INSIGHT

The Journal of Indiana University Medical Students

April 29, 2026

Spotlight Pieces

Ready Hands, Open Mind: Small, Quiet Choices That Define Us During Clinical Rotations

Arts and Humanities

Student-submitted artwork, narratives, opinion pieces, and more

Scholarly Work

Award-winning abstracts from IMPRS

Cover Image
Cardinal, Eagle Creek, IN
Photograph by Faith Mikolajczyk, MS3

Insight is an annual student-run medical student research journal that serves as a medium to showcase the research and creative excellence at Indiana University School of Medicine (IUSM). By highlighting the talented works of peers and faculty, our journal serves to ignite research interest early in medical education and promote creativity outside of medicine. We invite you to approach our journal with an open, inquisitive mind and to pass forward the wisdom and knowledge that you will gain through medical school. Finally, we invite you to join the medical community at IUSM in the journey towards becoming physicians who strive to create a better future for our patients through compassionate care and scientific curiosity.

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Questions? Contact us at isrsc@iu.edu.

In this Issue:

Sustaining Professionals

Richard Gunderman, MD, PhD

In his commentary on the biblical Book of Genesis, physician and humanist Leon Kass, one of my teachers at the University of Chicago, outlines three key components in the mission of founding a nation. The first is discovering a shared story – in the Exodus case, the Hebrew people's deliverance from slavery and the sense of gratitude and empathy for the oppressed it engenders. Second, the establishment of a covenantal order – an ennobling vision of what is appropriate or inappropriate to do and be. The Ten Commandments are part of this. And third, dedication to a higher purpose – the institution of rituals that provide contact with a higher order and channel human awe and reverence, a function served by the Tabernacle.

If the profession of medicine is to thrive in the future, we need to connect or reconnect with analogous sources of meaning, resilience, and inspiration. A large part of the burnout and demoralization experienced by contemporary physicians can be traced to their absence. For example, what is medicine's shared story? Too often, our attention is focused on lower things, such as policies and procedures, coding and billing, and revenue and profit, rather than higher things such as our shared calling to care for the distressed, sick, and injured, to prove ourselves worthy to serve the suffering, and to pass on the torch of the healing profession burning more brightly than when it was handed to us.

The same can be said for medicine's covenantal order. We are bound to our work not by mere contracts governing employment, but by a covenant that asks us to devote ourselves to something beyond money, security, and the conventional trappings of success. A physician can make a lot of money, rise high up an organizational hierarchy, and achieve acclaim, and all the while stray far from medicine's covenantal core, which emphasizes not adherence to agreed-upon terms but the aspiration to make a difference in the lives of those we serve, to put the interests of our patients and communities above our own, and to continue to grow and contribute in ways we cannot foresee when we embark on this journey.

We must, as Kass suggests, dedicate ourselves to a higher purpose. What we see and hear, whether through the microscope, in the dissection lab, on images produced by a CT scanner, or in conversation with patients, family members, and colleagues, represents something more than data by which to arrive at a diagnosis or formulate and monitor a treatment plan. As the philosophers might say, we are talking not about a means to an end but an end in itself, something perhaps even sacred – namely, a fellow human being and child of God, as well as an encounter with the divine itself in one of its richest and most revealing forms. In serving our fellow human beings, we enjoy our own best opportunity to become more human ourselves.

Consider perhaps the most revealing portrait of a physician's betrayal of purpose in English literature, which is found in George Eliot's (real name: Mary Ann Evans') great novel, *Middlemarch* (1871). One of the principal characters is Tertius Lydgate, an idealistic and dedicated young physician who hopes both to advance medical knowledge through his research and found a new hospital, and thereby to dramatically improve the lives of the ordinary people in whose community he has decided to set up practice. Like Dorothea Brooke, the other main

"We are bound to our work not by mere contracts governing employment, but by a covenant that asks us to devote ourselves to something beyond money, security, and success."

character, he wants to do good in the world, to make the world a better place, and he is so confident of his good intentions that he cannot imagine anything standing in his way.

Lydgate has sought out the very best training, leaving London to train first in Edinburgh and then in Paris, where medical research is progressing at a much faster rate than in his native land. Training complete, he arrives in Middlemarch in the full flush of his humanitarian enthusiasm, naively expecting everyone to embrace his vision, but he is very soon disappointed. For one thing, his plans for reform are regarded with suspicion by many of the locals, especially his fellow physicians. Medicine prides itself on its many breakthroughs and innovations, often preferring to ignore the intense resistance and backlash many pathbreakers faced in their own day. Instead of working with his detractors, he simply withdraws from and demonizes them.

Another problem is his marriage to Rosamond, the mayor's daughter, a beautiful young woman who seems to represent everything anyone could hope for in a wife, but who turns out to be self-centered and to care far more about luxury and status than her husband's professional aspirations. She is not evil, but over time she works on her husband to shift his attention from science and service to the poor to a revenue-producing career that she hopes will support her in the style to which she has become accustomed. Actually, however, Lydgate ends up sinking deeper and deeper into debt, which forces him to think more and more about money. He ends up dying, dejected and prematurely, of one of the infectious diseases he hoped to conquer.

Lydgate is a fundamentally good person. To repeat, he wants to do good in the world and longs for nothing more than the opportunity to exert himself to the utmost in service to this goal. But he is not indifferent to his own rank in society, and he sees his work and his marriage as means of distinguishing himself from others. His wife seizes on this passion and feeds it, resulting in his eventual abandonment of many of his loftiest motives. Eliot writes,

> His troubles will perhaps appear miserably sordid, and beneath the attention of lofty persons who can know nothing of debt except on a magnificent scale. Doubtless they were sordid; and for the majority, who are not lofty, there is no escape from sordidness but by being free from money-craving, with all its base hopes and temptations, its watching for death, its hinted requests, its horsedealer's desire to make bad work pass for good, its seeking for function which ought to be another's, its compulsion often to long for Luck in the shape of a wide calamity.

His very name is revealing. In Latin, Tertius means *third*, and Lydgate himself, though he aspires to be a first rate biomedical scientist, physician, and institution builder, turns out rather third rate, in the sense that he loses the thread of his better self and ends up a disappointment to all, and above all himself. Likewise, his surname includes both lid and gate, suggesting the images of entrances and exits that are barred to him by virtue of his isolation and associated inconstancy. He wants to distinguish himself by doing good, but he has no comrades, no teammates, no colleagues with whom to dream and work. Likewise, once he starts pursuing money and status, he finds himself trapped, with no way out.

When Lydgate sets out to serve the people of Middlemarch, and by extension humankind, he has a narrative, a set of principles, and a higher purpose in mind. But these are by and large his alone, and he fails to build

relationships with others with whom he can share, sustain, and succor them. His story is not a shared one. His covenantal order is not shared with professional brethren. He has no shared daily rituals to keep him integrated into a community dedicated to a higher purpose. In short, he stands alone, like a person balancing on one foot, which renders him easily turned and unstable. What he needs is to plant both of his feet firmly in community, hands linked together in a shared purpose.

Herein lie vital lessons for contemporary physicians. Like the trabecula in the vertebra of our spines, so long as we stand erect but unconnected to one another, we are relatively weak, which is a key feature of the pathophysiology of osteoporosis and the compression fractures to which it gives rise. To be strong and resilient, we must be interlinked. It is not just that we are not as strong when disconnected from one another, but also that our connections enable us to learn from one another and to deepen our mutual care and compassion. What we are talking about here is synergy – a kind of working and being together that enables us to become and contribute something far more than the sum of our parts.

To share a story, a covenantal order, and a set of rituals that bind us to a higher purpose is to create and develop trust in one another as fellow pilgrims and laborers on behalf of a good beyond ourselves. To work and live in conditions under which such trust is lacking, no matter how rich, powerful, or famous we might become, is to suffer from profound isolation and loneliness, bereft of one of life's greatest gifts. As Eliot herself asks, "What loneliness is more lonely than distrust?" To avoid this fate, we must render ourselves as trustworthy as we possibly can, a mission that requires us to join together to sustain, if not a nation, then a shared and worthy profession to which we can dedicate ourselves with all our hearts.

Spotlights

Curated and Composed by the Insight Editorial Board

Ready Hands, Open Mind: Small, Quiet Choices that Define Us During Clinical Rotations

Holly Carver, MS3

Take a moment to think about a time during your medical school career when you did not keep an open mind. Most of you probably immediately think of dramatic clinical examples. Fixating on a diagnosis and failing to consider alternatives. Dismissing a patient labeled as "drug-seeking" who later turns out to have a serious underlying condition. Stifling curiosity for fear of looking stupid or unknowledgeable. These are important and serious manifestations of closed-mindedness.

But what about the quieter, everyday versions? The kind that don't show up in morbidity and mortality conferences but still shape the kind of physician we become. The kind that manifest during a long day of clinical rotation. The kind that manifest during a rotation in a specialty that you're not interested in.

Everyday indications of a closed mind might include:

- Turning down learning opportunities when they are offered
- Avoiding a new experience by saying, "I don't know how to do that"
- Demonstrating a lack of curiosity or failure to ask questions
- Disengaging from a rotation and spending excessive time on your phone because "it's not what I'm interested in"
- Rejecting constructive feedback or offering excuses instead of reflection

Although these moments feel small and may be easy to dismiss, they are still choices that add up over time to detract from a growth mindset.

Think about a time you were offered an opportunity during a rotation. Did you turn it down? Or did you keep an open mind and ready hands – hands that are eager to jump into an opportunity and work and learn – and say yes?

With about a week and a half left in my surgery rotation, I heard that an amputation was happening in the neighboring OR. Honestly, it sounded disturbing. But in that moment, I had a decision to make. Did I turn it down out of fear? Or did I keep an open mind and embrace the opportunity to see something new?

"Medical school is not just about learning facts. It is about building habits."

On the first day of my internal medicine rotation, I saw a cardiology consult and later was asked by the resident whether I planned to write the note or if he should. Again, a choice. I could have easily said "I don't know how" and let him do it. Or did I say "yes" and write my first-ever consult note?

OB/GYN was my third (and most dreaded) rotation of third year. I was scrubbed and ready to assist for one of my first GYN surgeries when the surgeon asked if I wanted to place the Foley catheter. Did I?

These moments are not dramatic. No one but you will remember them. But they are pivotal when summed up over four years. So why does keeping an open mind and ready hands matter?

Unfortunately, studies show that intellectual medical curiosity decreases from first-year to final-year medical students. But medical school is not just about learning facts. It is about building habits. Habits of responsibility, humility, engagement, and curiosity. Third year is arguably the most pivotal year, and the way we approach rotations becomes the way we approach medicine and our future patients. tBenefits of keeping an open mind to approach new challenges during every rotation might include:

- Improving critical thinking and clinical and diagnostic reasoning

"These moments are not dramatic. No one but you will remember them. But they are pivotal when summed up over years."

- Working better with a team
- Cultivating humility and curiosity
- Improving bedside manner and patient-centered care and relationships
- Encouraging more and better constructive feedback
- Experiencing the culture of different specialties
- Promoting ownership of a patient's care
- Improving gratitude and empathy
- Building the habit of continuing education, medical knowledge, and skill

To answer the previous questions, yes, I scrubbed for the amputation and used the bone saw myself. I also helped close. Yes, I wrote the cardiology consult note. With some help. Yes, I inserted that catheter. Correctly. On the third try.

Sometimes keeping ready hands and an open mind and accepting the experiences that come your way can come with a side of squeamishness. Or a big learning curve. Or some laughter as the surgeon says you're trying to insert the catheter in the wrong place. But all of these experiences have one thing in common – something I encourage you to think about and embrace. Saying *yes* with an open mind and hands that are ready to jump into work and embrace a new adventure.

But how does one cultivate an open mind as a medical student on clinical rotations? My suggestion is simple: treat every rotation like it is the specialty you know you are going into.

As previously mentioned, OB/GYN was definitely not what I was interested in. I was not looking forward to six weeks of working in sensitive areas. I felt nervous, intimidated, and, to be honest, I dreaded the rotation.

But before third year started, I'd made a commitment to myself that no matter the rotation, I would keep an open mind. So, I treated OB/GYN like it was my future specialty. I showed up early. I asked questions. I took every opportunity to scrub into surgeries, perform ultrasounds, insert catheters, and take patient histories. I asked about lifestyle, call schedules, and career satisfaction. I made a conscious effort to demonstrate my engagement and interest.

And something unexpected happened. By the end of the rotation, I could actually see myself in the field. Have I decided to go into OB/GYN? No. My goal is still pediatrics. But I kept an open mind and gained a genuine appreciation for why others do choose OB/GYN. I learned its strengths, its challenges, and its role within the broader healthcare system.

"Sometimes keeping ready hands... can come with a side of squemishness. Or a big learning curve."

Most importantly, I left with a deeper respect for the specialty and a better understanding of how it intersects with others, including my own. Keeping an open mind does not mean you will change your career path. It means you will become a better learner, a better teammate, and ultimately, a better physician.

Third year rotations are a pivotal point for medical students. And sometimes, it starts with something as simple as saying yes.

With ready hands and an open mind.

Holly Carver is an MD student at Indiana University. She can be reached at hecarver@iu.edu.

Opinion: How Can Indiana Learn from the Wisconsin Idea in 2026 and Beyond?

Salil Gupta, MS3

I visited my grandparents over winter break in Madison, Wisconsin, a place I've returned to every year for twenty years. This visit felt different though, not because Madison had changed, but because I had. I am taking a year off from medical school to pursue my MBA and I found myself noticing how the state signals trust, participation, and public ownership.

On the drive into town, I passed Woodman's Markets, which had a bold message underneath its sign: "EMPLOYEE OWNED." It struck me as a proud declaration of shared stake and responsibility. That spirit echoed elsewhere. Knowing I would soon be an intern in the Indiana Senate, I visited the Wisconsin State Capitol and discovered that it is open to the public every day of the year. No appointments. No metal detectors. Multiple entrances. On Christmas Eve, my brothers and I walked freely inside.

By contrast, the Indiana Statehouse is closed on Sundays and many holidays, with limited public entrances and mandatory security screening. These architectural and access differences are not just logistical choices; they communicate values. One model emphasizes openness and public presence while the other prioritizes control and formality.

What explains this difference in civic posture?

Much of Wisconsin's civic identity traces back to the Progressive Era and what became known as the "Wisconsin Idea." Articulated by Charles Van Hise, then president of the University of Wisconsin, the idea held that the influence of the public university should extend to the boundaries of the state and that academic expertise exists to serve the public good. Professors regularly advised legislators, staffed commissions, and brought research directly into policymaking. The physical proximity of the University of Wisconsin-Madison to the state capitol symbolized this alliance and made collaboration easier. This partnership was championed by leaders like Robert La Follette, whose vision of government rested on the belief that democratic legitimacy flows from an informed and engaged public.

Wisconsin's civic tradition extends beyond higher education and politics. While discussing these ideas with a friend, I was reminded that the Green Bay Packers are the only major professional sports franchise owned by the public rather than a private individual. Packers shareholders receive no profits and hold limited governance rights, but this structure permanently prevents sale or relocation. This structure reflects the Wisconsin Idea's insistence that major public institutions exist not only to maximize profit, but to serve enduring civic purposes.

Indiana's early twentieth-century path was markedly different. Our state pioneered coercive eugenics legislation and later saw significant political influence exercised through exclusionary movements. In 1907, Indiana enacted the world's first modern compulsory eugenic sterilization statute, targeting people labeled "criminals, idiots, imbeciles, and rapists" in state custody. By the 1920s, the Ku Klux Klan in Indiana had more control of the state government than any other state outside the South. These histories matter not as condemnation, but as context. Civic cultures are inherited, shaped over decades by the institutions we empower and the voices we elevate. Understanding where we came from can help us understand how to move forward.

Today, Indiana's public priorities emphasize workforce development and economic efficiency. These goals are crucial to a successful community. But when pursued without equal investment in civic education and public engagement, they risk narrowing the role of public institutions. Universities become job pipelines rather than civic partners.

There are signs of change. Investments by Indiana University and Purdue University in Indianapolis suggest a renewed effort to integrate higher education with the life of the state. Indiana University is expand-

ing its scope through cooperative training and research agreements with life sciences firms. Purdue is rapidly expanding its downtown Indianapolis footprint around engineering and technology aligned with advanced manufacturing and corporate partnerships. The governor has also worked with all public universities in the state to freeze tuition for two years. Together, these approaches echo the Wisconsin Idea in their emphasis on public-facing scholarship.

Yet this integration must go beyond industry alignment and workforce development. A public university's highest obligation remains the pursuit of truth and the cultivation of informed citizens—capable not only of contributing to our state's economic growth, but of understanding how to participate meaningfully in civic and political life.

At a moment when public trust in expertise—especially in science and medicine—is eroding, this mission is urgent. Physicians, scientists, and medical students occupy a unique position of public credibility. Our responsibility does not end at the clinic door. Civic engagement, policy literacy, and public communication are essential components of professional ethics.

If Indiana hopes to chart a more participatory and accountable future, it should revisit the spirit of the Wisconsin Idea. That begins with universities that see public engagement as central, not peripheral; with statehouses that welcome citizens not only symbolically but physically; and with graduates who view civic responsibility as part of their professional identity.

For medical students especially, the lesson is clear: the physician of tomorrow must also be a citizen today.

Salil J. Gupta is an MD/MBA student at Indiana University. He can be reached at salgupt@iu.edu.

Opinion: Congrats - You're An Advocate

Ethan Fairbanks, MS4, and Janak Mukherji, MS4

How do you advocate for patients? If you've already interviewed for residency, I'm sure you've heard this question. If not, you will. What does advocacy look like for students? Some senior attendings (and even peers) argue that medical students should focus solely on their studies because they will have an entire career to advocate for patients. This argument exists, unknowingly or not, to protect those already holding formal positions of power. Rather, I would argue that as future providers, we must show the public that we do care, that we are fighting for them, and that we have earned the privilege of their trust.

I believe that there is a reason why my patients have allowed me to work with them. It isn't just out of politeness. Our position as future providers gives us a certain form of innate trust. We are taught, both through our curriculum as well as lived experiences in clerkships, the real-world impacts of healthcare policies. Thus, I believe that we have an obligation to not only become healers, but also moral messengers for change.

While we have no political or monetary standing to enact this, we are granted an amorphous power through the trust and relationships we build with our communities. On our own, this power may feel small and insignificant. However, if wielded together alongside community organizers and other healthcare professionals, we can build a better system.

When I started writing this, an Immigration and Customs Enforcement agent had just extrajudiciously shot, and ultimately murdered, Renee Good, a law-abiding citizen. As she was bleeding out with the car door open to the public, a man stating he was a physician pleaded with agents to check her pulse and try to provide life-saving measures. Their response should shake us all, as future doctors, to our cores: "I don't care."

By the time I finished writing this, ICE had just killed Alex Pretti, an ICU nurse at the Minneapolis VA. This sentiment of indifference towards life and death has historically targeted underserved and minority communities but truly impacts everyone in our country. Whether you like it or not, this will affect you and your patients, regardless of specialty.

This lack of humanity becomes more acceptable every time an insurance company denies coverage of necessary care. It is occasionally highlighted when whistleblowers, such as Dr. Linda Peeno, describe experiences of being rewarded for choosing the profits of insurers over people's lives. This is an open display of indifference to the well being of not only our patients, but of providers too. You can see this through our country's medical debt industry, with over 500,000 bankruptcies due to medical debt annually, overburdened emergency departments assuming the role of primary care clinics, and a life expectancy that has not kept up with economically comparable countries.

Unlike the firing of a gun, social murder through the inability to access care or medications is a slow, insidious, and often costly process.

Worse than a claims denial, 7.8 million individuals are expected to entirely lose access to insurance per estimates from the Congressional Budget Office as a direct result of the passing of the "Big Beautiful Bill" (BBB). Our very own state legislature is sleepwalking towards catastrophe this fall, during which federal Medicaid spending cuts from the "BBB" are expected to cause over 300,000 Hoosiers to lose healthcare access. This loss will exacerbate the negative profit margins already being experienced by 16 rural hospitals (29% of our state's total) and push additional facilities into risk of closure. This is without even considering the impact of the expired Affordable Care Act enhanced premium tax credits.

It is unfair and unjust to revoke healthcare from Hoosiers already at an economic disadvantage. Rather than accept this we must in unison demand a better path forward. Burnout is not only from long hours, it also comes in the form of moral injury from having the knowledge to help someone but not the means to provide it.

The solution we propose is not radical. It is in fact the

fiscally responsible choice: end the public-private partnership between our state and the managed care organizations (private insurance companies) running Medicaid. Connecticut underwent this process in 2012 and has since saved over $4 billion. They were even able to expand their "HUSKY A" program, which is their equivalent to the Healthy Indiana Plan, by over 100,000 enrollees. In Indiana, our estimated annual savings of 10%-17% are expected to total between $497-870 million by taking our current 2026 and 2027 state budgets and using the methods shared by Physicians for a National Health Program in their "Removing the Middlemen from Medicaid" report.

For better or for worse, we are a part of this system. How can we play a role in improving it? I've found that people often will choose to volunteer at a student clinic or take the time to connect their patients with resources, and I do not intend to downplay the importance of these actions. However, there is power in numbers - taking part in Physician Advocacy Day at the statehouse, joining local community organizers, or co-drafting a legislative bill with your classmates and discussing policies directly with legislators can be effective methods to demonstrate people-power. An excellent example of well-utilized "medical student power" can be seen through Reclaim Idaho's 2017 campaign which forced the state's legislation to adopt ACA expansion via ballot measure.

We in Indiana must similarly organize with the goal of building an infrastructure to mobilize ourselves in response to crises in healthcare as they happen, not wait until after people have already died. We, and our patients, cannot afford to wait for someone else to save us.

For me, this has taken the shape of involving myself in Students for a National Health Program, speaking to legislators in Washington D.C., and working to build more collaboration between student and community groups such as Hoosier Action. Before I graduate in May and begin the next phase of my career, I plan on being surrounded by white coats in Indianapolis demanding that our representatives allow for a healthcare system that lives up to our Hippocratic Oath. This work helps to fill my cup as it is drained by a system of indifference. Find what fills yours.

Ethan Fairbanks and Janak Mukherji are MD students at Indiana University. They can be reached at etcfair@iu.edu and jmukher@iu.edu.

Arts and Humanities

The following works were submitted by IUSM medical students and include artwork, narratives, poems, opinion pieces, critiques, and more.

Reframing the Idea of Non-Negotiables

Amber Nelson-Fuller, MS3

Recently, an incoming medical student asked me what advice I would give before starting school. I paused longer than I expected to at that. There are the obvious answers about studying, time management, and staying organized, but that felt too basic. What came to mind instead was a small moment from my own medical school orientation, one I had not thought much about at the time.

On the last day of orientation, we were handed a small journal and asked to write down our non-negotiables. The things we were supposed to protect, even when medical school became overwhelming. I remember feeling skeptical, but not dismissive. I wrote a list anyway:

Sleep.

Time with family.

Movement.

Writing.

It felt aspirational, but I decided to try to take it seriously. And I did try. Some weeks I was better at it than others. There were stretches when I slept enough, moved my body, and felt grounded. There were also weeks when none of it happened the way I intended. Early on, I assumed that inconsistency meant I was failing at the idea itself. If I could not protect my non-negotiables every day, then what did it mean to call them that?

Medical school slowly taught me something different. I was learning, often uncomfortably, that perfection was not a standard I could sustain. That lesson showed up everywhere. In exams that did not go as planned. In practice simulations with nursing students where I felt behind instead of prepared. Over time, I began to accept that doing my best, even when it looked uneven, was still enough.

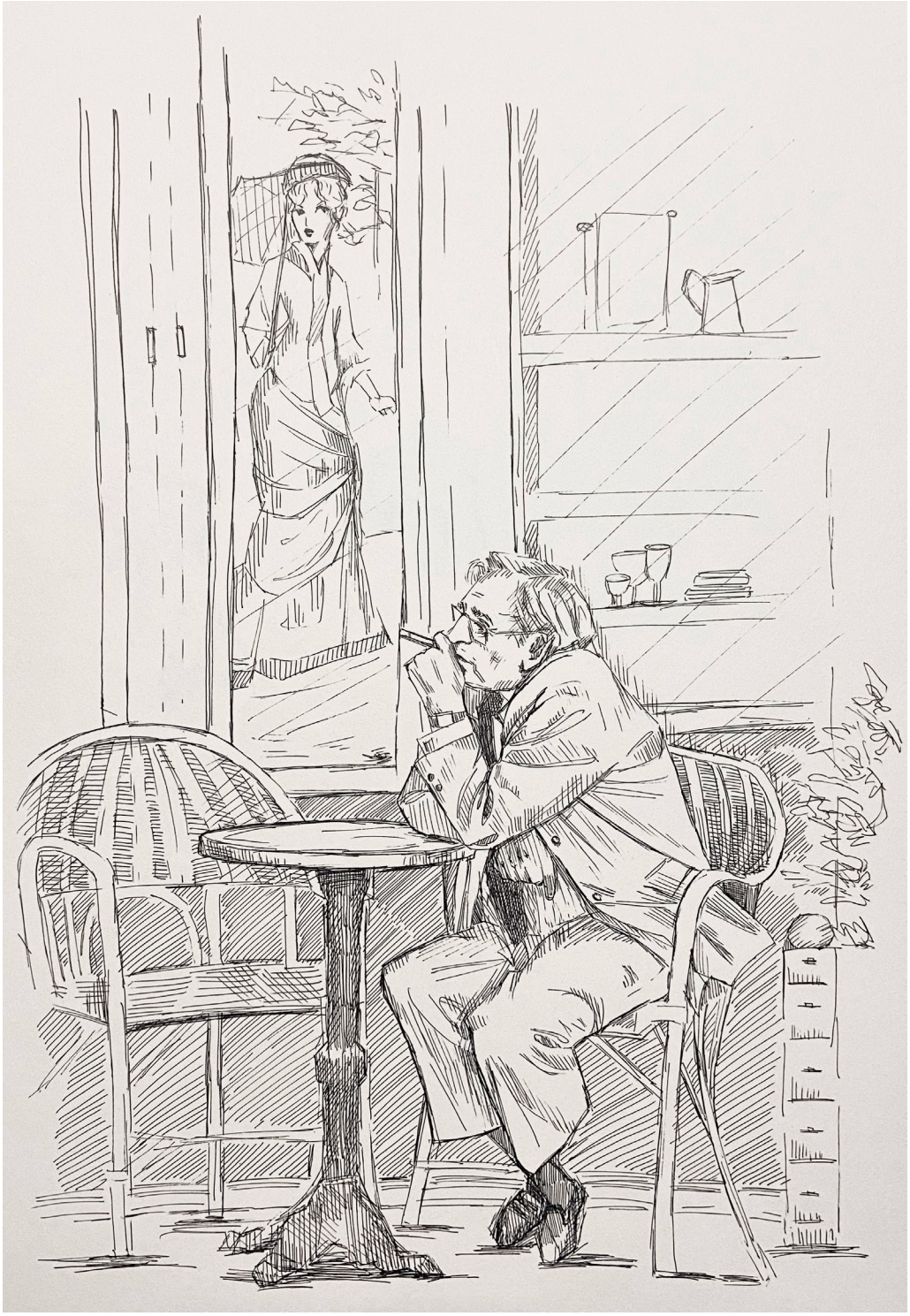
That shift changed how I thought about self-care. I stopped treating my non-negotiables as tasks I needed to execute flawlessly and started seeing them as anchors. They were not rules meant to be enforced. They were reminders of what mattered to me. On difficult weeks, they helped me notice what had quietly disappeared. On better weeks, they gave structure to what already felt manageable.

I also came to understand that non-negotiable does not mean always achievable. It means important. There were days when sleep mattered more than writing, or when time with family replaced movement. Instead of getting stuck on what I had missed, I became better at asking what I could realistically hold onto in that moment. That shift felt subtle, but it made the difference between giving up on the idea entirely and continuing to return to it.

When I thought back to that incoming student, I realized that this was the advice I wanted to give. Not a list of habits to perfect, but permission to be imperfect without losing sight of what matters. Medical school will take more than you expect some weeks. Other weeks, it will surprise you by giving a little back. The goal is not to protect your non-negotiables every day without fail. The goal is to know what they are, and to notice when you have drifted too far from them.

"I stopped treating my non-negotiables as tasks I needed to execute flawlessly and started seeing them as anchors."

Looking back, the value of that journal was never the list itself. It was the practice of naming what mattered to me and giving myself permission to let that definition change over time. Medical school did not teach me how to balance everything. It taught me how to keep showing up with intention, even when things felt unfinished or imperfect. When I finally answered that student, this was what I said: pay attention to what you need, expect that some weeks will be better than others, and keep coming back when things drift. Only afterward did I realize that I was not offering instructions so much as reassurance. Reassurance that falling short does not mean losing sight of what matters, and that self-care is less about doing it perfectly and more about returning to it over time.



a short break

Ink on paper

Feature: Visual Art

Ritu Gangadhara, MS3, showcases her creative work

An older man seated at a cafe, smoking a cigarette, and seems to be in deep reflection. There's a painting that can be seen of a young woman from a bygone era, and another of some figures on a path.

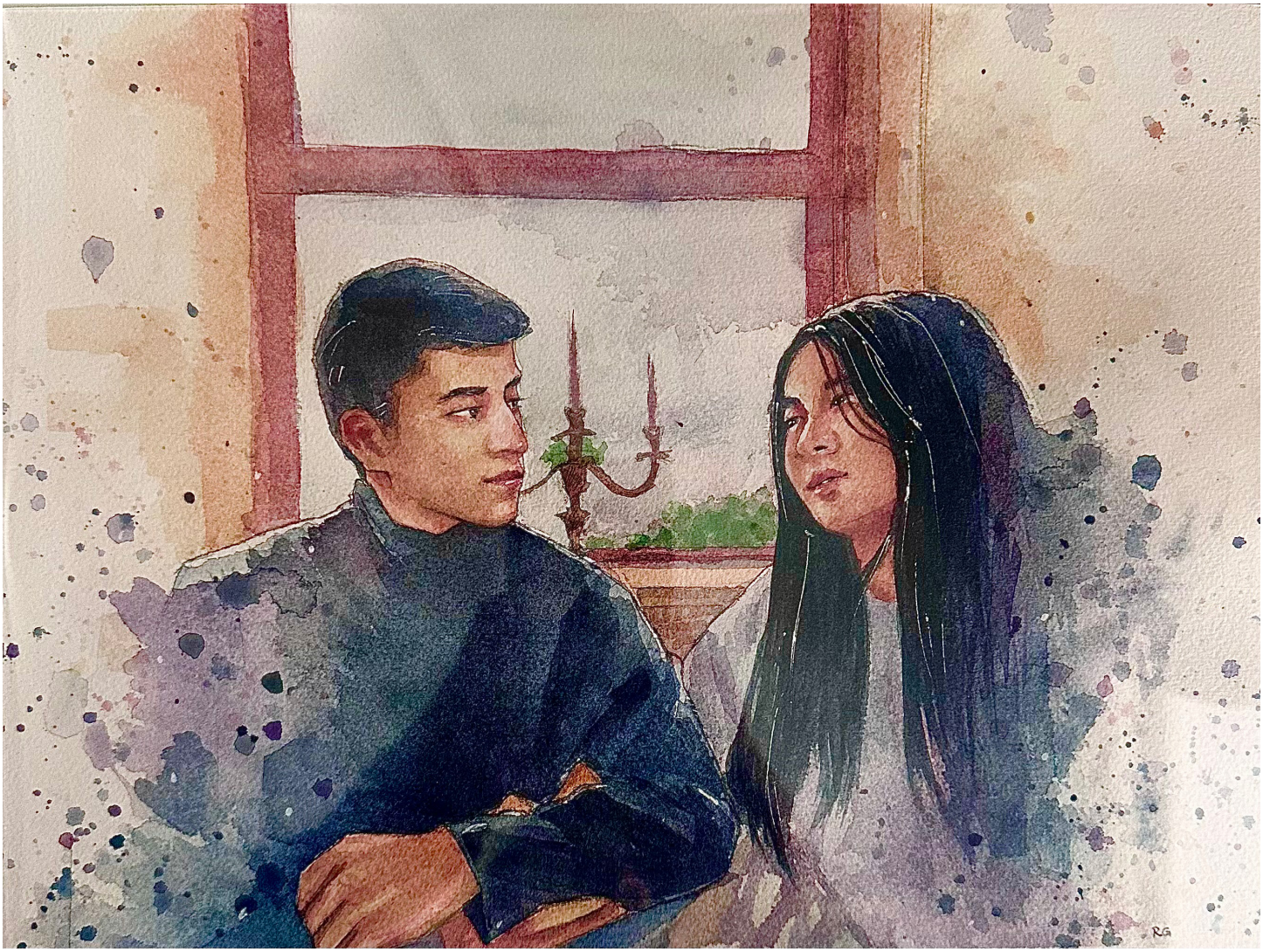
Ritu Gangadhara, MS3

that building on the corner street in bangkok

Ink on paper

My cousin's house borders a busy street. Whenever I visit, I like to go out on the terrace with their dog and gaze out across this corner. The building is dilapidated light green, but has always been full of life.

