Rocky Vista University presents

RESEARCH DAY 2025

ADVOCATING FOR EVIDENCE BASED MEDICINE

October 13th - 18th

EVENT PROGRAM

ROCKY VISTA UNIVERSITY

INDEX

WELCOME LETTER

Welcome to Rocky Vista University Research Week 2025!

Thank you to all our visitors, presenters, and participants for joining us as we celebrate *Research Week 2025* and explore this year's theme, **"Advocating for Evidence-Based Medicine."**

This year's program showcases the passion, innovation, and collaboration that define our RVU community. Research is the heart of evidence-based practice, and this week we honor the curiosity, creativity, and dedication of our students, faculty, and staff who are shaping the future of healthcare through discovery and innovation. With over **230 abstract submissions** across our three campuses, the impact of research at RVU continues to grow. Our students and faculty have collectively achieved hundreds of publications, presentations, and ongoing projects, each reflecting our shared dedication to advancing knowledge and improving patient care.

Research Week 2025 brings together a rich lineup of events designed to inform, inspire, and connect:

- **Keynote Address by Dr. Steve Harmon:** *Advocating for Evidence-Based Medicine*
- **Shark Tank:** Nine research ideas pitched for mentorship and funding
- **Panel Discussions:** *Research Gap Year & Fellowship Opportunities* and *Using Research to Support Your Match Strategy*
- **Oral Presentations and Poster Sessions:** Showcasing student research across all campuses

We are deeply grateful to all those who helped organize and support this week's events, including our faculty and staff judges and student researchers. Your time and dedication make this celebration of scholarship possible.

Thank you for joining us as we continue to advocate for science, scholarship, and service through evidence-based medicine.

Until May… **Happy Researching!**

Amanda Brooks, PhD
Vice Provost of Research and Scholarly Activity
Professor of Molecular Biology

SCHEDULE OF EVENTS

SCHEDULE FOR ORAL PRESENTATIONS

Time	Abstract Title	Authors	Campus
5:32	Pets and the Heart: Companion Animals in Stress Modulation and Cardiovascular Disease Prevention	Jacob Minkkinen; Henry Tilghman; Theodore Hooker; Alexandra Reynolds; Miriam L. Donohue, PhD	MT
5:43	Auranofin: An Alternative Treatment to Trichomoniasis	Justin Yang, PA-S III; Meghan Day, MS, PA-C; Yukiko Miyamoto; Lars Eckmann, MD, PhD	CO-PA
5:54	Endotyping Cervical Insufficiency: The Connective-Tissue Contribution to Mid-Trimester Loss	Jessica Vergara, MS, OMS IV; Benjamin Brooks, PhD	UT
6:05	Investigating a Standardized Protocol for Osteopathic Manipulative Treatment of Primary Dysmenorrhea	Barley Huttenlocker, MS, OMS III; Ambria Tilak, MS, OMS III; Lindsay Brennan, MS, OMS III; Julie LaFontano, DO; Kristin Putnam, DO	CO
6:16	Transformative Learning: The Effect of Global Health Trips on Medical Students' Well-Being and Career Aspirations	Cassidy Carda; Asis Babun; Johannes Durant; Kelson Knighton; Max Monsoon; Amira Katrib; Ashley Metzler; Thomas Bigham, DO; Mark Wardle, DO	UT
6:27	Beta-Alanine as a Potential Therapy for Hell's Itch: A Case Series Highlighting an Underrecognized Post-Sunburn Condition	Alexandra DeVries, BS; Precious Ochuwa Imokhai; Katelin Ball, DO; Brandon Muse, DO; Benjamin Brooks, PhD, MBA	MT
6:38	PCOS Beyond Reproductive Years: Uncovering Chronic Health Risks in Later Life	Taylor Glanz, MS; Kayla Brodie, MS; Kassidy Hamer, BS; Alexander Jones, MS; Lynne Stephenson, MS	UT
6:49	The Minimally Invasive Grid Approach for Seizure Localization: A Technical Report and Case Series	Hayley A. Granberg, BA; Megana Saripella, BS; Hernan Gonzalez, MD, PhD; Sabrina Chriqui, BS; Kareem Khalifeh, BS; Jerry Shih, MD; Leena Kansal, MD; David Lee, MD, PhD; Hoameng Ung, MD, PhD; Arjun Khanna, MD; Sharona Ben-Haim, MD	CO
7:00	Advanced Imaging Segmentation For Detecting Medication-Associated Changes In Knee Osteoarthritis And Potential Drug Repurposing Opportunities	Aarthi Muthukumar, BA; Michael Cannone, MS; Amanda Brooks, PhD	MT/UT

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TRANSFORMATIVE LEARNING: THE EFFECT OF GLOBAL HEALTH TRIPS ON MEDICAL STUDENTS' WELL-BEING AND CAREER ASPIRATIONS

Cassidy Carda[1], Asis Babun[1], Johannes duRant[1], Kelson Knighton[1], Isa Akorede[1], Amira Katrib[1], Ashley Metzler[1], Dr. Thomas Bigham DO[1], Dr. Mark Wardle DO[1]*
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Introduction:
Global medical trips provide U.S. medical students with transformative experiences that may reduce burnout and influence long-term career aspirations. Burnout is a pervasive issue in medical education, contributing to emotional exhaustion, depersonalization, and reduced sense of accomplishment. This study investigates the psychological and professional impact of one-week medical trips to Guatemala, Panama, and the Dominican Republic on U.S. medical students.

Methods:
A structured electronic survey was distributed to 60 U.S. medical students who participated in these trips. The survey assessed motivations for participation, emotional impact during travel, post-trip career perspectives, and burnout symptoms. Quantitative measures included the Maslach Burnout Inventory, while qualitative data were collected from students' narrative reflections on global health and underserved medicine. Data were analyzed to compare pre- and post-trip perceptions regarding burnout reduction and career goals.

Results:
Survey analysis revealed significant benefits associated with global medical trips. Approximately 72% of students reported decreased burnout symptoms following participation. Motivation to pursue a career in medicine increased in 78% of participants, while 65% expressed greater interest in global or underserved healthcare careers. Qualitative responses emphasized the value of working in culturally diverse and resource-limited settings, where students experienced both professional inspiration and personal fulfillment. Exposure to international health systems, health inequities, and cross-cultural care promoted resilience, problem-solving, and renewed enthusiasm for medicine. These findings align with prior research suggesting that global health experiences improve well-being and reinforce dedication to medical careers.

Conclusion:
Short-term international medical trips demonstrate measurable positive effects on medical students' mental health and career outlook. By reducing burnout and enhancing interest in global health, these experiences represent a valuable addition to medical education, supporting both personal well-being and the cultivation of socially responsible future physicians.

INVESTIGATING A STANDARDIZED PROTOCOL FOR OSTEOPATHIC MANIPULATIVE TREATMENT OF PRIMARY DYSMENORRHEA

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Primary dysmenorrhea, characterized by painful uterine contractions during menstruation which affects a large proportion of individuals. Current standard of care is management with non-steroidal anti-inflammatory drugs (NSAIDs). While effective, NSAIDs carry risks with prolonged use, including gastrointestinal and renal complications, with some individuals being unable or unwilling to use them. Osteopathic manipulative treatment (OMT) offers a low-cost, noninvasive alternative with potential for pain relief, although prior studies have been limited by treatment heterogeneity and lack of methodological rigor. This pilot study sought to evaluate a standardized, single-blinded OMT protocol compared to NSAIDs in the management of primary dysmenorrhea. Forty participants were recruited, with 28 included in the preliminary analysis. Participants were assigned to one of four groups: NSAID control, lumbosacral OMT, pelvic OMT, or viscerosomatic OMT. Pain scores were measured before and after intervention, and delta pain scores were calculated to assess treatment efficacy. Preliminary findings demonstrate that OMT resulted in significantly greater improvements in pain compared to NSAIDs. These results are clinically meaningful, as they suggest OMT may provide effective, non-pharmacologic relief for menstrual pain while reducing reliance on medications with adverse effects. Limitations of this preliminary investigation include a small sample size, narrow demographics regarding age and health status, and subjective evaluation of pain. Ongoing investigation is currently being perused to address such limitations. As a pilot study, these findings support the feasibility of a blinded OMT research design in women's health and highlight the need for larger-scale studies to further investigate OMT as a novel management option for primary dysmenorrhea.

PCOS BEYOND REPRODUCTIVE YEARS: UNCOVERING POST MENOPAUSAL HEALTH THREATS

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Polycystic ovary syndrome (PCOS) is a common endocrine disorder affecting reproductive-aged women, but its health implications extend well beyond menopause. While much is known about infertility, metabolic, and cardiovascular risk factors during the reproductive years, less is understood about the long-term chronic health risks in postmenopausal women with a history of PCOS. This study served to evaluate the most frequently reported chronic health risks associated with PCOS in postmenopausal women. A literature review was conducted across Google Scholar, PubMed, Embase, Open Evidence, and EBSCO using terms for PCOS, post menopause, menopause, chronic disease, and health risks. Studies published from 2015–2025 that reported long-term health outcomes in postmenopausal women with PCOS were included. Full-text articles were assessed, and findings were extracted, categorized by chronic health outcome type, and tallied to determine the most frequently reported outcomes. Postmenopausal women with a history of PCOS exhibit increased risk for metabolic syndrome, insulin resistance, type 2 diabetes, hypertension, and endometrial cancer. Cardiovascular event risk is modestly increased but this association appears attenuated when controlled for obesity. Limitations include the small number of postmenopausal-specific studies and heterogeneity in diagnostic criteria which may affect generalizability. PCOS confers long-term health risks that persist in the postmenopausal years, necessitating proactive screening, continued monitoring, and targeted preventive care. Recognition of these chronic risks underscores the importance of life-course management strategies for women with PCOS, even after the cessation of menses.

BETA-ALANINE AS A POTENTIAL THERAPY FOR HELL'S ITCH: A CASE SERIES HIGHLIGHTING AN UNDERRECOGNIZED POST-SUNBURN CONDITION

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Background and Clinical Significance:
Hell's Itch is a rare, extremely uncomfortable post-sunburn condition characterized by severe burning and itching starting 24–72 hours after sun exposure. It is often misdiagnosed or unrecognized by healthcare providers due to lack of understanding and awareness. Standard antipruritic and post-sunburn therapy is ineffective in providing symptom relief. Medical literature provides minimal guidance on effective therapies, leaving patients to rely on anecdotal reports and self-directed care.

Case Presentation:
Three healthy adult males (ages 23–28) experienced multiple episodes of delayed-onset, severe pruritus following moderate to severe sun exposure. They described the burning pain with terms like "fire ants" and "thumbtacks," with no associated rash or fever. Conventional post-sunburn therapies including oral antihistamines, topical lidocaine, NSAIDs, aloe vera, and cold compresses provided no significant relief. After reading online reports that beta-alanine might be helpful, all subjects consumed beta-alanine in pre-workout supplement or pure powder and experienced rapid and significant relief from their symptoms. One subject experienced mild transient paresthesia but overall, subjects tolerated the supplement well.

Discussion:
This case series identifies beta-alanine as a potential off-label therapy for Hell's Itch and emphasizes the psychological burden and clinical challenge of this poorly understood condition. While anecdotal, these findings support the need for further study into beta-alanine's mechanism of action, safety, and efficacy in relieving symptoms of Hell's Itch. Increased clinical recognition of this condition is essential to improve diagnosis, management, and quality of life for those affected by this condition.

***Keywords**: Hell's Itch; Post-sunburn pruritus; Beta-alanine; TRPV1-mediated itch; Neurogenic inflammation*

THE MINIMALLY INVASIVE GRID APPROACH FOR SEIZURE LOCALIZATION: A TECHNICAL REPORT AND CASE SERIES

Hayley A. Granberg[1], BA; Megana Saripella[3], MD; Hernan Gonzalez[3], MD, PhD; Sabrina Chriqui[2], BS; Kareem Khalifeh[2], BS; Jerry Shih[4], MD; Leena Kansal[4], MD; David Lee[4], MD, PhD; Hoameng Ung[4], MD, PhD; Arjun Khanna[4], MD; Sharona Ben-Haim[3], MD*

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The field of epilepsy surgery has benefited from the progressive evolution of minimally invasive techniques for both seizure localization and treatment. The stereotactic electroencephalography (sEEG) approach is increasingly utilized at many US centers; however, for certain patients, there remains a need to place subdural grids for increased cortical data collection. Traditional subdural grid electrodes typically require medium to large craniotomies and can carry significant risk of morbidity. This study introduces a minimally invasive technique using a small, strip-like craniotomy with placement of sequential, organized subdural strips to create a minimally invasive subdural 'grid' (MIG) for seizure localization.

Five patients underwent intracranial electrode placement using a minimally invasive grid approach in combination with stereotactic depth electrodes. Small craniotomies were performed several centimeters away from the targeted region, and strip electrodes were placed side by side using stereotactic navigation to cover a target region in a grid-like fashion. Postoperative imaging confirmed electrode positioning and allowed for further adjustments.

The minimally invasive grid technique effectively localized epileptogenic zones without major complications and was effective for electrocorticography mapping when appropriate. There were no instances of subdural fluid collection, infection, or cerebrospinal fluid leak. Across all cases, the MIG technique minimized the surgical incision and craniotomy size that would have traditionally required a continuous grid electrode over the same cortical surface.

The MIG technique offers a safe, minimally invasive alternative for localizing epileptogenic regions and performing electrocorticography mapping. Further study is needed to validate these findings in larger cohorts.

PETS AND THE HEART: COMPANION ANIMALS IN STRESS MODULATION AND CARDIOVASCULAR DISEASE PREVENTION

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Introduction: Chronic stress from persistent psychosocial stressors has been shown to enhance the risk for cardiovascular disease (CVD) and myocardial infarction (MI), primarily through neurohormonal and autonomic dysregulation. One consequence of chronic stress is sympathetic overdrive. These sympathetic signals are then integrated via rostral ventrolateral medulla excitation and caudal ventrolateral medulla inhibition. This pathway leads to downstream effects such as elevated cortisol, reduced oxytocin, increased peripheral sympathetic excitability, decreased vagal tone, and diminished baroreflex sensitivity—all of which contribute to ventricular remodeling and elevated cardiovascular risk.

Purpose: This literature search hypothesizes that companion animals (cats/dogs) may serve as adjunctive therapy for CVD and reduce the recurrence of MIs by modulating stress-related brain, brainstem, and neuroendocrine pathways. This adjunctive approach is accessible beyond the clinic setting and may provide supportive care for rural and underserved populations.

Methods: A systematic literature review was conducted on PubMed and Undermind, following PRISMA guidelines. This review synthesizes findings from peer-reviewed literature examining pet ownership (cats/dogs) and cardiovascular health, focusing on stress biomarkers (e.g., cortisol, oxytocin), autonomic regulation, and psychosocial factors.

Results: Pet ownership was shown to increase oxytocin, reduce cortisol, enhance parasympathetically driven pathways, while reducing stress and sympathetically mediated pathways, suggesting a neurohormonal cardioprotective benefit. Additionally, when compared to pharmacotherapy alone, the combination of pet ownership and pharmacotherapy was observed to lower the risk of MIs, improve post-MI survival, increase heart rate variability (HRV), and reduce blood pressure among owners. Notably, cat ownership specifically was linked to reduced fatal MI risk and reduced overall cardiovascular mortality.

Contribution: This review identifies pet ownership as a promising adjunct to conventional therapy for CVD. With stress affecting nearly half of Americans, pet companionship offers a low-risk intervention. By restoring autonomic balance, it provides cardioprotective benefits for high-risk individuals and reduces chronic stress in the general population.

Keywords: *cardiovascular disease, myocardial infarction, heart rate variability*

ADVANCED IMAGING SEGMENTATION FOR DETECTING MEDICATION-ASSOCIATED CHANGES IN KNEE OSTEOARTHRITIS AND POTENTIAL DRUG REPURPOSING OPPORTUNITIES

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Osteoarthritis (OA) is a progressive joint disorder characterized by cartilage degradation and joint space narrowing. Various etiologic factors are associated with OA progression and traditionally physicians follow a conservative progression of management and treatment with eventual surgical intervention for severe progression. In this study, we analyzed the distribution of commonly used medications among patients in the Osteoarthritis Initiative (OAI) dataset to identify drugs that may influence disease progression or prognosis. We segmented data using the Segment Anything Model, an advanced computer vision tool that allowed us to isolate bony structures from x-ray images. Our methods provide a preliminary framework for evaluating the potential structural effects of medications in knee OA and demonstrate the utility of such models in musculoskeletal imaging analysis. Several medication classes were associated with greater JSW narrowing, suggestive of accelerated structural joint degeneration, while others were linked to JSW widening, potentially indicating protective effects. These associations varied by gender, underscoring the importance of sex-specific analysis in osteoarthritis research. Our findings indicate that several commonly prescribed medications exert measurable effects on knee joint space width, with certain agents—such as carbonic anhydrase inhibitors and bisphosphonates—showing potential protective properties, while others, including corticosteroids and antineoplastics, were associated with cartilage narrowing. The primary limitation of this project is its reliance on 2D data; future studies will aim to incorporate 3D data to improve accuracy and clinical relevance. These results suggest that routine pharmacologic exposures may differentially influence osteoarthritis progression and underscore the importance of investigating drug repurposing in this condition.

ENDOTYPING CERVICAL INSUFFICIENCY: THE CONNECTIVE-TISSUE CONTRIBUTION TO MID-TRIMESTER LOSS

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Cervical insufficiency (CI), a contributor to second-trimester pregnancy loss, is characterized by painless cervical dilation or gradual shortening that occurs without labor or infection. Risk factors include cervical trauma from prior procedures, history of preterm birth, multifetal gestation, and congenital Müllerian anomalies, with the strongest associations in multifetal gestation and recurrent miscarriage. Patients with heritable connective tissue disorders (CTDs), such as collagenopathies or hypermobile Ehlers–Danlos syndrome, Marfan syndrome, Loeys–Dietz syndrome, and osteogenesis imperfecta, demonstrate increased vulnerability. Disrupted collagen composition and cross-linking, coupled with heightened matrix metalloproteinase activity, weaken cervical tissue, reduce biomechanical strength, and increase susceptibility to mid-trimester loss. In systemic sclerosis, histopathologic changes such as cervical fibrosis and vascular abnormalities provide additional evidence of impaired tissue remodeling.

A focused literature review (2014–2025) on PubMed identified observational cohorts, case series, case-control studies, and mechanistic reports evaluating CI in patients with CTDs or extracellular matrix biomarkers. Findings implicate genetic variants (COL1A1, COL4A3, TGFB1, TIMP2), immune dysregulation, and reduced cervical collagen concentration as key contributors to cervical weakness. Cancer-related studies were excluded.

CTDs reveal distinct endotypes of CI that may enhance risk stratification and guide individualized management. Recognition of CTD features should prompt early cervical-length surveillance, multidisciplinary care, and selective use of cerclage or progesterone. Prospective studies integrating genetics, imaging, and extracellular matrix biomarkers are needed to refine diagnosis and optimize pregnancy outcomes.

Keywords*: cervical insufficiency, mid-trimester pregnancy loss, connective tissue disorder, collagen*

AURANOFIN: AN ALTERNATIVE TREATMENT TO TRICHOMONIASIS

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Trichomoniasis, a prevalent sexually transmitted infection (STI) caused by *Trichomonas vaginalis*, faces increasing challenges due to widespread metronidazole resistance, underscoring an urgent need for alternative therapeutic strategies. This study aimed to evaluate the antitrichomonal efficacy of gold(I) complexes, particularly the FDA-approved drug auranofin, as potential topical treatments for both metronidazole-sensitive and metronidazole-resistant *T. vaginalis* strains. We employed a comprehensive approach, utilizing *in vitro* assays to assess compound efficacy and cytotoxicity against *T. vaginalis* and human cells, followed by *in vivo* validation in a *Tritrichomonas foetus* murine model. Our results demonstrated that both gold(I) complex drugs auranofin and chloro(triethylphosphine)gold(I) (CTG) exhibited potent *in vitro* activity against *T. vaginalis*, critically maintaining efficacy against metronidazole-resistant strains. Furthermore, topical administration of both auranofin and CTG achieved complete infection clearance in the animal model. While CTG presented a superior *in vitro* selectivity profile, auranofin's existing FDA approval offers a distinct advantage for translational efforts into clinical practice. The crucial next steps of developing optimal topical formulations, conducting thorough safety evaluations, and proceeding to rigorous clinical trials are required to translate these vital therapies into patient care settings. This research provides strong preclinical evidence for gold(I) complexes as highly promising alternative treatments for refractory trichomoniasis while emphasizing its shortcomings with a lack of currently available biochemical and clinical data.

ORAL PRESENTATION RUBRIC

Assessment/Scoring Rubric for Oral Presentations:

Provide a rank for each criterion on a Likert scale of 1-5

Below are examples of what would classify as excellent, very good, good, ok, and poor

Score	Description
5 - Excellent	Maintains eye contact, invites discussion, summaries key points, appropriate use of figures and references, slides are well designed and readable, potential limitations are identified, builds logical arguments based on evidence.
4 - Very Good	Clear summary, well-rehearsed, some filler words, images are used but may not always be well explained, makes limited jumps in logic.
3 - Good	Some use of scientific jargon, too many words and not enough images, images used did not support the audience learning, no clear summary, difficult to follow logic at times.
2 - Ok	Not engaging, too much jargon, did not lead a discussion well, difficult to hear, significant background missing.
1 - Poor	Unclear and hard to follow, not well practiced, did not stay within time limits, defensive during questioning, not well referenced, take home points unclear, limited background provided.

Content and Scientific Merit

Introduction:

- ○ Defines background and importance of research.
- ○ States objective, and is able to identify relevant questions.

Body:

- ○ Presenter has a scientifically valid argument.
- ○ Addresses audience at an appropriate level (rigorous, but generally understandable to a scientifically-minded group).
- ○ Offers evidence of proof/disproof.
- ○ Describes methodology.
- ○ The talk is logical.

Conclusion:

- ○ Summarizes major points of talk.
- ○ Summarizes potential weaknesses (if any) in findings.
- ○ Provides you with a “take-home” message.

ORAL PRESENTATION RUBRIC

Speaking Style/Delivery:

- ○ Speaks clearly and at an understandable pace.
- ○ Maintains eye contact with audience.
- ○ Well rehearsed (either extemporaneous or scripted presentation).
- ○ Limited use of filler words ("umm," "like," etc.).
- ○ Speaker uses body language appropriately.
- ○ Speaker is within time limits.
- ○ Speaker is able to answer questions professionally.
- ○ Speaker is dressed appropriately.

Audio/Visual:

- ○ Graphs/figures are clear and understandable.
- ○ The text is readable and clear.
- ○ Audio/Visual components support the main points of the talk.
- ○ Appropriate referencing of data that is/was not generated by presenter.

Constructive Criticisms (2 required):

1.
2.

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CASE REPORT RUBRIC

	0	1	2	3
	Absent	Poor	Good	Excellent
Case Report				
Case Description		Limited background and details of examination	Adequate	Comprehensive and clear detail including history and examination
Uniqueness	Not unique	Unclear uniqueness	Moderately unique	Clear description of uniqueness and is instructive.
Importance in the field	Not discussed	No clear importance in the field	Limited impact in the field	Clear description of importance. Could have significant impact on the field
Diagnosis/Treatment	Not described	Unclear diagnostic strategy, no justification of treatment	Adequately described diagnostics and treatment regimen	Clearly described diagnostics and justified treatment
Discussion	Missing	Case is not discussed in the context of the literature	Case is summarized but not connected to the current literature	Case is summarized and placed in the context of the literature and the field with clear impacts identified
Overall				
Format	Did not use correct format	Many formatting errors	Generally followed formatting guidelines	All formatting guidelines are carefully followed
Clarity	Unable to follow, typos impede understanding	Difficult to read		Clear and easy to read
Professional Communication	Too much jargon and poor communication	Many grammatical errors, but they do not impede understanding	Few grammatical errors and little jargon to impede understanding	Writing is appropriate to profession, all acronyms are defined, appropriate verb tense

ABSTRACT RUBRIC

Research Abstract	0	1	2	3
	Missing	**Poor**	**Good**	**Excellent**
Introduction	Missing	Unclear; Does not connect to the literature	Clear but not engaging; Attempts to connect to the literature	Clear, concise, engaging; Connects the topic to the literature and purpose of the work
Research Question/Purpose	Missing	Unclear; Includes irrelevant or unimportant information	Clear but not concise; Might contain irrelevant or unimportant information; lacks specifics	Clear, concise, relevant and assessable; Logical based on introduction
Methodology/Approach	Missing	Not mentioned but implied; Not appropriate for the purpose; Not good scientific practice	Unclear; Not appropriate detail; Unconnected to the purpose	Connected to the purpose; Clearly identifies methods used; Described in appropriate level of detail
Results (Findings)	Missing	Unclear; Not related to the purpose; Misinterpretation of the results	Presents findings, but may not be clear; some information missing	Clear, Connected to the purpose; Provides explanations of what was expected, found, accomplished, etc.; Clearly identifies the limitations of the study
Contribution to the Field	Missing	Unclear and lacks detail about contribution	Attempts to connect work to the field, but it is unclear	Clearly states how the work advances knowledge in the field or fills an important gap; States why it is important and where it can go
Professional Writing	Grammatical errors, typos impede understanding, inappropriate verb tense; Non-compliant with template	Many grammatical errors and typos but it does not impede understanding; inappropriate verb tense; Writing is unfocused or not engaging; Too much jargo	Few grammatical errors and typos; mixed verb tense; Writing is somewhat engaging	Writing is appropriate for the profession; Acronyms are defined at first use; Appropriate verb tense; Writing is engaging

NELL-1 MEMBRANOUS NEPHROPATHY WITHOUT MALIGNANCY OR KNOWN EXPOSURE: A DIAGNOSTIC CHALLENGE IN SERONEGATIVE NEPHROTIC DISEASE

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NELL-1 associated membranous nephropathy (MN) is a rare and recently characterized subtype of MN, accounting for approximately 1.5–9.3% of MN cases. It is most commonly idiopathic (~50–60%) but also associated with malignancy (~30%), drug exposures (~10–15%), and rarely, systemic autoimmune diseases (<5%). We report a unique case of biopsy-confirmed NELL-1 MN in an elderly male without malignancy, known exposures, or systemic autoimmune disease—but with evolving serologies—highlighting an atypical autoimmune-associated phenotype. An 81-year-old male with stage 3b chronic kidney disease was evaluated for declining renal function and abnormal serologies. In 2022, initial autoimmune testing demonstrated positive ANA (Antinuclear antibodies) with negative reflex testing. Renal function remained stable through 2025 (creatinine 1.49–1.87 mg/dL; eGFR 36–47 mL/min/1.73m²), and albumin was 3.1 g/dL. A renal biopsy performed in July 2025 demonstrated features consistent with membranous nephropathy, specifically, subepithelial and intramembranous electron-dense deposits with podocyte foot process effacement. Immunohistochemistry was negative for PLA2R, a marker of typical MN, but positive for NELL-1. Immunofluorescence revealed strong diffuse IgG (3+), and both kappa and lambda light chain staining. Imaging (CT chest/abdomen/pelvis) and PSA were unremarkable for malignancy. In 2014 the patient deferred future colorectal cancer (CRC) screening, with self-reported last CRC screening in 2002. Given the patient's positive paternal-family history of CRC, the patient agreed to follow-up colonoscopy. The procedure discovered three sessile polyps which were subsequently biopsied. Final pathological assessment of biopsied polyps is pending. Repeat ANA was positive (1:320 – speckled pattern), with newly reported reflex anti-U1RNP positivity. Although the patient had chronic joint symptoms attributed to osteoarthritis and pseudogout, he did not demonstrate systemic autoimmune features. Rheumatology referral was initiated to further investigate potential evolving autoimmune processes. This case illustrates a rare, non-malignant, non-exposure-associated presentation of NELL-1 MN with changing autoimmune serologic features. The presence of anti-U1RNP, commonly associated with Mixed Connective Tissue Disease (MCTD), raises suspicion for an evolving or limited autoimmune process. It underscores the need for a comprehensive diagnostic approach—including malignancy screening, autoimmune evaluation (with repeat testing if appropriate), and exposure history. Broader antigen testing, including NELL-1, should be pursued when traditional markers are negative to ensure accurate diagnosis, and guide appropriate treatment.

CALCIUM DYSREGULATION IN ADHESIVE SMALL BOWEL OBSTRUCTION: MITOCHONDRIAL STRESS, IMMUNE SIGNALING, AND MICROBIAL SYNERGY IN A MULTI-HIT FIBROTIC MODEL

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Adhesive small bowel obstruction (aSBO) is a leading cause of surgical readmission, arising from fibroinflammatory peritoneal adhesions. While ischemia, mesothelial disruption, and microbial contamination are established contributors, calcium dysregulation remains underexplored. Calcium plays a central role in mitochondrial integrity, immune activation, thromboinflammation, and extracellular matrix remodeling—pathways linked to adhesion formation. This review examines how clinical, metabolic, and pharmacologic factors may converge on calcium-sensitive signaling cascades to promote postoperative fibrosis. An integrative narrative review was conducted using literature from NCBI (PubMed), StatPearls, Elsevier, Springer, Wiley, and Open-access Journals (Frontiers, MDPI, BMC, and others). The scope included pathology, immunology, and metabolic disease. Key calcium-regulated pathways—TGF-β/SMAD, calcineurin/NFAT, RhoA/ROCK, and NLRP3 inflammasome—were examined in relation to mesothelial signaling, mitochondrial dysfunction, immune polarization, and microbial virulence. Evidence suggests hypercalcemia – through direct and indirect effects on immune mediators, fibroblast recruitment, angiogenesis, and ECM remodeling – drives the transition of mesothelial tissues from a dynamic reparative state into fibrotic, adhesiogenic architecture. These responses are exacerbated by ischemia, toxins, and calcium-sensitizing drugs. Patients with hypercalcemia, dysregulated electrolytes, or pharmacologic exposures may represent high-risk for adhesion development following surgery. Current research on postoperative adhesions often isolates mechanisms or drug targets. This work introduces a multi-model framework by integrating those perspectives to fill a critical gap in adhesion research and proposes a novel pathophysiologic lens for identifying high-risk patients. Future investigation into calcium-modulating strategies may inform targeted prevention in surgical populations.

Keywords: *Adhesive small bowel obstruction (aSBO), calcium signaling, fibrosis, postoperative adhesions, mitochondrial dysfunction*

THE PERSPECTIVES OF RURAL PATIENTS ON ASPECTS OF THE PATIENT-PROVIDER RELATIONSHIPS IMPACTING THEIR HEALTH CARE

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The lack of healthcare literacy and access in rural America, caused by fewer healthcare providers in those areas, contributes to poorer health outcomes for the people living there. This shortage persists despite the efforts of programs to increase healthcare providers in rural areas. Therefore, it is important to examine the nature of healthcare provided in rural areas, because a successful relationship between provider and patient can lead to better health outcomes. We surveyed people living in rural areas to gain insight into factors contributing to or diminishing their relationship with health care by specifically examining their opinions on relationships with healthcare providers. The results showed that rural people are most likely to take medical advice from providers who share their values. Additionally, participants suggested that providers use more compassion in their interactions. As the perceived degree of shared values increased, there was a positive correlation with respondents choosing to seek medical advice from providers who respect their values, and the same participants were less likely to take medical advice from friends, family, or online resources. Overall, the study found that value alignment can enhance patient-provider relationships, even when lifestyles differ. Patients prefer providers who invest time in a particular community and build long-term relationships. Lastly, clear, empathetic communication is important. While the study was limited by the low number of responses, these findings highlight opportunities for healthcare providers to strengthen trust with their patients, strengthen patient-provider communication, and respect the individuality of each patient in clinical practice.

THE ZOLPIDEM PARADOX: REVIEW OF PARADOXICAL AROUSAL IN DISORDERS OF CONSCIOUSNESS

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Zolpidem, a widely-used sedative, has been anecdotally reported to cause a paradoxical arousing effect in a small subset of patients with Disorders of Consciousness (DOC). These striking case reports have garnered significant public attention. This literature review aims to provide a comprehensive assessment of this phenomenon, clarifying the discrepancy between anecdotal evidence and systematic findings. Following PRISMA guidelines, a search was conducted using a pre-specified boolean phrase on Google Scholar and PubMed. The initial search yielded 1154 results, which were screened based on inclusion criteria: original research involving human subjects with a DOC diagnosis, and reporting on zolpidem-induced arousal. After screening and exclusion of reviews, editorials, and animal studies, seven research articles were included in the qualitative synthesis. The findings revealed that while dramatic case reports document remarkable, transient awakenings, larger prospective studies indicate a low responder rate of 5-7% of the DOC population. For instance, an open-label study of 60 patients showed behavioral improvements in 20%, but none were clinically significant enough to warrant a change in diagnosis. Objective neuroimaging, including PET and SPECT, provides support for the proposed neurobiological mechanism by consistently showing increased cerebral activity in responders. This review highlights the critical need to temper expectations and emphasizes the divergence between anecdotal evidence and systematic findings. Several limitations of this review include publication bias, the scarcity of large-scale RCTs, and the lack of standardized outcomes measures. Future research should prioritize large-scale, controlled trials to identify patient candidates using objective biomarkers.

AI INTERACTION AND PSYCHOSIS-LIKE SYMPTOMS: A STRUCTURED LITERATURE REVIEW

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Generative AI chatbots are now widely used, including for informal mental health support. Recently, psychiatrists have begun encountering patients with psychosis-like symptoms (delusions, paranoia, derealization) after intensive chatbot interactions (Cuthbertson, 2025; Dolan, 2025; Gander, 2025). Expert observers have warned that human-like AI could precipitate delusions in predisposed individuals (Østergaard, 2023), and case reports have described apparent chatbot-associated psychiatric crises (Cuthbertson, 2025; Gander, 2025).

Immersive engagement with large language model chatbots can precipitate or amplify psychosis-like symptoms in vulnerable individuals via design features (e.g., overly agreeable, human-like responses) that reinforce users' false beliefs.

We conducted a structured narrative review (2020-2025) via PubMed and Google Scholar using terms such as "AI chatbot," "psychosis," "delusions," and "ChatGPT." Given the limited literature, we included peer-reviewed articles, case descriptions, and credible media reports with clinical detail, synthesizing common symptom patterns, patient characteristics, chatbot behaviors, and proposed mechanisms.

Heavy chatbot use has been linked to diverse delusional themes (grandiose, religious, romantic) plus paranoia and derealization (Dolan, 2025; Gander, 2025). Most cases involved individuals with risk factors like prior mental illness, insomnia, or social isolation, and were often younger adults (Gander, 2025). However, even individuals with no psychiatric history have developed delusions after extensive chatbot use, and some cases required psychiatric hospitalization (Cuthbertson, 2025). Chatbots often validated or amplified users' false beliefs instead of providing reality-testing (Cuthbertson, 2025). For instance, one evaluation found that current models sometimes affirmed delusional content or offered unsafe advice (Moore et al., 2025), suggesting that highly agreeable responses could exacerbate risk.

Our findings suggest that AI chatbots can act as novel triggers or amplifiers for psychosis-like episodes in predisposed individuals (Østergaard, 2023). Clinically, psychiatrists should be vigilant and consider intensive chatbot use as a potential contributor when patients present with new or worsening delusions or paranoia.

AI chatbots may trigger or exacerbate psychosis-like symptoms in vulnerable populations. Psychiatrists should monitor and guide high-risk patients' chatbot use to mitigate harm.

CUP BY CUP: COFFEE AND THE HEART–MORTALITY, CORONARY DISEASE, AND ARRHYTHMIAS

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Coffee is one of the world's most consumed beverages. Clinical guidance has shifted from caution to potential benefit as recent reviews show neutral-to-favorable cardiovascular effects, often with a J-shaped dose–response peaking at moderate intake.
Purpose (Research Question)

To synthesize evidence from the last 10–15 years on associations between habitual coffee intake and (1) cardiovascular mortality, (2) coronary heart disease (CHD), and (3) arrhythmias, with practical implications for primary care.

Narrative review emphasizing umbrella reviews/meta-analyses and large prospective cohorts (e.g., UK Biobank). We extracted outcomes and dose–response patterns and examined brewing method (filtered vs unfiltered) and coffee type (caffeinated vs decaf).

Moderate intake (~3–5 cups/day; nadir ~3–4 cups/day) is consistently linked to lower overall cardiovascular risk; heavier intake offers no added benefit and generally no harm after adjustment. For arrhythmias, habitual caffeinated coffee is neutral or protective (e.g., lower AF incidence at 4–5 cups/day for ground and at 2–3 cups/day for instant in UK Biobank); decaf shows no reduction. For CHD, pooled estimates are largely neutral with a J-shaped pattern favoring moderation. Unfiltered/boiled coffee raises LDL via diterpenes and has been associated with higher CHD/mortality relative to filtered.

Net effects in habitual drinkers appear cardioprotective or neutral, likely via polyphenol-driven antioxidant and anti-inflammatory pathways and favorable metabolic effects that outweigh transient BP/HR rises from caffeine. Counseling should be individualized–favor filtered preparations, moderation (~2–4 cups/day), and symptom-guided adjustments in patients with palpitations or uncontrolled hypertension; contemporary guidance indicates typical caffeine intake does not increase AF risk.

For primary care, moderate, filtered coffee is compatible with–often supportive of–cardiovascular health. Emphasize minimizing sugar-dense additives and tailoring intake to comorbidities rather than blanket restriction.

THE ROLE OF HEALERS AND ELDERS IN RABIES PREVENTION IN SUB-SAHARAN AFRICA

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Rabies, a zoonotic disease caused by the rabies virus (RABV), remains a major public health challenge in developing countries, especially in Africa, claiming approximately 59,000 lives annually. Despite the availability of post-exposure prophylaxis (PEP), many individuals initially turn to misinformed traditional healers and elders, reflecting ingrained cultural beliefs. This study explores how cultural perception and community shape rabies treatment in underserved regions of Africa, and examines the role healers and elders may play in improving outcomes. Literature reviews of fifty peer-reviewed studies were conducted by using PubMed and Google Scholar. Our research focused on articles related to rabies in underserved African regions. The inclusion criteria was limited to underserved populations with rabies, sub Saharan Africa, English-language publications from 2000-2025. Studies were screened for relevance to cultural views of rabies and the role of traditional healers and elders in health related education. Misconceptions about rabies' disease dynamics, distance to medical facilities, and cost of treatment contributed to delays in PEP, yet reliance on traditional healers remained high. Studies demonstrated that integrating traditional healers and elders into education programs with accurate information about etiology, prevention, and pathogenesis improved treatment initiation and completion.

Despite having access to effective PEP, cultural beliefs and socioeconomic barriers limit rabies prevention. With efforts to increase engagement in medically accurate community-based interventions, traditional healers and elders proved to enhance adherence, promote earlier medical engagement, and reduce mortality. Bridging traditional and biomedical systems offers a culturally appropriate, evidence-based approach for rabies prevention.

EXPLORING HORMONAL AND CYTOKINE PROFILE DURING REPEATED STRESS IN INDIVIDUALS WITH TRUTHFUL AND DECEPTIVE RESPONSE

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Elevated cytokine and cortisol levels in saliva are often observed in response to a stressful scenario. Self-report measures are widely used to assess perceived stress, but their validity is limited by social-desirability or conformity biases and the absence of concurrent physiological verification. We aimed to determine whether objective stress biomarkers distinguish deceptive from truthful respondents. During Cut Suit Week, deception status was classified using the Veracity TouchScreener™. Salivary cortisol and immune cytokine concentrations were compared between participants identified as deceptive versus truthful, and associations between biomarker levels and deception classification were evaluated. Saliva samples were collected from participants twice daily (morning at CAR timepoints) for four consecutive days from beginning to end of cut suit week training, and the samples were analyzed by Eve Technologies to measure the concentrations of 2 hormones and 21 cytokines. Participants were divided into two groups (lying vs. truthful) based on TouchScreener™ data. A one-tailed T-test with a P-value of 0.05 was conducted to assess significant differences in hormone and cytokine levels between the groups. Significant differences ($p<0.05$) were found in the concentrations of Cortisol, EGF, FGF-2, Fractalkine, G-CSF, IFNγ, IL-1α, IL-1β, IL-6, IL-10, IL-18, and MCP-1 between the two groups. This indicates the variable immune response observed in individuals with deceptive response who had suppressed levels of anti-inflammatory cytokines and conversely elevated levels of cortisol during the course of the Cut Suit Week. There was a strong correlation between the Veracity TouchScreener™ data and biomarker changes which highlight the potential inaccuracies in surveys relying solely on self-reported metrics, as physiological stress responses can undermine the reliability of self-reported data. Further analysis may provide insights that challenge the validity of traditional survey methods and emphasize the need for incorporating objective physiological measurements in research.

STUDY DESIGN AND FEASABILITY OF A BIORESPOSITORY OF CADAVERIC TISSUE SAMPLES AFTER STUDENT DISSECTION AT A SINGLE INSTITUTION – A PILOT STUDY

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Cadaveric donors remain essential for anatomy education, yet their potential to advance pathology and translational research is seldom realized. Embalmed tissues can retain histologic integrity, yet few medical schools have established a framework to biobank specimens for use alongside curricula. This gap is significant, as osteopathic schools often lack hospital affiliations, have limited NIH funding, and rely on intramural resources. In order to address this, 28 donors from Rocky Vista University, provided by the Colorado State Anatomical Board, were screened after a year-long anatomy course. 12 were excluded due to unavailable tissues, time constraints, or other criteria. Standardized protocols targeted gastrointestinal, neurologic, cardiovascular, endocrine, pulmonary, hepatobiliary, musculoskeletal, and vascular systems. The primary aim was to assess the feasibility and reproducibility of procuring cadaveric tissues for prospective research or optional educational materials. From 16 eligible donors, tissues were de-identified and 272 planned procurements were attempted, 244 of which were viable for storage (89.7%). 13 additional donor-specific tissues procured; 2 spleens, 2 4th digit pairs of phalanges (resected at DIPs), 3 brain sectioned bilaterally, 1 prostate, 1 abdominal aorta, 1 gallbladder, and 1 lung– yielding 256 total specimens collected. Donors contributed a mean of ~13.6 tissues. Variability of tissues procured from each donor may reflect donor clinical history or pathology. Histologic preservation may be limited or varied between organ types due to exposures, timing of embalming, and postmortem degradation. Results of histology sections are pending. This pilot study confirms that cadaver-based tissues are feasible for procurement and potential histologic investigation. The data may be used for future research uses within an osteopathic medical institution, an approach not previously reported. By quantifying procurement outcomes and documenting logistical and clinical variability, this establishes infrastructure for future studies, expands research capacity in resource-limited settings, and provides a model to integrate pathology-based research into osteopathic training.

Keywords: *Cadaveric tissue, Biorepository, Feasibility study, Osteopathic medical education, Histopathology, Anatomy curriculum, Translational research*

EFFICACY AND RETENTION OF PERICARDIOCENTESIS MODELS FOR MEDICAL STUDENTS

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Medical education is an invaluable resource for improving patient care through the development of physician skills, particularly when applied to learning high acuity low occurrence (HALO) procedures, such as pericardiocentesis. However, there is a limited number of easily accessible models on which to educate physicians how to perform HALO procedures. This creates a need for an affordable and reusable model that can be used for training to retain the knowledge of these low occurrence procedures. To fill the gap, we created a model that combined the "best" aspects of previously established models to create a more anatomically accurate and efficient model. To prove that our novel model is more efficient at teaching pericardiocentesis, we will be comparing it against one of the previously established models through a series of tests and surveys over the course of three sessions. Session 1 will be an introductory and practice session, while Sessions 2 and 3 will be testing sessions where participants will be graded on their knowledge retention and accuracy of performing pericardiocentesis. Participants will be divided into four different groups: 1) Novel Control, 2) Novel Experimental, 3) Established Control, and 4) Established Experimental. Those in the experimental groups will have an additional opportunity to practice on each of the models, while the label of novel or experimental indicates which model participants will be tested on. Session 3 is still in the process of completion; however, it is expected that the experimental groups will have greater confidence and knowledge retention due to the extra practice while the novel groups will perform better overall due to the increased anatomical accuracy of the novel models. The development of an affordable, reusable, and anatomically accurate model that can be available to anyone will allow physicians to practice HALO procedures more often, creating better patient outcomes.

ANALYSIS OF THE EFFICACY AND FEASIBILITY OF A PILOT PREHOSPITAL WHOLE BLOOD PROGRAM IN RURAL COLORADO

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Uncontrolled hemorrhage is a leading causes of preventable prehospital trauma deaths, yet early access to life-saving blood products is rare in the United States. This pilot program evaluated the feasibility and physiologic impact of prehospital type O low-titer whole blood (LTOWB) transfusions in rural Colorado regions without immediate access to level I trauma centers. Data was collected from two EMS agencies in rural Colorado for the first 6 months of this pilot program. Primary measures were time from EMS activation to administration of blood, EMS arrival to definitive care and blood administration to definitive care. Additionally, we compared pre- and post-transfusion hemodynamic parameters including heart rate (HR), systolic blood pressure (SBP), respiratory rate (RR), saturation of peripheral oxygen (SPO_2), end tidal carbon dioxide ($EtCO_2$) and Glasgow Coma Scale (GCS). At definitive care we analyzed participants' need for emergent hemorrhage control, continued resuscitation, serum Ca2+, lactate, and patient outcome. Mean EMS activation to transfusions time was 15.28 minutes (SD ± 9.95 minutes) and mean injury to definitive care time was 47.90 minutes (SD ± 24.65 minutes). There were no reported adverse or transfusion related reactions and no wastage of blood products in the prehospital setting. Patients experienced a mean increase in SBP of 19.8 mmHg, a mean decrease in HR of 10.86, a mean increase in $EtCO_2$ of 10.00 mmHg and a mean reduction in shock index of 0.39. Although the sample size was modest and limited to two EMS agencies, patients demonstrated improved hemodynamic stability with no resource wastage or delays in definitive care. These findings suggest that prehospital administration of LTOWB is feasible for rapid delivery and, in the context of prolonged prehospital transport times, is associated with significant improvements in hemodynamic parameters indicative of enhanced physiologic stability and potentially improved trauma outcomes.

Keywords: *Hemorrhage, prehospital resuscitation, trauma, transfusion*

SPONTANEOUS PLEURAL EFFUSION IN PATIENT WITH CHRONIC MYELOID LEUKEMIA: A CASE REPORT

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Background: Dasatinib, a second-line tyrosine kinase inhibitor for chronic myeloid leukemia (CML), is associated with pleural effusions but rarely causes chylothorax, with fewer than 20 reported cases.

Case Presentation: A 43-year-old female with CML in remission on Dasatinib presented with two weeks of progressive dyspnea, orthopnea, and intermittent cough. Imaging revealed a right pleural effusion. Thoracentesis yielded 1.5 L of chylous exudative fluid (triglycerides 1295 mg/dL, lymphocyte predominance), consistent with chylothorax. Infectious, cardiac, traumatic, and malignant causes were excluded through negative cultures, normal BNP, and unremarkable imaging. Dasatinib-induced chylothorax was diagnosed. The patient discontinued Dasatinib, transitioned to Nilotinib, and began dietary modification. Serial imaging showed resolution without recurrence at one-year follow-up.

Discussion: Chylothorax is defined as pleural fluid containing chyle due to thoracic duct disruption or impaired lymphatic drainage. Drug-induced chylothorax is rare; among tyrosine kinase inhibitors, Dasatinib has been implicated through inhibition of PDGF-β signaling and induction of endothelial permeability, resulting in lymphatic leakage. In this case, exclusion of alternative etiologies, temporal association with Dasatinib, and resolution upon discontinuation support causality.

Conclusion: Dasatinib-induced chylothorax is a rare but clinically significant adverse effect. Recognition is essential in patients on Dasatinib who present with unexplained respiratory symptoms. Diagnosis relies on pleural fluid analysis and exclusion of alternative causes. Management typically includes drug cessation, therapeutic thoracentesis, dietary therapy, and supportive care. Further reporting of such cases is critical to improving recognition, clarifying mechanisms, and guiding management of this rare complication.

AI INTEGRATION IN PA PROGRAMS: ASSESSING STUDENT AND FACULTY PERCEPTIONS, PREPAREDNESS, AND BARRIERS

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Artificial intelligence (AI) is transforming healthcare through diagnostics, workflow optimization, and clinical decision support. Despite its potential to improve efficiency and patient outcomes, AI integration into physician assistant (PA) education remains limited. This study evaluated PA students' and faculty's preparedness to use AI in educational and clinical settings and aimed to identify barriers to integration. A cross-sectional nationwide survey of U.S. PA programs utilized a 47-item instrument designed to assess familiarity, attitudes, confidence, readiness for integration, and perceived training needs related to AI. Responses were collected anonymously and analyzed with descriptive statistics and correlation analysis to identify patterns and group differences. Participants (**n = 245 students, n = 32 faculty)** reported **low familiarity** (*M* = 15.95/30.00) and **confidence** (*M* = 2.75/5.00) with AI but demonstrated **moderate readiness (M = 49.88/68.00).** Faculty scored higher than students in **readiness** (faculty: *M* = 53.31/68.00; students: *M* = 49.43/68.00) and **perceived training needs** (faculty: *M* = 43.72/55.00; students: *M* = 40.17/55.00). Student familiarity declined during clinical phases, suggesting clinical exposure alone does not increase AI competence. Primary barriers included limited faculty training (60%), technology constraints (30%), and issues with student readiness or overreliance (25%). While PA students and faculty recognize AI's potential, many report limited familiarity and confidence, highlighting the need for structured training. Study limitations include reliance on self-reported data, a low faculty-to-student response ratio, and potential self-selection bias, which may limit generalizability. The cross-sectional design also prevents assessment of changes over time, highlighting the need for longitudinal research on targeted AI education.

THE EFFECTS OF GLP-1 RECEPTOR AGONISTS ON BONE MINERAL DENSITY AND FRACTURE RISK: A NARRATIVE REVIEW OF HUMAN STUDIES

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Glucagon-like peptide-1 (GLP-1) is a hormonal peptide made in the gastrointestinal tract with metabolic effects of insulin secretion, reduced gastric emptying, and inhibition of food intake. GLP-1 Receptor Agonists (GLP-1RA) have been historically used in the treatment of Type II Diabetes Mellitus and obesity. However, significant or rapid weight loss can negatively impact bone health by decreasing bone mineral density (BMD) and increasing fracture risk. This review aims to understand the potential long-term effects of GLP-1RA use in weight loss on BMD in humans. Studies indicate that caloric deprivation can lead to decreased BMD, suggesting that GLP-1RA-induced weight loss can also impair bone integrity due to its dramatic weight loss and satiety effects. A systematic search of PubMed, Embase, and MEDLINE was performed, excluding animal studies, articles published more than ten years ago, and review papers. Only articles containing relevant keywords were included. After reviewing 278 initial results, 31 papers were included in our search investigating GLP-1RA and bone mineral density in varying patient populations. Based on our review, there was no clear relationship between GLP-1RA and BMD. In diabetic patients with osteoporosis, GLP-1RA have a protective effect on BMD, potentially through direct actions on bone metabolism. In contrast, when used solely for weight loss in non-diabetic, obese individuals, GLP-1RA alone have been associated with reductions in BMD in hip and spine without exercise, but in combination with exercise, preserved BMD. This data supports the need to individualize GLP-1RA therapy based on patient demographics and osteoporosis risk. Future investigations should explore the mechanisms in which GLP1-RA exert varying effects across patient populations, given its growing usage for weight loss, Type II Diabetes, and emerging indications such as cardiovascular risk reduction and neuroprotective potential.

Keywords: *glucagon-like peptide 1, glucagon-like peptide-1 receptor agonists, Mounjaro, Wegovy, Zepbound, GLP-1 receptor agonist, GLP-1 agonists , ozempic, semaglutide, osteoporosis, bone density, bone mineral density, bone strength, bone health, bone mass, fractures, vitamin deficiency*

BRIDGING THE GAP IN DIABETIC RETINOPATHY SCREENING: PUBLIC HEALTH DATA INSIGHTS FOR INTERNAL MEDICINE AND OSTEOPATHIC PRACTICE

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Diabetic retinopathy (DR) remains a leading cause of preventable blindness, particularly in underserved populations. Timely diagnosis and treatment depend on early diabetes detection and consistent access to routine care; both of which may be influenced by social determinants such as insurance coverage and provider availability. However, regional data on DR screening adherence remains limited, making it difficult to quantify disparities in preventive eye care. The purpose of this review is to examine how county-level measures of insurance coverage, diabetes prevalence, preventive checkup rates, and provider shortage severity (Health Professional Shortage Area [HPSA] scores) interact as structural determinants of disparities relevant to DR screening. We performed a secondary analysis of a publicly available CDC dataset encompassing all 6,288 U.S. counties. Three variables were selected: Insurance, Diabetes, and Checkup. Insurance coverage was used as a proxy for healthcare access. To assess the role of provider availability, HPSA scores were merged with the dataset for the subset of counties with available data (N = 2,260). Descriptive statistics were calculated, and Pearson correlation coefficients were used to evaluate associations among variables. All correlations were statistically significant ($p < 0.00001$) due to large sample sizes, and the coefficients were moderate in magnitude. Mean county-level insurance coverage was 89.7%, diabetes prevalence 12.3%, and checkup rate 75.2%. Insurance coverage was negatively correlated with diabetes prevalence and positively correlated with checkup rates. Diabetes prevalence was positively correlated with checkup rates, potentially reflecting increased healthcare utilization after diagnosis. Among counties with HPSA data, higher shortage scores were associated with lower insurance, higher diabetes prevalence, and lower checkup rates. Although this dataset does not include direct measures of diabetic retinopathy screening, it highlights structural access barriers that likely contribute to downstream DR care gaps and stress the importance of integrating preventive eye care efforts into internal medicine practice.

E-CPR AND CATHETER-DIRECTED THROMBECTOMY FOR PULMONARY EMBOLISM-ASSOCIATED OUT OF HOSPITAL CARDIAC ARREST IN A HEALTHY WOMAN

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Massive pulmonary embolism (MPE) is an uncommon but potentially reversible cause of out-of-hospital cardiac arrest (OHCA), frequently presenting as pulseless electrical activity (PEA). Early identification and multidisciplinary intervention of MPE are critical, yet confirmatory imaging is often delayed. Current American Heart Association and European Society of Cardiology guidelines recommend consideration of extracorporeal membrane oxygenation support (ECMO) in specialized centers when MPE is suspected, and the patient presents with cardiogenic shock or cardiac arrest.

This case describes a 50-year-old woman with a remote history of deep vein thrombosis who arrested after acute-onset dyspnea. Emergency medical services noted PEA arrest and initiated advanced cardiac life support. On arrival to the emergency department, the patient remained in PEA arrest without cardiac motion on point of care ultrasound. Pulmonary embolism was suspected but could not be confirmed, thus Veno-Arterial (VA) ECMO was initiated within 42 minutes of arrest. Immediate pulmonary angiography confirmed massive bilateral PE and was followed by mechanical thrombectomy with the FlowTriever ® system. ECMO continued for 4 days before successful decannulation. The patient was discharged on hospital day 17 to a rehabilitation facility with a Cerebral Performance Category score of 1, indicating excellent neurological function.

This case illustrates the potential for excellent neurologic and functional outcomes in MPE-associated cardiac arrest when ECMO is implemented early as a bridge to definitive therapy. In resource-rich settings, rapid ED-based activation of extracorporeal cardiopulmonary resuscitation protocols and access to catheter-directed thrombectomy may represent the optimal strategy for improving survival and neurologic recovery in patients with suspected MPE-related PEA arrest.

SYNERGISTIC EFFECTS OF OSTEOPATHIC MANIPULATIVE MEDICINE AND NEGATIVE PRESSURE WOUND THERAPY ON EDEMA AND LYMPHATIC DRAINAGE: EXPLORING THE BENEFIT OF COMBINED THERAPY IN WOUND HEALING

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Persistent edema, impaired lymphatic drainage, and delayed healing are common complications of chronic venous stasis ulcers (venous leg ulcers or VLUs), which affect roughly 3% of the U.S. population. Negative pressure wound therapy (NPWT) reduces fluid burden, improves arterial perfusion, and stimulates granulation tissue formation. Osteopathic manipulative treatment (OMT), particularly myofascial and lymphatic techniques, enhances lymphatic flow, modulates inflammation, and supports tissue repair. Although both modalities independently show benefits, their combined use has not been studied. This review evaluates whether integrating NPWT and OMT could synergistically improve outcomes in patients with VLUs. A structured search of PubMed, Google Scholar, and Scopus identified studies that examined the roles of NPWT or OMT in wound healing, edema reduction, or lymphatic drainage. Evidence from animal models has shown that NPWT promotes wound closure through mechanical deformation, cytokine modulation, and optimized wound bed conditions. Additionally, it has demonstrated efficacy in human clinical trials, where it reduces interstitial fluid burden and promotes granulation tissue formation. OMT improves fluid redistribution through manual techniques that target diaphragmatic motion, fascial relationships and pressure gradients, and lymphatic pump function. Though there are few large-scale, longitudinal clinical trials involving OMT effects on lymphatics, there are short term studies demonstrating improved lymphatic flow and reduced interstitial fluid burden after treatment. No studies addressed concurrent use, indicating a notable research gap. Integrating OMT into NPWT protocols may be a feasible and cost-effective approach to enhance wound healing, reduce hospital stays and limit devastating complications for patients, justifying further evaluation in clinical trials.

