Rocky Vista University presents

SPRING RESEARCH DAY

May 2026

EVENT PROGRAM

ROCKY VISTA UNIVERSITY

Index

Welcome Letter

Welcome to Rocky Vista University's Spring Research Day!

We are delighted to welcome you to this year's Spring Research Day, a continued extension of our commitment to academic excellence and scholarly inquiry. Building upon the success of our Fall Research Week, this event highlights the depth, creativity, and impact of research across our campuses.

This spring's poster sessions showcase outstanding scholarly projects that have met our established benchmark criteria. We invite students, faculty, and staff to engage with presenters, explore new ideas, and contribute to a growing community that values inquiry, curiosity, and the pursuit of knowledge.

We extend our sincere appreciation to all who contributed their time, expertise, and dedication to make this event possible. Your efforts help foster a vibrant culture of research and innovation at Rocky Vista University.

Thank you for being part of Spring Research Day. We hope you leave inspired, energized, and intellectually enriched.

Happy Researching!

Amanda Brooks, PhD

Vice Provost of Research and Scholarly Activity

Professor of Molecular Biology

Welcome Letter

Rocky Vista University Montana College of Osteopathic Medicine
Spring Research Day 2026

Dear Colleagues, Students, and Guests,

On behalf of the Montana College of Osteopathic Medicine, it is my pleasure to welcome you to the 2026 Spring Research Day. This event celebrates the spirit of inquiry, innovation, and scholarly excellence that are central to osteopathic medical education.

Spring Research Day provides an important forum for students, faculty, and collaborators to share research across basic science, clinical investigation, medical education, and community-based scholarships. The breadth and quality of the work presented at Spring Research Day reflects our collective commitment to advancing knowledge, improving patient care, and promoting the osteopathic philosophy of whole-person medicine.

We praise our students for their dedication to scholarly inquiry and thank the faculty mentors who offer invaluable guidance and support throughout the research process. We are also grateful to the reviewers, judges, and partners whose time and expertise make this event possible.

We encourage all participants to engage fully—ask questions, exchange ideas, and build collaborations that extend beyond today's presentations. Whether you are presenting, mentoring, or attending, your contributions strengthen our academic community and advance the mission of osteopathic medicine.

Thank you for joining us. We wish you a meaningful and successful Spring Research Day.

Warm regards,

Mita Das, PhD
Assistant Research Director
Montana College of Osteopathic Medicine
Rocky Vista University

Welcome Letter

Welcome to the Rocky Vista University Spring Research Day 2026.

We are very excited to welcome you this year as we present a diverse and growing compilation of research projects developed across our campus. This event highlights the dedication, curiosity, and scholarly engagement of our students, faculty, and staff, and it reflects the continued investment in academic inquiry at Rocky Vista University. Each project showcased today represents countless hours of planning, collaboration, and thoughtful analysis, all driven by a commitment to advancing knowledge and improving healthcare practice.

These projects serve as strong examples of our University's core values and our students' motivation to become well-rounded healthcare providers. They demonstrate a self-driven commitment to service, grounded in evidence-based practice, critical thinking, and professional responsibility. Through their participation in research, our students strengthen and showcase the skills necessary to evaluate evidence, ask meaningful questions, and contribute thoughtfully to the evolving field of healthcare.

Research involvement and the quality of work presented continue to grow each year. Many of the projects featured today have extended beyond our campus to reach wider regional, national, and even international audiences. **These projects reflect not only the enthusiasm of our learners, but also the mentorship, collaboration, and institutional support that make these accomplishments possible.**

We are extremely thankful to everyone who helps make events like Spring Research Day possible. This includes the students, staff, and faculty engaged in research at all levels, as well as those who contribute their time and expertise to mentoring, reviewing, organizing, and supporting these efforts. The success of this event is the result of a collective commitment to scholarship and educational excellence.

To one more year of continuous growth and improvement,

RVU Colorado campus, we are killing it!

Isain Zapata, PhD
Assistant Director of Research – Colorado Campus
Associate Professor of Research and Statistics

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Case Report 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

Case Report Rubric

Case Report	0	1	2	3
	Missing	**Poor**	**Good**	**Excellent**
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				
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 jargon	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

Leveraging Honey's Antimicrobial Properties For Wound Healing In Underserved Communities

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Background: Advances in modern medicine, including biologics, gene therapies, and minimally invasive procedures, have improved patient outcomes but often remain financially inaccessible. Individuals in rural and underserved communities frequently face barriers such as limited healthcare infrastructure, lack of insurance, and economic constraints. These challenges can delay proper wound care and increase the risk of infection and chronic complications. Honey, historically used in traditional medicine, has gained renewed scientific interest because of its antimicrobial and wound healing properties.

Aim: This literature review examines whether honey's antimicrobial, anti-inflammatory, and tissue-healing properties make it a viable adjunct or short-term wound management option for underserved populations. The review focuses on biochemical characteristics including high osmolarity, low pH, viscosity, and enzymatic production of hydrogen peroxide. Methodology: A qualitative literature review was conducted using peer-reviewed biomedical studies investigating honey-based wound treatments. Studies assessing antimicrobial activity, wound-healing outcomes, and clinical or experimental wound models were analyzed to identify common therapeutic mechanisms and benefits.

Results: Multiple studies report that honey inhibits bacterial growth, including antibiotic-resistant strains such as MRSA, while maintaining a moist environment that supports tissue repair and reduces inflammation. Certain varieties, including Manuka and Tualang honey, show enhanced antimicrobial activity due to bioactive compounds such as methylglyoxal and phenolic antioxidants. However, variation in honey composition and limited large-scale clinical trials remain barriers to standardized medical use.