Ritu Gangadhara, MS3



Angela and Adam in Austria

Watercolor and ink on paper

A gift for lovely people I'm grateful to call my friends. Congratulations on your engagement.

Feature: Visual Art

Grace Armstrong, MS3, showcases her creative work

Seen in Pieces

Grace Zhou Armstrong, MS3

Somber Kool-Aid

My artwork explores the nuances of human experience throughout different stages of life. Each portrait aims to capture the unique emotions and thoughts that develop across a lifespan.

Barred Owl, Eagle Creek, IN 2026

Nikon D5600 | 250mm | 1/4000 sec @ f/7.1 | ISO 6400 | Aperture Priority

Feature: Visual Art

Faith Mikolajczyk, MS3, showcases her photographic work

Inspired by my great-grandmother and her love for owls (Edited in Adobe Lightroom).

Faith Mikolajczyk, MS3

Red Bellied Woodpecker, Eagle Creek, IN 2025

Nikon D5600 | 300mm | 1/1000 sec @ f/6.3 | ISO 6400 | Aperture Priority

Inspired by the quiet wonders of birds and nature that surround us every day.

DNET

Crochet tapestry

Feature: Visual Art

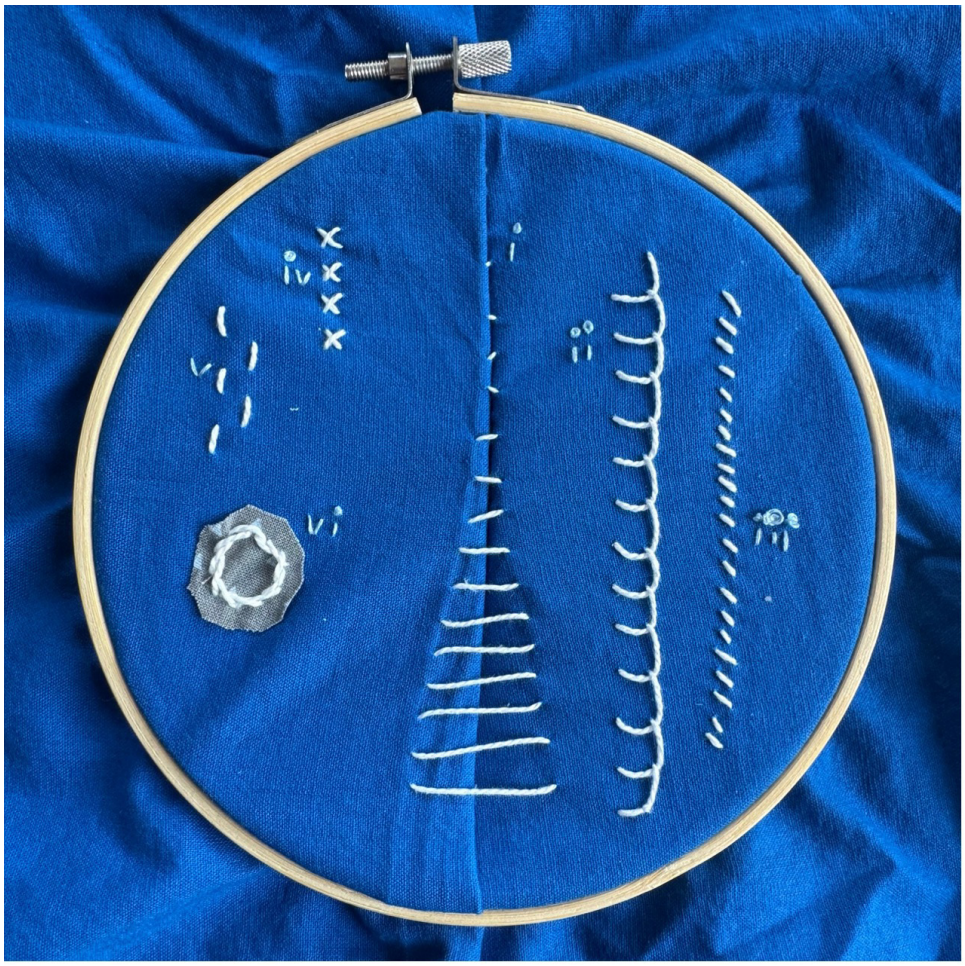
Aimee Lee, MS4, showcases her creative work

I recently got diagnosed with a brain tumor (dysembryoplastic neoepithelial tumor or DNET) which has epileptogenic foci. The piece is a crochet tapestry of my actual brain MRI with these foci being manifested as the colorful waves.

Feature: Visual Art

Erin Garzella, MS3, showcases her creative work

When someone is first learning embroidery, a traditional first project is a stitch sampler for learning new techniques. When I started my surgery rotation, I was delighted to learn that many of the suturing techniques we use in the OR are identical to stitches used in a variety of fiber arts, including sewing, embroidery, knitting, and more. This sampler highlights some of the stitches used in both surgery and fiber arts.



i. ***Running subcuticular/Ladder stitch****: Used for closing skin during surgery this stitch is used to make invisible seams when sewing. Sometimes called the 'zipper stitch' because when you pull on the end the stitch will 'zip' together.*

ii. ***Locking stitch/Blanket stitch****: This closure can reduce tension when closing skin and can prevent fraying on the edges of blankets.*

iii. ***Simple continuous/Whipstitch****: An extremely versatile stitch both in surgery and fiber arts. Often one of the first stitches a beginner learns, it is commonly used to join two pieces of material: skin-skin, skin-graft, skin-mesh, fabric-fabric.*

iv. ***Cross stitch****: Known of by the same name in surgery as it is in fiber arts, this stitch reduces tension on a skin closure. Cross stitching is also a type of embroidery where many individual cross stitches are tiled in different colors to create an image.*

v. ***Horizontal mattress/Mattress stitch:*** *The deep nature of this suture reduces tear through wounds with atrophic skin. This stitch can also be used to invisibly join two pieces of knitting, useful when making a sweater.*

vi. ***Basting suture/Stem stitch****: This stitch is used by plastic surgeons when attaching a full thickness skin grafts to increase contact-and reduce hematoma-in the center of large grafts. In embroidery the same technique is used to create flower stems, letters, and outlines.*

Ghost

Canon 70D, 30 mm, f/1.8, 1/800 s, ISO 100, natural light

Feature: Visual Art

Justin Yu, MS3, showcases his photographic work

Bedsheet ghost hung up for Halloween in a neighborhood along the Indianapolis Canal.

IMPRS

Indiana Medical Student Program for Research and Scholarship

The following works represent a selection of the student research that took place during the 2025 IMPRS summer internship program- a collaboration of Indiana University School of Medicine and Indiana CTSI.

IMPRS Award Winners

Beyond Joint Hypermobility: Investigating Bladder Dysfunction in Hypermobile Ehlers-Danlos Syndrome

Marium Ansari, Mallory Pine, Viktoriya Sapkalova, Emily Brodowsky, Charles R. Powell, Ramzy T. Burns

Background and Objective: Hypermobile Ehlers-Danlos Syndrome (hEDS) is the most common subtype of Ehlers-Danlos Syndromes, a group of heritable connective tissue disorders caused by collagen abnormalities. While musculoskeletal features of hEDS are well documented, its impact on visceral organs, including the bladder, remains underexplored. Despite frequent patient reports of urinary symptoms, a definitive link between hEDS and bladder pathology has not been established. This study aims to characterize lower urinary tract symptoms (LUTS) and urodynamic (UDS) findings in patients with hEDS to better understand potential mechanisms underlying bladder dysfunction in this population.

Methods: A retrospective chart review was conducted on patients with hEDS who underwent video UDS at a single tertiary-care center between 2022-2025. Inclusion criteria included age >18 years, confirmed hEDS diagnosis (2017 criteria), and completed UDS. Data were analyzed using Welch's t-test and Fisher's Exact Test.

Results: Among 27 patients, the mean age at hEDS diagnosis was 30.9 years (range 18-49), 92.6% (n=25) were female, and 92.6% (n=25) were white. Common LUTS seen in these patients included urinary frequency in 74.1% (n=20), urinary incontinence in 14.8% (n=4), frequent urinary tract infections in 25.9% (n=7), bladder pain in 33.3%(n=9), nocturia in 48.1%(n=13), and weak urinary stream in 51.8% (n=14) of patients. UDS findings revealed no evidence of detrusor overactivity, stress urinary incontinence, abnormalities in bladder compliance, or incomplete bladder emptying. Pelvic floor dysfunction was seen in 18.5% (n=5) with active EMG noted during emptying. Pelvic floor physical therapy was the most common intervention recommended, followed by beta-3 agonists for overactive bladder symptoms.

Conclusion: Our study shows that LUTS are prevalent in patients with hEDS, with findings suggesting pelvic floor and muscular dysfunction as primary contributors rather than classic bladder pathology. These results support a pelvic floor-focused approach to evaluation and management in hEDS patients.

Claude Smith Black, MD, Award for Outstanding Work in Research

Intersecting Burdens: Exploring Social Drivers of Food Insecurity in Congestive Heart Failure Patients in Northwest Indiana

Shivam Bhargava, Jonathan Guerrero, Baraka Muvuka

Introduction: Congestive heart failure (CHF) affects 6.7 million Americans, costing over $30 billion annually. CHF is targeted by the Hospital Readmissions Reduction Program due to 30- day readmission rates of 20-25%. Food insecurity disproportionately affects those below the poverty line and is associated with increased CHF morbidity and mortality. In Northwest Indiana (NWI), nearly 100,000 individuals experience food insecurity. There is limited research on intersections between food insecurity and other Social Determinants of Health (SDOH) in CHF patients. This study investigated SDOH and clinical factors associated with food insecurity in CHF patients.

Methods: This retrospective cross-sectional study analyzed data from CHF patients screened for food insecurity through EPIC-based SDOH screenings at 3 urban hospitals in NWI between January 2021 and March 2025. Descriptive, bivariate (Chi-Square and Mann-Whitney U, $p<0.05$), and multivariate (logistic regression; $p<0.05$) analyses were conducted using IBM SPSS V. 31.0. The study was exempted by Indiana University (IRB #14040).

Results: The sample consisted of 11,874 CHF patients, with 5.1% experiencing food insecurity. Among patients with food insecurity, 35.4% were Black, 59% had high housing risk, and 71.2% reported stress. Bivariate analysis revealed significant associations ($p<0.05$) between food insecurity and age, ethnicity, race, language, veteran status, insurance type, family income, financial resource risk, housing risk, intimate partner violence risk, stress, transportation needs, cumulative social risk, hospital, smoking, suicide risk, and BMI. In multivariate analysis, medium (OR = 4.61) and high (OR = 5.05) financial resource risk, high housing risk (OR = 3.24), stress (OR = 6.54), and unmet transportation needs (OR = 3.22) were associated with higher odds of food insecurity.

Conclusion: This study highlights the intersection of food insecurity and other SDOH among CHF patients. Findings will inform an ongoing community-health system-academic partnership to explore lived experiences of food insecurity and connect hospitalized CHF patients with medically tailored community food sources.

Hazel and Tommy Thompson Cardiac Research Scholarship

Generation of Affinity Reagents for the Study of Photoreceptor Neurons

Amee Punater, Kaitlyn Shook, Sanae Imanishi, Yoshikazu Imanishi

Background: Photoreceptor cells are highly polarized neurons with distinct compartments essential for visual function. Their outer segments contain specialized ciliary membranes, called disks, that detect photons. Actin contributes to disk morphogenesis, while rhodopsin, a transmembrane photopigment, is a major component of disks involved in phototransduction. Conventional fluorescence microscopy (200-300 nm resolution) is suboptimal for visualizing these subcellular structures (5–100 nm). The goals of this project are to enhance fluorescence microscopy resolution and refine protein labeling strategies to visualize actin and rhodopsin dynamics during disk formation. By generating recombinant affinity reagents (nanobodies and class-switched IgG), we aim to probe actin filaments in photoreceptor outer segments.

Methods: The DNA sequences encoding actin nanobody and its derivative were PCR-amplified and incorporated into the PET22B vector. Genetically modified nanobodies were expressed in Bl21 E. Coli for high-yield production, efficient purification, and detection via fluorescent tags or secondary IgG antibodies. In addition, a recombinant monoclonal antibody against rhodopsin was produced by introducing two expression vectors, coding 1D4 IgG heavy and light chains, to ExpiCHO cells. Western blotting was employed to measure the quality and quantity of these nanobodies and antibodies. These affinity reagents were used for immunofluorescence microscopy of mouse retinal sections with the Nikon AX R NSPARC super resolution confocal microscope.

Results: We successfully produced a recombinant rabbit monoclonal antibody against rhodopsin (1D4 mAb) in ExpiCHO cells. Based on immunoblotting analysis, we estimate approximately 1 mg of antibody is present in 35 ml of culture. The antibody labeled mouse rod outer segment structures, indicating it is specific to rhodopsin. We are currently attempting to express actin nanobodies in E. coli cells for fluorescence imaging.

Conclusion: The successful staining of actin and rhodopsin in the outer segment of photoreceptors help reveal their spatial relationship during disk morphogenesis, highlighting a potential interplay between cytoskeletal elements and membrane proteins. This discovery offers new insight into how photoreceptor architecture is built and maintained, offering a foundation for understanding mechanisms linked to photoreceptor dysfunction and degeneration in diseases including retinitis pigmentosa and other inherited retinal dystrophies.

Excellence Award: Ophthalmology Research

Predicting Deep Vein Thrombosis in Glioblastoma: A Competing Risk Regression Analysis

Tushar Sardesai, Matthew Pease

Background: Glioblastoma multiforme (GBM) patients face a high risk of developing venous thromboembolism (VTE), such as deep vein thrombosis (DVT). VTE is linked to worse survival. Typical DVT treatment is anticoagulation, but 25% of GBM patients suffer major intracranial bleeding within 1 year. This study addresses a research gap by assessing both genetic and clinical variables to predict DVT development in GBM patients. Objective: Identify DVT predictors in GBM using clinical and next-generation sequencing (NGS) data

Methods: This retrospective cohort study analyzed clinical/NGS data from GBM patients at University of Pittsburgh Medical Center from 2008-2020. NGS data included 32 genes. To account for the competing risk of death, common in GBM patients, Fine-Gray CRR (Competing Risk Regression) models were used. An unadjusted cumulative incidence function (CIF) curve showed lifetime DVT risk. Univariate, multivariate, and backwards stepwise selection CRR analyses were performed to identify significant DVT predictors.

Results: Of 578 patients with NGS data, 87 developed DVT, 367 died, and 124 were censored (lack of follow-up). 1-year cumulative incidence of DVT was 14% with median survival of 10 months. Avastin (bevacizumab) use, increased BMI, and a TP53 mutation were significant predictors of increased DVT risk (p1) in the final stepwise selection model. In a 3- predictor model, Avastin and BMI remained significant, with a 2.48- and 1.03-fold increased DVT risk, respectively. Adjusted CIF curves for Avastin and BMI showed a 5.6% and 2.7% increased DVT risk 1-year post-surgery, respectively. Although TP53 had a p-value of 0.053, its significance in the broader stepwise model indicates predictive power among other variables.

Conclusions: Avastin use, increased BMI, and a TP53 mutation predict DVT risk in GBM patients, supporting a clinical-genetic risk tool for DVT prediction. This combined model can guide clinical trials to include DVT treatment for high-risk GBM patients post-surgery, improving survival.

William H. and Fern L. Hardiman Scholarship

Modeling Inflammaging of the Bone Marrow Microenvironment Stimulates Multiple Myeloma Associated Stem Cells

Krishi Thaker, Piper Wilburn, Noriyoshi Kurihara, Attaya Suvannasankha, Conner Quinlan, Miloš Marinković

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William H. and Fern L. Hardiman Scholarship

IMPRS Abstracts

& Independent Review Articles

Unequal Burden of Melanoma: How Socioeconomic Status is Associated with Secondary Primary Malignancy Risk and Mortality

Flora Ho, Jonathan Guerrero, Baraka Muvuka

Background/Objective: Melanoma is the 5th most common cancer in the U.S. There is limited literature on how socio-economic status (SES) is associated with risk of secondary primary malignancies (SPMs), despite 2.1% of population living with a melanoma history. This study examined the relationship between SES and 1) incidence of SPMs in early-stage melanoma patients, and 2) survival in metastatic melanoma patients.

Methods: A retrospective cohort study was conducted using data of 426,732 stage 0/I/II melanoma patients from 2006-2020 and 1,089 metastatic melanoma patients from 2010-2020. Patient's SES quintile was calculated using census tract information including median household income, median house value/rent, education index, etc. Data on primary and secondary malignancies and cancer stage at diagnosis were analyzed using binomial and ordinal logistics regression.

Results: Patients with lower SES have significantly higher risks of developing higher stage SPMs (Stage I/II Group 1-lowest SES: OR 1.39, 95% CI 1.28-1.51) and metastatic SPMs (Stage I/II Group 1: OR 1.35, 95% CI 1.2-1.52). Group 5 (highest SES) served as reference. Conversely, patients with higher SES have a higher overall incidence of SPMs compared to lower SES groups (Stage I/II Group 1: OR 0.82, 95% CI 0.78-0.86). Results were significant across all SES levels, except for Group 4 with stage 0 melanoma.

Conclusion/Implications: This study shows the significance of socioeconomic disparities in melanoma outcomes. Patients with lower SES are at greater risk of developing higher stage SPMs and have poorer survival rates, whereas higher SES patients are more likely to be diagnosed with SPMs. Our findings highlight the need for targeted interventions to address SES-related disparities in melanoma prevention and care.

The Demographics of a Food Pantry in Newburgh, IN

Amira Alashi, Niki Messmore

Background: The Mobile Food Pantry (MFP), sponsored by the Muslim Association of Southern Indiana for Health Advancement, serves a pertinent need in Warrick and Vanderburgh counties in southwestern Indiana. Using distance to food stores, transportation access, and income as determinants of food accessibility, it is evident that food insecurity pervades both Warrick and Vanderburgh counties. With the most recent data presenting conditions from 2019, research into demographics and food insecurity identifiers of the MFP's clients is necessary. This project aims to determine the demographics of the MFP's clients and the factors affecting their food accessibility.

Methods: A Qualtrics survey was distributed to 187 adults aged 18 years and up who had received food from the MFP at least once in the past. The survey consisted of multiple-choice questions with some write-in options.

Results: Out of the 13 surveys completed, 2 were from participants who had never received food from the MFP and were thus not factored into the data analysis. Despite the small response rate, a preliminary understanding of the demographics and characteristics of the MFP's clients has been established. With consideration of the U.S. Department of Agriculture's parameters for food insecurity, low income and low accessibility are both reflected in the results. All respondents who provided their income are earning <80% of Vanderburgh's median household income. Additionally, 6 out of 10 respondents reported a lack of reliable transportation.

Conclusion: While our survey did not ask for specific distance from a food store, participants' responses regarding their transportation indicate that it's a relevant barrier to food security. Health and food are inseparable, and food insecurity is a pressing concern for public health. Therefore, this project serves as a stepping stone for the MFP's goal of reducing hunger in its community.

Taste Perception and Gastrointestinal Responses Following Salt and Ketone Supplementation in Healthy Adults

Abigail Aldridge, Soolim Jeong, Kallie E. Dawkins, Braxton A. Linder, Austin T. Robinson

Background and Hypothesis: Rodent studies indicate that dietary ketones can prevent some of the adverse health effects of high dietary salt. As a result, our laboratory is currently conducting a clinical trial to determine whether this effect can be replicated in humans (NCT:05545501). Both salt loading and ketone supplementation can be unpleasant in terms of taste perception and elicit mild gastrointestinal distress. However, our study needs to mask participants to which conditions they receive from each arm of the study. Therefore, we sought to determine whether we are effectively masking participants.

Methods: Young adults aged 19-35 who were free from cardiovascular disease were randomly assigned and masked to the order of three conditions. The three conditions included a) placebo capsules and placebo drink, b) salt capsules and placebo drink, and c) salt capsules and ketone drink. Taste perception and gastrointestinal surveys were taken after each condition. Taste perception was rated from 1-5 (great to terrible). Gastrointestinal distress was rated as 0-3 (none to severe). Participants were also asked to guess the condition they were in for each arm of the study.

Results: After survey collection and data analysis, there were no differences across the three conditions regarding taste perceptions ($ps \geq 0.134$) or gastrointestinal distress ($ps \geq 0.224$), and there was minimal gastrointestinal distress (average scores of 0 to 1 for nausea, vomiting, bloating, cramping, etc.). We found that participants were able to guess the capsule condition correctly 45% of the time and were able to guess the drink condition correctly 39% of the time across the study.

Conclusion: The data from this study is important because it tells us that the participants couldn't correctly guess the arm of the study that they were in. This means that participants were properly masked to the three conditions and that bias will be minimized in our clinical trial.

Emergency Department Identification of and Communication About Hypertensive Disorders in Pregnant Patients: A Retrospective Chart Review

Sana Alfrhan, Andreia Alexander

Background: Hypertensive disorders in pregnancy (e.g., chronic hypertension, preeclampsia, HELLP syndrome) are leading causes of maternal and fetal morbidity and mortality. Emergency departments (EDs) serve as a critical access point for pregnant patients, yet gaps remain in early recognition and management of these conditions. This study aims to evaluate how hypertensive disorders in pregnancy are identified and communicated in the ED setting.

Methods: A retrospective chart review was conducted of pregnant patients (aged ≥18 years, including postpartum and pregnancy loss patients) presenting to IU Health emergency departments (January 2021–December 2023) with at least one elevated blood pressure reading (SBP >140 or DBP >90). Data collected from electronic medical records included demographics, visit details, medical history, vital signs, symptoms, comorbidities, medications, diagnostics, procedures, discharge instructions, pregnancy-related follow-up, and outcomes. Descriptive statistics were used for analysis.

Results: Compared with state averages for pregnancy complications (6-8%), our cohort of hypertensive pregnant patients showed a higher overall complication rate (11.5%, n=80/690). Documentation gaps were most evident in first-trimester patients, with elevated blood pressure recorded for just 8.1% (30/370) of patients despite its clinical significance. This pattern improved in later trimesters, although inconsistencies remained throughout. Among hypertensive pregnant patients that were discharged from the ED (74%, 511/690), elevated blood pressure was addressed in only 2.4% of discharge instructions.

Conclusions: The ED presents a key opportunity to improve early identification and management of hypertensive disorders in pregnancy. These findings support evaluating targeted interventions — including standardized documentation and enhanced follow-up protocols — to address gaps in care for this high-risk population.

Optimization of a Biomolecule-Based Therapy to Induce Motor Endplate Formation for Treatment of Vocal Fold Paralysis

Alexandra Alva, Ananya Tadikonda, Sunjay Anekal, Patrick Finnegan, Stacey Halum

Background and Hypothesis: Vocal fold paralysis (VFP), often caused by recurrent laryngeal nerve (RLN) damage from surgery, scarring, or malignancy, can impair speech, swallowing, and breathing. Current treatments—surgery, injections, and voice therapy—offer symptom relief but do not restore function. Previous work in our lab showed that muscle progenitor cells (MPCs) can be induced into motor endplate-expressing cells (MEEs) using a biomolecule cocktail of agrin, neuregulin (NRG1), and acetylcholine (ACh). The formation of motor endplates triggers the release of neurotrophic and angiogenic factors like endothelial nitric oxide synthase (eNOS). Injecting MEEs into porcine larynges improved neuromuscular junction (NMJ) function, and direct injection of the biomolecule cocktail showed similar effects in mice. However, the optimal concentrations for therapeutic effects remain unknown. We hypothesized that specific combinations or doses of these biomolecules would significantly increase motor endplate formation as demonstrated by upregulated nicotinic cholinergic receptor subunit alpha 1 (CHRNA1) RNA and protein expression, with resultant upregulation of eNOS RNA.

Methods: Using two human skeletal muscle cell lines, we tested 51 biomolecule treatment variations. CHRNA1 and eNOS levels were quantified using Dot blots and qPCR.

Results: Three biomolecule combinations notably increased expression of CHRNA1 and eNOS, suggesting enhanced potential for NMJ restoration and muscle regeneration.

Conclusion and Impact: Select biomolecule cocktails significantly upregulate key markers for muscle repair and angiogenesis. These findings support their potential as therapeutic agents for VFP and related neuromuscular disorders.

New-Onset Atrial Fibrillation and Related Comorbidities in Cardiac Valve Replacement Patients

Tatiana Aviles, Nikolai Jones, Vyom Patel, Andrei Feldiorean, Lawrence Judy, Dale Saxon

Background and Objective: Heart valve replacement is a mainstay in managing valvular disease but poses risk of thrombosis, bleeding, infection, and valve failure. New-onset atrial fibrillation (NOAF) is the most prevalent arrhythmia after cardiac surgery. This study analyzes NOAF in mechanical and bioprosthetic valve patients without prior arrhythmias and its association with age-related comorbidities: hypertension, hyperlipidemia, atherosclerosis, valve disease, and heart failure.

Methods: Data collected from the IU School of Medicine-Evansville RWEdatalab (CRC/Sidus Insights Real-World Cardiology database). This 20+ year longitudinal dataset comprises over 3 million patients from 37,000 providers across all 50 U.S.

states. Odds ratios were calculated for individual comorbidities in 20,000+ patients aged ≥49 who underwent heart valve replacement.

Results: Odds ratios greater than 1 for NOAF were found for systolic heart failure (HFrEF) (2.010, 95% CI 1.83-2.20), diastolic heart failure (HFpEF) (1.768, 95% CI 1.63-1.92), mitral valve disease (1.645, 95% CI 1.54-1.75), and tricuspid valve disease (1.573, 95% CI 1.42-1.74). In contrast, hypertension (0.989, 95% CI 0.93-1.05), atherosclerosis (0.969, 95% CI 0.91-1.03), hyperlipidemia (0.823, 95% CI 0.77-0.88), and aortic valve disease (0.668, 95% CI 0.63-0.71) showed neutral or negative odds ratio.

Conclusion: Prosthetic valve replacement in patients with mitral or tricuspid valve disease, or HFpEF/HFrEF, may be associated with NOAF development. This association of NOAF with concurrent atrial involving valvular disease aligns with current literature linking atrial stretch as a predisposition for atrial fibrillation.

HOTFOOT: Acute Effects of Combined Foot Heating and Pneumatic Compression in Type 2 Diabetes: A Preliminary Report

Carolyn Bakx, Bruno Tesini Roseguin

Background and Hypothesis: Despite over 1.2 million annual U.S. Type 2 Diabetic (T2D) diagnoses, effective therapies for diabetic foot complications remain limited. We hypothesized that a device combining pneumatic compression and localized heating could increase leg blood flow and foot oxygenation in individuals with T2D.

Methods: Six healthy individuals (age: 67±3 years, A1c: 5.7 ± 0.38%) and five with T2D (age: 68±5 years, A1c: 7.06 ± 0.57%) were fitted with dorsal and plantar surface thermocouples and near-infrared spectroscopy sensors (OxiplexTS, ISS) over the metatarsal heads to assess foot temperature and oxygenation. Both legs were fitted with boot-like garments with a water-circulating pad and inflatable bladders (Aquilo Sports). After 30 minutes supine, heat (40°C) and intermittent compression (20 mmHg) were applied to one leg for 60 minutes, while the opposite leg served as control. Popliteal artery velocity and diameter were measured via Doppler ultrasound (GE Medical Systems) at baseline and after 60 minutes. A two-tailed paired t-test assessed differences between legs.

Results: Foot temperature increased by 6.5 ± 1.2°C in healthy controls and by 6.6 ± 1.8°C in participants with T2D ($p<0.01$). NIRS-derived tissue oxygen saturation (StO_2) increased in the treated foot by 5.3 ± 4.6% in healthy participants ($p = 0.01$) and by 4.9 ± 10.3% in T2D participants ($p = 0.325$). Popliteal blood flow increased by 23.0 ± 15.8 mL/min in the treated leg vs. 3.6 ± 18.6 mL/min in the control leg ($p = 0.167$) in healthy participants. In T2D participants, blood flow increased by 75.8 ± 112.9 mL/min in the treated leg and 8.0 ± 10.7 mL/min in the control leg ($p = 0.153$).

Conclusion and Potential Impact: Combined foot heating and compression increase foot oxygenation and leg blood flow in older adults with/without T2D. This accessible therapy may aid in managing diabetic foot complications.

Comparison of Patient-Reported Outcomes in Hinged and Non-Hinged Revision Total Knee Arthroplasty: A Matched Cohort Analysis

Ameya V. Belamkar, Leonard T. Buller, Evan R. Deckard, R. Michael Meneghini

Background: Hinged prostheses in revision total knee arthroplasty (rTKA) are typically reserved for cases of severe bone loss and/or ligamentous insufficiency. The increased constraint of the hinge (i.e., fewer degrees of freedom) is critical for providing sufficient stabilization in these complex cases, but also results in higher forces throughout the construct, which may increase the risk of re-revision due to aseptic loosening. This study compared patient-

reported outcome measures (PROMs) in case-control matched cohorts of hinged versus non-hinged rTKAs.

Methods: A retrospective review of 1,477 rTKAs was performed. After exclusions, 62 hinged and 730 non-hinged implants were available for matching. A total of 55 aseptic hinged rTKAs were case-control matched to 55 aseptic non-hinged rTKAs based on demographics of age, sex, BMI, and ASA-PS classification. The primary outcomes of the study were PROMs and reoperation rates. A P-value of 0.05 was considered statistically significant.

Results: The two matched groups did not differ by demographics or comorbidities (P≥0.225); except for an increased prevalence of lumbar spine disease in the non-hinged group (26% versus 11%, P=0.048), which did not affect PROMs (P≥0.100). In addition, no differences in PROMs were observed between groups at any time interval (P≥0.105). Furthermore, there was a slightly higher incidence of all-cause reoperation due to patella/extensor mechanism (11% versus 5%) and all-cause septic reoperation (9% versus 2%) in the hinged group, but these differences did not reach statistical significance (P≥0.190).

Potential Impact: This study demonstrated that PROMs were not significantly different for patients who received a hinged rTKA compared to a non-hinged rTKA, suggesting that patients may benefit from the increased stability provided by the hinge. The association with extensor mechanism complications in the hinged rTKA group likely reflects tthe selection bias inherent in this study design, as more complex cases were more likely to receive hinged devices.

Identifying 8-11B as a Novel Anti-Inflammatory Compound on Attenuating Neuroinflammation and Disease Severity in MS

Noah Bergsma, Jimmy Yen

Background and Hypothesis: Multiple sclerosis (MS) arises due to impairments in immune cell regulation, leading to neuroinflammation via alterations in microglial activation and pathogenic T cell differentiation. One novel compound developed from IUSM Fort Wayne and Manchester University, 8-11B, was recently associated with an in vitro reduction of inflammatory cytokine IL-6. 8-11B was thus analyzed in modulating pro-inflammatory cytokine and chemokine expression in microglia, attenuating pathogenic T cell differentiation, and ameliorating disease in MS animal models.

Methods: The first phase of the experiment incorporated a quantitative polymerase chain reaction (qPCR) to determine if 8-11B would reduce IL-27p28, CCL2, and CCL3 expression in primary microglia in vitro. The second phase of the experiment was performed by flow cytometry to analyze 8-11B in suppressing Th1 and Th17 differentiation via reducing IFN-γ, GM-CSF, and IL-17 production in CD4+ splenocytes in vitro. Finally, MS animal models were employed to assess the therapeutic effect of 8-11B in vivo.

Results: We found 8-11B enabled a dose-dependent reduction in IL-27p28, CCL2, and CCL3 RNA expression in microglia in vitro. Furthermore, 8-11B inhibited pathogenic T cell activation and differentiation by suppressing the production of IFN-γ and GM-CSF from Th1 cells and IL17 from Th17 cells in a dose-dependent manner in vitro. Finally, our in vivo results showed 8- 11B administration delayed disease onset and reduced disease severity in MS animal models.

Conclusion and Potential Impact: Our study demonstrated that 8-11B attenuates neuroinflammation through modulating microglial activation and pathogenic T cell differentiation. Most importantly, the in vivo analysis showed the ability of 8-11B to ameliorate disease severity in MS animal models. Thus, it suggests that 8-11B can be developed as a novel therapeutic agent for MS treatment.

Clinician Perspectives on Eye-Related Content in Medical Curricula

Michael Bertram, Polly Husmann

Background and Hypothesis: Though medical students are presented with an incredible amount of information, it is impossible to cover everything from every specialty in medical school. The primary goal of this study was to determine the state and breadth of ophthalmology related content in medical school and what practicing providers believe can be done to improve it.

Methods: This study was completed by interviewing six providers (two ophthalmologists, three optometrists, and one ENT physician) with a semi-structured set of questions. The interviews were recorded, transcribed, and thematic analysis was conducted.