***Keywords**: Negative pressure wound therapy (NPWT), Osteopathic manipulative treatment (OMT), chronic venous stasis ulcers, wound healing*

AML INDUCED END STAGE LIVER FAILURE: A CADAVERIC FINDING

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Acute myeloid leukemia (AML) is a hematologic malignancy that stems from proliferation of myeloid stem cells and suppression of all cell lines, resulting in anemia, thrombocytopenia, and granulocytopenia. AML affects approximately 2.4 per 100,000 individuals annually among the general population, however the incidence increases with age, peaking in adults over the age of 65 to 12.6 per 100,000. In addition to the malignancy infiltrating the bone marrow, it tends to infiltrate various tissues including the liver and spleen. Hepatosplenomegaly manifests in about 14% of AML cases, progression to end-stage liver disease (ESLD) is rare, reported in only 0.25% of cases. Progression is especially less common in patients who are less than 65 years of age.

During cadaveric dissection, a 25-year-old female donor was found to have significant postmortem hepatosplenomegaly. Clinical history revealed the cause of death as acute myeloid leukemia complicated by end stage liver disease.

The patient demonstrated extensive hepatosplenomegaly consistent with leukemic infiltration. ESLD was confirmed as a terminal complication despite the proposed absence of preexisting liver disease or other contributing factors. The patient's age and disease progression underscore the unusual nature of this presentation.

This case highlights a rare instance of AML progressing to ESLD in a young adult. While hepatic involvement in AML is recognized, liver failure remains an uncommon and severe outcome with poor prognosis. This case contributes to the limited literature of AML progressing to end stage liver disease. The case supports the need for heightened clinical vigilance and underscores the importance of early multidisciplinary evaluation in managing hepatic complications of hematologic malignancies.

A COMPUTATIONAL FRAMEWORK FOR ESTIMATING TRANSPORTABILITY IN CANCER SCREENING TRIALS

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Lung cancer screening has been shown in trials such as NLST and NELSON to reduce mortality, with PLCO and ITALUNG reporting null results. Although researchers have speculated that this variation may stem from differences in baseline demographics or trial implementation, such explanations remain largely qualitative and speculative. In particular, the pathway from screening to subsequent treatment is typically left implicit, limiting our ability to generalize trial findings to new populations. We formalize this pathway to provide a framework for policymakers to assess whether trial results are likely to transport to novel target populations. We started with a simple model and expanded the full expression from screening S to mortality Y by incorporating disease severity D, symptom level X, and treatment T. Under randomization of screening: E[Y=1 |S=1] - E[Y=1 | S=0] that identifies the average treatment effect of a screening protocol in a target population. We demonstrate an alternate decomposition of the average treatment effect: P(T=i|(S,X,D) = (1,x,d)) - P(T=i|(S,X,D) = (0,x,d)), the prevalence P(D=d) of disease severity, and combinations of terms of the expected outcome difference conditioned on choice of treatment and screening. The presence of these terms even after randomization of screening indicate how the average treatment effect of screening is sensitive to both demographic factors as well as the post-screening treatment regime, both of which may vary across populations and medical contexts. Transporting trial results may therefore fail, as differences in any of these terms in a novel demographic or medical context can result in discrepant estimates of the average treatment effect of screening. By modeling the full causal pathway and requiring detailed outcome reporting, we can move from speculative interpretation to evidence-based prediction of screening efficacy across new populations.

Keywords: *Screening, Transportability, Cancer, Mortality*

THE IMPACT OF RATER DISAGREEMENT ON MACHINE LEARNING MODEL PERFORMANCE

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Machine learning has made significant contributions to medicine, yet many models fail to replicate their high performance in clinical settings. A key reason for this discrepancy is the often-overlooked issue of rater disagreement, which affects both training and evaluation data, leading to inconsistent performance assessments. Despite well-documented clinician disagreement, existing research remains largely empirical and has failed to establish generalizable best practices. The absence of a theoretical framework has resulted in conflicting guidelines on how disagreement impacts model performance. In this work, we formalize the relationship between rater disagreement and model performance, proving under what conditions disagreement degrades predictive accuracy. We also provide theoretical insights into adjudication strategies, evaluating their ability to recover ground truth based on the number of raters and their accuracy. Using two widely used medical imaging datasets, we demonstrate how common empirical approaches to handling disagreement can lead to conflicting and misleading conclusions about its effect on model performance. Our findings highlight the need for a stronger theoretical foundation to guide empirical research and ensure reliable model evaluation in medical AI.

Keywords: *Radiology, Disagreement, Artificial Intelligence, Radiological Error*

PREVALENCE OF INCONTINENCE FOLLOWING SACRECTOMY FOR TUMOR REMOVAL: A SYSTEMATIC REVIEW

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Sacrectomy can result in incontinence because sacral nerve roots play a vital role in urinary and bowel control. Current evidence remains heterogeneous and provides limited guidance for surgical decision-making and patient counseling. This systematic review synthesizes existing literature on postoperative urinary and bowel incontinence after sacrectomy, focusing on the influence of nerve root preservation, resection laterality, and sacrectomy level.

A systematic PubMed search identified studies reporting continence outcomes following sacrectomy for tumor resection. Eligible studies described urinary and/or bowel function postoperatively. Data were extracted on tumor type, surgical approach, sacrectomy level, nerve root management, and rehabilitation strategies. Owing to study heterogeneity, findings were qualitatively synthesized.

Nine studies met inclusion criteria. Preservation of at least one S3 nerve root or unilateral nerve root resection was consistently associated with improved continence, while high or total sacrectomies with bilateral nerve root sacrifice resulted in nearly universal incontinence. Rehabilitation strategies, such as pelvic floor therapy and experimental nerve reconstruction, were inconsistently reported and lacked standardized outcome measures, limiting firm conclusions.

Postoperative continence outcomes after sacrectomy are primarily determined by nerve root preservation, laterality, and resection level. These findings may inform surgical planning and patient counseling. Standardized outcome measures and multicenter prospective studies are needed to clarify rehabilitation strategies and improve long-term quality of life.

Keywords: *sacrectomy, incontinence, nerve root preservation, tumor resection, rehabilitation*

INSTITUTIONAL STRATEGIES TO IMPROVE MEDICAL STUDENT WELL-BEING: A LITERATURE REVIEW

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Rising rates of burnout and psychological distress among medical students have prompted institutions to pursue reforms in assessment, curriculum structure, and wellness initiatives. This review synthesizes recent literature on grading reform, wellness interventions, curriculum integration, and equity-focused considerations.

The 2022 transition of USMLE Step 1 and COMLEX Level 1 to pass/fail scoring was intended to reduce stress and narrow racial performance gaps. However, studies (English, 2024; Rothka et al., 2024; Twardowski et al., 2023; Warm et al., 2024) found little evidence of stress reduction, instead noting displacement of anxiety to Step 2 exams, research productivity, and uncertainty around residency selection. Others have raised concerns about diminished objectivity in residency selection and potential inequities in residency processes contributing to increased stress particularly on students from less traditional or prestigious backgrounds (Patel et al., 2022; Agolia et al., 2025).

Wellness interventions such as mindfulness, reflection, and compassion-based curricula have been well received generally by students and have shown variable benefits in reducing stress and burnout (Rojas et al., 2023; Prendergast et al., 2024; Sanchez-Campos et al., 2020). Yet effectiveness is limited when programs are fragmented, perceived as interfering with academic curriculum, or fail to address more systemic stressors (Dyrbye et al., 2019; Velez et al., 2024). Integration into the curriculum and student involvement appear critical, though outcome measures remain inconsistent.

Equity-focused studies highlight that underrepresented students often face additional burdens and stressors that go mostly unacknowledged and may not benefit equally from generalized reforms (Charles et al., 2024; Betancourt et al., 2024). Few interventions use culturally responsive approaches or disaggregate outcomes by identity.
Overall, evidence suggests that sustainable improvements require coordinated, equity-centered reforms that embed wellness into institutional culture, clarify evaluative metrics, and meaningfully involve students.

Keywords: *medical education, well-being, residency selection, underrepresented in medicine students*

LOCAL ANESTHETIC SYSTEMIC TOXICITY PRESENTING AS STATUS EPILEPTICUS IN A PATIENT UNDERGOING HAIR TRANSPLANTATION

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Local anesthetic systemic toxicity (LAST) is a rare, critical complication that can follow a multitude of medical procedures. The sequelae of this condition can have significant morbidity and mortality and prolonged hospitalization making prompt recognition and treatment paramount to improved outcomes. The following case report describes a unique manifestation of LAST presenting as status epilepticus without overt hemodynamic instability in a patient without seizure history. A 48-year-old male with history of hypertension, benign prostatic hyperplasia, and remote surgical history of cranioplasty developed status epilepticus during an elective hair transplant procedure. The patient received streptocaine, lidocaine, and marcaine injections in divided doses, he began seizing several hours into the transplantation. EMS gave Versed and intubated for airway protection. On ED arrival he was treated for suspected LAST with Intralipid protocol and admitted to the ICU. The patient had a prolonged hospital course for treatment of status epilepticus complicated by its sequelae including severe acute respiratory distress syndrome from aspiration pneumonia, atrial fibrillation, and acute kidney failure from rhabdomyolysis. The patient ultimately made an uneventful recovery, he was liberated from mechanical ventilation and renal function was restored. Local anesthetics are found ubiquitously in healthcare settings, and while LAST is a rare complication it can have devastating consequences. This report highlights the vitality of proper technique, medication dosage, and need for preventative strategies when administering local anesthetics in order to increase awareness of LAST and support future research in guideline development.

EXOGENOUS HORMONE THERAPY AND PANCREATIC HEALTH: A REVIEW OF CLINICAL AND METABOLIC IMPLICATIONS

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The pancreas regulates key endocrine and exocrine functions, and emerging evidence suggests hormone therapy (HT) may influence its activity. As HT use grows (for menopause, gender-affirming care and contraception), its impact on pancreatic health warrants closer examination. This review explores how exogenous estrogen and/or progesterone affect pancreatic function and related pathologies. A structured review of human and animal studies from the past 25 years was conducted using PubMed, Embase and Google Scholar. Eligibles studies examined HT use across diverse populations (postmenopausal women, oral contraceptive users, transgender females, PCOS patients, and embryo transfer). Study types included cohort, case report, cross-sectional, RCT, and reviews. Studies involving pregnancies or pre-existing pancreatic disorders were excluded. Following initial screen, 67 studies met the inclusion criteria. The literature suggests that HT may have both protective and harmful effects on pancreatic health, depending on formulation, dose and patient history. Estrogen signalling appears to influence pancreatic physiology through modulating insulin secretion, β-cell survival, lipid metabolism, and inflammatory pathways. High-dose estrogen, such as that used in gender-affirming therapy, has been associated with acute pancreatitis secondary to gallstone formation, while transdermal routes may mitigate hepatic metabolic burden. Epidemiological studies also indicate a potential protective role of estrogen-only HT in reducing pancreatic cancer risk, possibly through anti-proliferative and pro-apoptotic effects mediated by pancreatic estrogen receptors. However, these associations remain highly inconsistent across populations and study designs. Further research is warranted to clarify the dose-response relationship, identify at risk-populations, and uncover the molecular pathways underlying hormone-induced pancreatic events.

Keywords: *Pancreatic function, estrogen, hormone therapy (HT)*

FIRST AID PREPAREDNESS IN HIGH-RISK RECREATION: A COMPARATIVE STUDY OF MOUNTAIN BIKERS AND BACKCOUNTRY SKIERS

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Mountain biking (MTB) is a rapidly growing high-risk recreational sport with substantial injury potential, yet little is known about riders' first aid preparedness. This study surveyed recreational MTBers who are 18 years or older with a 14-question anonymous online survey disseminated through colleagues, MTB forums on social media, and through flyers at local MTB trails. Incomplete responses were excluded, and data were analyzed with thematic analysis and student t-tests ($p<0.05$) to compare MTBers' injury history, training, and emergency preparedness with that of backcountry skiers. Eighty-five percent of the 127 complete responses reported MTB injuries, with 63 percent requiring medical intervention. While 72 percent of respondents had some form of medical training, the majority (69%) had no MTB-specific safety training, and MTB-specific first aid training was significantly less common when compared to avalanche training among skiers (T-test, $p<0.001$). Carrying first aid kits while MTB or skiing did not differ significantly among respondents (T-test, $p=0.444$). When asked if first aid preparedness was discussed with a healthcare provider, the majority (88%) did not, yet 78 percent were receptive to such counseling (T-test, $p<0.001$). While our study faced several limitations including self-selection bias, possible recall bias, and lack of regional variation, our results show that MTBers demonstrate high injury rates and substantial gaps in sport-specific safety training compared with backcountry skiers, whose culture emphasizes preparedness. Standardized MTB first aid programs and proactive provider engagement may improve safety outcomes in this high-risk of injury population.

WHAT VARIABLES INFLUENCE THE RELATIONSHIP BETWEEN MENIERE'S DISEASE AND CHRONIC KIDNEY DISEASE?

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Introduction: According to the American Hearing Research Foundation, Meniere's disease (MD), a disorder characterized by vertigo, tinnitus, and muffled hearing, roughly effects 615,000 people in the United States. While the underlying pathology of MD remains subject to debate, previous literature has demonstrated evidence that viral infections, allergies and autoimmune reactions as potential contributors to its symptomatology. Additionally, recent studies have postulated that chronic kidney disease (CKD) may negatively impact the audio-vestibular system, potentially influencing the development and progression of MD. Despite these emerging findings, there is a dearth of knowledge on the relationship between CKD and MD, particularly regarding factors that may moderate this association and how these interactions affect patients' overall health and well-being. The objective of this literature review is to examine existing evidence on the relationship between CKD and MD, identifying moderating variables and their implications for clinical practice and future research.

Methods: A comprehensive search was conducted within PubMed, Embase, and Medline databases to identify literature addressing MD pathophysiology and CKD-related audio-vestibular dysfunction. The research team identified 403 peer-reviewed articles published between 2020 and 2025 that met inclusion criteria (adult participants aged ≥19, English language, primary and secondary research). Data extraction focused on proposed biological mechanisms, demographic moderators, and clinical outcomes.

Results: Emerging evidence suggests that a multitude of variables, including oxidative stress, endolymph hydrops, electrolyte disturbances, and factors such as sex, age, dietary intake, and vitamin balance, may contribute to the progression of both MD and CKD.

Conclusion: Preliminary findings suggest the potential for future interventions and research to mitigate the negative impact of CKD on MD, including implementation of audio-vestibular and kidney screening protocols, multidisciplinary management of both the inner ear and kidney, and patient education programs highlighting symptom management of both disorders.

PROPOSAL FOR THE ETIOLOGY OF IDIOPATHIC CVT: A LITERATURE REVIEW

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Cerebral venous sinus thrombosis (CVST) is a rare form of stroke that, if untreated, can have poor prognoses. The venous system of the brain is vital to brain function because it drains deoxygenated blood, metabolic waste, and CSF into circulation. Because CVST is multifactorial in nature, it is difficult to prevent and treat. Although there are known risk factors that align with Virchow's Triad in causing CVST, there is a portion of cases with no identifiable risk factors and thus an unclear understanding of etiology. The purpose of this literature review is to provide a comprehensive overview of the causes, risk factors, clinical presentation, diagnosis criteria, treatment, and outcomes associated with CVST. A literature search was conducted using PubMed, ClinicalKey, and UpToDate. The search focused on peer-reviewed articles, reviews, and case studies published between July 2004 and December 2024 addressing CVST etiology, pathophysiology, and diagnostic methods in humans. The search included MeSH terms "Cerebral Venous Thrombosis," "Idiopathic," and "Sinus Thrombosis" with Boolean operators to exclude non-idiopathic cases. Results suggest that risk factors relating to Virchow's Triad can cause CVST by inducing hypercoagulability, endothelial damage, or altering blood flow. In idiopathic cases, it is possible that mechanisms of subclinical inflammation, genetic predisposition, or environmental stressors can induce CVST. Impaired venous drainage in idiopathic CVST can cause accumulation of toxic substances and possibly contribute to neurodegenerative diseases. Although Virchow's Triad offers a mechanism for CVST from associated risk factors, it has limitations in addressing the causes and mechanisms in idiopathic CVST. Limitations of this review include the possibility of missing relevant studies due to limited search strategies and not including literature published after December 2024. Further investigation, as well as having more thorough and refined diagnostic tools can improve the understanding of idiopathic CVST, help prevent cases, and improve long-term management.

Keywords: *CVST, CVT, idiopathic, Virchow's Triad, cytokines, PAI-1, tPA, vWF*

CASE STUDY: ENVIRONMENTAL AND GENETIC SYNERGY IN THE PATHOGENESIS OF EARLY-ONSET CLL

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Chronic lymphocytic leukemia (CLL) is the most common adult leukemia in Western countries, typically diagnosed in older adults, with a median age of 72. Despite its prevalence, the etiology is unclear, and cases at younger ages have been increasingly reported. Latency, cumulative exposures, and epigenetic modifications are thought to contribute to development, but research remains controversial. We present a 65-year old male with CLL to underscore the need for further investigation into the poorly understood etiology and management.

In 2022, the patient presented to his primary care provider for an annual examination, where an elevated white blood cell (WBC) count was first detected. Over the following two years, persistently elevated WBC counts were noted. Through peripheral blood smear and flow cytometry, oncology confirmed the diagnosis of CLL. At present, the patient is categorized at Rai Stage 1. Primary management is active surveillance, reflecting the current therapeutic uncertainty in early-stage disease. Genetic testing demonstrated an indolent disease progression, yet prognosis and optimal management remain uncertain.

Both genetic and environmental factors can influence CLL development, with up to 10% of patients having a first-degree relative affected by a hematologic malignancy. In this case, history revealed prolonged occupational glyphosate (Roundup®) exposure. Additionally, his father had been diagnosed with CLL, attributed to Agent Orange exposure. Familial predisposition and pesticide exposure may have synergistically contributed to earlier onset. This case adds to existing literature by demonstrating how combined risk factors may shape disease expression, reinforcing the need for further research into CLL pathogenesis and treatment.

COMPLEMENT-MEDIATED HEMOLYTIC ANEMIA TRIGGERED BY ADENOVIRUS INFECTION IN A PEDIATRIC PATIENT: A CASE REPORT

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Paroxysmal cold hemoglobinuria (PCH) is a rare form of complement-mediated hemolytic anemia in children, typically triggered by viral infections and mediated by Donath–Landsteiner antibodies that cause intravascular hemolysis upon cold exposure. While Mycoplasma pneumoniae and Epstein–Barr virus are recognized precipitants, adenovirus-associated PCH is less frequently reported. We describe the case of an 8-year-old previously healthy, unimmunized female who developed acute hemolytic anemia following a febrile viral illness, with jaundice, severe anemia (hemoglobin nadir 4.2 g/dL), reticulocytosis, hyperbilirubinemia, and elevated lactate dehydrogenase. Diagnostic evaluation revealed a direct antiglobulin test positive for complement (C3) but negative for IgG, adenovirus infection confirmed on viral testing, and a positive Donath–Landsteiner antibody, establishing the diagnosis of PCH. Management included maintenance of normothermia, intravenous methylprednisolone, intravenous immunoglobulin, epoetin alfa, folic acid, and empiric azithromycin, with successful avoidance of transfusion. The patient's condition stabilized with gradual hematologic recovery and resolution of symptoms. This case highlights adenovirus as a potential trigger for PCH in children and underscores the importance of early recognition, laboratory confirmation, and supportive management to prevent complications in pediatric complement-mediated hemolytic anemia.

GUIDELINE APPLICABILITY IN GERIATRIC ROTATOR CUFF TEARS: A STATISTICAL ANALYSIS OF FUNCTIONAL OUTCOMES AND RECOMMENDATIONS

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Rotator cuff tears (RCTs) are a leading cause of shoulder pain and disability in older adults, affecting over 40 percent of individuals aged ≥65. In this population, full-thickness RCTs impair strength, limit range of motion, and significantly reduce independence and quality of life. This study aimed to evaluate whether current American Academy of Orthopaedic Surgeons (AAOS) and American Shoulder and Elbow Surgeons (ASES) guidelines align with the latest evidence on optimal treatment for geriatric (≥65) full-thickness RCTs. Emerging literature suggests surgical repair may yield superior outcomes in active older adults, yet these benefits may be underrepresented in guidelines.

A systematic review and meta-analytic synthesis were performed using PubMed, Embase, Cochrane Library, and Scopus to identify randomized controlled trials, cohort studies, and meta-analyses reporting functional scores, pain outcomes, and re-tear rates in patients aged ≥65. Eligible studies underwent quality assessment, data extraction, and outcome visualization through forest plots and radar charts for comparison against guideline recommendations. This study showed that surgical repair produced greater improvements in Constant-Murley and ASES scores, more substantial pain reduction, and lower re-tear rates, while conservative care often resulted in functional plateau or tear progression. Study limitations included heterogeneity in surgical techniques, inconsistency in rehabilitation protocols, and variable follow-up durations, which may affect the comparability of outcomes across trials.

Findings support revising guidelines to incorporate patient-specific factors such as activity level, physiological resilience, and tear chronicity, enabling more individualized, evidence-based management and improved shared decision-making in geriatric RCT care.

POPULATION ASSESSMENT OF VACTERL NON-SYNDROMIC AND NON-SEQUELAE RELATED DIAGNOSES

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VACTERL syndrome is a complex and uncommon disorder affecting multiple body systems, frequently necessitating comprehensive and prolonged medical management. Due to the unclear underlying causes of the condition, there is potential for identifying additional health concerns. This study aims to investigate the general frequency and likelihood of medical diagnoses in VACTERL patients that are unrelated to the syndrome itself. This research is an ecological, cross-sectional analysis utilizing the 2020 NIS dataset to examine the frequency and likelihood of blood, endocrine, metabolic, and behavioral conditions in individuals diagnosed with VACTERL. Risk evaluation is conducted through comparison with a propensity score-matched control group. The VACTERL group consisted of 983 individuals, including 141 who met diagnostic criteria despite lacking a formal diagnosis of VACTERL, resulting in an incidence rate of 1 in 6,583 patient visits. Elevated risks were identified for conditions such as anemia, bleeding and clotting disorders, immune deficiencies, low thyroid function, poor nutrition, disturbances in mineral balance, acid-base disorders, and cognitive or developmental impairments. Conversely, reduced associations were noted with Type 1 diabetes, alcohol and cocaine use disorders, as well as psychiatric illnesses including schizophrenia, schizoaffective disorder, and mood disorders. While the results do not shed light on the underlying causes, this study brings together previously isolated case reports into a cohesive perspective, supporting families and healthcare professionals in developing more thorough care strategies that consider potential overlooked health risks.

CURRENT CHALLENGES TRANSGENDER AND NON-BINARY PATIENTS FACE IN THE EMERGENCY DEPARTMENT AND MECHANISMS TO IMPROVE PATIENT-PHYSICIAN TRUST

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Transgender and Nonbinary (TNB) individuals face mistreatment, misgendering and discrimination when seeking care in US Emergency Departments, leading to delays in care and poor health outcomes. The lack of standardized education and guidelines for TNB patient care reinforces an environment where patients are likely to be harmed or ignored. The goal of this project is to identify areas of discrimination, evaluate gaps in education practices, and create models for ED Physicians to provide affirming healthcare for TNB patients across the US. A comprehensive literature review using PubMed, national surveys, institutional reports including the 2015 U.S. Transgender Survey (USTS), emergency medicine education studies, and qualitative reviews of patient experiences. Our review revealed that 31% of TNB patients reported verbal harassment or denial of care, 27% were misgendered by staff, and 23% avoided the ED entirely due to fear of discrimination. Additionally, most ED residencies reported less than 2 hours of LGBTQIA+ curriculum, with low provider confidence in treating this community. International models have promoted gender-affirming care practices by initiating inclusive intake forms, patient-led training, and policy changes within hospitals. These countries serve as important models to initiate change in the US health education and care systems. This project provides a framework for integrating comprehensive LGBTQ+ education to medical students and EDs. The long-term aim is to support standardized education across emergency medicine and help build provider confidence in delivering gender-affirming care for TNB patients.

Keywords: *Transgender and Nonbinary (TNB) Health, Emergency Medicine, Gender-Affirming care, Medical Education, Health Disparities, Provider Training*

A MULTICENTER RETROSPECTIVE CHART-REVIEW OF THE RED43 ASPIRATION CATHETER FOR DISTAL MEDIUM VESSEL OCCLUSIONS

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Mechanical thrombectomy (MT) is a well-studied and proven way to effectively treat large vessel occlusion, but the emerging treatment of distal medium vessel occlusions (DMVO) remains limited. The RED43 catheter is a small-bore catheter that is designed for distal vasculature and direct aspiration making MT of DMVOs technically feasible. Data from four large-volume stroke centers were retrospectively reviewed to evaluate the effectiveness of using the RED43 catheter as the primary aspiration catheter for DMVOs. Primary effectiveness outcome was defined as first-pass effect (mTICI 2c or 3) and success recanalization (final mTICI ≥2c). DMVOs were separated based on whether the DMVOs presented as the primary occlusion or secondary occlusion. Secondary outcome evaluating functional effectiveness reviewed modified Rankin score (mRS) at 3 months post MT, defined as mRS ≤ 2. Additionally, safety outcomes looked at subarachnoid hemorrhage (SAH), symptomatic intracranial hemorrhage (sICH), and in-hospital mortality. We identified and analyzed 102 patients (mean age 70, medium NIHSS 9) who underwent MT for DMVOs. Results showed FPE in 57% of primary DMVOs and 61% of secondary DMVOs, success recanalization in 83% of primary DMVO and 87% of secondary DMVOs, and functional success in 57%. One case of sICH (1%), seven SAH, and two cases of in-hospital mortality were observed, supporting a favorable safety profile. These findings provide evidence for the effectiveness and safety of using the RED43 as a primary aspiration catheter for DMVOs. Favorable reperfusion outcomes were observed despite increased risk associated with increased tortuosity and potential for complication. Limitations include an absence of a comparative group evaluating outcomes for conservative medical management. This warrants multi-centered prospective studies to further review the therapeutic effects of treating DMVOs with aspiration catheter but is a promising step towards expanding the effective treatment options for acute ischemic stroke with the RED43 aspiration catheter.

Keywords: *stroke, thrombectomy, embolic*

CIRCULATING CELL-FREE DNA AND CIRCULATING TUMOR DNA AS PROGNOSTIC BIOMARKERS IN METASTATIC SPINE DISEASE, IS THERE A ROLE?

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Metastatic spine disease (MSD) significantly impacts patient survival and quality of life, yet existing prognostic models and scoring systems lack robustness in predicting survival. Circulating cell-free DNA (cfDNA) has emerged a promising non-invasive tumor-derived biomarker in oncology, reflecting tumor burden, treatment response, disease progression and survival. However, its role in MSD remains underexplored. This systematic review evaluates the cfDNA's utility in predicting prognosis, treatment response, disease progression and survival in cancers commonly metastasizing to the spine, focusing on its potential application in MSD management. A comprehensive literature search was conducted following PRISMA 2020 guidelines across five databases. Studies investigating prostate, lung, breast and colorectal cancers were included, with a subset evaluating bone metastases.

Fourteen studies evaluating 2,442 patients met inclusion criteria. Elevated baseline cfDNA levels correlated with higher tumor burden, shorter progression-free survival and overall-survival. There was no clear correlation between baseline cfDNA levels and treatment response, although higher baseline cfDNA levels trended toward greater treatment resistance. Persistent cfDNA during or after treatment was linked to poorer response and higher recurrence risk. In prostate cancer with bone metastases, cfDNA kinetics differentiated patients with diffuse osseous disease from those with limited metastases. No studies directly evaluated cfDNA in MSD. Emerging evidence suggests that cfDNA-derived chromosomal instability scores could stratify MSD patients by survival risk.

CfDNA holds potential as a real-time biomarker for MSD prognosis. Future research should integrate cfDNA into MSD scoring systems to validate its clinical utility for patient stratification and personalized treatment strategies.

LONG-TERM OUTCOMES AFTER ENDOSCOPIC RESECTION OF COLLOID CYSTS

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Endoscopic surgery offers a minimally invasive alternative to microsurgical resection for intraventricular lesions like colloid cysts, with potential advantages in morbidity and recovery. While microsurgery remains the historic standard, endoscopic techniques are increasingly used despite limited long-term outcomes data. This study presents a large, single institution retrospective case series assessing clinical outcomes following endoscopic colloid cyst resection with longer follow-up than most endoscopic series in the literature.

A retrospective review (2014-2024) included consecutive patients who underwent endoscopic colloid cyst resection at a single institution by a single surgeon. Demographics, pre-operative hydrocephalus, perioperative complications, recurrence, and reoperation rates were followed. Outcomes were compared to published literature on transcallosal open and endoscopic approaches.

Of the 58 patients initially identified, 4 were excluded for non-colloid cyst pathology, resulting in 54 patients for analysis. Mean age was 47 years; mean cyst size was 13.3mm. 88.9% of patients had pre-operative hydrocephalus. Mean follow-up time was 39 months. One patient needed reoperation for obstructive hydrocephalus, which was cured via septostomy. There were no reoperations for cyst recurrence. 96.3% achieved gross total resection (GTR; 100% by radiographic analysis). There were no shunt dependent patients, infections, or mortalities.
At our institution, endoscopic colloid cyst resection achieved high GTR rates better than published endoscopic series with lower recurrence rates despite longer follow-up. GTR rates were comparable to open approaches. Morbidity rates—including infection, venous infarction, and shunt dependence—were significantly reduced. These findings support the efficacy and safety of endoscopic resections for colloid cysts.

ROBOT-ASSISTED CERVICAL PEDICLE SCREW PLACEMENT: CASE SERIES AND TECHNICAL DESCRIPTION

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Robot-assisted (RA) techniques with pedicle implant placement demonstrate improved accuracy and safety in thoracolumbar spinal surgery, but their application in the cervical spine is less described due to the higher risk of neurovascular injury. Although spinal robotic systems are currently approved by the FDA for spinal fusion procedures, much of the discussion is around thoracolumbar instrumentation. As such, specific workflow and instrumentation adaptations for cervical procedures remain underdiscussed. Our objective is to present a case series and reproducible stepwise workflow for RA cervical pedicle screw (CPS) placement in spine surgery. This is a retrospective single center series of patients who underwent RA CPS placement by a single surgeon. Perioperative complications, radiographic results, and clinical outcomes were collected.

Eight patients (mean age 63.1 years; 50% female) with 50 CPS placed were identified. Diagnosis was degenerative (n=2), tumor (n=2), trauma (n=2), and deformity (n=2). The 50 CPS were distributed at C1 (8 screws), C2 (8 screws), C3 (6 screws), C4 (6 screws), C5 (6 screws), C6 (8 screws), and C7 (8 screws). There was one inferior Grade B breach at a C7 screw without clinical sequelae that was repositioned for a total screw accuracy of 98%.

RA CPS placement is a safe and effective adjunct in complex cervical spine surgery. The proposed stepwise workflow is reproducible and adaptable. Further studies are warranted to validate these findings in larger cohorts and to assess long-term outcomes. Further development of tailored cervical spinal instrumentation for robotic systems will facilitate a fully RA technique.

THE RETROSIGMOID KEYHOLE CRANIOTOMY AS A MINIMALLY INVASIVE APPROACH TO CEREBELLOPONTINE ANGLE LESIONS: A SYSTEMATIC REVIEW AND META-ANALYSIS

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The retrosigmoid keyhole craniotomy (RSKC) is a minimally invasive approach introduced in the early 2000s for cranial neuropathy relief, now adopted for cerebellopontine angle (CPA) tumor resection. However, outcomes remain unclear. We aimed to evaluate the RSKC approach on tumor resection for CPA lesions.

A systematic search of Google Scholar, PubMed and Web of Science identified studies reporting the RSKC for CPA tumor resection. Weighted averages, pooled effects and heterogeneity were calculated using a general linear mixed model. Complication rates were analyzed using a random-effects meta-regression. Sensitivity analyses and funnel plots assessed publication bias.

Ten studies (level II: n=1; level III: n=6; level IV: n=3) reporting outcomes for 863 patients (mean age 34.5 years, 55.04% (n=475) female). Vestibular schwannomas (n=683, 87.8%) and epidermoid cysts (n=57, 7.3%) were most common. Gross total resection (GTR) rates ranged from 94.0% to 94.6%; near total resection (NTR) rates approached 100%. Compared to conventional retrosigmoid approaches, RSKC demonstrated comparable GTR/NTR and cranial nerve preservation while minimizing morbidity. Meta-analysis revealed one outlier study skewing complication rates (Cook's distance = 0.8435) with evidence of publication bias (funnel plot asymmetry, p=0.02). Excluding this study yielded a less extreme but still significant reduction in complication odds (regression coefficient including study: –0.0093 [95% CI: –0.0151–0.0034] versus excluding study: –0.0121 [95% CI: –0.0185–0.0057]).

RSKC achieves comparable tumor resection rates compared to conventional methods with possible complication reduction. Critical interpretation of studies is warranted as publication bias may present more optimistic outcomes than the true effect.

INTERFACILITY TRANSFER PATTERNS OF TRAUMATIC BRAIN INJURY PATIENTS: A COMPARISON BETWEEN UNINSURED AND INSURED INDIVIDUALS IN CALIFORNIA BETWEEN 2017-2019

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Traumatic brain injury (TBI) is a leading cause of disability in the United States. TBI-related fatalities increased by 13.3% from 2019-2023. While the Emergency Treatment and Labor Act (EMTALA) of 1986 mandates care for patients regardless of payment ability, insurance status may influence interfacility transfer. We aimed to explore the impact of insurance status and hospital ownership on the likelihood of interfacility transfer for TBI patients upon arrival to the Emergency Department (ED).

We analyzed nonpublic data including initial encounters for all hospital inpatient stays, ED visits at licensed nonfederal and acute care hospitals using California's Patient Discharge and Emergency Department (2016-2019) for TBI cases (ICD codes S06.1-S06.9). Models adjusted for patient characteristics (race, age, comorbidities, socioeconomic status) and hospital characteristics (presence of neurosurgical coverage, ownership, teaching status, rurality, bed size).

Initial results showed that insured patients at public hospitals had significantly higher odds of transfer than underinsured patients at public hospitals (OR 1.57, 95% CI 1.07-2.29, p=0.02). Conversely, at private hospitals, neither insured or underinsured patients had significantly different transfer odds compared to underinsured patients at public hospitals (OR 1.53, 95% CI, 0.92-2.55, p=0.100; OR 1.45, 95% CI 0.86-2.47, p=0.165, respectively). However, further analysis excluding patients insured by a single large Health Maintenance Organization (HMO) in

California demonstrated no effect of insurance status on likelihood of transfer (OR 1.44, 95% CI 0.86-2.41, p=0.85).

Insurance status does not affect the likelihood of transfer for patients presenting with traumatic brain injury to hospitals with neurosurgical coverage.

RADIOGRAPHIC ANALYSIS OF ACOUSTIC NEUROMA POSITION ON SURGICAL OUTCOMES

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Large vestibular schwannomas (VS) often compress the brainstem and differ in their relation to the internal auditory canal (IAC), but the significance of these radiographic features on postoperative outcomes remains unclear in the literature. This study quantifies the impact of brainstem compression (BSC) and IAC position on surgical outcomes in VS.

We retrospectively identified 196 patients with sporadic unilateral VS ≥3 centimeters who underwent surgery at a single institution between 2017-2022. Neurofibromatosis-2 cases were excluded. BSC was measured on axial T1 post-contrast MRI images as the perpendicular distance from the brainstem-cerebellum baseline to the point of maximal compression. Anterior/posterior IAC extension were measured relative to a line bisecting the IAC from the porus to fundus. Outcomes included postoperative facial nerve (FN) function, extent of resection (EOR), and length of stay (LOS).

Greater anterior IAC extension was associated with lower EOR in univariate (OR=1.12, p=0.03) and partially adjusted models (OR = 1.13, p=0.0256), but not after controlling for tumor size and age (OR=1.09, p=0.158). Greater BSC was associated with worse FN function at 2-3 weeks postoperatively (OR=1.08, p=0.036). Posterior extension was associated with increased LOS in univariate analysis (β=217.57 minutes, p=0.024), but not multivariate analysis. Neither anterior extension nor BSC significantly affected LOS. Study limitations include its retrospective nature.

Anterior tumor extension and BSC are radiographic features associated with EOR and short-term FN outcomes, respectively. Posterior extension may impact LOS, though demographics may confound this. These findings may inform preoperative counseling and surgical planning for large VS.

AMPK PHOSPHORYLATION OF SYNTAPHILIN (SNPH) REVEALS NEW INSIGHTS INTO THERAPEUTIC TARGETING IN CANCER

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Despite remarkable progress in identifying the molecular and biochemical determinants of metastasis, actionable targets within the metastatic cascade remain limited. Mitochondria play multifaceted roles in cancer progression by hosting key signaling networks. Syntaphilin (SNPH), a molecular brake on mitochondrial motility, is downregulated or lost during tumor progression, suggesting a role in suppressing metastasis. Reduced SNPH expression correlates with poorer patient survival, increased mitochondrial trafficking to the cortical cytoskeleton, and greater cell invasion. Conversely, SNPH expression inhibits mitochondrial motility and blocks chemotaxis and metastasis in vivo. SNPH function is regulated by post-translational modifications, including ubiquitination, which anchors mitochondria to the microtubule cytoskeleton. We hypothesized that SNPH residue T214 is phosphorylated by AMP-activated protein kinase (AMPK), and that this modification modulates mitochondrial anchoring. To test this, human prostate adenocarcinoma (C4-2) cells were subjected to site-directed mutagenesis, plasmid transfections, and analyzed by Western blotting, immunofluorescence microscopy, and invasion assays. Quantitative image analysis and statistical testing were performed across multiple independent experiments. These findings show that SNPH is phosphorylated at T214 by AMPK, but this phosphorylation does not alter mitochondrial distribution in C4-2 cells. A limitation of this work is that it was performed in a single cell model and restricted to one phosphorylation site, leaving broader regulatory mechanisms unaddressed. These results suggest that phosphorylation at T214 regulates other SNPH functions, such as metabolism. Future studies will generate stable prostate cancer cell lines expressing SNPH-WT and phospho-mutant variants to test causal roles in mitochondrial anchoring. Expanded approaches, including Seahorse metabolic profiling, redox assays, and 3D invasion or in vivo metastasis models, will be essential to determine how AMPK–SNPH signaling influences tumor progression. Together, these studies will establish whether targeting this regulatory axis represents a viable strategy for disrupting mitochondrial dynamics and suppressing metastasis.

THE EFFECTS OF CULTURAL PERSPECTIVES ON MENTAL HEALTH STIGMA IN HISPANIC ADULTS IN DENVER, COLORADO

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Mental health stigma is a persistent barrier to care in the United States, disproportionately impacting Hispanic communities due to cultural, linguistic, and systemic factors. Understanding culturally specific influences is critical to improving access to mental healthcare within these communities. This study hypothesized that certain cultural values, particularly *machismo*, are associated with greater perceptions of mental health stigma and may influence help-seeking behavior. While stigma in Hispanic populations has been studied broadly, little is known about these dynamics among Hispanic adults in Denver, Colorado. This study aimed to evaluate the relationship between cultural values, stigma perception, and mental health service utilization in this population. A bilingual survey assessing cultural beliefs, stigma perception, and help-seeking behavior was administered to self-identified Hispanic adults (n=46) in the Denver metropolitan area. Associations were analyzed using Fisher's Exact Test, with p-value < 0.05 being considered significant. Results showed that 85% of participants believed mental health is stigmatized within the Hispanic community, and *machismo* was significantly associated with perceiving stigma (Fisher's Exact Test, $p= 0.0054$). No other cultural values or demographic factors showed significant associations with stigma or help-seeking. These findings suggest that *machismo*, as a cultural norm emphasizing strength and emotional restraint, plays a key role in perpetuating stigma, while other values like *familismo* and religion may have more complex or context-dependent effects. Although the small sample size limits its generalizability, this study highlights the need for culturally responsive interventions that address harmful gender norms and improve access to bilingual, community-based mental health resources.

STRUCTURAL RACISIM IN HEALTHCARE AND ITS IMPACT ON MATERNAL OUTCOMES FOR BLACK WOMEN

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Black Women experience a disproportionately high rate of pregnancy-related complications and maternal mortality compared with other racial and ethnic groups, despite most maternal deaths being preventable. These disparities may be driven by structural racism within the healthcare system, influenced by socioeconomic factors, lifestyle, and quality of prenatal care received. This study aimed to examine systemic factors including interpersonal care experiences and prenatal counseling that may contribute to adverse pregnancy outcomes among Black women. A 24-item survey was developed using Qualtrics and was distributed among social media platforms. Quantitative data were analyzed using Fisher's Exact Test, and qualitative data were through thematic analysis. Among the 27 complete survey responses, Black women (n=3) were significantly less likely than non-Black women (n=12) to report culturally respectful prenatal care (25% vs 80%, respectively; Fisher's Exact Test, $p = 0.0071$) and more likely to report racial discrimination (50% vs 6.7%, respectively; Fisher's Exact Test, $p = 0.0237$). When identifying qualitative themes, we found that respondents emphasized the need for respectful communication, culturally competent care, individualized attention, and additional support. This study reveals persistent disparities in prenatal care experiences for Black women and highlights the need for targeted interventions addressing both structural and interpersonal contributors to maternal health inequities. This study is limited by the small sample size, self-reported survey data, and recruitment through social media, which may not reflect all women's experiences. Future research should focus on larger and more diverse groups, and test strategies that are designed to improve prenatal care experiences.

WHAT ARE THE MISCONCEPTIONS THAT THE PUBLIC HAS ABOUT ISOTRETINOIN (PREVIOUSLY KNOWN AS ACCUTANE) FOR THE TREATMENT OF SEVERE CYSTIC ACNE?

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Background: Isotretinoin is the most effective treatment for severe cystic acne, yet public misconceptions regarding its safety, side effects, and long-term impact persist, potentially deterring appropriate use.

Objective: To identify and characterize common misconceptions about isotretinoin among individuals with a history of cystic or treatment-refractory acne, and to assess perceived adequacy of provider education.

Methods: A 23-item, anonymous, skip-logic, online survey was distributed to individuals self-reporting a history of cystic acne. Questions addressed acne severity, treatments used, perceived and experienced isotretinoin side effects, treatment outcomes, and adequacy of provider counseling. Data were analyzed using descriptive statistics and thematic analysis of open-ended responses.

Results: Of 50 survey respondents, 27 met the inclusion criteria with 46 percent reporting isotretinoin use. The most frequently perceived isotretinoin side effects were dryness, teratogenicity, arthralgias, purging, and pain. Among isotretinoin users, 73 percent reported side effects, most commonly dryness (43 percent), followed by pain, dermatitis, and epistaxis. Despite this, 80 percent reported at least moderate improvement, and 30 percent achieved complete or near-complete clearance. Only 64 percent of all respondents felt adequately informed about isotretinoin risks and benefits from their healthcare provider. These findings should be interpreted with caution, given the small sample size and reliance on self-reported data.

Conclusions: While isotretinoin is associated with high patient-reported improvement, persistent misconceptions and perceived gaps in provider communication may limit its use. Enhancing patient-centered education and addressing prevalent myths could improve informed decision-making and treatment uptake.

A DUAL-FOCUS LITERATURE REVIEW: PRECLINICAL EVIDENCE OF ANESTHETIC NEUROTOXICITY IN THE DEVELOPING BRAIN AND CLINICAL OUTCOMES OF POSTOPERATIVE NEUROCOGNITIVE COMPLICATIONS IN ADULTS

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Perioperative brain vulnerability is a concern across the lifespan, manifesting as impaired learning and memory following anesthetic exposure in children and postoperative delirium or cognitive dysfunction in adults. Although these outcomes appear age specific, evidence suggests shared mechanisms of injury. This review integrates findings from preclinical studies to identify converging biological pathways that underlie anesthetic neurotoxicity and perioperative cognitive decline.

Preclinical models in rodents and nonhuman primates demonstrate that anesthetic exposure disrupts synaptic development, impairs mitochondrial function, and alters gene expression through non-coding RNAs. These cellular changes promote neuroinflammation, microglial activation, and impaired neuronal connectivity. Clinical investigations including biomarker analyses, cohort studies, and neuroimaging reveal parallel disruptions in glymphatic clearance, impaired network integrity, and complement activation. Together, these studies point to unified mechanisms: cellular stress responses converge on large-scale network dysfunction, ultimately producing cognitive decline.

The purpose of this review is to integrate neurological anesthetic effects across pediatric and adult populations, evaluate neuroprotective strategies such as dexmedetomidine and mitochondrial support, and highlight opportunities for biomarker guided perioperative care. By unifying cellular, molecular, and systems-level data, this review underscores that perioperative brain vulnerability represents a spectrum rather than discrete pediatric or adult syndromes. Future work focused on mechanistic biomarkers may enable early risk stratification and targeted neuroprotection across the lifespan. Current evidence is constrained by heterogeneity in study design, variability in anesthetic exposure, and challenges in projecting findings from animal models to human outcomes. Longitudinal, multimodal studies are needed to validate biomarkers and test targeted interventions across patient populations.

ADDRESSING BARRIERS TO EQUITY IN PEDIATRIC RARE DISEASE CLINICAL TRIALS: PARENTAL PERSPECTIVES AND THE PROMISE OF DECENTRALIZED MODELS

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Clinical trials are essential for advancing therapies in pediatric rare genetic diseases, yet enrollment among underserved populations remains disproportionately low due to logistical, financial, and cultural barriers that limit diversity and the generalizability of study results. This study examined unique barriers faced by parents of children with rare disorders, with emphasis on underrepresented minority (URM) groups. A targeted literature review (2014–2024) explored parental perspectives on clinical trial participation for rare disorders. Themes were identified using grounded theory, an approach that develops theory directly from systematically collected and analyzed data, allowing patterns and insights to emerge naturally through comparative analysis. Findings were coded, compared across studies, and synthesized into broader categories of barriers. Five major themes emerged, including logistical barriers such as travel distances, limited site availability, and inflexible scheduling; informational barriers including limited awareness, unclear consent processes, and lack of personal invitations; socioeconomic factors such as financial constraints, inflexible work schedules, and single-parent household challenges; cultural issues such as language barriers, hierarchical physician-patient dynamics, and mistrust from systemic inequities; and study design concerns such as lengthy trial durations, placebo concerns, and burdensome protocols. Decentralized clinical trials (DCTs) offer a scalable approach to equity by replacing traditional site-bound models with telehealth visits, e-consent, local laboratory access, and home-based data collection. By addressing these barriers, DCTs directly respond to the challenges identified in the literature and extend existing calls for more inclusive research. **This review is limited by its reliance on published literature, which may exclude unpublished experiences or community-level insights from the most marginalized families. Heterogeneity in study design, sample sizes, and geographic representation also constrains generalizability. Furthermore, parental perspectives may differ from those of affected children or adolescents, whose voices remain underrepresented.** Despite these limitations, this review establishes a framework for evaluating DCT readiness to meet URM-specific needs in pediatric rare disease research.

ASSESSING THE IMPACT OF NEWS SOURCES ON KNOWLEDGE IN CLIMATE CHANGE, DIABETES, AND INFECTIOUS DISEASE

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Background: Misinformation regarding public health topics has intensified dramatically in the digital age, with media consumption habits significantly affecting public understanding of critical health issues. While existing research has primarily examined COVID-19 knowledge, the broader relationship between media consumption patterns and health knowledge across multiple domains remains inadequately understood.

Objective: This study examined how media consumption patterns and news source preferences influence public knowledge across three critical health domains: chronic diseases, climate change, and infectious diseases.

Methods: A cross-sectional survey of 509 U.S. adults was conducted through CloudResearch Connect. Participants completed validated knowledge assessments for each health domain (15 true/false items per domain, scored from -15 to +15), along with comprehensive measures of media consumption patterns, trust in health information sources, and demographic characteristics. Statistical analyses included ANOVA, t-tests, and correlation analyses to examine relationships between variables.

Results: Trust in the CDC emerged as the strongest predictor, explaining 25.38% of variance in climate change knowledge and 20.29% in total knowledge. Political affiliation also showed strong associations with knowledge scores, with Democrats outperforming Republicans in climate change and infectious disease domains (total knowledge: Democrats vs. Republicans, $p<0.0001$, $R^2=11.26\%$). Progressive-leaning media sources (PBS, CNN, MSNBC) were associated with higher knowledge scores, while Fox News consumption was associated with significantly lower scores across all domains (total knowledge: 17.55 vs. 25.56, $p<0.0001$, $R^2=6.13\%$). Rural residents, those with lower education and income, and participants without healthcare access demonstrated consistently lower knowledge scores. This cross-sectional design limits causal inferences, and the observational nature cannot distinguish whether media consumption influences knowledge or individuals with different knowledge levels gravitate toward specific sources.

Conclusions: Specific media consumption patterns show strong associations with health knowledge accuracy across multiple domains. These findings highlight the critical need for targeted interventions addressing media literacy and source credibility to combat health misinformation effectively.

PROVIDER ROLE AND CONFIDENCE IN PALLIATIVE CARE DISCUSSIONS IN THE ADULT HOSPITALIZED POPULATION

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Palliative care focuses on the physical, psychological, and spiritual aspects of serious illness while prioritizing patient-family centered medical care. As many hospital systems reduce the number of dedicated palliative care providers, generalists and specialists are increasingly responsible for these conversations. Current medical research acknowledges the discomfort of providers in initiating palliative care conversations but does not discuss the training, confidence, or barriers providers will have in palliative care conversations. This research study investigated providers' perspectives on the importance of palliative care conversations, current provider responsibilities with palliative care, confidence with end-of-life conversations, and assessed the overall importance of palliative care providers in the hospital setting. A 15-question Qualtrics survey assessed participants' experiences with palliative care and confidence in end-of-life conversations. Responses were collected through social media, family, friends, and flyers. Data were analyzed with descriptive statistics, correlative relationships, and contingency tables in Excel. Research findings revealed limited training in palliative care across disciplines, with confidence levels improving with increasing years of experience. Limitations of the study included a small sample size (n=22), distribution methods (through current relationships and clinical rotations), diversity of participants' current medical roles and specialties, and participation bias. This research highlighted a gap in training for palliative care among health providers while also identifying that more years of experience led to increased confidence among providers in palliative care conversations. Future research is needed to evaluate the effectiveness of different training approaches and explore the long-term financial implications of palliative care within hospital systems.

PUBLIC PERCEPTIONS OF FOOD DYE SAFETY AND POTENTIAL REACTIONS TO INFORMATION ON ADVERSE EFFECTS

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Artificial food dyes are commonly used in the food industry to enhance the color of processed food products, appearing in a wide range of consumer items, such as candies, beverages, and packaged snacks. However, despite their widespread use, concerns have emerged regarding the safety of these synthetic dyes. We hypothesize that U.S. residents have little awareness of artificial food dyes, and that educational intervention will significantly increase concern regarding food dye safety. Studies have addressed public knowledge of food additives in various contexts; however, there remains a possibility for further research focused on U.S. residents, as low awareness may influence consumers' food choices and health outcomes. This research aims to inform public health strategies, possibly aiding in furthering education and promoting the availability of naturally-colored food options. To execute this study, participants completed a pre-survey, mid-survey educational content, and a post-survey focusing on reactions to learned material. Survey data were analyzed using descriptive statistics to summarize response patterns. Results confirm our initial premise that public awareness of artificial food dyes in the U.S. remains low, as 83 percent of participants indicated learning new information regarding food dyes, and 70 percent indicated concern for the effects of food dyes. Limitations for this study include low number of responses on some pre-test questions. In conclusion, the survey revealed a broad range of prior knowledge among participants regarding food dyes, as well as concern about the presence of food dyes and their potential health impacts, underscoring the opportunity for further education and outreach.

CLEARANCE OF WIDESPREAD EXTRAGENITAL LICHEN SCLEROSUS WITH UPADACITINIB

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Background: Extragenital lichen sclerosus (LS) describes a subset of 15-20% of LS patients with cutaneous involvement affecting areas other than the anogenital region, often the trunk and extremities. It is characterized by white plaques, pruritus, scarring, and often leads to significantly impacted quality of life. First-line therapies typically include high-potency topical corticosteroids; however, a subset of patients remain refractory to standard treatment. JAK inhibitors have shown potential for treatment of various inflammatory dermatological conditions due to their ability to modulate key immune pathways. There have been reports of extragenital LS having been treated with JAK inhibitors, such as tofacitinib (2022) and baricitinib (2020, 2021, 2023). However, this case is one of the first few to describe successful clearance of extragenital LS with the selective JAK1 inhibitor, upadacitinib.

Methods: We present a case of a 52-year-old female with a 3-year history of vulvar and extragenital LS. The patient had a baseline body surface area (BSA) of 40% including the back, shoulders, abdomen, thighs, and buttocks. Her skin disease was refractory to initial treatments, including corticosteroids, phototherapy, and dupilumab.

Results: After 6 months of oral JAK1 inhibitor therapy at 15 mg daily, it was noted that the plaques in sun-exposed areas had become thinner and more pliable. After 9 months, the physical exam yielded <10% BSA with significant reduction in scarring and hypopigmentation. In addition, the extent of clearance of previously atrophic and scarred skin was impressive, suggesting that the dermal processes of LS can be reversed by upadacitinib.

Conclusion: This case adds to the growing body of evidence supporting the use of JAK inhibitors as a promising novel therapeutic option for severe extragenital LS and underscores the need for further investigation through larger studies.

Keywords: *Extragenital lichen sclerosus, lichen sclerosus, upadacitinib, janus kinase*

EARLY BARIATRIC SURGERY IN THE PREVENTION OF TYPE 2 DIABETES MELLITUS IN OBESE INDIVIDUALS

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The global rise in obesity has led to a parallel increase in type 2 diabetes mellitus (T2DM), a chronic disease with significant morbidity and economic burden. While bariatric surgery is widely accepted as an effective treatment for obesity and established T2DM, its potential role as a preventive intervention in high-risk obese individuals remains underexplored. Emerging evidence suggests that early metabolic surgery, particularly in prediabetic patients, may significantly reduce the progression to T2DM by improving insulin sensitivity, enhancing beta-cell function, and promoting long-term glycemic stability. This project aims to explore the preventative benefits of early bariatric surgery through a comprehensive review of current literature. Articles from Embase and Pubmed spanning from early 2015 to the most recent clinical trials were collected following a systematic approach using the Prisma Protocol guidelines. Different modalities of bariatric surgery and how the procedure affected patients' metabolic comorbidities were reviewed. By compiling and analyzing available data, this project seeks to determine whether earlier surgical intervention offers meaningful benefits in reducing T2DM risk. Bariatric surgery can be effective in managing and even reversing T2DM; however, the optimal timing of surgery for maximum preventive benefit is still under investigation. It was concluded that bariatric surgery significantly increased life expectancy in patients with T2DM compared with patients who managed their T2DM with pharmacologic agents alone. There is strong evidence of its benefits even when T2DM is already well established. By shifting the focus from treatment to prevention, this research highlights the clinical and public health value of earlier surgical referral for obese patients at high risk for T2DM.

PUBLIC AWARENESS AND PROVIDER PRACTICES IN INSULIN RESISTANCE: INSIGHTS FROM ADULTS AGED 18-64

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Insulin resistance, a condition in which the body's cells do not respond effectively to insulin, is a major yet often overlooked contributor to chronic diseases, affecting many adults aged 18 to 64. While insulin resistance is recognized as a driver of numerous chronic conditions, limited research has explored public understanding or healthcare provider engagement in prevention. This study aimed to assess how well adults in this age group understand insulin resistance, the extent to which healthcare providers proactively address it, whether individuals would be likely to adopt or promote healthier behaviors if better informed, and preferred resources to help make changes. To investigate this, a 19-question anonymous survey was distributed via Facebook and Instagram over a 10-month period, yielding 138 responses from adults (aged 18 to 64). Data were then analyzed using descriptive statistics, including frequency distributions, means, and measures of variability such as range and standard error of the mean (SEM). The findings revealed limited understanding of insulin resistance (only 13% correctly identified all associated chronic diseases), inadequate provider education on prevention strategies (89%), and strong willingness to adopt or promote healthier behaviors, including diet, physical activity, and sleep, if better informed (average mean >4.2/5). Although limited by a social media–based sample and potential recall or participation bias, these findings underscore the need for improved health literacy and better integration of insulin resistance education into primary care, highlighting a pathway to reduce the burden of chronic diseases through early intervention and lifestyle-focused strategies.

