allows data to be exported to common statistical software (e.g., SPSS, SAS, R, or Excel) or integrated with external databases, streamlining data analysis and reporting.

Researchers at LG Health can get access to REDCap by completing a simple User Support Form, available by scanning the QR code below.

Note: If you are collecting data for the purposes of human subjects research, review and approval of the project is required by the Institutional Review Board (IRB) prior to any data collection.

ICONNECT

iConnect is a web-based platform created by TrialX that facilitates patient recruitment. This technology makes it easier for potential research participants to

find studies through web searches and enables study teams to respond to patient referrals and questions more efficiently. The University of Pennsylvania Institutional Review Board (IRB) system automatically creates an iConnect study listing upon study approval. These can be modified by study teams to maximize effectiveness.

iConnect houses a research volunteer registry, to allow searches for potentially eligible volunteers that have already expressed an interest in research participation. This registry can be accessed by LG Health research staff.

Study teams can modify iConnect listings so that patients may refer themselves to a study. They can also create screening surveys to help determine patient eligibility for any given study. Alternatively, teams may create iConnect study listings for merely educational purposes, without referral or contact information listed.

The study status listed in iConnect is what drives patient interaction. Study status options include:

- *Under Review:* Study currently in IRB review process but not yet IRB approved.
- *Recruiting:* Allows patients to submit referrals to the study team. Used for studies in which eligibility criteria and enrollment process make it simple for patients to determine if they might be eligible to participate or that use an iConnect prescreener.
- *Not Recruiting:* Study not open to enrollment — may be closed to enrollment or have enrollment paused.
- *Enrolling by Invitation:* Allows patients to see the study information but does not allow for referrals or contact. Used for studies in which eligibility criteria are complex or the screening process does not allow for patients to identify themselves as eligible.
- *Site Selection:* Study still in a start-up process and not yet ready for enrollment.

The Penn IRB issued a blanket approval to utilize iConnect for recruitment and education; other use of iConnect may require additional IRB approval. Some of the more advanced options available in iConnect include campaign trackers to monitor advertising efforts and study websites.

Readers who would like user-access to iConnect must complete an online training module. To access the training module, email the research team at LGHResearch@pennmedicine.upenn.edu.

INVESTIGATOR-INITIATED STUDIES AT LG HEALTH USING THESE TOOLS

Phlebotomy Education — Gender Diversity Study

Principal Investigator: Christina Pierre, PhD

It is well documented that transgender and gender-nonbinary patients experience significant health disparities. One root cause of disparity in this population is a lack of knowledge regarding gender diversity, which leads to substandard care.

The purpose of this study is to determine if targeted educational training for phlebotomists about gender-cultural competency has an impact on clinical preparedness, attitude awareness, and basic knowledge of how to interact with people who identify as transgender or gender-nonbinary.

The subject population is employed certified phlebotomists working at large academic medical centers or community health systems. Participants will be randomized to either the intervention group — which will receive the web-based educational training — or a control group — which will not receive educational training. Both groups will complete a pretest and a posttest.

This study will utilize REDCap for consenting, randomization, study surveys, and web-based educational training.

DCM-DETECT: Dilated Cardiomyopathy Detection using AI and screening with mobile Technology

Principal Investigator: Roy Small, MD

The DCM-DETECT protocol — previously featured in the Fall 2024 issue of this publication — is a von Hess (LGH internal) funded study that aims to utilize artificial intelligence (AI) to analyze EKGs to screen for dilated cardiomyopathies.

The study enrolls probands, the first family member identified with a non-ischemic DCM, and asks them to:

- Provide family medical history.
- Complete a 6-lead EKG using a mobile EKG device.
- Contact their first-degree relatives (FDRs) to invite them to join the study.
- Complete a survey.

FDRs who choose to participate will also complete the mobile 6-lead EKG and survey.

In addition, they will complete a 12-lead EKG and be encouraged to obtain a transthoracic echocardiogram (TTE) through their health care provider. The primary objective of the study is the uptake of screening TTEs in FDRs of patients with DCM compared to historical controls.

The DCM-DETECT study team utilizes REDCap for study surveys. It also utilizes iConnect for prescreener surveys, recruitment, and education.