Results: The thematic analysis revealed several themes. The primary themes were what the providers believe the schools are currently teaching, how they can improve, and they should be teaching each medical student. The main things the providers think are being taught are the top emergencies associated with the eye and how the eye is impacted by other systems at a very surface level. Ways the providers suggested medical schools can improve were to increase class time talking about the eyes and its pathologies, requiring a short rotation through ophthalmology, and enforcing more dedicated skills training for the ophthalmic exam. The primary findings for what the providers think every medical student should be taught are the various forms of glaucoma and their treatments, steroid eye drops, and diabetic retinopathy.

Limitations and Future Directions: The main limitation for this study is the small sample size and all the providers being from a similar geographic location. Another limitation was the providers' exposure and experience with medical school curriculum providing response variability. In the future, more providers will be interviewed, and the interview responses will be compared to the Indiana University School of Medicine curriculum to determine the extent that IU covers what the providers believe to be important.

Investigating the Roles of miR-148a-3p and miR-126-5p in Mouse and in vitro Models of Diabetic Retinopathy

Sarah Boccone, Neha Mahajan, Ashay Bhatwadekar

Background: Diabetic retinopathy (DR) is the leading cause of blindness in American adults. Several studies have highlighted the role of microRNAs (miRNAs) in the pathophysiology of DR. Previous studies from our lab showed that long-standing diabetes affects the expression profiles of various miRNAs, including miR-148a-3p and miR-126-5p, in mouse hematopoietic stem cells. However, these miRNAs were not investigated in retinal cells. Therefore, in the present study, we explored the expression profiles of these miRNAs using both animal models and human retinal endothelial cells (HRECs).

Methods: For animal studies, retinas were isolated from 6-month-old diabetic db/db mice and age-matched control db/m mice. qRT-PCR was used to analyze the mouse retina miRNA and mRNA targets. For in vitro studies, HRECs were cultured in three conditions: normal glucose [5 mM], high glucose [15 mM + NG], and mannitol osmotic control [15 mM + NG]. After 24-hour treatment, RNA was extracted, and qRT-PCR was performed to determine miRNA expression. miRDB (MicroRNA Target Prediction Database; mirdb.org) was used to identify mRNA targets regulated by these miRNAs.

Results: qRT-PCR analysis of db/db mouse retinas showed significant upregulation of miR-148a3p compared to db/m control; miR-126-5p was upregulated but not statistically significant. Known targets of miR-148a-3p, ITGA5 and ITGA9, were significantly upregulated in db/db mouse retinas. qRT-PCR analysis of HG-treated HRECs showed an upregulation of miR-148a-3p and miR-126- 5p; however, the results were not statistically significant.

Conclusion: In the present study, we found that high-glucose conditions alter the expression profiles of miR-148a-3p and miR-126-5p in db/db mice and human retinal endothelial cells. We also found upregulation of integrins ITGA5 and ITGA9 in mouse

retinas, potentially implicating the interaction between miR-148a-3p and these extracellular matrix proteins in the pathophysiology of DR. Further experiments to validate these miRNAs and their mRNA targets are required to strengthen the current findings.

Evaluating Mesh Reinforcements in Abdominal Wall Closure During Autologous Breast Reconstruction with Abdominal Free Flaps

Kathryn Borders, Parhom Towfighi, Ravi Bamba

Background: Breast cancer is the most common cancer among women, and immediate breast reconstruction at the time of mastectomy has become well accepted. Autologous breast reconstruction uses a woman's own tissue for breast reconstruction, and this technique using abdominal tissue (Deep Inferior Epigastric Artery (DIEP) flap) is increasing in popularity. Abdominal weakness/bulging and hernias are possible complications as a result of dissection of the deep inferior epigastric artery. While rates of abdominal donor site weakness are low, mesh placement in the abdominal wall is becoming more common. The purpose of this study is to compare abdominal wall outcomes in patients who underwent DIEP flaps with and without mesh.

Methods: A retrospective chart review was conducted on 227 patients who underwent DIEP flap surgery between 2021 and 2025. Patients were grouped by mesh type Poly-L-lactide, poly-trimethylene carbonate copolymer (TransorbTM) (n = 29), Poly-4-hydroxybutyrate (PhasixTM) (n = 100), and no mesh (n = 98). Demographic data and postoperative complications were collected. Chi-square analysis was used to compare abdominal bulge and hernia incidence between patients with and without mesh placement.

Results: There was a lack of postoperative complications associated with mesh use, supporting its safety profile. Mesh placement (transorb and phasix) was linked to a lower rate of abdominal bulge formation compared to no mesh placement (3.10% mesh, 9.18% no mesh, p-value = 0.051). There was no statistically significant effect on hernia occurrence across groups (2.33% mesh, 5.10% no mesh, p-value = 0.261).

Conclusion and Clinical Impact: Mesh use in abdominal wall reinforcement is safe with a low complication rate with use. Patients who had mesh abdominal wall reinforcement after DIEP flaps had a lower incidence of abdominal bulge. When considering abdominal wall closure in abdominally based autologous breast reconstruction, surgeons should consider the use of mesh to decrease abdominal wall weakness.

Barriers to Mental Health Care in Indianapolis Latino Youth: A BACE Survey Analysis

Sofia Cazares, Silvia Bigatti

Background: Latino adolescents in the U.S. experience high rates of depression, anxiety, and suicidal behavior, yet have the lowest treatment rates for mental health conditions like Major Depressive Disorder. Barriers such as stigma, cultural values, and structural limitations contribute to this treatment gap. Past research, particularly regarding Latinas, has identified self-reliance and fear of family shame as key obstacles. This study focuses on identifying and evaluating these barriers among male and female Latino youth in the Indianapolis area, where current research is minimal.

Methods: The Your Life Your Story Latino Youth Summit was a two-week summer camp in Indianapolis for Latino youth ages 12–16 from immigrant backgrounds. Participants (N=8) completed a modified BACEv3 survey assessing perceived barriers to mental health care, rated on a 0–3 scale across 24 relevant items. Small sample size was attributed to unexpected political factors. Responses were averaged overall and then stratified by gender.

Results: Top reported barriers were: 1. "Wanting to solve the problem on my own" (1.625) 2. Tie: "Concern about what my family might think, say, do or feel" and "Dislike of talking about my feelings" (1.0) 3. "Thinking the problem would get better

by itself" (0.875) When stratified, males emphasized discomfort with emotional discussions and family opinions, while females cited embarrassment and concern over peers' opinions. Traditional structural barriers like cost and transportation were rated low.

Conclusion: Consistent with earlier studies, self-reliance remains a key deterrent to mental health care for Latino youth. Gender differences reveal unique concerns among males and females. These insights can help providers tailor approaches to better engage Latino adolescents and reduce the persistent gap between mental health needs and service use in this population.

Characterizing Clinical Variants of the Neurodevelopmental Disorder-associated Enzyme KMT5B

Morgan Clouse, Malini Iyer, Jocelyne Hanquier, Taylor Evans, Evan Cornett

Background: Neurodevelopmental disorders (NDDs) are estimated to affect up to 15% of children and adolescents worldwide; however, the underlying pathology of many NDDs is poorly understood. Lysine methyltransferases — the writers of lysine methylation — have been implicated in numerous neurodevelopmental disorders. The lysine methyltransferase KMT5B has a catalytic SET domain that dimethylates lysine 20 of histone H4 as well as non-histone substrates, and KMT5B haploinsufficiency has been implicated in NDDs. Clinical variants of KMT5B have been associated with autism spectrum disorder, intellectual disability, developmental delays, macrocephaly, and Chiari malformations; however, the impact of variants found in patients on KMT5B's methyltransferase activity is not known. In this work, we aim to 1) characterize the impact of clinical variants of KMT5B on its methyltransferase activity and 2) begin preliminary work on assessing the heterogeneity of cells undergoing single-cell sorting for future experiments to introduce clinical variants of KMT5B into neuronal cells.

Methods: Recombinant reference and variant forms of KMT5B were overexpressed and purified from E. coli. Enzymatic activity was assessed using a radiation-based KMT assay with mononucleosome substrate. Neuronal differentiation was monitored by live cell imaging using IncuCyte NeuroTrack software.

Results: In vitro assays displayed a varied decrease in enzymatic activity in variants T85I, C200R, L263F, and E302K. Interestingly, the variant S73F showed an increase in KMT activity, despite the patient displaying the phenotype typically associated with haploinsufficiency.

Conclusion: The clinical variants S73F, fsA74PTer10, C200R and L263F will be introduced into a neuronal cell model to assess the impact on differentiation. Characterization of these variants in a differentiation model will help elucidate whether there is a potential role of KMT5B catalytic activity in neuronal development.

Association Between Perioperative Opioid Type and Diagnosis of Opioid Use Disorder Following Total Joint Arthroplasty: An EHR-Based Case Control Study

Nolan Cook, Tommy Quach, Zachary Bowman, Kevin Jordan, Daniel Roque, Michael Roscoe

Background: The opioid epidemic remains a major public health concern in the United States. Total joint arthroplasties (TJA), including total knee, total hip, and total shoulder replacements, are common procedures associated with substantial perioperative opioid use. Prior research suggests that perioperative opioid prescriptions may increase the likelihood of developing opioid use disorder (OUD). This study aims to assess whether the type of opioid prescribed perioperatively influences the odds of developing OUD following TJA.

Methods: This study was a retrospective case-control study using the IU School of Medicine-Evansville RWEdatalab (CRC/Sidus

Insights), a real-world EHR-based psychiatric database. Patients who underwent a TJA were identified using CPT codes. OUD diagnosis after TJA was identified using ICD-10 codes. Two cohorts were created: patients with an OUD diagnosis after TJA (N = 294) and those without (N = 3,572). Odds ratios were calculated based on the specific opioid each patient was first prescribed in the perioperative period.

Results: All opioids analyzed were associated with elevated odds of developing OUD following TJA. Hydrocodone (OR: 3.38; 95% CI: 2.54-4.51), oxycodone (OR: 2.24; 95% CI: 1.64-3.07), and tramadol (OR: 3.75; 95% CI: 2.81-5.00) showed similar associations with no statistically significant differences observed between them. No type of arthroplasty (knee, hip, or shoulder) was associated with a higher likelihood of subsequent OUD.

Conclusion: Although differences between opioid types were not significant, the findings show a trend that contrasts from existing literature, which often identifies oxycodone as more commonly associated with misuse and tramadol as less commonly associated. These results highlight the need for further investigation into prescriptive patterns. Limitations include the use of a psychiatric-specific database, which may not fully reflect the general TJA population. Future studies should use broader or orthopedic-specific datasets and control for potential confounders such as dosage, comorbidities, and impact of previous psychiatric diagnoses.

Functional Connectivity Differences Across the Alzheimer's Disease Continuum: A Neural ROI-Based Analysis in Relation to Depression

Luka Cvijanovic, Meiheng Liang, Meichen Yu

Background: Alzheimer's disease (AD) is a neurodegenerative disease characterized by β-amyloid plaques and tau tangles, leading to symptoms like memory loss, agnosia, and apraxia. A common AD comorbidity includes depression. While some studies identify midlife depression as a risk factor for AD development, others interpret depression as a manifestation of AD itself. Though emerging literature supports both models, the underlying mechanisms linking the two remain poorly understood. We hypothesized that functional connectivity in the default-mode network (DMN), somatomotor network (SMN), and salience network (SN) would be reduced in association with both AD and depression.

Methods: 178 participants (ages 65-90, positive β-amyloid) fMRI datasets collected, split into 68 ROIs per the Desikan-Killiany atlas. Depressive symptoms were assessed via the NPI and GDS questionnaires. Participants were subdivided into 4 groups: preclinical AD patients without depressive symptoms; preclinical AD patients with depressive symptoms; prodromal and AD patients without depressive symptoms; and prodromal and AD patients with depressive symptoms. This data was residualized to correct for age and sex, then analyzed via nonparametric tests, e.g., Kruskal-Wallis.

Results: Six significantly different functional connectivity regions were found across groups: $p < 0.001$, bankssts; $0.001 < p < 0.01$, precentral, postcentral, and superior temporal; and $0.01 < p < 0.05$, lateral orbitofrontal and paracentral. Post hoc tests revealed that preclinical AD patients had greater connectivity relative to prodromal + AD patients, with and without depression. Depression specific regions included the paracentral and lateral orbitofrontal ROIs.

Conclusion: The DMN and SMN are implicated in AD development through the bankssts & superior temporal regions, and the pre-, post-, & paracentral regions, respectively, in patients both with and without depression. The SN and DMN are implicated in depression through the lateral orbitofrontal region, in preclinical AD. And lastly, the SMN and SN are implicated in depression through the paracentral region, specifically in AD patients.

The S.T.A.R. (Support, Tracking, And Referral) Program: A Scalable Wellness Intervention for Improving Collaborative Support for Resident Physicians

Jacob Destrampe, Destiny Folk, Kyra Reed

Background: Medical trainees face rising rates of burnout, depression, and psychological distress. Peer support groups have shown promise as an intervention but remain underexplored in the clinical learning environment (CLE). A pilot study among the Emergency Medicine (EM) residency demonstrated that 96% of participants (n=85) reported improved well-being after resident-led peer support sessions, particularly benefiting those experiencing burnout. Building on this success, the S.T.A.R. (Support, Tracking, And Referral) Program was developed and piloted across 10 residency programs, yielding encouraging results. This led to a GME-supported, grant-funded expansion of the program to all residency programs at Indiana University School of Medicine (IUSM), encompassing 1,142 residents. We hypothesize that participation in peer support groups will lead to measurable improvements in resident wellness over a two-year period.

Methods: This prospective, longitudinal cohort study uses a two-arm waitlist randomized controlled trial design involving 1,146 residents across 42 programs. Participants are randomized into immediate or delayed intervention groups. All residents complete baseline surveys via personalized dashboards before the intervention, which includes a one-hour didactic session followed by monthly peer support meetings. Data collection includes program engagement metrics, pre/post-intervention surveys, and three annual well-being assessments using validated tools measuring anxiety, depression, burnout, and loneliness.

Results: All 42 residency programs have enrolled, with 21 scheduled for immediate intervention. Early implementation shows strong engagement: 51% of 351 residents completed baseline surveys during GME orientation. In the first intervention session (n=40 pediatric residents), 67.5% completed pre-session and 25% completed post-session surveys.

Conclusion: The S.T.A.R. Program offers a scalable, evidence-based peer support model to address the urgent mental health needs of medical trainees. By equipping residents with the language and skills to support one another, the program fosters a culture of wellness and has the potential to reduce stigma and burnout across medical institutions.

Barriers to Medication-Assisted Treatment (MAT) and Sustained Recovery for Opioid Use Disorder in Incarcerated Individuals and Community Recovery Centers

Allison Dittmer, Darian Ghaffari, Lynn Witty

Background: Opioid use disorder (OUD) affects millions of Americans and is responsible for thousands of deaths annually in the United States. Although medication-assisted treatment (MAT) is considered first-line treatment for OUD by many, only about 1 in 5 individuals with OUD in the US receive it. Nationwide, approximately 3.7% of people carry an OUD diagnosis, while a disproportionate number of incarcerated individuals, up to 15-20%, carry an OUD diagnosis. The purpose of the present research is to explore the barriers individuals with OUD encounter when accessing MAT and to examine how those barriers differ between incarcerated individuals and those in community-based recovery.

Methods: Participants enrolled in Indiana's IRACS program based on peer recovery coaches regularly meeting with inmates in the jail with a handoff to an outside peer recovery team on release were given a cross-sectional survey. They rated six barriers – financial, housing, geographic, stigma, continued care, access, and social support – on a 4-point Likert scale based on how much each barrier made accessing MAT difficult.

Results: Social support (mean = 2.29 ± 1.07) and stigma (mean = 2.23 ± 1.00) emerged as the most significant barriers, while geographic (mean = 1.67 ± 0.87) and financial (mean = 1.68 ± 0.88) barriers were rated lowest. Age was significantly associated

with housing instability, with the 30– 49 age group reporting the greatest difficulty (mean = 2.37 ± 1.11, p = 0.006).

Conclusion: Findings highlight social support and stigma as key barriers to MAT access among incarcerated populations, which varies compared to other studies. The role of the IRACS team is an unknown variable. Future work will involve extending the study to individuals in community recovery centers to compare the relative impact of these barriers across populations and inform targeted intervention strategies.

Surveillance and Treatment Monitoring in Thymic Tumors via Circulating Tumor DNA

Dimitar Donovski, Layla Ahmadi, DuyKhanh Ceppa, Fatemeh Ardeshir-Larijani, Rohan Maniar, Patrick Loehrer

Background: Circulating tumor DNA (ctDNA) consists of non-pathologic nucleic acid fragments shed from tumor cells. Thymic epithelial tumors (TETs) are rare malignancies of the anterior mediastinum subdivided into thymomas and thymic carcinomas. The detection of ctDNA in plasma offers a potential marker for minimum residual disease (MRD). This study aims to evaluate the clinical utility of serial ctDNA testing in two patient groups with thymic tumors: (1) those undergoing curative-intent resection monitored for MRD and recurrence, and (2) those with metastatic disease receiving systemic therapy, in whom ctDNA trends may correlate with treatment response.

Methods: Retrospective chart review was conducted on a sample of thymic tumor patients (n=36). Charts were assessed for patient demographics, tumor characteristics, ctDNA values, recurrence/progression events, and treatment response. Patient blood samples were tested using bespoke Signatera mPCR-NGS. Testing occurred roughly every 3-6 months, along with corresponding CT examination.

Results: In patients who underwent curative-intent resection (n=22), 20% developed radiographic recurrence tested positive for elevated ctDNA postoperatively. No patients with preoperative ctDNA detection experienced recurrence (n=3). Positive ctDNA detection had a potential false positive rate of 11.8%. In patients with advanced disease (n=14), radiographic progression and stable disease were associated with higher mean levels of ctDNA compared to partial/complete response to treatment (10.73, 10.70, and 0.20 mtm/mL, respectively). Disease progression and ctDNA levels had a weak positive correlation (r=0.11) and 55% concordance.

Conclusion: ctDNA is not reliable as a standalone surveillance tool or progression marker in thymic tumor patients. Most patients that underwent curative-intent resection and experienced recurrence did not have detectable ctDNA levels postoperatively. The correlation between ctDNA levels and radiographic progression in advanced disease is weak, though consistently low levels were observed in responding patients and may be useful in tracking treatment response.

Characterizing Non-urgent Ophthalmic Utilization of Emergency Departments in Northwest Indiana

Shaker Erbini, Kyle Gospodarek, Jonathan Guerrero, Joshua Mangum, Baraka Muvuka

Background: Approximately 25% of ophthalmic-related emergency department (ED) visits are non-urgent, costing an extra $782 and 5.75 hours per patient compared to same-day outpatient care. However, the influences on such inappropriate ophthalmic-related healthcare service utilization remain unclear. This study investigates how demographics, social determinants of health (SDOH), and health characteristics influence non-urgent ophthalmic-related ED utilization.

Methods: This retrospective study analyzed data from SDOH screenings in EPIC for ED visits across 3 Northwest Indiana urban hospitals from January 2021-March 2025. Ophthalmic-related ED visits were identified using ICD-10 codes and classified as urgent or non-urgent. Data analysis included descriptive, bivariate

(Chi-Square; $p<0.05$), and multivariate (binary logistic regression; $p<0.05$) analyses using SPSS 31.0.

Results: The sample consisted of 6571 ophthalmic patients with similar representations of White/Caucasian (36.9%) and Black/African American patients (40.4%), mostly under 40 (58.0%). Bivariate analysis found a statistically significant ($p<0.05$) association between ophthalmic visit type and age, ethnicity, race, sex, sexual orientation, insurance type, family income, smoking status, length of stay, ED disposition, hospital, return visits, and number of ED visits. In multivariate analysis, age (OR = 1.005), Black/African American (OR = 1.884), other race (OR = 1.475), public insurance (OR = 1.341), other insurance (OR = 2.290), and hospital B (OR = 2.396) remained significantly ($p<0.05$) associated with higher odds of non-urgent visits. Female sex (OR = 0.810), admitted ED Disposition (OR = 0.540), other ED disposition (OR = 0.340), and family income (OR = 0.999996) remained significantly ($p<0.05$) associated with lower odds of non-urgent visits.

Conclusion: Lower income, Black/African American, and non-privately insured patients demonstrated higher odds of non-urgent ophthalmic-related ED utilization. Further research should continue examining how socio-structural factors influence healthcare utilization to inform targeted interventions for optimized ophthalmic care delivery.

Evaluation of Elastin Composition and Organization in Murine Abdominal Aortic Aneurysms

Annabelle Frazier, Cortland Johns, Abigail Cox, Craig J. Goergen

Background: The prevalence of aortic aneurysms has increased dramatically over the past 20 years, with over 35 million cases of abdominal aortic aneurysms (AAAs) in 2019 alone. However, AAAs with intraluminal thrombus (ILT) development remain understudied. Elastin is a key component of the aorta that gives it distensibility. Here, we evaluated the organization of aortic elastin with and without ILT.

Methods: AAAs were induced in mice by topically applying elastase to the aorta. β-aminopropionitrile was added to drinking water to promote AAA expansion. After 8 weeks, aortas were extracted and stained with Movat's Pentachrome. Images at the largest aortic diameter were collected at 100 μm zoom and separated into 4 quadrants around the lumen. Manual counting was used to determine the number of elastin fibers in the aortic wall. ImageJ's color segmentation was used to find extracellular matrix component composition of each aortic layer.

Results: We found samples without ILT on average had 2.7 more distinct elastin sheets compared to ILT samples. Color segmentation findings showed 7% less elastin in the tunica media in samples with ILT. Further, color segmentation showed there was a statistically significant increase in the amount of proteoglycans in the tunica media in samples with ILT. **Conclusion:** We found ILT forming aneurysms had fewer intact elastin fibers and greater proteoglycan deposition, indicating more detrimental breakdown of the tunica media compared to samples without ILT. Our findings suggest AAA patients with ILT are at higher risk for more severe cases of aortic wall degradation, suggesting special monitoring following identification of ILT. A larger sample size is needed to identify a statistically significant difference in elastin between groups. Future work should compare changes in aortic wall composition in male and female mice to improve our understanding of pathophysiological differences observed between genders.

Preliminary Results Characterizing the Role of Megakaryocytes in Pain Behavior and Fractured Healing

Muira Fontaine, Amy Creecy, Jiliang Li, Upasana Ganguly, Spencer Britton, Sonali J. Karnik, Rachel J. Blosser, Kuldeep Yadav, Sarah L. Mostardo, Melissa A. Kacena

Background: Bone is a heterogeneous tissue regulated by both

a complex interconnected biological and mechanical response. Megakaryocytes play an integral role in the biological signaling of this response, increasing bone formation through osteoblast upregulation, and osteoclast downregulation. Megakaryocytes may also have a significant role in pain amplification through the release of platelet derived growth factor (PDGF). The aim of this study is to characterize the role of megakaryocytes in fractured healing and pain behavior.

Methods: PF4Cre;iDTR male and female mice were separated into two groups. One group received diphtheria toxin (DT), adjusted for weight, every four to five days to ablate the natural megakaryocyte population. The control group received PBS injections at the same time points. A complete, nondisplaced fracture was created in the right hind femoral shaft. Weekly saphenous blood samples and in vivo X-rays were collected. Additionally, weekly behavior testing including Von-Frey mechanical sensitivity test was conducted. At twenty-two days post fracture, the mice were euthanized. Surgical and contralateral femurs were collected for later analysis.

Results: DT mice had a significantly lower body platelet count compared to the PBS controls. Body weight remained relatively constant. Preliminary pain and radiographic results do not show a difference in platelets in pain response or healing. However, with a small sample size (n=5-6 per group), and only two analyses completed, this data may not show the complete picture that we will have at the end of the study.

Conclusion: We hypothesize that megakaryocytes have an influential role in fracture healing and pain. At the end of this study, we aim to investigate if megakaryocytes are involved in fracture healing and associated pain. We will test our hypothesis by analyzing blood samples, X-ray and μCT analysis, biomechanical testing, as well as associated pain through behavior testing, and microenvironment shifts through histomorphometry. Through gaining a greater understanding of the extent of megakaryocyte involvement in fracture healing signaling, we may discover new targets for pain management and methods to improve fracture outcomes.

Immunotherapy Adherence Patterns in Melanoma Patients: A Retrospective Analysis

Eric Gan, Syril Que

Background: Immunotherapy has significantly improved outcomes for patients with melanoma, taking their median survival from 6-9 months to over 5 years. However, this is severely limited by the high discontinuation rate (50-60%). Understanding adherence factors is critical for optimizing treatment success and allows physicians to address potential complications earlier.

Methods: In this study, we performed a 5-year chart review in the Indiana University Health system through Cerner's electronic health records. In order to determine patients with Stage III melanoma, we used ICD-10 codes C43 (malignant melanoma) and C77 (lymph node metastases). Only 28 of 75 patients reviewed satisfied the inclusion criteria. We looked at demographics, clinical features, treatment regimen, patient preferences, and discontinuation outcomes. Descriptive statistics were applied to assess adherence and discontinuation factors.

Results: Among those 28 eligible patients, 20 (71.4%) of them discontinued immunotherapy. Those who received ipilimumab-nivolumab therapy had the highest discontinuation rate while patients with nivolumab monotherapy had the lowest. Adverse effects from the treatment itself were the most common cause of discontinuation. Socioeconomic factors like time to treatment centers (mean 29.4, ± 15.9 minutes) and insurance type had no effect on discontinuation.

Conclusion: In this retrospective, single-system cohort study, it highlights that immunotherapy discontinuation is still very high in patients with melanoma, likely due to adverse effects. Socioeconomic factors, in contrast, had no effect on the discontinuation rate. Although the sample size is limited, these findings could lead to future studies with larger cohorts that could be used to inform melanoma treatment in real-world patients.

3D Simulation Model for Training in Minimally Invasive Parafascicular Surgery for Intracerebral Hemorrhage Removal

Futhallah Hamed, Angela Richardson, Noah Burket

Background: Advances in minimally invasive neurosurgery demand that residents receive effective, realistic training. Simulation models foster skill development through hands-on, low risk practice. Minimally Invasive Parafasicular Surgery (MIPS) is a surgical technique that reduces damage to the brain by using sulci as corridors, brain imaging to avoid white matter tracts, and a tubular retractor to access subcortical regions. Several studies support MIPS for Intracerebral Hemorrhages (ICH) clot evacuation. We developed a 3D model to emulate this procedure to provide residents with the necessary practice in a low acuity environment.

Methods: Three-dimensional skull and brain models were digitally designed. The brain model was used to design, and 3D print a mold to create brain gels of phytagel (PHY), polyvinyl alcohol (PVA), cornstarch, agar, and water. Gel texture was compared with soft tofu due to their textural resemblance and strength was tested by inserting a tubular retractor. After initial testing by the researcher, formulations demonstrating optimal texture and strength were selected for resident evaluation. Different clot solutions were then created and inserted into the gels.

Results: Brain gels were cooled in the freezer for 15 minutes before inserting the clot solution into the gel. Twenty-seven gels were produced, differing in composition. The five formulations that didn't break apart and most closely matched tofu texture were selected. Additionally, we designed and 3D printed a larger brain mold to better accommodate the tubular retractor.

Conclusions: After finalization of the brain gel, the priority will be modeling the dura as well as 3D printing and testing the skull and replaceable skull cap. We will evaluate sausage casing as an analog for dura in future tests. Chiefly, this simulation platform aims to enhance resident proficiency and confidence in minimally invasive ICH procedures.

Localization of Intracerebral Hemorrhage on Risk of Vascular Dementia: A 10-year Retrospective Study

Ryan Harmelink, Aditi Ravikumar, Matthew Tobin, Bradley Bohnstedt

Background: Intracerebral hemorrhage (ICH) can be devastating to cognition and constitutes 13% of all stroke cases. Owing to its disproportionate incidence relative to outcome severity, spontaneous ICH accounts for more than two-thirds of all-stroke mortality. Approximately one-third of spontaneous ICH patients develop vascular dementia, but the etiological link remains under characterized. The aim of this study is to elucidate how ICH locality and volume relate to the disease.

Methods: A 10-year retrospective chart review was conducted on patients with their first ICH at IU Methodist (01/2014-01/2024). Patient demographics and stroke characteristics were abstracted from IU Health Cerner and charted in REDCap. Using Synapse radiology PACS, hematoma size and location were calculated while referencing neuroradiological reports (ABC/2 estimation). Cognitive characteristics such as duration to develop dementia or MCI, dementia type, and independence metrics were collected. All data were analyzed in RStudio.

Results: Of 30 patients meeting inclusion criteria, 5 had a pre-existing dementia (16.7%) and 1 with pre-existing MCI (3.33%), 10 (33.3%) with dementia and 8 (26.7%) with MCI at ICH discharge, and 4 patients had downstream dementia (13.3%) while 2 had MCI (6.67%). Of the 19 dementia patients, the average hematoma volume was significantly higher (21.6 mL) compared to MCI patients (12.2 mL, $p<0.05$). There were no significant differences between lobar ICH patients (n=13), non-lobar ICH (n=13), or both (n=4) in time-to-diagnosis (p=0.863). However, ICHs in both locations had significantly larger hematomas (p=0.02).

Conclusions: ICH location and volume may not be associated with differential dementia outcomes despite correlatory volumetric differences between dementia groups. This study may guide clinicians in prognosticating and counseling high acuity patients

and serve to pilot larger power characterizations of the ICH-dementia relationship.

Healthcare Referral Outcomes for Those Experiencing Homelessness

Audrey Harrison, Niki Messmore

Background: As of January 2024, it is estimated that there are 4,584 homeless individuals in the state of Indiana, and 1,138 of these individuals are not sheltered. Homeless and housing insatiable individuals experience many barriers to receiving healthcare including accurate contact information, primary care, transportation, cost, and insurance. Free and low-cost clinics attempt to supplement this need by providing primary care to vulnerable populations. However, primary care cannot cover all medical needs, and referrals to specialty care are essential. Successfully tracking referrals is a problem throughout medicine, but it can be even more difficult in housing unstable communities. The goal of this project is to understand referral outcomes at the Muncie Mission Free Medical Clinic, as well as patient barriers to receiving specialized health care.

Methods: The Muncie Mission Medical Clinic's EMR will be assessed for referrals made from the clinic to specialty providers. This data will start in 2023, when the EMR program was implemented, and these referrals will be cataloged as successful, unsuccessful, or unknown based on follow up data in the EMR. In addition, a survey will be passed out at various Muncie Mission services to assess barriers to receiving specialty care via a referral process.

Results: EMR analysis of the referral results display that 60.4% of referral outcomes are unknown, 25.7% are not successful, and 13.9% are known to be successful. More than 65% of known unsuccessful visits do not have a recorded reason for visit failure. National data on EMR referral success indicates that 83% of referrals are successfully completed; however, only 35% of referrals are recorded by their primary care provider as successful. Upon survey completion people noted factors including transportation, office hours, and accurate contact information to be some of the barriers they've experienced in making and keeping their referral appointments.

Conclusions: Free medical clinics that target homeless and housing unstable populations experience more difficulty in referring for specialty care. There can be many factors contributing to this unknown referral success including loss of contact with patients, no showing appointments, and improper data entry. Additionally, the majority of unsuccessful visits are not given a reason why they are unsuccessful, limiting physician direction and follow up. Implementing a referral follow-up methodology may have the potential to connect patients to the specialized care they need.

Aligning Independent Decisions (A.I.D.) for Appearance: Alpha Testing of a Patient Decision Aid for Cleft Revision Procedures

Brody Hendricks, Elizabeth Baker, Khoa Tran, Katelyn Makar

Background: Cleft lip and/or palate are the most common craniofacial anomaly worldwide, affecting 1 in 700 births. Individuals typically undergo multiple surgeries, with some choosing elective cleft revision later in childhood to improve appearance. To support patients in this process, an online patient decision aid was developed to provide surgical information, outline benefits and risks, and help identify personal values. We hypothesized that during alpha testing, this decision aid will be viewed as acceptable, appealing, and user friendly by participants.

Methods: After IRB approval, participants not actively facing a cleft revision decision were recruited by phone for alpha testing: 4 craniofacial surgeons, 7 parents of children with cleft lip, and 2 children with isolated cleft palate. Participants viewed the decision aid using a "think aloud" approach, and sessions were recorded and transcribed. Codes were developed through content analysis, and themes evolved with code review. Participants also completed

the Decision Aid Acceptability questionnaire and the System Usability Scale (SUS).

Results: Thirteen participants completed alpha testing. Parents rated the decision aid highest for usability (Mean system usability scale score) = 93.2), followed by surgeons (78.8) and children (70.0). Most participants (76%) reported the tool's length and information were "just right" and perceived its tone as balanced. Nearly all (92%) indicated the decision aid would be helpful for surgical decision-making. Qualitative analysis identified key themes of use of affirming language, supporting realistic expectations, and improving decision aid navigation and usability.