REACHING NEW HEIGHTS: INDOOR ROCK CLIMBING AND ITS EFFECTS ON INDIVIDUALS WITH INTELLECTUAL AND DEVELOPMENTAL DISABILITIES

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Over the past 10 years, North America has seen a massive increase in indoor rock-climbing gyms, from 388 to 635 new gyms. With the growing increase in the sport, there is an increase in accessibility to new demographics and skill levels. It is well known that physical exercise is beneficial for both mental and physical health. Recent literature shows indoor rock climbing can produce significant improvement in mental and somatic health over time. However, there is a need for data on individuals with intellectual and development disabilities (IDD) within this space. Specifically, there is a need to identify and evaluate existing outcome measures used to assess the impact of climbing on individuals with IDD, clarify which domains of health and well-being are most affected by climbing interventions, and highlight gaps in methodology, population inclusion, and outcome reporting to inform future research and practice. The purpose of this review is to examine the literature on individuals with IDD who have participated in rock climbing, focusing on outcome measures across domains of physical fitness and motor control, mental health and cognition, occupational self-efficacy, quality of life, mood states, and social functioning. Using academic databases (PubMed, Google Scholar), articles were identified that used both IDD and non-IDD subjects that have participated in rock climbing. On analysis and comparison, we found common positive health and social benefits. However, many studies were short in intervention length, contained small sample sizes, non-randomized designs, and lacked standardized measures, demonstrating the need for further studies.

CASE REVIEW: OMT AND PROLOTHERAPY EFFICACY IN MULTIFACTORIAL TRAUMA

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Chronic pain syndromes involving musculoskeletal and neurological features remain a significant therapeutic challenge. These conditions often lead to long-term disability, diminished quality of life, and high healthcare utilization, yet optimal treatment strategies remain poorly defined. The purpose of this report is to demonstrate how a multidimensional approach can provide improvement in a patient with otherwise refractory post-surgical pain. Years following a jet ski accident, a 50-year-old female with a history of thoracic spinal fusion, transverse process fractures, and rib trauma presented to the clinic with debilitating headaches, persistent neck and thoracic spine pain, and neuromuscular dysfunction. Despite multiple interventions, the patient's symptoms persisted, significantly impairing her daily activities. Examination revealed an innominate shear, thoracolumbar rotational dysfunction, occipital and suboccipital tenderness, scapular winging, and impaired neuromuscular coordination in the iliopsoas and serratus anterior. Imaging revealed no new structural abnormalities, despite severe and escalating symptoms. Treatment included ozone and prolotherapy injections to cervical and thoracic myofascial trigger points, osteopathic manipulative treatment (OMT), and therapeutic exercises targeting myofascial lines and functional movement trains. Over the treatment course, the patient reported improvement in migraine frequency and intensity, reduced muscle spasms, improved posture, and partial restoration of function. Although back pain persisted, the patient has transitioned from severe daily impairment to manageable soreness with improved resilience to physical exertion, sustained symptom control, and greater independence. This case demonstrates that combining regenerative injections, OMT, and functional exercise offers a novel approach to chronic pain, reinforcing the importance of addressing overlapping structural, neurologic, and functional domains together.

EPIGENETIC CHANGES ASSOCIATED WITH TRANSGENERATIONAL TRAUMA: CHARACTERIZATION, MECHANISMS, AND THERAPEUTICS

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Transgenerational trauma refers to the lasting psychological and physiological effects of traumatic experiences that are passed from parents to their children. These effects can shape emotional well-being, behavior, and health outcomes in the next generation, arising from learned behavior, disrupted family dynamics, and environmental stressors. Increasing evidence also suggests that biological processes may contribute to this transmission. The purpose of this review is to explore how acute, chronic, and complex forms of trauma are transmitted across generations, with a focus on epigenetic mechanisms and parenting behaviors. A comprehensive literature review was conducted using PubMed and Google Scholar using keywords transgenerational trauma, intergenerational trauma, epigenetics, and parenting. Peer-reviewed original research and review papers published between 1990-2025 were included. Studies were grouped by trauma type and evaluated for epigenetic outcomes, parenting behaviors, and offspring health effects. Non-peer-reviewed sources were excluded. Across trauma exposures, consistent epigenetic changes were identified in multiple pathways. Stress-response genes within the hypothalamic-pituitary-adrenal (HPA) axis were most frequently studied, with methylation changes noted in NR3C1 and FKBP5. Alterations were also reported in BDNF (neural plasticity) and STAT5B (immune signaling). These changes were commonly linked to increased vulnerability to post-traumatic stress disorder, anxiety, and depression, as well as immune dysregulation and metabolic disorders in offspring. Trauma-exposed parents often experienced psychological distress that disrupted caregiving, such as emotional withdrawal or inconsistent discipline, which may interact with biological pathways to amplify transmission. Evidence is limited by small sample size, varied designs, inconsistent trauma definitions, and few longitudinal or diverse cohorts. Replication is needed to confirm gene-specific findings. Transgenerational trauma reflects intertwined biological and psychological processes. Epigenetic alterations and disrupted caregiving contribute to offspring vulnerability, highlighting the need for integrated biological, psychological, and social perspectives. Future research should clarify causal pathways to guide potential interventions that can break the cycle of trauma transmission.

ATYPICAL PRESENTATION OF KIMURA'S DISEASE: BROADENING THE SPECTRUM OF CUTANEOUS PRESENTATION

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Kimura's disease (KD) is a rare chronic inflammatory disorder of unclear etiology, most often affecting young Asian males. It typically presents with painless subcutaneous nodules in the head and neck region and is frequently associated with regional lymphadenopathy or salivary gland involvement. Less common sites include the groin, orbit, and eyelids. Renal involvement, including nephrotic syndrome, occurs in up to 60% of cases. The exact cause remains uncertain, but it is thought to represent a self-limited allergic or antigenic response, supported by its association with peripheral eosinophilia, elevated serum IgE, and comorbid allergic conditions such as asthma, urticaria, pruritus, and rhinitis.

We report the case of a 39-year-old man presenting with a gradually progressive, firm, hyperpigmented nodule in the posterior auricular region for three years, unaccompanied by lymphadenopathy or systemic signs. Histopathologic examination demonstrated follicular hyperplasia with eosinophilic infiltrates and proliferation of post-capillary venules, while immunohistochemistry confirmed IgE deposition in germinal centers, establishing the diagnosis of KD.

This presentation is unusual in that KD manifested as an isolated auricular lesion without the more typical constellation of lymphadenopathy, salivary gland disease, or renal involvement. The differential diagnosis includes angiolymphoid hyperplasia with eosinophilia, lymphoma, and granulomatous infections. Treatment options range from surgical excision to corticosteroids and immunosuppressants, but recurrence remains common, highlighting the need for long-term follow-up. Beyond its rarity, KD serves as a model for chronic allergic inflammation, bridging dermatology, immunology, and otolaryngology, and its recognition in atypical cutaneous forms refines our understanding of inflammatory disorders that mimic neoplasia.

HIDING IN PLAIN SIGHT: ATYPICAL TIMELINE OF SYMPTOM PRESENTATION IN HELLP SYNDROME

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HELLP syndrome is a hypertensive disorder of pregnancy in which the patient develops hypertension, hemolysis, elevated liver enzymes, and thrombocytopenia. Typical symptoms include abdominal pain, headache, nausea, and vomiting. Complications include placental abruption, preterm birth, and maternofetal demise. The purpose of this case presentation is to describe what an atypical symptom timeline in HELLP syndrome may look like so that future cases may be diagnosed sooner and monitored closer for improved outcomes.

A 27-year-old G1P0000 female with excellent prenatal care presented with sensation of impending doom at approximately 20 weeks gestation (WG). Labs and examination were unremarkable at initial presentation. At approximately 23 WG the patient experienced one episode of epistaxis lasting 1.5 hours that resolved spontaneously. At 27 WG the patient developed RUQ pain, headache, nausea, and vomiting. At 28 WG, blood pressure (BP) measured 136/84 with lab values demonstrating AST 73 IU/L, ALT 164 IU/L, and platelets 76 $x10^3/\mu L$. At 28+4 lab values were AST 186 IU/L, ALT 339 IU/L, and platelets 47 $x10^3/\mu L$. Standard of care was followed which included hospitalization, magnesium sulfate, betamethasone, and eventual delivery. Upon delivery at 28+6 the patient's BP remained below 120/80. Her labs by discharge were AST 35 IU/L, ALT 149 IU/L, and platelets 180 $x10^3/\mu L$. The impending doom resolved and did not return.

It is abnormal to have impending doom as the first symptom of HELLP syndrome without abnormal lab or BP findings. Typically, patients present with high BP, nausea, vomiting, RUQ pain, and headache. Although uncommon, there are cases where epistaxis was the initial symptom. While impending doom can be a symptom of anxiety, the resolution after delivery without recurrence in our patient increases the probability this was pregnancy related. Early screening and diagnosis are important for good outcomes with HELLP syndrome as maternal and fetal mortality rates can be up to 24% and 60% respectively. Atypical presentations such as sustained impending doom can be an early warning sign that something abnormal is occurring in a pregnancy and should warrant close monitoring.

Keywords: *nonclassical HELLP syndrome*, *hypertensive disorders of pregnancy*, *pregnancy complications*, *sense of impending doom*

UNLOCKING CALM: USING OMT FOR THE TREATMENT OF ANXIETY DISORDERS

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Background: Anxiety is a prevalent mental health condition, affecting over 30 percent of all U.S. adults at some point in their lives. Osteopathic manipulative treatment (OMT) is a hands-on treatment that may provide a safe, low-cost, non-pharmacological intervention for reducing symptoms of anxiety.

Methods: We conducted a 6-week randomized controlled trial to evaluate the effects of OMT on anxiety. Participants were randomly assigned to a treatment group (group A) or a control group (group B). All participants completed a baseline Generalized Anxiety Disorder-7 (GAD-7) questionnaire. Physiologic measures (systolic blood pressure [SBP], diastolic blood pressure [DBP], and heart rate) were recorded before and after treatment or rest sessions. The treatment group received a standardized OMT protocol once weekly for 6 weeks. The control group rested supine for 10 minutes. Both groups completed a GAD-7 after each session. All participants additionally completed post-treatment period GAD-7 questionnaires at weeks 7 and 8.
Results: There were no significant differences between groups in systolic, diastolic, mean arterial pressure, or pulse over the 6-week period (all $p > 0.05$). In contrast, survey scores showed significant within-group reductions in anxiety symptoms over time (Treatment group: $p = 0.0175$; Control: $p < 0.0001$). Group B (treatment group) demonstrated a steady decline in GAD-7 scores from baseline through week 7.

Conclusion: OMT provides subjective improvements in anxiety, reflected by reductions in self-reported GAD-7 scores. As suggested by the trend in GAD-7 scores in the control group, continued treatment may further reduce symptoms of anxiety. These findings support the potential role of OMT as an affordable, non-pharmacologic intervention in the management of anxiety.

THE ADEQUACY OF MOBILE CLINICS IN THE CARE OF MIGRANT AGRICULTURAL WORKERS IN COLORADO

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Migrant agricultural workers in the United States face significant barriers to healthcare, including financial hardship, transportation challenges, and language differences. Mobile clinics have been proposed as a strategy to improve access for rural and migrant populations. This study evaluated whether mobile health services in Colorado adequately meet the needs of migrant agricultural workers. Prior research in Colorado is sparse and largely predates 2010. A structured literature review was conducted using PubMed, Google Scholar, and EBSCO. Inclusion criteria were studies published within the last 15 years in the United States that specifically addressed mobile health clinics serving migrant worker populations. Publicly available data from Mobile Health Map and state health departments were also analyzed to assess current mobile health infrastructure. Findings revealed only three mobile clinics serving migrant agricultural workers and no peer-reviewed studies from Colorado within the past 15 years. Results were limited by the absence of recent research, lack of a government-maintained registry of mobile health services, and the voluntary nature of databases such as Mobile Health Map. From the available evidence, we conclude that barriers to care among Colorado's migrant agricultural workers are likely exacerbated by both the limited number of mobile clinics and the absence of a centralized source for identifying them. These findings highlight the need for stronger mobile healthcare infrastructure and targeted research to guide the delivery of care to this vulnerable population.

GUT-EYE AXIS: A SYSTEMATIC APPRAISAL OF EVIDENCE LINKING THE GUT MICROBIOME TO OCULAR DISEASE

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The gut microbiome is increasingly recognized as a key regulator of systemic immune and inflammatory pathways, suggesting its potential role in extraintestinal disorders such as ocular disease. Dysbiosis may disrupt intestinal barrier integrity and alter microbial metabolite production, contributing to immune dysregulation and inflammatory signaling implicated in uveitis, glaucoma, diabetic retinopathy (DR), age-related macular degeneration (AMD), and dry eye disease. Despite expanding interest on the axis linking the gut microbiome and ocular disorders, the quality and consistency of evidence remain uncertain.

This review systematically evaluated literature published between January 2013 and March 2025 to assess the relationship between the gut microbiome and ocular disease and appraise methodological rigor. Eligible studies included systematic reviews, meta-analyses, and clinical investigations reporting associations between gut microbiome composition or metabolites and ocular pathology. Thirteen systematic reviews and multiple observational and interventional studies were identified. Findings indicate a consistent association between gut dysbiosis and ocular disorders, with variations by disease type. DR studies revealed reduced alpha diversity and a Firmicutes-to-Bacteroidetes ratio shift, while inflammatory conditions such as uveitis correlated with microbiome-driven immune alterations. In glaucoma, evidence highlighted microbial metabolites and LPS-TLR4 signaling as potential mechanistic pathways, whereas SCFAs demonstrated neuroprotective and anti-inflammatory effects relevant to AMD and retinal health. Interventional evidence remains sparse; four small clinical trials suggested symptom improvement following probiotic supplementation or fecal microbiota transplantation.

Overall, current data support a biologically plausible gut-eye axis; however, evidence quality is limited by methodological heterogeneity, small sample sizes, and predominance of observational designs. Standardized microbiome analyses, longitudinal cohorts, and adequately powered randomized controlled trials are essential to clarify causality and inform microbiome-targeted interventions for ocular disease.

Keywords: *gut microbiome, ocular disease, gut-eye axis, dysbiosis, short-chain fatty acids, immune modulation*

A NOVEL CLASSIFICATION SYSTEM FOR INTRAOPERATIVE EVALUATION OF ANTERIOR WALL HYPOPLASIA

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Historically, radiographs have been the primary imaging modality for assessing acetabular coverage and morphology. The anterior wall index (AWI) is the most clinically validated method for quantifying anterior wall coverage using an AP radiograph, but it is limited by errors from pelvic rotation, beam divergence, and the inherent inability of 2D-imaging to represent 3D-anatomy. Without a standardized classification system for anterior acetabular dysplasia, patients remain at risk of inadequate surgical correction, worse outcomes, and higher reoperation rates. This study introduces and evaluates the reliability of a novel intraoperative classification system for anteroinferior acetabular wall hypoplasia (AWH) and its relationship to hip instability. This multicenter, retrospective study reviewed 144 patients aged 18–89 who underwent hip arthroscopy with labral repair from 2024–2025. Exclusion criteria included inadequate image quality, traumatic injury, or prior rotational osteotomy. Two board-certified orthopedic surgeons graded arthroscopic images to describe wall morphology as no narrowing, mild narrowing, or severe “stiletto” narrowing. Patients were grouped by AWH type and radiographic parameters. Periacetabular osteotomy (PAO) surgery rates were compared between groups using linear regression models. Severe AWH narrowing was associated with smaller acetabular surface area and acetabular coverage than hips without narrowing. Moderate narrowing as associated with smaller AWI. Severe narrowing or ‘stiletto sign’ may indicate decreased anterior acetabular coverage and serve as an intraoperative identifier for anterior hip instability. Narrowing was not a significant predictor of PAO, however hips with severe narrowing trended toward higher odds of undergoing PAO compared with normal hips. The primary limitation was small sample size (n=144), which may restrict generalizability across the spectrum of anterior wall hypoplasia. Larger studies are needed to further validate its relationship to hip instability. Anterior wall narrowing may provide information about acetabular size and can assist with detecting hip instability during diagnostic arthroscopy. These findings may improve diagnostic accuracy, guide surgical decision-making, and promote diagnostic standardization.

COMPARISON OF UNIQUE ULTRASTRUCTURAL CHARACTERISTICS OF PIAL AND PERIVASCULAR FIBROBLASTS - IMPLICATIONS FOR CEREBRAL SMALL VESSEL DISEASE

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The unique characteristics of perivascular fibroblasts (PVFs) in brain vasculature may contribute to their ability of maintaining vessel homeostasis within the brain. Further, we find changes in PVF populations in Alzheimer's Disease (AD) mouse models pointing to their potential contribution to small vessel disease commonly observed in AD. Some characteristics of perivascular fibroblasts have been explored using electron microscopy of mice brains, and while some initial patterns can be drawn, little has been explored regarding characteristics of fibroblasts residing near the pial surface of the brain. To identify unique ultrastructural features of PVFs and pial fibroblasts, we sought out to compare characteristics between PVFs and pial fibroblasts in the MICrONs 1 cubic millimeter 3D electron microscopy dataset from the visual cortex of a healthy mouse brain. We explored differences in fibroblast macrophage interactions, vesicle exchange, vesicle density, proximity to arterioles or venules, and presence of fibroblast "projections" into surrounding tissue. By exploring the potential similarities or differences between pial and perivascular fibroblasts, we aim to discern unique qualities of pial fibroblasts and PVFs that may help explain their role in physiological and pathological situations, and how improper function may contribute to small vessel disease. We show that pial fibroblasts exhibit a lower incidence of fibroblast-macrophage interactions compared to counterparts seen in perivascular spaces. A part of these interactions includes exchange of vesicles between fibroblasts and macrophages, and while a large majority of perivascular fibroblasts demonstrate vesicular exchange between fibroblasts and macrophages, only a small portion of pial fibroblasts demonstrate this action. Furthermore, a phenomenon currently described as "fibroblast projections" is seen within select perivascular fibroblasts but is largely unseen in pial fibroblasts. Based off our initial findings, we observe different characteristics between PVFs and pial fibroblasts indicating differences in roles for maintaining vascular homeostasis and progression of cerebral amyloid angiopathy (CAA).

SUZETRIGINE IN POST-OPERATIVE PAIN MANAGEMENT: COMPARATIVE INSIGHTS AGAINST NON-OPIOID ANALGESICS

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Since 1999, the Center for Disease Control (CDC) has recorded over 300,000 prescription opioid related deaths. This statistic represents a medical need for safe non-opioid analgesic pharmacotherapies since post-operative pain management relies heavily on opioid-based therapies. Suzetrigine, a selective inhibitor of voltage-gated sodium channel NaV1.8, shows promise to fill this need. NaV1.8 is responsible for action potential propagation in peripheral nociception pathways, and with no expression in the brain, it suggests that inhibition would minimize central nervous system effects and abuse potential. While a majority of research focuses on Suzetrigine as a replacement for opioids, the comparison of Suzetrigine to other non-opioid medications has never been studied. A review of the data from meta-analyses and systematic reviews was conducted with a focus on efficacy, safety, and limitations in post-operative administration of COX inhibitors, gabapentinoids, and local anesthetics. A comparative analysis to Suzetrigine was also performed using data from phase 2 and 3 clinical trials in post-abdominoplasty and bunionectomy patients. Phase 3 randomized controlled trials for Suzetrigine demonstrated statistically significant reductions in moderate-to-severe acute post-operative pain compared to placebo with efficacy similar to hydrocodone/acetaminophen. Adverse events were primarily mild-to-moderate, with the most common being headaches and constipation without respiratory distress or sedation. Suzetrigine's limitations include: limited data on long term safety and efficacy, and indications for use in chronic pain. Compared to other non-opioid analgesics, Suzetrigine offers a novel mechanism while avoiding risks of renal and hepatic toxicity of COX inhibitors, and central nervous effects of gabapentinoids and local anesthetics. Future research should address comparative effectiveness of Suzetrigine to other non-opioid medications post-surgically, use in multimodal pain therapies, and long-term safety.

POSTOPERATIVE MULTIMODAL PAIN MANAGEMENT: A NARRATIVE REVIEW OF CURRENT PRACTICES, CLINICAL AND EDUCATIONAL GAPS, AND FUTURE DIRECTIONS

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Pain is among the most commonly reported side effects following surgical interventions; however, its management remains a significant challenge due to its multifaceted nature, with studies indicating that up to 80% of surgical patients experience inadequate pain control. Although multimodal pain management (MMPM) is widely recommended as a tool to help mitigate the ongoing opioid epidemic, a universally standardized approach for pain management is lacking and highly dependent on individual provider practices. Pain perception is inherently subjective, and while objective measurement tools are emerging, self-reported pain scales continue to dominate clinical practice. Differences in pain perception, further complicate efforts to standardize care, demonstrating the need for personalized approaches. Notably, there is a deficiency in surgical education regarding formalized training in postoperative analgesia, which leaves medical students and residents without a concrete foundation in evidence-based pain management strategies. Through a narrative review, we explore the pathophysiology of pain, evaluate current recommendations in surgery, and emphasize preoperative optimization. We find that using novel methods to determine an objective level of pain, combined with subjective levels may be the best way to address gaps in MMPM, and outline a more universal approach to post-operative pain management. Beginning this process in a pre-operative setting can further predict risks of complications allowing for adjustments of treatment strategies. We also argue for, and underscore the necessity for, comprehensive and structured pain management education across all surgical specialties to facilitate a comprehensive analgesia framework better while accommodating patient-specific modifications.

INTRAUTERINE DEVICE INSERTION AND PAIN PERCEPTIONS: A SURVEY STUDY

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Introduction: Intrauterine devices (IUDs) are a widely used form of long-acting reversible contraception, yet counseling and pain management practices remain inconsistent. In July 2025, the American College of Obstetricians and Gynecologists (ACOG) issued updated recommendations for in-office gynecologic procedures, including IUD insertion, endorsing routine use of pharmacologic and non-pharmacologic interventions with anticipatory counseling. This study evaluated the relationship between provider counseling and patient-reported pain during IUD insertion, and its influence on provider trust and future contraceptive decision-making.

Methods: An anonymous, nine-item online survey was distributed via Instagram from February to June 2025 to women aged 18 years or older with prior IUD insertion. Eligible respondents (n = 46) provided data analyzed using descriptive statistics, Gamma statistics for ordinal association, and Kappa statistics for agreement.

Results: Nearly 70% (n=32) reported no counseling on expected pain. Lack of counseling was significantly associated with higher pain ratings (Gamma=0.5751; p=0.0009). Higher pain correlated with lower likelihood of returning to the same provider (Gamma=0.3586; p=0.0201) and decreased intent to use an IUD again (Gamma=0.5864; p<0.0001). Counseling was associated with a greater willingness to return to the same provider (Gamma=0.4830; p=0.0094) but not with future IUD use. Perceived adequacy of counseling did not align with experienced pain (Kappa = 0.1617; p = 0.1865).

Conclusion: Persistent counseling gaps affect patient trust and procedural experience. Brief, structured counseling, consistent with 2025 ACOG recommendation, may improve patient-centered outcomes and promote standardized care.

***Keywords**: Intrauterine device, IUD, pain, counseling, patient satisfaction*

OPTIMIZING MEDICAL SIMULATION THROUGH FACULTY FEEDBACK

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Simulation-based medical education (SBME) is increasingly used to prepare medical students for clinical rotations, with pre-clerkship curricula shown to enhance confidence and skill acquisition. While student feedback is often reported, faculty perspectives remain underexamined despite their critical role in assessing instructional design, realism, and learner engagement. This study will evaluate faculty perceptions of simulation events to identify strengths and opportunities for improving SBME. Faculty, simulation fellows, and fourth-year medical student facilitators will complete an anonymous post-event Qualtrics survey. The survey will include ten Likert scale items assessing domains such as session structure, realism, adequacy of materials, and learner comprehension, as well as three open-ended questions soliciting qualitative feedback. Quantitative data will be analyzed using descriptive statistics, and qualitative responses will undergo inductive thematic analysis. The study is expected to yield insights into both the strengths of current simulation events and areas where faculty see opportunities for improvement. Survey findings may highlight elements such as session structure, realism, and learner engagement, while qualitative analysis may highlight themes that inform future improvements in curriculum design, faculty development, and learner assessment. By systematically capturing faculty perspectives, this study has the potential to inform the development of standardized evaluation methods, strengthen faculty training, and align simulation design more closely with clinical expectations. Ultimately, these contributions could advance best practices in medical education by supporting more consistent and impactful SBME experiences.

REWRITING RISK: LDL-C VERSUS APOB IN MODERN ASCVD PREVENTION GUIDELINES

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Atherosclerotic cardiovascular disease (ASCVD) prevention commonly relies on low-density lipoprotein cholesterol (LDL-C) blood levels, which can underestimate risk when atherogenic particle numbers are high. Apolipoprotein B (apoB) directly counts atherogenic lipoproteins; however, current guidelines vary in how to use apoB, resulting in inconsistent treatments.

We conducted a qualitative comparison of major lipid guidelines—the American College of Cardiology/American Heart Association (ACC/AHA, 2022), European Society of Cardiology/European Atherosclerosis Society (ESC/EAS, 2019), Canadian Cardiovascular Society (CCS, 2021), and American Association of Clinical Endocrinology (AACE, 2020)—extracting risk tiers and numeric targets. To estimate the clinical impact of marker choice, we simulated 1,000 adult lipid profiles using population-calibrated LDL-C and apoB distributions with empirically based correlation, then compared treatment classification at common thresholds. We aligned simulated lipid profiles into (1) apoB risk tiers (ESC/EAS; CCS); (2) apoB as a co-primary target (AACE); and (3) apoB as a risk-enhancing factor without numeric goals (ACC/AHA).

Replacing LDL-C with apoB, reclassified 38% of simulated profiles: 22% showed low LDL-C/high apoB (potential undertreatment) and 16% high LDL-C/low apoB (possible overtreatment). Additionally, 34% were concordant-high and 28% concordant-low. Because apoB reflects particle number while LDL-C reflects cholesterol mass, the markers are not interchangeable, and clinicians should not treat patients solely on LDL-C levels. . Aligning targets with apoB (as in ESC/EAS and CCS frameworks) may better match pathophysiology and reduce residual risk. Limitations include using simulated data and the absence of outcomes modeling; prospective studies should test apoB-anchored care pathways, cost-effectiveness, and patient outcomes.

DEVELOPING A LOW-COST MODEL FOR TRAINING RESUSCITATIVE THROACOTOMY

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Medical education often relies on lecture-based instruction and videos to teach procedural skills. However, cadaveric-based training offers a more hands-on approach, which may enhance procedural competency. This study evaluates the efficacy of cadaveric model training in teaching medical students the serratus anterior rib block, compared to traditional lecture and video-based instruction. A randomized, controlled study was conducted with medical students assigned to either the control group (lecture and video) or the experimental group (lecture, video, and cadaveric training). Participants completed a pre-study survey, followed by a lecture and video demonstration. The experimental group also received cadaveric model instruction, including a hands-on practice session. A procedural competency exam was administered within a week of instruction, and scores were compared between the two groups using t-tests. Participants also completed a post-study survey to evaluate their knowledge retention. There was no significant difference between groups for the written portion ($p > 0.05$). In contrast, the procedural competency score was significantly higher in the experimental group ($p < 0.05$). While written knowledge may improve similarly with both methods, hands-on cadaveric training provides a critical advantage in developing practical skills. These findings suggest that incorporating cadaveric training into procedural education could better prepare medical students for real-world clinical practice.

Keywords: *Cadaveric model training, Serratus anterior rib block, Medical education, Hands-on training*

A NARRATIVE REVIEW ON THE IMPACT OF BILINGUALISM ON COGNITIVE RESERVE AND DEMENTIA

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Bilingualism, the ability to use and switch between two languages, has been increasingly recognized as a factor that enhances brain development and strengthens cognitive reserve. Cognitive reserve functions as a protective buffer against neurological decline, preserving brain function and delaying the onset of dementia symptoms. This review explores the relationship between bilingualism and dementia by examining contemporary studies across the lifespan, including infants, young adults, older adults, and individuals diagnosed with dementia. Research demonstrates that bilingual individuals display stronger executive control, greater neural efficiency, and healthier structural preservation in regions of the brain involved in decision-making, attention, and memory. Findings indicate that bilingualism does not reduce the overall likelihood of developing dementia but does delay symptom onset and reduce disease severity. For example, bilingual patients often experience dementia symptoms years later than monolingual peers, with preserved cognitive performance despite evidence of neurological decline. These benefits appear linked to lifelong practice in managing two languages, which strengthens neural connectivity and supports more resilient brain function.
Nevertheless, gaps remain. Existing research varies in how it defines bilingualism and measures proficiency, making comparisons across studies challenging. There is also limited exploration of multilingualism, late second-language acquisition, and the thresholds of language use required to achieve cognitive benefits. These findings carry implications for public health strategies, education, and lifelong learning as potential avenues to strengthen resilience against age-related cognitive decline. Future research should prioritize longitudinal studies, standardized definitions, and investigation of structural brain changes to clarify how bilingualism exerts its protective effects.

Keywords: *Bilingualism, Cognitive reserve, Neuroplasticity, Dementia*

POSTPARTUM PATIENTS AND EFFECTS OF PHYSICAL THERAPY ON PELVIC FLOOR DYSFUNCTION

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Pelvic floor dysfunction (PFD) is a common postpartum complication, associated with urinary incontinence, pelvic organ prolapse, pain, and sexual dysfunction. Physical therapy (PT) is effective in addressing PFD, yet few studies have prospectively evaluated postpartum PT, and retrospective studies often lack follow-up beyond six weeks. Limited data exist on patient-reported outcomes during the first six months postpartum. This study aimed to (1) identify demographic, clinical, and socioeconomic predictors of postpartum pelvic floor physical therapy (PFPT) attendance, and (2) assess associations between PFPT attendance and persistence of PFD symptoms beyond three months postpartum. A case-control design was implemented using retrospective and prospective data from UCHealth's Health Data Compass and PatientIQ. Patients ≥15 years old who delivered between October 2019–May 2023 at Highlands Ranch Hospital or Lone Tree Clinic were included. Outcomes included the Pelvic Floor Distress Inventory (PFDI-20), delivery variables, and PT utilization. Logistic regression and summary statistics were used to evaluate predictors and outcomes. Among >1,000 deliveries, 89 patients met inclusion criteria. Approximately 10% of those diagnosed with PFD received PFPT, with 68% initiating therapy ≥42 days after diagnosis. Common diagnoses included perineal lacerations, pelvic and perineal pain, and urinary incontinence. Distress scores varied by diagnosis, with higher scores among patients with lacerations and incontinence. PFPT is underutilized in postpartum patients despite evidence supporting its benefit. Identifying barriers to therapy initiation and evaluating clinical outcomes will guide strategies to improve access, optimize timing of interventions, and enhance postpartum standards of care.

Keywords: *Pelvic floor dysfunction (PFD), Postpartum, Pelvic floor physical therapy (PFPT), Physical therapy utilization*

AI-ASSISTED POINT OF CARE ULTRASOUND (POCUS) FOR SOFT TISSUE MASSES IN LOW-INCOME COUNTRIES DURING GLOBAL OUTREACH TRIPS

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Soft tissue masses such as abscesses, cysts, and neoplasms are common presentations in global health outreach settings, yet access to advanced imaging is often limited. Point-of-care ultrasound (POCUS) offers a portable and low-cost diagnostic solution, but its accuracy can be limited by provider experience and equipment resolution, leaving a gap in reliable diagnosis during outreach trips. Recent advances in artificial intelligence (AI) have introduced automated POCUS interpretation tools that could significantly improve diagnostic capabilities in low-resource settings. We hypothesize that AI-assisted POCUS can enhance diagnostic accuracy and usability for soft tissue mass evaluation in low-resource settings. To explore this, we conducted a systematic literature search of articles published in the last 10 years, focusing on studies addressing AI-assisted POCUS and POCUS for soft tissue masses diagnoses. Articles were screened for diagnostic accuracy, usability, and barriers to implementation. Our review identified multiple studies on AI and POCUS applications, but none specifically addressed soft tissue mass diagnosis in the context of global outreach. These findings suggest both the promise and the gap in current evidence, laying the groundwork for future pilot studies. By integrating AI with portable ultrasound, this project highlights opportunities for sustainable and scalable diagnostic strategies to expand safe and effective care in underserved populations.

Keywords: *Artificial Intelligence, Bedside Sonography, Global Outreach, Literature Review, Point of Care Ultrasound*

QUALITY IMPROVEMENT CASE SERIES: DERMATITIS AFTER SPINE FUSION CAUSED BY LIQUID ADHESIVE (2-OCTYL CYANOACRYLATE)

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2-Octyl cyanoacrylate surgical adhesives have gained popularity among pediatric spine surgeons for their association with reduced infection rates, shorter operative times, and greater patient satisfaction. Despite these benefits, their use has led to under-recognized allergic complications that can mimic serious postoperative infections, resulting in misdiagnoses and inappropriate management. This case series highlights allergic contact dermatitis (ACD) following cyanoacrylate-based adhesives and the importance of timely recognition and treatment.

We report two pediatric cases of ACD following surgical correction for scoliosis. Both patients developed erythematous, pruritic rashes within one month postoperatively. In Case 1, the patient underwent revision surgery for magnetically controlled growing rods; the rash was limited to the incision with no systemic symptoms. Prior adhesive exposure may have contributed to sensitization. In Case 2, the patient underwent posterior spinal fusion; the rash progressed to involve surrounding tissue. Management involved a multimodal regimen including topical corticosteroids, mupirocin, emollients, and oral antihistamines. In the more severe case, a tapered course of systemic corticosteroids was also administered due to diffuse involvement. Both patients experienced full symptom resolution with no recurrence at follow-up.

This case series underscores the importance of recognizing ACD in postoperative patients to avoid misdiagnoses and unnecessary interventions. While cyanoacrylate-related reactions are well documented in dermatologic and cosmetic settings, their occurrence in pediatric spinal surgery is under-recognized. Timely diagnosis and appropriate dermatologic management are essential to reducing morbidity and avoiding costly complications. Greater awareness may lead to earlier identification, improved patient outcomes, and future screening protocols for at-risk populations.

PERCEPTION OF THE EFFICACY OF MENTAL HEALTH APPS: A LITERATURE REVIEW

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The rise in demand for accessible mental health care has driven the production of mobile applications. Understanding how users and clinicians perceive their efficacy is essential for adoption and consistent engagement. The objective of this review is to analyze the literature on the perceptions of the effectiveness of mental health apps, and identify recurring patterns and barriers.

The literature review of peer-reviewed studies (2020–2025, PubMed) included randomized controlled trials, clinical studies, and scoping reviews. Studies examined perceptions of populations such as older adults (ages 50 and up), college students, and young adults (age 21-50). Efficacy of apps were additionally measured in individuals with comorbid conditions. Perceptions varied but some similar thematic elements emerged:

- **Usability and Simplicity** – Simple interfaces, clear navigation, and relevant content increased perceived effectiveness.
- **Personalization** – Features customized to user needs or cultural contexts enhanced engagement and trust.
- **Accessibility and Convenience** – On-demand access, anonymity, and flexibility were highly valued.
- **Perceived Added Benefits** – Some users reported improvements in general well-being beyond targeted mental health outcomes.
- **Barriers** – Privacy concerns, uncertainty about content credibility, and declining engagement over time were common. Comfort with technology influenced perceptions, with tech-savvy groups adapting more readily. Culturally adapted tools improved viability in diverse or marginalized communities.

Across demographics, perceptions of mental health apps are generally positive, particularly when usability, personalization, and cultural relevance are prioritized. However, sustained use depends on trust, integration into daily routines, and perceived credibility. Gaps remain regarding clinician perspectives, long-term adherence, and insights from underrepresented populations. Future research should examine both perceived and objective efficacy in real-world settings to modify design, policy, and clinical integration. It should focus on accessibility and availability of mental health services to all populations.

SACRAL LATERAL BRANCH RADIOFREQUENCY ABLATION FOR SI JOINT PAIN: LITERATURE REVIEW

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The sacroiliac joint (SIJ) accounts for 15–30% of chronic low back pain (LBP) cases but is often overlooked. Despite its clinical relevance, diagnosing SIJ pain remains difficult due to symptom overlap with lumbar disc, facet, and hip pathology. This review synthesizes current literature on SIJ anatomy, biomechanics, diagnostic strategies, and management, with a particular focus on the evolving role of radiofrequency ablation (RFA). Diagnosis of the SIJ as the source of LBP requires a multimodal approach, including history, provocation maneuvers, and confirmatory image-guided anesthetic blocks; however, inconsistency between intra-articular and lateral branch blocks complicates patient selection and contributes to heterogeneity in the literature. Management follows a stepwise pathway from conservative care to injection therapies and, in refractory cases, surgical fusion. RFA, targeting posterior sacral lateral branches, offers a less invasive option for refractory cases between injections and fusion. Advances in conventional, cooled, bipolar, and pulsed RFA aim to address anatomic variability and optimize lesion geometry. Evidence from systematic reviews and randomized controlled trials supports RFA's efficacy in achieving durable pain relief, though heterogeneity in technique and patient selection contributes to variable outcomes. Emerging innovations, such as bipolar palisade and endoscopic approaches, continue to refine treatment methods. The literature underscores both the promise and challenges of SIJ RFA, highlighting the need for high-quality studies to define its role and guide decision-making for patients, providers, and healthcare payers.

COMPETITIVE TENNIS PLAYER WITH FINGER NUMBNESS AND NECK PAIN-CERVICAL RADICULOPATHY AND MYELPATHY MASQUERADING AS THORACIC OUTLET SYNDROME

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Cervical spondylotic myelopathy (CSM), the leading cause of spinal cord dysfunction in adults over 55, can present subtly and mimic peripheral syndromes such as thoracic outlet syndrome (TOS), delaying diagnosis and treatment. A 62-year-old competitive tennis player and retired physician initially attributed numbness in the fourth and fifth digits to neurogenic TOS and pursued conservative therapy, but symptoms progressed to axillary discomfort, sleep disruption, and upper extremity dysfunction. MRI revealed multilevel cervical spondylosis, foraminal stenosis, and myelomalacia at C5–C6, and he underwent anterior cervical discectomy and fusion (C5–T1), resulting in immediate relief of axillary symptoms and gradual sensory recovery. This case underscores the diagnostic challenge of distinguishing CSM from peripheral neuropathies in older, active adults, highlights risk factors such as degenerative changes, cumulative cervical strain, and postural stress from "Tech Neck," and emphasizes the importance of recognizing subtle upper motor neuron signs and obtaining timely imaging to guide surgical intervention.

Key words: *cervical myelopathy, thoracic outlet syndrome, degenerative disc disease, anterior cervical discectomy and fusion.*

ANALYZING PEDIATRIC POST-OPERATIVE PRESCRIPTION TRENDS FOLLOWING MOTOR VEHICLE ACCIDENTS

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Pain management in pediatric trauma patients following motor vehicle accidents (MVAs) presents unique challenges due to risks of over or under-treatment and concerns regarding opioid use in younger populations. Despite the availability of multimodal pain strategies, opioids remain a common choice— but the extent and variability of their use, especially postoperatively, are not well documented. Identifying current prescribing patterns and alternative agents in post-MVA pediatric care can help inform safer, more effective protocols, reduce opioid-related risks, and support efforts toward responsible analgesia in this vulnerable group. This study aims to identify and describe prescribing patterns of pharmacologic agents, with particular attention to pain medication use, in pediatric patients who underwent surgical intervention after an MVA. This project uses publicly available data from the National Center for Health Statistics, specifically the National Hospital Ambulatory Medical Care Survey (NHAMCS), which provides nationally representative data on healthcare usage and expenditures. The inclusion criteria were patients under 17 who were admitted to the emergency department post-MVA and underwent a surgical procedure of any kind. We collated data from 2015-2022 to map long-term prescribing patterns for this specific population. Preliminary results show the most used drug in the pediatric population was ibuprofen, followed by acetaminophen—these were more common in older pediatric patients; lidocaine was the most used drug in the 0-4 year old population. There was also a significant increase in total drugs prescribed in 2020 as compared to other years analyzed. By mapping long-term prescribing trends, this study provides a foundation for understanding current approaches to pediatric trauma pain management following MVAs. These findings can inform future investigations into safer, more effective protocols and support efforts toward reducing opioid-related risks through evidence-based multimodal strategies.

SHORT- AND LONG-TERM NEUROBIOLOGICAL AND NEUROPSYCHIATRIC OUTCOMES ASSOCIATED WITH YOUTH AND HIGH SCHOOL CONTACT AND COLLISION SPORTS

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Exposure to contact and collision sports (CCS, e.g., American football) puts athletes at risk for sustaining repetitive head impacts (RHI). Exposure to RHI has been associated with the development of psychiatric and cognitive symptoms, such as depression, anxiety, memory problems, and the neurodegenerative disease Chronic Traumatic Encephalopathy. Although this evidence is clear in professional and college CCS athletes, less is known about youth and high school CCS athletes. In this study, we investigated whether there are short- and long-term neurobiological and neuropsychiatric outcomes associated with playing youth and high school CCS. We conducted a literature search using the PUBMED database to identify all primary research studies from 2006-2024 that investigated neurobiological and neuropsychiatric outcomes in this population. Neurobiological outcomes of interest included brain imaging and biomarker analysis. Neuropsychiatric symptoms of interest included various psychiatric and cognitive symptoms. Exclusion criteria included studies investigating college and professional CCS. Results suggest that CCS is associated with white matter integrity change and psychiatric symptoms in early- to mid-adulthood, although some studies showed no association with psychiatric symptoms. Limitations of this study include that these findings are based on data accumulated across multiple research centers and methods and analyses were not consistent across all studies. More studies are required to investigate outcomes associated with other CCS besides football and in females, as the literature suggests females have worse outcomes than males after traumatic brain injury. These findings can assist parents of children interested in playing CCS in choosing to allow their child to participate.

IMPACT OF ENTERAL AND TOTAL PARENTERAL NUTRITION ON VENTILATOR-FREE DAYS IN MECHANICALLY VENTILATED ICU PATIENTS

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Critically ill, ventilated patients face a high risk of malnutrition due to stress-related catabolism; therefore, proper nutritional support, including enteral (EN) and total parenteral (TPN) nutrition, is a cornerstone in their care. The existing literature discusses a positive effect on clinical status when using guideline directed EN and TPN. Our aim is to summarize current evidence through a review on how guideline-directed EN and TPN feeding during mechanical ventilation can impact ventilator-free days in ICU patients.

Lexical searching was conducted in PubMed, Embase, EBSCO, Cochrane, CINAHL databases, and the Google Scholar search engine. OpenEvidence and Consensus AI platforms were utilized to conduct semantic searching. MeSH terms used, but not limited to, were “enteral,” “parenteral,” “airway extubation,” and “critical illness.” Initial screening by title/abstract excluded duplicates, non-English articles, those published outside the 2015-2025 timeframe, and the pediatric population. A full-text screening will be conducted to determine the citation count for quality review.

In our initial search, after removing duplicates, there were 161 articles. A second search identified an additional 113. Combined, these 274 were screened utilizing the above inclusion and exclusion criteria for a total of 75 to be reviewed.

Initial findings from the review suggest a benefit of early enteral or parenteral feeding on ventilator-free days. Notably, while some studies demonstrated improvement in outcomes, few studies suggested negative outcomes, indicating that early nutrition intervention may be a safe intervention with potential positive effects. Additionally, initial results suggest a wide variety of nutrition protocols and formulations. Participants in these studies have different types of critical illnesses which may impact how they responded to EN/TPN, a possible limitation to the impact of the study.

This review could inform changes to nutrition protocols in ICUs across the world as well as demonstrate a need for future high-quality studies to determine exact timing of nutrition initiation and more uniform feeding formulas.

AMNIOTIC FLUID EMBOLISM: CLINICAL RISKS & MATERNAL MORTALITY DISPARITIES

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Amniotic fluid embolism (AFE) is a rare but often catastrophic obstetric emergency characterized by the sudden entry of amniotic fluid or fetal material into maternal circulation, triggering a rapid and often fatal immune response. The condition can lead to abrupt cardiovascular collapse, respiratory failure, and disseminated intravascular coagulation, making it the second leading cause of peripartum maternal death in the United States. Despite its severity, AFE remains poorly understood due to diagnostic ambiguity, inconsistent reporting, and a limited epidemiological profile. These gaps are especially concerning given the broader context of maternal health disparities in the United States, where racial and age-related inequities contribute to significantly worse outcomes for certain populations. This literature review examines current data on AFE incidence, fatality rates, and established risk factors, with a focus on disparities related to race, age, and potential geographic region. By synthesizing findings across demographic groups, this review highlights areas in need of further clinical attention and argues the necessity of improved diagnostic protocols, reporting mechanisms, and equitable access to high-quality obstetric care. Although relatively rare, AFE accounts for a disproportionate share of maternal deaths and was found to be linked to identifiable risk factors. The data support an association between AFE and both clinical and demographic variables, but diagnostic challenges and underreporting limit definitive conclusions.

CURRENT ADVANCES AND CLINICAL APPLICATIONS OF CRYONEUROLYSIS IN NEUROLOGIC SPASTICITY MANAGEMENT

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Cyroneurolysis has been a prominent, approved treatment within the realm of rehabilitation medicine. New emerging research has found that ultrasound or electromyography (EMG) guided cyroneurolysis can be an effective, longer lasting treatment for patients with spasticity in comparison to the current standards of care. Currently, the FDA approved treatments for spasticity include oral medications such as baclofen or diltiazem, intrathecal pumps, and chemodenervation. This review aimed to evaluate efficacy of treatment with cryoneurolysis for patients with spasticity who are unsuitable for, or unresponsive to conventional treatment options. A literature review was conducted, using inclusion and exclusion criteria to determine the true application of cyroneurolysis, as well as the risks and benefits across diverse neuromuscular conditions. Search parameters included treatment resistant spasticity, effects of cryoneurolysis on peripheral nerves, and post- treatment efficacy. Research findings suggest advantages of cryoneurolysis for spasticity, including the ability to treat multiple nerves simultaneously due to the absence of maximum dosing restrictions, a lower risk of complications, and reduced treatment frequency. In addition, the limitations of the use of cryoneurolysis are significant, including the high cost of treatment and the implications of pain during treatment. These challenges, along with cryoneurolysis not being FDA approved for spasticity management, restrict both access and implementation of the treatment. Although limitations do exist, current evidence does support the value of this treatment as an additional therapy for those who do not benefit from or are refractory to other interventions for spasticity and an investigation into its possible use is worthwhile.

Keywords: *cryoneurolysis, spasticity, refractory treatment*

MIND MATTERS -TRACKING THE MENTAL HEALTH JOURNEY OF PHYSICIAN ASSISTANT STUDENTS THROUGH DIDACTIC SCHOOLING

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The Physician Assistant (PA) profession is growing rapidly, with over 11,000 graduates annually; however, little research has examined the mental health challenges students face during training. This study assessed changes in anxiety and depression among PA students during the didactic year, a demanding nine-month period with coursework exceeding 27 credit hours per semester. A cohort of 36 students completed three timed surveys using validated Generalized Anxiety Disorder-7 (GAD-7) and Patient Health Questionnaire-9 (PHQ-9) instruments at program entry, before first-semester final exams, and before end-of-year exams. At baseline (n=30), average scores indicated mild anxiety (GAD-7: 5.16) and no depression (PHQ-9: 3.94). By the end of the first semester (n=22), mean GAD-7 scores rose to 9.27 (moderate anxiety) and PHQ-9 to 8.78 (mild depression), representing 79% and 122% increases, respectively. At the end of the didactic year (n=24), scores decreased slightly to GAD-7: 7.35 and PHQ-9: 7.59 but remained higher than baseline. Analysis of variance showed a significant effect of time on both measures (ANOVA, $p<0.05$), with the most pronounced change occurring mid-year. Notably, all participants reported at least some anxiety symptoms at that point. Although limited by small sample size and single-institution design, these findings underscore the psychological strain inherent in PA education. The results highlight the need for proactive institutional strategies, including curriculum modifications, enhanced behavioral health resources, and continuous monitoring, to reduce mental health burdens and foster resilience among PA students as they progress through the challenges of their training.

EXPLORING BARRIERS TO DIABETIC SELF-MANAGEMENT EDUCATION UTILIZATION IN HISPANIC/LATINOS ADULTS WITH TYPE 2 DIABETES

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Type 2 diabetes (T2D) disproportionately affects Hispanic/Latino adults in the United States, with prevalence rates exceeding those of non-Hispanic Whites, and is associated with poorer glycemic control and higher mortality. Diabetic self-management education (DSME) improves clinical outcomes; however, participation among Hispanic/Latinos remains low. This scoping review examines socioeconomic, cultural, and systemic barriers to DSME utilization in Hispanic/Latinos with T2D and evaluates virtual interventions as a potential solution. A scoping literature review search was conducted discussing DSME barriers, efficacy, and virtual interventions in Hispanic/Latino populations. Sixteen articles met inclusion criteria and underwent thematic analysis. Eight major barriers emerged: financial constraints, language barriers, lack of health insurance, limited transportation, cultural stigma, mistrust in the healthcare system, low health literacy, and restricted healthcare access. Economic limitations and lack of insurance were the most frequently cited obstacles, often interlinked with other factors, along with cultural beliefs, stigma, and language discordance hindering engagement and participation in DSME. Virtual interventions, particularly interactive, culturally tailored, bilingual programs with culturally competent health coaching, demonstrated improved accessibility, trust, engagement in participants. These findings suggest that multifaceted socioeconomic and cultural barriers contribute to low DSME participation in Hispanic/Latino adults with T2D. Limitations included a narrow scope of available articles on virtual DSME in Hispanic/Latino populations, restriction to English-language studies, and a limited number of databases searched. The literature supports that addressing interconnected socioeconomic and cultural challenges through culturally relevant virtual programs could improve education participation and health outcomes in Hispanic/Latino adults with T2D, helping to reduce disparities in this population.

THE ROLE OF STRENGTH TRAINING IN FALL PREVENTION AND RECOVERY IN ADULTS OVER 65: A LITERATURE REVIEW.

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Falls can be life-altering events for adults over 65, often resulting in serious injuries, incomplete recovery, and loss of independence. While low muscle mass and osteopenia are established risk factors, less time has been devoted to investigating the impact of strength training in the prevention of falls and post-fall recovery. The purpose of this review is to examine the relationship between strength training, fall prevention, and fall recovery in adults over 65. Studies related to fall prevention and strength training in seniors were identified using Google Scholar and PUBMED with search terms: resistance training, fall prevention, and fall recovery. Any studies including adults under the age of 65 were excluded due to a lack of relevance to the study population. Study results were systematically evaluated to determine if strength training in adults over 65 improved strength and balance essential for post-fall recovery. Limitations to this study include varied definitions of strength training and a lack of prior research with qualitative measures of fall recovery. Study conclusions supported the idea that resistance training in older adults helps to prevent falls and improves balance and mobility needed for recovery when compared to adults who do not strength train. The evidence suggests that the implementation of strength training into the lifestyle of adults over 65 could help prevent falls and improve balance, mobility, and recovery outcomes. Future research could include longitudinal studies observing strength training's impacts on fall recovery and prevention based on measures of balance, mobility, and strength assessed at specific benchmarks such as 6, 12, and 18 months following a fall. Additional research could identify specific resistance training thresholds and their correlation with fall recovery and prevention.

Keywords: *Fall Prevention, Resistance training, fall recovery, adults over 65*

IMPROVING ACCESS TO PERINATAL CARE IN AMERICA'S "MATERNITY CARE DESERTS:" CAN INCREASED UTILIZATION OF PHYSICIAN ASSISTANTS HELP?

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In the United States, approximately 2.3 million women of childbearing age live in "maternity care deserts:" counties that lack birthing facilities and obstetrics providers. These women face barriers to obtaining adequate perinatal care. It is generally accepted that resolution of this issue will require an increase in obstetrics and gynecology (OB/GYN) providers in these areas. While extensive research evaluates the role of physicians, nurse practitioners and nurse midwives, very little research has been completed regarding the role physician assistants (PAs) can play in expanding the OB/GYN workforce. The goal of this research is to assess the prevalence of PAs practicing in OB/GYN, and to evaluate how greater utilization of PAs could improve access in maternity care deserts. A comprehensive literature review was undertaken. All results were limited to those published within the last ten years. Only sources written in English and addressing data gathered in the United States were included. Results revealed only 1.2% of practicing PAs practice primarily in OB/GYN. The number of CNMs and NPs working in OB/GYN outnumber PAs by more than 6:1 and 7:1, respectively. This research is limited in that factors other than workforce also contribute to maternity care deserts, including recent closure of hospitals and insufficient financial reimbursement. These areas would need to be evaluated further to understand if increased PAs in this area could truly help solve this crisis. This research could be utilized to improve workforce planning in maternity care deserts, which could improve maternal and neonatal health outcomes in these communities.

INCORPORATING OSTEOPATHIC MANIPULATIVE TREATMENT TO IMPROVE MALLAMPATI SCORE

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Evaluation of difficult airways is essential for patient safety. The Mallampati classification is widely recognized in predicting the difficulty of intubation. Current literature provides limited evidence regarding the effect of osteopathic manipulative treatment (OMT) on the Mallampati score. This project aims to explore the use of OMT to lower Mallampati scores and ultimately reduce airway management complications. Participants are randomized into either a control group or an OMT treatment group. Those in control group received a heating pad treatment. The OMT treatment group received therapy in regions: occipitoatlantal joint, atlantoaxial joint, C2 vertebra, anterior cervical fascia, hyoid, or glossa. These OMT treatments include soft tissue, myofascial release, muscle energy, high-velocity low amplitude (HVLA), balanced ligamentous tension (BLT), or a combination of various indicated modalities. The researchers took a picture of participant's mouth (pre- and post-treatment) for the independent reviewer to grade the Mallampati score. The scores are compared between the two groups using paired t-test. We hypothesized that the experimental OMT group will show an improvement in the Mallampati score compared to the control group.

From the preliminary data, we found that there is no statistically significant difference ($p<0.5977$) in the Mallampati score between the OMT group and the control group. When exploring different covariates, we identified that current stress level of the participant and their average hours of daily sleep showed a statistically significant ($p<0.0222$ and $p<0.0370$, respectively) positive correlation with their improvement of Mallampati score after the OMT treatment compared to the control group.

The Mallampati score has been utilized to determine the difficulty of a potential intubation and can alter clinical decision making and therefore patient outcomes. These preliminary findings suggest that OMT may improve Mallampati score for patients with certain comorbidities and lifestyle. Further research with greater statistical power is needed to explore the effectiveness of different OMT modalities on Mallampati scores.

Keywords: *Mallampati score, osteopathic manipulative treatment, airway management*

COUNSELING, BREASTFEEDING, AND FUTURE PREGNANCY DECISIONS IN PERIPARTUM CARDIOMYOPATHY

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Peripartum cardiomyopathy (PPCM) is a rare, life-threatening form of heart failure that emerges in late pregnancy or the postpartum period. In addition to acute management, counseling about breastfeeding, future pregnancy, genetic testing, and investigational therapies remains central to long-term care. Despite its importance, little is known about how women with PPCM experience counseling practices. The purpose of this study was to characterize patient-reported counseling and management patterns in PPCM. We conducted a cross-sectional survey of ~5,000 members of a Facebook-based PPCM support group. The survey was administered using Qualtrics, and analyses were restricted to U.S. respondents with complete data (N = 201). Descriptive analyses were performed in SAS v9.4 (SAS Institute Inc., Cary, North Carolina) using complete-case denominators. Variables included advice regarding breastfeeding, discouragement from future pregnancy, receipt of genetic testing, and bromocriptine prescription. Among respondents, 64.7% (130/201) reported being advised against breastfeeding, 88.6% (178/201) were discouraged from future pregnancy, 18.4% (37/201) received genetic testing, and 6.5% (13/201) were prescribed bromocriptine. These practices reflect concerns about prolactin-mediated pathophysiology, relapse risk with pregnancy, and the potential role of genetic predisposition. This study provides novel patient-reported evidence on PPCM counseling in the United States. Findings suggest that most women receive strong guidance regarding reproduction and lactation, though recommendations vary and may not be consistently applied. Standardized counseling and shared decision-making tools could reduce confusion, improve patient satisfaction, and support safer maternal health outcomes.