Conclusion: Current evidence supports honey as a promising, low-cost adjunct for wound care in settings with limited access to conventional treatment. Contribution to the Field: This review synthesizes evidence on honey's therapeutic mechanisms and highlights its potential as an accessible wound-care strategy while identifying gaps for future research.

Keywords: Honey, Antimicrobial, Wound care

Clinical and Pathological Review of Gastrocolic Fistulas: A Cadaveric Study

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Gastrocolic fistulas (GCFs) are rare gastrointestinal abnormalities characterized by an abnormal connection between the stomach and colon, with reported global incidence of 0.2–0.6%. Symptoms are nonspecific, and diagnosis is often delayed or incidental via imaging or endoscopy. Cadaveric descriptions remain limited but provide a unique opportunity to explore gross anatomy of GCFs. This case anatomically characterizes a cadaveric GCF to evaluate potential etiologies within the context of existing clinical literature. A 91-year-old female cadaver with causes of death including congestive heart failure, pneumonia, and failure to thrive underwent routine gross dissection. A fistulous tract between the greater curvature of the stomach and transverse colon was documented with calibrated gross photography and measurement. A focused literature review of GCF etiologies was performed. A mature lumenal fistula measuring 32.93 mm long and 5.44 mm wide connected the gastric greater curvature to the left colic flexure, traversing dense fibrotic tissue adherent to the gastrocolic ligament. Considerable sessile gastric polyps were identified on the internal gastric wall. No evidence of inflammation, abscess, ischemic injury, or prior surgery was identified in surrounding structures. Dense fibrosis and mature tract suggest a chronic process. Considerations include malignancy, chronic inflammation (ulcer disease, Crohn's disease), and surgery. Malignancy is favored given advanced age, failure to thrive, and diffuse gastric polyposis. Histologic evaluation would distinguish malignancy from benign inflammatory process. This report enhances GCF literature by relating gross anatomy to established clinical patterns and emphasizes the consideration of GCF in patients with unexplained metabolic/nutritional decline.

Keywords: Gastroenterology, Cadaver, Dissection, Fistula, Anatomic Anomaly

Addressing an Education Gap in Oncology Care: Preparing Clinics to Counsel Patients with Septic or Grinder Pump Systems

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Many chemotherapy agents and some long-term antibiotics or immunotherapies are excreted in urine and stool for 48–72 hours after treatment. Standard oncology education emphasizes safe handling of bodily fluids but rarely distinguishes between municipal sewer systems and onsite wastewater systems such as septic tanks or grinder pumps. In rural regions such as Montana, where many households rely on onsite wastewater systems, oncology clinics may encounter patients whose home infrastructure depends on microbial digestion for waste treatment. Chemotherapy residues excreted in bodily fluids may inhibit these microbial processes, potentially increasing maintenance needs if preventative practices are not followed. Despite this potential risk, oncology clinics typically lack standardized guidance for counseling patients who rely on onsite wastewater systems. Purpose: This project aims to assess current practices in oncology clinics in the Billings, Montana region regarding education for patients with septic or grinder pump systems and to evaluate whether a standardized educational pamphlet improves staff preparedness and counseling consistency. Methods: This quality improvement project will be conducted in local oncology practices. Clinical staff, including nurse managers, educators, pharmacists, and patient navigators will complete a baseline survey assessing current screening practices, patient education, and perceived preparedness regarding patients with septic or grinder pump systems. Participating clinics will then receive a standardized patient pamphlet and optional counseling script designed for integration into routine chemotherapy education. A follow-up survey administered 3–6 months later will evaluate changes in staff preparedness, counseling consistency, and perceived barriers and facilitators to implementation. Conclusion: This project addresses an under recognized intersection of oncology education and environmental health and may provide a practical model for integrating onsite wastewater considerations into chemotherapy counseling in clinics serving rural populations.

Keywords: Rural Health, Public Health, Oncology

Health-Related Quality of Life and Functional Outcomes after Stereotactic Radiotherapy for Gliomas: Preliminary Results

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Background: Stereotactic radiation techniques are increasingly used in the management of glioma, particularly for recurrent or progressive disease. While most studies emphasize traditional oncologic outcomes such as survival and tumor control, the impact of treatment on patient-centered outcomes, including functional status and health-related quality of life (HRQoL), remains less well characterized. This study aimed to systematically synthesize evidence on functional and HRQoL outcomes following stereotactic radiation for glioma.

Methods: A systematic literature search of PubMed, Embase, and Google Scholar was conducted in accordance with PRISMA guidelines, with the final search performed in January 2026. English-language studies reporting functional or HRQoL outcomes following Stereotactic Radiosurgery or Stereotactic Radiotherapy for glioma were included. The primary outcome was change or stability in functional status, most commonly measured using the Karnofsky Performance Status. Secondary outcomes included HRQoL measures such as the EORTC QLQ-C30 family of instruments and the SF-36. Risk of bias was assessed using the ROBINS-I tool. Random-effects meta-analysis was performed where sufficient data were available, with subgroup analyses comparing newly diagnosed versus recurrent tumors and stereotactic radiosurgery versus stereotactic radiotherapy.

Results: The search identified 1,562 records, of which 310 were duplicates, leaving 1,252 articles for screening. Following full-text review, 41 studies met inclusion criteria, representing 5,234 patients. Substantial heterogeneity was observed in study design, treatment regimens, and outcome reporting, and many studies included small cohorts. Functional outcomes were most frequently assessed using the Karnofsky Performance Status (n=30), followed by the EORTC QLQ-C30 family (n=9) and the SF-36 (n=2). Across studies, over 90% of patients demonstrated stable or unchanged functional status after treatment. HRQoL outcomes were similarly reported as largely stable.