Conclusions: The current decision aid will be adapted based upon both quantitative and qualitative analysis from alpha testing. Improving access and usability may enhance shared decision-making, reduce conflict, and increase confidence in cleft revision decisions. The updated version will undergo beta testing with patients actively considering cleft revision surgery, and the final decision aid will serve to facilitate patient-centered decision making in a highly preference-sensitive clinical situation.

Examining Sociodemographic and Diagnostic Predictors of Columbia Suicide Severity Rating Scale (C-SSRS) Scores and Suicide Attempts Within Northwest Indiana Emergency Departments

Jayden Henneman, Jonathan Guerrero, Joshua Mangum, Baraka Muvuka, Kyle Gospodarek

Background: Suicide is a public health crisis, ranked as the 11th leading cause of death in U.S. adults. Indiana suicide rates have surpassed the national average since 2000. Prior research indicates suicide risk factors vary between healthcare systems. This study examined whether analysis of sociodemographic and diagnostic predictors within emergency department (ED) data could provide more information about local suicide risk factors than the Columbia Suicide Severity Risk Scale (C-SSRS) scores alone.

Methods: Retrospective analysis of ED data from three urban hospitals in Northwest Indiana from January 2021 to March 2025 was conducted. Suicide attempts were identified via ICD-10. Suicide risk was modeled for sociodemographic factors using ordinal and binary logistic regression, with C-SSRS and suicide attempt as outcomes, respectively. Elastic net penalized logistic regression models were used to examine ICD-10 codes associated with suicide risk.

Results: The sample included 322,583 ED visits, with 1,674 (0.52%) visits involving high CSSRS scores and 454 (0.14%) suicide attempts. Sociodemographic factors with higher suicide risk included age<18 (CSSRS, suicide attempt models: OR=13.2, 11.8; p=0.017, <0.001), age 18-24 (OR=1.96, 3.31; p<0.001,<0.001), mental health diagnosis (OR=24.4, 15.7; p<0.001,<0.001), and family income <$15,000 (CSSRS model only, OR=3.37, p=0.045). ICD-10 codes most associated with high C-SSRS were severe major depressive disorder (MDD) with psychosis (OR=130.2); unspecified MDD (OR=73.9); and moderate MDD (OR=71.3). Suicide attempt was most associated with suicidal ideation (OR=71.9), accidental poisoning (OR=16.1), and cannabis dependence (OR=11.4). Notably, negative suicide attempt predictors included schizophrenia, unspecified (OR=0.22), and borderline personality disorder (BPD) (OR=0.23).

Conclusions: Consistent screening for social determinants of health may improve suicide risk identification. ED-based models can identify short-term risk factors for attempting suicide. Future research using diverse outpatient settings may provide more information on specific time scales for short- and long-term risk factors using models that can perform time-to-event analysis.

Communication and Learning Improvement Model for Bedside Skills (CLIMBS): An AI-Based Feedback Model for the Objective Standardized Clinical Examination

Liam Hobson, Chandler Lutz, David Rodgers

Background: The Objective Standardized Clinical Examination (OSCE) is a tool designed to assess and provide feedback to healthcare students; however, feedback quality is a common point of frustration for students. Common concerns with post-OSCE feedback include that it is generally not timely, comprehensive, and/or individualized. In this retrospective, quasi-experimental pilot study, we created and implemented an artificial intelligence (AI) feedback model and assessed its ability to provide accurate and reliable OSCE feedback.

Methods: Using ChatGPT-4o, we developed the Communication and Learning Improvement Model for Bedside Skills (CLIMBS) to reference a 16-metric OSCE rubric and provide feedback on OSCE transcripts derived from a custom workflow. Using a single, full-marks OSCE recording, we assessed CLIMBS by calculating transcription and feedback accuracy and examining feedback reliability against an artificially generated 'Poor Performance' transcript and a manually corrected transcript.

Results: The CLIMBS workflow exhibited 92.39% transcript accuracy and good inter-rater reliability (cosine similarity = 0.972 +/- 0.015; ICC2 = 0.744 (95% CI: [0.59, 0.88]). Overall OSCE scores assigned by CLIMBS to the unedited transcript (93.84; 95% CI [91.53, 96.17]) and the manually corrected transcript (87.69, 95% CI [81.37, 94.02]) were statistically different from the 'Poor Performance' transcript (78.08; 95% CI [71.59, 84.57]). The metric-based score pattern distribution of the manual transcript was similar to both the unedited and the 'Poor Performance' transcripts (cosine similarity = 0.890 and 0.819, respectively), while the unedited and 'Poor Performance' transcripts exhibited low overlap with each other (cosine similarity = 0.566).

Conclusions: This pilot study demonstrated that an AI model can analyze and provide accurate summative feedback to OSCE recordings – differentiating good from poor performance. The accuracy and reliability of formative feedback require further study. With future testing to improve inter-rater reliability and examine formative feedback, CLIMBS has potential to improve the timeliness, comprehensiveness, and personalization of OSCE feedback.

Pharmacologic Predictors of Engraftment and Survival in Hematopoietic Stem Cell Transplantation

Damon Ho, Aryan Patel, Stephanie N. Hurwitz

Background: For many aggressive hematologic disorders, hematopoietic stem cell (HSC) transplantation is the only curative therapy. This treatment involves collection of stem cells from healthy donors or patients themselves before pre-transplantation chemoablation, and donor cell infusion to reconstitute a healthy blood system. While HSC transplantation can be effective in treating blood diseases with poor prognoses, patient outcomes of HSC transplantation are variable, with overall 5-year survival rates of 40-60%. At early timepoints after transplantation, poor or delayed engraftment can lead to infections, hemorrhage, disease relapse, and increased mortality; however, the complex factors that lead to variable outcomes are yet to be fully understood. A recent study has shed light on a class of anti-hypertension medications that may delay engraftment (PMID: 39786370). Here we aim to more broadly understand common drugs that may impact engraftment rates and overall survival in HSC transplantation patients.

Methods: We conducted a retrospective analysis of 500 IU Health allogeneic transplantation patients from 2019-2025. Demographic data, transplant parameters, and blood count recovery from 1 week pre- to 3 months post-transplant was collected. Data was stored securely in REDCap and analyzed using Excel, OpenRefine, and GraphPad Prism.

Results: Patients receiving acyclovir, fluconazole, ondansetron, and tacrolimus post-transplant exhibited significantly faster platelet recovery within one month and higher 3-year survival rates compared to patients who were not on these medications. In adult patients, higher CD34+ cell doses modulated medication-dependent platelet recovery and survival.

Conclusions: Our findings suggest that certain medications taken in the peri-transplantation period may enhance platelet recovery and long-term survival, and that early platelet recovery could serve as a surrogate marker for survival. Future work will involve multivariate and machine learning approaches to explore additional variables, including disease type and comorbidities, to better optimize clinical decision making for HSC transplant outcomes.

Primary Care Providers' Attitudes towards Adolescent Substance Use Disorder as a Predictor of Prevention Advocacy

Emma Holder, Lauren O'Reilly, Brigid Marriott, Fangqian Ouyang, Patrick Monahan, Emily Owen, Zachary Adams, Leslie Hulvershorn, Matt Aalsma

Background: Of the 2.2 million adolescents in the US that had a substance use disorder (SUD) in 2023, only 0.5% received professional counseling or medication for SUD. Stigma is one of many potential barriers to care. Primary care is an ideal location to integrate SUD care due to frequency of care, access to resources, and provider-patient relationships. Adult primary care providers' stigmatizing beliefs about SUD is associated with less involvement in SUD care and decreased medication refills and specialist referrals. This study begins to fill the knowledge gap of primary care providers' attitudes towards adolescent SUD and provider SUD advocacy practices.

Methods: Data was collected from a cluster-randomized, stepped wedge, hybrid type III effectiveness-implementation randomized clinical trial including 25 clinical sites across 13 counties in a large midwestern hospital system that aimed to implement standardized screening processes and integrated behavioral health services. Survey participants (N=470) included medical assistants, providers (registered nurse, nurse practitioner, and physicians' assistant), physicians, and clinic staff. Descriptive analyses and inferential statistical testing of two measures for public stigma towards adolescents with a SUD and interprofessional communication (advocacy) about SUD prevention were completed. Univariate logistic regression was conducted to examine the factors of SUD prevention advocacy. A paired samples t-test was performed to evaluate whether there was a difference between the public stigma score between adolescent opioid use and marijuana use.

Results: The results showed that the mean stigma towards opioid use (M=2.99, SD=1.00) was significantly lower than the mean stigma towards marijuana use (M=3.17, SD=1.07, t(453)=- 6.126, p=<0.001). Providers had significantly higher social disengagement with adolescents with a SUD compared to other measures of stigma, including negative emotions, lack of empathy, and assessment of responsibility. The results of a paired t-test showed that the social disengagement subscore for opioid use (M=6.54, SD=1.88) was significantly higher than the mean opioid use stigma score (M=2.99, SD=1.00, t(453)=45.35, p=<0.001), and the social disengagement subscore for marijuana use (M=6.45, SD=1.97) was significantly higher than the mean marijuana use stigma score (M=3.17, SD=1.07, t(453)=40.31, p=<0.001). Across four substances (nicotine, alcohol, cannabis, and opioids), the percentage of providers with no communication about SUD prevention ranged between 37.0% and 51.2%. Regression findings indicate that male healthcare staff were at reduced odds of advocating for SUD prevention than females (OR=0.21 [95% CI 0.05, 0.61]). Registration staff had greater odds of discussing SUD prevention than providers (OR=6.36 [95% CI 3.51, 11.83]).

Conclusion: This study characterizes providers' stigmatizing beliefs and prevention advocacy towards adolescents with a SUD and identifies demographic differences that can be used to tailor intervention with providers and staff to increase advocacy.

Safety Planning for a Dementia Diagnosis: Understanding the Attitudes of Aging Firearm Owners and Identifying the Physician's Role in Developing Firearm Retirement Plans

Martha Hunter, Linda Schutzman

Background: In the US, 56 million individuals are aged 65 and older with 1 in 10 at risk of developing dementia. Among this population, 1 in 3 report firearm ownership. Dementia poses significant safety risks when coupled with firearm ownership. However, no standardized protocol exists to guide physicians in assisting aging firearm owners with planning for cognitive decline. This study aims to identify the demographic and behavioral factors associated with willingness to engage in firearm retirement planning.

Methods: A prospective survey was administered to 106 firearm owners aged 60 or older, including trauma inpatients (n = 58) and vascular clinic outpatients (n = 48). Multivariable logistic regression was used to identify predictors of openness to physician involvement in firearm retirement planning.

Results: Among respondents, 51.9% were open to or considering discussing a firearm safety plan with their physician (38.7% open, 13.2% undecided). Black respondents were significantly more likely than white respondents to endorse physician involvement (OR = 3.14, 95% CI 1.06– 9.33), as were single respondents compared to married ones (OR = 2.91, 95% CI 1.23–6.89). In contrast, those with above-basic firearm expertise (OR = 2.57, 95% CI 1.12–5.89), prior formal firearm training (OR = 2.21, 95% CI 1.00–4.89), or who stored firearms loaded (OR = 2.90, 95% CI 1.22–6.86) were more likely to oppose physician involvement. Post-survey, single respondents were also more likely to initiate firearm planning discussions with family (OR = 2.66, 95% CI 1.03–6.89).

Conclusions: Prior to completing the survey, most respondents had not discussed firearm planning; however, two-thirds intended to do so afterward. Findings suggest that Black individuals, those who are single, and those with less firearm experience may be especially receptive to physician-led firearm retirement conversations. Additional research should be done to understand the perspectives of the less receptive subgroups.

Preoperative Hypoglycemia as a Predictor of Postoperative Vitreous Hemorrhage in PDR Patients Undergoing Vitrectomy

Imran Syed Hussain, Frank Bogan, Ali Elobous, Amir Reza Hajrasouliha

Background: This study evaluated the association between preoperative glycemic status—specifically fasting hypoglycemia—and postoperative vitreous hemorrhage (POVH) incidence and visual outcomes in patients with proliferative diabetic retinopathy (PDR) undergoing pars plana vitrectomy (PPV). While much attention has been given to hyperglycemia and its impact on post-op complications, hypoglycemia is an often-underappreciated potential risk factor.

Methods: Medical records of 144 PDR patients who underwent PPV between 2020-2024 were reviewed. Preoperative fasting blood glucose levels were recorded, and patients were categorized as hypoglycemic (125 mg/dL). Postoperative vitreous hemorrhage was assessed within three months. Visual acuity (VA), measured in LogMAR, was collected preoperatively, specifically at Postoperative Day 1 (POD1), Month 1, and Month 3. Additional demographic, systemic, and ocular variables were collected. Statistical analyses included t-tests, chi-square analysis, and ANOVA to evaluate associations between glycemic status, POVH incidence, and Visual Acuity outcomes.

Results: Preoperative hypoglycemia was not significantly associated with POVH, though a trend toward increased incidence was noted. Conversely, hyperglycemia was significantly associated with higher POVH rates within three months (P=0.009**). In terms of VA outcomes, hypoglycemic patients demonstrated significant postoperative worsening at Month 1 (P=0.0001***) and Month 3 (P=0.001***). Hyperglycemic patients also experienced significantly worse VA at POD1 (P=0.04*), Month 1 (P=0.01**), and Month 3 (P=0.04*) compared to normoglycemic patients. Normoglycemic patients exhibited the most favorable recovery in visual acuity across all timepoints.

Conclusions: Both preoperative hyperglycemia and hypoglycemia

were associated with worse postoperative outcomes in PDR patients undergoing PPV. While hyperglycemia increased the risk of early POVH, hypoglycemia was linked to poorer visual outcomes. These findings underscore the clinical importance of perioperative glycemic control to potentially improve visual and surgical outcomes in this high-risk population. Future prospective studies are needed to establish evidence-based guidelines for perioperative glycemic management in ophthalmic surgery.

Associations Between Cardiac Comorbidity Burden and Atrial Fibrillation Prevalence: A Real-World-Evidence Based Approach

Nikolai Jones, Tatiana Aviles, Vyom Patel, Andrei Feldiorean, Lawrence Judy, Dale Saxon

Background: In the aging US population, atrial fibrillation (AFib) is increasingly prevalent, affecting nearly 5% of individuals. While previous studies have identified independent risk factors such as heart failure (HF), coronary artery disease (CAD), hypertension (HTN), hyperlipidemia (HLD), and type 2 diabetes (T2D), less is known about how these conditions relate to AFib when co-occurring. We aimed to assess how frequently AFib is observed in individuals with one or more of these conditions and to estimate odds ratios associated with both individual and combined disease states.

Methods: We performed a retrospective analysis using the IU School of Medicine-Evansville RWEdataLab (CRC/Sidus Insights) cardiac database, which includes electronic health records for 3.5 million de-identified individuals. ICD-9 and ICD-10 codes were used to identify chronic forms of AFib, HF, CAD, HTN, HLD, and T2D. Adults 49+ were included and stratified by sex (total: 3.00M, 1.54M female). Odds ratios (ORs) along with their 95% confidence intervals (CIs) were calculated.

Results: AFib was more frequently observed among individuals with cardiac conditions and T2D. Heart failure demonstrated the strongest association with AFib with OR of 7.04 (95% CI: 6.95 – 7.12) in males and 8.12 (95% CI: 8.01 – 8.23) in females. Other conditions, such as CAD, HTN, HLD, and T2D were associated with elevated AFib odds, ranging from an OR of 2.47 with T2D to 6.38 with HTN. 20 ORs were calculated.

Conclusions: These findings demonstrate that the odds ratio for AFib changes with different combinations of comorbidities, such as HF and HTN, which is consistent with current literature. Future work should involve multivariate models to control for confounders like healthcare utilization and treatment effects. Limitations include inability to determine temporality and causality. Longitudinal studies could help establish temporality and determine whether individuals with certain cardiometabolic profiles might benefit from targeted AFib screening.

Is the Social Vulnerability Index Related to Outcomes in Pregnancies Complicated by Type 2 Diabetes?

Claudia Linczer Kabele, Christina Scifres

Background: Type 2 diabetes (T2D) is associated with increased risk for adverse maternal and fetal outcomes. Using the Social Vulnerability Index (SVI), a measure developed by the CDC, studies show that women in areas of higher social vulnerability face challenges achieving recommended glycemic targets. We investigated whether pregnancies complicated by T2D and higher social vulnerability have increased adverse perinatal outcomes.

Methods: We performed a retrospective cohort study looking at pregnancies complicated by T2D who delivered at Eskenazi and IU Health from January 2018 to December 2020. Demographic, medical history, and pregnancy outcome data were abstracted. We used the Census Geocoder Tool to match each patient's address with the respective census tract and SVI value. SVIs were divided into tertiles (< 0.492, 0.492 - 0.7792, > 0.7792). We compared demographic and perinatal outcomes using chi-square tests and ANOVA as indicated across SVI tertiles.

Results: The SVI was calculated for 349/371 (94%) participants. Those in the highest tertile of SVI were less likely to initiate prenatal care in the first trimester compared to those in the lowest tertiles (79 vs 70 vs 59%, p=0.005). HbA1c values were similar across SVI groups. The proportion of those with T2D who received prenatal care at Eskenazi Health increased across SVI tertiles (21 vs 34 vs 58%, p<0.001). Unexpectedly, birth weight, preterm birth, hypertensive disorders, and neonatal morbidity did not differ among groups.

Conclusions: The SVI identifies individuals at increased risk for initiation of prenatal care after the first trimester. Rates of adverse outcomes were high among all individuals with T2D and did not vary significantly by SVI tertile. To better understand the impact of public health support provided by Eskenazi on perinatal outcomes among those with T2D and a high SVI, data abstraction from 2021 to 2024 is ongoing.

Perioperative Instrumentation and Factors that Impact Intravesical Urothelial Carcinoma Recurrence After Nephroureterectomy

Joseph Kaefer, Daniel Sidhom, Chandru Sundaram

Background: Urothelial carcinoma of the ureter and renal pelvis has a tendency to recur following surgical intervention. A leading theory attributes this pattern to tumor seeding occurring during diagnostic or surgical procedures. Instruments commonly used during diagnostic and surgical intervention, such as ureteral stents, may influence recurrence rates.

Methods: Electronic medical records of 201 patients with a history of upper tract urothelial carcinoma and nephroureterectomy were reviewed. Seventy clinical factors were recorded and organized into pre-, peri-, and post-surgical categories. Of these variables pre-procedural ureteroscopy, access sheath use, stent placement, and biopsy were analyzed in connection to recurrence. Perioperative factors analyzed included the presence of a stent during the nephroureterectomy and the surgical approach (open vs. minimally invasive). Odds ratios (OR) and statistical significance (p-value) were used to determine potential correlation.

Results: Of the 201 patients, 105 (52.2%) experienced recurrence. Pre-procedural biopsy (OR 0.87, p=0.67), pre-procedural ureteroscopy (OR 0.96, p = 0.90), and surgical approach (OR 1.04, p=0.90) demonstrated no significant impact on recurrence. Use of an access sheath during the diagnostic procedure (OR 1.22, p=0.53) and pre-procedural stent placement (OR 1.26, p=0.45) suggested an increase in recurrence, although not statistically significant. The presence of a stent during nephroureterectomy demonstrated a higher risk of recurrence (OR 1.8) and neared statistical significance (p=0.05).

Conclusion: These findings suggest that certain perioperative factors such as the presence of a stent during nephroureterectomy may contribute to increased recurrence rates through mechanisms such as tumor seeding. Our study approaches statistical significance. Analysis of a larger cohort is anticipated to strengthen this association.

The Impact of Manual Correction on Automated Hippocampal Volumetry in a Young Athletic Cohort with Variable Level of Exposure to Head Trauma

Demetrios Kamiotis, Ho-Ching Yang, Yomna Takieldeen, Salman Shahid, Yu-Chien Wu

Introduction: An estimated 1.6 to 3.8 million people suffer from sport-related concussion annually, yet the long-term effects of concussion and repetitive head injury exposure are not fully understood. Given the potential risk of future neurodegeneration, the hippocampus has emerged as a key region of interest. While post-mortem studies demonstrated marked hippocampal atrophy in athletes from high-impact sports, more recent in-vivo research reveals more nuanced findings as they rely heavily on imaging and segmentation accuracy. Freesurfer, a widely used tool for automated hippocampal segmentation, has been shown to

overestimate the volume, especially in older populations. In this study, we evaluated the accuracy of Freesurfer's segmentation against manual refinement in a cohort with head impact exposure.

Methods: Structural MRI data (T1W and T2W) of the CARE-SALTOS Integrated (CSI) project was used for hippocampal segmentation using FreeSurfer (7.4.1). Twenty participants (age range: 29 to 32) were sex-matched and grouped into high-exposure (n=10, including 5 football players) and low-exposure cohorts (n=10). The hippocampal volumes were compared between initial automatic segmentations and subsequent manually refined delineations by a trained medical professional using paired t-tests.

Results: Our results showed significant differences in the hippocampal volume between automatic segmentation and after manual refinement. By visual inspection, FreeSurfer tends to overestimate hippocampal segmentation volumes as generated masks extend into lateral ventricular spaces and include choroid plexus. In both groups, hippocampal volumes significantly decreased after manual refinement (Left Hippocampus, -788.81±245.30mm3 , p=1.15E-11; Right Hippocampus, -649.60±246.83mm3 , p=3.59E-10).

Conclusion: Based on our results, we conclude that while automatic segmentation is a feasible and fast method for large datasets, it requires subsequent manual refining to ensure data accuracy by avoiding volumetric overestimation and potential bias from adjacent ventricular areas.

PD-1 and VEGF Peptide Vaccine Combination Display Synergistic Anti-Tumor Effect in Cancer Immunotherapy

Navjot Kaur, Linlin Guo, Jay Overholser, Pravin T.P Kaumaya

Cancer immunotherapy with checkpoint inhibitors (PD-1, CTLA-4, etc.) have had promising effects on suppressing tumor growth in numerous cancers. Programmed death-1 (PD-1) is a receptor commonly expressed on T cells where it plays a key role in maintaining self-tolerance and preventing autoimmunity. In a normal functioning immune system, when PD1 ligand (PDL1) binds PD-1 receptor, T cell activation is suppressed. Meanwhile, vascular endothelial growth factor (VEGF) is a growth factor secreted by tumor cells that promotes angiogenesis, a key requirement by which tumors grow and invade surrounding tissue. In this study, we aim to exploit the immunological roles of PD-1 and VEGF to promote further T cell activation and inhibit angiogenesis in colon tumors, respectively. By administering the combination of B cell epitopes PD-1 and VEGF peptide vaccines in mouse models, we hypothesize the host immune system will elicit a response by generating neutralizing antibodies to the B cell epitopes in a synergistic manner. To test this, BALB/c mice were immunized with the PD-1/VEGF combination three times and subsequently challenged with the CT26 colon cancer cell line. Antigenicity and immunogenicity were monitored by collecting serum and performing enzyme-linked immunosorbent assay (ELISA). Tumor growth was also monitored for 2 weeks. Results indicate increasing immunogenicity upon subsequent immunizations, along with decreased tumor growth compared to controls. These data suggest the combination of PD-1 and VEGF peptide vaccines synergistically enhance survival outcomes by slowing tumor growth and hold a strong potential as an applicable treatment strategy for colon carcinomas. These findings support further investigation of vaccine efficacy in other cancer models.

Mapping Mitochondrial Interactions with Endoplasmic Reticulum and Plasma Membrane Under DNA Damage in Prostate Cancer Cells

Faris Khan, Jennifer Rooks, Asmaa El-Kenawi

Introduction: Prostate Cancer is the second leading cause of cancer death in men in US. The primary treatment for prostate cancer is androgen deprivation therapy (ADT). If cancer progresses while being treated with ADT, the cancer is classified as metastatic castration resistant to prostate cancer. Poly (ADP-ribose)

polymerase inhibitors (PARPi) have demonstrated promising results for castration-resistant (and castration-sensitive) prostate cancer. However, some patients develop resistance to PARPi. The mechanisms of action of these drugs are not fully understood and are vital to overcoming PARPi resistance. Therefore, the aim of this study is to fill our knowledge gap of how PARPi affects organelle crosstalk, specifically mitochondrial interactions with the endoplasmic reticulum and plasma membrane.

Methods: LNCaP and MDA PCa 2b, androgen-sensitive cell lines, were treated with 12.5 μM of Olaparib and Rucaparib (FDA-approved PARPi) for 48 hours. A proximity ligation assay (PLA) was used to highlight mitochondrial interactions with the endoplasmic reticulum and with the plasma membrane. Confocal microscopy was used to image these interactions. Kamoshita's (2023) protocol was modified and implemented to quantify the number of interactions between the organelles in the PLA. A pretrained machine learning model, Cellpose, was used to segment the nuclei and obtain an average number of interactions between organelles per cell.

Results: When treated with Olaparib and with Rucaparib, LNCaP cell lines had more mitochondria-endoplasmic reticulum interactions compared to the control ($P<0.05$). There were no significant changes in the number of mitochondria-plasma membrane interactions in LNCaP cell lines when treated with PARPi. There were no significant changes in the number of mitochondria-endoplasmic reticulum and mitochondria-plasma membrane interactions in MDA PCa 2b cell lines when treated with PARPi.

Conclusion: Findings suggest that PARPi affects organelle crosstalk in prostate cancer cells. Further research should investigate how PARPi affects organelle crosstalk in PARPi-resistant cancer cells to improve patient outcomes.

Optimization of a RAG Model Chatbot for Medical Education

Kenzie Knight, Kelsey Pape, Esther Kim, Caroline Rouse, David Hanson, Anthony Shanks

Background/Objective: In fast-paced clinical settings like labor and delivery, quick access to accurate, evidence-based guidance is critical. Traditional methods of sharing protocols can be inefficient, especially for trainees managing complex scenarios. Advances in artificial intelligence (AI) and large language models (LLMs) offer the potential to transform how critical clinical decision-making tools are disseminated, making them more accessible, responsive, and integrated into real-time learning. Our objective was to develop our own chatbot to facilitate quick retrieval and enhanced learning.

Methods: The AI chatbot was developed by IUSM researchers using Microsoft Copilot Studio and made accessible via Microsoft Teams. The AI chatbot was built on a retrieval-augmented generation (RAG) framework, leveraging a fine-tuned LLM. The base LLM was augmented with domainspecific documents, including IUSM protocols – developed by the Maternal-Fetal Medicine division - which incorporate evidence-based practices and provide a consistent management strategy for OB conditions. The RAG architecture was configured to retrieve contextually relevant documents from the collection of protocols in response to user queries.

Results: The chatbot retrieves information from the protocols based on a user's query and generates a relevant answer with reference to the sources. Upon testing the chatbot, we learned that the chatbot was unable to retrieve information from figures, flowcharts, and diagrams. Therefore, figures were manually annotated and narrated, enabling the model to process and retrieve relevant visual information during inference. With other adjustments, the chatbot is able to read all aspects of the protocols and synthesize accurate answers to clinical questions.

Conclusion and Potential Impact: We optimized an RAG model AI chatbot for clinical education, demonstrating that existing

educational material can be used to activate a chatbot to serve clinical needs with sufficient oversight to ensure clinical accuracy. Future directions include evaluating its impact on clinical decision making and student perception of the learning environment once the chatbot is more uniformly adopted.

Physician Education and Knowledge, Attitudes, and Practices Surrounding Opioid Education

Victoria Leeder, Polly Husmann

Background/Objective: Many currently practicing physicians have not received adequate training on opioids, opioid use disorder, and medications for opioid use disorder (MOUDs). The primary goal of this study was to determine physician knowledge, attitudes, and practices regarding these topics.

Methods: This was done by interviewing four physicians with a set of predetermined questions and allowing them to elaborate where they saw fit. A thematic analysis was then conducted on their transcripts.

Results and Conclusions: The thematic analysis revealed three themes. First, that significant patient and medication complexity leads to physician hesitation to prescribe. Second, that there are inconsistencies in resources offered to patients and providers. Third, for many current providers, continuing medical education (CME) is their only source of opioid and MOUD education. The primary barrier identified in this analysis is finding a balance between providing consistent resources and actions for physicians while tailoring specialty-specific training that best serves patients' needs.

Limitations and Future Directions: The major limitation of this study is the sample size and concentration of physicians to one geographic area. Additionally, the physicians practice at different hospitals, leading to both beneficial and detrimental response variability. The interviews conducted for this study will be used to build a larger study considering what changes can be made to increase the efficacy of opioid CME. The objective is to increase physician participation, engagement, and interest in the topic.

Neuroregenerative Effects of Human Neuritin 1 on Glaucomatous Human Retinal Ganglion Cells

Ksenia N. Lewyckyj, Shahna S. Hameed, Tasneem P. Sharma

Purpose: Glaucoma is a group of optic neuropathies characterized by progressive loss of retinal ganglion cells (RGC) and corresponding visual field deficits. Current treatments can only slow the progression of glaucoma, but RGC death is not preventable and irreversible. Thus, neurotrophic factor therapy may be a suitable therapeutic approach. Human Neuritin 1 (NRN1) has demonstrated neurodegenerative and neuroprotective properties, and our group has previously established that NRN1 is downregulated in glaucomatous RGCs. We will investigate the therapeutic potential of NRN1 on human RGCs using a human stem cell-derived RGC model.

Methods: Corneal fibroblasts from glaucomatous and non-glaucomatous post-humous donor tissue were reprogrammed into induced pluripotent stem cells (iPSCs) using the CytoTuneTM-iPSC 2.0 Sendai reprogramming kit. These iPSCs were characterized via PCR (C-MYC, KLF4, SOX2, NANOG) and immunofluorescence staining (TRA-1-60, SOX2) and karyotyped. The iPSCs were differentiated into three-dimensional retinal organoids (ROs) from which RGCs were dissociated. PCR (RBPMS, THY1) and immunofluorescence staining (RBPMS, BRN3A, DAPI) were used to characterize RGCs. The RGC apoptosis and neurite outgrowth were measured with and without NRN1 treatment using markers such as CASP3 and NEFL respectively.

Results: NRN1 treatment enhanced neurite outgrowth and reduced RGC apoptosis in NRN1 treated RGCs compared to untreated cells.

Conclusions: These findings confirm that NRN1 enhances

neurite outgrowth and RGC survival in human glaucomatous cells, further demonstrating its potential as a candidate for glaucoma therapy.

Association Between Semaglutide Use and Mood Disorders in Patients with Type 2 Diabetes

Uday Lomada, Jonathan Rusche, Steven Wu, Gattadahalli S. Seetharam

Background and Objective: Glucagon-like peptide-1 receptor agonists (GLP-1 RAs) have been approved for blood glucose management and weight loss since 2005 with the FDA approval of exenatide. However, research has shown mixed results concerning effects on mood. The aim of this study is to investigate whether the use of the GLP-1 RA semaglutide, specifically Ozempic, is associated with mood disorder diagnoses, particularly depression and anxiety.

Methods: A retrospective study was conducted using data from the IU School of Medicine-Evansville RWEdataLab (CRC/Sidus Insights) national Real-World psychiatry and cardiology databases containing de-identified EHR information. The databases were searched for patients with type 2 diabetes. Odds ratios were calculated to compare the occurrence of depressive episodes, major depression, or anxiety after 2018 given at least one documented prescription of Ozempic.

Results: A total of 660,523 patients with type 2 diabetes were identified from 5,316,216 patients in the psychiatric database. 187,838 patients were identified from 3,396,429 patients in the cardiac database. The psychiatric database demonstrated semaglutide was significantly associated with higher odds of mood disorder diagnoses: anxiety (OR 2.323; 95% CI: 2.277–2.370), depressive episodes (OR 2.029; 95% CI: 1.988–2.071), and major depression (OR 1.449; 95% CI: 1.406– 1.493). The cardiac database demonstrates similar trends: anxiety (OR 1.967; 95% CI: 1.792– 2.159), depressive episodes (OR 1.585; 95% CI: 1.398–1.797), and major depression (OR 1.660; 95% CI: 1.317–2.092).

Conclusion and Potential Impacts: Our findings suggest that in patients with T2DM, semaglutide prescription is likely positively associated with a mood disorder diagnosis. Limitations of the database include a lack of dosage information and potential over- and underrepresentation of the true prevalence of mood diagnoses. Additionally, the observational nature of the study means causality cannot be implied. However, our findings suggest increased vigilance for depression and anxiety is appropriate in patients prescribed semaglutide.

Revolutionizing OSCE Preparation Through AI-Driven Synthetic Patients

Chandler Lutz, Liam Hobson, David Rodgers

Background: Objective Structured Clinical Examination (OSCE) preparation is a key component of medical student training. Traditional methods like standardized patient (SP) encounters and peer-to-peer practice provide valuable experience but are limited by inconsistent feedback, access issues, and time constraints. To support OSCE preparation, we developed AI-driven synthetic patients that offer students a flexible, accessible, and consistent practice tool. Using ChatGPT-4o and core clinical competencies expected of first-year students at Indiana University School of Medicine (IUSM), we piloted virtual patients that simulate realistic encounters—enabling conversational interviews with immediate, structured feedback.