THE ROLE OF ULTRASOUND IN CRICOTHRYOTOMY: A REVIEW OF CURRENT EVIDENCE AND CLINICAL APPLICATIONS

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Cricothyrotomy is a high-acuity, low-occurrence emergency airway procedure performed when conventional methods fail. Its rarity, anatomical variability, and time constraints make it difficult to teach and sustain proficiency. Landmark-based techniques are often unreliable in trauma or obesity, highlighting the need for adjunctive strategies. Emerging evidence suggests ultrasound (US) guidance and simulation-based training improve accuracy, efficiency, and provider preparedness. The purpose of this review was to evaluate the effectiveness of US and simulation strategies in enhancing cricothyrotomy training and performance. We conducted a narrative review of English-language, peer-reviewed studies published from 2000 to 2025 that assessed US or simulation in cricothyrotomy training or performance. Databases searched included PubMed, ScienceDirect, and ClinicalKey. Studies were screened for relevance, and findings were synthesized qualitatively by outcomes of interest: accuracy, time to completion, complication rates, confidence, and skill retention. Results show that US enhances identification of the cricothyroid membrane (CTM), particularly in patients with obesity, trauma, or tracheal deviation. Pre-marking the CTM reduced time to completion in anticipated airway failure, though real-time US may delay intervention if equipment is not readily available. Simulation studies, including cadaveric and high-fidelity models, demonstrated faster, more accurate performance, fewer complications, and greater learner confidence. Handheld US devices may mitigate setup delays and increase feasibility. Limitations of the current literature include small samples, heterogeneous study designs, lack of standardized outcome measures, and minimal long-term retention data. Overall, US and simulation improve safety, accuracy, and readiness in cricothyrotomy. Standardized curricula and longitudinal studies are needed to confirm sustained clinical impact.

MIND THE GAHP: A NOVEL PROTOCOL FOR IMPROVED VASCULAR ACCESS IN THE HYPOTENSIVE PATIENT

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Background:
Obtaining intravenous access in the hypotensive patient is challenging and can delay the resuscitation of critically ill patients. This study aims to evaluate the efficacy of a Graduated Vascular Access for Hypotensive Patient (GHAP) protocol in optimizing venous target vessels through early anatomically adjacent intraosseous (IO) access, followed by a small fluid bolus and a step-up to direct venous cannulation on the same extremity. GHAP leverages the use of IO fluid boluses to dilate proximal veins to optimize venous access options.
Methods:
Twenty-three cadavers were randomized to receive one of three different types of 15-gauge, 45-mm intraosseous devices inserted into four sites: distal radius, proximal humerus, distal femur, and distal tibia. Syringe-bolusing of IO saline was then performed and associated venous changes were observed using ultrasound. Measurements were taken to assess maximum venous circumference before and after infusion, time to maximum circumference, and the volume required. Statistical analysis included Levene's test, Wilcoxon signed-rank test, and Kruskal-Wallis test.
Results:
This study demonstrated a significant increase in proximal venous circumference during IO fluid bolusing across all sites, with a mean increase of 1.03 cm. We found no significant difference in time required for optimization of different veins, but there was a significant difference in volume.
Conclusion:
The GAHP protocol quickly and effectively increased the circumference of proximal veins. This could have significant clinical utility in hypotensive patients, where a brief bolus through IO could optimize and facilitate peripheral or central vascular access, expedite resuscitation, and reduce the risk of intravenous line-related complications in severely ill patients. The relatively small volume of fluid required to effect vessel change has significant implications for patient populations sensitive to volume overload. Additionally, this could have significant impacts on early trauma resuscitation and prolonged casualty management in austere, far-forward environments and emergent care.

NOT JUST GOLFER'S ELBOW: A CASE OF ACUTE PRONATOR TERES TEAR IN A YOUNG ATHLETE

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Pronator teres tears are rare soft tissue injuries with non-specific clinical presentations, which can lead to delayed or incorrect diagnosis. Point-of-care ultrasound (POCUS) is increasingly utilized in musculoskeletal medicine due to its enhancement of diagnosis and management in soft tissue injuries. In this case report, a 25-year-old male who developed acute left forearm pain while golfing presented to clinic 48 hours post-injury. Clinical examination indicated a pronator teres injury, which prompted further evaluation using POCUS. Imaging demonstrated a partial-thickness tear of the superficial head of the pronator teres muscle without involvement of the median nerve or proximal tendon. This finding confirmed the clinical suspicion and excluded more severe pathology that would have required surgical intervention. Integration of POCUS allowed for timely diagnosis, guiding a conservative treatment plan consisting of rest, activity modification, and structured rehabilitation. This case highlights the value of POCUS as a rapid, non-invasive diagnostic modality in the evaluation of acute upper extremity injuries.

Keywords: *ultrasound, sports medicine, musculoskeletal medicine, pronator teres*

THE ROLE OF SOCIAL MEDIA IN PROMOTING SUICIDE PREVENTION AND MENTAL WELLNESS

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Social media platforms, such as Instagram and TikTok, have become central to how people connect and access information, presenting both opportunities and challenges for mental wellness. While these platforms can raise awareness and provide support, their impact on mental health and suicide prevention remains uncertain. This study explored how social media users perceive the role of these platforms in promoting mental wellness. Despite extensive research on social media use, little is known about users' subjective experiences and engagement with mental health content. To address this gap, we surveyed social media users to evaluate their exposure to mental health resources, engagement behaviors, and perceptions of effectiveness. An online survey of 27 adults collected quantitative data on social media usage, exposure to mental health content, and perceived impact. Descriptive statistics were used to identify trends and relationships between exposure and perceived effectiveness. Participants reported moderate exposure to mental health content, most often on Instagram and TikTok, yet over half (52%) perceived social media as somewhat harmful to their well-being. Engagement with mental health accounts was limited, with 59% reporting they did not follow or interact with such groups, and perceptions of usefulness ranged from slightly to very helpful. The small sample size and overrepresentation of females aged 25–34 limit the generalizability of these findings. Social media can both support and challenge mental wellness, with engagement and interactivity shaping its effectiveness. Evidence-based, interactive strategies are essential to maximizing benefits and mitigating potential harms, guiding future research and intervention design.

IMPROVING TRAUMA OUTCOMES THROUGH STRUCTURED OUTREACH PROGRAMS: LESSONS FROM EXPANDED MODELS

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Effective trauma outreach programs are critical for improving follow-up adherence, reducing readmissions, and addressing long-term morbidity and mortality in trauma patients. However, the structure and scope of these programs remain highly variable across trauma centers, leaving a gap in defining best practices for outcomes and accreditation.

We hypothesized that structured outreach programs built around accessibility, continuity, and community prevention provide the most effective model for reducing complications and costs in trauma care.

To explore this, we conducted a narrative review of trauma outreach practices, focusing on common program elements including accessible clinic locations, coordinated inpatient-to-outpatient transitions, and faculty-led continuity of care. We further examined the REACH Clinic in Denver as an illustrative example of an expanded model, incorporating non-traditional outreach such as gun violence prevention, youth mentoring, and community education. Findings demonstrate that successful outreach programs integrate with inpatient care, create accessible follow-up pathways, and extend continuity services such as wound care and bullet removal. Expanded roles addressing social determinants and root causes of violence show promise in amplifying community-level outcomes.

These results suggest that trauma outreach programs aligned with ACS verification standards can improve both patient and community outcomes when structured around accessibility, continuity, and prevention, filling the gap in consistent outreach design.

Keywords: *trauma outreach, continuity of care, injury prevention, community engagement, ACS standards*

CLOSING THE LOOP: HOW INSURANCE AND SOCIAL DETERMINANTS SHAPE POST-SURGICAL OUTCOMES AND HEALTHCARE COSTS

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Post-operative readmissions following emergency general surgery (EGS) are costly, frequent, and often preventable. While insurance coverage and social determinants of health (SDOH) are known to shape surgical outcomes, few studies directly compare Medicaid and commercially insured patients while accounting for socioeconomic barriers.

This retrospective study analyzed emergency department admissions at Beth Israel Deaconess Medical Center from 2008 to 2022 to identify patients undergoing EGS procedures. Data collected included demographic and clinical characteristics, insurance type, post-operative complications, 30-day readmissions, emergency department utilization, follow-up adherence, and documented social risk factors. Patients were stratified by insurance status (Medicaid vs. commercial), and comparative and regression analyses were performed.

Preliminary findings align with prior literature: Medicaid patients demonstrated higher rates of post-operative complications, emergency department visits, and 30-day readmissions compared to commercially insured patients. Missed follow-up appointments, lower medication adherence, and AMA discharges were more common among Medicaid patients, particularly in those facing transportation barriers, unstable housing, or limited access to primary care. These disparities not only worsen clinical outcomes but also impose greater costs on hospitals, as Medicaid reimbursement is lower while care utilization remains high.

This study highlights the measurable impact of insurance status and SDOH on surgical recovery. Incorporating these factors into risk stratification models could improve perioperative care, reduce readmissions, and inform targeted interventions for vulnerable populations. Addressing these disparities has the potential to improve patient outcomes, enhance health equity, and reduce the overall financial burden on healthcare systems.

KNOWLEDGE, ATTITUDES, AND PRACTICES REGARDING TUBERCULOSIS IN THE FRONT RANGE

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Tuberculosis remains a large global health threat and recently has had increased cases in generally low-incidence areas of the United States. However, the knowledge, attitudes, and practices regarding tuberculosis in these low-incidence areas are underexplored, precluding planning for effective health communication in these areas regarding travel to high-incidence areas or potential future outbreaks in currently low-incidence areas. Using the Health Belief Model as a theoretical framework, we developed a Knowledge, Attitudes, and Practices (KAP) survey to assess public perceptions of tuberculosis in Colorado, a currently low-incidence area. We collected complete responses from n=225 adults, with most participants residing in the Front Range. Because of this limitation in our cohort, our data cannot be extrapolated to more rural populations. We found that participants had higher self-assessed knowledge than actual knowledge about tuberculosis. We also found that while participants recognized tuberculosis as a global health threat, they were not personally worried about contracting tuberculosis. However, a portion of participants indicated that they would feel shame if they did contract tuberculosis. Providing further messaging in low-incidence areas on actual public health burden of tuberculosis could help right-size public knowledge and risk perception about tuberculosis. Additionally, providing health communication to focus on emotion management and reducing stigma about the disease would be important to promote healthcare-seeking and treatment compliance in case of a future outbreak.

HOW OPIOID WITHDRAWAL SYMPTOM MANAGEMENT IMPACTS SOBRIETY

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Opioid addiction remains a significant public health issue in the United States, with approximately 2.5 million adults meeting criteria for Opioid Use Disorder in 2025. The aim of this survey was to examine the relationship between symptom management during opioid withdrawal and the duration of sobriety following that withdrawal. While symptom management strategies and factors influencing sobriety have been studied individually, there is minimal research directly comparing the two. An anonymous online survey consisting of 15 questions was shared via social media and collected self-reported data on participants' withdrawal experiences, symptom management strategies, and duration of sobriety following withdrawal. The survey had 32 respondents, but several did not meet eligibility criteria or only partially completed it, leaving 13 complete responses that were used during data analysis. A majority of participants (10 out of 13) felt that their withdrawal experience had some impact on their sobriety, though this was not statistically significant with relation to duration of sobriety (R square = 0.293, F = 1.24, significance F = 0.346). There was no statistically significant relationship found between duration of sobriety and being prescribed medication for opioid use disorder (MOUD) (using a paired t-test $t(11) = 0.58$, $p = 0.57$). Additionally, no statistically significant relationship was found between voluntariness of sobriety (Ranked ANOVA Cohen's $f = 0.509$, $p = 0.361$). Given the inconclusive nature of these results and the small sample size of this study, more research is warranted to better understand how withdrawal management may influence long-term recovery outcomes.

OUTCOMES OF CS-131 INTRAOPERATIVE TILE BRACHYTHERAPY IN RECURRENT GLIOBLASTOMA

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Introduction: Gamma Tiles (GT) is a novel brachytherapy device using Cesium-131 indicated for malignant brain tumors. GT can be placed during surgery, allowing radiotherapy to start immediately during resection. GT received FDA clearance in 2018 for malignant brain tumors and this technology has been utilized at University of Missouri since 2021. The purpose of this study is to evaluate the safety, feasibility, and outcomes of GT in patients with recurrent glioblastoma (rGBM) who previously received external beam radiation therapy.

Methods: We completed a retrospective chart review for patients who underwent GT implantation from 2021-2024. We collected the following data: number of tiles implanted, dose to 90% of the target (D90), local control, complications within 30 days of surgery, and overall survival. We completed survival analysis utilizing the Kaplan Meier curve. Of note, patients enrolled into clinical trials were excluded from this analysis.

Results: A total of 9 patients diagnosed with recurrent glioblastoma (rGBM) were used in analysis. A total of between 3-10 GT were placed in the resection cavity at the time of implantation, with an average of 5.8 tiles placed per patient. The prescription was to cover the resection cavity with 60 Gy. Our analysis showed that 8 of 9 patients had adequate dosimetry with a D90 of greater than 90% of the prescription dose. 4/9 patients who received implantation had no radiographic signs of local progression. Of the 9 patients with rGBM, most received chemotherapy, although interestingly 1 patient received no chemotherapy but used tumor treating fields only and has done well. A total of 4 patients died, with the median overall survival of 23 months, and a 1-year survival of 67%.

Conclusion: GammaTiles is a novel brachytherapy approach that is safe, feasible, and demonstrates excellent local control and survival in previously irradiated patients who have recurrent glioblastoma and are candidates for surgery and re-irradiation. However, these findings are limited by the small sample size, retrospective design, and lack of a control group, which may limit generalizability. Larger, prospective controlled trials are needed to validate these results and directly compare GT with other salvage therapies.

BRIDGING THE MORTALITY GAP: BARRIERS TO EARLY MELANOMA DIAGNOSIS IN NON-HISPANIC BLACK PATIENTS

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The non-Hispanic Black (NHB) population has worse melanoma survival outcomes compared to the non-Hispanic White population. With a lower incidence of melanoma in NHB patients, this mortality gap is often overlooked. This study investigates the barriers to melanoma diagnosis among NHB individuals. A literature review was conducted using PubMed and OpenEvidence, with thematic saturation defined by repetition of themes and diminishing returns. Included studies focused on NHB patients with melanoma to discern the barriers within this culturally distinct group. Studies regarding NHB perceptions of skin cancer risk, dermatology provider education, and published from 2015 to 2025 were also included. Studies were excluded if they pertained to Hispanic Black patients and non-Black patients of color, melanoma treatment, non-melanoma skin cancers, and provider opinion outside of dermatology. The review concluded once themes were identified across at least four research articles and no new themes emerged. Five themes were identified: lack of skin cancer awareness, diminished engagement in sun protective measures, misdiagnosis of melanoma subtypes, underrepresentation of skin of color in provider education, and socioeconomic barriers. Addressing these issues by including skin of color in skin cancer awareness campaigns and increasing skin of color education in dermatology programs could facilitate earlier diagnoses and improved outcomes for NHB melanoma patients. Limitations of this study included potential sampling bias in the reviewed surveys, a lack of recent research on sun protection measures and skin cancer awareness in the NHB population, and a focus on diagnosis rather than treatment outcomes.

PATIENT PERSPECTIVES ON AI-ASSISTED NOTE-TAKING IN THE PSYCHIATRIC EMERGENCY DEPARTMENT

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Artificial intelligence tools are increasingly being adopted in healthcare to enhance efficiency, accuracy, and documentation. While prior research has largely focused on physician usability, little is known about patient perspectives, particularly in psychiatric emergency settings. This study will explore how patients perceive the use of AI-assisted note-taking tools in the psychiatric emergency department.

The study will use a cross-sectional, survey-based design at MIND 24-7. Patients who complete a clinical encounter in which an AI note-taking tool is used will be screened for eligibility—this AI-assisted note-taking refers to an ambient documentation system that records clinician–patient dialogue. Inclusion criteria include being medically stable, able to provide informed consent, and willing to participate. Exclusion criteria will include acute medical or psychiatric instability, inability to understand the survey, or refusal to participate. Eligible patients will be approached in a private area following their visit to ensure confidentiality and comfort. After informed consent, participants will complete an anonymous paper survey lasting 5–10 minutes. The survey will collect non-identifiable demographic information, prior experiences with AI in other contexts (e.g., automated phone systems), and assess perceptions of comfort, satisfaction, trust in clinician oversight, confidence in AI accuracy, and willingness to continue using AI-assisted documentation in future encounters.

This project will center on patient voices in a vulnerable and under-represented population, addressing real-world challenges of ethical and patient-centered AI adoption. Anticipated findings include both positive responses (efficiency, reduced clinician burden) and concerns (privacy, accuracy, depersonalization). Findings will be limited by a cross-sectional, single-site convenience sample in a psychiatric ED; exclusion of clinically unstable or non-consenting patients reduces generalizability. Immediate, self-report paper surveys are vulnerable to social desirability, recall/mood effects, and nonresponse bias; brief, non-identifiable demographics restrict adjustment for confounding. Additional limitations include novelty bias toward new technology, the inability of yes/no survey items to capture nuanced patient attitudes, potential influence of clinician presence on responses (courtesy bias), variability across different AI tools or implementations, and the context-specific nature of psychiatric emergency settings, which may not generalize to other clinical environments. Despite these limitations, findings will provide timely insights to guide clinical practice and policy on responsible AI integration in psychiatry.

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THE IMPACT OF SOCIAL MEDIA ON MISCONCEPTIONS SURROUNDING BIRTH CONTROL

Social media has become a prominent source of contraceptive information, yet the accuracy and influence of such content remain uncertain. This study examined how digital platforms shape women's opinions and misconceptions regarding birth control. A cross-sectional survey was distributed via Facebook, Instagram, and in-person recruitment to women aged ≥18 currently using contraception or seeking counseling. Data from 100 respondents (mean age 31) were analyzed using descriptive statistics and gamma correlation tests. Most participants (69%) reported encountering birth control content online, with 30% indicating opinion changes due to such content, though this was not statistically significant ($p=0.2652$). An inverse, non-significant trend suggested higher education correlated with reduced opinion change. Contrary to expectations, educational posts from healthcare professionals had no significant effect, while personal stories/testimonials significantly influenced opinions ($p=0.0175$). Findings are limited by sample size and self-reported data. These results underscore the persuasive power of peer narratives and the need for strategies that combine emotional resonance with evidence-based messaging. This work advances understanding of digital health communication by highlighting the role of content type in shaping contraceptive beliefs and stressing the importance of improving online health literacy to counter misinformation.

ARE THERE RELIABLE PREOPERATIVE AND INTRAOPERATIVE METHODS OF BONE QUALITY ASSESSMENT PRIOR TO CEMENTLESS TOTAL KNEE ARTHROPLASTY? A REVIEW OF THE LITERATURE

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Recent advances in knee implant design, including three-dimensional printing, have increased the popularity of cementless total knee arthroplasty (TKA) components in the United States. While cemented fixation remains the standard of care due to its long-term success, cementless technology has shown favorable outcomes in younger, active, and obese patients. Broader clinical adoption, however, is limited by the absence of standardized methods to evaluate bone quality and guide patient selection.

This review synthesizes the current literature on preoperative and intraoperative approaches to bone quality assessment for cementless TKA. Reported preoperative methods include dual x-ray absorptiometry (DXA), quantitative computed tomography (QCT), and dual-energy CT (DECT). DXA is the most extensively studied modality, but its use in TKA is inconsistent, with no consensus on appropriate tibial or femoral regions of interest. QCT and DECT offer volumetric, three-dimensional analysis of trabecular bone and may provide more accurate assessments, though existing studies remain limited in number and scope. Intraoperatively, surgeons rely on subjective measures such as tactile resistance during sawing, ease of pin insertion, or the “thumb test,” none of which are standardized or validated.

Overall, current evidence highlights a critical gap: while bone mineral density strongly influences cementless fixation, no universally accepted assessment method exists. Standardization could improve patient selection, minimize complications, and optimize long-term outcomes. Limitations of the available literature include heterogeneity of study design and lack of prospective validation. Future research should integrate advanced imaging with intraoperative assessment to establish evidence-based, reproducible strategies for bone quality evaluation in cementless TKA.

OPTIMAL ACL GRAFT CHOICE FOR YOUNG FEMALE ATHLETES: A REVIEW OF OUTCOMES AND BIOMECHANICAL CONSIDERATIONS

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Tearing the anterior cruciate ligament (ACL) is one of the most common and career-threatening injuries for young female athletes, who face significantly higher rates of initial tears and re-injury than their male peers. Choosing the optimal graft for ACL reconstruction is critical for preventing future injuries and enabling a safe return to sport. Despite this elevated risk, current clinical guidelines lack clear, evidence-based recommendations that consider sex-specific factors. This paper examines which autograft—bone–patellar tendon–bone (BTB), hamstring tendon (HT), or quadriceps tendon (QT)—offers the best ACL reconstruction outcomes for young female athletes. A comprehensive literature search identified recent studies analyzing graft failure rate and donor site morbidity in young female athletes to compare with current guideline recommendations from the American Academy of Orthopedic Surgery, Japanese Orthopedic Association, and International Olympic Committee. Extracted data were synthesized and summarized in tables and figures for comparison. Our analysis shows that QT autografts provide graft failure rates comparable or superior to BTB (2.5-2.7% and 2.3-7.2%, respectively) and offer lower donor site morbidity than HT (17.6% and 26.2%, respectively). These findings support consideration of QT as a favorable graft choice for young female athletes. By integrating these results into clinical decision-making, this work advances evidence-based strategies for optimizing graft selection and reducing re-injury risk in high-risk athletes. Limitations include the limited number of studies focused specifically on young female athletes and the relative lack of long-term outcomes regarding QT grafts. Future research should target these areas to better support this high-risk population.

VIRTUAL CURRICULUM COMPLETION AND ACADEMIC PERFORMANCE IN COLORADO HIGH SCHOOL STUDENTS

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Online curriculum has become an integral component in all levels of education. High school education is critical for a student's success in standardized tests, graduation, and acceptance into further educational programs. Previous research has been conducted observing online learning during the COVID-19 lockdown and its function in medical schools. However, there is a lack of information regarding academic success following online curriculum. We aimed to determine how online learning correlates with high school standardized test scores and graduation rates in Colorado. We sought to find if online curriculum has benefited students in preparing them for future success.

Following IRB approval, we retrospectively reviewed 9 online high schools to 9 in-person high schools in Colorado. Each online school was matched in a 1:1 ratio to an in-person high school based on the total number of high school students. 2022 Scholastic Aptitude Test (SAT) scores and their classes corresponding graduation rates in 2023 were used as the comparison between online and in-person schools. SAT and graduation rate data was collected from the Colorado Department of Education. Total online curriculum was provided by the individual high school. There was not a significant difference in the student population between the two cohorts ($p=0.6419$). The average 2023 graduation rate for in-person schools was 91.99%, while online schools was 64.88% ($p=0.0001$). Based on the 2022 SAT scores there was not a significant difference between the online high schools and in-person high schools ($p=0.1054$). However, there was a 51.11-point difference in the average SAT scores. Online high schools scored an average of 893.44 points, while in-person high schools scored higher with an average of 944.55 points.

Our pilot study suggests that graduation rates are significantly lower in online high schools compared to in-person high schools. Online high schools are not significantly different from in-person high schools considering SAT scores. However, a 51.11-point difference is an important factor when considering college admission. The in-person students averaging a score of 944 may have a more competitive college application, as the average SAT score for public Colorado colleges is 1385. This study has limitations. Our sample size is relatively small, which makes it difficult to generalize our findings to the entire state. We cannot explain reasons why students and their guardians chose online education or whether to take the SAT. This study is ongoing and could suggest crucial information to students' success in higher education and the professional workforce. More data needs to be collected as SAT scores and graduation rates are not the only determinant of student success. A follow up study would include aspects involving students' socioeconomic status, ethnicity, involvement in extracurricular activities, mental status, and their success in the professional world.

UNDERSTANDING MEDICAL STUDENT AWARENESS OF ABORTION LEGISLATION AND GUIDELINES IN COLORADO AND UTAH

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Following the overturning of *Roe v. Wade* in 2022, the legality of abortion has shifted dramatically across the United States, influencing patient outcomes and exposing providers to potential legal consequences. Abortion training has historically been inconsistently integrated into medical curricula, but current legal variability highlights the urgent need for medical students to be well-versed in both clinical indications and relevant legal frameworks. This study evaluated abortion-related knowledge among first- and second-year medical students at the Colorado and Utah campuses of Rocky Vista University. A cross-sectional, anonymous survey was administered via Qualtrics, assessing demographics, general and legal abortion knowledge, and self-perceived confidence in abortion counseling. Preliminary findings indicate that while students generally know whether abortion is legal or restricted in their state of study and under what circumstances, many lack accurate knowledge regarding gestational limits, mandatory waiting periods, and provider protections. Most participants reported low to moderate confidence in counseling patients, citing news media and peer discussions as their primary sources of information. These results highlight a significant gap in medical education surrounding abortion care. Strengthening curriculum coverage of abortion laws and clinical practice may enhance student preparedness for clinical rotations, support informed patient counseling, and ultimately improve reproductive health outcomes.

EXPLORING PATTERNS AND MECHANISMS OF INJURY IN THE HOMELESS POPULATION

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Background:
Members of the homeless population are disproportionately affected by limited access to healthcare, environmental hazards, and socioeconomic instability. Traumatic injuries faced by the homeless population include vehicle-related incidents, thermal energy injuries, falls, and injuries related to increased exposure to violence.

Although existing literature discusses the prevalence of increasingly severe injuries and poorer health outcomes within the homeless population, there is limited discussion of the specific patterns and mechanisms of injury faced by the homeless population. Knowledge from this study can inform the development and placement of targeted outreach programs in areas of high risk where homeless individuals are more likely to sustain injury. This approach allows emergency departments and healthcare agencies to effectively allocate resources, reduce preventable injuries, and improve patient outcomes, in turn lowering healthcare costs and alleviating systemic burden.

Objective:
In this study we will evaluate members of the homeless population who present at hospitals across the country following traumatic injury. Homeless individuals experience distinct patterns and mechanisms of traumatic injury compared to the general population, influenced by socioeconomic factors, access to healthcare, and environmental conditions. Our hypothesis is that higher rates of injury, injury severity, and injury recurrence are correlated with being a member of the homeless population.

Methods:
Nationwide, patients arriving at Level 1 trauma centers, and meeting criteria are registered in the National Trauma Data Standard. A de-identified dataset will be pulled from the registry that includes data related to the care for the patients included. All patients from the registry will be assessed for inclusion. All patients who identify as part of the homeless population will be included, including patients under the age of 18. The dataset will include all information needed for the analysis.

DEMOGRAPHIC AND REGIONAL PREDICTORS OF HOSPITALIZATION FOR HEAT-RELATED ILLNESS: A NATIONWIDE EMERGENCY DEPARTMENT ANALYSIS

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Heat-related illness (HRI) encompasses a spectrum of conditions resulting from impaired thermoregulation, which can be life-threatening.[1] As global temperatures rise, HRI is an increasing public health concern.[2] This study evaluated demographic and regional predictors of hospital admission among HRI-related emergency department visits. While risk factors for incidence, like low income, male sex, and comorbidities, have been identified, fewer studies have examined predictors of hospitalization. A chart review of May through September 2019 data from the Nationwide Emergency Department Sample was conducted. The dataset was filtered to include cases with HRI ICD-10 codes T67.0 through T67.9. Descriptive statistics were calculated for predictor variables (sex, age, region, income), and binary logistic regression was conducted to analyze predictors of admission. Among 15,116 HRI cases, 69.7% were male, 40.1% resided in the lowest income quartile, and over half occurred in the South. Increasing age was the strongest predictor of admission (OR=2.045, $p<0.001$), while females had lower odds than males (OR=0.653, $p<0.001$). Regionally, unadjusted odds of admission in comparison to the South were higher in the West and Midwest, and lowest in the Northeast (OR=1.352, $p<0.001$; OR=1.265, $p=0.036$, OR=0.722, $p=0.001$). Income was not a significant predictor for odds of admission. Limitations include reliance on one year of data, absence of a non-HRI comparison group, ZIP code-based income estimates, and use of average maximum temperatures. Despite these constraints, these findings highlight the complexities of HRI severity despite incidence risk and emphasize the need for region-specific prevention strategies and further evaluation of triage and treatment practices.

ASSESSING AND ENHANCING OVARIAN CANCER AWARENESS IN COLORADO: A PRE-POST SURVEY STUDY ON SYMPTOMS AND RISK FACTORS

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Ovarian cancer is the most lethal gynecological malignancy in the U.S., and in Colorado, 70 percent (200 of 290) of women die from the disease, as most diagnoses occur at late stages due to nonspecific symptoms and a lack of screening. This makes public awareness necessary. Previous research has identified low awareness and frequent confusion of ovarian cancer symptoms with those of other conditions, but few studies have assessed targeted education in this population. To address this gap, we conducted a pre-post survey of adult women in Colorado, measuring confidence, knowledge, and the likelihood to seek care or educate others before and after viewing educational materials. A 10-question Qualtrics survey was distributed, and data from 49 complete responses were analyzed using paired t-tests and correlation analyses. After education, participants' confidence in identifying symptoms and risk factors increased significantly ($p<0.001$), and the likelihood to educate others increased ($p<0.001$). However, the likelihood to seek medical care did not change significantly. Accuracy in identifying symptoms and risk factors averaged 64 percent, revealing persistent knowledge gaps. Confidence moderately correlated with actual knowledge, suggesting targeted education at those who identify with a lack of knowledge. This study is limited by a small sample size, potential response bias, and recruitment methods that may not fully represent the broader population. These results highlight the importance of implementing ovarian cancer education in community and primary care settings. Increasing awareness can empower women to recognize early signs, potentially enabling earlier diagnosis and improving survival outcomes.

LONG-TERM EFFECTS OF BRADYCARDIA AND SINOATRIAL NODE DYSFUNCTION IN FORMER ENDURANCE ATHLETES: A SCOPING REVIEW

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Bradycardia is frequently observed among endurance athletes, yet the long-term physiologic effects of bradycardia are less defined in scientific literature. A need exists for mapping the gaps, trends and range of evidence in this population. This scoping review seeks to examine the existing literature on the long-term effects of bradycardia in endurance athletes, specifically in terms of sinoatrial node dysfunction, identify gaps in current knowledge, and provide an overview of the study designs, populations, and reported outcomes. Following the PRISMA-ScR framework, a systematic search was conducted across PubMed, Google Scholar, and Embase for studies published from January, 2000 to July, 2025 with inclusion criteria of mentioning “endurance athlete” and “bradycardia”. Mesh terms used to initiate the search were “Arrhythmia AND endurance athletes” which yielded over 16,000 results across all 3 databases. We used boolean operators, for a more refined search, “("sinoatrial node dysfunction" OR "sinus node dysfunction" OR "sick sinus syndrome") AND ("endurance training" OR "endurance athlete") AND (bradycardia OR pacemaker OR fibrosis OR remodeling)” and added “intitle:endurance” for google scholar which yielded under 100 results across all 3 databases. Data were documented by study type, athlete demographics and clinical outcomes. Preliminary findings reveal a limited number of studies specifically addressing bradycardia and endurance athletes; however, the available literature provides evidence of cardiac rhythm disturbances, including atrioventricular (AV) block and sinus bradycardia. The majority of these studies are constrained by small sample sizes and predominantly male populations, with minimal to no inclusion of female participants. Further analysis of available data is required to develop a more comprehensive understanding of the current research on bradycardia and its long-term effects. A major limitation stems from grouping varied disciplines under the broad label of ‘endurance athletes,’ which prevents adjustment for sport-specific variables and forces data to be pooled across different sports.

SMALL BOWEL ABSCESS DUE TO PERFORATED JEJUNAL DIVERTICULUM: A CASE REPORT

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Background
Jejunal diverticulitis is a rare cause of intra-abdominal abscess, representing only 0.3–1.3% of diverticulitis cases. Perforation occurs in 2–6% of patients and can result in localized abscess formation. Diagnosis is challenging due to nonspecific symptoms and low incidence, often delaying treatment. Standard management includes antibiotics and image-guided percutaneous drainage, but persistent or recurrent cases may require surgical resection. Novel approaches, such as photodynamic therapy (PDT), may offer future treatment options in refractory cases.

Case Presentation
A 55-year-old woman with no prior gastrointestinal history presented with acute, severe left lower quadrant abdominal pain, fever, and malaise. She denied trauma, NSAID use, or foreign body ingestion. CT imaging revealed a 4.2 cm abscess adjacent to the small bowel with a narrow tract suggesting a contained perforation. Image-guided percutaneous drainage was performed, and cultures grew gram-positive diplococci, gram-positive cocci in chains, gram-positive bacilli, and Candida albicans. Despite intravenous antibiotics and partial symptomatic improvement, the abscess–bowel tract persisted. Surgical exploration revealed a perforated jejunal diverticulum, which was resected. Pathology confirmed a true diverticulum with localized perforation; no additional diverticula or malignancy were found.

Discussion
This case underscores the diagnostic challenge of jejunal diverticulitis and the limitations of conservative management in perforated or fistulizing disease. Polymicrobial and fungal cultures suggest biofilm involvement, which can reduce antibiotic efficacy. PDT, though not applied here, offers a potential non-antibiotic adjunct by disrupting biofilms and killing pathogens via reactive oxygen species generation. Such techniques warrant further clinical investigation for refractory or surgically inaccessible abscesses.

Conclusion
Jejunal diverticulitis should be considered in unexplained intra-abdominal abscesses. Failure of percutaneous drainage and antibiotics should prompt early surgical consultation. Emerging therapies like PDT may expand treatment options in complex intra-abdominal infections. Multidisciplinary management is key for optimal outcomes.

BRAIN GROWTH TRAJECTORY IN YOUNG CHILDREN TREATED FOR BRAIN TUMORS

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Brain development in early childhood is rapid, dynamic, and sensitive to therapeutic injury. Conventional treatment for pediatric brain tumors, such as cranial irradiation (CRT), damages healthy brain tissue and can disrupt brain growth and function. Head Start 4 (HS4) is alternative treatment protocol, which consists of high dose myeloablative chemotherapy with three cycles of cisplatin, vincristine, cyclophosphamide, etoposide, and methotrexate, followed by autologous stem cell rescue, that offers a management option with less neurotoxicity. This study tracked the regional brain growth of children on HS4 compared against published healthy age-matched controls to ascertain the efficacy of the treatment protocol, while maintaining brain growth. Between 2014-2024, 201 children from 40 international institutions were enrolled: 77 meeting eligibility for analysis after excluding those who relapsed, those whose magnetic resonance imaging (MRIs) did not follow protocol, and any who had an artifact on their MRI. Longitudinal MRIs were obtained at diagnosis, post-operative, after induction chemotherapy, and at two and four years after therapy ended. Images were preprocessed and segmented to quantify gray matter, white matter, hippocampal, thalamic, and putaminal volumes. These volumes will be analyzed and compared using a custom pipeline and rates of growth compared to published norms for age. Preliminary results indicate promising preserved regional brain growth trajectories for medulloblastoma patients following treatment with the HS4 protocol. Head Start 4 treatment protocol may represent a viable therapeutic strategy for maintaining brain growth in young children with pediatric brain tumors. Continued analysis and follow-up will clarify the extent of brain growth preservation and the long-term cognitive and functional outcomes associated with this approach.

THE INFLUENCE OF GENDER ON EPINEPHRINE AUTO INJECTABLE (EAI) DEVICE CARRYING RATES IN ADULT PATIENTS WITH ANAPHYLACTIC ALLERGIES

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Anaphylaxis prevalence is increasing in the United States and globally, with 0.7 to 2 percent of cases being fatal. Timely recognition of symptoms and epinephrine auto-injector (EAI) device use are critical to prevent morbidity and mortality. Various barriers impact EAI-carrying behaviors, including fear of use, cost, perceived risk of allergen exposure, and not having the device when needed. Existing research suggests EAI-carrying adherence remains low in patients with anaphylaxis, though the relationship between gender and device-carrying behaviors is not well-established. This study explored how gender affects EAI-carrying habits, knowledge of anaphylaxis, and barriers to adherence using a self-reported multiple-choice and open-ended survey conducted via social media platforms, snowball sampling, and word of mouth. Categorical data were analyzed by gender ($p<0.05$), while thematic analysis was applied to open-ended responses from 65 participants (n=54 female; n=7 male; n=4 non-binary). Female participants were statistically more likely to carry an EAI in a purse (Chi-square, $p<0.0001$), while male participants were more likely to store EAIs in the car (Chi-square, $p=0.0489$). However, no significant differences were found in “always” carrying rates, barriers to carrying, or knowledge of anaphylaxis and EAI use among genders. Although the small number of responses limits statistical power and generalizability, this study identified gender-specific carrying methods and common deterrents to adherence, including forgetting the device, lack of storage options, and cost. Addressing deterrents to EAI-carrying, which may be multifactorial, and reinforcing appropriate carrying recommendations for all patients with anaphylaxis may promote adherence and have life-saving implications.

THE INVISIBLE WOUNDS OF ABUSE: HARNESSING HPA AXIS DYSREGULATION AND EPIGENETIC ALTERATIONS FOR CONSIDERATION OF AN OBJECTIVE TOOL FOR CHILDHOOD MALTREATMENT

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According to the US department of Health and Human Services, in 2021, approximately 1,820 children died due to child abuse and neglect and about 25% of women and 16% of men report experiencing sexual abuse before age 18. There currently lacks an objective measure for detecting childhood abuse in clinical settings. This study uses existing literature to explore the effects of childhood abuse on cortisol levels, sexual development hormones, and the epigenome. By identifying potential biomarkers from existing studies, we provide evidence for a potential diagnostic profile. We completed a systematic search identifying studies examining the association between childhood abuse and biological markers of stress, developmental disruption, and effects on adulthood. The following terms were cross-referenced to capture relevant studies: "Child abuse," "child maltreatment," "adverse childhood experiences (ACEs)," "early life stress," "childhood trauma," “HPA axis dysfunction," "HPG axis dysfunction," "cortisol awakening," "epigenetic changes," "sexual development abnormalities," "hormonal levels," "inflammatory markers," “telomere shortening”, and in combination ("child abuse" + "HPA axis dysfunction," "ACEs" + "epigenetic changes"). Our research revealed 50 studies and literature reviews displaying the effects of childhood abuse on the HPA axis, pubertal abnormalities, the epigenome, and telomere length disruption. Findings reveal consistent patterns of blunted cortisol levels, altered pubertal timing, hypermethylation of NR3C1, FKBP5, changes to CRP and IL-6, and telomere shortening in abused individuals. Challenges such as heterogeneity in abuse types, age- and gender-specific responses, and confounding lifestyle factors revealed the need for a multi-modal approach. Suggesting a diagnostic tool that combines biomarkers with existing screening tools could enhance diagnostic accuracy, reduce reliance on subjective assessments, and facilitate early intervention. Future research must prioritize clinical validation studies to standardize biomarker thresholds and address socioeconomic and racial disparities in stress responses.

HOW HEALTHCARE PRACTITIONERS IN THE UNITED STATES APPROACH CONVERSATIONS SURROUNDING LIFESTYLE INTERVENTIONS WITH THEIR PATIENTS

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Introduction: Lifestyle-related chronic diseases are a leading cause of morbidity and mortality in the United States. Evidence supports that lifestyle intervention counseling (LIC) improve patient outcomes, yet many healthcare providers face barriers to delivering effective counseling. This study examines provider practices, confidence, training, and systemic challenges in implementing LIC.

Methods: A cross-sectional survey was conducted with 62 licensed U.S. healthcare practitioners across various specialties. The survey assessed provider confidence in LIC, frequency and content of counseling, perceived barriers, and follow-up practices. Descriptive analyses identified trends and common themes.

Results: Most respondents recognized LIC as essential to patient care; however, over half reported limited formal training. The most frequently cited barrier was insufficient visit time (66%). Providers reporting higher confidence were more likely to deliver frequent and comprehensive counseling, yet structured follow-up was uncommon across all confidence levels.

Discussion: Findings indicate a disconnect between provider recognition of LIC's importance and consistent delivery. Integrating LIC into professional education, adopting team-based care approaches, and adapting LIC EMR tools may enhance implementation. System-level reforms, including reimbursement/incentive changes, are imperative to support preventive counseling. Limitations include sample size, survey distribution methods, and geographic concentration (primarily Colorado), which may limit generalizability.

Conclusion: Addressing educational and systemic barriers can strengthen provider capacity to promote sustainable lifestyle changes, potentially reducing the burden of chronic disease in the U.S.

INNOVATIVE APPROACHES TO GLIOBLASTOMA TREATMENT: INTEGRATING RNA INTERFERENCE & EPIGENETICS

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Glioblastoma Multiforme (GBM) is the most malignant and prevalent adult brain tumor with a yearly incidence of 3.5/100,000 and median survival of 12–18 months. It is facilitated by frequent EGFR, PTEN, and IDH gene mutations that make it aggressive, resistant to treatment, and prone to recurrence. The standard treatment now as of 2025 consists of a combination of surgery, radiation, temozolomide chemotherapy, and novel immunotherapy, but they all are still inadequate. MicroRNAs (miRNAs), small non-coding RNAs that regulate gene expression post-transcriptionally, are becoming recognized for their dual roles as tumor suppressors or oncogenes (oncomiRs). The dysfunction of these miRNAs in GBM affects key pathways involved in proliferation, apoptosis, and resistance. This narrative review explores how restoring or silencing specic dysregulated miRNAs through RNAi- based therapy can suppress GBM progression by targeting critical molecular pathways such as EGFR/AKT and PTEN regulation, offering a more precise and potentially effective treatment alternative. A systematic literature review was conducted using PubMed, Google Scholar, and Web of Science. Search terms included “glioblastoma,” “miRNA,” “RNA interference,” and “epigenetics.” Inclusion criteria consisted of studies published within the past 15 years, and primary research in human or relevant animal models identifying specic miRNA involvement in GBM and their molecular targets. Literature that was excluded had one or more of these following parameters: non-English papers, reviews without primary data, studies unrelated to GBM or lacking clear mechanistic insights, and non-translational animal studies. Our search revealed key miRNAs dysregulated in GBM include miR-7, miR-21, miR-17~92, miR-181b, and miR-221/222. These miRNAs inuence pathways such as EGFR, PI3K/AKT, and JAK/STAT, that drive the classic GBM behaviors including invasion, therapy resistance, and immune evasion. miRNA-based therapies offer an epigenetic approach to cancer treatment by targeting upstream regulators of gene expression. While promising, delivery of these nucleic acids remains the largest hurdle. Current methods under investigation include intranasal administration, nanoparticles, viral vectors, and convection-enhanced delivery. Future directions include personalized miRNA proling, combination therapies, and minimizing off-target effects.

THE IMPACT OF VISUAL AIDS IN PATIENT UNDERSTANDING OF CORONARY ARTERY DISEASE AND ITS EFFECTS ON MEDICATION ADHERENCE

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Coronary artery disease (CAD) is the leading cause of death in the United States. Patient adherence to medications, including antiplatelets and statins, is important in reducing morbidity and mortality. However, low health literacy rates and a lack of understanding of CAD and its commonly prescribed pharmacological interventions contribute to poor medication adherence. Recent research has shown that interventions to improve health literacy can improve medication compliance. This study aimed to further examine this concept through determining if the usage of a visual aid could improve CAD patients' understanding of their condition and increase adherence to medications. A convenience-based, anonymous web survey was conducted among participants diagnosed with CAD or those taking statins or aspirin. Participants completed a pre- and post-survey surrounding a visual aid designed to improve understanding of CAD and its pharmacological management. A total of 9 participants completed the survey. While only 4 confirmed a diagnosis of CAD, all reported statin or aspirin use. Following the review of the visual aid, three participants increased their aspirin adherence, and one initiated statin use. Participants who reported a strong understanding of CAD were correlated with strong medication adherence. This study further confirmed that health literacy can impact medication adherence. Despite limitations including small sample size and self-reported data, the findings suggest a potential correlation between patient education through visual aids and medication compliance among patients with CAD and support the usage of educational tools into routine care.

REDUCING DISPARITIES IN ACUTE STROKE CARE: DIGITAL AND SYSTEMIC BARRIERS IN RURAL POPULATIONS

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Stroke is a leading cause of death and long-term disability in the United States, with rural populations experiencing higher mortality and lower access to timely reperfusion therapies than their urban counterparts. Despite advances such as telestroke (use of telemedicine in stroke care) and mobile stroke units, their reach in rural areas remains limited. This study aimed to identify key barriers to acute stroke care in rural U.S. settings and propose a coordinated intervention model. A targeted literature search of peer-reviewed articles (2010–2024) across multiple electronic databases identified studies addressing rural–urban stroke disparities, telemedicine integration, and access limitations. Fifteen studies met inclusion criteria. Three barrier domains emerged: (1) Geographic—long distances to stroke centers and delayed EMS activation; (2) Neurological Care—shortages of vascular neurologists and inconsistent telestroke adoption; and (3) Digital Access—broadband deficits and low digital literacy. The intersection between digital connectivity and timely neurological intervention remains insufficiently addressed in the literature. To bridge this gap, we proposed the Rural Digital Health and Telestroke Navigator (RDHTN) program: a community-based model that trains local navigators to support patients and providers during telestroke consults, troubleshoot digital issues, and enhance virtual follow-up. This program aligns patient-centered navigation with infrastructure expansion to improve time-to-treatment and promote stroke care equity. Limitations include the selective nature of the literature review and the need for pilot testing across diverse rural communities. Future research should evaluate real-world RDHTN program implementation and its impact on clinical outcomes, care continuity, and mortality reduction in underserved stroke populations.

EXPLORING TREATMENT GAPS AND LIFESTYLE INTERVENTIONS IN AUTOSOMAL DOMINANT POLYCYSTIC KIDNEY DISEASE (ADPKD): A CASE STUDY OF A PATIENT WITH LIMITED THERAPEUTIC OPTIONS

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Introduction: Autosomal Dominant Polycystic Kidney Disease (ADPKD) is the most common inherited kidney disorder and a leading cause of end-stage renal disease worldwide. Although tolvaptan is the only FDA-approved disease-modifying therapy, its adverse effect profile limits patient acceptance. The purpose of this case report is to illustrate the therapeutic gap in ADPKD when standard treatment is declined, and to emphasize the importance of patient-centered management strategies.
Case Description: A 42-year-old woman with a strong maternal history of ADPKD and prior maternal kidney transplant presented with flank pain, recurrent urinary tract infections, fatigue, and cyst enlargement up to 14.9 cm. Despite elevated creatinine, she declined tolvaptan due to concerns about side effects. Diagnosis was based on family history, imaging, and laboratory evidence of impaired renal function. Management has focused on hydration, low-potassium/phosphate/sodium diet, and maintaining physical activity.
Results/Clinical Outcome: The patient remains untreated with pharmacologic therapy, highlighting diagnostic and therapeutic uncertainty. While supportive lifestyle measures may slow progression, their effectiveness is unproven. In contrast, tolvaptan could potentially have delayed renal decline but at the cost of hepatotoxicity risk and strict monitoring. This uncertainty underscores the difficult balance patients face when choosing between tolerability and efficacy.
Contribution to the Field: This case demonstrates how treatment refusal in ADPKD exposes critical gaps in therapy. It underscores the need for better-tolerated interventions, structured evidence for lifestyle strategies, and patient-centered approaches to decision-making in chronic kidney disease.

BIOFEEDBACK DEVICES IN PELVIC FLOOR MUSCLE TRAINING (PFMT): EFFICACY, MARKET COMPARISONS, AND INTEGRATION WITH STANDARD PROTOCOLS

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Pelvic organ prolapse (POP) is a highly prevalent condition, with estimates indicating that up to 50% of women will experience it during their lifetime. Pelvic floor muscle training (PFMT) is a cornerstone of conservative management for POP; however, numerous barriers contribute to sub-optimal treatment outcomes. These include limited access to specialists due to geographic or financial constraints, social stigma surrounding pelvic health, and other personal or systemic factors that obstruct effective treatment. Biofeedback devices have emerged as valuable adjuncts to existing treatment protocols, with many devices relying on the at-home gamification of PFMT and the use of digital platforms to prompt accurate pelvic floor contractions, enhance engagement, and track progress. This review synthesizes evidence on the efficacy of biofeedback-assisted interventions and evaluates the devices currently available on the market. Emerging research suggests that biofeedback-assisted PFMT devices significantly improve symptoms associated with POP, treatment adherence, and patient-reported outcomes compared with PFMT alone. However, it is important to acknowledge that treatment benefits can vary and may be limited in severe POP. Additionally, most commercially available devices primarily target urinary incontinence, with little mention of the broader range of symptoms associated with POP, which may limit their applicability. The complexity of POP symptoms also makes it difficult to standardize treatment outcomes, highlighting the need for individualized PFMT approaches. This comprehensive appraisal will consolidate information on available biofeedback devices into a single resource, allowing patients and physicians alike to compare devices based on cost, level of FDA substantiation, accessibility, features, and supporting research. Devices that do not provide feedback on contraction quality or use electromyostimulation will be excluded from this review. The results of this study will inform the development of a survey on women diagnosed with POP, exploring their perspectives and willingness to engage with technology-assisted PFMT to improve pelvic floor health.

ASSESSING RISK FACTORS AND ETIOLOGICAL VARIABILITY IN SELF-IDENTIFIED PERIPARTUM CARDIOMYOPATHY

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Peripartum cardiomyopathy (PPCM) is an idiopathic form of heart failure that develops in pregnancy or within five months postpartum. It is characterized by left ventricular systolic dysfunction and can range from mild dyspnea to severe heart failure requiring advanced support. Early diagnosis is difficult because symptoms overlap with normal pregnancy, and the condition remains a leading cause of maternal morbidity and mortality. Known risk factors such as hypertensive disorders of pregnancy, multiparity, and advanced maternal age do not fully explain variability in outcomes, highlighting the need for patient-centered data. This study evaluated associations between comorbidities and adverse outcomes in women with PPCM. We conducted a cross-sectional survey of ~5,000 members of a Facebook-based PPCM support group using Qualtrics. Analyses were restricted to U.S. respondents with complete data (N = 201). Outcomes included heart failure, hospitalization, and sudden cardiac death. Associations were examined using contingency tables in SAS v9.4. Four statistically significant associations emerged: stillbirth with sudden cardiac death ($P < 0.0001$); preeclampsia with hospitalization (OR 20.4, 95% CI 1.97–211.8, $P = 0.0028$); autoimmune disease with heart failure (OR 4.16, 95% CI 1.15–15.1, $P = 0.0202$); and obesity with heart failure (OR 2.17, 95% CI 1.08–4.34, $P = 0.0272$). These findings suggest that pregnancy complications and chronic comorbidities may influence PPCM outcomes. Although interpretation is limited by self-reported data and small subgroups, results highlight the need for improved risk stratification and a national registry to guide counseling and long-term care.

TOLPERISONE AS A NON-SEDATING SKELETAL MUSCLE RELAXANT: ADDRESSING UNMET NEEDS IN ACUTE LOW BACK PAIN

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Acute low back pain (LBP), often accompanied by paraspinal muscle spasms, is a leading driver of disability, healthcare costs, and emergency visits. Pharmacologic management begins with nonsteroidal anti-inflammatory drugs (NSAIDs), with skeletal muscle relaxants (SMRs) such as cyclobenzaprine considered second-line for refractory symptoms. However, SMRs offer modest efficacy with potential risks of sedation and misuse. Nonpharmacologic options such as heat and physical therapy show modest benefit but are constrained by accessibility. These limitations disproportionately affect underserved patients, including those with lower income, limited insurance coverage, or restricted access to nonpharmacologic care, increasing reliance on pharmacotherapy and reducing the ability to perform daily activities and work. Tolperisone, a non-opioid, non-sedating SMR that blocks voltage-gated sodium and calcium channels, represents a promising alternative to address these unmet clinical and equity needs. This narrative review evaluates the limitations of SMRs in acute low back spasm and examines how tolperisone's pharmacology may address these gaps within broader challenges of SMR development and equitable care. Evidence was identified through PubMed searches (2010–2025), limited to English-language, peer-reviewed studies, and synthesized narratively with emphasis on efficacy, safety, pharmacology, trial endpoints, and equity. SMRs provide modest short-term benefit while causing sedation and cognitive impairment, yet remain the most common ED discharge medication for LBP in the U.S. SMRs in combination with NSAIDs show unclear efficacy and increase CNS adverse events. Tolperisone demonstrated non-sedating spasmolytic and analgesic activity with favorable tolerability in phase 2 U.S. trials; however, confirmatory phase 3 data remain unpublished, leaving uncertainty regarding its efficacy. Limitations of the evidence include reliance on short-term outcomes, absence of published phase 3 data, heterogeneity across trials, and use of pain scales that fail to capture spasm resolution or functional recovery. These shortcomings disproportionately affect underserved patients, highlighting the need for safer SMRs and validated functional, spasm-specific endpoints.

CULTURAL CONTEXT MATTERS: EXPLORING HYPERTENSION DISPARITIES AMONG THE VIETNAMESE POPULATION

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Hypertension (HTN), defined as persistent elevation of blood pressure, is a leading risk factor for cardiovascular disease and remains underdiagnosed and undertreated in immigrant communities. Literature highlights that cultural beliefs, language barriers, and reliance on traditional medicine can influence preventive practices. The purpose of this study was to examine perceptions of preventive care and the influence of traditional medicine on HTN prevention within a Vietnamese community. A cross-sectional survey was conducted among 67 Vietnamese adults. Participants completed a questionnaire, offered in Vietnamese and English, that assessed demographics, frequency of HTN screening, receipt of lifestyle counseling, adherence to recommendations, perceptions of preventive care, and the role of traditional medicine. Findings demonstrated that most participants reported blood pressure screening at least occasionally, and 80 percent had received lifestyle counseling from healthcare professionals. However, adherence to lifestyle advice varied. Preventive care was valued by the majority, with 73 percent rating it as moderately or highly important. Traditional medicine influenced health behaviors for 51 percent of respondents, highlighting the role of culture in health choices. This study contributes to the field by identifying both facilitators and barriers to HTN prevention in Vietnamese communities. Limitations include reliance on self-reported data and a modest sample size. Despite these, the findings highlight opportunities for culturally sensitive, bilingual education and outreach. Integrating traditional medicine considerations with evidence-based HTN prevention strategies may improve adherence, build trust, and enhance long-term cardiovascular outcomes. Future research should expand to larger and more diverse Vietnamese populations to strengthen generalizability.

EFFICACY OF DELIRIUM PREVENTION INTERVENTIONS IN INTENSIVE CARE PATIENTS

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Delirium is a frequent and serious complication among intensive care unit (ICU) patients, associated with increased morbidity, prolonged hospital stays, and higher mortality rates. Its multifactorial etiology necessitates a comprehensive approach to prevention and management. Both pharmacologic and non-pharmacologic interventions have been investigated to mitigate delirium risk in critically ill patients. This review aims to evaluate current interventions used in clinical practice and their effectiveness in reducing delirium incidence.

We conducted a retrospective literature review of studies published in the last 10 years, focusing on ICU patients aged 18 years or older, without prior psychiatric history. Literature was screened using Rayyan. Pharmacologic interventions included dexmedetomidine and sedatives, while non-pharmacologic approaches included early ambulation, music therapy, and light therapy. Our findings demonstrate that early ambulation and music therapy are both feasible and effective, with significant benefits for ICU patient outcomes. Among pharmacologic interventions, dexmedetomidine was frequently utilized and consistently associated with reduced delirium incidence.

Overall, dexmedetomidine, early ambulation, and light therapy were identified as the most effective interventions for reducing delirium in ICU patients. Future research should stratify outcomes by reason for ICU admission and explore additive benefits of multimodal strategies. Growing evidence supports a multimodal approach, integrating both pharmacologic and non-pharmacologic interventions to optimize delirium prevention in critically ill patients.

MULTIMODAL ANALGESIA IN REDUCING OPIOID USE IN GENERAL SURGERY PATIENTS

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Multimodal analgesia (MMA) is well studied in orthopedic and spinal surgery, but its role in abdominal surgery remains less studied. Prior chart reviews and retrospective analyses demonstrate MMA's effectiveness in reducing opioid use in orthopedic patients, thus aiming to reduce opioid usage post-operatively (Madden et al., 2024), however, little is known about effective methods of post-operative pain control and reducing opioid usage in adult abdominal surgery patients. This study evaluates MMA in open and laparoscopic abdominal surgery procedures, focusing on outcomes related to opioid reduction.