Conclusions: Available evidence suggests stereotactic radiation may preserve functional status and HRQoL in appropriately selected glioma patients. However, existing studies are heterogeneous and frequently limited by small sample sizes and observational designs. Standardized HRQoL reporting will be essential for improving comparability in future glioma research.

Keywords: Glioma, Neuro-Oncology, Stereotatic Radiosurgery, Stereotactic Radiotherapy, HRQoL, Functional Outcomes

The Role of the Thoracolumbar Fascia in Osteopathic Palpatory Diagnosis: Clinical Foundations

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Clinically, the thoracolumbar fascia (TLF) is increasingly recognized as a contributor to chronic low back pain (LBP), one of the most prevalent and costly musculoskeletal conditions. The TLF's role in transmitting force between the upper and lower extremities, its dense nociceptive innervation, and its layered mobility make it a key structure in both functional movement and pain perception. Altered TLF stiffness, impaired shear strain, and reduced fascial layer sliding have all been associated with chronic LBP, underscoring the fascia's importance in diagnostic evaluation and manual therapy. This literature review synthesizes findings from a curated set of PubMed-sourced studies selected based on relevance to TLF mobility, chronic LBP, fascial dysfunction, and osteopathic or manual therapy interventions. Included research employed ultrasound imaging, biomechanical testing, palpatory assessment literature, randomized controlled trials, and feasibility studies evaluating TLF shear strain, tissue stiffness, and treatment outcomes. Across the reviewed literature, the TLF is shown to exhibit measurable functional changes in individuals with chronic LBP, including decreased shear plane mobility and altered connective tissue stiffness. Ultrasound and elastography studies reveal reduced sliding between fascial layers, while neurophysiological research demonstrates somatosensory crosstalk between fascia, muscle, and skin, supporting the TLF's role in pain propagation. Interventions targeting the fascia, such as fascial manipulation and multimodal chiropractic care, demonstrate symptomatic improvement in some studies, though evidence remains inconsistent. Overall, the literature supports the TLF as a clinically relevant structure in the diagnosis and management of chronic LBP, warranting further standardized and mechanistically focused research.

The Role of the Thoracolumbar Fascia in Osteopathic Palpatory Diagnosis: Anatomical Foundations

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The thoracolumbar fascia (TLF) is a multilayered connective tissue complex essential to spinal stabilization, force transmission, and proprioceptive integration. Composed of anterior, middle, and posterior layers, each with distinct orientations and functional relationships, the TLF forms a fascial continuum linking the spine, pelvis, and abdominal wall musculature. Despite its clinical importance with it being a central anatomical feature, the TLF remains insufficiently understood in terms of its layered architecture, sensory capacity, and load bearing properties. The anatomical findings summarized here originate from a structured literature review of PubMed-sourced studies. Boolean search strategies combining terms such as thoracolumbar fascia, anatomy, and palpatory diagnosis yielded articles that were screened for relevance and validity. Extracted data included morphological descriptions, histological evidence, imaging-based anatomical mapping, and neural innervation patterns. Key studies provided dissection-based descriptions, MRI correlations, and immunohistochemical analyses of sensory and sympathetic fibers. Across the reviewed literature the TLF is consistently described as a tri-layered structure integrating with the aponeuroses of the transversus abdominis, internal oblique, latissimus dorsi, and serratus posterior inferior. The paraspinal retinacular sheath (PRS), lateral raphe, and lumbar interfascial triangle were identified as major load transfer junctions. Histological findings revealed three sublayers—outer, middle, and inner—with varied collagen density and orientation. Experiments involving induced inflammation demonstrated increased dorsal horn neuronal excitability, indicating that the fascia is highly mechanosensitive and capable of modulating nociception. These anatomical insights demonstrate that the TLF functions as an active, tension-bearing, and sensory-rich structure, forming a biomechanical and neurophysiological foundation for its diagnostic importance in osteopathic practice.

Antibiotic-Mediated Modulation of Colony Pigmentation in a Poultry-Derived Serratia marcescens Isolate

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Background: Antimicrobial resistance is a growing global health threat, with foodborne pathogens serving as important reservoirs. Serratia marcescens, a Gram-negative organism, produces the red pigment prodigiosin, which has been associated with virulence. However, the effect of antibiotic exposure on pigment expression and related phenotypic traits remains incompletely understood. This study aimed to compare antimicrobial resistance profiles of Enterobacterales isolated from domestically produced versus USA-imported poultry products and evaluate antibiotic-associated modulation of prodigiosin expression in a S. marcescens isolate.

Methods: Retail chicken products from Grenada and USA-imported sources were sampled, yielding bacterial isolates that underwent species identification and antimicrobial susceptibility testing. Multidrug resistance was defined as resistance to ≥3 antibiotic classes. A S. marcescens isolate was cultured with antibiotic gradient strips, and prodigiosin expression was assessed qualitatively based on colony pigmentation across concentration gradients.

Results: A total of 18 Grenadian and 49 USA-imported meat samples yielded 19 and 78 bacterial isolates, respectively. MDR prevalence was higher among isolates from USA-imported poultry (72%) compared to Grenadian samples (11%). Across all antibiotics, reduced prodigiosin expression was observed in regions of higher antibiotic concentration, with relative preservation of pigmentation at lower concentrations.

Conclusions: Imported poultry products demonstrated a substantially higher prevalence of multidrug-resistant Enterobacterales compared to domestically produced samples. Additionally, antibiotic exposure was associated with concentration-dependent changes in S. marcescens pigmentation, suggesting modulation of phenotypic traits potentially linked to regulatory pathways such as quorum sensing. These findings highlight both the epidemiologic differences in AMR burden and the potential for antibiotics to influence bacterial phenotype.