Methods: Five interactive synthetic patient cases were created to reflect common OSCE scenarios. Each case included a computerized door note, dynamic dialogue, realistic patient responses, and downloadable feedback modeled after IUSM OSCE grading rubrics. We recruited 14 rising second-year medical students at IUSM–Bloomington to interview the synthetic patients. A preinterview survey assessed students' prior OSCE preparation, while a post-interview survey evaluated the tool's realism, usefulness, and convenience, and gathered qualitative feedback.

Results: The pre-interview survey revealed that a majority of students (9 of 14) desired additional tools to support history-taking practice for the OSCE. In the post-interview survey (n=6), students rated the tool an average of 7.5 for usefulness, 7.5 for realism, and 9.5 for convenience on a 10-point Likert scale. Participants appreciated the ability to engage with the tool independently and at their own pace, simulating the structure of a real OSCE. All participants recommended integrating the tool into first-year OSCE preparation and expressed strong interest in expanding its use for second-year OSCE preparation.

Conclusion and Future Directions: This pilot demonstrates strong student support for AI-based OSCE preparation. Full implementation is planned for Fall 2025 at IUSM–Bloomington, where we will compare OSCE outcomes between users and non-users.

The Role of Pre-Plus Disease in the Efficacy of Supplemental Oxygen for Stage 2 Retinopathy of Prematurity

Nathan Macha, Charline Boente, Kok Lim Kua, Kathryn Haider

Background/Objective: Retinopathy of prematurity (ROP) is a vasoproliferative retinal disorder primarily affecting premature infants and remains a leading cause of preventable childhood blindness. Recent evidence suggests that supplemental oxygen administered to maintain an oxygen saturation of 97-99% may help arrest disease progression from retinal ischemia and hypoxia. The influence of pre-plus disease on treatment response to oxygen supplementation, however, has not been well characterized. We sought to examine whether pre-plus status at oxygen therapy initiation impacts its effectiveness in preventing the need for laser photocoagulation or intravitreal bevacizumab (IVB) in infants with stage 2 ROP.

Methods: A retrospective chart review was performed on infants diagnosed with stage 2 ROP at Riley Hospital for Children between 8/2020 and 9/2024. Infants were stratified based on vascular findings at the initiation of oxygen therapy as either "pre-plus" or "normal". Demographic data and clinical comorbidities known to affect ROP were collected from medical records for both cohorts. The primary endpoint was the requirement for ROP intervention.

Results: A total of 152 patients met inclusion criteria, of which 70 had pre-plus disease and 82 had normal vasculature at oxygen therapy initiation. Infants with pre-plus disease had significantly lower birthweights ($p = 0.02$) and gestational age at birth ($p < 0.01$), as well as a higher occurrence of sepsis ($p = 0.01$). The need for treatment was substantially higher in the pre-plus cohort (54%) compared to the normal cohort (22%, $p < 0.01$). Both cohorts were similar in the type of treatment received, the age of first treatment, and the number of laser spots.

Conclusion: The presence of pre-plus disease when supplemental oxygen is initiated correlates with significantly higher rates of subsequent ROP treatment, indicating that oxygen therapy alone may be less effective in this population. Patient stratification based on pre-plus status should be considered when assessing supplemental oxygen use.

Inpatient Consultation for the Management of Infantile Hemangiomas

Madeline Mahoney, Anita Haggstrom, Edita Newton, Jenna Streicher

Background/Objective: Infantile Hemangiomas (IH) are the most common pediatric benign vascular tumors, affecting approximately 4-5% of infants. To our knowledge, there has not been a dedicated study looking at inpatient dermatology consultation for IH. While the majority of IH do not require treatment, high risk hemangioma may require additional workup and treatment. This study aims to characterize clinical and demographic features, identify associated comorbidities and risk

factors, and describe the utilization of pediatric dermatology consult service at Riley Children's Hospital for management of IH.

Methods: A REDCap database was used to record demographic and clinical characteristics, treatment details, and Hemangioma Severity Score on 36 patients from 12/19/2022 – 10/17/2024 and 1/20/2025 – 6/20/2025 who consulted dermatology. Excel and REDCap were both utilized for analysis.

Results: The majority of consultations consisted of infants born at less than 37 weeks of gestational age (GA). Consultations were evenly split between NICU and general pediatric wards, however, the median GA at the time of consultation was 9.35 weeks for NICU patients and 7.75 weeks for pediatric ward patients. Preterm infants were more likely to present with superficial IH, particularly those with thicker subtype and stepped border. Stepped borders are associated with a higher risk of permanent disfigurement. Notably, 0.25% topical timolol was more frequently recommended over the standard 0.5% formulation recommended by current literature.

Conclusion and Potential Impact: This study highlights the importance of dermatological input in the inpatient setting for the management of IH. Characterizing consult patterns provides a foundation for future inpatient IH consultation studies. Future directions may include evaluating off-label timolol use in the inpatient setting and analyzing delays in NICU referral to improve IH outcomes.

Defining Pharmacodynamic Gene Markers and the Biological Processes of INPP5D Modulation Across Experimental Models

Roma Matharu, Disha Soni, Peter Lin, Isaac Caballero-Floran, Bruce Lamb, Claudia Rangel-Barajes, Adrian Oblak

Background: Alzheimer's disease (AD) is a progressive neurodegenerative disorder marked by the accumulation of extracellular amyloid-β plaques and intracellular neurofibrillary tau tangles. Microglia respond to these pathological features but often become functionally impaired as the disease advances. INPP5D (also known as SHIP1), a phosphatase broadly expressed in hematopoietic cells and restricted to microglia within the brain, plays a key inhibitory role in regulating microglial activity. It acts through receptors such as TREM2, Dectin-1, and FcγR via the PI3K/AKT signaling axis. Preclinical studies suggest that inhibiting INPP5D enhances microglial function and reduces AD-related pathology. To advance INPP5D-targeted therapies, it is essential to characterize the downstream transcriptional effects of inhibition. Identifying consistent gene expression changes across experimental models can help establish pharmacodynamic markers and clarify biological pathways to guide therapeutic development.

Methods: We investigated transcriptomic alterations associated with INPP5D inhibition using four models: (1) primary mouse microglia from Inpp5d haplodeficient versus wild-type mice (in vitro), (2) TAD32-treated versus vehicle-treated primary microglia (in vitro), (3) TAD32-treated versus vehicle-treated C57BL/6J mice (in vivo), and (4) INPP5D-targeting siRNA versus scrambled RNA-treated C57BL/6J mice (in vivo). Gene expression was profiled using Nanostring's neuroinflammation and glial panels. Differentially expressed genes (DEGs) were compared across models to identify shared molecular signatures, and enrichment analysis was performed.

Results: Despite a limited overlap of individual DEGs, we observed consistent enrichment of key biological pathways related to phagocytosis (including FcγR signaling, lysosomal function, and complement activation), inflammatory regulation (TLR, IL-17, and TNF signaling), and PI3K/AKT signaling. These findings suggest that INPP5D inhibition elicits conserved functional effects across diverse experimental contexts.

The Indiana POST Form: Do You Know What You're Signing?

Kiernan McCormick, Valerie O'Loughlin, Kathleen Zoppi

Background: The Indiana Physician Orders for Scope of Treatment (POST) form is utilized as a baseline to develop Advanced Care Directives (ACDs) for many Hoosiers. Designed for those with advanced/terminal disease to plan their end-of-life care, it is often the starting point when developing ACDs in general in Indiana. The form requires a physician's signature to be recognized; this is no guarantee that all patients filling it out are provided with the same depth and clarity. With such heavy implications, it should be formatted to be digestible by the general populace.

Methods: Patients in the waiting room of a primary care office were recruited through convenience sampling completed three iterations of the POST form in sequence with each having more information than the last. Participants rated how confident they were based on the information they were provided on a seven-point Likert scale to measure the impact of each change throughout the survey.

Results: Measuring the impact of each additional change using paired t-tests, we found that compared to the base POST form, both increased participant confidence ($p<0.001$). Intriguingly, the added risks and considerations for the third time through the form were not significant, likely due to added variables and potential negatives making participants second guess. Addition of these adverse effects could lead to confusion and outline the role of the physician in the discussion.

Conclusion: While the form is streamlined for the sake of time, adding only the plain-language summary was enough to significantly increase confidence. With further exploration, the Indiana POST form can be improved to allow for more patient autonomy during the decision-making process. By empowering patients to make end-of-life care decisions more in line with their goals, physicians can foster better relationships with patients and be certain that they are acting in their best interests.

Characterizing Predictors of Repeat Emergency Department Visits in Patients with a Cancer Diagnosis

Anastasia E. Metropulos, Joshua Mangum, Kyle Gospodarek, Jonathan Guerrero, Baraka Muvuka

Background: Cancer remains the second-leading cause of death in the United States. The emergency department (ED) plays a vital role in the initial diagnosis of cancer for many patients. There are several studies on cancer identification in the ED and less on ED utilization patterns among patients with cancer. This study characterized patterns and predictors of ED visits in patients with cancer.

Methods: This retrospective study analyzed routine EPIC-based social determinants of health screenings for all ED visits involving patients with cancer across three urban hospitals in Northwest Indiana from January 2021-March 2025. Cancer diagnoses were identified using ICD-10. The dependent variable was the number of ED visits. Data analysis comprised descriptive, bivariate (Mann-Whitney, Kruskal Wallis) and multivariate analyses (linear regression) using IBM SPSS v.31.0 ($p < 0.05$).

Results: The sample comprised 1026 patients with cancer, with lymphoid/hematopoietic (20.0%), ill-defined/secondary (19.0%), and genitourinary (16.3%) cancers being most represented. Bivariate analysis identified statistically significant associations ($p < 0.05$) between number of ED visits and age, race, language, family income, and hospital. Multivariate analysis revealed more ED visits in patients identifying as Black/African American ($p < 0.05$, $B = 0.694$), Other race ($p < 0.001$, $B = 2.223$), and receiving care at Hospital B ($p < 0.001$, $B = 0.841$). Age ($p < 0.001$, $B = -0.050$), family income ($p < 0.005$, $B = -0.104$), and Spanish language ($p < 0.05$, $B = -1.350$) were associated with fewer ED visits.

Conclusions: This study addresses the gap in identifying predictors of ED utilization among patients with cancer. Future efforts should validate these results in larger samples, focus on ED integration into the cancer care continuum, and support more vulnerable patient populations to minimize cancer disparities.

Comparison of the Sysmex UF-5000 urine flow cytometer to urine leukocyte esterase and urethral Gram stain in the detection of urethritis in men

Ishaan K. Modi, Xiaoli Zhang, Evelyn Toh, David Nelson, Stephen Jordan

Background: Urethritis (urethral inflammation) is a common condition encountered in primary care and sexually transmitted infection (STI) clinics. Urethritis diagnosis requires evidence of inflammation. The Centers for Disease Control (CDC) recommends testing for increased white blood cells (WBCs) by urethral Gram stain smear (GSS) or the presence of leukocyte esterase (LE) by urinalysis. However, the urethral swab procedure is invasive while the LE assay is insensitive. We compared the performance of the Sysmex UF-5000 urinary flow cytometer to LE, urethral GSS, and a clinical diagnosis of urethritis.

Methods: Remnant urine specimens collected from males aged 18 and older who presented to the Bell Flower STI Clinic in Indianapolis with STI symptoms, for STI treatment, or screening were analyzed. WBC/μL urine was determined using the UF-5000 and LE was determined by urinalysis. Demographic and clinical metadata were abstracted from the electronic medical record. Welch t-tests were performed to assess statistical significance (p-values < 0.05).

Results: Five hundred and fifty (550) specimens were included in this study. Participants' median age was 32 (range 18-74), 46% were Black, 35% were White, and 79% were non-Hispanic. 64% identified as heterosexual and 26% as men who have sex with men. The UF-5000 mean WBC count was elevated in participants who had a positive LE (676 vs 27 WBCs/μL, p=0.0007), reported urethritis symptoms (162 vs 29 WBCs/μL, p=0.0024), had ≥ 5 WBCs per high-power field by GSS microscopy (507 vs 39 WBCs/μL, p=0.0032), and were diagnosed with urethritis (382 vs 27 WBCs/μL, p=0.0011).

Conclusions: The Sysmex UF-5000 detected increased WBCs in men with confirmed urethritis and could be a rapid, non-invasive point-of care-test for urethritis. Future studies will define the assay performance (ROC curves) to identify optimal WBC cut-offs to diagnose urethritis and predict specific STIs, caused by N. gonorrhoeae or C. trachomatis.

Descriptive Study of Nutritional Deficiencies and Core Demographics of Pyoderma Gangrenosum Cases Presenting to Indiana University's Comprehensive Wound Center

Yatziri Moreno, Sahand Rahnama-Moghadam

Background: Pyoderma Gangrenosum (PG) is a rare, neutrophilic dermatosis characterized by rapidly progressing skin ulcers. PG has been associated with autoimmune inflammatory conditions. Nutritional deficiencies may impact disease progression and wound healing; however, there are no standardized nutritional assessments for PG. This study aims to characterize the clinical and biochemical profiles of patients with PG at Indiana University.

Methods: A retrospective chart review was conducted using Cerner electronic medical records. Patients with an ICD 9/10 diagnosis of PG were included in the initial screening. Charts were reviewed to assess the accuracy of diagnosis. Collected data included demographics, clinical course, autoimmune comorbidities, and biochemical markers. Laboratory values were collected from the period of PG onset through resolution, with the date of diagnosis being prioritized. Data was entered into REDCap and analyzed descriptively in Excel.

Results: This 148-patient cohort had a mean age of 49.2 years (SD = 19.41) and BMI of 32.5 kg/m2 (SD = 10.46). Most patients were White (82.19%), non-Hispanic (97.30%), and Female (64.86%). 56.08% of patients had autoimmune comorbidities. Nutritional assessments were performed in 56.76% of patients. Notably, 44.44% were vitamin D deficient, and 51.28% were iron deficient by their iron saturation.

Conclusions: Our cohort is one of the largest single-center studies in the United States. Our findings reveal that PG may occur in

patients that are overweight and more likely to have vitamin D deficiency; these associations are nearly as frequent as autoimmune disease associations. Towards our secondary aim of describing associations, PG is frequently associated with autoimmune conditions and metabolic comorbidities, and our study helps narrow down the rate of occurrence. Despite increased recognition of these associations, gaps remain in the standardized evaluation of nutritional deficiencies in PG. Our findings underscore the need for future research to better define the role of nutritional factors in PG onset, progression, and healing.

Evaluating the Effectiveness of Fremanezumab on Open Femoral Osteotomy-Induced Pain and Inflammation

Jackson Moss, Natalie Nguyen, Tyler Nguyen, Alexander Obukhov, Fletcher White

Background: People who suffer from fractures frequently have injury-associated pain. The current pain management options are opioids and nonsteroidal anti-inflammatory drugs (NSAIDs), however, these drugs present a challenging recovery process impairing skeletal repair. Recent research efforts found that the neuropeptide calcitonin gene-related peptide-α (CGRP) plays a critical role in both bone repair and pain states post-trauma. CGRP is known to be important to vasodilation, neurogenic inflammation peripherally, mechanical and thermal hyperalgesia centrally, and inflammation-dependent bone repair. This neuropeptide has become a potential therapeutic target for bone fracture pain. Fremanezumab (Ajovy), a monoclonal antibody against CGRP, has been shown to reduce clinical pain states and recently received FDA approval for migraine prophylaxis. This study aims to evaluate the effect of Ajovy as an analgesic therapy following femur fracture.

Methods: C57BL/6 female mice were subjected to open femoral osteotomy and then treated with either saline or Ajovy (30mg/kg, intraperitoneally) every day for 7 days following fracture. In vivo bioluminescence imaging (IVIS) was performed to assess caspase-1 mediated inflammation. Grimace Scoring was used to evaluate pain response at various time points before and after treatment.

Results: Through IVIS, we found that mice subjected to femur fracture exhibit profound inflammatory response up to 3 weeks post-trauma and this response was attenuated with Ajovy treatment. Furthermore, preliminary behavioral data found a trend of decreased pain behaviors in the Ajovy-treated fractured mice compared to the saline control. Specifically, at 2 weeks postfracture there was a significant reduction in the pain score.

Conclusion: The effect of modulating CGRP signaling in bone healing is yet to be determined. However, this preliminary study reveals promising results in reducing inflammation and painful behavior with Ajovy administered near the time of injury. Additional works aiming to increase the cohort number and assess bone healing are currently ongoing.

Recommendations for Indiana's Reach Out and Read Strategic Plan

Uchechukwu Nnate, Niki Messmore

Background: Reach Out and Read is a nationwide nonprofit that partners with pediatricians to distribute books to children ages 6 months to 5 years old during their well child visits. Physicians deliver anticipatory guidance to parents and instruct them on the importance of reading for brain development and school readiness. This literary model is the only national program endorsed by the American Academy of Pediatrics as studies have demonstrated that participants are more likely to read with their children and have improved language development. Currently, they serve 26% of the nation's children, but in their new strategic plan they have highlighted their goal of reaching 50% of children in the United States by the end of 2030. By partnering with the Indiana Reach Out and Read State Chapter, this project seeks to recommend which counties would best align with their equitable growth goals based on population demographics.

Methods: Indiana's Reach Out and Read State Chapter provided June 2024 site data which was used to calculate total site number and average book distribution percentages per county. Publicly available census data was then used to identify the top 10 and top 20 counties with the highest external need criteria.

Results: This method produced 28 counties that were top 10 in the state for at least two external need criteria, 13 of which have no current Reach Out and Read sites. The next phase of this project is to identify critical healthcare services sites within each of these counties that could serve as potential partners for future Reach Out and Read initiatives.

Predictive Factors for Hypertensive Disorders of Pregnancy in a Pregnancy Cohort at Risk for Gestational Diabetes

Isabel R. Ortiz, Yuedi Yang, Aric Kotarski, Maha Aamir, Haley Schmidt, Rafael F. Guerrero, David M. Haas

Background: Hypertensive disorders of pregnancy (HDP) are a leading cause of both maternal and neonatal morbidity and mortality worldwide. Predicting which pregnant patients will develop HDP, however, remains a challenge, as existing models often overlook the value of incorporating both behavioral and genetic factors. The objective of this study was to identify predictive factors for HDP, including behavioral, psychosocial, and genetic characteristics not typically included in other models.

Methods: We conducted a secondary analysis of the Hoosier Mom Cohort, a prospective observational study of pregnant individuals preferentially recruited to assess predictors for gestational diabetes. Participants completed detailed surveys on behavioral and psychosocial factors, as well as activity and sleep. Biospecimens including maternal blood, urine, and feces, placental biopsies, infant cord blood, and buccal swabs were collected. Genotyping was performed to calculate ancestry-adjusted polygenic risk scores (PRS) for preeclampsia. After identifying variables associated with HDP, a logistic regression was used to assess for independent HDP associations. Models were evaluated with and without PRS, to evaluate the added value of genetic risk in prediction.

Results: Among 399 participants with complete outcome data, 121 developed HDP (30.3%). Significant predictors included higher BMI, non-White race, nulliparity, and elevated snoring scores. Preeclampsia PRS tertiles showed no significant association with HDP and did not improve the performance of the regression model.

Conclusion: In addition to high BMI, nulliparity, and self-reported race, snoring scores were independently associated with developing HDP. However, adding PRS did not improve the model. Multidimensional risk factor evaluation and clinical screening are needed to improve early intervention and care for patients with HDP.

The Role of P-Tau in the Driving of Neurovascular Uncoupling

Lilly O'Shea, Alyssa Collins, Kierra Eldridge, Rose Diaz, Margaret Bright, Scott Persohn, Paul Territo, and the IU/JAX/PITT MODEL-AD Center

Background and Hypothesis: Alzheimer's disease (AD) presently affects more than 50 million people worldwide, with that number projected to rise to more than 150 million by 2050 according to the World Health Organization (WHO). The neuropathologic underpinnings of AD are defined by the accumulation of extracellular amyloid-β (Aβ) plaques and intracellular neurofibrillary tangles (NFT) composed of hyperphosphorylated tau protein (p-tau). Recent evidence suggests p-tau specifically acts as a catalyst for global cognitive degeneration, implicating the protein in neuronal dysfunction at the synaptic level. A robust correlation has been demonstrated between both the reprogramming of cellular metabolism in favor of glycolytic upregulation as well as mitochondrial instability enhancing the oxidative stress response, thus driving the accumulation of cerebral p-tau. These determinants have been empirically linked

to the precursors of endovascular debasement and subsequent neurovascular uncoupling in Aβ mouse models. Prior studies support the position of microglial activation as the precipitating source of the comprehensive FDG-PET signal, with diminished glucose uptake corresponding to a more pronounced neurovascular uncoupling. However, the comprehensive implications of increased p-tau in cerebral metabolic dysfunction (CMET), cerebral blood flow (CBF), and neurovascular coupling (NVC) are not presently well defined. In order to further elucidate the relationship, we hypothesize that aggregates of p-tau will drive progressive neurovascular uncoupling, disrupting CMET and CBF in the PS19 mouse model of AD.

Methods: To establish clinical significance, we obtained 18F-FDG and 64Cu-PTSM PET/CT images and co-registered these to stereotactic brain coordinates to assess neurometabolic and vascular uncoupling. To assess the co-localization of p-tau on specific cell types involved in metabolic and vascular dysregulation, cryoprotected tissues were stained for co-localization of p-tau in neurons (NeuN), astrocytes (GFAP), microglia (IBA1), vascular endothelial (CD3), and mono-carboxylate transporters (MCT2 and MCT4). Immunopathological assays were conducted to assess cellular communication, neuroinflammation, and oxidative stress.

Results: When observing the effects of aging by genotype, B6 control mice exhibited a randomized and dispersed distribution, consistent with the expected physiological variability associated with the normative aging process, while PS19 mice exhibited neuro-metabolic failure, with significant regions including the auditory cortex (dorsal/ventral/medial), caudate putamen (dorsal striatum), cerebellum, dorsal intermediate entorhinal cortex, entorhinal cortex, fornix, frontal association cortex, medial orbital cortex, perirhinal cortex, secondary motor cortex, temporal association cortex, thalamus, and ventral orbital cortex.

Conclusion: These findings demonstrate a temporally and regionally progressive pattern of p-tau–driven neurovascular uncoupling, originating in the entorhinal cortex and advancing to higher-order cortical regions. Dysfunction in areas governing executive function, emotional regulation, spatial processing, and memory highlights the behavioral consequences of tau pathology and supports the potential for early diagnostic imaging and therapeutic targeting in AD.

Management and Outcomes of Intra-articular Ballistic Injuries of the Hand

C. Max Otterbacher, Melissa Cullom, Joshua Adkinson

Background and Objective: Intra-articular ballistic injuries of the hand present unique challenges not commonly encountered with other gunshot wounds (GSWs). Due to their rarity, data on demographics, operative trends, and joint preservation outcomes are limited. This study examines management strategies with an emphasis on factors associated with joint salvage.

Methods: Patients with hand GSWs treated from 2021–2025 at a metropolitan academic health system—including three Level 1 trauma centers—were identified using CPT and ICD-10 codes. Intra-articular involvement patients were included. Demographics, injury mechanism, procedures, and complications were reviewed. Unpaired t-tests compared patients with salvaged versus unsalvageable joints.

Results: Of 83 patients with hand GSWs, 48 were intra-articular. Most were male (89.6%) with a mean age of 30.4 years. Black was the most common racial group (50%) and most patients (75%) had government insurance. Common comorbidities included tobacco use (43.8%) and obesity (16.7%). Assault was the most frequent mechanism (58.3%). Injuries involved the left hand in 73% of cases; the metacarpophalangeal (MCP) joint in 80%; and the third ray in 41.7%. Open reduction and internal fixation (ORIF) was the most common operation (70.8%). Many patients underwent multiple procedures. Frequent complications included ER/hospital returns (27.1%) and infection (6.3%). Eight cases (16.7%) were deemed unsalvageable, resulting in 5 amputations, 2 arthrodeses, and 1 arthroplasty. These patients tended toward being younger ($p = 0.2402$), having greater bone ($p = 0.5195$) and soft tissue loss ($p = 0.1425$), longer hospital stays ($p = 0.8459$),

and more frequent government insurance (p = 0.2654).

Conclusions: Intra-articular hand GSWs frequently involve the MCPJ and third ray. Unsalvageable cases often involve younger patients with greater tissue damage. These findings may guide physician-patient discussions on prognosis and treatment planning. Larger studies are needed to identify predictors of joint preservation.

Complications Following Aseptic Knee Revision Based on Tourniquet Use

Will Pater, Leonard Buller, Mary Ziemba-Davis, Kevin Sonn

Background: Tourniquet use in revision TKA (rTKA) is used to enhance visualization and improve cement penetration. However, concerns exist about ischemic muscle injury, increased postoperative pain, wound complications, and venous thromboembolism (VTE). This study compared early clinical outcomes in aseptic rTKA performed with no/minimal tourniquet use versus standard tourniquet use.

Methods: In this retrospective matched cohort study, 105 aseptic rTKAs with no/minimal tourniquet use were matched to 105 rTKAs with standard tourniquet use (P≥.210). Average tourniquet times were 12.9±15.8 and 80.1±23.6 minutes, respectively (P<.001). Postoperative complications, outcomes, and pain were compared between groups. Statistical analysis included Chi-square tests, t-tests, and Pearson correlation ($\alpha \leq 0.05$). Estimated blood loss (EBL) was calculated using the Hahn-Klimroth et al. formula.

Results: Mean EBL (no/minimal 5.9±1.2 vs. standard 5.8±1.1 g/dL, P=.819) and blood products received (no/minimal 2% vs. standard 4.8%, P=.445) showed no significant differences between groups. There were no major inpatient events or significant differences in 90-day VTE, wound complications, or reoperations. Inpatient opioid requests were higher in the standard tourniquet group (no/minimal 95.2% vs. standard 100%, P=.059). Opioid use in the first 24 hours was higher in the standard group (26.2±12.8 vs. 21.9±13.9 MME, P=.023) despite similar pain scores (standard 4.1±1.7 vs. no/minimal 4.3±2.2, P=.492). After 24 hours, opioid use (standard 4.2±10.9 vs. no/minimal 9.7±23.6 MME, P=.035) and pain (standard 0.9±1.9 vs. No/minimal 1.7±2.7, P=.016) were significantly lower in the standard group. Final pain scores were similar (standard 4.1±2.3 vs. no/minimal 3.8±2.8, P=.362). Some null results may be due to low statistical power.

Conclusion: In rTKA, the use of tourniquets does not seem to affect blood loss, early complications, or reoperation rates. Differences in postoperative pain and opioid use indicate an association worthy of further exploration. Tourniquet decisions based on individual patient and surgical factors may remain the best approach in rTKA.

Effects of Site Relocation on Demographic Patterns at Recovery Cafe Indy

Holly Pickett, Niki Messmore

Background and Hypothesis: Peer support services, involving individuals in long-term recovery helping others with their current recovery journeys, have shown a positive impact on personal recovery from trauma, substance use, and mental illness. Knowledge about the population being serviced by a recovery program is necessary to inform the peer support services and resources offered to meet those needs. Recovery Cafe Indy (RCI) is a community-based peer support program in Indianapolis that provides a judgment-free space open to all adults recovering from a variety of challenges. Between 2023-2025, RCI operated out of three distinct locations in downtown Indianapolis. We hypothesize that the rapid relocations have significantly impacted the demographics of RCI's new member population, and that adaptations need to be made to the support services currently offered to better serve the existing population.

Methods: Demographic data from a total of 1,316 RCI members between 1/1/2023 - 7/15/2025 were obtained via new member

enrollment surveys and recorded into an information database by RCI staff. The data were de-identified and presented to researchers for analysis, separated into time periods correlating to a different RCI location.

Results: There was not a significant difference in the portion of unhoused vs. housed or unemployed vs. employed populations across locations. There was a significant drop in new membership after the relocation from the Central Library to the Meridian Street location. This was theorized by RCI staff to be due to the new location's lack of centrality and foot traffic compared to the other two locations.

Conclusions and Implications: Recommendations for services based on specific trends in the data include outreach to nonprofits specializing in housing assistance, creation of an on-site food and clothing pantry, hosting resume workshops for RCI members, and more. Connections with community partners working with similar populations is suggested to counteract RCI's drop in membership after relocation.

Disparities in Hospitalization Outcomes Among Pediatric Cancer Patients: A Nationwide Healthcare Cost Utilization Project (HCUP) Analysis

Tyler Porter, Baraka Muvuka, Joshua Mangum, Jonathan Guerrero

Introduction: Pediatric cancer poses major health and economic challenges, with Medicaid-insured and low-income children facing disproportionate hospitalization burdens. One study found that socioeconomic status explained 44% of excess mortality among Black and 31% among Hispanic children with acute lymphoblastic leukemia. Yet, inpatient care patterns remain underexplored. This study examines socio-demographic and institutional predictors of hospitalization outcomes among pediatric cancer patients.

Methods: This retrospective cross-sectional study analyzed the 2019 and 2022 HCUP Kids' Inpatient Database. Pediatric cancer admissions were identified using NEO001–NEO074 codes. Dependent variables included length of stay (LOS), total charges, debilitation, and mortality risk scores. Predictors included insurance, Zip income quartile, race, sex, admission year, hospital and county characteristics. Multivariate analyses using linear and ordinal logistic regressions were conducted in SPSS v31.0 on significant factors in bivariate analyses ($p<0.05$). This study received Indiana University IRB exemption (#27940) on 7/2/2025.

Results: The sample comprised 46,322 admissions. Longer hospital stays were significantly ($p<0.05$) associated with Black race (B=0.318), uninsured (B=0.625), publicly insured (B=0.865), lower-income ZIP codes (B=1.044, 0.633, and 0.350 for quartiles 1,2, and 3 respectively), and admission to government hospitals (B=1.135). Total charges were significantly higher with Hispanic, Asian/Pacific Islander, and other racial groups (B=31,746.43, 30,302.35, and 30,016.68 respectively) uninsured status (B=78,176.82), and 2022 admission year (B=13,687.92), but significantly lower with lower income (B=-26,126.61, -18,725.60, and -20,683.30 for quartiles 1,2, and 3 respectively) and rural, urban non-teaching or government hospitals (B=-57,581.43, -72,394.08, and -42.574.95 respectively). Higher debilitation was associated with ($p<0.05$) public or no insurance (OR=1.146 and 1.207 respectively), and lower debilitation with females (OR=0.773) and rural and urban non-teaching hospitals (OR=0.611 and 0.520 respectively). Mortality risk increased with Black race (OR=1.010) and decreased with Hispanic ethnicity (OR=0.923) and urban non-teaching hospital admission (OR=0.811). LOS and total charges were positively correlated. ZIP income and debilitation were negatively correlated.

Conclusion: Public insurance, lower income, and certain racial groups were significant predictors of longer stays, greater debilitation, and disparities in total charges. Government and non-teaching hospitals had lower costs. These patterns reflect structural inequities, warranting policy reforms and equitable resource allocation.

Association Between Combined Nicotine and Opioid Dependence and Osteoporosis in Women: A Real-World Data Analysis

Tommy Quach, Zachary T. Bowman, Nolan A. Cook, Kevin D. Jordan, Daniel Roque, Michael S. Roscoe

Background: Osteoporosis is the most common bone disease in the United States, with women exhibiting a higher prevalence compared to men. Chronic cigarette smoking and opioid use are each recognized as independent risk factors for osteoporosis. However, it is unclear whether these substances contribute an additive effect on the development of osteoporosis. Therefore, we hypothesize that women with a combined history of nicotine and opioid dependence have an increased odds of developing osteoporosis compared to those with nicotine dependence alone.

Methods: We conducted a retrospective case-control study using a psychiatric dataset from the IU School of Medicine-Evansville RWEdataLab (CRC/Sidus Insights), a U.S. electronic health record (EHR) database. Diagnoses were identified using ICD-10 codes for: nicotine dependence (cigarette-related), opioid dependence, and osteoporosis. Female patients with an osteoporosis diagnosis following documentation of both dependencies were included. Odds Ratios (ORs) were calculated to compare the likelihood of developing osteoporosis in patients with both dependencies compared to patients with nicotine dependence alone.

Results: Nicotine dependence was more strongly associated with osteoporosis than opioid dependence alone (OR: 1.88; 95% CI: 1.32-2.68; N=153,539). Women with both nicotine and opioid dependencies had significantly higher odds of osteoporosis compared to those with nicotine dependence alone (OR: 5.99; 95% CI: 3.46-10.37; N=79,247). The order in which the dependencies developed did not significantly differ in association with odds of developing osteoporosis.

Conclusions: These findings suggest that women with a chronic history of nicotine use are more likely to develop osteoporosis than those with a history of opioid use. Furthermore, women with a co-occurring nicotine and opioid dependence may be more strongly associated with osteoporosis than nicotine dependence alone. Stratification by age was limited by sample size and may be a confounding variable. Future studies should adjust for age and explore these associations.