FACCTS — Evaluate Foundational Wellness programs to help reduce clinician burnout and improve professional fulfilment in health care professionals

Principal Investigator: Mrinalini Meesala, MD

This research study is being conducted to examine the impact of well-being interventions to help reduce clinician burnout. Eligible participants will be randomized into one of three groups:

1. Sudarshan Kriya Yoga (SKY) Breathing and Sahaj Meditation Program.
2. Mindfulness Based Stress Reduction (MBSR).
3. Control (no intervention).

Participants will complete web-based training and follow-ups throughout their time in the study. The study team will use REDCap for consenting, randomization, and surveys. To be eligible for this study, participants must be:

- 25-70 years of age.
- A University of Pennsylvania Health System or Massachusetts General Hospital clinician (physician, APP, CRNP, PA, or psychologist).
- Able to access a smartphone and the internet.
- Willing to do relaxation exercises every day for 2 months (9 weeks).

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TOP TIPS FROM FAMILY PRACTICE

Beers Criteria, Heart Guidelines, Radon-Leukemia Link, Breast Cancer Screening

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BEERS CRITERIA MEDICATION UPDATE[1]

The most recent update to the American Geriatric Society Beers Criteria® includes new guidance on several medications commonly used in primary care.

The Beers Criteria were established by the American Geriatric Society in 1991 as a guide for physicians about medications that may possess more risk than benefits in older patients, specifically those aged 65 years and older. A discussion of deprescribing using the Beers Criteria as a guide was recently published in this journal.[2]

Approximately 100 medications comprise the list. Criteria used to establish the list include medications to avoid in individuals over the age of 65 years in an outpatient setting, medications to avoid in certain medical conditions, medications to avoid that may interact with other medications, medications to avoid with renal impairment, and medications to avoid where harmful side effects outweigh possible benefits. The American Geriatric Society updates the list as new published evidence becomes available.

Regarding anticoagulation, warfarin should be avoided as initial therapy and apixaban should be used in patients with reduced renal function. This is based on new evidence regarding nonvalvular atrial fibrillation and venous thromboembolism. In addition, the use of aspirin is no longer recommended in older adults.

Although many of us have been moving away from prescribing sulfonylureas for some time, the Beers Criteria now suggest we avoid prescribing all sulfonylureas in our patients over 65 years of age. This is an update from the suggestion in previous iterations that we avoid the long-acting formulations of these medications. If a sulfonylurea is necessary, use of a short-acting agent is advised.

Keep in mind that these are broad recommendations and not patient specific. Clinicians should evaluate individual medical needs on a case-by-case basis.

GUIDELINES UPDATED FOR NONCARDIAC SURGERY

The 2024 Guidelines for Perioperative Cardiovascular Management for Noncardiac Surgery, published in *Circulation*,[3] offer evidence-based guidance from preoperative assessment through postoperative care. Key updates and recommendations include:

- Team-based care is emphasized for managing patients with complex anatomy or unstable cardiovascular disease.
- Preoperative stress testing should be performed judiciously, particularly in lower-risk patients, and only when it is appropriate independent of the planned surgery.
- A stepwise approach to perioperative cardiac assessment is recommended to help clinicians determine when surgery should proceed or when further evaluation is necessary.
- New therapies for diabetes, heart failure, and obesity have potential perioperative morbidity. Sodium-glucose cotransporter-2 inhibitors should be discontinued three to four days before surgery to reduce the risk of perioperative ketoacidosis.
- Diagnosing myocardial injury after noncardiac surgery (MINS) requires that there be evidence of injury, for example with a change in troponin levels, as well as the exclusion of non-ischemic causes. Management must be individualized depending on the degree of injury.
- Perioperative bridging of oral anticoagulant therapy should be used selectively and reserved for patients with the highest risk of thrombotic complications.
- In patients with unexplained hemodynamic instability, emergency-focused cardiac ultrasound can be used for perioperative evaluation.
- Frailty assessment is recommended in patients aged 65 years and older or those under 65 years with perceived frailty. The Fried frailty phenotype criteria is one assessment tool that can be used.[4]
- The Duke Activity Status Index (DASI) is recommended for estimating functional capacity in patients undergoing elevated-risk surgery. Functional capacity below 4 METs is linked to a higher risk of adverse perioperative cardiovascular events.
- For patients with known cardiovascular risk fac-

tors, a 12-lead electrocardiogram is recommended preoperatively to establish a baseline and to guide perioperative management.