Keywords: Antimicrobial resistance, Serratia marcescens, prodigiosin, quorum sensing, One Health, zoonotic infections

Prevalence and Morphology of Ossification of the Suprascapular Ligament: A Cadaveric Anatomical Study

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The suprascapular notch is spanned by the suprascapular ligament, beneath which the suprascapular nerve passes. Ossification of this ligament has been associated with suprascapular nerve entrapment and shoulder dysfunction. This study quantified the prevalence, degree, laterality, and demographic associations of suprascapular ligament ossification in a cadaveric population. Thirty-two scapulae from 16 formalin-fixed donors were dissected bilaterally. Ossification was classified using a three-point ordinal rubric (none, partial, complete) based on tactile assessment and blunt probe testing. Following independent evaluation and subsequent adjudication, consensus classification was used for analysis. Prevalence estimates were calculated with 95% confidence intervals (CI). Side, sex, and age associations were assessed using paired and regression analyses. Any ossification was identified in 26 of 32 scapulae (81.3%; 95% CI, 63.6–92.8%), with complete ossification observed in 14 scapulae (43.8%; 95% CI, 26.4–62.3%). At the donor level, 14 of 16 donors (87.5%; 95% CI, 61.7–98.4%) demonstrated any degree of ossification, including 12 with bilateral involvement (75%). Complete ossification on at least one side was present in 8 donors (50%), including 6 with bilateral complete ossification (37.5%). No significant left–right or sex-based differences were observed. Increasing age demonstrated a moderate positive association with ossification severity ($\rho = 0.43$; $p = 0.097$). Based on this data, we conclude that suprascapular ligament ossification is common, frequently bilateral, and may increase with age. These findings support interpretation of ossification as a prevalent anatomical variant and provide quantitative data relevant to suprascapular notch morphology and potential nerve compression.

Keywords: Suprascapular ligament, Cadaveric study, Anatomical variation, Suprascapular nerve entrapment, Ligament ossification

Morphometry and Orientation of Coronary Ostia in the Aortic Root of Cadaver Hearts: Implications for Percutaneous Coronary Intervention and Cannulation

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The coronary arteries arise from the aortic root via the coronary ostia. Ostial morphology and spatial orientation influences catheter engagement and cannulation stability during percutaneous coronary intervention. Detailed anatomic characterization of coronary ostial dimensions and geometric relationships within the aortic root may clarify access-related variability. Sixteen formalin-fixed human hearts were examined. Number and shape of coronary ostia were documented. Ostial diameter and height were measured using digital calipers, and cross-sectional area was calculated to account for noncircular morphology. Circumference of the sinuses of Valsalva (SoV) was measured with a flexible tape and converted to diameter. Three rater pairs independently obtained measurements and inter-rater reliability was assessed. Associations between ostial measurements, SoV diameter, and heart weight were evaluated. Median donor age was 81.5. Inter-rater reliability across measurements was moderate to excellent (ICC range 0.67–0.90). Left coronary ostial area was significantly larger than right (median 11.4 vs 4.9 mm²; $p < 0.001$). Right ostial height exceeded left (median difference 1.6 mm; $p = 0.002$). High takeoff occurred in 84.4% of ostia; no low-lying ostia were observed. Ostial area did not scale with heart weight. Left ostial area correlated with SoV diameter (Ï□ = 0.60, $p = 0.015$), whereas right did not. We conclude that coronary ostial morphology demonstrates consistent left–right asymmetry. The left ostium is larger and associated with aortic root geometry, while the right is smaller and positioned higher within the aortic root. These findings enhance anatomical understanding of coronary origins and may inform variability encountered during coronary cannulation.

Keywords: Coronary ostia; Aortic root anatomy; Anatomical variation; Coronary cannulation

Cadaveric Identification of a Meandering Pulmonary Vein: Anatomical Description and Clinical Implications

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The meandering pulmonary vein (MPV) is a rare congenital anomaly characterized by an additional pulmonary vein following an atypical course, with fewer than 50 cases reported. In this study, an MPV was identified during cadaveric dissection of a donor whose cause of death included COPD, pneumonia, and general decline. This case describes the MPV course, dimensions, and associated cardiac wall thickness, thereby contributing to the limited anatomical and clinical data on MPV. A formalin-fixed cadaver was obtained through the Colorado Anatomical Board's Gift Program. Using Rocky Vista University's dissection guide, students identified an anomalous pulmonary vein draining into the left atrium, consistent with MPV. Calipers were used to measure the MPV diameter, the thickness of the right and left ventricular walls, and the interventricular septum to assess for hypertrophy. Images documented both external and internal heart anatomy, including mapping of the MPV with a probe. A literature review on pulmonary venous anomalies and associated pathologies supplemented the findings. The MPV diameter measured 10.97" mm. The right ventricular wall measured 4.56" mm, the left ventricular wall 7.61" mm, and the interventricular septum 11.75" mm, indicating mild hypertrophy. Previous MPV cases describe presentations such as hemoptysis, mimicking scimitar syndrome, and associations with atrial fibrillation. Pulmonary venous anomalies may contribute to pulmonary venous hypertension and vein stenosis, leading to compensatory cardiac hypertrophy. The ventricular and septal thickening observed in this case aligns with these secondary changes. Given the rarity of MPV, this report adds valuable anatomical and clinical insight to the existing literature.