Evaluating the Management of Ectopic Pregnancies at a Tertiary Teaching Hospital in Western Kenya to Build Minimally Invasive Gynecologic Surgery

Elena Rogers, Etoroabasi Ekpe, Doreen Gati, Peter Itsura, Wycliffe Kosegei, Richard Mogeni, Veran Mokua, Wan-Ju Wu

Background: Minimally invasive surgery (MIS) offers clinical and economic benefits over laparotomy which are critical in low- and middle-income countries (LMICs) like Kenya. Most efforts to expand MIS in LMICs have focused on surgical training, while systems-level barriers remain under addressed. As part of a larger quality improvement (QI) initiative to expand minimally invasive gynecologic surgery (MIGS) at Moi Teaching and Referral Hospital (MTRH), this subproject of preliminary data focused on evaluating MIGS implementation for ectopic pregnancy using time-based analysis and outcome comparison.

Methods: To assess change over time, we used a run-sequence plot to track rates of laparoscopic management of ectopic pregnancy, overlaying Plan, Do, Study, Act (PDSA) cycles to identify interventions and setbacks. We also compared clinical outcomes between laparotomy and laparoscopy groups, focusing on estimated blood loss (EBL), and length of hospital stay. Insights from a MIS Leaders Committee (LCom) interpreted these findings.

Results: Laparoscopic management of ectopic pregnancies increased from an average of 2.8% to 6% after targeted interventions. The run chart revealed both progress and barriers to MIGS adoption. Preliminary data showed reduced EBL in laparoscopic cases but no difference in hospital stays. LCom feedback suggested selection bias in patient acuity and norms

around post-op discharge practices as possible explanations. Additional challenges include case identification by OBGYN registrars and equipment, space, and staff availability.

Conclusion: While some progress has been made, systems-level challenges continue to limit MIGS uptake. The ongoing QI project will focus on improvements needed to meet the target of 20% laparoscopic management of ectopic pregnancies and expand MIGS capacity at MTRH. This work supports development of a context-specific MIS implementation toolkit for use across similarly resourced Kenyan hospitals. Improving MIS access advances surgical equity, strengthens health systems, and aligns with global health priorities shared by U.S. and Kenyan partners.

Predictors of Residual Obstructive Sleep Apnea in Children following Adenotonsillectomy

James Rooney, Hasnaa Jalou, Anuja Bandyopadhyay, Harish Rao

Background: Obstructive sleep apnea (OSA) is the most frequently diagnosed pediatric sleep disorder, affecting 3-6% of the 74 million children in the U.S. Children with moderate to severe sleep apnea, defined by an Apnea-Hypopnea Index (AHI) score of 5.1 or higher, are candidates for adenotonsillectomy. Follow-up sleep studies are frequently ordered following the adenotonsillectomy in these patients due to the absence of a standardized protocol that elucidates when a follow-up sleep study is needed in children with OSA. This retrospective cohort study will investigate predictors of residual OSA in children following adenotonsillectomy.

Methods: In this single-center retrospective study, data were collected by reviewing the medical records and PSG REDCap database from 2021-2024. Patients aged 2-18 with two sleep studies, one before and one after adenotonsillectomy, and a baseline AHI of 5.1 or higher were included. Variables related to the severity of OSA such as body mass index (BMI), neck circumference, hypoxic burden, AHI, rapid eye movement (REM) AHI, and Epworth Sleepiness Scale (ESS) were evaluated.

Results: 370 patients met the criteria for the study, including 206 males and 164 females ranging in age from 2-17 with a median age of 6. Patient BMIs pre-adenotonsillectomy ranged from 11-62.4 with a median of 18.6. Pre-adenotonsillectomy, 50 patients had moderate OSA, and 320 patients had severe OSA with a median AHI of 17.55. Post-adenotonsillectomy, 189 patients had mild OSA, 80 patients had moderate OSA, and 73 patients had severe OSA with a median AHI of 3.8.

Conclusion: Evaluation of variables related to the severity of OSA may be used to help predict the necessity of follow-up sleep studies secondary to adenotonsillectomy. A metric that determines if a follow-up sleep study is warranted in children with OSA who undergo adenotonsillectomy could reduce unnecessary sleep studies and improve accessibility of sleep studies for other patients.

Association Between Non-alcoholic Fatty Liver Disease (NAFLD) and Atherosclerotic Cardiovascular Disease (ASCVD)-Associated Myocardial Infarction and Ischemic Stroke Using Real World Data

Jonathan Rusche, Uday Lomada, Steven Wu, Gattadahalli S. Seetharam

Background: ASCVD-related conditions are the leading cause of death in individuals with NAFLD/nonalcoholic steatohepatitis (NASH). Despite this, the current 10-year ASCVD risk assessment tools do not consider a patient's NAFLD/NASH history. The aim of this study is to examine the association between NAFLD/NASH and ASCVD-associated myocardial infarction and ischemic stroke, and to reinforce existing evidence showing that NAFLD/NASH patients are at greater risk for ASCVD-associated cardiac events.

Methods: We used de-identified patient data from the IU School of Medicine–Evansville RWEdataLab (CRC/Sidus Insights) National Real-World Cardiology database. Patients with diagnoses of NAFLD or NASH who later developed ischemic stroke (IS) or

myocardial infarction (MI) were identified using ICD-9 and 10 codes. Odds ratios were calculated to estimate the likelihood of MI/IS in patients with NAFLD/NASH.

Results: Of 3,396,429 patients in the database, we identified 674 patients with NAFLD/NASH and MI/IS. In 424 patients, the odds of MI/IS after NAFLD/NASH diagnosis were significantly higher (OR 1.648; 95% CI: 1.489–1.823) compared to patients without NAFLD/NASH, with females at significantly greater odds (OR 1.983; 95% CI: 1.730–2.273) than males (OR 1.366; 95% CI: 1.176–1.587). Patients with type 2 diabetes mellitus (T2DM) and NAFLD/NASH had increased odds of subsequent MI/IS (OR 2.328; 95% CI: 2.015-2.689) compared to those without NAFLD/NASH. Additionally, T2DM females had significantly greater odds of MI/IS (OR 2.861; 95% CI: 2.358-3.470) than T2DM males (OR 1.873; 95% CI: 1.508-2.327) following NAFLD/NASH diagnosis.

Conclusions: Our results support an association between NAFLD/NASH and ASCVD-related MI/IS suggesting NAFLD/NASH may be an important early marker of cardiovascular risk. One limitation of this research includes 4-year binning of patient age. Furthermore, NAFLD/NASH is progressive, and diagnosis underrepresents true incidence in the population analyzed. Nonetheless, these results may support revising current ASCVD risk calculators to include NAFLD status, improving risk stratification and encouraging earlier preventive interventions.

Prevalence of Traumatic Brain Injury in the Previously Unhoused Population

Suki Sasic, Niki Messmore

Background: It has been established that the unhoused or previously unhoused population has a higher prevalence of traumatic brain injuries (TBI) as compared to the general population. Some of the various long-term consequences of TBIs are cognitive/functional impairments, attention deficits, and impulsive/risky behavior. Therefore, because a large proportion of the unhoused population may be experiencing the persistent challenges that stem from unidentified TBIs, identification and education of those involved in supportive services to the unhoused could result in more effective support for long-term housing success.

Methods: This project compared rates of TBIs in two housing models that are run by the nonprofit Beacon Inc. The first, Crawford Apartments (the "clustered housing" site), gives housing to people that have been chronically unhoused and meet at least two of the following criteria: intellectually or physically disabled, mental illness, or substance abuse disorder. The other is referred to as the "scattered housing" sites, in which apartments are given to those that have been chronically unhoused but do not meet all the criteria to live at the clustered site. Interviews were conducted according to the Ohio State University TBI ID tool. Results Residents of the clustered site had a higher incidence of TBI (78%, n=32) than residents of the scattered sites (41%, n=17). Both groups were also higher than the lifetime prevalence of TBI nationwide of 18.2% with p values of 0.02 and <0.001, respectively. Secondly, the prevalence of subcategories of TBIs was higher at the clustered site vs. scattered sites. Subcategories include moderate/severe TBI (22% clustered vs. 12% scattered), first moderate/severe TBI before 20y.o. (31% clustered vs 18% scattered), and multiple TBIs in a short time period (31% clustered vs 24% scattered). However, due to small sample sizes, a Fisher's exact test found no significant differences between subcategories between groups.

Conclusions: Failure to diagnose TBIs, especially in the unhoused population, is common due to lack of healthcare accessibility and medical distrust. This gap in care may lead to underdiagnosed prevalence and therefore untreated, unacknowledged long-term consequences. This study is important for the functioning of Beacon Inc and other nonprofits that work with the unhoused because currently cognitive and TBI screenings are not part of the standard homelessness intake service. Having a better understanding of clients' cognitive capacities and therefore, ability to live independently could better inform case managers of what supports are necessary for clients' long-term housing success.

BariMind: Addressing Mental Health Needs in Weight Recurrence Post-Bariatric Surgery

Anita Sayar, Yeni Bencomo Suarez, Robin Gardiner, William Hilgendorf, Kevin Prather, Jill Nault Connors

Background: Bariatric surgery patients commonly experience weight recurrence (67-75%) and anxiety or depression (~70%). However, no guidelines currently exist for post-surgical mental health care, and research remains limited on integrating mental health care in bariatric clinics. This pilot study aims to determine the effectiveness of a mental health intervention program on depression, anxiety, and weight loss motivation in this population. Objective: Explore the relationship between weight recurrence and depression or anxiety symptoms in participants.

Methods: Patients 2+ years post-surgery who regained >10% of their lost weight, had BMI > 35, or lost <50% of excess weight, and screened positively for anxiety or depression were eligible. Participants complete a 3-month online, self-administered cognitive behavioral therapy (iCBT) course, along with bimonthly guided peer support groups, off-week check-ins with a peer specialist, and option to join a private Facebook group. Data was collected from peer field notes taken during support group meetings. Qualitative analysis was conducted using conventional content analysis methodology.

Results: Findings from current enrollment (n=12) demonstrated a negative impact of depression, anxiety symptoms and weight recurrence on lifestyle behaviors, manifesting as overeating to alleviate symptoms. Depression and anxiety preceded rather than followed weight recurrence, and were commonly attributed to the death of a loved one. Most participants stated weight loss goals either solely or in conjunction with mental health goals during the iCBT program. Actions during participation included practicing controlled breathing, journaling, sharing nutrition information, and engaging in a group with shared lived experiences. Challenges included several participants lacking familiarity with platforms for virtual conferencing, online learning, and social media.

Conclusions: Depression and anxiety negatively impact lifestyle modification efforts in patients with weight recurrence post-bariatric surgery. These insights reflect need for mental health care among these patients. As enrollment continues, such an iCBT program has potential to increase access to mental health services in bariatric patients.

Applying the Integrated Behavioral Model to Better Understand Asian Women's Decisions to Participate in a Unique Clinical Trial

Arnima Singh, Julia K. A. Roehm, Katherine Ridley-Merriweather

Background: Breast cancer (BC) has the highest cancer incidence among U.S. women. Although Asian women have lower BC rates than non-Hispanic white and Black women, their incidence has increased by 2.6% annually over the past decade. Cultural and language barriers often limit screening and healthcare access, contributing to disparities. Despite this rising trend, Asian women remain underrepresented in clinical trials and biobanking initiatives. The Komen Tissue Bank (KTB) is a clinical trial and biorepository that provides researchers with healthy breast tissue to advance BC research. This health communication study applies the Integrated Behavior Model to explore the motivations of Asian women who donated healthy breast tissue to the KTB.

Methods: Participants (N=20) who self-identified as Asian and had previously donated healthy breast tissue to the KTB were recruited through an email requesting their voluntary participation in an interview conducted over Zoom or Microsoft Teams. Fifty emails were sent weekly until the predetermined goal of a minimum of 20 participants was reached.

Results: In this study, participants were highly motivated by a desire to address underrepresentation of Asian women in research and contribute meaningfully to scientific advancement, reflecting positive instrumental attitudes. Many expressed altruistic motivations and wanted to help future generations, demonstrating a strong legacy norm. Having scientific backgrounds, familial support, and lack of external barriers (like cost or transportation)

enhanced participants' perceived control. Participants also felt empowered by contributing to research, which displayed high self-efficacy. Conclusion and Future Work: This study highlights the legacy norm, desire to increase representation, and support for research that drives Asian women to participate in healthy breast tissue donation through the KTB. These findings can inform targeted strategies to increase Asian women's participation in research. Future work can test these approaches and explore motivational differences across Asian subgroups to guide recruitment efforts.

Inflatable Penile Prosthesis and Mini-Jupette Sling for Treating Climacturia in Men with Erectile Dysfunction

Katherine Snook, James Allen Malony, Lucas G. C. R. de Amorim, Jeremiah Dallmer, Thairo A. Pereira, Helen L. Bernie

Background: Climacturia and arousal incontinence commonly present substantial challenges to patients' quality of life after pelvic surgeries. When accompanied by erectile dysfunction (ED), the concomitant implantation of an inflatable penile prosthesis (IPP) and Mini-Jupette sling emerged as a promising option to simultaneously address both sexual function and continence. Therefore, our study aimed to assess efficacy and patient satisfaction of combined IPP and Mini-Jupette sling for treating climacturia and concurrent ED in post-pelvic procedure patients.

Methods: We retrospectively analyzed charts of men with concomitant ED and climacturia who underwent simultaneous IPP and Mini-Jupette sling placement from December 2022 to May 2025. Key endpoints included climacturia and continence status, residual leakage pattern, and subjective patient satisfaction.

Results: Preoperatively, all 29 patients presented with climacturia, 11 reported arousal incontinence, and 24 had stress urinary incontinence. At a mean follow-up of 9 months, 26 patients reported resolved climacturia, and 14 patients had complete continence. The average number of pads used per day reduced from 2.2 to 0.9. Among men with persistent leakage, 53% achieved a clinically meaningful improvement in leakage pattern. Overall, 72% of patients reported satisfaction with their outcomes. Of those not fully satisfied, 37% nonetheless experienced a clinical improvement in leakage pattern.

Conclusions: In our cohort, simultaneous IPP and Mini-Jupette sling placement proved to be a safe and streamlined approach, delivering marked improvement in climacturia and high satisfaction rates among men with ED and climacturia after pelvic surgery. While not specifically intended for incontinence, the Mini-Jupette sling also improved continence in select cases.

Somatomotor Network Connectivity as a Neural Correlate of Clinical Status, Symptom Severity, and Cognitive Performance

Valentino Sorto, Meichen Yu

Background: Alzheimer's disease pathology begins years before clinical symptoms emerge. Most functional connectivity research has focused on "higher order" networks (default mode, frontoparietal, attention), consistently showing decreased connectivity in patients with dementia or cognitive impairment. However, primary sensory-motor networks remain relatively understudied. This study investigated somatomotor network connectivity across the AD spectrum and its relationships with cognitive and neuropsychiatric measures.

Methods: 146 participants (ages 60-92) from the Indiana Memory and Aging Study were stratified into preclinical (cognitively normal + subjective cognitive decline; n=81) and clinical (mild cognitive impairment + Alzheimer's disease; n=65) groups. Resting-state fMRI data were parcellated using the Desikan-Killiany atlas, with mean functional connectivity computed using Yeo's seven-network parcellation. Wilcoxon rank-sum tests and Welch's t-tests compared FC between groups across all networks. Spearman correlations assessed associations between all networks and NPI-Q composite domains and MoCA-derived cognitive

domains, with FDR correction.

Results: The somatomotor network was the only network among seven that significantly distinguished clinical from preclinical groups, showing a 37.6% effect size reduction. LASSO regression identified somatomotor connectivity as the sole predictive feature. Somatomotor FC showed specific positive relationships with executive function ($\rho = 0.251$) and language performance ($\rho = 0.268$), and negative correlation with vegetative/motor symptoms ($\rho = -0.226$). These associations remained significant after controlling for demographics.

Conclusions: These results suggest that somatomotor network integrity may be an early biomarker of disease progression, reflecting shared neural substrates between motor control and higher-order functions.

Diagnostic Delays and Socio-Demographic Factors Among Patients Referred to an Undiagnosed Rare Disease Clinic

Dylan Kim, **Katherine Stanford**, Vanessa Vital, Melissa Gillette, Amy Han, Baraka Muvuka

Background: Rare diseases affect 25 million Americans, with average diagnostic delays of 6–7 years, 2–3 misdiagnoses, and approximately $29,000 in added annual costs. Patients with rare, undiagnosed conditions experience diagnostic delays influenced by social and demographic disparities. This study examined relationships between socio-demographic factors and diagnostic delay among patients at the Undiagnosed Rare Disease Clinic (URDC).

Methods: This study retrospectively analyzed 149 patients at URDC (Jan 2020–Jun 2025), a rare disease program at Indiana University School of Medicine and clinical site for the NIH-funded Undiagnosed Diseases Network. Diagnostic delay was measured as: 1) time from symptom onset to first genetic testing (TSO-GT), and 2) time to first in-person URDC visit (TSO-UV). Independent variables included demographics and social determinants of health. Analysis included descriptive, bivariate (Mann–Whitney U, Kruskal–Wallis, Spearman's correlations), and multivariate (Multiple linear regression) analyses in SPSS v31.0 ($p<0.05$). This study was approved by Indiana University IRB (#2005902680).

Results: Among 149 patients, 52.3% were female, 91.3% white, 57.7% publicly insured, and 57.4% urban. Median time from symptom onset to first genetic testing was 2.4 years (IQR: 6.2) and to URDC visit was 7.6 years (IQR: 9.4). Bivariate analysis revealed significant associations between TSO-GT and race ($p=.010$), number of Human Phenotype Ontology (HPO) terms ($p=.039$), and presence of constitutional HPO terms ($p=.014$). Having more HPO categories was associated with shorter TSO-UV. Following multivariate analysis, only constitutional HPO terms ($p=.027$) remained significantly associated with TSO-GT.

Conclusions: Most factors were not significantly associated with diagnostic delays, reflecting limitations in sample size, diversity, and referral criteria. Findings highlight the importance of expanding rare disease programs and research to engage diverse and underserved urban populations. Findings will guide efforts to raise community and provider awareness, build larger multi-site cohorts, and identify socio-structural barriers to ensure timely, equitable rare disease care.

Combined Treatment with Dietary Inulin and a Calcimimetic Agent Improve Cortical Bone in a Rat Model of Chronic Kidney Disease

Daniel J. Stephen, Corinne E. Metzger, Emily K. Matter, Shruthi Srinivasan, Kalisha O'Neill, Neal X. Chen, Sharon M. Moe, Matthew R. Allen

Background: Chronic kidney disease (CKD) leads to an increased risk of fractures. The increased skeletal fragility is partly due to secondary hyperparathyroidism commonly seen in CKD patients, which leads to cortical bone deterioration. Pharmacological

lowering of parathyroid hormone (PTH) via calcimimetics is a key treatment, but fracture risk is not altered in clinical trials. Previous preclinical work has shown dietary inulin reduces PTH levels potentially through alterations of the gut microbiome to reduce gut-derived uremic toxins, but bone mechanics did not improve. Due to the complex nature of CKD, combination therapy with a PTH lowering pharmacotherapy, like etelcalcetide, and dietary inulin may better mitigate skeletal fragility.

Methods: Male Cy/+ rats were treated with either 10% dietary inulin, 3x/week KP injections (a rat analog of etelcalcetide), or combination for 10 weeks. Bone mechanical properties were tested via three-point bending of femora. Microstructural cortical bone parameters of the midshaft femur were assessed via micro-computed tomography. Bones were analyzed via histomorphometry to evaluate bone turnover, and serum PTH and kidney biomarkers were obtained.

Results: Both treatments significantly lowered PTH independently and in combination, with the combined treatment demonstrating a 60-fold lower PTH compared to untreated CKD. Bone mechanical properties, including ultimate force, stiffness, total work, and toughness, were significantly improved in combination treatment compared to untreated CKD. Combined treatment had the greatest effect on bone microarchitecture, displaying 10.6% higher cortical bone area than untreated CKD. Additionally, untreated CKD had an average of 7.4% cortical porosity while combined treatment had approximately 0.1% cortical porosity. Combined treatment lowered bone turnover compared to untreated CKD.

Conclusions/Implications: These data demonstrate that combined treatment was the most effective at improving bone structure and mechanical properties. This indicates combined treatment with dietary inulin and a calcimimetic could be a promising treatment option for treating the bone complications of CKD.

Prevalence of Critical Illness at Moi Teaching and Referral Hospital in Western Kenya

Allison Stogsdill, Betty Sirera, Josephat Kerema, Sarah Fortna, Babar Khan, Neelima Navuluri, Maria Srour

Rationale: Despite the disproportionate burden of critical illness in low- and middle-income countries (LMICs), access to intensive care units (ICUs) remains limited. At Moi Teaching and Referral Hospital (MTRH), a public referral hospital in Western Kenya serving over 24 million people, critically ill patients are often managed in general wards without close monitoring due to insufficient ICU space. While qualitative evidence suggests a significant need for increased ICU capacity, the actual demand is unknown.

Methods: This mixed-methods study quantified the prevalence of critical illness, defined as a National Early Warning Score (NEWS) greater than six, among adults presenting and admitted to MTRH between November 2024 and June 2025. Participants were enrolled from the emergency department and all general wards during three separate 24-hour periods. Adults with NEWS > six were followed for outcome, ICU admission, and subsequent NEWS at 7, 14, 21, and 28 days. Key informant interviews with healthcare providers directly involved in the care of critically ill patients explored workflows, perceptions of critical illness, and barriers to ICU expansion.

Results: Of 1,274 patients enrolled, 187 (14.7%) had a NEWS > six. Six (3.2%) were admitted to an ICU and 33 (17.6%) died by day 28. Most critically ill patients were identified in the internal medicine wards (50.3%), general surgery wards (15.5%), and emergency department (12.3%). Preliminary qualitative findings among 6 key informants suggest nursing and bed shortages are the primary barriers to ICU transfer. Other factors include reliance on ambulance transport, proximity of the ICU, dialysis, and imaging facilities, and the absence of standardized protocols for critical illness assessment and transfer.

Conclusion: This study may help inform resource planning, ICU capacity building, and the development and implementation of

protocols to improve recognition, management, and transfer of critically ill patients at MTRH and similar referral hospitals in sub-Saharan Africa.

Examining In-Hospital and Post-Discharge Surgical Complications Following Cardiac Interventions in Northwest Indiana

Olivia Strube, Jonathan Guerrero, Baraka Muvuka, Kyle Gospodarek, Joshua Mangum

Introduction: Post operative complications contribute to prolonged hospital stay and adverse outcomes. While prior research has primarily focused on in-hospital cardiac intervention outcomes, the impact of Social Determinants of Health (SDOH) on postdischarge surgical complications remains underexplored. This study examined in-hospital and post-discharge surgical complications following cardiac interventions in Northwest Indiana (NWI).

Methods: This retrospective cross-sectional study analyzed a limited dataset of patients who underwent a cardiac intervention within three hospitals in NWI during January 2021- March 2025. SDOH data were generated from routine EPIC-based SDOH screenings using the Protocol for Responding to and Assessing Patients' Assets, Risk, and Experiences (PRAPARE). Cardiac interventions and surgical complications (in-hospital and postdischarge) were identified using ICD-10 codes. Data analysis comprised bivariate (Chi Square) and multivariate analysis (Multinomial Logistic Regression) using SPSS v31.0. This study was exempted by Indiana University Human Research Protection Program (IRB#14040).

Results: The sample included 8993 patients who were primarily white (62.1%), female (55.5%), 75 and older (29.7%), English-speaking (96.1%), and publicly insured (78.6%). Bivariate analysis revealed significant associations between both in-hospital and post discharge surgical complications with multiple demographic (e.g., age, ethnicity, race, language, insurance type), social (e.g., family income, housing risk, transportation needs), and health factors (e.g., smoking, BMI, and emergency department (ED) disposition). Multivariate analysis found that surgical complications were significantly associated with public insurance ($p=0.045$; OR=2.195), family income ($p=0.008$; OR=1.000012), ED disposition-observation ($p=0.007$; OR=0.502), and length of stay ($p<0.001$; OR=1.084). Specifically, in-hospital surgical complications were significantly associated with family income ($p=0.046$; OR=1.0000013), obesity ($p=0.047$; OR=3.031), length of stay ($p<0.001$; OR=1.093) while post-discharge surgical complications were significantly associated with public insurance ($p=0.035$; OR=3.403), ED disposition-observation ($p=0.003$; OR=0.348), and length of stay ($p<0.001$; OR=1.070).

Conclusion: This study addresses a research gap on post-discharge surgical complications and the influence of SDOH, highlighting opportunities for SDOH integration into institutional practices and medical education.

Shifts in Pediatric Urinary Stone Composition from 2012 to 2023: A Retrospective Cohort Analysis

Saad Sualeh, Ashorne Mahenthiran, Pankaj Dangle

Background: Multiple studies have noted shifts in urinary stone composition amongst adult populations in recent decades, often attributed to changing diets and rising obesity rates . These trends are less studied in the pediatric population. Therefore, in this study, we investigate if shifts in urinary stone composition also existed in the pediatric population over the span of 12 years.

Methods: A retrospective chart review of our institutional database for stone events from 2012 to 2023 was conducted. A list of pediatric patients was compiled with ICD codes for primary diagnosis of nephrolithiasis. For each year, we collected 20 stone analyses, which overall equated to 240 distinct stone analyses from 233 patients across 2012 to 2023. To increase the power of the study, we decided to create 3 cohorts (each with 80 stone analyses): 2012-2015, 2016-2019, 2020-2023. Stones

were categorized based on the predominant composition. Various demographic data (e.g. age, gender) as well as clinical data (e.g. underlying conditions, stone characteristics) were collected. A Chi-square analysis was also performed to evaluate statistical significance.

Results: A total of 233 pediatric patients were identified with the average age being 12.0 years. Calcium oxalate and calcium phosphate were by far the most common stone types in all three cohorts. Struvite stones did show an upward trend although a larger sample would be needed to draw any conclusions. Chi-square test comparing the three cohorts resulted in χ^2 (14, N=240) = 17.732, p = .2193.

Conclusion: There was no statistically significant shift in stone composition within this pediatric cohort over the 12-year study period. Some limitations of this study were its retrospective design, potential loss of patients due to spontaneous stone passage without follow-up, and the data coming from a single institution. Further studies should be conducted to confirm these findings and to explore different time frames and pediatric populations.

From Scalpel to Slide: The Effects of Air Exposure and Histologic Processing on Surgical Margin Assessment in a Murine Model

Camren Toole, Anoushka Poduval, Johanna Koothur, Anuradha Kambrath, Laura Warmke, L. Daniel Wurtz, Christopher Collier

Background: Accurate measurement of surgical margins is essential to confirm complete tumor excision and to guide appropriate postoperative oncologic treatment. However, post-resection tissue shrinkage, resulting from factors such as air exposure and histologic processing, can lead to underestimation of true margins. This distortion may contribute to overtreatment with unnecessary adjuvant therapies. This study aimed to evaluate the impact of various post-resection factors on the accuracy of margin measurement.

Methods: Seventeen euthanized mice had their arms, thighs, and legs dissected. Specimens were either processed immediately or exposed to ambient air for three or 24 hours. Micro-CT imaging was performed on arm specimens to measure cross-sectional muscle area and calculate radius at humeral mid-diaphysis. Lower limbs were processed using frozen sectioning, paraffin embedding after formalin fixation and EDTA demineralization, or MMA embedding with or without demineralization. Muscle fiber cross-sectional areas were measured from histology sections using ImageJ. Statistical analysis was performed using GraphPad PRISM version 10.5.0.

Results: Arm mass decreased by 15.7% at three hours ($p < 0.0001$) and 57.3% at 24 hours ($p < 0.0001$). Thigh and leg specimens showed similar time-dependent reductions in mass. Micro-CT analysis revealed a 25.5% decrease in muscle area at three hours ($p = 0.0199$) and 67.3% at 24 hours ($p < 0.0001$), corresponding to reductions in calculated radius of 14.2% and 43.2%, respectively. Differences were observed in muscle fiber area of paraffin embedded specimens only at 24 hours (p=0.0178). No differences were observed in muscle fiber area between frozen vs paraffin embedded thighs at zero, three, or 24 hours (p=0.4848, 0.3095, 0.4206) or between nondemineralized and demineralized legs (2261.4 vs 1940.4 um2 , p= 0.0649).

Conclusions: Air exposure causes significant tissue and margin shrinkage. Early changes likely result from interstitial fluid loss rather than muscle atrophy. Clinical processing and demineralization do not likely affect margin size. Adjustments for air exposure are therefore necessary to improve margin accuracy and provide appropriate post-surgical cancer patient care. Future research will confirm these effects in clinical specimens.

Rare But Not Forgotten: Strengthening Early Recognition and Diagnostic Access for Rare Diseases in Northwest Indiana Through Provider and Community Education

Vanessa Vital, Katherine Stanford, Dylan Kim, Melissa Gillette,

Baraka Muvuka, Amy Han

Background: Northwest Indiana (NWI), with nearly 900,000 residents, accounts for only 4.1% of the medical genetic patient volume in Indiana, 11 times less than Central Indiana. This disparity suggests a potential diagnostic desert, driven by limited access to genetic specialists and low awareness. Individuals with rare diseases face financial strain, limited access to specialists, and costly or unavailable treatments. These challenges are exacerbated in underserved communities. This study examined the impact of a community-based educational presentation on awareness, knowledge, and health-seeking behaviors related to rare and undiagnosed diseases in urban, medically underserved populations.

Methods: Pre- and post-surveys were collected from community members and healthcare providers in NWI following a 20-minute presentation on rare diseases. Three presentations were given at Indiana University School of Medicine-Northwest, the Lake County Health Department, and Powers Comprehensive Neurology Center. Survey collected data on demographics and practice background, awareness and knowledge, attitudes and confidence, and behavior and barriers. Responses informed the development of a rare disease educational toolkit, which will undergo future pilot testing. Wilcoxon Signed-Rank tests were conducted to analyze pre- and post-changes. This project was approved by Indiana University IRB (#2005902680).

Results: Following presentations to 13 healthcare providers and 26 community members, statistically significant improvements were observed across all measured domains. Both groups showed increased familiarity with the UDN, IU's URDC, the UDN referral process, IU's role in the UDN, and genetic testing options (all $p < .01$), along with greater confidence in identifying rare conditions and completing the UDN referral process ($p < .05$). However, community members' confidence in navigating financial resources remained neutral, indicating a need for additional outreach and resource development.

Conclusion: The findings highlight the effectiveness of targeted education in addressing awareness of rare diseases in both clinical and community settings, underscoring the need for increased advocacy in underserved communities.

Social Determinants of Health and Emergency Department Utilization for Genitourinary Complications in Patients with Genitourinary Cancers: A Retrospective Cohort Study

Carly Waite, Baraka Muvuka, Jonathan Guerrero, Joshua Mangum

Background: Genitourinary (GU) complications are a common reason for emergency department (ED) visits, particularly among patients with GU cancers who represent approximately 1 in 16 cancerrelated ED encounters. Urinary tract infections (UTIs) are the leading GU complication, accounting for over 3% of cancer-related ED visits. Patients with GU malignancies often experience overlapping complications, such as infections, obstruction, or postprocedural issues, reflecting underlying disparities in access to care and coordination. To our knowledge, this study is the first to examine this issue in Northwest Indiana (NWI), focusing on demographic, clinical, and social factors associated with ED presentation for GU complications. The goal is to inform community-based interventions targeting cancer disparities in NWI.

Methods: This retrospective cohort study included patients with GU cancers who presented to the ED at three NWI hospitals from January 2021 to March 2025. GU cancers and complications were identified using ICD-10. The primary outcome was ED presentation for GU complications (yes/no). Data were extracted from EPIC. Analyses included descriptive statistics, bivariate analysis (Chi-square, Kruskal-Wallis), and binary logistic regression using SPSS 31.0 ($p<0.05$). The study was IRB-exempt (IRB #14040) through Indiana University.

Results: Among 534 patients, bivariate analysis showed significant ($p<0.05$) associations between GU complications and age, sex, ethnicity, insurance type, smoking status, ED disposition, and

return visits (30-day and 90-day). Multivariate analysis revealed increased age (OR=1.034, p<0.001) and 90-day return visits (OR=3.603, p=0.001) were associated with higher odds of ED presentation. Hispanic ethnicity (OR=0.557, p=0.049) and current smoking (OR=0.369, p=0.002) were associated with lower odds of ED presentation.

Conclusion: Multiple sociodemographic and clinical factors were independently associated with ED presentation for GU complications. These findings may guide targeted interventions, risk stratification, and future research aimed at addressing structural inequities and care coordination among patients with GU cancer.

Challenges to aging in place experienced by low-income older adult homeowners in Marion County, Indiana

Nathan Wang, Niki Messmore

Background: As the US population ages, it becomes imperative to ensure people have access to ways to age healthily. A vast majority of older adults indicate a preference toward aging in place over institutional care. Therefore, identifying the challenges and barriers that prevent safe aging in place can help reach an understanding of how to better support those who wish to stay in their homes as they grow older. The goal of this project was to explore the most prominent obstacles faced by low-income older adults who are aging in place in Marion County, Indiana.