- Patients with valvular heart disease or pulmonary hypertension should be evaluated for right ventricular dysfunction, which is associated with perioperative cardiovascular risks. Echocardiography may be used for this assessment.

RADON, EVEN AT LOW LEVELS, LINKED TO CHILDHOOD LEUKEMIA[5]

A study of more than 700 counties across multiple U.S. states found a link between childhood leukemia and levels of radon gas, including those lower than the federal guideline for mitigation. The research was published last September in *Science of the Total Environment* and described an 18-year statistical modelling study of counties across 14 states.[6]

Radon, a naturally occurring gas, is a product of the radioactive decay of uranium, which is present in certain rocks and soils. When radon escapes from the ground, it decays and emits radioactive particles that can collect in body tissues. Those particles can then damage or destroy cell DNA which can cause cancer.

Becquerels per cubic meter (Bq/m^3) is a unit for expressing the concentration of radioactive decay in a given volume of air. The EPA says no level of radon is safe and advises that mitigation efforts — passive or active ventilation in basements and crawl spaces — be taken when radon concentration reaches 148 Bq/m^3. This study considered concentrations as low as half of that.

Choosing Wisely

Originally published in the Spring 2013 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 COLLEGE OF RADIOLOGY

❶ **Patients being evaluated for headache who do not have any clinical neurological findings that suggest structural disease, or risk factors such as multiple family members with brain tumors, are not likely to require an imaging study, as it probably will not change their management or improve their outcomes.** Those with a significant likelihood for structural disease obviously require immediate attention and are detected by clinical screens that have been validated in many settings. Incidental imaging findings lead to additional medical procedures and expenses that do not improve patient well-being.[7]

❷ **For suspected pulmonary embolism, do not image if there is not a moderate or high probability of positive findings.** While deep vein thrombosis and pulmonary embolism (PE) are relatively common clinically, they are rare in the absence of elevated blood D-dimer levels and certain specific risk factors. Imaging — particularly computed tomography (CT) pulmonary angiography — is a rapid, accurate, and widely available test, but has limited value in patients who are very unlikely to have a PE based on serum and clinical criteria. Imaging is not helpful to confirm or exclude PE for patients with low pre-test probability of PE.

❸ **Avoid admission or preoperative chest x-rays for ambulatory patients with an unremarkable history and physical exam.** Only 2% of such images lead to a change in management. Obviously, a chest radiograph is reasonable if acute cardiopulmonary disease is suspected or there is a history of chronic stable cardiopulmonary disease in a patient older than 70 years who has not had chest radiography within six months.

❹ **For the evaluation for suspected appendicitis in children, an ultrasound should be the first option.** In experienced hands, an ultrasound is nearly as good as a CT, reduces radiation exposure, and is cost effective. A longitudinal assessment demonstrates that diagnostic accuracy in any given institution improves with the use of an ultrasound-first protocol.[8] If the results of the ultrasound are equivocal, it may be followed by a CT.

❺ **Clinically inconsequential adnexal cysts do not require follow-up imaging.** Hemorrhagic cysts and simple cysts in women of reproductive age are almost always physiologic. Small simple cysts in postmenopausal women are common and are likewise inconsequential. Ovarian cancer, while typically cystic, does not arise in these benign-appearing cysts. After a quality ultrasound in women of reproductive age, do not recommend follow-up for classic *corpus luteum* or simple cysts under 5 cm in greatest diameter. Use 1 cm as a threshold for follow-up imaging of a simple cyst in postmenopausal women.[9]

Leukemia, the most common cancer in children, affects the blood and bone marrow. About 3,000 new cases of childhood leukemia — defined in the study and by the National Institutes of Health as involving patients up to age 19 years — are diagnosed in the United States each year. The annual incidence rate is 4.8 cases per 100,000 children.

This study demonstrated that childhood leukemia risk is associated with average radon levels below the level at which the U.S. Environmental Protection Agency recommends mitigation (148 Bq/m^3) and that elevated risks correlate with rising levels. Further research is warranted.

ACOG UPDATES BREAST CANCER SCREENING GUIDELINES

The American College of Obstetricians and Gynecologists (ACOG) late in 2024 updated its breast cancer screening guidelines, recommending that individuals at an average risk for breast cancer should begin mammography screening at age 40 years.