Keywords: Anatomical Variation, Pulmonary Venous Anomaly

Global Prevalence and Trends in Prehospital Airway Management: Supraglottic Airway Devices Versus Endotracheal Intubation

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Airway management is a critical component of prehospital emergency care, particularly in patients experiencing out-of-hospital cardiac arrest (OHCA) and severe trauma. While endotracheal intubation (ETI) has traditionally been considered the gold standard for advanced airway management, supraglottic airway devices (SGAs) are increasingly utilized because of faster placement, easier insertion, and fewer interruptions in chest compressions. This literature review evaluated whether SGA use compared with ETI is associated with differences in return of spontaneous circulation (ROSC), survival to hospital admission, and neurologically favorable survival in prehospital OHCA management. A structured review of PubMed, Elsevier, SAGE Publications, Emergency Medicine Journal, Annals of Emergency Medicine, and the International Journal of Emergency Medicine was conducted for studies published between 2012 and 2025. Search terms included supraglottic airway, endotracheal intubation, prehospital airway management, EMS, and out-of-hospital cardiac arrest. Observational studies, randomized controlled trials, systematic reviews, and meta-analyses were included. Non-English, in-hospital, and pediatric-only studies were excluded. Fifteen studies from multiple international EMS systems were reviewed. SGAs demonstrated higher first-pass success rates, faster insertion times, and fewer interruptions in chest compressions compared with ETI. First-pass success often exceeded 85% for SGAs, while ETI success varied by provider experience. ROSC, survival to hospital admission, and neurologically favorable survival were generally comparable between techniques, although ETI showed benefit in systems with experienced providers. Limitations included heterogeneity in EMS protocols, provider training, and non-randomized study designs introducing confounding and selection bias. Overall, evidence supports increasing global adoption of SGAs as an effective alternative to ETI in prehospital emergency care.

Keywords: Supraglottic airway devices, Endotracheal intubation, Prehospital airway management, Emergency medical services, Out-of-hospital cardiac arrest

Dynamic Autonomic Regulation in Female Combat Veterans: Continuous HRV Monitoring Across a Trauma-Focused Intervention

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Female veteran's recovery from combat-related trauma remains vastly understudied. Heart rate variability (HRV), a vagally mediated index of parasympathetic tone, provides a direct lens on autonomic engagement and recovery. The aim of this study was to quantify parasympathetic regulation via daily HRV as evidence of the biological efficacy of the first female-only combat-veteran retreat in attempts to scientifically validate their healing journey.

An IRB-approved observational case series was conducted during a five-day retreat (June 17–21, 2025, Montana). Ten veterans enrolled; nine contributed daily HRV via FitBit wear, spanning May 18–July 17, 2025. HRV was cleaned (duplicate same-day values averaged; implausible zeros flagged), aggregated by participant-day, and summarized within predefined windows: Pre (June 10–16), During (June 17–21), and Post (June 22–28). Window coverage was adequate for most participants (Pre n = 8, During n = 9, Post n = 8).

Group mean HRV was 28.2 ms (Pre), 24.5 ms (During), and 28.4 ms (Post); the average During–Pre change was −3.8 ms and Post–Pre ≈ +0.1 ms, indicating a transient reduction during the emotionally activating retreat period with post-retreat normalization. Individual trajectories showed dynamic, context-dependent modulation, and several participants exhibited Post > Pre HRV, consistent with strengthened parasympathetic tone and greater autonomic flexibility after intervention.

Continuous HRV monitoring proved feasible and informative in this high-risk, understudied population, highlighting HRV as a biologically meaningful endpoint for retreat-based trauma care. Limitations include small sample size, uncontrolled observational design, limited covariates, and potential wearable artifacts. These findings are preliminary and hypothesis-generating, motivating larger controlled trials centered on HRV outcomes in female veterans.

Keywords: PTSD, Autonomic Regulation

Supplements and Surprises: A Case Report on Ashwagandha-Influenced Diagnostic Confusion

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Withania somnifera (Ashwagandha), an Ayurvedic medication used for stress, sleep, and fatigue, modulates the hypothalamic–pituitary–adrenal axis and immune pathways. Although marketed as a natural supplement, it has been associated with immune dysregulation that mimics autoimmune syndromes. We present a case of suspected Ashwagandha-associated exacerbation of an underlying, undiagnosed autoimmune neuromuscular disease, highlighting associated diagnostic and systems-based challenges. A previously healthy college student developed rapidly progressive paresthesia, diplopia, and respiratory failure requiring intubation following acute sinusitis and COVID-19 infection. Concern for Guillain–Barr syndrome (GBS) prompted treatment with corticosteroids and IVIG before their transfer to our long-term acute care facility (LTAC), where the provided medical records were incomplete. Examination revealed bilateral ptosis, ophthalmoplegia, and fluctuating proximal weakness. MRI was unremarkable; lumbar puncture showed elevated opening pressure without albuminocytologic dissociation. As post-extubation respiratory status improved, the patient was rapidly weaned from mechanical ventilation to minimal oxygen support. Within three days, the patient was ambulating with assistance, reporting clearer vision, and demonstrating marked gains in proximal strength. The patient disclosed ingesting four Ashwagandha tablets daily for five months. Rapid post-treatment improvement is atypical for GBS and raises concern for Myasthenia Gravis (MG) or similar autoimmune etiology. In the context of recent viral infection and family history of autoimmunity, supplement-related immune modulation likely precipitated an MG phenotype leading to respiratory failure. The patient's follow-up course reflected remarkable clinical improvement, and arrangements were made for antibody testing and EMG after discharge to confirm the underlying diagnosis and ensure continuation of appropriate long-term management. This case underscores the importance of thorough medication and supplement histories in critically ill patients. It also highlights systemic barriers, including fragmented interfacility communication and incomplete patient records, subsequently delaying diagnostic closure. Recognition of supplement-associated immune phenomena and coordinated follow-up protocols are essential to ensuring accurate diagnosis and patient outcomes.