A retrospective literature review was conducted using Rayyan AI to screen studies published in the past 10 years. Eligible studies included adult patients (≥18 years) undergoing open or laparoscopic abdominal surgery, while emergency trauma cases were excluded. Data was extracted on analgesic regimens, opioid consumption, and recovery endpoints. Sources were analyzed with emphasis on consistency of outcomes across varying MMA protocols.

Our findings suggest MMA, particularly when incorporated into Enhanced Recovery After Surgery (ERAS) protocols, reduce opioid requirements and improve recovery metrics. Regimens frequently combined gabapentinoids and acetaminophen. Results of this study suggest decreased opiate use, shorter hospital stays, and lower cost of care, in addition to shorter time to ambulation and recovery. However, heterogeneity in study design and the absence of standardized MMA protocols limits generalizability, suggesting potential variability in effectiveness across institutions. This review synthesizes existing evidence specifically for abdominal surgery, highlighting effective approaches in reducing opioid use in post-operative general surgery patients via MMA protocols.

EXPLORING INJURY PREVENTION IN BRAZILIAN JIU-JITSU: A SURVEY ANALYSIS OF HAND AND FINGER INJURIES AMONG PRACTITIONERS

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Brazilian Jiu-Jitsu (BJJ), a grappling martial art that relies heavily on gripping and positional control, places significant stress on the hands and fingers, yet the prevalence of such injuries and the real-world effectiveness of common preventive strategies remain poorly understood. This study aimed to assess the frequency, impact, and prevention methods for hand and finger injuries among BJJ practitioners. We conducted a cross-sectional survey of 134 participants, gathering self-reported data on injury history, time away from training, and the use of preventive measures such as taping, hand strengthening, and stretching. The analysis revealed that 89.6% of respondents experienced at least one hand or finger injury, and 62.6% missed training time as a result. None of the prevention strategies were statistically associated with reduced injury incidence or duration of training loss; paradoxically, increased usage of these strategies was linked to higher injury frequency, likely reflecting reverse causality, where injured athletes adopt preventive measures. Hand strengthening showed a non-significant trend toward shorter recovery ($\gamma = -0.3411$, $p = 0.0690$), suggesting potential rehabilitative benefit. These findings underscore the high burden of hand and finger injuries in BJJ and raise questions about the protective value of widely used preventive approaches. To truly understand causality and develop effective, sport-specific injury prevention protocols, future longitudinal studies using objective injury verification and biomechanical insights are needed.

ENHANCING CLINICAL REASONING ACCURACY WITH CHAIN-OF-THOUGHT PROMPTING IN LARGE LANGUAGE MODELS: A NARRATIVE LITERATURE REVIEW

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Large language models (LLMs) are increasingly being used for their potential in clinical decision support; however, their reliability depends heavily on how they are prompted to reason. Chain-of-thought (CoT) prompting, which directs models to articulate intermediate reasoning steps, has been proposed to improve diagnostic accuracy, interpretability, and transparency by mirroring human clinical reasoning.

This narrative review synthesized studies published between 2019–2025 that evaluated CoT and structured prompting strategies across medical tasks including: diagnosis, electronic health record (EHR) interpretation, guideline adherence, and clinical question answering. Findings indicate that structured, stepwise prompting often improves performance, with modest but consistent gains in diagnostic radiology (~4–5%) and larger improvements in structured EHR classification and differential diagnosis when guideline-based reasoning or ensemble/self-consistency strategies were applied; however, results remain heterogeneous, with several studies showing minimal or no advantage over direct prompting. Limitations include reliance on proprietary models, small sample sizes, and limited external validation.

Overall, CoT prompting shows promise as a tool to enhance reasoning accuracy and transparency, particularly when aligned with guideline-based workflows. Yet its benefits are task- and model-dependent, underscoring the importance of clinician oversight, rigorous prospective validation, and integration into existing workflows. Safe implementation will require AI-literacy training and structured governance, positioning CoT as a supportive adjunct to, rather than a replacement for, clinical judgment.

Keywords*: large language models, chain-of-thought prompting, clinical reasoning, artificial intelligence, decision support*

INSIGHTS AND INPUTS: ANALYZING CHATGPT PROMPT DESIGN BY FUTURE PHYSICIANS

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As artificial intelligence (AI) becomes increasingly integrated into healthcare, effective prompting has emerged as a key factor in optimizing large language model (LLM) performance. While strategies such as chain-of-thought prompting can enhance reasoning, little is known about how medical students naturally construct prompts when engaging with LLMs. Given ChatGPT's ability to pass the USMLE, the research question guiding this study was "How do medical students interact with LLMs, and how does prior digital health training influence these approaches?" To address this, we examined how medical students at Rocky Vista University used ChatGPT-4.0 to answer medically related questions. The primary objective was to characterize prompt themes and elements; the secondary objective was to compare students enrolled in a longitudinal digital health curriculum—including training in prompt engineering—with peers lacking formal instruction. An 11-question Qualtrics survey was distributed across the Colorado and Utah campuses, including six demographic items and five medical questions. Of 108 responses, 60 met eligibility criteria and were analyzed. Responses were evaluated for prompting styles, AI interactions, and digital health participation. Findings revealed challenges for both students and ChatGPT in osteopathic principles and practice (OPP), particularly with sacral landmarks and axis application (correct response rate ~52%). In contrast, ChatGPT answered an ethics-based question correctly that many students misinterpreted, highlighting differences in reasoning rather than model performance. Prompting strategy influenced outcomes: students using targeted prompts with copy-and-paste achieved the highest accuracy (75% fully correct), while most relied on unmodified copy-and-paste. Limitations include the small sample size and recruitment from a single medical program, which may limit generalizability. This study suggests that targeted prompt design improves LLM accuracy and that incorporating structured prompting instruction may be critical to preparing medical students to engage with AI responsibly and productively in medical education.

READINESS AND RELUCTANCE: A SURVEY OF BYSTANDER WILLINGNESS AND BARRIERS TO PERFORM CPR IN OUT-OF-HOSPITAL CARDIAC ARRESTS

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In the United States, more than 350,000 out-of-hospital cardiac arrests (OHCA) occur each year, with only 9 percent of patients surviving to hospital discharge. Bystander cardiopulmonary resuscitation (CPR) has been shown to improve survival rates by 7.2 percent, however only 2.39 percent of Americans receive CPR training each year. The goal of this study is to guide how to improve bystander CPR rates by determining the American population's confidence in performing CPR as well as find barriers that prevent regular training. Similar studies have been performed in European countries to guide governmental changes and improve bystander CPR rates, but no such study has been performed on the U.S. population. To assess confidence and barriers to training we created an online survey that asked participants the time since their last training, willingness to perform CPR in various situations, interest in community response tools, and barriers that have personally prevented them from attending regular training. A total of 93 responses were collected and data analysis were performed using SAS (Cary, NC) to compare responses between groups. The results demonstrated that regular training every two years may improve individual confidence performing CPR, more than half of respondents expressed interest in utilizing community response tools, and the most common barriers preventing this regular CPR training were cost and availability. The results of this study may be used to guide the AHA in improving yearly training rates, as well as lay the groundwork for future studies to assess the efficacy of the current training model.

SKIN CANCER INCIDENCE AMONG COMMERCIAL AND PRIVATE AIRCRAFT PILOTS IN THE UNITED STATES

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Skin cancer is an umbrella term encompassing multiple cancers, including Basal Cell Carcinoma (BCC), Squamous Cell Carcinoma (SCC), and melanoma. It is important for healthcare providers to know which patient populations are at an increased risk of skin cancer to ensure these patients receive proper care; however, one occupation whose risk is still undetermined is pilots. Previous studies on the association between skin cancer and pilots are outdated, not statistically significant, or investigate only a narrow population. Therefore, we created a survey investigating the association between United States (U.S.) pilots and skin cancer while considering variables such as flight hours, military involvement, and preventive measures. Our survey found that when comparing the incidence of BCC, SCC, and melanoma in our sample of U.S. pilots against the general U.S. population, the chi-square values were 382.72216, 70.7723, and 1352.2207 respectively using a p-value <0.0001. These values were statistically significant which indicated the difference in incidence of skin cancer between our two populations was likely not due to chance. It is important to note our study was likely limited by volunteer bias and future studies may consider partnering with U.S. airlines to receive comprehensive, unbiased data. Nonetheless, our results supported the hypothesis that U.S. pilots are at an increased risk of developing BCC, SCC, and melanoma compared to the general U.S. population. Given this increased risk, healthcare providers must appropriately counsel and follow their patients who are pilots, and pilots themselves should consider taking preventive measures while flying to limit sun exposure.

RUG BURN-ASSOCIATED CUTANEOUS MUCORMYCOSIS INFECTION IN A PEDIATRIC PATIENT WITH ACUTE LYMPHOBLASTIC LEUKEMIA

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Mucormycosis is a rare and highly aggressive fungal infection with mortality rates exceeding 50% in immunocompromised patients. While typically affecting the face due to inhalation of spores, skin infection following abrasion is infrequently reported in the literature. The purpose of this case report is to describe an unusual presentation and highlight treatment challenges in a pediatric oncology patient. A 6-year-old boy undergoing treatment for leukemia developed rapidly expanding discoloration of the right knee following a rug burn. Laboratory studies revealed a profound, chemotherapy-induced decrease in the white blood cell count. Despite intravenous antibacterial therapy, the lesion progressed rapidly. Mucormycosis, though not initially suspected, was confirmed by fungal culture. Chemotherapy was temporarily stopped to support immune recovery. The patient underwent multiple surgical debridements and was treated with intravenous antifungal therapy. After infection resolution, a bioengineered skin graft was placed, and chemotherapy was resumed. This case highlights a life-threatening fungal infection arising from a highly unusual source. It also illustrates the rare need to pause chemotherapy as part of infection management. It underscores the need for clinicians to maintain a high index of suspicion for fungal infections when skin lesions worsen despite antibacterial therapy. Favorable outcomes depend on early clinical suspicion, timely laboratory confirmation, aggressive surgical debridement, and prompt antifungal therapy. Management must also account for the immunosuppressive effects of chemotherapy. This case adds critical insight to the pediatric oncology literature by highlighting vulnerabilities and treatment challenges associated with atypical fungal infections.

ARTIFICIAL INTELLIGENCE IN PREHOSPITAL EMERGENCY CARE: ADVANCING TRIAGE AND DESTINATION DECISIONS FOR TIME-CRITICAL CONDITIONS

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Prehospital triage is critical for time-sensitive emergencies such as trauma, stroke, and acute coronary syndrome. Undertriage delays definitive care, while overtriage strains higher-level facilities. Existing triage tools based on vital signs and scoring systems have limited accuracy, but artificial intelligence (AI), machine learning (ML), and neural networks (NN) offer the potential to improve decision-making by integrating multiple data sources. This narrative review of studies indexed in PubMed and PubMed Central through August 2025 evaluated AI, ML, and NN models designed for prehospital triage or transport destination decisions across trauma, critical illness, stroke, dyspnea, cardiac emergencies, sepsis, and in-hospital studies preventing possible readmission. Across the conditions examined, ML models consistently outperformed traditional early warning scores and guideline-based tools. Trauma models achieved area under the curve (AUC) values between 0.75 and 0.93 and reduced undertriage to less than 10%. ML models predicted the need for critical care with an AUC of 0.908, and prehospital stroke algorithms reached AUCs above 0.98. NN, deep forest, and random forest models demonstrated an AUC of 0.88 in prehospital acute respiratory distress syndrome (ARDS) prediction. Additional studies demonstrated improved recognition of dyspnea-related serious events and acute coronary syndrome, while no validated models currently exist for prehospital sepsis. Despite promising results, most studies were retrospective, with limited prospective validation, generalizability, or evaluation of workflow integration. Future research should focus on prospective studies, diverse patient cohorts, integration into emergency medical service (EMS) workflows, model explainability, and rigorous comparisons with standard practice.

FATAL DOG MAULINGS IN COLORADO: A FORENSIC CASE SERIES

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Lethal dog attacks, though comparatively uncommon, are a serious forensic, public health, and medico-legal problem. Our case series explores three lethal canine attacks occurring in the first months of 2025 in the state of Colorado as a way of better understanding canine-mediated mortality. Autopsy and investigative reports were analyzed for three adult victims who were killed over six weeks as a result of dog attacks. Cases were identified through review of official coroner autopsy records, with inclusion limited to deaths certified as due to canine mauling; all other cases were excluded. Demographic data, scene context, and injury findings were extracted from the autopsy reports and investigative files. Comparative analysis was conducted to assess similarities and differences in injury distribution, environmental context, and contributing health factors. Case 1 involved a 76-year-old woman with dementia, fatally attacked by her own 14 dogs at home, suffering exsanguination from femoral artery trauma. Case 2 concerned a 68-year-old woman with multiple comorbidities, found with extensive defensive wounds and avulsion injuries in a suspected feral or uncontained canine attack. Case 3 described a 57-year-old man fatally mauled while walking his dog, with major scalp avulsion and bite injuries inflicted by two pit bulls. All deaths were certified as accidental. Common forensic findings included patterned puncture wounds, soft tissue gouging, and circumferential limb injuries. Defensive wounds were present in two of the three cases. Scene contexts ranged from domestic residences to public areas, with both owned and unrestrained dogs involved. Here, the volume of cases in a short period of time demonstrates the forensic significance of the determination of canine injury patterns, specifically among susceptible victims and street canine populations. This comparative analysis provides insight into wound morphology, victim response, and issues involving multi-canine attack scenes. These findings may have an impact on future guidelines of forensic investigation, animal control laws, and health education.

FROM METAL TO METHOD: DECODING PEDICLE SCREW CONDUCTIVITY IN T-EMG

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Introduction: Concern regarding "high electrical resistance" of pedicle screws as a potential source of error in stimulus-evoked EMG was first noted in 2002. At that time, most discussion centered on t-EMG methodology rather than screw engineering. Since then, research has expanded to examine intrinsic resistance, geometry, and coating-related impacts.

Research Question/Purpose: This work evaluates how screw geometry, coatings, and measurement criteria affect resistance and conductivity, aiming to clarify what "changes in conductivity" signify in a clinical context.

Methodology/Approach: Published data were reviewed on conduction pathways across variables such as solid versus hollow shafts, surface modifications, alloy coatings, and resistance measured at various points on a screw. Comparative analysis assessed conduction, junction/interface effects, and surrounding tissue impedance. Findings were synthesized to identify clinically relevant patterns and methodological considerations.

Results: Resistance is lowest at screw tips and highest at screw heads, with screw geometry strongly influencing conduction. Tissue impedance typically dominates total resistance, making small screw-level changes clinically negligible. However, coatings alter current distribution but can be highly dependent on direct neural contact.

Contribution to the Field: Pedicle screw conductivity has been increasingly studied in the context of intraoperative neuromonitoring (IONM). Variations in electrical pathways through screws may influence triggered EMG (t-EMG) thresholds, yet findings are often inconsistent, reflecting methodological and material differences. This current synthesis identifies when "changes in conductivity" are more likely to represent a conductive failure/inconsistency on the part of the screw, rather than of the neural element being assessed, as well as identifying what research gaps remain.

INCIDENTAL FLOOR-OF-FOURTH-VENTRICLE SUBEPENDYMOMA DISCOVERED DURING WORK-UP FOR EPISODIC HEMIFACIAL AND LIMB PARESTHESIAS: A CASE REPORT

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Background: Subependymomas are rare, slow-growing WHO grade I ependymal tumors comprising 0.2–0.7% of intracranial neoplasms, most often in the fourth or lateral ventricles. They usually present in mid-life with male predominance and are frequently incidental MRI findings—small, T2-hyperintense, circumscribed nodules with minimal enhancement and no hydrocephalus. Symptoms, when present, arise from mass effect or CSF obstruction (e.g., headache, gait imbalance, cranial neuropathies). Migratory sensory phenomena are highly atypical. Given their indolent nature and excellent prognosis after resection, observation is often appropriate for asymptomatic, non-obstructive lesions.

Case: A 22-year-old woman experienced three discrete, self-limited sensory events over four months. The first involved bilateral hand numbness resolving in 16 hours. On 9 May, she had two episodes: the first began with left V2 numbness spreading to lips, tongue, and both arms, with transient right facial weakness; the second started with right forearm numbness, progressing to recurrent paresthesias in V2–V3 and tongue, again with brief right facial paresis. Each episode lasted about one hour, followed by mild headache. Neurologic exam and labs were normal. MRI revealed a 7 × 7 × 11 mm T2-hyperintense, mildly enhancing lesion in the floor of the fourth ventricle without hydrocephalus or mass effect, consistent with subependymoma. Multidisciplinary consensus recommended surveillance. At six months, MRI was unchanged and no further episodes occurred.

Conclusion: In young adults, episodic migratory paresthesias often prompt evaluation for demyelinating disease, yet may uncover incidental tumors. Small, non-obstructive fourth-ventricle subependymomas can be safely managed with interval imaging.

COMPARATIVE VISIBILITY ANALYSIS OF 3rd HARMONIC IMAGING (3HLI) WITH D5.5I SOFTWARE IN HUMAN ABDOMINAL ULTRASOUND SCANS

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Harmonic imaging is a widely utilized technique in abdominal ultrasonography due to its ability to reduce ultrasound artifacts. In this study, a novel version of harmonic ultrasound software, 3rd Harmonic Imaging, (3HLI), is compared to an earlier harmonic imaging version (d5.5i) to quantify user image detectability of tubular/liquid organ structures in the abdominal cavity between operators. A retrospective analysis was performed on a Canon ultrasound scanner (Aplio i800). In B- mode ultrasound, image quality was assessed by pixel intensity (histogram) and Contrast-to-Noise Ratio (CNRs) measurements. Regions of Interest (Target ROIs) included the lumen of common bile duct, gall bladder, and portal vein which were compared against Reference ROI, the liver parenchyma. Images acquired using both 3HLI and d5.5i software were analyzed across three different operators using a paired two-tailed paired t-test. 37 total pairs (3Hii and d5.5i) of B-mode ultrasound images were analyzed. A t-test was conducted to compare pixel intensity mean (M) and standard deviation (SD) of the Target ROI and Reference ROI. Contrast-to-Noise-Ratio (CNR) was then analyzed between the two software platforms. At a 95% confidence interval, significant differences were observed in the Target ROI (mean and SD) and CNR ($P < 0.001$) but not the mean nor the SD in the Reference ROI. CNR of 3Hii was significantly higher than d5.5i. These findings suggest that 3HLI software provides convincing evidence for improved visibility of tubular/liquid structures compared to d5.5i. Improved operator visibility and lesion detectability via 3rd harmonic imaging may provide greater diagnostic accuracy and patient outcomes. Though large-scale prospective studies using 3HLI software are recommended to confirm its clinical significance.

ADVANCED IMAGING SEGMENTATION FOR DETECTING MEDICATION-ASSOCIATED CHANGES IN KNEE OSTEOARTHRITIS AND POTENTIAL DRUG REPURPOSING OPPORTUNITIES

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Osteoarthritis (OA) is a progressive joint disorder characterized by cartilage degradation and joint space narrowing. Various etiologic factors are associated with OA progression and traditionally physicians follow a conservative progression of management and treatment with eventual surgical intervention for severe progression. In this study, we analyzed the distribution of commonly used medications among patients in the NIH's longitudinal Osteoarthritis Initiative (OAI) dataset to identify drugs that may influence disease progression or prognosis. We segmented data from the OAI using the Segment Anything Model, an advanced computer vision tool that allowed us to isolate bony structures from x-ray images. Binary masks were generated to define the femur and tibia, allowing for precise measurement of joint space as a function of black pixel area between bones. Our methods provide a preliminary framework for evaluating the potential structural effects of medications in knee OA and demonstrate the utility of advanced segmentation models in musculoskeletal imaging analysis. By analyzing pixel-level joint-space width (JSW) measurements across the knee joint and grouping patients by medication, we observed distinct patterns of JSW change across drug classes. Several medication classes were associated with greater JSW narrowing, suggestive of accelerated structural joint degeneration, while others were linked to JSW widening, potentially indicating protective effects. These associations varied by gender, underscoring the importance of sex-specific analysis in osteoarthritis research. Our findings indicate that several commonly prescribed medications exert measurable effects on knee joint space width, with certain agents—such as carbonic anhydrase inhibitors and bisphosphonates—showing potential protective properties, while others, including corticosteroids and antineoplastics, were associated with cartilage narrowing. The primary limitation of this project is its reliance on 2D data; future studies will aim to incorporate 3D data to improve accuracy and clinical relevance. These results suggest that routine pharmacologic exposures may differentially influence osteoarthritis progression and underscore the importance of investigating drug repurposing in this condition.

TRANSCRIPTIONAL MECHANISMS OF VARIOUS CELL TYPES IN SEVERE HYPOXIA AS A MODEL OF FETAL GROWTH RESTRICTION

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Within the first trimester placenta, there is physiologic hypoxia (5-8% O_2). As the second trimester begins, a return to normoxia (21% O_2) occurs. Fetal growth restriction (FGR) can develop as a consequence of severe hypoxia (less than 5% O_2) within the placenta. Cellular adaptations mediated by Hypoxia Inducible Factor-1α (HIF-1α) include upregulation of glycolysis and angiogenesis. This study aims to investigate the effect of hypoxia on placental cell types involved in trophoblast differentiation and angiogenesis, providing insights into mechanisms contributing to FGR. Trophoblast stem cells (TSCs) were studied alongside extravillous trophoblasts (EVTs), which are both essential for placentation. Human umbilical vein endothelial cells (HUVECs) and microvascular endothelial cells (MVECs), both essential for placental angiogenesis, were also examined. Additionally, first trimester trophoblast organoids (TOs) were cultured. Cell types were cultured under normoxia as a control and 1.5% oxygen to model severe hypoxia. Gene expression changes were assessed by qPCR focusing on markers of cellular adaptation to hypoxia, EVT differentiation, and angiogenesis. Statistical significance was determined by Student's t-test ($p < 0.05$). Hypoxic EVTs exhibited increased HIF-1α expression, confirming hypoxic response activation. HUVECs and MVECs showed upregulated angiogenesis with VEGFα. Hypoxic TSCs and TOs showed increased EVT markers (HLA-G) and decreased TSC markers (ELF5), suggesting hypoxia-driven EVT differentiation. This study shows that severe hypoxia induces transcriptional changes in placental cells that mirror FGR features, including enhanced angiogenesis, hypoxia signaling, and promotion of EVT differentiation. These findings shed light on placental adaptations in adverse oxygen conditions which can contribute to development of FGR.

***Keywords**: Fetal growth restriction, FGR, hypoxia, HIF-1α*

POST-PROCEDURAL PHOTOPROTECTION IN SKIN RESURFACING: A REVIEW OF CURRENT RECOMMENDATIONS

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Introduction:
Minimally invasive skin resurfacing procedures, including chemical peels (CP), lasers, microneedling (MN), and photodynamic therapy (PDT), are increasingly used to address photoaging, pigmentation, and skin texture concerns. However, disruption of the skin barrier increases vulnerability to ultraviolet (UV) damage. This review summarizes current post-treatment photoprotection recommendations.

Methods:
A PubMed search was conducted using keywords such as “resurfacing procedure,” “photosensitivity,” “sunscreen,” “chemical peel,” “laser,” “microneedling,” and “photodynamic therapy.” English-language articles were included based on relevance. Additional studies were identified through citation tracking. Authors' clinical experience was also considered.

Results:
Forty articles met inclusion criteria. For CP, daily broad-spectrum sunscreen is advised for several weeks after medium-depth peels and at least two months after deep peels. MN literature suggests brief sun avoidance; one study supports immediate post-procedure use of physical sunscreen. After ablative laser (AL), broad-spectrum sunscreen reduced post-inflammatory hyperpigmentation (PIH) when used for one week. Although nonablative laser (NAL) typically requires less recovery, strict sun protection is still recommended. PDT studies advise avoiding sunlight and using SPF 50 for at least three days.

Discussion:
Skin resurfacing procedures vary in epidermal injury depth, influencing post-procedure photoprotection needs. Inadequate sun protection may lead to PIH, sunburns, delayed healing, or scarring. While most studies recommend sunscreen use for days to weeks, increased photosensitivity may persist for up to four months, particularly with AL. Since topical sunscreens may be irritating and sun avoidance is often impractical, oral agents like Polypodium leucotomos extract (PLE) may offer additional protection. Ultimately, standardized photoprotection guidelines are needed.

***Keywords**: Skin resurfacing, Photoprotection, Sunscreen, Photosensitivity, Post-inflammatory hyperpigmentation*

SPONTANEOUS DISSECTION OF LEFT INTERNAL MAMMARY ARTERY (LIMA) GRAFT COMPLICATING CORONARY ARTERY BYPASS GRAFTING: A PATHOLOGICAL CASE REPORT

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Introduction:
Coronary artery bypass grafting (CABG) surgery is a procedure utilized for the revascularization of the myocardium in the management of multi-vessel coronary artery disease. Although various conduits can be used in CABG, the left internal mammary artery (LIMA) is preferred due to its proven long-term patency and prognostic benefit. However, CABG surgeries in which LIMA is used can be complicated by the spontaneous dissection of the LIMA post-surgery. Although extremely rare, this complication can be serious and life-threatening and can occur at any moment, even years after surgery. It presents with acute coronary syndrome (ACS).

Case description:
A 48-year-old woman with history of hypertension, coronary artery disease, aortic insufficiency, nonrheumatic mitral valve regurgitation, Stage 3a chronic kidney disease, and tobacco and methamphetamine abuse underwent CABG to treat atherosclerotic cardiovascular disease. Her postoperative course was unremarkable, and she was discharged. Eight days post-CABG, she was found deceased in her home. Autopsy diagnosed an acute dissection of the LIMA graft. Anatomic and histopathological findings are presented.

Discussion:
This complication has been reported in 14 case reports, all of which described clinical and imaging findings without post-mortem tissue analysis of the dissected graft. Histopathologic analysis of the LIMA graft dissection in this report makes it unique, providing insight into the potential pathological mechanisms underlying this rare event. This case also provides valuable information regarding the nature of dissections in the early postoperative stage, as most previously documented LIMA graft dissections occurred months to years postoperatively. This report emphasizes the need for healthcare providers to consider LIMA graft dissection in patients post-CABG presenting with ACS. This case supports long-term surveillance and risk factor management as being vital for the safety and well-being of patients. Identifying deaths due to therapeutic complications is important for patients, families, clinicians, public health, and vital statistics.

Keywords: *forensic pathology, coronary artery bypass grafting, LIMA graft, spontaneous dissection*

A REVIEW OF EVALUATING THE EFFICACY AND SAFETY OF GLUTATHIONE-BASED INTERVENTIONS FOR AGING DARK SKIN AND IN FACIAL REJUVENATION SURGERY

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Post-procedure dyspigmentation, hypertrophic/keloid scarring, and delayed healing remain prominent concerns for patients with darker skin (Fitzpatrick IV–VI) undergoing facial rejuvenation and resurfacing. Glutathione (GSH), a ubiquitous intracellular antioxidant, has been proposed to mitigate these risks by inhibiting tyrosinase-driven melanogenesis and buffering oxidative injury; however, its perioperative value in darker skin is uncertain. A scoping review was conducted using PRISMA-ScR guidelines. The databases PubMed, Embase, Scopus, Web of Science, Cochrane Library, and ClinicalTrials.gov (with supplemental Google Scholar screening) were searched through July 2025. Search terms linked "glutathione" with "hyperpigmentation," "wound healing," "scar," "Fitzpatrick," "dark skin," "laser," "peel," and "facial rejuvenation." Studies were included if adult participants received topical, oral, or parenteral GSH with pigmentary or wound-healing outcomes reported; animal-only studies, case reports without objective outcomes, and older cosmetic reports were excluded. Two reviewers independently screened records and extracted data, resolving discrepancies by consensus. Evidence was mapped across mechanistic, cosmetic, and procedural contexts. Mechanistic work shows GSH inhibits tyrosinase, scavenges reactive oxygen species, and may influence collagen remodeling. Small human studies suggest modest melanin-index reductions and dyschromia improvement with topical or oral GSH, but effect sizes vary. Critically, no controlled studies evaluate perioperative GSH to prevent post-inflammatory hyperpigmentation or unfavorable scarring after facial procedures, and outcomes are infrequently stratified by Fitzpatrick type. Heterogeneity in formulation, dose, and follow-up, low oral bioavailability, stability concerns for topical preparations, and safety/regulatory issues surrounding off-label intravenous use further limit interpretation. The current literature supports biologic plausibility but not clinical effectiveness of GSH as a perioperative adjunct for darker skin. Skin type–aware risk models are lacking; procedure-specific, Fitzpatrick-stratified trials with standardized pigment/scar outcomes and head-to-head comparators are required to define optimal dosing, timing, and route of administration for equitable perioperative care.

ROBOTIC-ASSISTED SURGICAL CORRECTION OF BILATERAL LUMBAR HERNIAS: A CASE REPORT

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Lumbar hernias are rare, comprising approximately 2% of all abdominal wall hernias, and result from protrusion of abdominal contents through the posterior abdominal wall between the 12th rib and iliac crest. Diagnosis is clinical and confirmed with computed tomography (CT). Definitive treatment requires prompt surgical repair, which can be addressed through open, laparoscopic, or robotic approaches. We report a unique case of concurrent bilateral lumbar hernias, an exceptional finding given the rarity of even unilateral cases. Robotic-assisted lumbar hernia repair, conducted in this case, is the least reported method. This case presents a 47-year-old female with enlarging bilateral flank swellings that caused concern for several months. The patient reported discomfort in the lumbar region and intermittent weakness in the left lower extremity. The patient experienced no abdominal pain, vomiting, nausea, or fever, and had no history of trauma or infection. Ultrasound initially suggested lipomas, though intermittent regression of the swellings prompted further workup. CT imaging demonstrated bilateral superior lumbar hernias; thus, surgical repair was indicated. The patient underwent two robotic-assisted hernia repairs with mesh. In both cases, immediate post-surgical recovery was uneventful, and the patient was discharged home the same day. Resolution of symptoms was achieved, with no recurrence of either defect observed. Lumbar hernias are a rare condition that is commonly overlooked or misdiagnosed. This case highlights the importance of including lumbar hernia in the differential diagnosis of a flank mass for prompt diagnostic imaging and treatment. Early recognition, facilitated by high clinical suspicion, can improve patient outcomes.

Keywords: *Hernia, lumbar hernia, robotic surgery, mesh repair*

COMPARATIVE ANALYSIS OF CONVENTIONAL, WIDE, AND ULTRA-WIDE ULTRASOUND VIEWS FOR IMPROVED ABDOMINAL AORTIC ANEURYSM SCREENING

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Abdominal aortic aneurysms (AAA) present significant health risks, yet consensus is lacking on the optimal ultrasound technique for reliable vessel measurement. Prior studies have not directly compared the accuracy and reproducibility of different ultrasound field views. This study evaluated inter-observer and intra-observer reliability of abdominal aorta (AA) and inferior vena cava (IVC) measurements across three ultrasound field views (90, 120, and 140) using a single curvilinear transducer placed transhepatically. Following IRB approval and informed consent, three operators measured the largest transverse dimensions of the AA (n=15) and IVC (n=10). Differences in vessel length across field views were analyzed with one-way ANOVA, while 95% Bland-Altman limits of agreement (LOA) assessed measurement agreement. Intra-observer and inter-observer reliability were determined using intraclass correlation coefficients (ICC). Vessel length measurements differed significantly among the three field views ($P < .001$). Bland-Altman analysis demonstrated good agreement across operators, and both intra-observer and inter-observer reliability were high (ICC = 0.92–0.98). Among the three field views, the ultra-wide view provided the most accurate and consistent vessel measurements, with strong reproducibility across operators. These findings highlight the value of the ultra-wide ultrasound view for AAA and IVC evaluation. The ultra-wide view offers improved vessel measurement reliability compared to narrower field views that require the ultrasonographer to mentally piece together cross-sections instead of assessing a single panoramic image. By addressing a critical gap in ultrasound methodology, this study supports the adaptation of enhanced imaging techniques for AAA detection, which may enable earlier intervention and improved patient outcomes.

Keywords: *AAA, IVC, Ultrasound*

ANATOMICAL VARIATIONS IN THE CIRCLE OF WILLIS IN A COLORADO POPULATION

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The Circle of Willis (CoW) is a vital arterial anastomotic network at the brain's base that plays a key role in maintaining cerebral blood flow. Research has demonstrated anatomical variations of the CoW are common, particularly in the anterior and posterior communicating arteries, and may significantly influence cerebrovascular health. This study seeks to determine the prevalence and clinical significance of anatomical variations in the CoW. Using a combination of cadaveric analysis and an extensive literature review, we will evaluate the prevalence and types of CoW variants in a U.S. population sample and explore their correlation with cerebrovascular outcomes. Furthermore, we will investigate how such variations may impact patient outcomes. The anatomical variations found in our cadaveric population were referenced against the classification system established by Ayre, et al. There were no "normal" CoW variants found in our population, of which the published prevalence is 60%. In addition, we found two cases of bilateral hypoplastic PComAs and one case of an X-shaped ACA union and unilateral hypoplastic A1 segment, which is a combined variant not found in our literature review. All other variations found are as follows: unilateral hypoplastic A1, absent AComA and bilateral hypoplastic PComAs, duplicated AComA, unilateral duplicated A1, medial triplicated ACA and bilateral hypoplastic PComAs, lateral triplicated ACA, hypoplastic AComA and unilateral hypoplastic PComA, V-shaped AComA and fenestrated A1/A2 junction. Further investigation and data analysis will be conducted to explore distribution of our CoW variants compared to published populations. Further research will also be done to investigate the clinical implications of these variants. These results will be presented at the time of Fall Research Day. Our results are limited by our small sample size, so a larger population to truly establish prevalence of these variants in our population will need to be done. These findings are expected to enhance diagnostic approaches, inform therapeutic strategies, and deepen understanding of how CoW anomalies may affect patient management.

Keywords: *Circle of Willis, anatomical variations, cadaveric analysis, cerebrovascular health*

CROSSING LANGUAGE BARRIERS: TREATING CHRONIC LOW BACK PAIN IN PANAMA WITH THE FASCIAL DISTORTION MODEL

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The fascial distortion model (FDM) is an anatomical perspective and treatment technique within the discipline of osteopathic manipulative treatment (OMT). The FDM is unique in that it elucidates a set of common gestures and body language for each of the six recognized distortions of the FDM. Stephen Typaldos, D.O., developed the FDM in 1991 after noticing recurring patterns in the way patients used body language and hand gestures to describe their pain – often before verbalizing it. This case study explores the application of FDM in treating chronic low back pain in a Panamanian agricultural worker, highlighting its utility across language barriers. B.P. presents with chronic low back pain, limited range of motion, and hypertonicity of the lumbar paraspinal muscles. Lumbar active range of motion was tested before, during, and after treatment. B.P.'s nonverbal gestures indicated two trigger bands and two herniated trigger points, which were treated using the appropriate FDM techniques. Post-treatment evaluations revealed significant improvement in functional mobility and complete resolution of pain. B.P. demonstrated increased lumbar range of motion and reported relief without requiring extensive verbal communication. This case report demonstrates the effectiveness of using the FDM to treat chronic low back pain, while giving credence to the universal nature of the body language described by the model. In B.P.'s case, FDM treatments facilitated a successful and culturally competent intervention that improved both pain and function, reinforcing the value of this treatment modality in global and resource-limited contexts.

A CASE SERIES: INSPACE SUBACROMIAL BALLOON SPACER FOR MASSIVE, IRREPARABLE ROTATOR CUFF TEARS

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Massive irreparable rotator cuff tears (MIRCTs) present a difficult challenge in orthopedic care, especially for patients who are poor candidates for traditional surgical repair. These tears often lead to chronic pain, loss of function, and present with limited treatment options once conservative measures fail. The InSpace Subacromial Balloon spacer is a minimally invasive, biodegradable implant designed to restore the subacromial space as MIRCTs can result in a narrowed subacromial space and limited range of motion. First introduced in Europe in 2010, and later by the FDA in July 2021, this device offers a novel approach to treat MIRCTs in patients who have exhausted conventional therapies. This case series aimed to contribute to the growing body of literature evaluating the implant's efficacy in pain relief and functional recovery. Pre-operative notes, operative reports, and post-operative notes were reviewed for nine patients (4 males, 5 females) from a private orthopaedic surgery center in Michigan. Inclusion criteria included MIRCT measuring >5 cm in diameter involving 2 or more tendons, failed conservative treatment, functional deltoid muscle, and good health. Exclusion criteria included a known allergy to the implant, severe glenohumeral or acromiohumeral arthritis, deltoid defect, partial thickness tears, repairable tears, and infection of the glenohumeral joint. Four males and four females demonstrated complete resolution of pain. Three males showed improved forward flexion (FF). One male patient had a previous spinal cord injury, precluding range of motion assessment. Efficacy of function in the female patients was variable with one showing improved FF, internal rotation (IR), and external rotation (ER), one showing improved IR, one showing no change in function, and one showing worse function post-operatively. Our findings offer insight into how the InSpace Subacromial Balloon Spacer may serve as a viable alternative for a patient population often left with few treatment options.

EARLY BARIATRIC SURGERY IN THE PREVENTION OF TYPE 2 DIABETES MELLITUS IN OBESE INDIVIDUALS

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The global rise in obesity has led to a parallel increase in type 2 diabetes mellitus (T2DM), a chronic disease with significant morbidity and economic burden. While bariatric surgery is widely accepted as an effective treatment for obesity and established T2DM, its potential role as a preventive intervention in high-risk obese individuals remains underexplored. Emerging evidence suggests that early metabolic surgery, particularly in prediabetic patients, may significantly reduce the progression to T2DM by improving insulin sensitivity, enhancing beta-cell function, and promoting long-term glycemic stability. This project aims to explore the preventative benefits of early bariatric surgery through a comprehensive review of current literature. Articles from Embase and Pubmed spanning from early 2015 to the most recent clinical trials were collected following a systematic approach using the Prisma Protocol guidelines. Different modalities of bariatric surgery and how the procedure affected patients' metabolic comorbidities were reviewed. By compiling and analyzing available data, this project seeks to determine whether earlier surgical intervention offers meaningful benefits in reducing T2DM risk. Bariatric surgery can be effective in managing and even reversing T2DM; however, the optimal timing of surgery for maximum preventive benefit is still under investigation. It was concluded that bariatric surgery significantly increased life expectancy in patients with T2DM compared with patients who managed their T2DM with pharmacologic agents alone. There is strong evidence of its benefits even when T2DM is already well established. By shifting the focus from treatment to prevention, this research highlights the clinical and public health value of earlier surgical referral for obese patients at high risk for T2DM.

SENSITIVITY OF EXTRACELLULAR AND INTRACELLULAR *TOXOPLASMA GONDII* TO BEAUVERICIN

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Toxoplasma gondii is an obligate intracellular protozoan parasite that causes mild infections in healthy individuals but causes life-threatening infections in immunocompromised individuals and fetal infection. *T. gondii* has been shown to inhibit apoptosis induced by various mechanisms, including cytotoxic-T lymphocytes (CTL) granzyme B killing, CTL CD95 killing, and beauvericin exposure. Since *T. gondii* inhibits apoptosis of its host cell, the question arises of whether it can protect itself or not. This knowledge can help in understanding the mechanisms of inhibition. We tested the effect of beauvericin, a toxin that induces apoptosis in host cells, on *T. gondii* viability. $TCID_{50}$ results showed almost 100% death of *T. gondii* with both extracellular and intracellular treatment.

EFFECT OF INTERACTIVE ANKI FLASHCARDS IN MEDICAL SCHOOL HISTOLOGY EXAM PERFORMANCE

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Anki is an open-source flashcard program that employs spaced repetition and active recall to optimize long-term retention. Despite its popularity among medical students, limited research has examined how specific features—such as the "type-in-the-answer" card format—impact performance in visually intensive subjects like histology. This study aims to evaluate whether using a standardized Anki deck with this interactive feature improves academic performance in first-year medical histology content.

This cohort quasi-experimental study will be conducted at Rocky Vista University, Montana College of Osteopathic Medicine, during the 2025–2026 academic year. First-year students (N = 206) will be invited to participate, assigned to the experimental group, and given the pre-made "type-in-the-answer" Anki histology deck for the school year. The control group will be those who don't have access to the deck, using other personal study methods. Participants will complete a pre-study survey assessing demographics, study habits, and prior Anki experience. Anki usage data (e.g., time spent, cards reviewed, review frequency) will be extrapolated throughout the school year via an "add-on" tool we developed through Anki and collected and deidentified through a school server. Histology exam scores will also be collected, de-identified by faculty, and compared between the two experimental groups. Independent t-tests will be used to compare qualitative data (exam scores and Anki statistics). At the same time, qualitative data from the pre- and post-study surveys will be analyzed with a chi-square test.

We anticipate that students using the interactive Anki deck will show higher exam performance and improved recall of histological features compared to those in the control group. These findings are expected to provide evidence supporting the use of structured active recall tools in medical education and offer guidance for integrating effective study strategies into curricula. The study also opens avenues for further research on long-term retention and customizable digital learning tools.

QIGONG AS A HOLISTIC INTERVENTION FOR PHYSICAL AND MENTAL HEALTH IN AGING POPULATIONS

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Introduction:
In the United States, older adults face challenges related to mobility, independence in activities of daily living (ADLs), and mental health. Declines in musculoskeletal strength, balance, and cognition contribute to reduced autonomy, fall risk, and reliance on long-term care. These concerns have prompted interest in adjunctive approaches such as Qigong, a traditional Chinese mind-body practice integrating gentle movement, breath regulation, and meditative focus. Qigong is low-risk, cost-effective, and adaptable to physical limitations, making it well suited for aging populations. Research over the past two decades highlights benefits for strength, cardiovascular health, cognition, and emotional well-being, yet integration into osteopathic care remains limited. Few studies have examined organ-focused forms such as Zang Fu Gong in assisted living settings.

Purpose:
This study investigates the physiological and psychological benefits of Zang Fu Gong as a complementary therapy for older adults in assisted living, focusing on mobility, confidence in ADLs, and quality of life.

Methods:
This prospective, single-group intervention includes up to 25 residents aged 55 and older at St. John's United Assisted Living Facility. Participants attend bi-weekly Zang Fu Gong sessions for 12 weeks. Outcomes include the Falls Efficacy Scale-International (FES-I) and EQ-5D-5L questionnaires at weeks 1 and 12, and Timed Up and Go (TUG) tests at weeks 1, 6, and 12. Inclusion criteria require ability to follow instructions and ambulate with or without aids; exclusion criteria include severe cognitive impairment or contraindications to physical activity.

Results:
Preliminary volunteer-led Qigong classes at St. John's suggested improvements in balance, mood, and ADLs. A structured implementation is now underway.

Contribution:
If effective, Zang Fu Gong could serve as a scalable, non-pharmacological strategy to reduce fall risk, enhance quality of life, and support healthy aging in older adults.

Keywords: *Qigong, Zang Fu Gong, older adults, assisted living, falls prevention, balance, mobility, activities of daily living (ADLs), Timed Up and Go (TUG), Falls Efficacy Scale-International (FES-I), EQ-5D-5L, holistic intervention, osteopathic principles, non-pharmacological therapy, quality of life, mental health, well-being*

THE IMPACT OF OSTEOPATHIC MANIPULATIVE THERAPIES ON SPORTS PERFORMANCE AND RECOVERY: A LITERATURE REVIEW

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Introduction: Athletes often experience maladaptive changes in performance and range of motion (ROM) due to injury or training demands, with contributing factors such as level of play, game load, and travel. Current conventional sports medicine strategies to maintain or improve performance and ROM vary widely and may or may not include osteopathic manipulation techniques (OMT). Evidence supports OMTs effectiveness in optimizing ROM and performance. Integrating it into training and return-to-play protocols could reduce injuries, shorten recovery time, and improve overall performance across the competitive and non-competitive season.
Purpose: Investigate the efficacy of OMT to improve athletic performance and recovery in college athletes. We aim to evaluate whether OMT can improve sports performance and recovery to potentially serve as an adjunct to conventional sports medicine treatments.
Methods: A systematic review was conducted in accordance with PRISMA guidelines using PubMed and Clinicalkey. Search terms included "osteopathic manipulative medicine," "muscle energy," "high-velocity low-amplitude," "counterstrain," "sports recovery," "sports performance," and related MeSH terms. Peer-reviewed studies published within the last 20 years evaluating high-velocity low-amplitude (HVLA), strain-counterstrain (SCS), or muscle energy technique (MET) in athletic or musculoskeletal populations were included. Non-athlete populations, non-OMT interventions, and non-peer-reviewed articles were excluded. Data were extracted on study design, population, intervention, and outcomes related to performance, pain and recovery.
Results: A total of 18 studies met inclusion criteria. SCS (n = 5) consistently reduced palpation pain, with 3 reporting significant improvements in ROM and functional recovery in athletes with chronic musculoskeletal dysfunction. MET (n = 6) demonstrated clinically meaningful gains in ROM, particularly in the shoulder, and reductions in low back and lateral elbow pain; 2 studies also noted improved grip and finger strength, especially when combined with adjunctive modalities. HVLA (n = 7) yielded short-term enhancements in sprint speed, vertical jump distance, and throwing velocity/accuracy, with 4 studies highlighting greater benefit in symptomatic athletes. These findings suggest that OMT may offer measurable improvements in recovery and selected performance outcomes, supporting its role as a potential adjunctive therapy in collegiate sports medicine.
Contribution: OMT demonstrates promise as an effective adjunctive therapy with potential to improve athletic recovery and select performance outcomes, though current evidence is limited by small sample sizes and inconsistent findings. To build on this work, we aim to conduct a longitudinal study with collegiate athletes in Billings, Montana by incorporating multiple treatment modalities and contributing stronger evidence for OMT's role as an adjunctive therapy in collegiate sports medicine.

ENDOVASCULAR REPAIR OF ABDOMINAL AORTIC ANEURYSM USING A THORACOABDOMINAL BRANCH ENDOPROSTHESIS (TAMBE): A CASE REPORT

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Abdominal aortic aneurysms (AAAs) pose a substantial clinical challenge due to their risk of rupture and associated mortality. Traditional management options include open surgical repair or endovascular aneurysm repair (EVAR). The thoracoabdominal branch endoprosthesis (TAMBE) has recently emerged as an innovative endovascular alternative, particularly useful for complex juxtarenal and thoracoabdominal aneurysms. This case report presents a 63-year-old male with a history of smoking, chronic obstructive pulmonary disease, coronary artery disease with prior stenting, peripheral arterial disease, and hyperlipidemia who was referred for evaluation of a juxtarenal AAA measuring 5.7 cm. The aneurysm was without tenderness, mass effect, or distal ischemia. Computed tomography confirmed the aneurysm's size and morphology. Based on the aneurysm's growth beyond the 5.5 cm intervention threshold, his rupture risk was estimated at 20–30%. After discussion of open versus endovascular repair, the patient elected to undergo repair with TAMBE. TAMBE represents a significant advancement in AAA management, particularly for anatomically complex cases. Compared to open repair, TAMBE minimizes invasiveness while preserving renal and visceral branch perfusion. Recent literature highlights its efficacy in reducing perioperative morbidity. Its development broadened therapeutic options for patients with challenging aneurysmal anatomy. Integration of advanced imaging and endovascular technology continues to refine patient selection and procedural outcomes. This case demonstrates successful management of a juxtarenal AAA with TAMBE, underscoring its emerging role in contemporary vascular surgery. Broader investigation into long-term outcomes is warranted to establish TAMBE as a standard option in AAA repair.

***Keywords**: AAA, EVAR, TAMBE*

AI-ASSISTED POINT OF CARE ULTRASOUND (POCUS) FOR SOFT TISSUE MASSES IN LOW-INCOME COUNTRIES DURING GLOBAL OUTREACH TRIPS

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Soft tissue masses such as abscesses, cysts, and neoplasms are common presentations in global health outreach settings, yet access to advanced imaging is often limited. Point-of-care ultrasound (POCUS) offers a portable and low-cost diagnostic solution, but its accuracy can be limited by provider experience and equipment resolution, leaving a gap in reliable diagnosis during outreach trips. Recent advances in artificial intelligence (AI) have introduced automated POCUS interpretation tools that could significantly improve diagnostic capabilities in low-resource settings. We hypothesize that AI-assisted POCUS can enhance diagnostic accuracy and usability for soft tissue mass evaluation in low-resource settings. To explore this, we conducted a systematic literature search of articles published in the last 10 years, focusing on studies addressing AI-assisted POCUS and POCUS for soft tissue masses diagnoses. Articles were screened for diagnostic accuracy, usability, and barriers to implementation. Our review identified multiple studies on AI and POCUS applications, but none specifically addressed soft tissue mass diagnosis in the context of global outreach. These findings suggest both the promise and the gap in current evidence, laying the groundwork for future pilot studies. By integrating AI with portable ultrasound, this project highlights opportunities for sustainable and scalable diagnostic strategies to expand safe and effective care in underserved populations.

Keywords: *Artificial Intelligence, Bedside Sonography, Global Outreach, Literature Review, Point of Care Ultrasound*

THE INTERPLAY OF HOST GENETICS, GUT MICROBIOME, AND SHORT-CHAIN FATTY ACIDS IN OBESITY

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Obesity is a global epidemic driving the rising prevalence of type 2 diabetes (T2DM), cardiovascular disease, and other metabolic disorders. The gut microbiome plays a key role in host energy balance through appetite regulation, glucose homeostasis, lipid metabolism, and inflammation, largely mediated by short-chain fatty acids (SCFAs), particularly butyrate. The purpose of this study is to examine how host genetic variation influences metabolic responses to microbiome-derived SCFAs in the context of obesity. By integrating evidence on SCFA-mediated pathways with known genetic polymorphisms, this work evaluates the potential for personalized, genetics-informed microbiome interventions. A structured literature review was conducted using PubMed and Embase, covering 2005–2025. Key MeSH terms included "obesity," "gut microbiome," "short-chain fatty acids," "butyrate," "epigenetics," and "genetic variation," including single nucleotide polymorphisms (SNPs) such as PGC-1α, FGF21, TCF7L2, UCP1, and ARβ3. Animal studies consistently demonstrated beneficial effects of SCFAs, including improved insulin sensitivity, enhanced mitochondrial function, reduced fat mass, and adipose tissue browning. Human studies revealed microbiota differences between obese and lean individuals, with altered SCFA production accompanying weight loss. However, integration of genetic profiling with microbiome analysis remains limited, constraining prediction of therapeutic benefit. Future research should incorporate genetically stratified cohorts to identify individuals most likely to respond to SCFA-targeted interventions. The interplay between host genetics, microbiome composition, and SCFA production reinforces the potential for genetically informed, microbiome-based strategies. Advancing this research could enable personalized therapies to optimize metabolic health and address obesity-related disease.

WHO BENEFITS MOST? STRATIFIED ANALYSIS OF HUCKLEBERRY SUPPLEMENTATION AND GLYCEMIC CONTROL

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Huckleberries are rich in polyphenols and anthocyanins, compounds with antioxidant and anti-inflammatory properties that may improve glucose metabolism. Previous work has shown modest improvements in glycemic control with berry supplementation, but variability in outcomes suggests that certain populations may benefit more than others. This study aimed to evaluate the effects of huckleberry supplementation on glycemic control and identify subgroups most likely to benefit, based on demographic and clinical characteristics. For this project, we are going to focus on sex differences. There is established scientific evidence that estrogen might give physiological advantage to females in glucose modulation. Our aim is to show if that physiological advantage was evidenced in our experiment and provide additional literature that supports this concept. A secondary analysis was performed using data from "Huckleberries and Glycemic Regulation: Exploring Post-prandial Glucose Excursions When Paired with Carbohydrates". Participants were stratified by age, sex, and baseline glycemic status. Glycemic outcomes included fasting glucose and glucose levels in 3 different scenarios: berries alone, bread alone and berries plus bread. Preliminary findings indicate that participants demonstrated a great improvement in glycemic outcomes following huckleberry supplementation. Huckleberry supplementation may have the most meaningful impact on glycemic control but sex characteristics such as hormonal profile also plays a significant role in how this modulation occurs. Estrogen appears to confer a protective advantage in glucose homeostasis and insulin sensitivity, while androgen-driven pathways in males may predispose to greater insulin resistance. These hormonal influences, along with differences in body composition and microbiome interactions, underscore the importance of stratified analysis when evaluating dietary interventions. By considering sex-specific physiology, this project aims to clarify “who benefits most” from huckleberry supplementation and provide insight into tailored nutritional approaches for optimizing glycemic control.

PERIPHERAL NEUROPATHY IN CIRRHOSIS: PREVALENCE, RISK FACTORS AND THERAPEUTIC GAPS

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Peripheral neuropathy (PN) is a frequent but underrecognized complication in patients with liver cirrhosis. It contributes to impaired quality of life, increased fall risk, and disability. Despite its clinical impact, current care often involves neurotoxic medications and lacks standardized screening or management protocols. This literature review aims to evaluate the prevalence, risk factors, and treatment options for peripheral neuropathy in cirrhotic patients, while identifying gaps in current evidence and opportunities for safer, more effective care. A comprehensive review of peer-reviewed studies indexed in PubMed was conducted. Inclusion criteria focused on adult cirrhotic populations assessed for peripheral neuropathy through clinical or electrophysiological methods. Key outcomes extracted included prevalence rates, neuropathy types, risk factors, and any evidence supporting strategies to delay or improve neuropathic progression. Reported prevalence of PN in cirrhosis ranges from 19% to 80%, with most cases presenting as axonal sensorimotor polyneuropathy. Liver transplantation has been associated with symptomatic improvement, although data on other interventions remain sparse. Neurotoxic medications commonly used for pain may pose additional risks to this population. Novel or safer therapeutic strategies have not been adequately studied in clinical trials. PN is a common and potentially modifiable feature of cirrhosis. However, current treatment approaches may be inadequate or harmful. Greater recognition and targeted research are needed to improve outcomes and guide evidence-based neuropathy management in cirrhotic patients.

***Keywords**: Peripheral Neuropathy, Cirrhosis, Pain Management, Neurotoxic*

EVALUATING INFLUENZA VACCINE EFFICACY: A REVIEW OF PUBLISHED STUDIES

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Despite the efforts made in lowering influenza infection rates, the virus continues to pose a significant public health risk with rising infection rates and outpatient respiratory illnesses (CDC, 2025). Previous studies demonstrated the challenge the seasonal variance of influenza strains poses, highlighting the difficulty in providing optimal protection (Houser & Subbarao, 2015). This literature review aims to identify the most efficient vaccine strategies by evaluating immune responses and health outcomes in diverse patient populations, with the intention of balancing cost and production time. As new studies and methodologies emerge, the evolution of the influenza vaccine may lead to improved public health immunity through more durable immune responses.

To examine past, present, and future approaches, a review of the current literature – case studies, meta-analyses, and clinical trials – was conducted. Different types of literature were chosen to identify common themes in vaccine applicability. The literature selected for this review focused on enhancing immune responses, whether seasonal or long-term, while keeping manufacturing efficiency and overall patient experience in consideration.

Publications analyzed in this review highlight efficacious vaccine development strategies that produce robust immune responses and can be used for a broad range of patient populations. Previous studies reveal that high-dose trivalent inactivated influenza vaccines are more efficacious in the older adult populations than the standard dose, providing that population with adequate protection (Veroniki et al., 2024). According to meta-analyses, spray live attenuated influenza vaccines have shown to be a future direction of study as it produces effective protection with low invasiveness and less adverse systemic response, which may increase willingness to receive vaccination (Perego et al., 2021).

This review examines these findings to explore differences across production methods and vaccine performance on specific populations. However, a key limitation remains: the variability of influenza strains present annually and the differing immune profiles of patient populations, necessitating frequent alterations of vaccine formulations and complicating long-term immunization.

Overall, the analysis of these insights offers promising directions for optimizing influenza vaccine strategies, particularly in broadening an individual's personal immune response and reducing healthcare burdens.

***Keywords**: influenza, immune responses, annual variants, long term efficacy*

PREVALENCE OF MEDICATION-RELATED OSTEONECROSIS OF THE JAW IN ADULT CANCER PATIENTS TREATED WITH DENOSUMAB VERSUS BISPHOSPHONATES: A SYSTEMATIC REVIEW

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Background: Medication-related osteonecrosis of the jaw (MRONJ) is an uncommon but notable complication of antiresorptive therapy in cancer patients treated with bisphosphonates or denosumab. While these agents reduce skeletal-related events, they carry a measurable risk of MRONJ, with variation by drug type, cancer, and exposure. Clinical decision-making remains challenging, particularly regarding the timing of dental extractions, initiation of therapy, and management of patients requiring oral surgery.