ACOG had previously recommended that individuals at average risk of breast cancer be offered mammography screening at age 40 years and that those who had not initiated screening in their 40s begin by age 50 years. However, new data — such as an increasing incidence of invasive breast cancer in younger women, a demonstrated greater net benefit of earlier screening, and an opportunity to improve health inequities — led to the updated recommendation.

New cases of invasive breast cancer among women aged 40-49 years increased by an average of 2% per year from 2015 to 2019, demonstrating the importance of earlier screening to identify invasive breast cancer.

Earlier initiation of breast cancer screening may also help reduce racial inequities in breast cancer outcomes for patients. Data have demonstrated that Black women have the highest rate of breast cancer mortality among all women, even when adjusting for age of the patient and stage of the cancer at diagnosis. Black women also have a higher incidence of triple-negative breast cancer.

The clinical practice update acknowledges that there are still structural inequities that must be addressed to further improve breast cancer care.

Recent evidence has further prompted ACOG to revise its recommendations for individuals assigned female at birth, including cisgender women, transgender men, and nonbinary individuals. The updated guidance includes individuals with dense breast tissue or a family history of breast cancer but excludes those with higher risk factors, such as a personal history of breast cancer or a previous high-risk lesion on a breast biopsy, genetic mutations linked to higher risk, or a history of high-dose radiation therapy to their chest at a young age.[10]

Under the new guidelines, routine screening mammography should start at age 40 and can be performed annually or every two years, based on an informed, shared decision-making process that considers the benefits and potential harms of frequent screening.

The updated recommendation to begin routine screening at age 40 is consistent with guidelines from the U.S. Preventative Services Task Force, the National Comprehensive Cancer Network, the American College of Radiology, and the Society of Breast Imaging.

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The Journal of
Lancaster General Hospital
Owned and Published by
Penn Medicine Lancaster General Health

The Journal of Lancaster General Hospital is published quarterly by Lancaster General Hospital, a nonprofit, community hospital in Lancaster, PA. The hospital and its parent, Lancaster General Health, are members of the University of Pennsylvania Health System (Penn Medicine). The journal is sent to the medical staff of Lancaster General Hospital, to physicians and others involved in delivery of health care in our service area, and to the administrative and medical leadership of Penn Medicine.

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ISSN 1940-2813

Cover photo by Barbara Flory, MHA, C-TAGME, director of graduate medical education and DIO (designated institutional official) at Penn Medicine Lancaster General Health. Though the original photo above showcases a cold sunrise in Mount Joy, if you look closely, you can see Spring on the horizon.

Interested in writing for *JLGH*?

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

- Scientific manuscripts are typically between 2,500-4,500 words. Perspective articles are usually shorter, and photo quizzes average about 725 words plus illustrations.
- Medical articles should report research, introduce new diagnostic or therapeutic modalities, describe innovations in health care delivery, or review complex or controversial clinical issues in patient care.
- Reports of research involving human subjects must include a statement that the subjects gave informed consent to participate in the study and that the study has been approved by the Institutional Review Board (IRB).
- Patient confidentiality must be protected according to the U.S. Health Insurance Portability and Accountability Act (HIPAA).
- The Journal of Lancaster General Hospital *does not allow chatbot tools such as ChatGPT to be listed as authors.* JLGH *editors warn authors that the use of these tools 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 at LGHealth.org/CME. *For advanced practice providers,* more 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.

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IN THE NEWS: LG Health CME Achieves Reaccreditation with Commendation

Penn Medicine Lancaster General Health's Continuing Medical Education program is proud to announce that it has achieved Reaccreditation with Commendation from the Pennsylvania Medical Society and the Accreditation Council for Continuing Medical Education.

This prestigious reaccreditation status, valid through February 28, 2031, keeps LG Health among the top 20% of CME providers nationwide and recognizes the program's positive impact on health care professional and patient education.

Upcoming CME Offerings at LG Health

Department of Medicine Grand Rounds
April 2, June 4 — 1:00-2:00 p.m.

Research Grand Rounds
April 3, May 1 — 12:00 noon-1:00 p.m.

Pediatric Grand Rounds
April 8, May 13, June 10 — 7:00-8:00 a.m.

Connect on Instagram

Follow the CME Department on Instagram @LGHCME for updates on upcoming Lancaster General Health CME events, including information on regularly scheduled series and links to register for symposia.

For the most up-to-date offerings and information from the LG Health Continuing Education Department, visit LGHealth.org/CME.