Keywords: Myasthenia Gravis; Guillain-Barr syndrome; Withania somnifera; Ashwagandha; COVID-19

Understanding the Menstrual Pain Experience in Osteopathic Medical Students: Expansion Study

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In 2019, Matsumoto et al. reported a higher prevalence of severe psychosocial symptoms among college women who consider themselves unhealthy and stressed during their menstrual cycle, highlighting the impact of menstrual pain on academic performance. This study aimed to explore pharmacological versus non-pharmacological methods used to alleviate menstrual pain among osteopathic medical students. Because osteopathic training emphasizes a holistic approach to care, this study sought to examine pain management strategies within a population trained to consider body, mind, and spirit. We hypothesized that menstrual pain significantly impacts daily and academic functioning and that non-pharmacological methods would play a notable role in pain management, within this population specifically. An anonymous 11-question Qualtrics survey was distributed to menstruating osteopathic medical students at Rocky Vista University Montana College of Osteopathic Medicine (September to October 2025), then expanded nationwide (November 2025), assessing pharmacological and non-pharmacological pain management methods and their impact on daily functioning via multiple-choice and numeric rating scale responses. Survey limitations included response drop-offs, low response rates, dissemination challenges across campuses, fraudulent responses, environmental distractions, and technology issues. Data from 36 responses (30 complete) was analyzed using Qualtrics-generated charts and trend analysis. Majority of participants reported moderate impacts of menstrual pain on daily and academic functioning, used both pharmacological and non-pharmacological methods, and identified heat therapy as the most common non-pharmacological approach. These findings highlight the impact of menstrual pain on daily and academic functioning and suggest potential gaps in campus support resources.

Keywords: Women's health, Physical medicine, Integrative health, Functional wellbeing, Reproductive health, Menstrual health, Pain management, Non-pharmacological pain management

Revision Pectoralis Major Transfer with Semitendinosus Allograft Augmentation for Recurrent Medial Scapular Winging in a Young Female Athlete: A Case Report

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Medial scapular winging most commonly results from serratus anterior dysfunction due to long thoracic nerve palsy and can lead to significant pain, shoulder instability, and functional impairment. Pectoralis major transfer with semitendinosus augmentation has been described as a surgical option to restore scapular stability when conservative management fails. This case report describes a 16-year-old female who developed right medial scapular winging following a volleyball overuse injury in 2021. Electromyography (EMG) confirmed long thoracic nerve palsy as the underlying etiology. After failure of conservative management and persistent functional limitations with reduced shoulder range of motion for eight months, she underwent a split pectoralis major transfer in July 2022. One year later, she sustained a traction injury of the same extremity. Magnetic resonance imaging (MRI) confirmed failure of the graft, resulting in recurrent scapular winging, worsening pain, and decreased range of motion. Following unsuccessful nonoperative treatment for nearly two years, revision surgery was pursued. In May 2025, a revision pectoralis major transfer with semitendinosus graft augmentation was performed to restore scapular stability and improve shoulder mechanics. Postoperative follow-up demonstrated resolution of pain and restoration of functional scapular control. Revision pectoralis major transfer with graft augmentation restored functional scapular control after failure of a primary transfer in this patient. Careful patient selection and surgical planning remain important when managing recurrent scapular winging due to long thoracic nerve dysfunction. Additional studies with larger cohorts are needed to better define long-term outcomes and optimize surgical strategies for revision management of medial scapular winging.

Keywords: Medial scapular winging, Pectoralis major, Long thoracic nerve palsy, Revision

Transurethral Resection of Bladder Tumor for A High-Grade Papillary Urothelial Carcinoma: A Case Study

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Bladder cancer is the tenth most common cancer worldwide, with urothelial carcinoma being the most predominant histological type. Transurethral resection of bladder tumor (TURBT) remains the gold standard for both diagnosis and initial management of non-muscle invasive bladder cancer (NMIBC) because it allows for both histologic characterization and maximal tumor resection. This case study describes the evaluation and management of recurrent high-grade papillary urothelial carcinoma in a 73-year-old male presenting with mild lower urinary tract symptoms. The patient's medical history was significant for non-Hodgkin's lymphoma and prior bladder cancer treated with TURBT in 2020, with recurrence again documented in 2022. A computed tomography urogram obtained in June 2023 demonstrated enhancing material along the right posterior bladder wall measuring 4.9 x 4.3 x 2.5 cm, representing interval growth compared with prior imaging. Based on the patient's history of recurrent disease and radiographic findings suspicious for malignancy, diagnostic and therapeutic TURBT was pursued. Intraoperative cystoscopic evaluation demonstrated multifocal tumors located at the left posterior, right lateral, and right inferior aspects of the bladder. Using a continuous-flow resectoscope with a resection electrode loop, all visible tumors were resected to the level of the muscularis propria to ensure adequate sampling for accurate staging. Histopathologic evaluation confirmed high-grade urothelial carcinoma. This case highlights several key considerations in the management of recurrent NMIBC, including the importance of complete tumor resection, inclusion of muscularis propria in the specimen to prevent understaging, and careful evaluation of recurrent lesions in patients with prior bladder cancer. Although long-term follow-up data were limited, this report underscores the continued clinical value of TURBT as both a diagnostic and therapeutic intervention in recurrent high-grade bladder cancer and emphasizes the importance of meticulous surgical technique and accurate pathologic staging in guiding subsequent treatment decisions.