Objective: To evaluate MRONJ prevalence in cancer patients receiving antiresorptive therapy and compare outcomes between bisphosphonates and denosumab across different cancer types, with the goal of informing prevention strategies and supporting guideline development for these patients.

Methods: A systematic PubMed search identified studies (2015-2025) reporting MRONJ prevalence or incidence in adults with breast cancer, prostate cancer, or multiple myeloma treated with bisphosphonates and/or denosumab. Eligible designs included randomized controlled trials, cohorts, case series, meta-analyses, and systematic reviews. Twenty-two studies met inclusion criteria.

Results: MRONJ prevalence with bisphosphonates alone ranged from 0–7%, most commonly 1–3%. Denosumab showed a broader prevalence of 0–11.6% with higher rates and earlier onset. The prevalence increased with concurrent use at 16.3%. Multiple myeloma patients exhibited the highest prevalence, followed by breast and prostate cancer. Observational studies generally reported higher rates than randomized trials. Risk factors included prolonged therapy, sequential use, dentoalveolar surgery, poor oral hygiene, chemotherapy, and comorbidities. Preventive dental care was protective.

Conclusion: Denosumab is associated with higher and earlier MRONJ risk than bisphosphonates, particularly in multiple myeloma and breast cancer. Standardized diagnostic criteria and prospective, comparative studies are needed to refine risk stratification and prevention strategies.

Keywords: *osteonecrosis of the jaw, bisphosphonate, denosumab, cancer*

EVALUATION OF TREATMENT MODALITIES IN FEMALE COMBAT VETERANS

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Female combat veterans experience disproportionately high rates of emotional trauma, including PTSD, depression, anxiety, traumatic brain injury (TBI), and military sexual trauma (MST), yet traditional evidence-based treatments often fall short in addressing their complex needs. This pilot study evaluates the impact of four trauma-informed, creative therapies- songwriting, equine therapy, art therapy, and Resonance Repatterning- on emotional and physiological regulation in a cohort of female veterans. Ten U.S. female military veterans (ages 37–68) with a history of combat related emotional trauma participated in the 2025 (not so) Average Jane Retreat, a five-day therapeutic program held at Warriors and Quiet Waters Ranch in Belgrade, Montana. Interventions included two 2-hour sessions of songwriting and Resonance Repatterning, one 2-hour session each of equine and art therapy, and daily breathwork, yoga, and social activities. Participants wore Fitbit devices to track heart rate variability (HRV) for at least 14 days prior to the retreat, continuously during the retreat, and for at least 14 days post-retreat. HRV data was self-reported and analyzed alongside pre- and post-retreat mental health surveys (PHQ-8, GAD-7, PCL-C, and PSS), as well as session-specific questionnaires.

To date, only standardized psychological surveys have been reviewed, without formal statistical testing. Preliminary evaluation of these self-report instruments indicates a general reduction in symptoms of depression, anxiety, PTSD, and perceived stress following the retreat. Participants also completed post-session surveys which will be included in future analysis. While the small sample size, lack of statistical analysis, and pending biometric data limit definitive conclusions, this case series provides initial support for the feasibility and potential value of holistic, creative therapies in addressing the mental health needs of female veterans. These findings offer early insight and lay the groundwork for future studies using controlled designs and more robust physiological measures.

CONTEMPORARY INSIGHTS INTO PREHOSPITAL BATTLEFIELD CARE: A RECENT LITERATURE REVIEW

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The Russia–Ukraine conflict has created unprecedented challenges in battlefield medicine, offering critical insights into Tactical Combat Casualty Care (TCCC), prehospital interventions, and evacuation protocols. Evaluating these developments is essential for improving combat casualty outcomes in future conflicts. This review synthesized peer-reviewed literature published between 2022 and 2025 addressing injury patterns, prehospital practices, and adherence to TCCC guidelines. Particular emphasis was placed on hemorrhage control, tourniquet use, analgesia, infection management, hypothermia, and the integration of technology into prehospital triage. Analysis demonstrated that 1,503 verified attacks on Ukrainian medical facilities between February 2022 and August 2023 disrupted evacuation and extended prehospital times. Improper tourniquet application—including unnecessary placement, use of non-approved devices, and wear exceeding six hours—was associated with complications such as compartment syndrome, rhabdomyolysis, and preventable amputations. Hemorrhage remained the leading preventable cause of death, with evidence supporting improved survival from prehospital tranexamic acid administration, early whole blood transfusion, and novel storage methods. Analgesia practices relying on nalbuphine complicated subsequent opioid use, while antimicrobial shortages and high regional resistance patterns contributed to sepsis-related mortality. Hypothermia significantly increased casualty mortality but remains underemphasized in military protocols. Although electronic emissions raise operational concerns, emerging wearable technologies demonstrated predictive accuracy for triage and resource allocation. These findings highlight that strict adherence to TCCC—particularly evacuation within the “golden hour”—remains the cornerstone of survival. Future military medicine must balance mobility and simplicity with targeted integration of evidence-based therapies and select technologies to reduce preventable combat deaths in contested environments.

UNDERSTANDING THE MENSTRUAL PAIN EXPERIENCE IN OSTEOPATHIC MEDICAL STUDENTS

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In 2019, Matsumoto et. al reported higher prevalence of severe psychosocial symptoms among college women who consider themselves "unhealthy and stressed" during their menstrual cycle, shedding light on the severity of menstrual pain affecting daily performance in the academic setting. Our objective for this project is to explore pharmacological vs. non-pharmacological methods in alleviating menstrual pain in osteopathic medical students. Although osteopathic medical students are taught to deliver care from an integrated lens, our research aims to explore the methods for alleviating menstrual pain within this population that is trained to treat body, mind, and spirit. Do osteopathic medical students prefer to utilize pharmacological or non-pharmacological methods in alleviating their menstrual pain?

This study will be carried out through delivering an anonymous 10-question survey to the Rocky Vista University Montana College of Osteopathic Medicine student population during September 2025. Questions will survey which methods students use to alleviate their menstrual pain, from pharmacological to non-pharmacological methods, as well as its impact on daily functioning. Survey responses from Microsoft Forms will be analyzed to generate statistical insights. Further analysis will be conducted by exporting the results into Excel, where pivot tables and charts will be generated to explore potential correlations in greater depth. This study is expected to reveal that menstrual pain will significantly impact functioning and performance within an academic setting among osteopathic medical students attending Rocky Vista University. While pharmacological strategies are among the most widely used methods to alleviate menstrual pain (Zahradnik, et al 2010), we anticipate that non-pharmacological approaches will also play an important role in pain management within this population.

The purpose of this study is to understand where campuses may be under-resourced in providing support to osteopathic medical students experiencing menstrual pain. We aim to destigmatize menstrual health concerns and normalize the acknowledgement of menstrual health within professional settings. This allows us to better understand a multidisciplinary approach to menstrual pain while highlighting menstrual health as an essential yet often overlooked aspect of pain management and daily life. Potential limitations may include low response rates, difficulty disseminating the survey across RVU MCOM, fraudulent responses, environmental distractions while taking the survey, and technology issues.

THE ROLE OF TATTOO ARTISTS IN SKIN CANCER DETECTION: ASSESSING AWARENESS AND POTENTIAL IMPACT AS FIRST-LINE SCREENERS

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Skin cancer is the most common type of cancer in the United States, with rates consistently rising – over two Americans die each hour from skin cancer. Despite its prevalence, many individuals miss annual skin checks, which can worsen prognoses. In the state of Montana there is limited access to skin specialists, with only 84 board certified dermatologists practicing in the state. Compared to the more than double licensed tattoo artists in Montana, these professionals may be uniquely positioned to notice suspicious lesions as they regularly view large areas of their clients' skin. Previous literature has focused on sun safety education post-tattoo as well as potential links between tattoos and skin cancer, little focus has been placed on tattoo artists as potential first-line screeners. We conducted an anonymous survey amongst tattoo artists aged 18+ currently employed in the state of Montana with the purpose of exploring the screening practices and knowledge of skin cancer amongst the artists. Preliminary results have found a lack of professional education and knowledge amongst tattoo artists on skin lesions. Our research is limited by a small sample size; further research should include a larger sample size. In a state with a severe shortage of dermatologists (1 for every 13,000 residents) we have identified a key demographic that could potentially act as a first-line screener. This work is important as we may increase professional education amongst an underutilized group, tattoo artists, to help identify skin cancer that would otherwise go undetected.

CHASING PERFECTION OR CHASING A HIGH? INVESTIGATING THE ADDICTION POTENTIAL OF COSMETIC DERMATOLOGY

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The field of cosmetic medicine is rapidly gaining popularity amongst the public. In 2019, dermatologists in America performed 10.3 million cosmetic procedures. A noted effect of the COVID-19 Pandemic is the "Zoom effect", which increased desire for cosmetic work. Patients who have received excessive cosmetic treatments have been described as "addicted". Like many addictive agents, the increased number of procedures completed may increase the relative risk for patients, both physical and mental. Previous literature has preliminarily linked signaling pathways in the skin to the central nervous system when tanning via upregulating POMC transcription. In this review of the literature, we will investigate if a true neural explanation exists for cosmetic procedures and addiction potential. A literature search through PubMed yielded just three results identifying cosmetic procedures as a type of substance abuse disorder. Although limiting based on a small number of results, it identifies a need for further study within the field of dermatology. There are numerous documentations in the literature about patients *addicted* to procedures. This proves practicing dermatologists acknowledge a subset of patients who obtain cosmetic procedures in "excess". Further study and potential identification of an addiction pathway between cosmetic procedures and the brain may allow physicians to better understand their patients while also improving treatments.

ACL INJURY PREVENTION IN SOCCER: COACHES SURVEY

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This research project investigates the implementation of anterior cruciate ligament (ACL) injury prevention programs among soccer coaches in Montana. Utilizing a statewide survey, the study evaluates coaches' awareness, usage, and consistency in applying evidence-based strategies such as FIFA 11+ and the PEP Program. The objective is to identify gaps in knowledge, barriers to adoption, and opportunities to enhance the integration of proven prevention protocols.

Drawing on data from established programs that have demonstrated a 30–70% reduction in ACL injuries with FIFA 11+ and up to 88% with the PEP Program, the survey aims to assess coaches' prior knowledge and current practices in Montana. A correlation between prevention program implementation and previous ACL injuries will be tracked and the findings will inform the development of targeted resources and guide future research efforts.

This project represents the initial phase of a broader initiative to reduce ACL injury rates among Montana soccer players through the widespread adoption of effective, time-efficient prevention strategies.

BRIDGING THE GAP: ACL INJURY PREVENTION PROGRAM IMPLEMENTATION IN MONTANA SOCCER

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Anterior cruciate ligament (ACL) tears remain a significant concern among athletes, impacting performance, training, and long-term mobility. While injury prevention programs (IPPs) have been studied for years, their demonstrated success is often underreported or underutilized in practice. This literature review aims to evaluate the effectiveness of IPPs in reducing ACL injuries, with a specific focus on Montana's soccer population. A comprehensive search was conducted using databases including PubMed, Scopus, SPORTDiscus, and the American Orthopaedic Society for Sports Medicine. Studies published from 2005 onward were reviewed using keywords such as "IPP," "ACL," "anterior cruciate ligament," "prevention programs," and "Montana."

The findings consistently demonstrate that when coaches implement IPPs—particularly those emphasizing neuromuscular training, muscle isolation, and athlete education—there is a substantial reduction in ACL injury rates. Programs such as FIFA 11+ show measurable success, yet widespread adoption remains limited. A notable gap in the literature involves the practicality of implementing these programs: many coaches report insufficient time to integrate structured IPPs into regular training. Furthermore, existing research underrepresents the unique needs of female athletes, despite their higher risk of ACL injury.

This review highlights the effectiveness of IPPs while calling for further research on streamlined, time-efficient interventions and greater emphasis on sex-specific risk factors. Addressing these gaps could enhance implementation, reduce injury incidence, and improve long-term outcomes for athletes.

PROGRESS TOWARDS THE DEVELOPMENT OF A RECOMBINANT YEAST-BASED INFLUENZA VACCINE TO ENHANCE IMMUNOGENICITY AND LONGEVITY OF PROTECTION

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Current seasonal influenza vaccines are limited by variable efficacy, limited protection levels, and the need for annual updates. Influenza infection, especially in vulnerable populations, contributes to significant morbidity and mortality each year. This has led to growing interest in vaccines that can provide robust and long-lasting cell-mediated immunity. Prior studies show promising results with recombinant *Saccharomyces cerevisiae* expressing experimental and neoplastic antigens, effectively stimulating both $CD8^+$ cytotoxic and $CD4^+$ helper T-cell responses via dendritic cell activation.

Our approach aims to develop a recombinant yeast-based influenza vaccine capable of eliciting cellular immunity. As an initial step, influenza genes have been successfully incorporated into *Saccharomyces cerevisiae* for protein expression.

Portions of influenza protein genes were cloned into plasmids through bacterial isolation and gene recombination. The recombinant plasmids were transformed into *Saccharomyces cerevisiae* for expression. Protein expression was assessed by SDS-PAGE to verify expression of the recombinant proteins.

SDS-PAGE revealed distinct bands corresponding to protein fragment 1 (~34.5 kDa), protein fragment 2 (~32.7 kDa), and protein fragment 3 (~16 kDa), confirming expression of multiple influenza proteins. Successful transformation of these genes into *Saccharomyces cerevisiae* demonstrates the viability of vaccine engineering. These findings support progress toward development of the vaccine, however, further testing in mice is needed.
This yeast-based vaccine approach has the potential to provide a cost-effective, longer-lasting immunity towards influenza, reducing mortality and morbidity. The protein expression seen in the study shows promise in the development of a universal influenza vaccine that stimulates a cytotoxic T-cell response.

Keywords*: influenza vaccine, cytotoxic T-cells, cellular immunity, vaccine engineering, Saccharomyces cerevisiae*

REASSESSING THE PALMARIS LONGUS: FUNCTIONAL IMPLICATIONS FOR GRIP AND STEADINESS IN SURGICAL SIMULATION

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Background: The palmaris longus (PL) tendon is congenitally absent in ~10–25% of individuals and is commonly harvested for grafts, yet its functional relevance to dexterity is debated. For tasks demanding steadiness, such as surgical maneuvers, small differences in grip endurance or tremor could matter.

Objective: To determine whether the presence or absence of the PL influences grip strength and fatigue resistance or fine motor steadiness during a simulated surgical task.

Methods: We will conduct a cross-sectional study of pre-clinical medical students. PL status will be determined bilaterally using Schaeffer's test with ultrasound confirmation. Participants will be grouped by PL status of the dominant hand (present vs absent). The primary outcomes tested will be fine motor steadiness and grip strength fatigue. Fine motor steadiness will be assessed via performance on the Operation game using the dominant hand. We will record number of buzzer activations (errors) and time-to-completion. Grip strength fatigue will be tested with wrist-curl endurance and a grip strength tool. Subjects will be grouped by sex and variables that can overtly impact hand shakiness, such as caffeine intake, will be controlled for.

Expected Results: We hypothesize no significant difference in peak grip strength in sex controlled groups, but that there will be a grip strength difference in males vs female. We expect PL presence to modestly improve fatigue resistance and reduce tremors or shakiness during surgical simulation tasks.

Conclusion: If PL presence confers measurable benefits to steadiness or endurance, this could inform counseling around tendon harvest and refine understanding of forearm accessory contributions to fine motor control.

Keywords: *Palmaris Longus, Surgical Precision, Ultrasound*

INTEGRATING OSTEOPATHIC MANIPULATIVE TREATMENT WITH LUMBAR EPIDURAL STEROID INJECTIONS: A PILOT RANDOMIZED TRIAL

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Background:
Corticosteroid injections are widely used for chronic lumbar pain but can be limited by diminishing long-term benefit and side effects. Osteopathic manipulative treatment (OMT) has demonstrated efficacy in pain reduction and functional improvement, potentially through anti-inflammatory and lymphatic effects. Combining OMT with corticosteroid injections may accelerate recovery and enhance patient outcomes.

Objective:
To evaluate the feasibility and preliminary effects of adding OMT immediately prior to lumbar epidural steroid injection (LESI) on post-procedure disability.

Methods:
Patients scheduled for LESI were randomized to receive 3 minutes of lumbar OMT (intervention) or 3 minutes of sham ultrasound (control) prior to injection. Disability was assessed using the Oswestry Disability Index (ODI) at baseline and at days 3, 7, and 14 post-injection via telephone follow-up. Changes from baseline were compared between groups using linear mixed-effects modeling and t-tests.

Results:
Ten participants (OMT = 5, Sham = 5) completed at least two follow-up assessments, demonstrating high retention for this short-term follow-up protocol. Baseline ODI scores were comparable between groups ($p = 0.74$). Both groups showed improvements in ODI over the study period, with similar reductions at day 3 (−5.25 points in each group), day 7, and day 14. The protocol was successfully implemented in a clinical setting without disruption to standard care.

Conclusion:
This pilot study demonstrates the feasibility of integrating OMT immediately prior to LESI. While no differences between groups were detected in this small sample, the protocol is well suited for larger trials to evaluate the potential synergistic effects of OMT and corticosteroid injections on pain and disability.

INTRANASAL KETAMINE FOR TREATMENT RESISTANT-FIBROMYALGIA: A CASE REPORT

Catherine Arnold, OMS-III; Brooks Beal, DO

Introduction: Fibromyalgia, affecting 2–4% of the population, is characterized by widespread musculoskeletal pain, fatigue, and sleep disturbances. Despite pharmacologic and non-pharmacologic options—such as SSRIs, SNRIs, anticonvulsants, physical therapy, and complementary approaches—many patients experience limited relief. Ketamine, an NMDA receptor antagonist, may disrupt central sensitization and provide an alternative for refractory cases.

Case Description: A 66-year-old female with long-standing fibromyalgia presented with chronic pain, depressive symptoms, fatigue, and non-restorative sleep, severely restricting daily activities. She had trialed SSRIs, SNRIs, and physical therapy with only transient or partial benefit, and complementary approaches provided no durable improvement. Given persistent impairment, she was offered intranasal ketamine therapy.

Assessment and Results: Treatment consisted of 13 intranasal ketamine sessions (80–120 mg each) over several months. Fibromyalgia Impact Questionnaire (FIQ) scores decreased from 41 at baseline to 12 post-treatment, reflecting substantial functional improvement. PHQ-9 scores declined from 7 to 2, indicating improved mood. The patient also reported enhanced sleep quality, mobility, and daily energy. Reductions were progressive across sessions, with the greatest gains occurring after the first six treatments. No significant adverse effects were observed.

Discussion: Fibromyalgia pathophysiology involves central sensitization and dysregulated pain processing. While intravenous ketamine has demonstrated efficacy, intranasal delivery offers a convenient, non-invasive alternative.

Conclusions: Intranasal ketamine provided marked improvement in pain, mood, and function in this treatment-resistant fibromyalgia case. These findings highlight its promise as a novel therapeutic option and underscore the need for controlled studies to establish protocols, clarify long-term safety, and identify responders.

DIAGNOSIS OF MAST CELL ACTIVATION SYNDROME IN THE ABSENCE OF TRADITIONAL BIOMARKERS: A CASE REPORT

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Mast cell activation syndrome (MCAS) is characterized by recurrent multisystem symptoms related to inappropriate mast cell mediator release, such as flushing, urticaria, diarrhea, and throat tightness. Diagnostic criteria traditionally require: (1) symptoms in at least two organ systems, (2) laboratory evidence of elevated mast cell derived mediators, and (3) symptom improvement with therapy targeting mast cells such as antihistamines. However, emerging frameworks such as consensus-2 suggest diagnosis without biomarker elevation if clinical presentation and therapeutic response are consistent with MCAS.

We present a 55-year-old male with Hashimoto's thyroiditis, mild intermittent asthma, obstructive sleep apnea, and multiple anaphylactic allergies presenting with a nine year history of flushing, urticaria, fatigue, diarrhea, and throat tightness triggered by various allergens, notably sulfite-containing foods and medications. Physical examination was significant for nasal turbinate erythema during asymptomatic periods and flushing with urticaria during flares. Laboratory evaluation revealed normal tryptase and urinary N-methylhistamine levels, mild eosinophilia, and negative KIT D816V mutation. Despite lacking biomarker evidence, his symptom pattern involved multiple systems and improved with cromolyn sodium and cetirizine, meeting consensus-2 diagnostic criteria.

This case illustrates the diagnostic challenge posed by MCAS in the absence of mediator elevation, particularly given the difficulty of testing during acute flares. While consensus-2 criteria may broaden recognition of MCAS, there is risk of overdiagnosis as many patients present with nonspecific symptoms. Clinicians must balance adherence to established guidelines with careful application of emerging frameworks, using therapeutic response as an adjunctive diagnostic tool to reduce morbidity in complex cases.

LLMs IN ACUTE CARE: A CASE-BASED COMPARISON OF CLINICAL ACCURACY BETWEEN AI AND EMERGENCY PHYSICIANS

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Medicine, especially emergency medicine, requires rapid and accurate decision-making under pressure, making it the prime field for assessing the potential of large language models (LLMs) as clinical decision support tools. While LLMs like ChatGPT-5 by OpenAI, Gemini by Google, and Grok by xAI show promise in medical reasoning, their reliability in high-stakes, time-sensitive settings compared to emergency physicians remains underexplored in acute care. This study addresses this gap by assessing LLM performance against evidence-based standards and laying the groundwork for comparisons with clinician expertise.

This study aims to evaluate the following five domains: the diagnostic accuracy, appropriate management, patient safety, differential completeness, and quality of reasoning of the three aforementioned LLMs. This was explored in published emergency department cases, with a secondary goal of establishing a benchmark for future comparisons with emergency physicians. Five de-identified and redacted case vignettes from recent editions of the Annals of Emergency Medicine and the Academy of Emergency Physicians were selected. The cases represented common acute conditions such as acute coronary syndrome, pulmonary embolism, displaced upper extremity fracture from a motor vehicle collision, community-acquired pneumonia, and a simple palmar laceration. Each LLM was prompted to provide differential diagnoses, most likely diagnosis, initial management, disposition, and justification. Responses were scored by blinded reviewers using a 0–5 performance rubric across the previously mentioned domains. There was a maximum of 25 points per case, converted to percentages. Scores were analyzed using one-way ANOVA with Tukey HSD post-hoc tests. A physician comparator group is planned for future analysis.

ChatGPT-5 achieved the highest average score (115/125; 92.0%), significantly outperforming Gemini (91/125; 72.8%; p=0.025), with Grok scoring intermediate (103/125; 82.4%). All models correctly identified the primary diagnosis in most cases, but ChatGPT excelled in guideline-driven management and patient safety. Gemini frequently produced incomplete differentials or unsafe recommendations, such as early adaptation of anticoagulants in pulmonary emboli. Limitations include the small sample size (n=5) and use of hand-picked, redacted real-world scenarios, which may not fully reflect actual clinical variability.

This study provides a benchmark for LLM performance in emergency medicine, highlighting correct differential diagnoses, adherence to guidelines, and safety considerations. However, variability in reasoning quality and occasional unsafe recommendations across all models suggests the need for targeted adjustments and human oversight. These findings demonstrate LLMs may serve as valuable resource materials but are not yet reliable as standalone decision makers. Future work should expand to larger case sets and include blinded comparisons with emergency physicians to guide safe AI integration into clinical practice.

A RARE CASE OF SCHAAF YANG SYNDROME

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Schaaf-Yang syndrome (SYS) is a rare genetic neurodevelopmental disorder caused by variant on paternally derived MAGEL2 allele in chromosome 15q11.2, which shares similar clinical and genetic features to Prader- Willi syndrome (Schaaf 2021). We describe a term female neonate presenting within minutes of delivery with hypotonia, respiratory distress due to excessive oral secretions requiring ventilation support. Physical exam revealed micrognathia, respiratory distress, and feeding difficulties, prompting early genetic evaluation due to a family history suggestive of syndromic presentation. Molecular testing confirmed MAGEL2 variant. Multidisciplinary management included respiratory support, nutritional optimization, caloric optimization and coordination with subspecialist teams. This case is unique in demonstrating early, secretion associated respiratory compromise, a hallmark of SYS which is rarely emphasized in literature. Prognosis can vary widely depending on the severity of neonatal symptoms and complications. This report highlights the importance of early recognition of SYS in neonates presenting with craniofacial anomalies, secretion related respiratory distress, as early diagnosis allows for anticipatory guidance, proactive subspecialty involvement, and informed family planning.

***Keywords**: Schaaf-Yang syndrome, MAGEL2, respiratory distress, secretions, hypotonia, micrognathia*

PUBIC HAIR GROOMING AND THE GENITAL MICROBIOME: A LITERATURE REVIEW OF HEALTH IMPLICATIONS

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The genital microbiome is a critical factor in maintaining sexual and overall health, yet the combined impact of pubic hair grooming and sexual activity remains poorly understood. This study sought to evaluate how pubic hair removal, in conjunction with sexual behaviors, influences microbial balance and susceptibility to disease.

A literature review was conducted using PubMed and Google Scholar to identify peer-reviewed studies published between 2014 and 2025 that addressed grooming practices, sexual activity, and their effects on the genital microbiome and health outcomes. Search terms included *pubic hair grooming, sexual activity, microbiota, sexually transmitted infections, and long-term health outcomes*.

The evidence suggests that pubic hair serves as a natural barrier supporting microbial stability, and its removal is associated with increased rates of infections such as HPV, herpes, gonorrhea, and chlamydia, as well as higher incidences of local irritation, dermatitis, and inflammation. Additionally, sexual activity facilitates microbial exchange between partners, influencing both protective immunity and vulnerability to pathogens.

These findings highlight a significant research gap and emphasize the need for longitudinal, gender-inclusive studies that can guide clinical recommendations and improve sexual health education.

COMPARATIVE ANALYSIS OF HYDROCOLLOID "ACNE DOTS": COST, ADHESIVENESS, AND CLINICAL CONSIDERATIONS FOR PHYSICIAN RECOMMENDATIONS

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Hydrocolloid bandages, marketed as "acne dots," have become popular over-the-counter tools for acne management because they absorb exudate, protect lesions, and provide a discreet barrier. Despite their widespread use, physicians often lack clear, evidence-based guidance on brand efficacy, cost-effectiveness, and safety, particularly for patients with adhesive allergies. This study proposes a comparative analysis of leading hydrocolloid acne dot products to address this gap. The investigation will assess cost per unit surface area, determine the presence or absence of embedded medications, and evaluate adhesive strength using standardized peel-resistance testing. Potential allergenic materials in adhesives will also be examined to identify products best suited for individuals with sensitive skin or adhesive allergies.

Findings are expected to provide a comprehensive overview of performance, affordability, and safety across top brands, supporting the development of practical recommendations to guide physicians in counseling patients who wish to incorporate acne dot bandages into their dermatologic care routines. The project is currently in the process of obtaining IRB approval.

FROM COMPETITION TO CONTINUATION: A LITERATURE REVIEW OF EXERCISE GUIDELINES FOR ATHLETES TRANSITIONING OUT OF SPORT

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Elite athletes dedicate years to achieving peak performance, but athletic retirement, defined as the cessation of a competitive athletic career and the loss of a central sport-related role, represents a significant life transition. Retirement is accompanied by a rapid decline in physical health, including reduced cardiovascular fitness and increased risk of chronic injury. While protecting health remains a goal for this population, no standardized, evidence-based exercise framework exists for transitioning. Current recommendations are generic and lack information on the unique physiological demands, injury history, and training backgrounds of former competitors. As a result, retired athletes face uncertainty in adapting their training to a new lifestyle. This study evaluates the direction given to newly retired athletes regarding transitional fitness plans and their effectiveness.

This systematic review analyzes peer-reviewed literature from PubMed and Science Direct, focusing on exercise education and physical wellness in retired athletes. Eligible studies were published in English within the past decade and addressed physiological changes after retirement. Exclusion criteria included studies not in English and those focused on psychosocial outcomes.

The review identified six studies evaluating transitional exercise programs for newly retired athletes. Findings indicate adherence is inconsistent and influenced by psycho-socio factors. Abandonment of plans leads to a decline in health and performance. Outcomes differed between men and women, yet most programs adopt a “one-size-fits-all” approach. No program provided individualized, evidence-based strategies or long-term follow-up. This review highlights the need for sex- and sport-specific programs that teams, coaches, and clinicians can implement to support lifelong fitness.

3D-PRINTED VERTEBRAL MODELS FOR EPIDURAL PLACEMENT TRAINING IN MEDICAL STUDENTS

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Introduction: Epidural anesthesia is a fundamental skill in anesthesiology, yet opportunities for early, risk-free training are limited. Commercial simulators are costly and lack customization, highlighting the need for affordable, accessible alternatives. Advances in 3D printing provide a potential solution by enabling anatomically accurate and customizable training models.

Objective: To design and evaluate a cost-effective, anatomically accurate 3D-printed vertebral model intended for epidural placement training in medical students, with the goal of improving procedural skill acquisition while demonstrating projected cost-effectiveness compared to commercial simulators.

Methods: We outline a design concept using CT-based lumbar vertebral anatomy processed in CAD software and fabricated with polylactic acid (PLA). The proposed model would integrate synthetic ligaments and soft tissue analogues to reproduce tactile feedback, including the “loss of resistance” technique. The intended application is for educational demonstrations and future training modules within medical curricula.

Expected Results: The model is anticipated to replicate key anatomical landmarks and procedural feedback while costing less than $100 per unit compared to over $2,000 for commercial trainers. Its reproducibility and adaptability would allow broader access to procedural training across educational settings.

Conclusion and Discussion: This proposed 3D-printed vertebral model offers a scalable, low-cost alternative to commercial epidural trainers. By lowering barriers to simulation-based education, it has the potential to enhance procedural skill development among medical students. Importantly, its affordability and reproducibility could expand access for learners in low-resource institutions and international settings where commercial simulators are often unattainable. If validated, such models may help democratize anesthesia education, foster global equity in training, and complement existing approaches documented in the literature.

Keywords: *3D printing, vertebral model, epidural anesthesia, simulation training, medical education, procedural skills, anesthesiology, low-cost simulator, medical student training.*

FOLIC ACID, VITAMIN E, AND OMEGA-3 FATTY ACIDS IN STROKE PREVENTION: A COMPARATIVE EVIDENCE-BASED REVIEW

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Stroke remains a leading cause of morbidity and mortality worldwide, and the potential role of nutritional supplements in mitigating stroke risk has been the focus of extensive research. Despite numerous trials, findings have been heterogeneous, necessitating a comparative evaluation. The purpose of this review is to clarify the role of key nutritional supplements in stroke prevention by synthesizing evidence from large randomized controlled trials (RCTs) and meta-analyses. This review focuses on three widely studied supplements—folic acid/B-vitamins, vitamin E, and marine omega-3 fatty acids—with attention to stroke subtype (ischemic vs. hemorrhagic) and population-level modifiers such as folic-acid fortification and genetic variation.

Evidence from the China Stroke Primary Prevention Trial demonstrated that folic acid supplementation reduced first-stroke risk, particularly among carriers of the MTHFR C677T polymorphism and in regions without folic acid fortification. Meta-analyses further support modest reductions in ischemic stroke risk in low-folate populations. In contrast, vitamin E supplementation was associated with an increased risk of hemorrhagic stroke that outweighed its limited protective effect against ischemic stroke. Large-scale trials of omega-3 fatty acids, including VITAL and ASCEND, consistently found no significant impact on overall stroke risk. However, interpretation is limited by heterogeneous study populations, variations in baseline nutritional status, and differences in supplement dosage and duration across trials.

Overall, current evidence suggests that folic acid may provide context-dependent benefit for ischemic stroke prevention, particularly in low-folate settings and genetically susceptible groups. By contrast, vitamin E appears harmful due to elevated hemorrhagic stroke risk, and omega-3 fatty acids show no consistent preventive effect. These findings underscore the importance of population context and stroke subtype in evaluating the role of nutritional supplements for stroke prevention.

EXPLORING THE IMPACT OF OMM ON LOEYS-DIETZ SYNDROME

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Loeys-Dietz Syndrome (LDS) is a rare connective tissue disorder characterized by vascular and musculoskeletal complications, including aortic aneurysms, scoliosis, and joint hypermobility. While musculoskeletal symptoms are seemingly prevalent in LDS patients, the role of osteopathic manipulative medicine (OMM) in managing these multisystem issues has not been a focus or well explored in the literature.

The objective of this systematic literature review is to assess the potential benefits and risks of specific OMM techniques in managing musculoskeletal symptoms in LDS patients.
A comprehensive search was conducted across multiple databases (CINAHL, Consensus AI, Embase, Google Scholar, Open Evidence, and PubMed), initially identifying 373 articles published in the past 20 years. Nineteen articles were deemed pertinent after screening with the following inclusion criteria: connective tissue disorders (Marfan Syndrome, Ehlers-Danlos Syndrome, and Loeys-Dietz Syndrome) and OMM. Studies discussing non-OMM techniques were excluded.

Results examine the uses of soft tissue manipulation, muscle energy, Still's technique, counterstrain, and high-velocity low-amplitude (HVLA) on function and range of motion while also identifying treatments that may be contraindicated; such as cervical HVLA due to joint subluxation. Since the intersection of OMM and LDS is minimally studied, the lack of longitudinal data represents a significant limitation, highlighting the need for future research in assessing the long-term impact of OMM on patients living with connective tissue disease. This review seeks to fill a critical gap in current research and provide insights into how OMM could impact the quality of life for individuals living with LDS and other similar connective tissue conditions.

Keywords: *Loeys-Dietz Syndrome, Marfan Syndrome, Ehlers-Danlos Syndrome, Connective Tissue Disease, Osteopathic Manipulation, Osteopathic Manipulative Treatment*

THE PSYCHOLOGICAL BURDEN OF GI DISEASE: ASSOCIATIONS BETWEEN GI SYMPTOMS SEVERITY AND MENTAL STRESSORS

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Growing evidence indicates that mental health factors—such as stress, depression, and anxiety—play a significant role in exacerbating gastrointestinal (GI) disease symptoms. With an estimated 60–70 million individuals affected by GI disorders in the United States alone, the connection between psychological distress and GI symptom burden warrants deeper investigation. However, existing research has yielded inconsistent findings and often lacks direct comparisons between functional and inflammatory GI conditions. To address this critical gap, we designed a study to assess whether the severity of psychological distress correlates with GI symptom intensity in patients diagnosed with GI disorders such as irritable bowel syndrome (IBS), ulcerative colitis (UC), and Crohn's disease.

This cross-sectional survey will consist of a minimum of 200 to 300 adults aged 18+ years with self-reported GI symptoms including those with physician-confirmed diagnosis of IBS, UC, or Crohn's disease. Measures will include a GI Symptom Severity Scale, Patient Health Questionnaire-9 (PHQ-9) for depression, a learned helplessness scale, Generalized Anxiety Disorder-7 (GAD-7), and the Perceived Stress Scale (PSS), with additional items assessing reported symptom clusters, management, and impact on life. This anonymous and voluntary survey will be posted to GI specific social media support groups as well willing medical offices. Data collection is forthcoming, but anticipated results include a positive correlation between these mental stressors and GI symptom severity. Limitations include reliance on self-reported data, potential recall bias, and sample size constraints. This study will contribute to a clearer understanding of the mind–gut relationship and may inform clinical strategies that integrate mental health care into GI management. Future directions include longitudinal analyses and interventional trials to test whether stress-reduction strategies, such as exercise or mindfulness, can improve outcomes in both mental health and gastrointestinal domains.

ADDRESSING FALL RISK AND SOCIAL ISOLATION IN OLDER ADULTS THROUGH A MEDICAL STUDENT–LED VIRTUAL REALITY INTERVENTION

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Background:
Falls are the leading cause of injury-related deaths among U.S. older adults, with mortality rising by 35% in the past decade. Loneliness is also a widespread public health concern, particularly in rural, rapidly aging regions such as Southern Utah. Despite evidence-based fall prevention strategies, access and adherence remain low, creating a critical gap in addressing both physical and psychosocial determinants of health.

The study is based on the hypothesis that medical student–led, immersive virtual reality (VR) balance training program, combined with structured intergenerational engagement, can reduce fall risk, alleviate loneliness, and enhance geriatric care competencies among future physicians.

Methods:
This mixed-methods, quasi-experimental study will enroll community-dwelling older adults (65–85 years) at risk of falls. Participants will complete 12 bi-weekly VR sessions using the UpRightVR system, focused on gait adaptability and balance. Primary measures include the Berg Balance Scale, Timed Up and Go, Fall Risk Assessment Tool, and Falls Efficacy Scale–International. Secondary measures include the Simulator Sickness Questionnaire, Technology Acceptance Model survey, and pre/post medical student geriatric competency assessments. Data will be collected at baseline, post-intervention, and three-month follow-up.

Planned Scope:
The expected results are high feasibility, strong participant acceptance, reduced loneliness scores, and improved balance confidence in older adults, alongside enhanced empathy and positive attitudes toward aging among medical students.

Conclusion:
This protocol offers a scalable, intergenerational model that addresses both physical and emotional risk factors for falls while embedding meaningful geriatric training into medical education, directly filling the gap between traditional fall prevention programs and real-world engagement strategies.

Keywords: *Aging, Fall risk, Fall Prevention, Virtual Reality, Immersion, isolation, intergenerational*

ILLUMINATING GLIOBLASTOMA ONE CELL AT A TIME: CLINICAL PROSPECTS OF SINGLE-CELL IN VIVO IMAGING

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Background:
Glioblastoma (GBM) is the most aggressive primary brain tumor, with median survival of 12–15 months despite multimodal therapy. Current imaging modalities such as MRI, PET, and intraoperative fluorescence with 5-ALA improve tumor visualization at the tissue level but cannot detect individual infiltrating cells that drive recurrence. Advances in preclinical imaging have demonstrated the possibility of single-cell resolution in vivo, raising critical questions about their translational potential.

Methods:
We will conduct a structured literature review (2010–2025) of in vivo imaging modalities applied to GBM. Studies will be included if they evaluate approaches capable of single-cell or near single-cell resolution in animal models or humans. Data will be extracted on spatial and temporal resolution, penetration depth, labeling requirements, invasiveness, longitudinal tracking capacity, and translational feasibility.

Planned Scope:
The review will catalog preclinical techniques that achieve cellular-level visualization (e.g., multiphoton microscopy, adaptive optics, reporter-based probes) and summarize how they have been applied to study GBM biology. It will also examine minimally invasive and clinically tested modalities, such as confocal laser endomicroscopy, to identify approaches that may represent potential pathways toward translation.

Conclusion:
By systematically synthesizing available evidence, this review aims to clarify the current landscape of single-cell in vivo imaging for GBM and outline key opportunities and barriers to clinical implementation.

Keywords: *Glioblastoma, single-cell imaging, in vivo microscopy, intravital microscopy, three-photon microscopy, confocal laser endomicroscopy translational neuro-oncology*

BURNOUT IN MEDICAL STUDENTS

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Background: What is the prevalence of burnout in medical students and what can be done to reduce it? Burnout among medical students is a growing concern, with prevalence rates approaching 50%. Main symptoms include emotional exhaustion, depersonalization, and a reduced sense of accomplishment co-occurring with depression and anxiety. Burnout threatens student well-being, professional development, and ultimately patient care. This indicates that there is a need for intervention.

Methods: A systematic search of PubMed, Scopus, and PsycINFO (2004–2024) identified peer-reviewed studies examining burnout prevalence, contributing factors, and interventions in medical students. Eligible studies included cross-sectional surveys, meta-analyses, and intervention trials. Data were extracted on prevalence rates, risk factors, intervention types, and outcomes.

Results: The prevalence of burnout ranged from 30–50%, with meta-analyses reporting rates near 44%. Emotional exhaustion was the most common symptom. The COVID-19 pandemic increased burnout risk due to disrupted education and social isolation. Key factors included high academic pressure, lack of institutional support, financial stress, sleep deprivation, and mental health stigma. Minority and female students reported higher burnout levels. Interventions showed mixed results: mindfulness-based programs modestly reduced stress, while curricular reforms and structured mentorship demonstrated greater improvements in well-being. System-level approaches are necessary for sustainable outcomes.

Conclusion: Burnout is prevalent among medical students and stems from individual and systemic factors. While mindfulness and curricular reforms show promise, multi-faceted, institution-wide strategies integrating mentorship, workload reform, and mental health normalization appear most effective. Future research should focus on long-term efficacy and scalability to guide wide-spread change in medical student burnout.

LITERATURE REVIEW: THE USE OF MOTIVATIONAL INTERVIEWING IN THE EMERGENCY DEPARTMENT SETTING AND ITS IMPACT ON PATIENT OUTCOMES

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Background: What are the benefits of motivational interviewing in the emergency department? The Emergency Department (ED) presents both challenges and opportunities for behavior change interventions. Motivational interviewing (MI), a patient-centered counseling style, may be well suited to the ED's fast-paced environment by leveraging "teachable moments" to address risky behaviors and support long-term health.

Methods: A systematic search of PubMed, Scopus, PsycINFO, and CINAHL (2000–2024) identified peer-reviewed studies evaluating MI in ED settings. Eligible studies used MI as a primary intervention and assessed patient outcomes such as substance use, medication adherence, follow-up, or satisfaction. Data were extracted on study design, intervention characteristics, and outcomes.

Results: Multiple randomized trials demonstrated that MI reduced substance use, hazardous drinking, and alcohol-related injuries. MI was also linked to improved medication adherence, hypertension control, and follow-up care. Patients receiving MI reported higher satisfaction and, in some studies, decreased repeat ED utilization. However, effects were sometimes short-lived, and efficacy varied with clinician training and fidelity to MI principles.

Conclusion: Motivational interviewing shows promise as a brief, adaptable intervention to improve patient outcomes in the ED. Its effectiveness in reducing risky behaviors and enhancing engagement highlights its potential value for integration into routine care. Sustaining benefits may require standardized training, tailored approaches for high-risk populations, and system-level strategies to overcome workflow barriers.

COMPARATIVE EFFICACY OF PULLEY TAPING TECHNIQUES IN REDUCING TENDON-TO-BONE DISTANCE IN ROCK CLIMBERS

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Pulley injuries are common in rock climbers and can impair performance and delay recovery. This study evaluates the effectiveness of various pulley taping techniques, traditional H taping, circumferential taping, pre-cut H tape, and figure-eight taping, in reducing tendon-to-bone distance (TBD), a biomechanical marker of pulley support. Five climbers underwent ultrasound imaging under a standardized 10 N load across all taping styles and a no-tape control. Results show all taping methods reduced TBD compared to no tape, with pre-cut H tape and figure-eight taping showing the greatest average reduction. These findings provide preliminary evidence to inform evidence-based recommendations for pulley injury prevention and management.

IS THERE A STANDARD DISTAL LOCKING SCREW LENGTH FOR HUMERAL INTRAMEDULLARY NAILINING?

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Introduction:
Measuring distal locking screw lengths in humeral intramedullary nailing can be a time-consuming step that may increase surgery times, radiation exposure, soft tissue trauma and nerve injury risk. The goal of this study is to determine if there is a standard length for distal locking screws for intramedullary nailing of the humerus in skeletally mature patients.

Methods:
A total of 167 CT scans including the distal humerus were evaluated. Cortical diameters were measured along the anteroposterior (AP) and mediolateral (ML) axes at 2.5, 5.0, and 7.5 cm proximal to the olecranon fossa. All AP and ML measurements were significantly different between males and females.

Results:
The mean cortical AP diameters of the distal humerus at 2.5, 5.0, and 7.5 cm proximal to the olecranon fossa were 18.7 mm (95% CI: 14.4 to 23.0), 20.7 mm (95% CI: 16.0 to 25.4), and 22.6 mm (95% CI: 16.8 to 28.3) for male patients, and 16.7 mm (95% CI: 13.1 to 20.2), 18.5 mm (95% CI: 14.2 to 22.9), and 20.0 mm (95% CI: 14.1 to 25.8) for female patients, respectively. The mean cortical ML diameters of the distal humerus at 2.5, 5.0, and 7.5 cm proximal to the olecranon fossa were 24.1 mm (95% CI: 17.0 to 31.3), 20.9 mm (95% CI: 16.1 to 25.8), and 20.7 mm (95% CI: 16.0 to 25.4) for male patients, and 19.8 mm (95% CI: 14.1 to 25.4), 17.7 mm (95% CI: 13.4 to 21.9), and 17.5 mm (95% CI: 13.5 to 21.5) for female patients, respectively.

Discussion/Conclusion:
Given the confidence interval lies greater than 2 mm beyond the average measurement at each level, we cannot recommend a standard distal locking screw length at this time. Depending on desired screw placement, screw lengths from 14 mm to 26 mm should be available in the operating room.

Keywords: *Anthropometric, Humerus, Distal interlocking screw*

PSYCHOLOGICAL CHANGES IN MEDICAL AND HIGH-DEMAND STUDENTS DURING TRAINING

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Existing research on the psychological well-being of students in high-academic-demand fields, such as medicine, leaves a gap in understanding the full, longitudinal evolution of their psychological state from program entry to completion. This review hypothesizes that a comprehensive review will demonstrate increased rates of anxiety, depression, and burnout. This review examines the existing literature on the progression of negative psychological states, including anxiety, depression, and burnout. It integrates findings on the concurrent decline of positive coping mechanisms, such as patience and resilience. Finally, it consolidates this evidence to identify key inflection points and propose a framework for intervention.
The findings suggest that while initial psychological states vary, a trend of distress is demonstrated throughout academic programs. This decline is associated with increased psychological distress and burnout. Ultimately, this review provides a longitudinal narrative of student psychological well-being, highlighting its importance for developing and justifying proactive, targeted support systems. This work advances knowledge by offering a framework for understanding the toll of these programs, with significant potential to inform institutional policy and future research.

BIDIRECTIONAL LINK BETWEEN STRESS AND THE ORAL MICROBIOME

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The human oral microbiome is a complex and dynamic ecosystem critical to both oral and systemic health. While its composition is influenced by local factors, a growing body of evidence suggests a significant and bidirectional relationship with psychological stress. This literature review integrates the current understanding of how stress impacts the oral microbiome and, conversely, how microbial dysbiosis may influence stress-related outcomes. The review serves as an analysis of the history and current state of this field, highlighting its unique importance in advancing a holistic understanding of health.

A systematic examination of literature reveals pathways through which chronic stress alters the oral environment. These systemic changes serve as diagnostic indicators of stress's impact on microbial balance. Consequently, these environmental stressors lead to dysbiosis and ultimately compromise the microbiome's resilience. The review combines the findings from diverse studies, placing them in the context of a broader understanding.

The findings have significant and instructive implications for clinical and academic fields. The oral microbiome may act as a valuable biomarker for chronic stress and a potential target for therapeutic intervention. This literature review advances knowledge by filling a gap in our understanding of this bidirectional link. It highlights the potential for future research to develop novel diagnostics and personalized treatments, paving the way for a more integrated approach to health that recognizes the powerful interplay between the mind and the microbiome.

KRATOM OVERDOSE: A REVIEW OF MECHANISMS, RISKS, AND CLINICAL CONSIDERATIONS

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Kratom (*Mitragyna speciosa*), a psychoactive plant increasingly used in the United States for pain, anxiety, and opioid withdrawal, has been linked to rising reports of toxicity and overdose. Despite its therapeutic potential, kratom remains poorly understood in clinical settings, particularly with regard to its pharmacological effects and management of adverse outcomes. A review of current literature reveals that kratom's primary alkaloids, mitragynine and 7-hydroxymitragynine, act as partial mu-opioid receptor agonists, producing dose-dependent effects ranging from stimulation to sedation and respiratory depression. Western preparations, often more concentrated than traditional forms, elevate the risk of toxicity—especially when combined with other central nervous system depressants such as alcohol, opioids, or benzodiazepines. Clinical challenges include under recognition due to negative standard toxicology screens, rebound hypoxia following naloxone administration, and the absence of established treatment guidelines. Case reports and epidemiological data document kratom-associated fatalities, including those involving kratom alone. These findings highlight the urgent need for evidence-based clinical protocols, improved provider education, and thoughtful regulatory approaches to ensure patient safety while acknowledging kratom's evolving role in self-medication.

USING PET SCAN SUV METRICS TO PREDICT RESPONSE TO LOW-CARB DIETS IN CANCER PATIENTS

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Ketogenic and other low-carbohydrate diets are increasingly investigated as adjuvant therapies for cancer, particularly in malignancies that are difficult to treat or resect, such as glioblastoma and other brain tumors. These dietary strategies are based on the metabolic vulnerability described by the Warburg effect, in which many cancers rely heavily on glycolysis and glucose for energy production. By restricting dietary carbohydrates, ketogenic diets may reduce tumor glucose availability, potentially enhancing the efficacy of standard treatments such as chemotherapy and radiation.

Despite growing interest, there is limited research on how to identify which patients are most likely to benefit from such dietary interventions. We hypothesize that positron emission tomography (PET) imaging, which provides standardized uptake values (SUV_mean and SUV_max) as measures of tumor glucose metabolism can be leveraged as a predictive tool. Specifically, we propose that baseline PET SUV metrics can be used to predict which patients will be responsive to this adjuvant treatment in terms of progression-free survival and overall survival.

The goal of this project is to invite future studies to identify SUV thresholds that predict favorable outcomes, thereby providing a framework for personalized adjuvant dietary therapy and supporting future prospective trials that use metabolic imaging as a predictive biomarker.

UNSPOKEN HISTORIES: THE IMPACT OF ABORTION NONDISCLOSURE ON PATIENT SAFETY AND PATIENT OUTCOMES

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Introduction: Abortion is one of the most common yet underacknowledged reproductive experiences, with nearly one in four U.S. women undergoing the procedure by age 45. Despite its prevalence, studies estimate 60-70% of abortions remain undisclosed in national surveys. Stigma, rooted in fear of judgment, legal repercussions, and confidentiality, is a primary barrier. Nondisclosure can compromise patient safety, impact clinical care, and distort reproductive health and fertility research.

Purpose: This review examines factors driving abortion nondisclosure and its effects on patient safety, clinical management, and reproductive health research and data.

Methods: A systematic literature review was conducted across PubMed, Embase, and Google Scholar, focusing on studies published between 2010 and 2015. Search terms included abortion, disclosure, medical history taking, stigma, and qualitative research. Of 650 articles screened, 89 met inclusion criteria.

Results: Key drivers of nondisclosure included stigma, fear of judgment, confidentiality, and potential legal repercussions. Nondisclosure **conceals key clinical history and delays treatment, raising risks of complications and poor outcomes**. It also **undermines continuity of care,** leading to incomplete records, inappropriate treatment, and missed opportunities for counseling or contraception. In addition, underreporting **skews reproductive health data,** limiting accurate policy development, resource allocation, and validity of population research. Limitations included reliance on self-report, variable definitions of disclosure, and underrepresentation of marginalized populations.

Contribution to the Field: Reducing nondisclosure requires multi-level strategies, including provider training to reduce stigma, trauma-informed communication, and research tools using neutral, patient-centered language. These approaches can close care gaps, improve decision-making, reduce complications, and ensure reproductive health research reflects the full spectrum of patient experiences.

DO FASCIAL PLANE BLOCKS REDUCE POST-CESAREAN OPIOID USE IN PATIENTS ALREADY RECEIVING NEURAXIAL ANESTHESIA?

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Background: Neuraxial anesthesia with intrathecal opioids is the gold standard for post-cesarean analgesia. In cases where neuraxial techniques are contraindicated (e.g., emergent cesarean delivery, coagulopathy, or HELLP syndrome), alternative strategies are required. Fascial plane blocks, including the transversus abdominis plane (TAP) and quadratus lumborum (QL) blocks, have emerged as potential adjuncts. While these techniques may reduce opioid-related side effects and hasten recovery, their utility when combined with neuraxial opioids remains unclear.

Methods: We reviewed randomized controlled trials, systematic reviews, and meta-analyses published in the past 10 years examining adult women undergoing cesarean delivery. Comparisons were made between neuraxial anesthesia with adjunctive TAP or QL blocks versus neuraxial opioids alone. Primary outcomes included postoperative opioid consumption and pain scores; secondary outcomes included analgesic requirements and opioid-related side effects.

Results:

· **Quadratus Lumborum (QL) Block:** Significantly reduced 24-hour opioid consumption (~8–12 mg morphine equivalents) and improved early postoperative pain scores (≤12 hours) compared to control. Minimal adverse effects were reported. However, no additional benefit was observed when combined with intrathecal morphine.

· **Transversus Abdominis Plane (TAP) Block:** Reduced opioid consumption (~10–20 mg morphine equivalents) and improved pain scores when neuraxial opioids were not administered. When used with intrathecal morphine, benefits were negligible.

Conclusions: TAP and QL blocks provide meaningful analgesia and opioid-sparing effects in patients who do not receive neuraxial opioids, such as those requiring emergent cesarean delivery or with contraindications to neuraxial anesthesia. However, when intrathecal morphine is administered, additional fascial plane blocks offer little benefit. These findings support the selective use of TAP and QL blocks when neuraxial anesthesia is not feasible to optimize postoperative pain control and potentially expedite recovery.

AI TO ADDRESS CAREGIVER BURDEN: STRATEGIES TO ENHANCE USABILITY IN DIVERSE CARE SETTINGS

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Introduction: Artificial intelligence (AI) is increasingly applied in healthcare to support caregivers in settings such as home care, long-term care, and transitional care. While these tools have potential to reduce caregiver burden and enhance care, their usability remains variable. Understanding how AI tools can be optimized for caregiver usability is essential for successful implementation.

Purpose: To examine usability challenges and strategies for optimizing AI tools for caregivers across diverse care settings.

Methods: A systematic literature review was conducted using PubMed, Embase, CINAHL, Cochrane, and Google Scholar. Search terms included "Artificial Intelligence," "Ambient Intelligence," "Machine Learning," "User-Computer Interface," and "Caregivers," combined with terms for "Long-Term Care," "Home Care," and "Caregiver Burden." Studies from 2015–2025 reporting caregiver-facing AI applications and usability outcomes were included. Findings were categorized into themes (usability challenges, barriers, optimization strategies) and synthesized.

Results: Preliminary findings suggest that caregivers often experience challenges when using AI tools, particularly around ease of use, clarity, and how well the tools support their daily caregiving tasks. Some studies indicate that poorly designed systems can unintentionally increase stress or workload. Early strategies to improve caregiver experiences include involving caregivers in design, adjusting interfaces based on feedback, and tailoring tools to specific care settings. Approaches that prioritize transparency and clear guidance appear promising for fostering trust, confidence, and satisfaction among caregivers, though evidence on long-term impact is limited.

Limitations: Heterogeneity in caregiver roles, variability in study quality, and limited long-term evaluation were noted.

Contribution: Optimizing AI for caregivers requires prioritizing usability, adaptability, and trust alongside technical performance. Incorporating caregiver perspectives may enhance adoption, reduce burden, and maximize AI's potential to improve care delivery.

INTELLECTUAL ABILITY INFLUENCES ON PARENT-TEACHER AGREEMENT FOR EXTERNALIZING AND INTERNALIZING PROBLEMS

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Introduction:
Information on externalizing problems and internalizing problems is gathered from parents and teachers in the psychological assessment of children. Past research has documented low concordance between teacher and parent report that make clinical evaluation difficult. A variety of factors can lead to parent-teacher discrepancies in ratings.

Purpose:
The goal of this study is to explore the impact of intellectual functioning on teacher and parent report consistency by analyzing the association between intellectual functioning, teacher-report, and parent-report of internalizing and externalizing symptoms in children.

Methods:
Participants included 921 children (54% male) ages 8 to 12 with and without ADHD. Intellectual functioning was measured using FSIQ. Externalizing and internalizing symptom t-scores were obtained for each participant via parent and teacher report on BASC-2. Intellectual functioning, parent-reported symptomatology, and the interaction between the two were entered into a regression model predicting teacher-reported symptomatology for both externalizing and internalizing symptoms in SPSS 30.0.

Results:
For externalizing problems, parent-reports significantly predicted teacher-report ($p < .001$), and there was a significant interaction between parent-report and intellectual functioning ($p <. 001$) such that parent-report more strongly predicted teacher-report when intellectual functioning was higher. For internalizing problems, parent-report significantly predicted teacher-reports ($p < .001$), however, the interaction between parent-report and intellectual functioning was not significant ($p = .415$).

Discussion:
The results suggest optimization strategies for the scoring system. For internalizing problems, the goal of optimization is to improve the parent-teacher agreement, while for externalizing problems, the goal of optimization is to minimize the interference of FSIQ.