Methods: The participants of this study were current or past clients of Home Repairs for Good (HRFG), a nonprofit focused on assisting low-income, older adults with aging in place by providing home repairs and modifications at no cost. To be an HRFG client, one must be 62 or older or have a disability, own their own home, live within Marion County, and live at or below 150% of the Federal Poverty Line. Participants were contacted via phone and asked to participate in a one-time interview taking place at their home.

Results: Seven interviews were performed and then transcribed. Content analysis with inductive coding was performed on the transcripts to identify themes. The themes highlighted in the interviews included financial insecurity, house maintenance and repairs, loss of support network, declining health, navigational challenges, and neighborhood safety.

Conclusion: Overall, these themes indicate a need for integrated, trustworthy, and accessible support systems that can better enable low-income, older adults to safely and comfortably age-in-place.

NE Indiana WIC Nutrition Educators' Impressions of Infant and Toddler Feeding Practices that May Lead to Childhood Obesity

Madison Werling, Niki Messmore

Background: Childhood obesity continues to rise in the United States, particularly among low-income populations. WIC (Women, Infants, and Children) nutrition educators interact closely with women and children and are well-positioned to observe feeding behaviors that may contribute to early childhood obesity. This study aimed to identify obesogenic infant and toddler feeding practices among WIC-enrolled women and children in Indiana.

Methods: An online survey was distributed to WIC nutrition educators in Allen County and surrounding NE Indiana counties.

Results: Responses from 18 participants were qualitatively analyzed and five key themes emerged: practices that support excess energy intake, sugar-sweetened beverage consumption, inappropriate bottle-feeding, suboptimal food and beverage choices, and instrumental feeding.

Conclusion: Results were consistent with findings from a previous New Jersey study, with sugar-sweetened beverages noted more frequently in this sample. Although limited by its survey format, this study provides valuable insight into potentially obesogenic feeding behaviors. Findings may inform future WIC education

and intervention strategies to help reduce early childhood obesity risk.

Ex Vivo Neurite Outgrowth of Sensory Neurons Derived from Patients Suffering from Taxane-Induced Peripheral Neuropathy

Zane York, Erica L. Cantor, Fei Shen, Santosh Philips, Bryan P. Schneider

Introduction: Taxane-induced peripheral neuropathy (TIPN) is a devastating side effect commonly seen in African American women being treated with chemotherapy for breast cancer and can cause significant dose reduction or cessation of treatment. EAZ171, a first NCI sponsored clinical trial focusing only on African American women with breast cancer, demonstrated that docetaxel clinically caused significantly less TIPN than paclitaxel. In the current project, we have investigated the impact of two taxanes, paclitaxel and docetaxel, on the morphology of neurons derived from EAZ171 patients.

Methods: Using an ex vivo model of induced pluripotent stem cell-derived sensory neurons (iPSC-dSNs) derived from peripheral blood of EAZ171 TIPN case and control patients, we measured neurite outgrowth of the induced neurons treated with vehicle or taxane. The change in neurite outgrowth was analyzed between vehicle- and taxane-treated groups. Differences in taxane induced neurite outgrowth between patients who experienced TIPN (cases) and those who did not (controls) were assessed for the differential impact of paclitaxel vs docetaxel.

Results: Taxane treatment significantly reduced the neurite outgrowth of iPSC-dSNs in a combined analysis and an analysis stratified by taxane type. Compared to the iPSC-dSNs derived from their control counterparts, iPSC-dSNs derived from paclitaxel therapy cases had a greater reduction in neurite outgrowth than that from docetaxel therapy cases.

Conclusions: The differences between paclitaxel and docetaxel in this model mirror the clinical differences in EAZ171 and provide an opportunity for unraveling mechanistic differences in this ex vivo model system. Further investigation involving fluorescence-based calcium imaging, whole transcriptome sequencing, methylation analysis, and ATAC-Seq can uncover differences between taxane types and factors that predispose patients to TIPN.

When Should We Admit? A Knowledge Gap in Hyperemesis Gravidarum Care

Sophia M. May, Karina B. Reynoso, Victoria A. Whichard, Trenton D. Goffinet, Hajirah Ishaq

Background: Hyperemesis Gravidarum (HG) is a severe pregnancy condition causing extreme nausea and vomiting with risks of dehydration, malnutrition, PTSD, and serious maternal complications including death. HG is the leading cause of hospitalization in the first trimester and the second most common cause of hospitalization during pregnancy, accounting for 400,000 visits in the U.S. annually. Due to the early presentation and severity of HG, emergency department (ED) providers are often the first to encounter these patients.

Case Description: A 33-year-old G2P1 female presented to the ED at 6 weeks' gestation with persistent nausea, vomiting, and oral intolerance for 4 days. Labs revealed mild hyponatremia and ketonuria. She was diagnosed with HG and treated with IV fluids and antiemetics, resulting in transient relief. She was discharged home from the ED with instructions to follow up with her OBGYN provider. She returned to the ED 2 days later with persistent vomiting and a 10-lb weight loss over 6 days, unrecognized at her initial visit. Despite multiple rounds of IV fluids and antiemetics, her symptoms persisted, and the decision was made to admit her.

Clinical Significance: This case highlights the key role ED providers play in deciding when admission is warranted. Premature discharge in this case may have resulted from limited

understanding of HG and the factors warranting inpatient care. The Hyperemesis Education and Research (HER) Foundation has developed ED and hospital treatment guidelines and tools, such as the HELP score and HG treatment algorithm, that are easily accessible to providers.

Conclusion: Implementation of standardized admission criteria, including HELP scores, by ED providers can better identify patients requiring inpatient care, and may improve maternal-fetal outcomes and reduce undertreatment. This case study highlights the existing knowledge gap regarding appropriate admission criteria for patients with HG and underscores the need for further research to establish clear guidelines.

Simulated Gastric Digestion to Estimate Public Health Risk of Lead in Soil from Rural Brazil, IN

Katie Rusiniak, Jennifer Latimer, Ellen Ireland

Background: Lead (Pb) contamination in soil poses significant public health risks, particularly in areas with historical industrial activities. Rural communities often receive limited routine surveillance despite potential localized contamination sources.

Objectives: This study quantified total and gastric-bioavailable soil Pb across Brazil, Indiana, characterized spatial clustering patterns, and estimated potential exposures to inform rural health prioritization and remediation planning.

Methods: One hundred surface soil samples (0-6 inches) were collected using random spatial distribution across Brazil, IN. Total Pb was measured using X-ray fluorescence (XRF) technology. Bioavailable Pb was assessed through simulated gastric digestion followed by inductively coupled plasma-optical emission spectroscopy (ICP-OES). Geospatial analysis characterized contamination patterns.

Results: Mean total Pb was 69.95 ppm (median 47.04 ppm); mean bioavailable Pb was 36.82 ppm (median 9.17 ppm). Strong correlation existed between total and bioavailable Pb ($R=0.92$, $R^2=0.85$). Four percent of sites exceeded EPA's 200 ppm screening threshold, with hotspots identified along US Highway 40 and in residential areas.

Conclusions: While most soils showed low contamination, distinct hotspots warrant targeted intervention. Strong correlation between total and bioavailable Pb suggests XRF screening could effectively identify areas requiring further assessment in rural communities.

Isolation and Quantification of Microplastics from Pediatric Tonsils

Alex D. Bindemann, Anushri Umesh, Esther Thang, Alan Richardson, Kara D. Meister, Nathan J. Alves

Background: Microplastics have been identified in nearly every organ system, posing an increasing and poorly characterized threat to human health. This project aims to isolate and quantify environmentally acquired microplastics in pediatric tonsil samples. Tonsils provide a unique opportunity for the isolation of microplastics. Not only are they highly vascularized, but they are also exposed to microplastics through eating, drinking, and breathing.

Methods: Pediatric tonsils, removed as standard of care, were obtained from a Stanford University collaborator on an approved IRB protocol. Samples were digested in 10% KOH at 50C for 48hrs with 30mins of ultrasonication at 24hrs (42kHz). Enzymatic digestion followed using collagenase (1mg/mL), DNase (100µg/mL), and proteinase K (250µg/mL) for 24hrs. Post-digestion, samples were stained with Nile Red (30µg/mL) to selectively visualize microplastics and filtered via 0.2µm aluminum oxide filters in an all-glass vacuum apparatus. Filters were imaged under brightfield, Texas Red (ex-560nm), and CY3 (ex-540nm) fluorescence channels. Image quantification was performed using R-statistical software to assess particle count, diameter, and area.

Results: The digestion protocol effectively degraded tissue while preserving suspected microplastics. Filters captured fluorescently labeled particles larger than 0.2μm. Preliminary analyses revealed fluorescently labeled particles in every sample (n=6). Across samples there was a mean particle count of 268±274 and a median particle diameter ranging from 13.0μm to 15.6μm. No observed correlation between tonsil mass (78.3±39.4mg) and particle number. In the tissue free negative control, 39 particles were identified.

Conclusion/Impact: Despite growing evidence of systemic microplastic contamination and an ever-increasing exposure to plastics, reliable methods for isolating and characterizing environmentally acquired microplastics remain limited. This work establishes an optimized protocol for non-destructive isolation and quantification of microplastics from human tissue. The tonsil-isolated microplastics will undergo further particle typing and be used in subsequent tissue culture models to better understand microplastic exposure implications to human health.

Longitudinal Pain and Sensory Sensitivity Outcomes Following Rotational Ankle Fracture

Darren Lu, Tyler Nguyen, Roman Natoli, Kelly Naugle, Anastasiya Bahdanovich, Hillarie Arellano, Fletcher White

Background: Chronic pain is a prevalent outcome in ankle fractures where 18–43% of patients report neuropathic pain symptoms up to a year post-surgery. Oftentimes, this pain substantially reduces patients' quality of life and work performance, impeding their recovery. Current studies primarily focus on treatment efficacy, with limited insight into the underlying pathophysiology that drives chronic pain. Our study aims to highlight potential risk factors for bone fracture associated neuropathic pain (BFNP), specifically to identify underlying changes in patient sensory and pain sensitivity in the development of BFNP.

Methods: Quantitative sensory testing (QST) was performed on ankle fracture patients 5–9 weeks, 3–5 months, and 6–9 months at follow-up visits post-surgery. QST included mechanical detection (MDT), warm detection (WDT), heat pain (HPT), cold detection (CDT), and pressure pain (PPT) thresholds as well as mechanical temporal summation of pain (MTS) and conditioned pain modulation (CPM) with cold water bath (CWB). Data from their 5–9 week and 6–9-month follow-up visits were compared, and analysis was performed on GraphPad Prism 10 to generate descriptive statistics.

Results: 18 out of 21 patients who have completed all follow-up visits demonstrated increased pain sensitivity in their injured ankles with 33.3% and 66.7% showing heightened pressure and mechanical pain sensitivity, respectively. 19 out of 21 patients demonstrated some form of increased mechanical or thermal sensitivity. Specifically, 38.1%, 33.3%, 38.1%, and 57.1% of patients showed increased sensitivity to mechanical, warm, heat, and cold stimuli tests respectively. 9 out of 21 patients showed reduced conditioned pain modulation.

Conclusions: This preliminary study showed that a substantial proportion of ankle fracture patients exhibited increased mechanical, thermal, or pain sensitivity as well as a reduction in pain modulation (i.e., impaired descending pain signaling). As this is an ongoing study, we will continue to recruit additional patients for further data collection and analysis.

Preoperative GLP-1 Receptor Agonist Use and Postoperative Opioid Outcomes in Elective Surgery

Ellias Hanna, Vidhya Gunaseelan, Joshua Adkinson, Jennifer F. Waljee

Background: Glucagon-like peptide-1 receptor agonists (GLP-1 RAs) are widely prescribed for diabetes and obesity, with emerging evidence suggesting they may reduce reward-seeking behaviors and alleviate certain types of pain. However, their impact on postoperative opioid prescribing remains unclear. We hypothesized that patients receiving GLP-1 RAs prior to surgery would have

lower rates of postoperative opioid fills and new persistent opioid use (NPOU) compared to non-users.

Methods: We conducted a retrospective cohort study using the Merative MarketScan Database (2018–2023). Adults aged 18–64 undergoing one of 20 selected surgeries were included. Patients with opioid fills in the year prior to surgery were excluded. Exposure was defined as any GLP-1 RA prescription 365 days before surgery. The primary outcome was the occurrence of postoperative opioid prescription. Secondary outcomes included total morphine milligram equivalents (MME) filled in the 30/90 days post-discharge, refills, and NPOU (defined as an opioid fill in both 4–90 and 91–180 days post-discharge). Descriptive analyses were conducted, and outcomes were stratified by GLP-1 use and duration of exposure.

Results: Among 989,688 patients, 2.5% had a GLP-1 RA prescription prior to surgery. GLP-1 users had lower perioperative opioid fill rates (59.2% vs. 65.2%, $p<0.001$) and filled prescriptions with lower MME at 30 and 90 days post-discharge (151.5 vs. 220.1, $p=0.015$; 168.8 vs. 235.0, $p=0.030$). However, they had higher rates of refills (10.9% vs. 9.4%) and NPOU (1.5% vs. 0.9%). Longer GLP-1 exposure, defined as consistent prescription fills, was associated with reduced opioid fill rates.

Conclusion/Impact: GLP-1 RA fills prior to surgery are associated with lower rates of initial postoperative opioid fills, but are associated with higher refill and NPOU rates, suggesting a complex interplay between metabolic therapy and pain trajectories. These findings highlight the need for tailored opioid prescribing strategies for patients with multimorbidity and chronic pain.

Chronic Neuropathic Pain Following a Rare Automobile-Related Compression Injury: A Case Report

Mitchell Holland, Jacob Ramsey-Morrow

Case Description: Our patient is a 47-year-old woman with a history of type 2 diabetes mellitus managed with medication. She presented to our clinic eight months after sustaining a right thigh compression injury, which occurred when an unattended passenger vehicle rolled into her car as she was unloading groceries. Significant swelling and bruising were present for the first three months after the injury. The only prior diagnostic workup was lumbar magnetic resonance imaging done one month prior to presentation, which was unremarkable. On initial presentation to our clinic, she reported persistent hypersensitivity of the right posterior thigh with intermittent swelling. She denied changes in sweating, hair, nails, and skin alterations, weakness, and radicular pain. Pain was aggravated by cold weather and palpation. Acetaminophen and ibuprofen provided no relief. On physical examination, the right lower extremity had increased swelling compared to the left. Allodynia and hyperesthesia were present over the right posterior distal thigh. There was no tenderness to palpation over the bilateral posterior superior iliac spine, gluteal, or piriformis muscles, and no lumbar midline or paraspinal tenderness. Sensation was intact in L2–S1 dermatomes bilaterally except for the aforementioned hyperesthesia. Motor testing revealed 5/5 strength in the lower extremities in all myotomes tested. Provocative maneuvers were negative bilaterally. The patient did not meet the Budapest criteria for complex regional pain syndrome. She was prescribed gabapentin 100 mg daily with a plan to titrate if necessary and referred to physical therapy for desensitization techniques. Two months later, nerve conduction studies (NCS) demonstrated absent sural sensory responses bilaterally, with mildly reduced amplitude and borderline conduction velocities in the right peroneal and tibial motor responses. Electromyography (EMG) showed rare fibrillation potentials and mildly enlarged motor unit potentials in the right medial gastrocnemius.

Assessment/Results: At follow-up seven months later, she continued to report posterior right thigh pain with occasional buttock involvement, without relief from gabapentin or physical therapy. She endorsed mild allodynia to light touch in the right posteromedial thigh and intermittent mottling distal to the site of

pain. She denied changes in sweating, hair, or nails. Examination again revealed right-sided lower extremity swelling without skin mottling or allodynia. Repeat NCS showed persistent absence of the right sural response with reduced amplitudes and mildly slowed conduction velocities bilaterally. EMG demonstrated mildly enlarged motor unit potentials in the right gastrocnemius. These findings suggest chronic right gastrocnemius neurogenic motor units with a superimposed sensorimotor polyneuropathy, secondary to the sciatic nerve compression injury and concomitant diabetes mellitus. Treatment options discussed included pregabalin to replace gabapentin, sciatic nerve block, and Sprint peripheral nerve stimulator. The patient declined further intervention, opting to defer management until after vascular surgery consultation.

Discussion: This is the first reported case, to our knowledge, of this situational mechanism of injury. It provides greater insight into working up the etiology of persistent lower extremity pain in the setting of trauma or crush injury and the role of serial electrodiagnostic studies to monitor acute versus chronic nerve injuries.

Conclusion: This case highlights an unusual mechanism of sciatic nerve compression injury resulting in chronic neuropathic pain. It emphasizes the role of an effective diagnostic workup in clarifying the etiology and guiding management of persistent lower extremity pain. Recognition of such rare presentations can improve diagnostic accuracy and broaden the understanding of post-traumatic neuropathic pain syndromes.

Understanding Chronic Pain in Pediatric Sickle Cell Disease: Insights from a Retrospective Chart Review

Elizabeth A. Andersen, Seethal A. Jacob

Background: Sickle cell disease (SCD) is an inherited blood condition characterized by abnormally shaped red blood cells that can obstruct blood flow, often leading to painful vaso-occlusive crises. While the current standard of care utilizes opioid-based strategies to manage acute pain, the development and diagnosis of chronic pain remain poorly understood, particularly in pediatric populations. This study aims to understand the prevalence of chronic pain in pediatric patients with SCD at a single institution.

Methods: A retrospective chart review was conducted of children with a confirmed diagnosis of SCD who received care at Riley Children's Hospital Sickle Cell Clinic between January 1 and December 31, 2024. Data were extracted from the electronic medical record. This study was approved by Indiana University's Institutional Review Board.

Results: A total of 441 unique patient charts were reviewed. Twenty-nine were excluded due to being less than 1 year old or not being seen during the study period. Most patients had the Hb SS-genotype (58%) and nearly half (48%) were female. Of the 412 unique patients reviewed, only 16 had an established diagnosis of chronic pain, with an average age of 17 years (SD +/- 2.4).

Fifteen of the 412 patients had 3 or more hospitalizations in a year, 12 of whom did not have a diagnosis of chronic pain. Five had 6 or more opioid prescriptions in 12 months. Similar to the larger cohort, most had Hb SS and about half were female. However, the average age of this cohort was younger (13 years +/- 4.6 years).

Conclusion: These findings reveal a notable discrepancy between clinical indicators of high pain burden and formal recognition of chronic pain in pediatric patients with SCD, suggesting under-recognition of chronic pain in younger individuals leading to delay in appropriate treatment.

Opioid Prescribing Following Hand Surgery Among Patients With and Without Preoperative Opioid Use Disorder

Yovani Castaneda, May Hu, Joshua M. Adkinson, Jennifer F. Waljee

Background: Given the increasing prevalence of opioid use disorder (OUD) in the United States, understanding the

association between preoperative OUD and postoperative prescribing patterns in patients with common injuries is critical. This study evaluates the association between preoperative OUD and perioperative prescribing and long-term opioid use after common hand injuries.

Methods: Using Merative MarketScan data from 2013 to 2023, we conducted a retrospective cohort study of 40,444 patients aged 18–64 who underwent hand surgery, including distal radius ORIF, flexor tendon repair, extensor tendon repair, and nerve repair. Patients were stratified by OUD diagnosis within 12 months prior to surgery. Outcomes included perioperative opioid fills, initial prescription size, naloxone co-prescribing, total morphine milligram equivalents (MME) filled within 30 days, and persistent opioid use (defined as ≥1 opioid fill from postoperative day 4–90 and 91–180). Multivariable logistic regression adjusted for demographics, comorbidities, and surgery type.

Results: Of the 40,444 patients, 468 (1.2%) had a diagnosis of OUD within 12 months of surgery. Compared to opioid-naive patients, those with OUD were less likely to fill a perioperative opioid prescription (78.9% vs. 85.3%, $p < 0.001$), received larger initial postoperative prescriptions (median: 198 vs. 150 MME, $p = 0.031$), and had significantly higher total MMEs filled within 30 days post-discharge (median: 150 vs. 0 MME, $p = 0.015$). Naloxone was co-prescribed more often in the OUD group (1.7% vs. 0.4%, $p < 0.001$), though rates remained low. Persistent opioid use occurred in 26.3% of patients with OUD compared to 1.5% of opioid-naive patients ($p < 0.001$).

Conclusion/Impact: Patients with OUD face disproportionately high rates of persistent opioid use after hand surgery and receive inadequate harm-reduction support like naloxone. These findings underscore the need for tailored perioperative care and opioid stewardship, including efforts to standardize prescribing, support recovery, and prevent dependence.

Implementing CareMessage Communication Software for Patient Navigation Optimization

Tharp, Margaret; **Gerstein, Joshua;** Lockwood, Tate; Tharp Barten, Molly; Kumar, Chaman; Gupta, Salil; Cabrero, Gloria; Cooke, Noah; Clarke, Laura; Yung, Chi-Wah Rudy; Eikenberry, Jennifer

Background: A common challenge in the patient navigation process identified by Ophthalmology Student Interest Group (OSIG) patient navigators at the Indiana University School of Medicine (IUSM) free ophthalmology clinic is establishing reliable and safe communication for patients with referrals. Current literature suggests short message service (SMS) "text" messaging can be a more reliable method of patient communication.1,2 OSIG Leadership overseeing the patient navigation efforts have also identified a preference for centralized communication from the growing number of patient navigators. In 2024, CareMessage patient messaging software was implemented to improve the ease, quality, and safety communication between patients and OSIG eye clinic patient navigators, and to provide a central repository of patient-patient navigator communications.

Methods: Consultation was held with CareMessage to discuss the software's suitability for OSIG eye clinic needs. Once deemed feasible, OSIG eye clinic leadership underwent training and began transferring patient contact information into the software. OSIG eye clinic leadership created SMS text message templates to standardize patient navigator outreach. Patients with existing but incomplete referrals or past challenges in communication were added according to the date of the initial presentation. Following initial success in contacting these patients, patients with existing referrals were added to the software, followed by patients from clinic dates thereafter. Patients were contacted by patient navigators using a shared account login.

Results: Nine clinic dates have been held using the CareMessage software. The implementation process lasted approximately three months from initial consultation to regular use at clinic dates. A singular account shared by 30 patient navigators is used for

messaging future plans to create individual accounts for all patient navigators. Individual accounts were created for Continuity Managers overseeing patient navigator efforts. Common topics of correspondence include scheduling at the OSIG eye clinic, logistics of accessing the OSIG eye clinic, and confirming referral status. Messaging templates include initial and follow-up correspondence, confirmation or denial of appointment time offering, and initial correspondence regarding referrals. The average show rate of patients who confirmed their appointment at the OSIG eye clinic is 45.8%.

Conclusions: The CareMessage platform offers an effective, secure location for patient communication that aligns seamlessly with the OSIG free clinic model. By centralizing patient messages and scheduling capabilities in one dashboard, administrative burden is diminished, and efficiency is enhanced. Translation capabilities offered by CareMessage can enhance the quality of correspondence. Transition to individual accounts for CareMessage login could improve the patient navigator engagement and response times and is planned to be a future direction for CareMessage implementation at the IUSM OSIG eye clinic.

Following-Up on Follow-Up: Summarizing Impact, Strengths, and Challenges of a Patient Navigation Program at a Student-Run Free Eye Clinic

Joshua Gerstein, Tate Lockwood, Margaret Tharp, Molly Barten, Chaman Kumar, Salil Gupta, Gloria Cabrero, Noah Cooke, Laura Clarke, Chi-Wah Rudy Yung, Jennifer Eikenberry

Background: The Ophthalmology Student Interest Group (OSIG) eye clinic at the Indiana University School of Medicine (IUSM) Student Outreach Clinic (SOC), provides free vision screenings, glasses, and referrals to individuals who may face challenges in accessing proper eye examinations. While free eye care clinics help mitigate financial barriers to healthcare access, many patients present with advanced ocular pathology that necessitates referral for additional services outside the scope of the OSIG eye clinic. The Sidney and Lois Eskenazi Hospital (Eskenazi), a safety-net institution for Marion County, Indiana, serves as the primary referral site for the OSIG eye clinic. However, a previous study at the OSIG eye clinic revealed that referral follow-up rates are less than 20%. To address the gap in care continuity, the OSIG developed a patient navigator (PN) program in 2021 in which volunteer medical students assist with patient communication and scheduling. In late 2024, the PN program also transitioned to a centralized short message service (SMS) communication system in light of emerging evidence suggesting that SMS may offer a more reliable method of patient communication. This study aims to provide a summary of referral characteristics, successes, and challenges in a one-year period.

Methods: This retrospective chart review included patients with referrals from the OSIG Eye Clinic to the ophthalmology clinic at the local county hospital between June 2024 and May 2025. Variables including patient demographics, appointment date and time, medical history, insurance status, and diagnosis/diagnoses at follow up were compared to data collected before implementation of the PN program. Data were organized and analyzed using Microsoft Excel and Statistical Package for Social Sciences. This study has received Institutional Review Board approval from Indiana University School of Medicine.

Results: During this study time period, 18 clinic dates were held at the OSIG Eye Clinic leading to 57 referred patients to the local county hospital. African American patients comprised 57.9% of the referrals, followed by Hispanic patients (22.8%). By language, 49.1% of the referred patients spoke English, followed by Spanish-speaking (31.6%) and Yoruba-speaking (7.0%) patients. The most common indications for referral were glaucoma or glaucoma suspect (24.1%), cataracts (20.7%), and diabetic retinopathy (15.5%). Insurance status varied between Medicaid and private (17.5% each), but the majority had no insurance or had an unknown financial status (61.4%). The average time from OSIG Eye Clinic appointment to local county hospital appointment was 6.27 months (± 3.28).

Conclusions: The OSIG Eye Clinic sees mainly non-White, uninsured, and non-English speaking patients. Transportation

and patient contact are other important barriers to obtaining ophthalmic care for these patients. This study shows a relatively stable follow-up time to the local county hospital, highlighting the sustained progress that the PN program has provided. To further improve follow-up rates, the OSIG Eye Clinic is seeking to establish recurring appointment times at the local county hospital reserved for referred patients. Financial navigation assistance from the Indiana Rural Health Association is also being implemented. It is anticipated that this combination of initiatives directed toward patient outreach, scheduling, and barriers will continue to improve patient show rates and follow up.

Red Cell Distribution Width as a Prognostic Indicator of Mortality in Extracorporeal Life

Jacob Jones, John Morton, Asim Mohammed

Background: Red cell distribution width (RDW) is a component of routine inpatient blood work that has been indicated as a potential prognostic mortality indicator for various conditions. Extracorporeal membrane oxygenation (ECMO) patients have a high mortality rate, and ECMO does not have easily obtainable prognostic measurements. RDW values may be a potential prognostic factor for ECMO patients and improve clinical decision making.

Methods: 142 patient charts (70 survivors, 72 non-survivors) placed on ECMO care at Lutheran Hospital met inclusion criteria. RDW values were collected at six specific times during care along with peak RDW value and survivorship outcome. Patients were stratified into high (>14.5%) and low (≤14.5%) RDW groups for each time. Relative risk (RR) and odds ratio (OR) were used to analyze survivorship outcome between the groups.

Results: Only several RR and OR calculations yielded results that indicated differences in mortality risk and odds and were statistically significant. RDW at 24 hours after ECMO initiation showed a RR of 1.72, 95% CI 1.06-2.76, p<.05 and OR of 2.68, 95% CI 1.24-5.80, p<.05. RDW at ECMO termination and discharge had an OR of 3.88, 95% CI 1.20-12.55, p<.05.

Discussion: Results showed an association between high RDW value and increased risk and odds of mortality at 24 hours after ECMO initiation. Results also indicated increased odds of mortality at ECMO termination and discharge. These preliminary results are promising for further analysis and encourage the feasibility of potentially using RDW as a prognostic mortality indicator during ECMO treatment.

Conclusions: Further analysis must be conducted on the samples collected during the study, but these preliminary results demonstrated feasibility of RDW as a prognostic biomarker for clinical decision making with ECMO survivorship outcomes.

Generation of CRISPR-Cas9 Engineered OPTNE478G Human Embryo Stem Cell Line for Investigation into Mitophagy Defects

Maverick Tebbe, Saajid Kathri, Michelle Surma, Arupratan Das

Background: Optineurin (OPTN) is a mitophagy adaptor protein linking damaged, ubiquitinated mitochondria to autophagosomes for lysosomal degradation. The E50K and E478G OPTN mutations are associated with normal tension glaucoma and ALS, respectively. Currently, it is unknown whether the E50K mutation selectively affects retinal ganglion cells and the E478G mutation selectively affects motor neurons. Given OPTN's role in mitophagy, investigating the mitophagy defects in human stem cell-differentiated (hRGCs) and induced motor neurons (iMNs) harboring these mutations provides an avenue to explore the cellular mechanisms of these diseases.

Methods: This project generated an OPTN-E478G human embryonic stem cell (hESC) line through CRISPR Cas9 gene editing. gRNA oligomers were annealed and cloned via transformation of DH5α cells. Following sequencing, the gRNA-Cas9-GFP plasmid and donor plasmid with E478G insert were transfected into H7-WT-hESCs. The CRISPR-Cas9 system cut

and repaired the double stranded break by homology-directed repair introducing the E478G mutation. GFP-positive colonies were isolated, expanded, and screened by PCR and restriction enzyme digestion. Western blot analysis of E50K and E478G mutants for hRGCs and iMNs were performed following introduction of the mitochondrial uncoupler CCCP, inducing mitophagy.

Results: Insertion of the gRNA into the Cas9-GFP plasmid was confirmed by sequencing. The hESCs were successfully transfected with the E478G plasmid as confirmed by restriction enzyme digestion of SapI and BspHI. Isolation of this stem cell population is ongoing and will be screened with restriction enzymes prior to sequencing. Western blots of NBR1 showed increased levels in WT-hRGCs and iMNs (E50K and E50K corrected), but not in E50K-hRGCs, indicating impaired mitophagy.

Conclusions: Our study reveals distinct mitophagy defects seen in the OPTN mutations E50K and E478G for the RGCs and iMNs. This project lays the groundwork for further studies, including live cell imaging, OPTN activation, and LC3b lipidation, to further define the implications of these mutations on mitophagy.

ACE-inhibitor–induced intestinal angioedema mimicking colitis/IBD

Carter Shaw, Yaniv Cozacov

Background: Angiotensin-converting enzyme inhibitors (ACEi) are among the most prescribed antihypertensive medications worldwide, used for hypertension, heart failure, and post-myocardial infarction management. Angioedema is a rare but recognized adverse side effect of their use and most commonly involves the face and oropharynx, however, visceral angioedema can occur. This underrecognized entity may mimic colitis, small bowel obstruction, or inflammatory bowel disease. In this case, we report a 49-year-old female who developed recurrent abdominal pain and emesis shortly after beginning lisinopril. Initial CT in the ED was radiographically interpreted as right-sided colitis, and lisinopril was continued. The patient's symptoms recurred, prompting surgical consultation and then radiology reinterpretation of the CT, which revealed small bowel inflammation consistent with intestinal angioedema. Following discontinuation of lisinopril, the patient's symptoms resolved completely. EGD and colonoscopy excluded alternative pathology.

Case Description: The patient is a 49-year-old female with a past medical history remarkable for hypertension, obstructive sleep apnea, obesity, and prior diverticulitis who presented to the Emergency Department (ED) with acute abdominal pain associated with nausea and vomiting. CT scan of the abdomen and pelvis initially was interpreted as right-sided colitis. Laboratory results were unremarkable. The patient was treated with Augmentin and antiemetics and was discharged with a plan of outpatient follow-up.

At her follow up with her primary care provider, the patient reported an improvement in symptoms. Her PCP referred her to gastroenterology, general surgery, and cardiology for further evaluation and management of colitis. When the patient was evaluated by general surgery, it was noted that the CT interpretation of colitis was incorrect after review of images by the surgeon, and in fact, it was a long segment of small bowel with wall thickening laying in parallel to the ascending colon. Further investigation of the patient's history revealed that her episodes of emesis closely coincided with recent initiation of Lisinopril which raised concern for angioedema. A radiology addendum revised the prior CT interpretation, noting the inflamed bowel was the ileum and not the colon. The patient was then advised to stop taking Lisinopril. Esophagogastroduodenoscopy (EGD) and colonoscopy were performed to rule out other etiology and found no evidence of inflammatory bowel disease or neoplasia.

Following these findings, the patient's GI symptoms improved after discontinuing Lisinopril and no recurrent episodes of occurred. The patient was advised to avoid future ACEi therapy.

Discussion: Most often, the adverse effects of angiotensin-conversing enzyme inhibitors (ACEi) include angioedema

which presents as swelling of the lips, tongue, and upper airway. Angioedema of the intestine, however, is much less common and can present with a multitude of nonspecific symptoms such as abdominal pain, vomiting, nausea, and diarrhea. Due to its rarity and overlap with more common gastrointestinal disorders, it is often initially misdiagnosed.