Keywords: Urology, TURBT, Bladder cancer

Surgical Technique for an Open Reduction Internal Fixation Periprosthetic Intra-articular Femur Fracture: A Case Study

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Periprosthetic distal femur fractures comprise approximately 3–6% of all femur fractures and are increasing in incidence with rising rates of knee arthroplasty. Management is challenging when existing implants limit standard fixation options such as isolated intramedullary nailing or lateral plating. Hybrid constructs combining intramedullary nails with lateral distal femur plates have been proposed to improve biomechanical stability, though reports in the setting of prior patellofemoral arthroplasty remain limited. This case describes a 55-year-old female with a history of bilateral patellofemoral arthroplasty who sustained a twisting injury, resulting in an oblique distal femoral shaft fracture with intra-articular extension adjacent to the prosthesis. Imaging showed no evidence of implant loosening. The patient was neurovascularly intact and initially stabilized in Buck's traction before operative intervention. Given her age and preserved bone stock, distal femoral replacement was deferred. Instead, a hybrid nail-plate construct was selected to optimize stability while accommodating existing implants. Open reduction and internal fixation via a lateral approach achieved satisfactory fracture reduction and alignment, confirmed intraoperatively with fluoroscopy. No intraoperative or immediate postoperative complications occurred. This case highlights the technical challenges of managing periprosthetic distal femur fractures and supports the use of combined nail-plate constructs to enhance stability in the setting of altered anatomy. While long-term functional outcomes are not yet available, this approach offers a viable strategy when conventional fixation options are limited.

Keywords: Orthopedics, fracture, hybrid fixation

Regenerative Medicine in Orthopedics: Evaluating PRP, MSC Therapies, BPC-157, TB-4/TB-500, CJC-1295, Retatrutide, and Osteostatin as Complements to Conventional Care: A Narrative Review

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Musculoskeletal disorders affect billions of individuals globally and are a leading cause of disability and healthcare expenditure. Regenerative medicine has emerged as a potential therapy, aiming to enhance tissue repair, improve functional outcomes, and delay the need for surgical intervention. This narrative review examines biologic therapies that aim to restore function and promote healing by leveraging the body's intrinsic regenerative capacity. A comprehensive literature search was conducted using PubMed, Google Scholar, and various anthropological and orthopedic journals for studies published between 1990 and 2026. The review included clinical trials, observational studies, and preclinical investigations, with human data prioritized when available. Therapies evaluated included platelet-rich plasma (PRP), mesenchymal stem cell (MSC)-based therapies, and investigational peptides such as body protective compound-157 (BPC-157), thymosin beta-4 (TB-4), thymosin beta-500 (TB-500), CJC-1295, retatrutide, and osteostatin. PRP demonstrated the most consistent clinical benefit, particularly in knee osteoarthritis and tendinopathy. MSC-based therapies exhibit promising immunomodulatory and regenerative potential, largely mediated through paracrine signaling. Peptide-based therapies show encouraging preclinical effects in tissue repair, angiogenesis, and bone remodeling. Across all modalities, variations in study design and treatment protocols complicate reproducibility and cross-study comparison. Regenerative medicine is a rapidly expanding field and represents a potential adjunct in the management of musculoskeletal injury and degenerative disease. However, significant gaps remain in regulatory oversight, the standardization of treatment protocols, and, most importantly, clinical evidence. By carefully examining both the potential advantages and current limitations of these therapies, this review seeks to help bridge the gap between laboratory research and clinical application.

Keywords: Orthopedics, musculoskeletal, biologics, peptides

Premiere league players slashing socks. Waste of socks or physiological enhancement?

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A recent trend among premier league footballers involves cutting compression socks in the gastrocnemius and soleus region to relieve compression and improve lower-leg circulation. Whilst compression garments can enhance venous return and cardiovascular efficiency, excessive calf compression may restrict blood flow in individuals with larger musculature. Despite its popularity, there is limited scientific evidence evaluating the effect of cutting socks. We hypothesize that cutting compression socks in the sural region does not provide a measurable physiological advantage and is more likely a fashion trend or comfort-based preference rather than a performance-enhancing intervention. To test this hypothesis, popliteal artery blood flow and arterial diameter will be measured using Doppler ultrasound at rest and immediately following controlled treadmill exercise. Participants will complete the protocol under three conditions: no socks, intact socks, and cut socks. Resting blood flow will be calculated from baseline arterial diameter and mean blood velocity, with exercise measurements used to assess changes from baseline. Each condition will be repeated with adequate rest periods to ensure a return to baseline hemodynamics. We expect that cut vs intact sock condition will not produce significant differences in popliteal arterial diameter. Any observed differences in blood flow are anticipated to be minimal, with a potential for a slight decrease, and unlikely to translate into meaningful improvements in exercise performance. This study will provide objective physiological data regarding a widely observed athletic practice and help determine whether cutting compression socks offers measurable benefits to lower limb circulation.

Portable POCUS for Rural Cardiovascular Screening: Identifying Valve Calcification and Peripheral Arterial Occlusion

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Aortic valve calcification (AVC) and peripheral artery disease (PAD) are systemic manifestations of atherosclerosis that frequently coexist yet are often evaluated through separate diagnostic pathways. In rural, resource-limited settings, access to comprehensive cardiovascular imaging may be delayed or unavailable. Handheld point-of-care ultrasound (POCUS) offers a portable, bedside modality with demonstrated diagnostic utility for screening and triage when standard imaging is inaccessible. This case highlights the role of handheld POCUS in the concurrent evaluation of cardiac and peripheral arterial disease during a single encounter. POCUS was performed using a Butterfly iQ3 in Tarapoto, Peru, on a 61-year-old man with uncontrolled diabetes mellitus presenting with cyanosis and necrosis of the left foot. Physical examination revealed a palpable left popliteal pulse with absent distal pedal pulses. Using the cardiac preset, POCUS demonstrated marked aortic valve calcification with hyperechoic leaflet thickening, restricted excursion, and mild aortic regurgitation. Two-dimensional imaging and color Doppler were used to qualitatively assess valvular morphology. The examination was extended to the lower extremity using a high-frequency linear vascular preset, revealing eccentric plaque and complete occlusion of the posterior tibial artery, consistent with advanced PAD and correlating with ischemic findings. Differential diagnoses included vasculitis and necrotizing soft tissue infection; preserved proximal pulsatility, lack of systemic illness, and absence of inflammatory sonographic features supported arterial occlusive disease. POCUS findings enabled rapid diagnostic clarification, risk stratification, and urgent vascular surgery referral. Follow-up outcome data were unavailable at the time of submission.