***Keywords**: ADHD, externalizing and internalizing, parent-teacher agreement, intellectual functioning*

SURVEY AND CORRELATION ANALYSIS ON BMI AND ALT AMONG ADULTS IN NORTHERN CHINA

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Introduction and Purpose:
The obesity rate is higher in northern China than in southern China. Alanine transaminase (ALT) correlates with BMI. AASLD recommended a ULN for ALT of 35 U/L for males (M) and 25 U/L for females (F). More analysis of the correlation between ALT and BMI needs to be conducted under the new standards.

Methods:
A total of 13,335 adults from northern China, divided into ten groups (1 = M, 18-29 y, 12.9%; 2 = M, 30-39 y, 28.9%; 3 = M, 40-49 y, 23.1%; 4 = M, 50-59 y, 21.9%; 5 = M, > 60 y, 13.3%; 6 = F, 18-29 y, 11.0%; 7 = F, 30-39 y, 28.5%; 8 = F, 40-49 y, 23.2%; 9 = F, 50-59 y, 23.7%; 10 = F, > 60 y, 13.5%). China BMI standards: normal 18.5-23.9, overweight 24-27.9, and obese ≥ 28. ALT > 35 U/L in males and > 25 U/L in females is abnormal. The correlation of BMI and ALT was analyzed by SPSS 25.0. $P < 0.05$ was a significant difference.

Results:
In the 1-10 groups, the overweight ratio was 34.2%, 41.4%, 47.3%, 49.5%, 47.5%, 19.4%, 26.6%, 37.4%, 44.7% and 50.5%, respectively; the obese ratio was 27.2%, 31.4%, 33.5%, 26.3%, 22.3%, 7.9%, 9.2%, 14.3%, 17.1% and 19.0%, respectively. In the 1-10 groups, the abnormal ALT ratio was 27.8%, 30.6%, 24.0%, 12.7%, 6.9%, 7.1%, 8.8%, 12.7%, 14.8% and 13.4%, respectively. The abnormal ALT ratio in the obese of groups 1, 2, and 3 and overweight of groups 1 and 2 was 54.7%, 55.3%, 34.3%, 30.2%, and 32.5%, respectively. A correlation between ALT and BMI was seen (overall, $r = 0.275$; normal, $r = 0.352$; abnormal, $r = 0.106$). Among abnormal ALT, the correlation was only seen in group 7 ($r = 0.191$) of the ten groups, seen in women ($r = 0.105$) but not in men, while in the obese of groups 5 ($r = 0.255$), 7 ($r = 0.439$), 10 ($r = 0.582$), and the overweight of groups 6 ($r = 0.618$), 8 ($r = 0.233$).

Discussion:
The ratio of overweight and obesity is higher in adults in northern China. Overweight and obese men under 50 years old are at high risk of abnormal ALT. Multiple factors are involved in men's liver injury, while BMI is a relatively single factor in liver injury of women.

Keywords: *alanine transaminase, BMI, northern China*

IMMUNOBIOLOGICAL MECHANISMS AND POTENTIAL THERAPEUTIC TARGETS IN SPINAL IMPLANT ASEPTIC LOOSENING

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Background:
Artificial disc replacement (ADR) was developed to preserve spinal mobility and reduce adjacent segment degeneration compared to fusion. However, ADR can still lead to aseptic loosening driven by wear particles (titanium, UHMWPE). These particles activate innate and adaptive immune pathways, causing inflammation, osteolysis, and eventual implant failure. While the immunobiology of aseptic loosening is well described in hip and knee arthroplasty, spinal implant-specific research remains limited. Denosumab, currently in Phase II trials for hip implant osteolysis, represents the only immunomodulatory therapy under clinical investigation, highlighting the need for novel approaches in the spinal context.
Objectives:
To summarize available literature on immunobiological mechanisms contributing to aseptic loosening of spinal implants.
To review current and emerging immunomodulatory therapies and explore potential future targets for spinal implant aseptic loosening.
Methods:
Two search strategies were conducted in PubMed and ScienceDirect (May–August 2025). The first included in vitro and in vivo studies on immune-mediated mechanisms of implant loosening. The second included preclinical and clinical studies on potential therapeutics for spinal or orthopedic implant aseptic loosening. Reference lists of relevant articles were screened for additional eligible studies.
Results:
Key mechanisms identified include TNF-α–driven RANKL expression and osteoclastogenesis, inflammasome activation (NLRP3), matrix metalloproteinase release, and impaired osteoblast differentiation. Denosumab is the only therapy to advance to clinical trials for peri-prosthetic osteolysis. Promising preclinical targets include NLRP3 inhibitors and pro-resolving lipid mediators (e.g., Lipoxin A4).
Conclusions:
Spinal implant loosening is mediated by complex immunobiological pathways, yet specific data for ADR remain sparse and are often extrapolated from large joint prostheses. Future work should focus on translational preclinical studies targeting identified pathways, with emphasis on delivery strategies, pharmacokinetics, and safety. Conjunctive therapies addressing both implant loosening and adjacent segment disease may offer synergistic benefits, ultimately reducing revision surgery rates and improving patient outcomes.

***Keywords**: aseptic loosening, ADR, osteolysis, joint prosthesis*

FROM CODE TO CARE: AI RELIABILITY IN EMERGENCY MEDICINE

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Artificial intelligence (AI) applications in emergency medicine are rapidly expanding, with tools designed to improve diagnostic accuracy, predict outcomes, and optimize resources. In the emergency department (ED), where timely decisions are critical, AI has shown promise in imaging interpretation, admission forecasting, and detection of life-threatening conditions. However, concerns remain about generalizability, bias, and equitable use.

A literature review was conducted using PubMed to identify peer-reviewed studies evaluating AI in the ED. Inclusion criteria encompassed studies reporting diagnostic accuracy, predictive performance, or operational improvements. The articles were analyzed, focusing on imaging, triage prediction, and bias. Reported metrics included sensitivity, specificity, area under the curve (AUC), and workflow impact.

AI demonstrated high accuracy across multiple applications. Deep learning algorithms for imaging achieved AUCs of 0.94–0.97 for conditions such as pneumothorax and fractures, comparable to expert radiologists. Admission prediction models using triage data reached AUCs of 0.73–0.77, supporting early bed planning. Sepsis detection models improved early recognition but generated false positives. Despite advances, risks of algorithmic bias in diverse populations and integration challenges were noted.

Current evidence suggests AI can serve as a reliable adjunct in ED decision-making, particularly for image-based diagnosis and prediction. Yet reliability depends on validation across diverse populations and real-world contexts. Addressing bias, ensuring transparency, and maintaining human oversight remain essential for safe, equitable use. Future work should prioritize prospective trials, bias mitigation, and assessment of long-term impacts on outcomes and ED efficiency.

CUTTING COSTS, NOT SAFETY: ORAL TRANEXAMIC ACID IN TOTAL JOINT ARTHROPLASTY

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Tranexamic acid (TXA) is widely used in total joint arthroplasty (TJA) to reduce perioperative blood loss and transfusion requirements. While intravenous (IV) administration has been traditional, oral TXA has emerged as a cost-effective alternative. This review synthesizes randomized controlled trials (RCTs), meta-analyses, guidelines, and large safety studies to compare efficacy, safety, and cost of oral versus IV TXA in total knee (TKA) and hip arthroplasty (THA).

A structured literature review of RCTs, meta-analyses, and clinical guidelines was performed. Primary outcomes were calculated blood loss, hemoglobin change, transfusion rates, and perioperative complications; secondary outcomes included cost-effectiveness and use in high-risk populations.

RCTs consistently demonstrate equivalent efficacy between oral and IV TXA in reducing blood loss and transfusion requirements in both TKA and THA. Sukeik et al. found no significant differences in outcomes for TKA, with oral TXA providing notable cost savings (~$14 vs ~$114). Shichman et al. similarly confirmed non-inferiority in THA. Lee et al. compared oral, IV, and topical TXA in TKA, showing comparable results across all routes, again favoring oral for cost. A network meta-analysis of 67 studies (Fillingham et al.) confirmed that all TXA routes outperform placebo without clear superiority of any one route.

Clinical guidelines from leading orthopedic societies endorse TXA in TJA regardless of route, citing reductions in blood loss and transfusion with route choice dependent on institutional protocols, patient factors, and cost. Large-scale retrospective data (Poeran et al.) further support TXA safety, including in patients with prior venous thromboembolism.

Conclusion: High-quality evidence supports oral TXA as a safe, clinically equivalent, and cost-effective alternative to IV administration in TJA. Adoption of oral TXA protocols may reduce perioperative costs without compromising patient outcomes. Future research should refine dosing strategies, evaluate patient-centered outcomes, and assess implementation in diverse practice settings.

***Keywords**: tranexamic acid, total joint arthroplasty, knee replacement, hip replacement, perioperative blood loss, cost-effectiveness*

FROM BARRIERS TO BREAKTHROUGHS: STUDENT-IDENTIFIED STRATEGIES TO GROW THE RVU RESEARCH ENTERPRISE

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With the transition of USMLE Step 1 and COMLEX Level 1 from a scored exam to pass/fail, research has emerged as a primary way for students to distinguish themselves in the NRMP residency match. Since 2009, the average number of research experiences reported by residency applicants has nearly doubled, even as match rates remain steady – highlighting research as a critical differentiator in today's competitive residency landscape. For medical schools, this shift underscores the importance of creating systems that better support student research involvement.

To evaluate the challenges and opportunities for student research at Rocky Vista University (RVU), a cross-sectional survey was distributed to the class of 2028 via Qualtrics. The survey included questions on current involvement, prior experience, barriers to participation, and preferred support strategies. Of the 78 respondents, 47 (61.8%) reported active research participation at RVU, while 26 (33.3%) had prior research experience before matriculation but were not currently engaged. The most frequently identified barrier was difficulty generating a research question, followed by the need for guidance in study design and navigating institutional systems. To address these challenges, most students (86.6%) preferred small, mentor-led groups and implementation of a digital task management tool to support project completion.

These findings highlight opportunities to expand the RVU research enterprise through structured supports including peer mentorship, facilitated project development, and improved navigation of institutional processes. Targeted strategies to reduce barriers will enhance engagement and foster a stronger culture of scholarly activity at RVU.

TRENDS, RISKS, AND ETHICAL CONSIDERATIONS OF SUPPLEMENTAL TESTOSTERONE USE BY HEALTHCARE PROFESSIONALS: A COLLABORATIVE REVIEW GUIDING UTAH POLICY DEVELOPEMENT

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Testosterone therapy (TTh) has expanded dramatically in the United States, often extending beyond evidence-based indications for hypogonadism. National studies reveal that up to 25% of men receiving TTh lack pre-treatment testing and nearly half are not monitored post-initiation, raising concerns about safety and overprescribing. Utah reflects broader Western U.S. trends, where testosterone prescribing has grown substantially, influenced by a cultural emphasis on fitness and wellness. Yet, little research has examined the implications of TTh misuse among healthcare professionals, where psychiatric, cognitive, and ethical risks may compromise clinical judgment and patient safety. In response to these concerns, the Utah Professionals Health Program (UPHP) requested that Rocky Vista University (RVU) conduct a review to guide evidence-based policy development for the state. To address this objective, we conducted a targeted literature review synthesizing peer-reviewed research, national clinical guidelines, and UPHP internal reports to evaluate prescribing practices, adverse outcomes, and oversight gaps most relevant to regulatory decision-making. Findings revealed increasing TTh utilization in Utah, frequent initiation without proper diagnostic testing, and inadequate post-initiation monitoring. Risks included mood dysregulation, impaired empathy, impulsivity, polysubstance use, and withdrawal-related hypogonadism, all of which threaten physician performance and patient safety. While limited by reliance on retrospective data and internal reporting, this review directly informed UPHP's policy response, which now includes enhanced screening, confidential monitoring, and targeted education. This collaboration demonstrates how academic–regulatory partnerships can address a growing physician health concern, offering a replicable framework for other states confronting off-label hormone use while safeguarding patient care and physician well-being.

***Keywords**: testosterone therapy, hypogonadism, substance abuse, patient safety, healthcare professionals*

OSTEOPATHIC MANIPULATIVE MEDICINE FOR SHOULDER INSTABILITY, SLING-RELATED DYSFUNCTION, AND PSYCHOSOCIAL RESILIENCE IN EHLERS-DANLOS SYNDROME: A CASE REPORT

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Introduction: Ehlers-Danlos syndrome (EDS) is a connective tissue disorder marked by hypermobility, chronic pain, and recurrent dislocations. Conventional treatments often provide limited relief, while medication side effects and disability add psychosocial burden. Osteopathic manipulative treatment (OMT) offers a holistic approach that can address biomechanical dysfunction and emotional well-being. Case Description: A 23-year-old woman with a 10-year history of severe EDS presented with diffuse neck, shoulder, back, hip, and wrist pain, recurrent dislocations, and headaches. She had undergone seven surgeries, including shoulder and reverse shoulder replacements, yet her right shoulder remained unstable, requiring continuous sling use. Past interventions included physical therapy, which worsened symptoms, and injections, which gave only transient benefit. Pain medications caused distressing cognitive fog. She engaged in frequent pool exercise and counseling for mental health support. Intervention and Outcomes: Over four months, she received nine OMT sessions. Techniques included counterstrain (trapezius, deltoid, pectoralis, biceps, triceps), balanced ligamentous tension (BLT) for intrinsic and extrinsic shoulder structures, pectoral traction, and thoracic inlet release, with attention to compensatory patterns from sling use. She consistently reported an immediate “floating” sensation lasting hours, followed by days of reduced pain and improved mobility. Over time, she noted better tolerance for social activity, exercise, and improved emotional resilience, which she attributed to the mind-body-spirit focus of OMT. Discussion: This case aligns with literature showing OMT as an effective adjunct in EDS-related pain. It emphasizes treating biomechanical sequelae of sling dependence and addressing psychosocial outcomes through osteopathic principles. Conclusion: OMT improved pain, function, and psychosocial health in a patient with severe EDS, supporting its use as a targeted, holistic therapy.

Keywords: *Ehlers-Danlos syndrome, osteopathic manipulative treatment, chronic pain management, hypermobility disorder, recurrent joint dislocations, psychosocial outcomes*

#SKINCARE: A REVIEW OF THE INFLUENCE OF TIKTOK ON DERMATOLOGY

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TikTok has quickly emerged as a popular social media platform and a major source of health-related information, particularly in dermatology. Its algorithm-driven, visually engaging format enables rapid dissemination of both accurate and misleading content, shaping public perception and health behaviors. This study systematically reviews published literature on dermatology-related content on TikTok, assessing content type, creator characteristics, and information quality.

A comprehensive literature review was conducted using MEDLINE via PubMed and Embase. Two reviewers independently screened studies and extracted data based on predefined criteria. Eligible studies, published in English from 2016 onward, analyzed dermatology or skincare content on TikTok. The search identified 134 articles; after removing duplicates, 105 were screened, and 53 met the inclusion criteria. The most frequent topics were acne and systemic therapies (n = 13), followed by cosmetic dermatology and social media trends (n = 10). Seventeen studies analyzing 1,934 TikTok videos reported on content type, revealing that personal experiences were the most common format (38.8%). Twenty-one studies analyzing 3,204 videos reported on creator type; 64.2% were influencers or vloggers, and 20.6% were board-certified physicians. Physician-generated content had a higher average DISCERN score (2.7) compared to nonphysician content (1.98), indicating superior informational quality.

This review highlights an increasing reliance on TikTok for dermatologic information, predominantly from non-professional sources. The findings emphasize the need for greater dermatologist participation in providing accurate, evidence-based content that improves the quality and reliability of dermatology-related information.

LET'S TALK ABOUT SEX: A REVIEW OF THE INFLUENCE OF SOCIAL MEDIA ON ERECTILE DYSFUNCTION

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Erectile dysfunction (ED), the recurrent inability to achieve or maintain an erection sufficient for satisfactory sexual activity, affects over 30 million men in the United States and significantly impacts quality of life. Despite its prevalence, stigma and reluctance to report symptoms leave many men untreated. While prior research has examined ED awareness and treatment-seeking behaviors, the influence of social media- an increasingly important source of health information- remains less explored. This review explores the influence of social media on men's understanding, discussion, and treatment of ED.

To address this gap, a comprehensive literature search was conducted using MEDLINE via PubMed and Embase. Two reviewers independently screened studies and extracted data using predefined criteria. Eligible studies, published in English, analyzed ED and social media. The search identified 79 articles; after removing duplicates, 72 were screened, and 12 met the inclusion criteria. Key themes included: (1) audience engagement and accuracy of video content on phosphodiesterase inhibitors (PDE5i), (2) comparisons of clinician- versus non-clinician-generated content regarding actionability, engagement, accuracy, and misinformation, and (3) cross-platform comparisons of reliability, quality, and actionability. TikTok, YouTube, and Reddit were the most frequently studied platforms.

This review highlights that accurate content, often produced by clinicians, struggles to gain traction, while misleading material achieves broader visibility. TikTok appears more prone to misinformation than YouTube. Although limited by the small number of eligible studies and potential bias in platform sampling, these findings illustrate how platform dynamics and audience behavior amplify popularity over precision, broadening access but risking credibility.

SPONTANEOUS REGRESSION OF METASTATIC RENAL CELL CARCINOMA IN THE ABSENCE OF SYSTEMIC THERAPY: A CASE REPORT AND REFLECTION OF CURRENT LITERATURE

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Spontaneous regression of metastatic clear cell renal cell carcinoma (ccRCC) is a rare event, occurring in fewer than 1% of cases and typically involving partial, transient regression in patients with limited metastatic burden. Complete and durable regression with extensive disease is exceedingly uncommon. This report describes a rare case of complete and sustained regression of extensive pulmonary nodules following nephrectomy alone.

A 65-year-old man with a past medical history of hypertension, type 2 diabetes, supraventricular tachycardia, and an 80-pack-year smoking history presented with fatigue, weight loss, anemia, and hypercalcemia. Computed tomography (CT) revealed a 10 cm right renal mass with level 1 inferior vena cava (IVC) tumor thrombus, right retroperitoneal lymphadenopathy, and 25 bilateral pulmonary nodules consistent with metastatic disease. The patient underwent right radical nephrectomy with IVC thrombectomy. Pathology confirmed T3a N0 M1 ccRCC. One month postoperatively, CT demonstrated marked regression of multiple pulmonary nodules. Serial imaging over five years revealed complete resolution of all pulmonary lesions without the need for systemic therapy.

This case is notable for sustained regression despite high metastatic burden and adverse prognostic features, including IVC tumor thrombus, which has rarely been documented with spontaneous regression. Proposed explanations include immune activation, modulation of tumor growth factors, and changes in the tumor microenvironment following removal of the primary tumor.

This case adds to the limited literature on spontaneous regression in metastatic RCC. It underscores the need for further research into tumor-immune interactions, which may guide the development of novel therapeutic approaches and treatment for metastatic disease.

COMPARING OSTEOPATHIC MANIPULATIVE MEDICINE AND RADIOFREQUENCY ABLATION IN THE MANAGEMENT OF CHRONIC LOW BACK PAIN: A LITERATURE REVIEW

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Low back pain is a leading cause of disability worldwide, often resulting from facet joint dysfunction, muscular imbalance, and degenerative spinal changes. While conventional management includes pharmacologic therapy, physical rehabilitation, and surgical intervention, non-surgical approaches such as Osteopathic Manipulative Medicine (OMM) and Radiofrequency Ablation (RFA) have gained clinical attention. OMM is a non-invasive, hands-on modality aimed at restoring musculoskeletal balance and mobility, whereas RFA is a minimally invasive technique that disrupts nociceptive signaling from facet joints.

A literature review was conducted using PubMed, Google Scholar, and the OpenEvidence platform to identify relevant studies published within the past 15 years. Search terms included "low back pain," "osteopathic manipulative medicine," "radiofrequency ablation," and "facet joint pain." Articles were screened for relevance to pain reduction, functional outcomes, safety, and patient-reported quality of life.

OMM demonstrated effectiveness in reducing mechanical low back pain, improving functional mobility, and decreasing dependence on analgesics. Its outcomes varied depending on patient selection and provider expertise. RFA consistently showed benefit for facet-mediated pain, with durable relief compared to conservative management, though efficacy may decline over time. Procedural risks of RFA include neuritis and infection, while OMM carries minimal risk. Direct head-to-head comparisons between the two modalities remain limited.

OMM and RFA represent effective, non-surgical options for chronic low back pain management. OMM provides a holistic, low-risk approach that emphasizes function and mobility, while RFA offers targeted, long-term pain relief for appropriately selected patients. Further comparative studies are needed to optimize treatment selection and integration of these modalities into comprehensive pain management strategies.

***Keywords**: low back pain, osteopathic manipulative medicine, radiofrequency ablation, facet joint pain, non-surgical management*

COMPARATIVE ANALYSIS OF SURGICAL INTERVENTIONS IN THE TREATMENT OF OBSTRUCTIVE SLEEP APNEA

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Obstructive sleep apnea (OSA) is a prevalent and potentially life-threatening sleep disorder characterized by recurrent episodes of upper airway collapse during sleep, which can lead to intermittent hypoxia, fragmented sleep, and increased cardiovascular risk. Although continuous positive airway pressure (CPAP) therapy remains the first-line treatment, a substantial number of patients lack accessibility or are noncompliant due to discomfort, intolerance, or inconvenience. Moreover, CPAP is limited in the setting of more severe OSA cases or subtypes. As a result, surgical interventions have emerged as an important alternative or adjunctive treatment strategy. This literature review explores the major surgical options currently available for the treatment of OSA in adults, with a focus on the most prevalent procedures such as uvulopalatopharyngoplasty, maxillomandibular advancement, multilevel upper airway surgery, hypoglossal nerve stimulation, hypoglossal nerve stimulation, transoral robotic surgery, coblation tongue base resection, tonsillectomy, and tracheotomy. This review seeks to identify how these approaches vary in factors such as: target site, patient selection, success rate, complications, limitations, and post-surgical management and quality of life. The sources for this review were drawn from peer-reviewed medical journals, surgical case studies, and clinical trials published within the last 15 years. Inclusion criteria prioritized studies that outline surgical techniques, patient selection criteria, and clinical outcomes such as Apnea-Hypopnea Index reduction. Studies that addressed central or mixed sleep apnea, patients with BMI >32, or patients with prior upper airway surgeries were excluded. The findings of this review are expected to illustrate contrasts in surgical outcomes depending on the procedure type, anatomical target, and patient characteristics. Limitations include variation in surgical approach, sample size, and length of follow-up period. By highlighting the range of surgical interventions available and how they are best implemented, this review aims to provide both patients and clinicians a clearer understanding of OSA management and treatment personalization.

DIAGNOSIS, COMORBIDITIES, AND SURGICAL AND LONG TERM OUTCOMES IN PARTIAL ANOMALOUS PULMONARY VENOUS RETURN (INCLUDING SCIMITAR SYNDROME)

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Partial anomalous pulmonary venous return (PAPVR) is a rare congenital anomaly in which one or more pulmonary veins drain into the systemic venous circulation rather than the left atrium. While some patients remain asymptomatic and are diagnosed incidentally, others develop clinically significant hemodynamic sequelae necessitating surgical repair. Current knowledge of PAPVR remains fragmented, largely confined to isolated case reports, small series, and cohorts where PAPVR appears as a secondary finding.

We are conducting a systematic review to synthesize the available literature on PAPVR with emphasis on clinical presentation, associated anomalies, diagnostic strategies, management pathways, and long-term prognosis. Following PRISMA guidelines, we designed a comprehensive multi-database search that includes English and non-English studies. Data extraction is ongoing, but initial screening has revealed several recurring themes. Diagnostic approaches vary widely, from echocardiography to CT and MRI, reflecting both temporal and institutional practice differences. Surgical techniques are heterogeneous, with outcomes ranging from excellent long-term survival to reports of reintervention and complications, while conservative management remains under-characterized.

Emerging themes include the importance of anatomical variability in shaping treatment strategy and outcome, the influence of comorbid syndromes and systemic context on presentation, and the promise of novel imaging and surgical technologies to refine diagnosis and repair. However, wide variability in follow-up protocols and outcome reporting limits cross-study comparability. By consolidating diverse evidence, this review aims to clarify the natural history and treatment outcomes of PAPVR, identify gaps in existing data, and provide a foundation for standardized recommendations on patient selection, timing of intervention, and long-term surveillance.

DIAGNOSIS, COMORBIDITIES, AND SURGICAL AND LONG TERM OUTCOMES IN PULMONARY ARTERY SLING (WITH OR WITHOUT CONGENITAL TRACHEAL STENOSIS)

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Pulmonary artery sling (PAS) is a rare congenital vascular anomaly in which the left pulmonary artery arises aberrantly from the right pulmonary artery and courses between the trachea and esophagus, often producing airway compression. PAS frequently coexists with congenital tracheal stenosis (CTS), including complete tracheal rings, creating a combined airway–vascular pathology. Surgical management typically involves left pulmonary artery (LPA) reimplantation, with or without concomitant airway reconstruction such as slide tracheoplasty.

We are conducting a systematic review and meta-analysis of surgical and long-term outcomes in PAS with or without CTS. A comprehensive search of PubMed, Embase, Cochrane CENTRAL, Scopus, and Web of Science (1950–present) has been undertaken, supplemented by grey literature and reference snowballing. Eligible studies include observational cohorts, case series, and case reports. Primary outcomes include early mortality, late survival, airway restenosis and reintervention, prolonged ventilation, and ICU length of stay. Secondary outcomes include ECMO, pneumonia/readmissions, tracheostomy, and long-term airway function.

Early screening highlights several recurring themes. Comparative groups include PAS patients with versus without complete tracheal rings, those undergoing LPA reimplantation alone versus single-stage repair with slide tracheoplasty, and historical versus contemporary cohorts. Additional themes include variability in diagnostic modalities (echocardiography, CT, MRI, bronchoscopy), heterogeneity in reporting of long-term respiratory morbidity, and the influence of associated anomalies such as right lung abnormalities or complex congenital heart disease. Reports also describe novel adjuncts such as three-dimensional imaging, surgical simulation, and bioresorbable airway splints.

This review will synthesize these diverse comparators and themes to clarify patterns in the management and outcomes of PAS.

DIAGNOSIS, COMORBIDITIES, AND SURGICAL AND LONG TERM OUTCOMES IN HETEROTAXY SYNDROMES (INCLUDING RIGHT/LEFT ATRIAL ISOMERISM, AV/VENOUS ANOMALIES)

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Heterotaxy syndrome is a rare and complex congenital condition characterized by abnormal thoracoabdominal organ arrangement, frequently involving atrial isomerism, venous anomalies, and splenic abnormalities. Patients often present with severe congenital heart disease requiring biventricular repair, single-ventricle palliation, or transplantation. Despite advances in surgical management, reported outcomes remain variable and are largely derived from small, heterogeneous series.

We are conducting a systematic review and meta-analysis of surgical and long-term outcomes in heterotaxy. A comprehensive search of PubMed, Embase, Cochrane CENTRAL, Scopus, and Web of Science (1950–present) has been initiated, with PubMed screening and early data extraction completed. Eligible studies include observational cohorts, retrospective and prospective case series, and case reports.

Preliminary trends indicate that right atrial isomerism carries higher early mortality compared with left atrial isomerism. When feasible, biventricular repair appears to be associated with improved late survival relative to Fontan palliation. Outcomes following Glenn, Fontan, and Ladd procedures are consistently worse in heterotaxy compared with non-heterotaxy populations, though direct subgroup comparisons are limited. Timing and indications for valve repair, annuloplasty, and Ladd procedures remain debated, underscoring how early decisions shape long-term trajectories. Additional challenges include poorer transplant outcomes in heterotaxy patients, infection risk related to asplenia or hyposplenism, and the inherent complexity of anatomic variability. Emerging adjuncts such as 3D modeling and printing are increasingly utilized for surgical planning in this heterogeneous group.

Although data collection is ongoing, early findings highlight significant variability in outcomes driven by anatomic subtype and surgical pathway. Pooled analysis will further clarify prognosis and guide clinical decision-making in heterotaxy syndrome.

EARLY BARIATRIC SURGERY IN THE PREVENTION OF TYPE 2 DIABETES MELLITUS IN OBESE INDIVIDUALS

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The global rise in obesity has led to a parallel increase in type 2 diabetes mellitus (T2DM), a chronic disease with significant morbidity and economic burden. While bariatric surgery is widely accepted as an effective treatment for obesity and established T2DM, its potential role as a preventive intervention in high-risk obese individuals remains underexplored. Emerging evidence suggests that early metabolic surgery, particularly in prediabetic patients, may significantly reduce the progression to T2DM by improving insulin sensitivity, enhancing beta-cell function, and promoting long-term glycemic stability. This project aims to explore the preventative benefits of early bariatric surgery through a comprehensive review of current literature. Articles from Embase and Pubmed spanning from early 2015 to the most recent clinical trials were collected following a systematic approach using the Prisma Protocol guidelines. Different modalities of bariatric surgery and how the procedure affected patients' metabolic comorbidities were reviewed. By compiling and analyzing available data, this project seeks to determine whether earlier surgical intervention offers meaningful benefits in reducing T2DM risk. Bariatric surgery can be effective in managing and even reversing T2DM; however, the optimal timing of surgery for maximum preventive benefit is still under investigation. It was concluded that bariatric surgery significantly increased life expectancy in patients with T2DM compared with patients who managed their T2DM with pharmacologic agents alone. There is strong evidence of its benefits even when T2DM is already well established. By shifting the focus from treatment to prevention, this research highlights the clinical and public health value of earlier surgical referral for obese patients at high risk for T2DM.

GEOGRAPHIC CARE PATTERNS AND COST IMPLICATIONS FOR INFLAMMATORY BOWEL DISEASE PATIENTS

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Inflammatory Bowel Disease (IBD) is a chronic immune-mediated condition that requires timely diagnosis and sustained management to prevent serious complications and maintain quality of life. Optimal care often involves regular gastroenterology follow-up, routine colonoscopies, and maintenance therapy with high-cost specialty medications, such as biologics. However, barriers such as limited healthcare access, insurance coverage, and financial constraints can influence the quality and consistency of care received by patients with IBD. To investigate how these barriers affect access to care, we analyzed data from New York using the SPARCS database and the U.S. Census Medically Underserved Area (MUA) county classification. New York was selected due to the accessibility of its dataset, regional variation between urban and rural areas, and the high incidence of IBD in the Northeast. Patients from MUAs in New York State frequently travel outside their home counties for IBD care—including non-emergency treatment—which may be due to insufficient local specialist coverage, with emergency cases concentrating in NYC and downstate facilities. This geographic movement consistently increases healthcare charges across all payer types due to structural billing differences and network rules, creating cost escalation independent of medical necessity that particularly impacts access patterns for different insurance groups. This project, which will expand to include additional U.S. regions, specifically examines how geographic and insurance-related barriers affect access and cost of IBD care, while acknowledging the limitation of relying on retrospective administrative data that may not fully capture patient-level factors such as disease severity or complex social factors.

ANALYZING PEDIATRIC POST-OPERATIVE PRESCRIPTION TRENDS FOLLOWING MOTOR VEHICLE ACCIDENTS

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Pain management in pediatric trauma patients following motor vehicle accidents (MVAs) presents unique challenges due to risks of over or under-treatment and concerns regarding opioid use in younger populations. Despite the availability of multimodal pain strategies, opioids remain a common choice— but the extent and variability of their use, especially postoperatively, are not well documented. Identifying current prescribing patterns and alternative agents in post-MVA pediatric care can help inform safer, more effective protocols, reduce opioid-related risks, and support efforts toward responsible analgesia in this vulnerable group. This study aims to identify and describe prescribing patterns of pharmacologic agents, with particular attention to pain medication use, in pediatric patients who underwent surgical intervention after an MVA. This project uses publicly available data from the National Center for Health Statistics, specifically the National Hospital Ambulatory Medical Care Survey (NHAMCS), which provides nationally representative data on healthcare usage and expenditures. The inclusion criteria were patients under 17 who were admitted to the emergency department post-MVA and underwent a surgical procedure of any kind. We collated data from 2015-2022 to map long-term prescribing patterns for this specific population. Preliminary results show the most used drug in the pediatric population was ibuprofen, followed by acetaminophen—these were more common in older pediatric patients; lidocaine was the most used drug in the 0-4 year old population. There was also a significant increase in total drugs prescribed in 2020 as compared to other years analyzed. By mapping long-term prescribing trends, this study provides a foundation for understanding current approaches to pediatric trauma pain management following MVAs. These findings can inform future investigations into safer, more effective protocols and support efforts toward reducing opioid-related risks through evidence-based multimodal strategies.

AUGMENTED REALITY TOOL FOR SURGICAL PLANNING: OVERLAYING CT-DERIVED 3D MODELS ON PHYSICAL OBJECTS USING POLYCAM AND ARUCO MARKERS

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Augmented Reality (AR) is an emerging tool in surgical planning that allows for real-time visualization of patient-specific anatomy in 3D. While previous AR platforms have demonstrated clinical utility, they are now discontinued and expensive, with no open-source alternatives widely available. Our goal was to develop an accessible pipeline that converts CT scan data into 3D models and overlays them onto physical objects in real space using a smartphone and low-cost computer vision tools. This proof-of-concept uses a 3D-printed biomolecule as a stand-in for anatomical tissue and aims to demonstrate the feasibility of this approach for future use in surgical settings. We began by using PolyCam, a LiDAR scanning app, to create a 3D mesh of a 3D-printed biomolecule. This mesh served as a simulated anatomical model. To anchor the virtual mesh onto the physical object, we used ArUco markers—visual tags recognizable by computer algorithms. The model is rescaled and rotated based on three selected anchor points for improved accuracy. The 3D model successfully aligned to the physical object in real time with minimal latency. Visual overlay appeared stable under typical lighting conditions and maintained positional tracking as the object or camera was moved. Although minor jitter occurred during rapid movements or extreme angles, the overlay consistently re-registered upon re-detection of the ArUco marker. With refinement, this approach could support surgical planning, anatomy education, and intraoperative guidance. Future directions include adapting the pipeline for use with real anatomical models and in surgical environments where tissue complexities present additional challenges.

ADVANCED IMAGING SEGMENTATION FOR DETECTING MEDICATION-ASSOCIATED CHANGES IN KNEE OSTEOARTHRITIS AND POTENTIAL DRUG REPURPOSING OPPORTUNITIES

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Osteoarthritis (OA) is a progressive joint disorder characterized by cartilage degradation and joint space narrowing. Various etiologic factors are associated with OA progression and traditionally physicians follow a conservative progression of management and treatment with eventual surgical intervention for severe progression. In this study, we analyzed the distribution of commonly used medications among patients in the Osteoarthritis Initiative (OAI) dataset to identify drugs that may influence disease progression or prognosis. We segmented data using the Segment Anything Model, an advanced computer vision tool that allowed us to isolate bony structures from x-ray images. Our methods provide a preliminary framework for evaluating the potential structural effects of medications in knee OA and demonstrate the utility of such models in musculoskeletal imaging analysis. Several medication classes were associated with greater JSW narrowing, suggestive of accelerated structural joint degeneration, while others were linked to JSW widening, potentially indicating protective effects. These associations varied by gender, underscoring the importance of sex-specific analysis in osteoarthritis research. Our findings indicate that several commonly prescribed medications exert measurable effects on knee joint space width, with certain agents—such as carbonic anhydrase inhibitors and bisphosphonates—showing potential protective properties, while others, including corticosteroids and antineoplastics, were associated with cartilage narrowing. The primary limitation of this project is its reliance on 2D data; future studies will aim to incorporate 3D data to improve accuracy and clinical relevance. These results suggest that routine pharmacologic exposures may differentially influence osteoarthritis progression and underscore the importance of investigating drug repurposing in this condition.

FACTOR XII DEFICIENCY IN A 68-YEAR-OLD MALE SMOKER DISCOVERED DURING AN ABDOMINAL AORTIC ANEURYSM REPAIR

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Factor XII is a serine protease that initiates the intrinsic coagulation cascade, measured by activated partial thromboplastin time (aPTT). Although Factor XII deficiency does not usually cause bleeding, it has been paradoxically associated with thromboembolic events that can be life threatening. This condition is often identified during evaluation of unexplained coagulopathy or incidentally through abnormal coagulation testing.

We report the case of a 68-year-old male with a 17.5 pack year smoking history, prior asbestos exposure, and a mass in his left upper lung lobe determined to be inactive on a recent PET/CT. Previous chest CTs showed pleural thickening, interstitial fibrosis, and atelectasis. His only symptom was mild, intermittent shortness of breath. No history of hypertension, diabetes, or hyperlipidemia. He was cleared to undergo an elective abdominal aortic aneurysm repair with renal artery stenting. Preoperative coagulation studies were not obtained. Intraoperatively, the activated clotting time (ACT) exceeded 1000 seconds on three separate checks within one hour. Postoperatively, the patient continued to demonstrate persistently prolonged aPTT values over a 24-hour period. Hematology evaluation revealed normal platelet count, fibrinogen, international normalized ratio (INR), and prothrombin time (PT) on postoperative day one. Further testing showed an undetectable heparin level (anti Xa <0.10), a normal PTT mixing study, and an unremarkable Rosner index. Coagulation factor assays demonstrated normal levels of Factors VII, IX, and XI, with a markedly reduced Factor XII level (<2) and elevated Factor VIII (224). Beta 2 microglobulin was mildly elevated (2.43), while antiphospholipid panel, protein electrophoresis, and immunoglobulin studies were within normal limits.

In the absence of malignancy on PET/CT and with stable lung findings, a neoplastic process is less likely, although the elevated Beta 2 microglobulin warrants follow up. The persistently elevated ACT and aPTT are most consistent with Factor XII deficiency.

This case highlights the importance of recognizing Factor XII deficiency in the perioperative setting. While it does not increase bleeding risk, its identification can prevent unnecessary interventions and inform appropriate hematologic evaluation.

FAST-TRACKING PROFICIENCY: A COMPARISON OF MINIMAL VERSUS SUPPLEMENTAL ULTRASOUND TRAINING IN MEDICAL STUDENTS

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Ultrasound is increasingly recognized as a vital diagnostic tool across medical specialties due to its portability, non-invasive nature, rapid results, and lack of radiation. In acute care, the Focused Assessment with Sonography in Trauma (FAST) exam is particularly important for detecting intra-abdominal and thoracic injuries. While ultrasound training is expanding in medical curricula, instruction remains inconsistent across different medical schools. This study evaluates whether supplemental ultrasound exposure beyond the standard curriculum improves medical students' FAST exam performance.An observational mixed-methods study was conducted at Rocky Vista University College of Osteopathic Medicine – Southern Utah with second-year students. Participants completed a survey on prior ultrasound experience, categorized as minimal (0–3 hours outside the required curriculum) or extensive (>6 hours). Students with 3–6 hours were excluded for clearer comparisons. Each student then performed a FAST exam within five minutes using a Chison or Mindray ultrasound machine. Performance on four views—Morrison's pouch, splenorenal recess, suprapubic region, and subxiphoid—was scored using a three-tier rubric assessing accuracy, image optimization, and probe orientation.Preliminary findings indicate that students with extensive extracurricular training demonstrated greater accuracy, faster completion, and stronger technical proficiency compared to peers with only minimal instruction. Study limitations include variability in prior training opportunities and evaluator subjectivity, and results may not generalize beyond a single institution. By demonstrating the impact of supplemental ultrasound training on student competency, this research supports the integration of increased time dedicated to ultrasound education in medical school curricula to better prepare students for their future careers.

NAVIGATING THE VISUAL MAZE: THE IMPACT OF VISUAL-SPATIAL AND ARTIFICIAL INTELLIGENCES ON DIAGNOSTIC IMAGING PROFICIENCY

Tyler Trent, Kai Nethercott, Cassie Cortes, Mason Widdison, Lynne Stephenson, MEd

Accurate interpretation of complex visual information is crucial in many medical specialties, particularly diagnostic radiology. Visual-spatial intelligence, which enables the mental manipulation of 2D and 3D images, plays a pivotal role in this process. Artificial intelligence (AI) has recently emerged as a complementary tool, offering pattern recognition, quantitative analysis, and decision support. This literature review examined the relationship between visual-spatial intelligence, diagnostic image interpretation, and the potential role of AI in enhancing performance across different stages of medical training and practice. We reviewed studies from the last 10 years using PubMed, Cochrane, Scopus, and Google Scholar that investigated visual-spatial ability, AI-assisted diagnostics, or both in relation to radiology and other image-based specialties. Findings indicate that higher visual-spatial ability is consistently associated with improved diagnostic accuracy, particularly among trainees, while AI systems show promise in reducing error rates and supporting complex image interpretation. However, few studies have explored the integration of AI with individual cognitive abilities, highlighting a gap in the literature. Limitations include the heterogeneity of study designs and outcome measures, which restrict direct comparison. This review contributes to the field by synthesizing current evidence and underscoring the need for future research on how AI can complement, rather than replace, human visual-spatial intelligence in medical image interpretation.

APPROACHING THE STANDARDIZATION OF ARTIFICIAL INTELLIGENCE EDUCATION IN RADIOLOGY RESIDENCY

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Introduction: Artificial intelligence (AI) is rapidly transforming the field of radiology, influencing image interpretation, diagnostic workflows, and clinical decision-making. The diffusion of AI in clinical practice has necessitated radiologists to be trained in these technologies, and residency programs have been increasingly motivated to equip their trainees with the skills and knowledge to implement and critically assess these tools. However, education for radiological imaging differs; graduate medical education programs lack standardization, and courses vary in length and hands-on learning opportunities. This literature review analyzes the current approaches, discrepancies, and future directions in AI training in radiology residency.

Methodology: Articles indexed by MEDLINE via Pubmed, EBSCO, Embase, and Google Scholar were captured by searching across three domains: Artificial Intelligence, Radiology/Medical Imaging, and Education/Residency Training.

Results: Educational strategies identified include didactic sessions, journal clubs, hands-on learning, and certificate programs. Systematic reviews and resident surveys consistently indicate a preference for longitudinal, hands-on, and case-based learning throughout residency. Key challenges in implementing AI education are the absence of standardized curricula, scheduling constraints for residents, and limited faculty expertise. Discrepancies exist in course content depth and assessment methods, with frequent omission of essential topics such as algorithmic bias, data management, and regulatory oversight.

Discussion: Standardization of AI competencies is urgently needed to prepare radiology trainees for the evolving landscape of AI in clinical practice. This review highlights the necessity for standardized, evidence-based, and longitudinal guidelines that incorporate practical skills, ethical considerations, and regulatory frameworks to ensure safe and effective integration of AI into radiology education.

ASSESSING SAFE AND EFFECTIVE MANAGEMENT OF ROSACEA FULMINANS IN PREGNANCY

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Rosacea fulminans (RF) is a dermatosis of centrofacial erythema, papules, pustules, and nodules. Although its pathogenesis remains unclear, proposed triggers include hormonal and immune dysregulation, which are both prominent during pregnancy. Managing RF during pregnancy is challenging due to teratogenicities and risks of standard therapies. No standardized guidelines exist for managing RF during pregnancy, making treatment difficult and delaying care. This review aims to evaluate treatment strategies for RF during pregnancy to determine the most effective therapies.

A comprehensive electronic database search was conducted. Studies were included if they reported on patients without prior RF history, included post-partum follow-up, and included detailed treatment regimens (i.e. dosage and outcomes). Studies were excluded if RF was not distinguished from rosacea or if pregnancy ended with early termination. Case reports were assessed to identify patterns in treatment efficacy and safety during pregnancy.
The most common treatments during pregnancy were corticosteroids, mainly prednisolone, and antibiotics (i.e. erythromycin, amoxicillin-clavulanate, azithromycin). Outcomes varied from no improvement to partial resolution, though most cases reported clinical benefit. Isotretinoin, used exclusively postpartum, was consistently associated with complete resolution without relapses. Limitations include small sample size and combination therapy, which limits assessment of individual drug efficacy.

Corticosteroids and antibiotics were identified as moderately effective options during pregnancy, with isotretinoin as the most effective postpartum. These findings help clarify current management strategies and contribute to determining the most effective treatment plan for RF. Future steps include developing clear dosing recommendations and standardizing weight-based treatment protocols to guide clinical practice.

POST-INFLAMMATORY PIGMENTARY CHANGES FOLLOWING KELOID TREATMENT IN DARKER SKIN: A LITERATURE REVIEW

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Keloids are raised scars that develop following skin trauma, growing beyond the original borders of the wound. Keloids disproportionately affect darker skin types, with a higher risk in those on Fitzpatrick Scale levels IV - VI. This review aims to compare the effects of various forms of keloid treatment on post-inflammatory pigment changes (PIPC), such as hyperpigmentation or hypopigmentation.

A comprehensive electronic literature review was completed. Studies were included if they reported patient treatment modalities, Fitzpatrick scale IV-VI, keloids, and PIP changes. Studies were excluded if they did not report PIP changes and if treatment was not specifically for keloids.

Pigment changes were reported across all treatment modalities for keloids. Silicone sheets were associated with the lowest risk of PIPC while cryotherapy had the highest associated risk, specifically for hypopigmentation. Laser-based therapy produced variable outcomes influenced by wavelength, energy settings, and use of other treatments in conjunction. Intralesional corticosteroids alone were linked to mild PIPC, and combination therapeutic regimens showed lower risk than monotherapy. Limitations included inconsistent reporting of patient skin type and PIPC outcomes. Overall, post inflammatory pigment changes appeared temporary with improvement over several months.

Post-inflammatory pigment changes are a frequent side effect of keloid treatment in darker skin, but are often reversible. Treatment selection should be tailored to minimize risk and pigmentary outcomes should be more consistently reported in clinical studies to further tailor treatment for people of color. Understanding the frequency of these changes could help provide better guidance for physicians and patients seeking care.

THREE CRUCIAL DERMATOLOGIC DRUG INTERACTIONS: A FOCUS ON MECHANISMS, ADVERSE REACTIONS, AND COMPLICATIONS

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Drug-drug interactions are a frequent challenge in dermatology, as many patients take medications for multiple conditions. This review aimed to identify the most clinically significant dermatologic drug-drug interactions and highlight strategies for safer prescribing.
A literature search using PubMed, Google Scholar, and OpenEvidence AI identified studies detailing mechanisms, adverse reactions, and clinical outcomes of dermatologic drug-drug interactions. Case reports were included to recognize patterns in presentation, management, and resolution; studies without clinical outcomes were excluded.

From this analysis, three interactions emerged as most clinically significant: isotretinoin-tetracyclines, terbinafine-paroxetine, and spironolactone-ACE inhibitors/ARBs. Isotretinoin with tetracyclines consistently raised intracranial pressure, with multiple reports linking this combination to pseudotumor cerebri; a washout period or immediate drug discontinuation was recommended to prevent permanent neurological damage. Terbinafine inhibited CYP2D6 metabolism of paroxetine, predisposing patients to serotonin syndrome; dose adjustment or substitution strategies were effective in reported cases. Spironolactone with ACE inhibitors/ARBs frequently caused hyperkalemia, especially in patients with renal impairment, underscoring the need for potassium monitoring.

While isotretinoin-tetracycline carried the highest risk due to severe neurological outcomes, the other interactions posed significant but more manageable risks with close clinical follow-up. Limitations include reliance on case reports and heterogeneous study designs, which may affect generalizability. Future directions include integrating EMR alerts, enhancing patient education, and developing risk-based prescribing guidelines to reduce preventable harm in dermatology and primary care settings.

CUTANEOUS MANIFESTATIONS OF NUTRITIONAL DEFICIENCIES AND GLP-1 AGONIST ADJUNCTS IN POST-BARIATRIC SURGERY PATIENTS

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Bariatric surgery is an effective treatment for obesity, but weight regain is common, leading some patients to use GLP-1 receptor agonists to enhance postoperative weight loss. Surgical alteration of the stomach, combined with GLP-1–induced delayed gastric emptying, can exacerbate nutritional deficiencies, potentially causing dermatologic complications. Understanding this interaction may improve patient counseling and postoperative care.
A PubMed search was conducted for articles published in the past 10 years using the terms "Bariatric surgery," "skin changes," "GLP-1 agonist," "dermatologic manifestations," "nutritional deficiencies," and "gastric bypass." Inclusion criteria required discussion of both bariatric surgery and skin changes in the context of GLP-1 agonist use, with free-text availability.

Of 144 articles screened, 8 met all criteria. GLP-1 agonists alone were not directly associated with dermatologic changes, but when used post-bariatric surgery, they increased the risk of nutrient deficiencies and delayed wound healing. Bariatric surgery itself can lead to alopecia, dermatitis, hyperpigmentation, and heightened infection risk due to malabsorption of zinc, vitamins A, B, and C, protein, and other nutrients. GLP-1–related adverse effects—nausea, vomiting, and diarrhea—can compound these deficiencies, increasing risks such as bruising. Despite these risks, GLP-1 agonists were found to be more effective when used after bariatric surgery, improving weight loss, cardiovascular risk factors, obesity-related comorbidities, and all-cause mortality. Limitations included reliance on a single database and scarce research on post-bariatric GLP-1 use.

Further studies are needed to clarify the dermatologic consequences of combining bariatric surgery with GLP-1 agonists, ensuring patients recognize nutrient deficiency symptoms early to optimize recovery and outcomes.

THE ROLE OF THE SKIN MICROBIOME IN THE DEVELOPMENT AND SEVERITY OF OCULAR SURFACE DISEASE

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The ocular surface microbiome has become increasingly researched as its role in immune function continues to be discovered. Rising evidence suggests that the microbiome of the skin can influence ocular health and the function of the meibomian gland, which can play a major role in ocular surface disease (OCD). The purpose of this study is to determine how skin flora influences the severity of OCD by comparing the conjunctiva, the skin of the eyelid, and meibum in healthy controls (HCs) and patients with Meibomian Gland Dysfunction (MGD), a leading cause of dry eye symptoms.

A thorough electronic database search was undertaken. Eligible studies included those reporting on the skin microbiome and meibomian gland within the last ten years. Significant differences were discovered in the microbial makeup of meibum between HCs and MGD patients. A majority of microbial differences seen in the meibum of MGD patients were also seen in the eyelid skin. However, they were not comparative on the conjunctiva, indicating a connection solely between the meibum and the skin. Microbial organisms, such as *Campylobacter jejuni* and *Bacteroides species*, were ample in the meibum of MGD patients, likely surviving using virulence factors such as the type III secretion system and polysaccharide capsule, respectively. However, they were absent in MCs.

The similarities in microbial dysfunction between the eyelid skin and meibum of MGD patients suggests that skin flora may contribute to the severity of OCD. Further research into the microbiome between the skin and eyes may reveal therapies for OCD.

ENHANCING KETAMINE THERAPY THROUGH FLAVOR-LINKED POSITIVE REINFORCEMENT

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Ketamine is increasingly used in the treatment of mood disorders and chronic pain, with much of the research focused on its pharmacologic mechanisms. However, nonpharmacologic strategies to enhance its therapeutic effects remain underexplored. This study examined whether pairing nasal ketamine administration with a flavor stimulus, such as a sucker of the same flavor, could reinforce positive associations and whether reintroducing that flavor outside of treatment sessions might provide relief during challenging moments. We conducted a retrospective review of patient experiences in a clinical setting where nasal ketamine was administered in conjunction with a flavor stimulus. Patients were surveyed about the perceived impact of this pairing during treatment and whether they later used the same flavor sucker at other times when feeling down, anxious, or distressed, and if doing so provided relief. Preliminary findings suggest that consistent flavor pairing during ketamine therapy may enhance positive reinforcement, facilitate recall of therapeutic states, and offer patients a nonpharmacologic coping tool. Flavor-linked reinforcement, therefore, represents a novel adjunctive approach to ketamine therapy, with this study demonstrating a positive correlation between flavor pairing and enhanced therapeutic recall. To our knowledge, no prior literature has evaluated this method.

RAPID PERMANENT VISION LOSS SECONDARY TO GIANT CELL ARTERITIS

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Giant cell arteritis (GCA) is the most common systemic vasculitis in adults over 50 and represents an ophthalmic emergency due to its potential for irreversible blindness. Although prompt corticosteroid therapy typically preserves vision in the contralateral eye, rare fulminant presentations can result in rapid bilateral vision loss despite immediate treatment.
We present the case of a 78-year-old male who developed acute, profound visual loss in his left eye. Over the course of weeks, visual acuity declined from 20/40 to counting fingers OS, with optic disc edema and hemorrhages consistent with arteritic anterior ischemic optic neuropathy. Despite hospital admission and initiation of high-dose intravenous methylprednisolone followed by oral corticosteroids, the right eye deteriorated as well, from 20/25 at baseline to 20/200 and subsequently 20/100, with worsening field deficits. The left eye further declined to 20/350 with severe visual field loss. Temporal artery biopsy confirmed GCA.
This unusually aggressive course underscores the unpredictable and devastating nature of GCA, in which even timely, guideline-directed therapy may fail to halt progression. While most cases stabilize with treatment, this report highlights the catastrophic potential of fulminant disease and the need for heightened vigilance and continued research into adjunctive or alternative therapies beyond corticosteroids for treatment-resistant presentations.

DEVELOPMENT OF CLINICAL TOOLS TO DEMONSTRATE PELVIC FLOOR EXERCISES TO ADULTS 50+

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Background: Pelvic floor disorders (PFD) are extremely prevalent; half of females over the age of 80 have one (Okeahialam). Pelvic floor exercise (PFE) has been shown to improve urinary incontinence and overall quality of life for women older than 50 (Fricke). While pelvic floor muscle training (PFMT) such as "Kegels" are routinely discussed in OB/GYN settings, PFMT is infrequently prescribed to men. In men, PFMT can help with stress urinary incontinence and sexual dysfunction (Siegel). Although PFE is an effective intervention, a wide variety of implementation strategies has led to inconsistent outcomes (Jundt).

Objective: Develop simple and effective tools for teaching PFE to adults (male and female) over 50.

Methods: First, the research team will conduct a thorough literature review to select 2-3 well-studied PFEs used to prevent and treat PFDs in adults over 50. If outcomes vary by sex, separate interventions will be developed. Educational materials will be developed including a seminar slideshow, video demonstration, and pamphlet that describes how to properly perform PFEs in a way that is understandable to the general public. The projects will demonstrate PFEs using visual aids to increase engagement and comfort. Finally, a seminar will be given at a senior center or senior living facility in Washington County, Utah (videos/pamphlets offered as supplemental). A survey will be administered to attendees rating their understanding of PFEs and likelihood to implement them into their routine. The seminar will ideally be given at several locations within the county to increase the number of attendees and survey responses.

Expected Results: A standardized tool explaining PFEs expands accessibility to exercise prescription for treatment of PFDs. The strongest benefit is predicted for older adults. We expect to see increased knowledge and desire to implement PFE in participants. The significant limitation in this study is that it does not address implementation of PFE.

TARGETED MODULATION OF EPIPHYSEAL FUSION TO OPTIMIZE GROWTH HORMONE THERAPY

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Background: Growth hormone (GH) therapy remains a key treatment in pediatric endocrinology for GH deficiency and other impaired growth conditions. The therapeutic window for GH efficacy is predominantly constrained by epiphyseal development rather than chronological age, as GH stimulates linear growth until growth plates fuse, after which height addition is physiologically unachievable.

Purpose: This study aims to synthesize evidence demonstrating that pharmacological modulation of bone maturation can extend the therapeutic window for growth hormone, thereby improving final adult height outcomes.

Methods: Current evidence synthesized from recent observational studies and clinical trials was used to evaluate the therapeutic window of growth hormone.

Results: Importantly, skeletal maturation is flexible and can be pharmacologically modified. Adjunctive therapy with an aromatase inhibitor, like anastrozole, has shown a decelerated advancement of bone age in pubertal boys, resulting in substantial adult height gains. A similar result is seen with gonadotropin-releasing hormone (GnRH) agonists, which delay puberty by suppressing sex steroid production. This prolongs the growth window by delaying estrogen-mediated epiphyseal fusion. Advancing therapies, such as C-type natriuretic peptide (CNP) analogs like vosoritide, directly target growth plate signaling mechanisms to lengthen chondrocyte proliferation.

Conclusion: Collectively, these methods demonstrate that the effectiveness of GH therapy is determined by skeletal biology rather than age. Targeted modulation of bone maturation is capable of extending the period of linear bone growth. This shift in findings emphasizes the importance of individually customized treatment strategies, integrating adjunctive therapies with GH administration in select populations, to optimize final adult height outcomes.

AI-ENHANCED RETINAL IMAGING FOR CARDIOVASCULAR RISK ASSESSMENT: A SYSTEMATIC REVIEW

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Background: The retinal microvasculature provides a noninvasive window into systemic vascular health. Recent studies show that combining retinal imaging with artificial intelligence (AI) can predict cardiovascular (CV) risk with accuracy comparable to clinical models. However, most studies have been retrospective. Thus, prospective trials in diverse populations are needed to confirm clinical utility.