Radiographic findings of bowel wall thickening and edema can mimic colitis, infectious enteritis, or inflammatory bowel disease (IBD). For our patient, an initial CT scan was originally interpreted as right-sided colitis. The patient was then subsequently prescribed antibiotics. An addendum later clarified that the patient's colonic thickening was ileum instead and therefore, was consistent with enteritis. The relationship between lisinopril initiation and symptom onset was then noted, as well as the resolution of vomiting after its discontinuation, thus making the patient's course highly suggestive of ACEi induced intestinal angioedema.

ACEi induced angioedema has been described in large cohort studies. Epidemiologic data demonstrated that among more than 134,000 patients prescribed an ACE inhibitor, approximately 0.7% (n=888) developed angioedema within five years of initiation. Although most cases of angioedema involve the upper airway, GI involvement represents a small but clinically relevant subset. Therefore, being aware of this presentation is critical. Failure to recognize it could potentially lead to unneeded invasive testing, antibiotic therapy, or surgery.

This patient's case highlights the importance of considering ACEi induced angioedema as a differential diagnosis and in the workup of unexplained abdominal pain and vomiting. In conjunction, it is important to consider the timeline associated between symptom onset and initiation of ACEi therapy. Early recognition of ACEi induced angioedema of the small bowel can prevent unnecessary interventions and can lead to complete resolution with discontinuation of the ACEi.

Conclusion: This case report highlights the importance of the recognition of ACEi induced intestinal angioedema. Although rare, it is a reversible cause of abdominal pain and vomiting. Radiographic findings may mimic colitis or inflammatory bowel disease, leading to the use of unnecessary antibiotics or further invasive testing . Therefore, carefully identifying the relationship between medication initiation and symptom onset along with excluding inflammatory or malignant causes is essential in management. Once discovered, prompt discontinuation of the ACEi results in symptom resolution and prevents recurrence.

Clinical Needs Analysis: Oxygen Saturation Monitoring During Sedation

Prabhnoor Nagra

Background: Continuous pulse oximetry is a component of patient monitoring during anesthesia and procedural sedation, arguably one of the most foundational. Peripheral pulse oximetry relies on finger or toe probes most commonly, which are susceptible to signal degradation in low-perfusion states, vasoconstriction, patient movement, and poor probe adherence. Anesthesiologists have tried to combat this by moving the probe around to different areas, sometimes to no avail. These limitations are frequently encountered during monitored anesthesia care (MAC), endoscopy, and pediatric sedation, potentially delaying recognition of hypoxemia or generating frequent false alarms. Depending on the patient's anatomy, accurate and continuous oximetry can play a very large role. This work aims to perform a clinical needs analysis, examining limitations of conventional peripheral oxygen saturation monitoring during procedural sedation, and to explore conceptual considerations for alternative monitoring approaches.

Methods: A qualitative needs assessment was conducted through review of anesthesia workflows, procedural sedation practices, and relevant literature on pulse oximetry physiology and perfusion characteristics across anatomical sites. Common failure modes of peripheral pulse oximetry were identified, both from literature and personal, anecdotal experience in the OR. Procedural contexts in which monitoring reliability is most challenged were examined.

Results: The analysis identified multiple clinical scenarios in which peripheral oxygen saturation monitoring is unreliable, particularly in patients with obesity, pediatric patients, and those experiencing peripheral vasoconstriction. Review of perfusion physiology suggests that certain central and mucosal anatomical regions may maintain more stable blood flow during sedation. Additionally, procedural workflows often already require oral access and adjunct devices, presenting opportunities to reconsider how physiologic monitoring could be integrated without increasing complexity.

Conclusion: Peripheral pulse oximetry has well-recognized limitations in procedural sedation settings. A structured needs analysis highlights opportunities for future monitoring approaches that prioritize reliable perfusion sites along with seamless workflow integration. Further work will focus on translating these conceptual considerations into the conduction or review of feasibility studies, and potential prototype development, while maintaining patient safety and clinical usability. The latter could improve the adoption of safer clinical practices, which could also help address possible institutional liability concerns.

Clinical Diagnosis and Management of Disseminated Cryptococcus

Makala Blakely, Radha Patel, Kate Standford, Stephanie Wei, Bree Weaver, W. Graham Carlos

Background: Cryptococcal peritonitis is a rare presentation of Cryptococcus infection where fungi enter via intraluminal or periluminal pathways from the skin, hematogeneous spread, or via the gastrointestinal tract. Between 1951 and 2012, a total of only 61 cases have been reported. Risk factors for cryptococcal peritonitis include cirrhosis, HIV/AIDS infection, and peritoneal dialysis for end-stage renal disease (ESRD).

Case Description: A 52-year-old woman with a past medical history of ESRD on peritoneal dialysis (PD) presented to the emergency department with acutely worsening diffuse abdominal pain. Peritoneal fluid analysis from her dialysis catheter was concerning for a fungal infection. On arrival, repeat analysis was performed, the PD catheter was removed, and a hemodialysis line was placed. Preliminary peritoneal fluid analysis showed yeast. Treatment consisted of fluconazole initially, which was replaced by miconazole per Infectious Disease consult recommendations due to concern for Candida species. Additionally, she was found to have right lower lung nodules on imaging with subsequent bronchoalveolar lavage samples negative for fungal infection. The peritoneal fluid sample grew Cryptococcus neoformans. Given suspected disseminated disease, the patient was switched to amphotericin B and flucytosine, followed by daily fluconazole with clinical improvement and eventual discharge.

Clinical Significance: Disseminated cryptococcal peritonitis is a rare, but life-threatening disease process in patients with peritoneal catheters. Timely catheter removal and appropriate selection of empiric antifungal therapy remain critical and challenging aspects of management.

Conclusion: This case underscores the need for heightened clinical suspicion and a multidisciplinary approach to rapidly identify and manage disseminated cryptococcal peritonitis in peritoneal dialysis patients.

Anticoagulation and Block: Always a Dilemma

Makala Blakely, Jyoti Dangle

Introduction: Acute coronary syndrome can often result in ventricular arrhythmias commonly treated with antiarrhythmic medications, defibrillation, and ablation. Stellate ganglion blocks are indicated for treatment of refractory ventricular arrhythmias. This method targets the sympathetic ganglion and reduces sympathetic input to the electrical conduction system of the heart, resulting in decreased episodes of ventricular arrhythmias. Concerns for complications with this method of treatment arise when patients are receiving anticoagulation due to bleeding risk.

Materials and Methods: This case report is devoid of patient

identifiable information, and research was conducted in an established or commonly accepted educational setting that specifically involved normal educational practices. These practices were not likely to adversely impact students' opportunity to learn required educational content, or the assessment of educators who provide instruction. This includes most research on regular and special education instructional strategies, and research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods. Therefore, it is exempt from IRB review requirements per IUSM's HRPP Exempt Research policy. Consent was obtained from the patients next of kin.

Case Report: A 58-year-old man with a history of diabetes mellitus and hypertension presented with acute decompensated heart failure complicated by ventricular arrest. Return of spontaneous circulation was achieved, and he was intubated and intra-aortic balloon pump placed with addition of venoarterial ECMO due to escalating vasopressor requirements. Anticoagulation was transitioned from heparin to bivalirudin due to ECMO. Over the next seven days, he experienced recurrent episodes of refractory ventricular tachycardia and ventricular fibrillation requiring multiple cardioversions and antiarrhythmic therapies. The acute pain service was consulted for an ultrasound guided left sided stellate ganglion block to provide sympatholysis and assist with arrhythmia control. Bivalirudin was held for one hour before and after the procedure to reduce the risk of hemorrhage or hematoma formation. Following the first block (6 ml 0.25 % bupivacaine), the patient had approximately 36 hours free of arrhythmia before experiencing two episodes of ventricular fibrillation requiring defibrillation. A second stellate ganglion block was performed uneventfully using the same anticoagulation withholding strategy. After the second block, he had brief episodes of rapid ventricular rate, but no sustained ventricular tachycardia or fibrillation. His condition stabilized with continued antiarrhythmic therapy, and he was successfully extubated four days later.

Discussion: The American Society of Regional Anesthesia recommends against performing deep blocks in presence of bivalirudin. In a retrospective STAR study, 67% of patients receiving the stellate ganglion block for electrical storm had anticoagulation on board. Bivalirudin is distinctive in that coagulation parameters normalize within one hour of discontinuing the infusion, supporting the safety of this withholding interval in this patient. Furthermore, this case highlights complex shared decision making and understanding risk-benefit analysis in clinical decision making.

Hearing Wellness in Older Adults

Noah Moore, Jessica Beer, Charles W. Yates, Mark Prifogle, Irina Castellanos

Background and Hypothesis: Age-related hearing loss is a highly prevalent condition affecting two thirds of Americans over the age of 70 years old. It is characterized as progressive, bilateral, symmetrical age-related sensorineural hearing loss and affects speech understanding and the ability to communicate effectively. The standard of care is well-established, but residents of Senior Living Communities (SLCs) often experience significant challenges to accessing basic hearing healthcare, which places them at an increased risk for dementia, falls, and depression. The objective of this project was to describe and evaluate auditory wellness in residents of SLCs.

Methods: Twenty-eight residents at the independent level of care received an otoscopic exam, audiometric hearing screener, and a self-report functional hearing screener. We characterized this unique sample in terms of social determinants of health, hearing history, and hearing health.

Results: All participants experienced less than optimal auditory wellness. Self-reported functional hearing was moderately correlated with audiometric hearing loss. Hearing aid use increased with poorer performance on audiometric screening but not with poorer self-reported functional hearing. Aging is correlated with poorer performance on the audiometric screener but not with self-reported functional hearing. Cerumen occlusion was unrelated to

performance on audiometric or functional hearing screener.

Project Impact: This project is notable as a needed description and evaluation of hearing health in the growing population of older adults residing in SLCs who experience unique barriers to hearing healthcare. A comprehensive hearing health history and the use of multiple measures is imperative to evaluate and treat auditory wellness beyond degree of hearing loss and can inform identification of individualized pathways to auditory wellness. Results provide the first steps in future development of an auditory wellness toolkit designed to identify individualized auditory wellness goals that fit their specific needs and goals.

A Review of Orthopaedic Trauma Injuries in Amish Pediatric Patients

Kaitlyn Reif, Taylor G. Landis, Jon Luc Poirier, Kaushal Upadhyay, Robert J. Bielski, Erika L. Daley, Robert G. Tysklind, Laura E. Bess

Introduction: Amish patients are more likely to experience a variety of orthopaedic injuries related to their unique lifestyle, and limited research exists regarding traumatic orthopaedic injuries in Amish pediatric patients. Orthopaedic surgical intervention is the most common necessary medical treatment following pediatric trauma admissions and taking Amish culture into account is critical in providing appropriate care. Opportunities for developing interventions to prevent polytrauma and increase optimal injury resolution within the Amish population should be sought after in orthopaedic healthcare. This study investigates barriers to healthcare access and characterizes traumatic orthopaedic injury patterns and presentations in this population with the goal to increase optimal injury resolution.

Methods: 82 Amish pediatric patients with orthopaedic injuries and conditions were identified by a trauma database at a children's hospital and by payer system, listed as "self-pay Amish". 58 trauma patients met inclusion criteria, and a retrospective chart review was utilized to gather patient information. Patients were divided into operative or nonoperative traumatic injuries for data analysis.

Results: 48 patients sustained traumatic injuries requiring surgical intervention, and 10 patients had nonoperative traumatic injuries. 37 operative patients and 8 nonoperative patients presented to an outside hospital first. Operative patients had longer lengths of time from injury to presentation to the children's hospital, longer hospital stays, and more PICU admissions. The average Injury Severity Score for operative and nonoperative patients was 8.68 and 11.1, respectively. Lower extremity (26) injuries and household and personal injuries (15) were most common in operative patients, while nonoperative patients mostly had upper extremity injuries (4) and injuries from machines and equipment (4). 17 operative patients were lost to follow up compared to 5 nonoperative patients. 88% of all patients were unvaccinated.

Discussion and Conclusion: Out of 58 Amish pediatric patients who presented to a children's hospital for traumatic orthopaedic injuries, the majority underwent operative repair, initially presented to outside hospitals, and were unvaccinated. It is beneficial for medical teams to be aware of Amish pediatric patients' access to care, vaccination status, opportunities for traumatic orthopaedic injury, and likelihood of outpatient follow up to provide complete medical care as well as increase orthopaedic injury prevention strategies.

Clinical Sequelae of Fetal Parvovirus B19 Infection: A Case Report of fetal and maternal complications of in utero Parvovirus B19 infection

Elaina Lewis, Angela Diaz, Sarina Perez, Leah Stallkamp, Brian Cook

Background: Parvovirus B19 (B19V) is a prevalent viral pathogen with significant implications during pregnancy. Although maternal infection is often mild and self-limited, infection during the first or second trimester poses a risk of vertical transmission and fetal complications. B19V-induced bone marrow suppression and aplastic anemia may result in hydrops fetalis and fetal demise.

Once maternal infection is detected through serologic testing, fetal infection is confirmed via amniocentesis or fetal blood sampling. Serial ultrasonography is used to monitor hydrops fetalis, and intrauterine transfusion may be indicated in cases of severe fetal anemia.

Case Description: Patient is a 27-year-old G5P3014 female who presented at 19 weeks pregnant with concerns of decreased fetal movement. Ultrasound was significant for severe hydrops, ascites, and pleural effusion. Serologic testing showed positive IgG and IgM for B19V. Patient monitored closely with MCA doppler and percutaneous umbilical blood sampling (PUBS). A fetal intrauterine transfusion was performed, which resulted in resolution of hydrops. After a second PUBS procedure, the fetus developed bradycardia, prompting successful emergency cesarean delivery at 23 weeks gestation.

Discussion: This case emphasizes the importance of patient education and early B19V detection in first and second trimester pregnancies. Patient education should emphasize routine handwashing and sanitization. If an infection is suspected, then serological testing is first line; however, if negative, further PCR testing is recommended. By increasing patient awareness and screening, the risk of B19V infection and subsequent hydrops development can be reduced.

Conclusion: The often-asymptomatic nature of B19V infection in pregnant women increases the risk for the fetus to develop fetal anemia and hydrops fetalis. Patient awareness, education, and early testing are therefore vital to prevent infection and aid in early detection of B19V to allow for fetal monitoring and management.

Evaluating Participant Response to a Community-Based Career Fair

Andrew Jameson, Cesar Mares**, Hugo Rodriguez,** Molly Beatty, Matthew Tews

Background: Parental engagement is a critical determinant of children's educational and career trajectories, yet families with limited exposure to higher education, particularly Spanish-speaking families, often face linguistic, structural, and informational barriers to early college and career exploration. These challenges are especially salient in the Lafayette–West Lafayette region of Indiana, where a growing Hispanic and foreign-born population coexists with persistent disparities in educational attainment. This project aimed to adapt the traditional career fair model into a bilingual, community-based intervention designed to cultivate early college and career capital among elementary and middle school families.

Methods: A one-day bilingual career pathways and community resource fair was developed in collaboration with local educational institutions, community organizations, and bilingual professionals. Career presenters facilitated hands-on, profession-specific activities, while community partners shared information about existing educational and social resources. Programming was delivered in English and Spanish, and families were encouraged to self-navigate the event to promote autonomy and engagement. An IRB-exempt, anonymous pre- and post-event survey was planned to assess caregiver perceptions of education, career pathways, and access to community resources.

Results: Although approximately 15 individuals attended the event, no survey responses were collected, limiting formal outcome evaluation. However, the implementation process yielded important insights regarding event timing, location, dissemination strategies, trust-building, and evaluation feasibility. Despite low attendance, informal feedback from participants reinforced the value of family-centered, bilingual engagement.

Conclusion: This innovation highlights the importance of sustained, relationship-centered approaches and iterative refinement when implementing community-based educational initiatives and provides practical guidance for others seeking to develop similar interventions.

Automated Extraction of Clinical Note Sections

Using Large Language Models

Mout-Maine Moustapha, Andrew Zolensky, Shantanu Dev, Andrew A. Gonzalez

Background: Extracting structured clinical sections from unstructured electronic health record (EHR) notes remains challenging due to narrative variability. Manual retrieval of critical sections, History of Present Illness (HPI), Physical Examination (PE), and Assessment and Plan (AP), impedes clinical efficiency and research data curation. Large language models (LLMs) offer potential solutions but require validation for full-section extraction in real-world settings.

Methods: We developed an LLM-based extraction framework using 10,000 History and Physical notes from the Indiana Network for Patient Care registry. A hybrid annotation pipeline included: (1) REGEX-based parsing to identify section boundaries, (2) clinician validation mapping 465 unique headers to HPI/PE/AP, and (3) de-formatting to remove HTML tags. The Meta-Llama-3.1-8B-Instruct model was fine-tuned in two configurations: three single-task models (specialized per section) and one multi-task model extracting all sections jointly. Lengthy notes were segmented into 2048-token overlapping chunks to accommodate context windows. Performance was evaluated against clinician-annotated ground truth using Exact Match (EM), ROUGE-L, BLEU, and METEOR on a held-out dataset.

Results: The multi-task model outperformed single-task models in ROUGE metrics for all sections (ROUGE-L: HPI 95.7% vs. 95.5%; PE 91.7% vs. 90.2%; AP 81.4% vs. 79.0%; *p*<0.001). HPI extraction achieved the highest EM (single-task: 81.5%; multi-task: 72.9%), while AP showed the largest multi-task improvement in EM (+3.8%) but lower overall scores (28.9%) due to header variability. Semantic fidelity remained high for AP (METEOR: 78.8–89.0%), confirming accurate content capture despite formatting inconsistencies.

Discussion: Our framework demonstrates that generative LLMs can automate clinical section extraction at scale. The multi-task approach matches or exceeds specialized models in most metrics while reducing deployment complexity. This addresses critical workflow inefficiencies, potentially cutting chart review time by 30%, and enhances research data pipelines through noise reduction. Limitations include AP's header-dependent performance and HTML dependency in training.

Conclusion: Generative LLMs represent a transformative solution for structuring unstructured EHR data, enabling rapid access to clinically actionable information. By consolidating multi-section extraction into a single efficient model, our approach significantly lowers implementation barriers while maintaining high accuracy, hence accelerating both point-of-care decisions and large-scale clinical research.

Effects of Mineralization and Porosity On Ultrasound Backscatter in Bone

Christopher J. Basinski, Noah A. Jasinkiewicz, Sadia Mahmud, Alfaj Uddin Ahmed, Wikum Roshan Ban Ranasinghe Mudiyanselage, Mark R. Holland, Rachel K. Surowiec, Christopher L. Newman

Background: Though bone mineral density testing is the current standard for evaluating fracture risk, there are known limitations in some patient populations. Quantitative ultrasound has been explored as a tool for evaluating bone quality. However, the specific contributions to the backscattered ultrasound signal remain unclear. The purpose of this study was to evaluate the contributions of mineral content and porosity to ultrasound scattering.

Methods: To assess the effect of mineralization, bone mineral phantoms (n = 17) with varying degrees of mineralization (as determined by bone mineral density testing) were evaluated with quantitative ultrasound. Excised femora (n = 6) from normal adult rats were also evaluated by serial demineralization using a formic acid solution. Each bone was analyzed before and after 24 hours of demineralization. To assess the effect of geometry, cortical porosity phantoms (n = 3) made from calcium hydroxyapatite with varying

degrees of poppy seeds (to mimic abnormal pores in cortical bone) were evaluated with quantitative ultrasound. Excised femora from adult rats with chronic kidney disease with severe porosity (n = 8) also were compared to normal rats (n = 8). For phantoms and bones, the primary outcomes were speed of sound and apparent integrated backscatter (a measure of the efficiency of ultrasound scattering in a given tissue or organ).

Results: Though the speed of sound consistently increased with bone mineral density in the bone mineral phantoms (r^2 = 0.92), there were no changes observed with backscatter measurements. After demineralization of normal rat bones, the scattering efficiency decreased. Complete demineralization limited the ability to assess the speed of sound, however. In the cortical porosity phantoms, there was no difference in scattering efficiency. Similarly, bones from rats with chronic kidney disease demonstrated no changes in backscatter efficiency compared to normal bones. Attenuation of the ultrasound beam from the porosity in the phantoms and the chronic kidney disease bones limited the ability to assess speed of sound.

Conclusions: These results indicate that mineralization does impact the speed of sound in bone. Decreasing bone mineral may lead to decreased scattering efficiency. However, since these changes were only observed with complete demineralization, the clinical utility of these findings is still unclear. On the other hand, there were no detectable changes readily apparent with changing porosity. Though further studies are needed, changes in mineralization may have a bigger impact on ultrasound scattering than changes in cortical porosity.

Review: Miles from Treatment: Addressing Alzheimer's Disease Healthcare Disparities in Rural Communities

Laura Clarke

Background: Alzheimer's Disease (AD) is the most prevalent dementia, accounting for 70% of all cases. Its pathology is complex, influenced by genetic, lifestyle, and environmental factors. Affecting seven million Americans, AD mortality has risen, particularly in rural areas due to limited healthcare access. This barrier often leads to delayed AD diagnosis, worsening patient outcomes. This review examines major healthcare barriers for rural populations and proposes early interventions to enhance patient quality of life.

Methods: A literature search was performed across several academic databases. Relevant studies included peer-reviewed articles published between the years 2020 to 2025. Key search terms included "Alzheimer's", "rural", "barriers to care", and "prevention".

Results: Rural living presents with significant healthcare access challenges. Obstacles include limited healthcare infrastructure, with many towns lacking hospitals. This limitation, therefore, forces patients to travel significant distances to receive care. Transportation, thus, further aggravates barrier issues. Lastly, insufficient digital access remains a major barrier. Despite telemedicine expansion, its utilization by the geriatric population is hampered by inadequate navigation support in rural regions.

To mitigate these disparities, several actions are crucial for AD preventive care. Firstly, promoting cognitive stimulation through senior centers can reduce AD risk by combating isolation. Secondly, improving access to affordable, nutritious foods is vital for rural individuals, impacting cognitive health. Thirdly, improving physical exercise via expanded recreation centers or sidewalks fosters safe activity. Finally, enhancing AD education for patients and caregivers is paramount, facilitating earlier symptom recognition and diagnosis.

Conclusion: AD is a complex condition, necessitating more research to optimize treatment, especially for rural populations. Key barriers, including inadequate facilities, transportation, and digital illiteracy, can be addressed through initiatives like building more rural hospitals, expanding bus routes, and offering local technology education. Through expanded education, advocacy, and awareness, AD prevention, diagnosis, intervention, and

management will undoubtedly improve across rural communities.

Review: Olive Oil: Just Another Salad Dressing, or the Brain's Defense?

Noora Said

Introduction: For decades, the Mediterranean diet has received praise as the gold standard for a long life, with extra virgin olive oil (EVOO) serving as its superstar. But for too long, we've talked about

EVOO almost exclusively as a heart health hero. While it's true that the landmark PREDIMED study showed a staggering 30% relative risk reduction in major cardiovascular events like stroke and myocardial infarction, recent studies may show us that it's time to realize that what's good for the pump is even better for the processor: the human brain. As neurodegenerative diseases like Alzheimer's become an escalating global crisis, it is in our best interest to look past basic nutrition and toward potentially functional protection that diet can offer. The evidence suggests that a rather powerful shield for brain health might already be sitting in your pantry, provided that you know exactly which bottles to reach for.

The Magic of Unprocessed Oil: It would be an incorrect assumption to think that all olive oils are created equal. The real magic lies in the distinction between EVOO and refined oil: because EVOO undergoes minimal processing, it preserves a rich fraction of bioactive compounds known as polyphenols, alongside the dominant monounsaturated fatty acid, oleic acid. These compounds work synergistically to provide the oil with its pronounced antioxidant and anti-inflammatory properties. Polyphenols have been proven to have utility. For instance, hydroxytyrosol plays a fundamental role in protecting cells against reactive oxygen species; it has been found to maintain reduced glutathione, a critical endogenous antioxidant. Meanwhile, oleocanthal, another polyphenol, acts on the brain's resident immune cells, known as microglia, moving them from a pro-inflammatory, destructive state toward a protective, anti-inflammatory state. This shift allows for the resolution of inflammation, tissue repair, and the clearing of debris. Also among recent discoveries, is EVOO's ability to fortify the blood brain barrier (BBB) in mouse models. The breakdown of the BBB is one of the earliest markers of neurodegenerative processes, as breakdown facilitates the harmful infiltration of peripheral components into the central nervous system. In clinical trials involving patients with mild cognitive impairment (MCI), those who consumed EVOO for six months saw a significant reduction in the leakage of contrast in the brain hippocampi and parahippocampal gyrus, indicating a direct improvement in BBB and neuronal function. Crucially, patients in the same study who consumed refined olive oil saw no such improvement in permeability or connectivity. This tells us that the fats alone aren't enough; the unique phenolic fraction is key.

Amyloid and Tau: The neuroprotective actions of EVOO are further defined by its ability to modulate the very molecular pathways involved in Alzheimer's pathophysiology, particularly amyloid-beta deposition. Preclinical models indicate that EVOO reduces the amyloid-beta load by enhancing its clearance across the BBB. This process is mediated by the direct upregulation of critical efflux transporters expressed in the cerebral microvessels. Furthermore, EVOO enhances the ApoE-dependent amyloid clearance pathway. By upregulating ApoE and ABC1 through nuclear receptors like PPAR-γ, EVOO influences the essential downstream pathways required to remove toxic amyloid-beta from the brain's parenchyma. This multi-pronged attack on plaque formation makes it a unique candidate for long-term brain maintenance. For fighting tauopathy, there are similar effects, with limitations. Studies show that early-onset, long-term consumption significantly reduces brain tau and phospho-tau levels, which correlates directly with improved cognition contrast. Interventions initiated later in life might reduce amyloid levels, but they often leave tau levels and cognitive function unaffected.

Canola vs. Olive Oil: In an era of rising grocery bills, canola oil (CO) is marketed as a budget-friendly, heart-healthy alternative. It is true that CO can be more effective than olive oil at lowering

serum LDL cholesterol according to some studies; with regard to LDL levels, CO consumption was found to be more effective than olive oil in significantly reducing serum LDL by a mean of -6.13 mg/dl. That said, it does not appear to have neuroprotective effects. In direct comparisons, canola oil failed to provide the crucial anti-inflammatory and molecular neuroprotective effects necessary to interrupt the pathophysiology of Alzheimer's. While EVOO groups exhibit the lowest biomarkers of lipid peroxidation, canola oil groups have recorded significantly higher oxidative damage. Even more concerning, preclinical models showed that a canola-rich diet led to a decrease in the synaptic protein PSD95, implying harm to synaptic integrity and resulting in memory impairments. Thus, heart-healthy may not always be brain-healthy.

Conclusion: We need to stop viewing EVOO as just a salad dressing and start seeing it as a promising functional protectant. Current literature suggests that EVOO and its phenolic compounds may have a direct role in neuroprotection, alongside their well-documented cardiovascular benefits. However, to translate these molecular findings into actionable clinical recommendations, we must prioritize specific research goals. Future research should determine the optimal polyphenol threshold for therapeutic potential, move beyond mouse models to involve long term human studies on cognitive benefits, and compare metabolically similar oils, like canola, for future health recommendations. In the meantime, the literature is becoming increasingly clear; the brain is our most vulnerable asset, and EVOO is one of its most capable defenders. By stabilizing vascular integrity, protecting lipoproteins from oxidation, and actively fighting neuroinflammation, this cornerstone of the Mediterranean diet offers a multi-targeted approach to brain health.

Review: **Applying social and industrial/ organizational (I/O) psychology theories to positively affect the recruitment of Black women into breast cancer clinical trials**

Kaitlyn A. Reif, Katherine E. Ridley-Merriweather, Krista Longtin, Leslie Ashburn-Nardo

Background: Black women remain underrepresented and underrecruited in breast cancer clinical trials, limiting researchers' understanding of cancer in these women and reducing opportunities for novel treatments. Researchers must develop more effective health communication strategies to better recruit Black women into these studies. Social psychology and industrial/ organizational (I/O) psychology scholars have characterized the importance of workplace diversity, helping employers enhance recruitment and create more inclusive environments. This paper draws a parallel between workplace organizations and clinical trials and suggests that prospective Black female employees are analogous to potential Black female research participants.

Methods: We performed a literature review of social and I/O psychology and explored how the application of these frameworks' constructs could positively impact the communication surrounding the recruitment of Black women into breast cancer clinical trials.

Results: We found no literature describing health communication scholars utilizing social and I/O psychology frameworks to address the underrepresentation of Black women within breast cancer clinical trials.

Conclusion: We are prescribing an innovative application of these theoretical constructs as guides for developing recruitment strategies targeting these population members. We call for health communication researchers to incorporate these psychological constructs when developing and designing breast cancer clinical trial recruitment strategies targeting Black women.

Review: **Current landscape and clinical progress of targeted alpha radioimmunotherapy**

Owen C. Booth, Karena R. Dhamecha, Oluwaseyi M. Oderinde, Qi-Huang Zheng

Theranostics is an interesting area of cancer research that describes

the use of radiotracers to first diagnose and then treat cancer. By coupling a radioisotope to an agent that selectively targets malignant cells, one can distribute focused radiation to disease sites. There are a variety of different radiopharmaceutical vectors that have been utilized in this way, such as peptides, small molecules, and antibodies. Because antibodies bind to highly specific antigens, radioimmunotherapy (RIT) offers a promising route to precisely targeted treatments with reduced systemic toxicity compared to conventional radiotherapy. Beta (β)-emitting isotopes (e.g., 131I, ^{90}Y) have been more commonly coupled in RIT, but the use of alpha (α)-emitters (e.g., 225Ac, 212Pb), for RIT (α-RIT) has rising popularity due to their shorter tissue range and higher linear energy transfer. These characteristics decrease off-target effects in neighboring tissues and increase tumor cell destruction, respectively. However, there are several challenges to RIT. The production of daughter isotopes from α decay makes dosimetric assessments difficult and could potentially cause off target toxicities. Additionally, whole antibodies tend to accumulate in liver tissue as well as have long biological clearance times, which may cause excess radiation to the blood, marrow and liver. Yet, there are a variety of α-RIT agents currently in development to treat prostate cancer, hematologic malignancies, and other solid tumors. Many agents show promise, including 225Ac-DOTA-J591, a PSMA-targeted α-RIT that displayed acceptable toxicities and a confirmed 50% decline in prostate specific antigen (PSA) levels (PSA50) in 34.4% of patients (NCT03276572). However, like many of these agents, follow-up studies are needed to improve efficacy. Strategies to widen therapeutic indices of these agents have been investigated such as pretargeting, use of antibody fragments, chelator optimization, and combination therapies. This review describes the current landscape and clinical progress of targeted α radioimmunotherapy.

Review: Clinical Efficacy and Implementation Considerations of FDA-Approved Home-Based Transcranial Direct Current Stimulation for Major Depressive Disorder

Sabin Karki

Background: Home-based neuromodulation has emerged as a potential strategy to expand access to nonpharmacologic treatment for major depressive disorder (MDD), particularly for patients who cannot access clinic-based repetitive transcranial magnetic stimulation. Transcranial direct current stimulation (tDCS) is among the most studied modalities in this space, including commercially deployed, FDA-approved systems such as Flow Neuroscience.

Methods: Scoping review of recent randomized trials and supporting feasibility studies of home-use tDCS for MDD, with emphasis on implementation considerations including supervision model (tele-supervised vs unsupervised), clinical outcomes, and safety signals.

Results: Evidence for tDCS-based antidepressant efficacy is mixed and appears sensitive to implementation. In a fully remote, multisite, double-blind, sham-controlled phase 2 trial (n = 174), active home-based tDCS produced a statistically greater reduction in Hamilton Depression Rating Scale scores than sham, supporting efficacy under a structured, remotely supervised protocol. In contrast, a larger double-blind randomized clinical trial of unsupervised home-use tDCS (n = 210) did not demonstrate superiority over sham on depressive symptom trajectories, underscoring that decentralization without tight protocol control may attenuate measurable benefit. Safety findings were generally favorable but not trivial. A systematic review incorporating a prematurely terminated home-use pilot highlighted clinically relevant dermatologic adverse events, including skin lesions, and identified implementation vulnerabilities that can limit scalability. Feasibility studies using tele-supervision report on high adherence and clinically meaningful symptom reduction, suggesting that supervised

workflows may be an important mediator of effectiveness. At the broader evidence level, an individual patient data meta-analysis of tDCS trials in acute depression demonstrates modest but significant advantages over sham (response and remission benefits with clinically interpretable numbers needed to treat), supporting biologic plausibility while reinforcing moderate effect sizes.

Conclusions: Home-based tDCS is an evidence-supported approach for MDD when paired with supervision and safety controls, but current data does not demonstrate equivalence between home-use devices and clinic-administered neuromodulation in unsupervised practice. Future work should prioritize implementation science outcomes, including adherence verification, electrode placement quality control, impedance and skin monitoring, and identify patient subgroups most likely to benefit to guide clinically effective and sustainable integration into psychiatric care.

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