Purpose: This review examines evidence linking retinal vasculature to major adverse cardiovascular events (MACE), evaluates the predictive precision of AI models, and outlines steps necessary for broader clinical adoption.

Methods: A targeted PubMed search identified 18 studies comparing AI-based retinal image analysis with established clinical risk models for predicting MACE or related outcomes, with an emphasis on studies exploring multimodal data integration.

Results: In large cohorts, narrower arterioles, wider venules, reduced fractal dimension, and increased tortuosity were independently associated with a higher CV risk after adjusting for traditional risk factors. AI models achieved a high area under the curve (AUC) value of 0.70-0.85 for MACE prediction. In some instances, deep learning AI models outperformed standard calculators such as the Framingham Risk Score. Multiple studies also highlighted the feasibility of rapid and cost-effective screening using deep learning AI models in primary care and underserved settings.

Conclusion: Retinal imaging, enhanced by AI, shows strong potential as a transformative tool for CV risk assessment due to its scalability and economic viability. However, it is not yet ready for routine clinical integration. Its successful adoption is contingent upon the rigorous prospective validation of AI models for MACE prediction, standardized imaging protocols, and formal regulatory approval.

DRY EYE DISEASE IN YOUNG ADULTS: PREVALENCE, RISK FACTORS, AND A CALL FOR PROACTIVE SCREENING

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Background: Although dry eye disease (DED) is traditionally associated with aging, recent epidemiological studies indicate that it also affects adolescents and young adults. Prolonged digital screen use, contact lens wear, and environmental conditions have been identified as potential risk factors. Furthermore, pediatric diabetes has been linked to a higher prevalence of DED.

Purpose: This review synthesizes current evidence to examine how the prevalence of DED, its predominant risk factors, and specific ocular surface findings are influenced by behavioral and environmental factors in individuals under 30 years of age.

Methods: A targeted PubMed search identified 12 studies that utilized objective measures, such as tear breakup time, Schirmer's test, and meibography, to assess the prevalence, risk factors, diagnostics, and management of DED in young people.

Results: During the COVID-19 lockdowns, DED prevalence ranged from 10-30% in young adults to over 40% in pediatric cohorts. Several studies consistently identified daily screen time exceeding 4-6 hours as a primary risk factor. Other notable factors included contact lens wear, short sleep duration, eye allergies, and pediatric diabetes. Objective tests revealed significant instability in the tear film and changes in meibomian gland function, even in asymptomatic individuals.

Conclusion: This review challenges the traditional view of DED as a disorder of aging. The early onset of ocular surface changes in younger populations, even among those without symptoms, underscores the necessity of routine screening and preventative strategies to preserve long-term ocular health.

AUTONOMOUS ARTIFICIAL INTELLIGENCE IN DIABETIC RETINOPATHY SCREENING: ACCURACY, IMPLEMENTATION, AND ECONOMIC VALUE

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Background: Diabetic retinopathy (DR) is a leading cause of preventable blindness globally. To address the fact that nearly half of all individuals with diabetes miss their annual eye exams, autonomous artificial intelligence (AI) systems, such as IDx-DR/LumineticsCore, EyeArt, and AEYE-DS, have shown significant potential. These FDA-approved platforms can accurately and independently analyze retinal fundus photographs, providing immediate referral decisions in primary care or community settings

Purpose: This review assesses how autonomous AI systems influence diagnostic accuracy, cost-effectiveness, and equity in DR screening.

Methods: A targeted PubMed search identified 22 studies that evaluated clinical validations, real-world implementation, and economic outcomes of autonomous AI for DR screening. Results: Prospective trials demonstrated high sensitivity (85-96%) and specificity (80-91%) for detecting referral-warranted DR, with an imageability rate greater than 94%. Implementation studies showed that the integration of AI platforms increased screening rates by 25% and narrowed racial and ethnic disparities in care by 15%. Economic analyses conducted across the U.S., Japan, China, and Europe found that per-screening costs decreased by 25% when AI was integrated into the screening workflow.

Conclusion: Autonomous AI systems achieve a high level of diagnostic accuracy, comparable to that of specialists. These platforms broaden access to DR screening and reduce disparities in care at a lower overall cost. By shifting the initial triage of patients to primary care settings, these AI systems enable ophthalmologists to focus their expertise on patients who will most likely benefit from timely intervention. Therefore, autonomous AI represents a scalable and globally applicable framework for preventing vision loss.

THE GOLD STANDARD IN END-STAGE CORNEAL BLINDNESS: A REVIEW OF OSTEO-ODONTO-KERATOPROSTHESIS (OOKP)

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Background: End-stage corneal blindness from trauma or graft rejections presents a significant challenge. OOKP is a promising treatment using a patient's own tooth-and-bone graft to restore vision. It minimizes immune rejection and provides long-term stability. While several case series exist, a focused synthesis of long-term outcomes and complication management is lacking. Methods: This review synthesized data from 12 PubMed studies. We focused on implant survival rates, changes in visual acuity (VA), and key complications: glaucoma, mucosal necrosis, and lamina resorption.

Results: The device showed high functionality with survival rates over 80% at 10 years. OOKP consistently improved VA, with many patients achieving 20/40 to 20/200. Complications were observed, including glaucoma progression in up to 30%, mucosal necrosis in 20-25%, and lamina resorption in 10-15%. Despite these outcomes, OOKP outperformed alternative keratoprostheses in long-term stability.

Discussion: The literature emphasizes OOKP as a highly effective intervention when corneal transplants fail. The autologous tissue minimizes rejection and the optical cylinder facilitates meaningful vision. Nonetheless, OOKP remains a multidisciplinary approach involving ophthalmologists, oral surgeons, and prosthetic specialists. Major gaps are seen in patient selection, secondary glaucoma management, and less invasive alternatives. Outcomes highlight that the procedure is well-tolerated, sustainable, and vision-preserving.

Conclusion: OOKP remains the gold standard among keratoprostheses as it provides a unique gateway to vision for patients otherwise destined for permanent blindness. To ensure its continued success and mitigate postoperative risks, there is a need for multidisciplinary approach that includes rigorous surveillance and targeted strategies to manage postoperative complications and preserve functional outcomes.

THE UNSTANDARDIZED SOLUTION: A REVIEW OF PICKLE JUICE DOSING FOR MUSCLE CRAMPS

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Introduction: Exercise-associated muscle cramps (EAMC) are a prevalent and often performance-limiting issue for athletes. While traditionally linked to dehydration, recent evidence highlights neuromuscular fatigue and altered spinal reflex control as primary mechanisms. Pickle juice (PJ) has emerged as a rapid intervention mediated by oropharyngeal neural reflexes. The objective of this review is to determine if existing literature supports a standardized, effective dose of PJ for the treatment of EAMC.

Methods: We reviewed 18 articles, including randomized controlled trials and physiological studies, to compare electrolyte depletion versus neural reflex theories and analyze the impact of varying PJ doses.

Results: Dehydration and moderate electrolyte loss did not significantly alter cramp susceptibility; instead, neuromuscular fatigue reliably increased muscle excitability, which made cramp initiation easier. PJ consistently relieved cramps within 60-90 seconds via a neural reflex triggered by oropharyngeal transient receptor potential (TRP) channels. This is supported by the fact that its action occurs without significant changes in plasma electrolytes or hydration status, suggesting a mechanism independent of systemic absorption. While effective, the optimal dose remains undefined, as the doses varied across studies, from as little as one tablespoon or a small sip in individuals with cirrhosis to 30–60 mL in case reports for EAMC, while controlled trials employed larger, weight-based dosing (1–2 mL/kg).

Conclusion: PJ is a rapid, reflex-based therapy for cramps. Its effectiveness is threshold-dependent, acting through a neural pathway rather than systemic changes. This review highlights the critical knowledge gap of a standardized dosing protocol, providing a foundation for future research to determine the minimal effective dose and establish population-specific recommendations.

COUNSELING, BREASTFEEDING, AND FUTURE PREGNANCY DECISIONS IN PERIPARTUM CARDIOMYOPATHY

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Peripartum cardiomyopathy (PPCM) is a rare, life-threatening form of heart failure that emerges in late pregnancy or the postpartum period. In addition to acute management, counseling about breastfeeding, future pregnancy, genetic testing, and investigational therapies remains central to long-term care. Despite its importance, little is known about how women with PPCM experience counseling practices. The purpose of this study was to characterize patient-reported counseling and management patterns in PPCM. We conducted a cross-sectional survey of ~5,000 members of a Facebook-based PPCM support group. The survey was administered using Qualtrics, and analyses were restricted to U.S. respondents with complete data (N = 201). Descriptive analyses were performed in SAS v9.4 (SAS Institute Inc., Cary, North Carolina) using complete-case denominators. Variables included advice regarding breastfeeding, discouragement from future pregnancy, receipt of genetic testing, and bromocriptine prescription. Among respondents, 64.7% (130/201) reported being advised against breastfeeding, 88.6% (178/201) were discouraged from future pregnancy, 18.4% (37/201) received genetic testing, and 6.5% (13/201) were prescribed bromocriptine. These practices reflect concerns about prolactin-mediated pathophysiology, relapse risk with pregnancy, and the potential role of genetic predisposition. This study provides novel patient-reported evidence on PPCM counseling in the United States. Findings suggest that most women receive strong guidance regarding reproduction and lactation, though recommendations vary and may not be consistently applied. Standardized counseling and shared decision-making tools could reduce confusion, improve patient satisfaction, and support safer maternal health outcomes.

QUADRICEPS TENDON VERSUS HAMSTRING TENDON AUTOGRAFTS FOR ACL RECONSTRUCTION: COMPARATIVE OUTCOMES AND LONG-TERM KNEE FUNCTION

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Anterior cruciate ligament (ACL) reconstruction commonly utilizes hamstring tendon (HT), bone–patellar tendon–bone (BPTB), or quadriceps tendon (QT) autografts, with QT gaining interest as a potentially lower-morbidity alternative. An analysis of recent systematic reviews, meta-analyses, and comparative cohort studies indicates that QT autografts provide graft survival, functional outcomes, and stability comparable to HT and BPTB. Compared with HT, QT autografts yield similar patient-reported outcomes at both short- and long-term follow-up, with some evidence suggesting superior functional scores, while consistently demonstrating lower donor site morbidity than either HT or BPTB. HT autografts are associated with less anterior knee pain than BPTB, but QT autografts report the lowest harvest site discomfort overall. No significant differences are observed between QT and HT in Lachman, pivot shift, or single-leg hop tests, and long-term data show no consistent differences in osteoarthritis rates or contralateral ACL injuries. Current evidence supports QT autografts as a reliable first-line option for primary ACL reconstruction, offering equivalent performance to HT with potential benefits in postoperative morbidity, though further high-quality long-term studies are warranted.

THE ROLE OF EARLY MOBILIZATION IN RECOVERY AFTER ANKLE FRACTURE SURGERY: OUTCOMES, RISKS, AND BEST PRACTICES

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The timing of mobilization after surgical fixation of ankle fractures remains a topic of ongoing discussion. Early mobilization can speed up functional recovery, but it also raises concerns about safety and possible complications. This review examines the evidence on when to begin mobilization following open reduction and internal fixation (ORIF) surgery. Recent studies involving thousands of patients show that within the first six weeks after surgery, those who began weight bearing and mobilization early tended to have better short-term functional scores compared to patients who remained immobilized. However, by six months, these differences largely disappeared. On average, patients in early mobilization programs returned to work about three weeks sooner than those who were non-weight-bearing. Despite these benefits, research also shows a slightly higher rate of complications—particularly wound infections—among early mobilization groups. Given the modest short-term advantages and the potential for complications, most experts recommend tailoring rehabilitation plans to each patient's specific condition, surgical outcome, and risk profile rather than applying a one-size-fits-all approach.

BARRIERS TO HEALTHCARE ACCESS AMID HEIGHTENED IMMIGRATION ENFORCEMENT: A COMPARATIVE ANALYSIS OF DOCUMENTED AND UNDOCUMENTED LATINO POPULATIONS IN UTAH

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Immigration enforcement policies have created a "chilling effect," where fear of deportation discourages immigrant households from seeking healthcare. This disproportionately impacts Hispanic/Latino communities, which comprise 16% of Utah's population. This study examined the association between perceived immigration enforcement risk and healthcare delays or avoidance among Latino adults in Southern Utah. A cross-sectional, bilingual, anonymous survey was distributed through July-September 2025 among community organizations serving Hispanic/Latino populations. Eligible participants were consenting Utah residents, 18+, who self-identified as Hispanic/Latino. Data was analyzed through descriptive statistics. Of 117 surveys, 49 respondents were undocumented. Undocumented participants more often used community health centers, while documented participants preferred doctor's offices (23.2%, (95% CI: 14.8%-62.5%) vs 34.4%, (95% CI: 27.2%-49.5%) respectively, n=69, P = 0.0126). Most participants (89.2%, n=65) indicated Spanish-speaking staff would make them feel safer. Documented participants mostly reported not delaying care, while undocumented individuals delayed care at a higher rate (n=68, (90% CI: 31.3%-58.0%), P=0.0684). No significant associations were observed between ICE enforcement and delaying care in either group. Preliminary data identified a lack of Spanish interpreters as a major barrier to care. Over two-thirds of respondents had heard of immigration raids and reported moderate to severe deportation worries. Contrary to the hypothesis, immigration raids were not significantly linked to delayed care among undocumented participants. Interestingly, undocumented participants more often reported "never" receiving poorer service than documented participants; possibly, this is due to community health centers offering free or reduced-cost healthcare.

Keywords: *immigration, healthcare access, Latino population*

THE INFLUENCE OF DIETARY PATTERNS ON TESTOSTERONE LEVELS IN MEN

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Low testosterone is an increasingly recognized concern in men, associated with diminished reproductive capacity, reduced muscle mass, decreased bone density, impaired mood, and overall decline in quality of life. Clinicians are encountering rising cases of hypogonadism, particularly in Western countries, where dietary and lifestyle habits play a significant role. Emerging evidence highlights sugar consumption as a key, yet underappreciated, modifiable factor influencing the hypothalamic-pituitary-gonadal (HPG) axis. Acute glucose ingestion has been shown to suppress testosterone levels by nearly 25% in healthy men, independent of luteinizing hormone signaling, suggesting a direct inhibitory effect on testicular function. Chronic intake of sugar-sweetened beverages and high-fructose diets further exacerbates this suppression, increasing estradiol levels and fueling metabolic dysfunction that perpetuates hypogonadism. Currently, hypogonadism is often screened through serum testosterone measurements and treated with testosterone replacement therapy (TRT). While TRT can restore levels, adherence is variable, and the therapy carries potential adverse outcomes such as infertility, cardiovascular risk, and poor long-term compliance. Furthermore, treatment strategies frequently overlook upstream, modifiable contributors such as diet. Men with persistently low testosterone face higher risks of osteoporosis, sarcopenia, metabolic syndrome, and cardiovascular disease, all of which significantly reduce quality of life and increase healthcare burden.

Given the growing body of evidence linking sugar intake to impaired gonadal function, lifestyle modification, specifically reducing dietary sugar, should be prioritized as a frontline intervention. Unlike pharmacologic therapy, dietary modification addresses the root metabolic drivers of hypogonadism and improves overall health outcomes, including insulin sensitivity, body composition, and cardiovascular risk. Clinicians should consider counseling patients on the profound impact of diet on hormonal regulation and emphasize sugar reduction as a cornerstone of management. Public health efforts aimed at decreasing sugar consumption may represent a low-cost, high-yield strategy to mitigate the rising prevalence of hypogonadism and its systemic complications.

HITTING THE GENETIC MARK: PHARMACOGENETIC APPROACHES TO LUNG CANCER ANESTHESIA

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Surgical resection is a primary treatment for lung cancer, yet anesthetic selection may influence perioperative safety, immune modulation, and long-term outcomes. Our prior work examined anesthetic-related immune responses in lung cancer patients. Building on this, we now explore the role of preoperative pharmacogenomic testing in guiding individualized anesthetic selection and dosing.

Genetic variability, particularly within cytochrome P450 enzymes, alters anesthetic metabolism and clearance, contributing to interpatient differences in efficacy and adverse drug reactions. In addition, polymorphisms in immune- and inflammation-related genes (e.g., IL6, TNF-α, HIF1A) may shape perioperative immune responses, affecting recovery and potentially cancer progression.

This review synthesizes evidence on anesthetic choice, immune modulation, and lung cancer outcomes, while evaluating the potential of pharmacogenomic testing to refine anesthetic planning. We propose that incorporating genetic profiling into preoperative assessment could optimize drug selection, reduce complications, and improve perioperative stability and recovery. By integrating anesthetic choice with patient-specific genomic data, this approach highlights the promise of precision anesthesia as part of personalized cancer care. Future studies are warranted to evaluate the clinical utility of pharmacogenomic-guided anesthetic strategies in improving safety, efficacy, and long-term outcomes for lung cancer patients.

DILATED CARDIOMYOPATHY IN ATHLETES: NAVIGATING THE GRAY ZONE BETWEEN PHYSIOLOGY AND PATHOLOGY

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Dilated cardiomyopathy (DCM) represents a diagnostic challenge in athletes due to the significant overlap between physiologic cardiac remodeling and pathologic structural changes. The differentiation between athlete's heart and early or subclinical cardiomyopathy carries critical implications, particularly given the risks of sudden cardiac death, arrhythmia, and long-term ventricular dysfunction such as reduced ejection fraction in competitive sports. To clarify this diagnostic intersection, we conducted a structured literature review using PubMed; of 53 identified articles, 22 met inclusion criteria.

Emerging evidence highlights imaging modalities—particularly echocardiography, electrocardiography, and cardiovascular magnetic resonance—as the most reliable tools for distinguishing physiologic remodeling from DCM. Key discriminators include left ventricular cavity size, systolic function at rest and with exercise, tissue characterization via CMR mapping, and electrocardiographic markers suggestive of underlying genetic or structural disease. Recent studies further emphasize the contribution of genetic variants, such as titin and lamin A/C mutations, which may predispose athletes to impaired systolic function despite high training loads. Sex-based differences and the role of clinical context also remain important considerations in risk stratification.

Overall, current literature underscores the complexity of differentiating benign adaptation from pathologic cardiomyopathy in athletes, necessitating a multimodal diagnostic approach that integrates imaging, genetics, and clinical evaluation. Improved recognition of these "gray zones" is vital to optimize risk assessment, guide safe return-to-play decisions, and prevent adverse outcomes in athletes.

HUMIDITY AND POST-CESAREAN SURGICAL SITE INFECTIONS: A RETROSPECTIVE COHORT COMPARING A HUMID (ORLANDO, FLORIDA) AND ARID (LAS VEGAS, NV) CLIMATE FROM MAY TO JULY

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Background: Cesarean delivery is a common surgery in the United States, accounting for 32.2% of all births. Standard care includes pre-incision antibiotic prophylaxis to reduce surgical site infections (SSIs). Despite these precautions, SSIs remain a significant contributor to maternal morbidity. Prior U.S. studies suggest that meteorologic factors, such as humidity, may increase SSI risk, but the effect of regional climate variation on post-cesarean SSIs has not been defined. The objective of this study is to determine whether climate variation within the United States influences rates of post-cesarean SSIs.

Methods: To evaluate whether climate influences rates of post-cesarean SSIs, we propose a retrospective cohort study of scheduled cesarean deliveries performed from May–July 2025 in two contrasting climates: humid Orlando, Florida, and arid Las Vegas, Nevada. Eligible patients are healthy, primiparous females (G1P1A0), aged 11–51, discharged to home. Exclusions include chronic disease, pre-existing diabetes, malignancy, anticoagulant use, and unstable social determinants. Climate is defined by mean daily dew point, specific humidity, and precipitation to directly compare SSI rate across over 30 days.

Results: Data collection and analysis are ongoing. We hypothesize that patients in Orlando will have higher rates of wound-related follow-up visits compared with patients in Las Vegas. Preliminary results will be presented at the conference.

Conclusion: This study will clarify whether environmental humidity contributes to post-cesarean SSI risk. Findings may support climate-informed perioperative strategies and postpartum surveillance tailored to diverse U.S. regions.

FROM ORPHAN TRANSPORTER TO THERAPEUTIC TARGET: CHARACTERIZING THE ROLE OF SLC16A6 IN CANCER METABOLISM

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The solute carrier (SLC) family consists of over 430 metabolite transporters that maintain cellular homeostasis by moving substrates across organelle membranes. While several SLCs are established therapeutic targets in cancer, more than 30% remain uncharacterized, representing untapped potential for new treatments. In a transcriptional screen of nutrient stress responses, we identified SLC16A6 as upregulated during essential amino acid starvation. Although previously orphaned of substrates and cellular functions, we discovered that SLC16A6 localizes to endosomal and melanosomal membranes, where it is required for melanosome biogenesis and lysosomal acidification. Loss of SLC16A6 disrupts V-ATPase assembly, blocks melanogenesis, and diminishes expression of the transcription factors SOX10 and MITF—critical regulators of melanocyte identity and melanoma progression. CRISPR-based screening confirmed SOX10 and MITF as transcriptional activators of SLC16A6, establishing it as part of the CLEAR network of lysosomal genes.

Metabolomic analyses revealed that deletion of SLC16A6 depletes multiple nucleotides, most notably nicotinamide mononucleotide (NMN), while overexpression leads to nucleotide accumulation and buildup of quinolinic acid, an NMN precursor. Structural modeling further supports potential binding of SLC16A6 to NMN, implicating this transporter in NAD+ metabolism.

These findings establish SLC16A6 as a critical regulator linking metabolite transport, organelle homeostasis, and melanoma cell identity. From a clinical perspective, SLC16A6 represents a novel therapeutic target: inhibiting its function could impair melanoma survival, while modulating its activity may influence NAD+ metabolism relevant to cancer and other metabolic diseases. Defining the substrates of SLC16A6 will not only advance our understanding of tumor biology but may also open new therapeutic avenues.

FROM DIGANOSIS TO PROCEDURE: EMERGENCY DEPARTMENT TRENDS IN PCOS, PRE-ECLAMPSIA, AND ENDOMETRIOSIS

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The median wait time to see a clinician (DO/MD, APRN, or PA) in U.S. emergency departments (ED) was 16.0 minutes with a mean wait time of 38.1 minutes (2022). Polycystic ovary syndrome (PCOS), pre-eclampsia, and endometriosis are common conditions prompting ED visits for acute symptoms or complications. However, national trends in ED wait times and procedural interventions for these diagnoses remain overlooked. These conditions are often underdiagnosed or dismissed, exacerbating disparities in women's health and negatively influencing patient outcomes. Understanding these patterns is critical to address disparities and optimize ED care. This study uses the National Hospital Ambulatory Medical Care Survey (NHAMCS) from 2015–2022 to examine national trends in ED wait times and procedures performed for patients presenting with PCOS, pre-eclampsia, or endometriosis. We conducted a retrospective observational analysis, including trend analyses of wait times and procedure utilization, stratified by diagnosis. Data was pre-processed using Python and filtered for adults (≥18 years old) with the CPT and ICD-10 diagnosis codes for the three conditions. Preliminary findings indicate condition-specific variation in wait times and procedural interventions. Limitations including inability to assess longitudinal outcomes, repeat visits, or underlying reasons for delays in care, since NHAMCS is a cross-sectional survey. This study addresses a critical gap in ED care by characterizing national trends in ED wait times and procedures for three conditions that are often misdiagnosed and neglected. By addressing such discrepancies, this study aims to identify disparities and support targeted interventions to improve time and quality of care for patients.

A COMPARATIVE STUDY OF TUINA AND OSTEOPATHIC MANIPULATIVE TREATMENT FOR LOWER BACK PAIN

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Tuina therapy in Chinese Medicine and Osteopathic Manipulative Treatment in Osteopathic Medicine are both hands-on, non-invasive treatment approaches for musculoskeletal issues such as nonspecific back pain. Currently, there is limited research comparing the two techniques, and we aim to fill this gap by evaluating how these therapies affect nonspecific lower back pain. To do this, we conducted a narrative review using PubMed and Embase. Search terms include "Tuina," "Tui Na," "Osteopathic Manipulative Treatment," "manual therapy," and "low back pain." Both MeSH and free-text terms were applied. Articles published between 2010 and 2025 in English were included. Eligible studies examined mechanisms, safety, or clinical outcomes of both therapies. Excluded were animal studies and pediatric populations. A total of 278 articles were retrieved; 117 met the inclusion criteria. Studies highlighted effects on neuromuscular modulation, circulation, and fascia. Safety analyses reported almost no adverse events, with most side effects being mild and transient (e.g., soreness, fatigue). Clinical outcomes for OMT demonstrated some improvements in pain reduction, functional status, and quality of life. However, clinical outcomes for Tuina therapy are more varied, with some reporting only mild improvement with Tuina monotherapy but better outcomes when combined with acupuncture. Some literature included in our research may have factors that limit the effectiveness of our research, including small sample sizes, unclear randomization, or limited blinding. Further research may be needed to identify the best non-invasive treatments for nonspecific lower back pain and promote integration between Eastern and Western manual therapies.

Keywords: *Osteopathic Manipulative Treatment, Tuina, Lower back pain, adult human clinical study*

MANAGEMENT OF COMPLETE CONCENTRIC COLLAPSE IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEA: A NARRATIVE REVIEW

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Background:
Obstructive sleep apnea (OSA) is a prevalent disorder characterized by recurrent upper airway obstruction during sleep, contributing to substantial cardiovascular and metabolic morbidity. Complete concentric collapse (CCC) of the velopharynx represents one of the most difficult OSA phenotypes to treat, as it reduces the effectiveness of established therapies such as continuous positive airway pressure (CPAP) and hypoglossal nerve stimulation (HGNS).

Objective:
This narrative review aims to summarize current surgical approaches for OSA, evaluate the challenges posed by CCC, and explore potential innovations in therapy—particularly bilateral hypoglossal nerve stimulation (B-HGNS)—as a possible treatment option for this patient population.

Methods:
A focused literature review was conducted using PubMed and Google Scholar to identify key studies on CCC, surgical OSA management, and HGNS. Articles discussing CCC-related treatment outcomes, surgical interventions, and emerging technologies were prioritized.

Results:
Traditional surgical options—including uvulopalatopharyngoplasty (UPPP), expansion sphincter pharyngoplasty (ESP), maxillomandibular advancement (MMA), and skeletal surgeries—remain viable for select patients but have variable success rates in CCC. Current HGNS devices are generally contraindicated in CCC due to limited airway patency improvement. This stems in part from a pivotal but small-scale study whose findings may not be broadly generalizable. Emerging concepts, such as B-HGNS, aim to stimulate both genioglossus muscles simultaneously, potentially enhancing airway stability and expanding HGNS eligibility.

Conclusion:
CCC remains a major therapeutic challenge in OSA management. While existing surgical interventions offer some benefit, innovation is needed to address this phenotype effectively. B-HGNS represents a promising avenue warranting further investigation through larger, well-designed clinical trials. Advancing treatment strategies for CCC could reduce reliance on invasive surgeries and improve long-term patient outcomes.

SMALL BOWEL ABSCESS DUE TO PERFORATED JEJUNAL DIVERTICULUM: A CASE REPORT

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Background:
Jejunal diverticulitis is a rare cause of intra-abdominal abscess, representing only 0.3–1.3% of diverticulitis cases. Perforation occurs in 2–6% of patients and can result in localized abscess formation. Diagnosis is challenging due to nonspecific symptoms and low incidence, often delaying treatment. Standard management includes antibiotics and image-guided percutaneous drainage, but persistent or recurrent cases may require surgical resection. Novel approaches, such as photodynamic therapy (PDT), may offer future treatment options in refractory cases.

Case Presentation:
A 55-year-old woman with no prior gastrointestinal history presented with acute, severe left lower quadrant abdominal pain, fever, and malaise. She denied trauma, NSAID use, or foreign body ingestion. CT imaging revealed a 4.2 cm abscess adjacent to the small bowel with a narrow tract suggesting a contained perforation. Image-guided percutaneous drainage was performed, and cultures grew gram-positive diplococci, gram-positive cocci in chains, gram-positive bacilli, and Candida albicans. Despite intravenous antibiotics and partial symptomatic improvement, the abscess–bowel tract persisted. Surgical exploration revealed a perforated jejunal diverticulum, which was resected. Pathology confirmed a true diverticulum with localized perforation; no additional diverticula or malignancy were found.

Discussion:
This case underscores the diagnostic challenge of jejunal diverticulitis and the limitations of conservative management in perforated or fistulizing disease. Polymicrobial and fungal cultures suggest biofilm involvement, which can reduce antibiotic efficacy. PDT, though not applied here, offers a potential non-antibiotic adjunct by disrupting biofilms and killing pathogens via reactive oxygen species generation. Such techniques warrant further clinical investigation for refractory or surgically inaccessible abscesses.

Conclusion:
Jejunal diverticulitis should be considered in unexplained intra-abdominal abscesses. Failure of percutaneous drainage and antibiotics should prompt early surgical consultation. Emerging therapies like PDT may expand treatment options in complex intra-abdominal infections. Multidisciplinary management is key for optimal outcomes.

BEST FOOT FORWARD: A MULTIDISCIPLINARY APPROACH TO CHRONIC FOOT PAIN

Garrick Quackenbush[1], BS; Kalin Sorenson[2], BS; Angela Branda[3], DO

Background:
Chronic foot pain is a common and disabling condition with biomechanical, structural, or post-traumatic causes. Standard treatments may not fully address underlying dysfunctions, especially when symptoms persist for years. Osteopathic manipulative treatment (OMT), combined with targeted exercises and patient-centered care, can address both local pathology and compensatory patterns that perpetuate pain.

Case Presentation:
A 49-year-old physically active woman presented with chronic left foot and bilateral ankle pain persisting since a motor vehicle accident in 2006. The pain was dull and aching with intermittent sharp episodes, radiating from the dorsal left foot to the medial ankle, accompanied by swelling, crepitus, and morning stiffness. Her history included right tibia and femur open reduction internal fixation and hysterectomy. Despite regular exercise, she reported minimal muscle gains. Osteopathic structural examination revealed several somatic dysfunctions, with fascial assessment identifying plantar fascial restrictions and interosseous membrane strain. Initial OMT included myofascial release, balanced ligamentous tension, Still technique, and muscle energy to the pelvis, sacrum, and lower extremities. The patient reported early reduction in forefoot pain and crepitus. Adjunctive care included daily toe yoga for intrinsic muscle activation, toe spacers for alignment, and box breathing for autonomic regulation. Later treatments incorporated facilitated positional release and fascial distortion model techniques, producing progressive symptom improvement.

Discussion:
This case illustrates the effectiveness of an integrative osteopathic approach for chronic post-traumatic foot pain. By addressing somatic dysfunctions, fascial restrictions, and biomechanical imbalances, OMT reduced symptoms while adjunctive exercises enhanced function and alignment. The multidisciplinary approach encouraged patient engagement and promoted self-healing.

Conclusion:
A combined regimen of OMT, targeted home exercises, stress management, and patient education led to significant improvement in chronic foot and ankle pain. This case underscores the value of addressing both regional and systemic dysfunctions in osteopathic practice to restore optimal structure and function.

RESOLUTION OF CHRONIC SHOULDER PAIN WITH FASCIAL DISTORTION MODEL AND OSTEOPATHIC MANIPULATIVE TREATMENT: A CASE REPORT

Kalin Sorenson[1], BS; Garrick Quackenbush[2], BS; Angela Branda[3], DO

Background:
Shoulder pain is a prevalent musculoskeletal complaint that can significantly impair daily activities and quality of life. The fascial distortion model (FDM) offers a framework for diagnosis and treatment based on six specific distortion patterns. While widely applied in sports medicine and acute care, its role in persistent shoulder pain remains underreported in the literature.

Case Presentation:
A 36-year-old female presented with several months of right shoulder pain following a workout injury. The pain was localized to the lateral and anterior aspects of the shoulder and aggravated by overhead movements. Osteopathic examination revealed several somatic dysfunctions and a fascial assessment identified triggerband, herniated triggerpoint, and continuum distortions. Based on the FDM, targeted manual therapy was applied, including direct pressure, sweeping techniques, and compression maneuvers to address the identified distortions. The patient reported marked pain reduction and improved range of motion immediately post-treatment, with continued improvement noted at follow-up one week later.

Discussion:
This case highlights the potential benefits of applying the FDM in osteopathic manipulative treatment (OMT) for shoulder pain. The model's targeted approach allows for precise identification of tissue restrictions and distortion patterns, which may lead to faster symptom resolution compared to nonspecific soft tissue techniques. Although evidence supporting the FDM is growing, most studies are limited to case reports, small case series, and sports injury contexts. This report contributes to the expanding body of literature by demonstrating its applicability in a non-athletic adult with persistent shoulder pain.

Conclusion:
The FDM may serve as a valuable adjunct in the osteopathic management of shoulder pain, offering targeted interventions based on specific palpatory findings. Larger controlled studies are warranted to further establish its efficacy, optimize treatment protocols, and clarify its role alongside conventional rehabilitation strategies.

AN OSTEOPATHIC APPROACH TO SHOULDER PAIN INCORPORATING THE FASCIAL DISTORTION MODEL: A CASE REPORT

Kalin Sorenson[1], BS; Chase Kruse[2], BS; Madeline Harding[3], BS; Jackson Case[4], BS; Angela Branda[5], DO

Background:
Shoulder pain is the third most common musculoskeletal complaint in the United States, generating millions of primary care visits annually. Diagnosis can be challenging due to overlapping exam findings and inconclusive imaging. The Fascial Distortion Model (FDM), developed by Stephen Typaldos, DO, emphasizes fascial contributions to pain and dysfunction. Widely applied in sports medicine, FDM may provide rapid improvement where traditional approaches fall short.

Case Presentation:
A man in his 70s with a history of multiple joint replacements presented with decades of left shoulder pain following trauma in 1976. He reported flares with exercise and recent paresthesias in the left arm. Exam demonstrated supraspinatus weakness, tenderness along the bicipital groove, and painful abduction limited to 75 degrees. Conventional osteopathic techniques (Still, facilitated positional release, Spencer's, articulatory) produced minimal benefit. Targeted FDM application resulted in immediate pain relief, abduction improvement to 120 degrees, and return to gym and golf activities. At five-day follow-up, he remained pain-free with preserved function.

Discussion:
This case demonstrates the utility of FDM in addressing chronic shoulder pain, even with suspected underlying structural pathology. The rapid, durable improvement supports fascial distortions as clinically significant contributors to dysfunction. FDM may be particularly useful for patients reluctant to pursue surgery, offering a low-risk, conservative alternative. Limitations include the single-patient design and short follow-up.

Conclusion:
Incorporating FDM into osteopathic care can provide meaningful symptom resolution and functional restoration in chronic shoulder pain. Larger studies are needed to clarify its long-term role.

NATIONAL ADHERENCE TO BELL'S PALSY CLINICAL PRACTICE GUIDELINES: A 20 YEAR RETROSPECTIVE ANALYSIS USING A LARGE-SCALE EHR DATABASE

Ariel Harsinay[1], BS; Kalin Sorenson[2], BS; Nicole Favre[1], MD; Mattie Rossi-Schumacher[1], MD; David Sherris[1], MD; Benjamin Brooks[2], PhD

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(2) Rocky Vista University College of Osteopathic Medicine – Utah Campus

Introduction:
The American Academy of Otolaryngology (AAO) clinical practice guidelines (CPG) for Bell's palsy management strongly recommend initiating steroids within 72 hours of symptom onset while advising against the use of laboratory tests or imaging. Although adherence to these guidelines has been studied at single institutions, to our knowledge, no studies have utilized a large-scale nationwide database to evaluate guideline adherence.

Objective:
To assess nationwide adherence to the 2013 AAO CPG for Bell's palsy, specifically evaluating corticosteroid use, antiviral prescribing, and utilization of imaging and serology testing.

Methods: Using TriNetX, a global EHR database, a retrospective study was conducted on patients diagnosed with Bell's palsy (ICD code G51.0) between 2004 to 2024. Data collected included the administration of corticosteroids within 72 hours, the use of antivirals (valacyclovir or acyclovir), and whether imaging or serology testing was performed. Cohorts were analyzed before and after 2013, marking the publication of the AAO CPG.

Results:
Prior to the CPG publication, 13,825 of 53,805 patients (25.7%) with Bell's palsy received corticosteroids within 72 hours of diagnosis. After 2013, this figure increased significantly to 110,037 of 253,832 patients (43.4%) ($p < 0.001$). Despite the guidelines advising against imaging and Borrelia burgdorferi serology, both practices increased over time. MRI/CT use rose from 0.5% to 1% ($p < 0.001$), and serology testing from 4.1% to 6.5% ($p < 0.001$). Antiviral prescribing also increased from 13.1% to 23.4% ($p < 0.001$).

Conclusion:
A greater percentage of patients with Bell's palsy received steroid treatment within 72 hours of symptom onset after the CPG publication. However, providers continued to order imaging and labs not recommended by the CPG.

CREATINE SUPPLEMENTATION AS AN ADJUNCTIVE TREATMENT FOR DEPRESSION: A LITERATURE REVIEW

Mason Stephens, OMS II; Ellie Evans, OMS II; Marco Lybbert, OMS II; Ryan Hagen, OMS II; Eian Brightwell, OMS II

Creatine is a safe, inexpensive supplement that may offer therapeutic benefits beyond its established role in muscle physiology, including potential utility in managing depression—a debilitating condition where effective symptom relief is essential for overall health. This study aims to synthesize existing findings and provide an overview of the current evidence regarding the impact of creatine supplementation on depressive symptoms, something that has not been done up to this point. We reviewed experimental studies in which daily creatine supplementation was administered as an intervention and depressive symptoms were measured using standardized depression scales before and after intervention. Preliminary review of the research shows promising results that consistent creatine intake of 2.5-5 grams per day shows a decrease in depressive scores on standardized depression questionnaires. Creatine supplementation has promising initial results as an adjunct treatment for depression with standard antidepressant medication, further alleviating symptoms than just antidepressants alone. This is an exciting development in treatment for depressive disorders as it is an affordable and low risk option to further help so many who suffer from this illness. Although initial findings are promising, further research is needed to solidify the connection between treatment outcomes and creatine intake and clarify what mechanisms are causing this effect.

A RARE CASE OF AN ATYPICAL XANTHOFIBROMA

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A 67-year-old female with a history of basal cell carcinoma and squamous cell carcinoma presented with a rapidly enlarging, sensitive papule on the dorsal left hand. Previous topical fluorouracil therapy was ineffective. Clinical examination revealed a 1.2 cm dome-shaped, red-pink papule; shave biopsy demonstrated histopathologic features consistent with atypical fibroxanthoma (AFX). AFX is a rare, UV-induced, primary dermal neoplasm most commonly arising in sun-damaged skin of elderly patients, with a predilection for the head, neck, and extremities.[1-3][5] Immunohistochemical analysis is essential for diagnosis, given the overlap with other cutaneous malignancies.[1][6-7] The patient underwent Mohs micrographic surgery, resulting in complete tumor clearance in one stage with negative margins. Mohs surgery is associated with higher cure rates and optimal margin control compared to wide local excision, reflecting current consensus for AFX management.[3-4] The prognosis for AFX is excellent, with low recurrence and metastatic rates when adequately excised.[1][3] This case highlights the importance of clinicopathologic correlation, appropriate use of immunohistochemistry, and evidence-based surgical management in AFX.

Keywords: *atypical fibroxanthoma, immunohistochemistry, Mohs surgery, UV-induced neoplasm*

BIOFEEDBACK DEVICES IN PELVIC FLOOR MUSCLE TRAINING (PFMT): EFFICACY, MARKET COMPARISONS, AND INTEGRATION WITH STANDARD PROTOCOLS

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Pelvic organ prolapse (POP) is a highly prevalent condition, with estimates indicating that up to 50% of women will experience it during their lifetime. Pelvic floor muscle training (PFMT) is a cornerstone of conservative management for POP; however, numerous barriers contribute to sub-optimal treatment outcomes. These include limited access to specialists due to geographic or financial constraints, social stigma surrounding pelvic health, and other personal or systemic factors that obstruct effective treatment. Biofeedback devices have emerged as valuable adjuncts to existing treatment protocols, with many devices relying on the at-home gamification of PFMT and the use of digital platforms to prompt accurate pelvic floor contractions, enhance engagement, and track progress. This review synthesizes evidence on the efficacy of biofeedback-assisted interventions and evaluates the devices currently available on the market. Emerging research suggests that biofeedback-assisted PFMT devices significantly improve symptoms associated with POP, treatment adherence, and patient-reported outcomes compared with PFMT alone. However, it is important to acknowledge that treatment benefits can vary and may be limited in severe POP. Additionally, most commercially available devices primarily target urinary incontinence, with little mention of the broader range of symptoms associated with POP, which may limit their applicability. The complexity of POP symptoms also makes it difficult to standardize treatment outcomes, highlighting the need for individualized PFMT approaches. This comprehensive appraisal will consolidate information on available biofeedback devices into a single resource, allowing patients and physicians alike to compare devices based on cost, level of FDA substantiation, accessibility, features, and supporting research. Devices that do not provide feedback on contraction quality or use electromyostimulation will be excluded from this review. The results of this study will inform the development of a survey on women diagnosed with POP, exploring their perspectives and willingness to engage with technology-assisted PFMT to improve pelvic floor health.

ASSESSING RISK FACTORS AND ETIOLOGICAL VARIABILITY IN SELF-IDENTIFIED PERIPARTUM CARDIOMYOPATHY

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Peripartum cardiomyopathy (PPCM) is an idiopathic form of heart failure that develops in pregnancy or within five months postpartum. It is characterized by left ventricular systolic dysfunction and can range from mild dyspnea to severe heart failure requiring advanced support. Early diagnosis is difficult because symptoms overlap with normal pregnancy, and the condition remains a leading cause of maternal morbidity and mortality. Known risk factors such as hypertensive disorders of pregnancy, multiparity, and advanced maternal age do not fully explain variability in outcomes, highlighting the need for patient-centered data. This study evaluated associations between comorbidities and adverse outcomes in women with PPCM. We conducted a cross-sectional survey of ~5,000 members of a Facebook-based PPCM support group using Qualtrics. Analyses were restricted to U.S. respondents with complete data (N = 201). Outcomes included heart failure, hospitalization, and sudden cardiac death. Associations were examined using contingency tables in SAS v9.4. Four statistically significant associations emerged: stillbirth with sudden cardiac death ($P < 0.0001$); preeclampsia with hospitalization (OR 20.4, 95% CI 1.97–211.8, $P = 0.0028$); autoimmune disease with heart failure (OR 4.16, 95% CI 1.15–15.1, $P = 0.0202$); and obesity with heart failure (OR 2.17, 95% CI 1.08–4.34, $P = 0.0272$). These findings suggest that pregnancy complications and chronic comorbidities may influence PPCM outcomes. Although interpretation is limited by self-reported data and small subgroups, results highlight the need for improved risk stratification and a national registry to guide counseling and long-term care.

PALLIATIVE DIVERSION FOR MALIGNANT SACRAL ENTEROCUTANEOUS FISTULA IN ADVANCED RECTAL ADENOCARCINOMA

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Background:
Spontaneous enterocutaneous fistulas (ECFs) secondary to rectal adenocarcinoma are exceptionally rare, particularly in the sacral region. Most occur after surgery or radiation, making spontaneous malignant ECFs without prior intervention an unusual finding. Such cases reveal the aggressive local behavior of untreated colorectal malignancy and may present atypically, including with sepsis from an unrecognized fistula. This case aims to raise awareness of malignant sacral ECFs as an overlooked cause of sepsis, highlight the value of thorough physical examination, and review the role of palliative diversion in advanced disease.

Case Presentation:
A woman in her late seventies with untreated, moderately differentiated rectal adenocarcinoma and a history of being lost to follow up presented with fever, hypotension, and weakness. She had severe anemia and sepsis that could have been from urinary tract infection, rectal abscess, or necrotic rectal mass. Examination revealed an ulcerated opening superior to the anus in the sacral region producing feculent discharge. She and her husband were unaware of its presence. Imaging confirmed a fistulous tract from the rectum to the sacral skin with surrounding necrosis. During hospitalization, a necrotic tumor mass extruded spontaneously. A temporary drain was placed to manage the abscess. Given her advanced disease, comorbidities, and preference for palliative care while avoiding prolonged hospitalization, she underwent a diverting colostomy to divert stool from the fistula, reduce contamination, and lower the risk of recurrent infection.

Conclusion:
This case adds to the limited literature on malignant sacral ECFs, demonstrates the value of early recognition and palliative diversion in infection control, and emphasizes patient centered care in advanced colorectal cancer.

Keywords*: enterocutaneous fistula, rectal adenocarcinoma, sacral fistula, palliative diversion, colorectal cancer*

NOT IF, BUT HOW: THE NEXT STEP FOR POCUS IN CARDIAC ARREST MANAGEMENT

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Point-of-care ultrasound (POCUS) is increasingly incorporated into cardiac arrest management, providing real-time diagnostic information, identifying reversible causes, and offering prognostic insight. Whereas spontaneous cardiac motion on POCUS is strongly associated with return of spontaneous circulation (ROSC), cardiac standstill generally predicts poor outcomes. However, cases of survival without sonographic cardiac activity have been documented, underscoring the danger of using POCUS alone to guide termination of resuscitation. The purpose of this review is to define how POCUS should be standardized and integrated into resuscitation algorithms, shifting the discussion from whether to use POCUS toward how best to apply it. Evidence from meta-analyses, consensus guidelines, and recent studies from 2024–2025 were identified through structured database searches using MeSH terms and informed by PRISMA methodology. Findings demonstrate that ≥10 minutes of cardiac standstill on serial POCUS predicts futility with specificity and positive predictive value approaching 100% (95% CI 90–100), yet workflow challenges such as CPR interruptions, provider variability, and ethical and medicolegal issues make its role in resuscitation controversial and have prevented consensus on its application. The next step for the field is not proving its value in cardiac arrest, but defining how to standardize and integrate it into resuscitation algorithms.

ANTIGENIC DRIFT EXPANDS INFLUENZA VIRAL ESCAPE PATHWAYS FROM RECALLED HOMRAL IMMUNITY

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Seasonal influenza strains H1N1 and H3N2 are responsible for roughly 1-billion infections globally per year despite widespread vaccination. The influenza virus can escape host humoral immunity by acquiring substitutions in the surface exposed hemagglutinin (HA) providing the ability to evade antibody detection. This capability to escape reduces vaccine efficacy contributing to the need for annual vaccination updates. Antigenic drift occurs primarily in the influenza A virus (IAV) HA head. Typically, minor strain variations don't significantly reduce vaccine efficacy. However, every couple of years, a new antigenic cluster is generated from major mutations changing the circulating strain.

Studies have shown that alone, single mutations often have no effect on IAV strains, but when considered with additional "background" mutations, these allow for escape from monoclonal antibodies (mAbs). Thus, we are unable to accurately predict the effect of a single mutation. Through the study of "original antigenic sin" the term "immune imprinting" is the effect of an individual's initial exposure strongly guides their response to subsequent exposures. Our research question explored how IAVs continue to escape immune responses through techniques such as deep mutational scanning (DMS) and viral escape assays in H1N1 strains from various antigenic clusters to understand viral escape regarding antibody lineages. While affinity maturation increased the barrier to escape in the eliciting strain, antigenically drifted strains readily escaped these antibodies despite similar neutralizing potencies. Through this study, we found that it is important to weigh the benefits of utilizing a memory response compared to a *de novo* response when creating next-generation influenza vaccines.

LINKING LIFESTYLE TO ALZHEIMER'S DISEASE: THE ROLE OF THE GUT-BRAIN AXIS IN INFLAMMATION AND NEURODEGENERATION

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Alzheimer's disease (AD) is a neurodegenerative disease characterized by the accumulation of ß-amyloids and neurofibrillary tangles of hyperphosphorylated tau proteins in the central nervous system (CNS), and it remains without a cure. Emerging evidence shows the gut–brain axis (GBA) is a critical mediator between the CNS and intestinal microbiome, linking lifestyle factors to AD pathogenesis. This review synthesizes literature from 2000 to 2025 obtained through ClinicalKey, Access Medicine, and Embase. We initially included a broad range of articles on the GBA and AD, then narrowed the scope using strict exclusion criteria, focusing on the keywords "GBA," "Alzheimer's," "Diet," "Exercise," and "Inflammation." This approach enabled a mechanistic understanding of how diet and exercise moderate the relationship between these two variables. Dysbiosis, or imbalance in microbial diversity, is associated with low-fiber, high-fat diets and minimal exercise, which promote systemic inflammation through pathogen-associated molecular patterns such as lipopolysaccharide from gram-negative bacteria and pro-inflammatory cytokines including Tumor Necrosis Factor-α (TNF-α) and interleukins-1 and -6. These changes increase intestinal permeability and weaken blood–brain barrier integrity, fostering neuroinflammation, microglial activation, and amyloid/tau accumulation. Conversely, moderately strenuous cardiovascular exercise and fiber-rich diets improve microbial diversity, short-chain fatty acid production, bile acid balance, and barrier integrity. While this review supports a link between dysbiosis, inflammation, and neurodegeneration in AD, a major limitation of the current literature is the lack of standardization and consensus in defining and measuring microbiome diversity. Addressing this gap is essential for drawing reproducible conclusions and developing lifestyle-based therapeutic strategies.

THE ROLE OF T CELLS IN INDUCING TOLERANCE FOR ALLOGRAPHIC TRANSPLANTATION

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Background: Allogeneic transplantation remains the most effective treatment for patients with end-stage organ failure. Over the past several decades, surgical techniques and immunosuppressive therapies have advanced significantly; however, long-term graft survival continues to be limited by immune-mediated rejection. Current management relies on immunosuppressive medications. Matching human leukocyte antigen (HLA) helps reduce the risk of rejection; however, T cells remain the central driver of graft failure. Emerging research can provide insight into the mechanisms of immune tolerance.

Objective: One promising area involves the role of regulatory T cells (Tregs), specifically FoxP3+ subsets, for inducing anergy and promoting tolerance to the organ's foreign antigens. The objective of this review is to evaluate the current literature on tolerance induction in allogeneic transplantation, highlight research gaps, and identify potential therapies for future study.

Methods: A systematic search was performed using PubMed with predefined criteria. Keywords included allogeneic transplantation, T cells, FOXP3+ T regulatory cells (Tregs), and tolerance induction published after 2020. Studies excluded were those on skin grafts, animal models, and cancer.

Results: The initial search yielded approximately 300 studies. Following the removal of duplicates and retracted publications, a secondary screening provided a limited number of primary research articles to understand the baseline research completed thus far.

Conclusion: Ultimately, this review aims to synthesize recent progress in tolerance research, provide insight into promising immunoregulatory mechanisms, and highlight directions for future investigation. With thousands of patients waiting for a transplant, advancing the body's natural tolerance mechanisms could lower rejection rates and improve patient outcomes.

ALCOHOLIC FATTY LIVER DISEASE AND ITS EFFECTS ON GENERAL ANESTHETIC METABOLISM AND CLEARANCE

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Alcoholic liver disease (ALD) spans from fatty liver to cirrhosis, with alcoholic fatty liver disease (AFLD) as the earliest and most prevalent stage. In surgical patients, AFLD complicates anesthetic management due to impaired hepatic metabolism and altered physiology. These changes influence the pharmacokinetics and pharmacodynamics of anesthetic agents, raising risks of hemodynamic instability, delayed clearance, and prolonged recovery. Despite these challenges, clinical guidance for anesthetic care in AFLD remains limited. This review explores current evidence on the effects of AFLD on anesthetics and outlines perioperative considerations. This study aims to investigate the impact of AFLD on anesthetic pharmacokinetics, assessing alterations in metabolism, clearance, and perioperative recovery associated with various general anesthetics. A systematic literature review was conducted using PubMed, Google Scholar, and OpenEvidence. Keywords included “Alcoholic Fatty Liver Disease,” “Alcohol-Associated Steatotic Liver Disease,” “Alcohol Induced Fatty Liver Disease,” and “ethanol effects.” Studies not focused on anesthetic metabolism or clearance in AFLD were excluded. AFLD primarily disrupts anesthetic metabolism through impairment of the cytochrome P450 enzyme system. One study on alfentanil reported reduced plasma clearance in alcoholics compared to controls (158.8 vs. 187.4 mL/min). Propofol showed only mild alterations in chronic alcoholism. However, recovery outcomes were worse in AFLD: patients demonstrated lower discharge eligibility (54.1% vs. 61.7%) and airway removal times that were 43% longer than controls. The liver plays a central role in drug metabolism, and AFLD alters this function in ways that affect anesthetic pharmacokinetics and recovery. These findings highlight the need for anesthesiologists to consider alcohol history and tailor anesthetic plans accordingly. A deeper understanding of AFLD’s effects can improve perioperative care and outcomes.

CASE REPORT ON HYPEREMESIS GRAVIDARUM AND GENETICS OF GDF-15

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(2)

Hyperemesis Gravidarum (HG) is a severe form of nausea and vomiting in pregnancy. HG affects up to 2% of pregnancies and contributes to an estimated $1.7 billion in annual U.S. healthcare costs. Despite its prevalence and severity, current treatments remain largely supportive and the underlying mechanisms are poorly understood. Recent studies implicate Growth Differentiation Factor 15 (GDF15) in HG susceptibility. Our project investigates this genetic link by analyzing the DNA of a 31-year-old woman with HG and her children using polymerase chain reaction (PCR) and DNA sequencing. Specifically, we examined the C211G mutation as a potential contributor to HG pathophysiology. By focusing on the genetic analysis, our study complements ongoing clinical and review efforts and contributes to the growing body of HG research. These insights may help inform future investigations into genetic risk factors and improve clinical management of HG.

RESEARCH WEEK JUDGES

Colorado Judges:

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Carol Penn
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Kristopher Vaudrey
Ben Wilde

Intramural Grants

Awarded	Project Title	Investigators
Feb. 1, 2025	Impact of Tolerance of Ambiguity on Burnout in Medical Education	Amy Wamhoff and Dr. Michael Hall
Feb. 1, 2025	Validated Survey to Measure Medical Student Well-Being and Stress Levels	Emma Moore and Dr. Brett Condon
Feb. 1, 2025	Physical and Mental Wellness in a Medical Student Cohort	Anatalia Kerstan and Dr. Amanda Brooks
Feb. 1, 2025	Incorporating Osteopathic Manipulation Therapy to Improve Mallampati score	Andy Phung and Dr. Kristin Putnam
Feb. 1, 2025	Longitudinal Analysis of Sepsis Care Cost Disparities Across US Trauma Centers	Dr. Jennifer Hellier
Feb. 1, 2025	A Novel Screening Method for Pseudomonas Aeruginosa in UTIs	Jacob Sandgathe and Dr. Benjamin Brooks
Feb. 1, 2025	Physical and Mental Wellness in a Medical Student Cohort	Kelson Knighton and Dr. Benjamin Brooks
Feb. 1, 2025	Assessing Dietary Patterns and Interest in Anti-Inflammatory Nutrition of Rocky Boy Reservation Residents	Daniel Cordova and Dr. Brett Condon
Feb. 1, 2025	Perceived Stress, Sleep Quality, and Heart Rate Variability among Osteopathic Medical Students Using Wearable Devices	Sharinjit Kaur and Dr. Jacquelyn Waller
Feb. 1, 2025	The Influence of Media Consumption on Public Knowledge in Chronic Disease, Climate Change, and Infectious Diseases: Identifying Misinformation Patterns and Informing Health Literacy Interventions	Jonathan Irby, Elizabeth Lehnardt, and Dr Rebecca Ryznar
Feb 6, 2025	Stabilizing Resting Metabolic Rate: Investigating Impact of Dietary Modifications	Eva Morrison and Dr. Benjamin Brooks

Intramural Grants

July 9, 2025	Influenza Vaccine Translational Study	Dr. Paul Nash
July 9, 2025	Impact of Health Policy on Medical Students' Career Decision-Making: A Cross-Institutional Survey	Megan Facey
July 23, 2025	Cultivating Compassion Through Movement:A Community Based Qigong Research and Service Learning Initiative	Dr. Carol Penn
July 26, 2025	Creating a Resiliency Training Course	Dr. Mary Wilde
Sept. 16, 2025	Research on fossil Mammals	Dr. Tony Harper
Sept. 27, 2025	Reducing Fall Risk, Fear of Falling, and Loneliness in Older Adults Through Osteopathic Medical Student-Led Immersive VR Training	Oluwagbenga Dada
Sept. 27, 2025	Integrating Trust-Based Relational Intervention® (TBRI®) into First-Year Medical Education to Foster Compassionate and Empathetic Patient Care	Dr. Jeremy Sporrong

Thank you for attending Rocky Vista University's 13th Annual Research Day

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