Keywords: Keywords: Aortic Valve Calcification, Butterfly iQ3, Echocardiography, Handheld Ultrasound, Peripheral Artery Disease (PAD), POCUS; Toe Necrosis; POCUS; Vascular Surgery Referral

Expanding Access to Bedside Diagnosis: Implementation of POCUS to Identify Gallstones in Rural Healthcare Settings

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Gallstones affect approximately 10–15% of adults and represent a frequent cause of right upper quadrant (RUQ) pain. Ultrasound is recommended as the first-line diagnostic modality for suspected biliary disease, yet access may be limited in rural settings due to cost, transportation barriers, and lack of laboratory services. Handheld point-of-care ultrasound (POCUS) offers rapid bedside evaluation and may bridge diagnostic gaps when cart-based systems are unavailable. Although the literature increasingly supports POCUS for biliary assessment, its real-world implementation in low-resource environments remains under-reported. This case report aims to discuss the utility of POCUS for biliary diagnosis in low-resource settings. A 71-year-old woman with no comorbidities presented with one day of acute RUQ pain. She denied fever, nausea, or vomiting. Vital signs were stable. Physical examination demonstrated positive Murphy's and Lloyd's signs without rebound tenderness. Laboratory testing was not available at the clinical site, necessitating a diagnosis informed solely by bedside imaging and physical examination. A handheld abdominal ultrasound (Butterfly iQ3, abdomen preset) was performed with the patient supine. Imaging revealed three mobile hyperechoic gallstones measuring approximately 1.5 cm each with posterior acoustic shadowing, gallbladder wall thickening of 5 mm, and a positive sonographic Murphy's sign. No biliary ductal dilation was noted. In the absence of systemic inflammation or evidence of obstruction, findings were most consistent with symptomatic cholelithiasis versus early cholecystitis. Alternative causes of RUQ pain, including hepatic, renal, peritoneal, peptic, or pulmonary etiologies, were considered less likely based on imaging and clinical context. The patient received analgesia with improvement and was discharged with expedited gastroenterology referral for cholecystectomy. Follow-up was limited due to temporary clinic operations. This case highlights the utility of handheld POCUS in rural settings, supporting timely diagnosis, reducing barriers to care, and demonstrating its potential to improve clinical decision-making in rural settings.

Keywords: Rural Health, Low-Resource Medicine, Ultrasound, Biliary Disease, Case Report

AI-Assisted Radiology Report Generation: Impacts on Accuracy, Clarity, and Workflow Efficiency

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Objective: This study synthesizes current evidence regarding the performance and clinical applications of artificial intelligence (AI)-assisted systems in radiology report generation. The review compares AI-generated and human-authored reports across accuracy, clarity, and efficiency, evaluates workflow integration, and identifies key evidence gaps. Methods: A synthesis of recent literature (2021–2025) was conducted, focusing on original research and systematic reviews involving multimodal AI frameworks and large-scale language models applied to imaging modalities including X-ray, CT, and MRI. Results: Evidence indicates that AI has evolved from simple image captioning to multimodal, clinically aware frameworks capable of advanced reasoning. In specialized domains such as neurological and hepatobiliary imaging, AI achieves diagnostic accuracy rates between 94% and 99%. Automated systems generate reports in under one second, compared to 1.5–2 minutes for manual drafting, and can reduce radiologist review time by up to 58%. AI-generated reports also improve patient comprehension, with scores nearly doubling (2.71 to 4.69/5) when translating technical language. However, human-authored reports remain superior in clinical depth and nuanced reasoning. Feasibility and Workflow Integration: Integration is increasingly feasible through explainable hybrid models using interpretable features and lesion-aware logic, supporting human-AI collaboration. Gaps and Future Research: Barriers include hallucinations, limited longitudinal judgment, and inadequate evaluation metrics. Future work should focus on robust, clinically aligned evaluation methods and models capable of assessing temporal patient data. Conclusion: AI is a valuable decision-support tool that enhances productivity and patient engagement, but expert human oversight remains essential for clinical safety.

Effect of Interactive Anki Flashcards in Medical School Histology Exam Performance

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Background: Anki is an open-source flashcard program that employs spaced repetition and active recall to enhance long-term knowledge retention. Although Anki is widely used in medical education, limited evidence exists regarding how specific card formats, particularly "type-in-the-answer" cards, influence learning outcomes in visually intensive subjects such as histology. This study evaluates the impact of a standardized "type-in-the-answer" Anki histology deck on first-year medical student performance. Methods: We conducted a cohort quasi-experimental study at Rocky Vista University–Montana College of Osteopathic Medicine during the 2025–2026 academic year. Following their first histology examination, first-year medical students (N = 133) completed a pre-study Qualtrics survey assessing prior histology exposure and Anki use. Participants were subsequently provided access to a pre-made, "type-in-the-answer" Histology Anki deck for the remaining Academic year. Anki usage metrics (time spent studying, cards reviewed, and review frequency) were collected via a custom Anki add-on, de-identified, and stored on a secure institutional server. Histology examination scores were de-identified by faculty and compared within the study cohort and against a control group (non-enrolled peers). Pre- and post-study survey responses will be analyzed using chi-square testing. Results: Eighty students met study adherence criteria (i.e., Anki add-on installation and accurate entry of student identification numbers). Participants were stratified by average practical examination performance (<70%, 70–80%, 80–90%, >90%). Overall, the study cohort demonstrated a 0.81% higher average exam score compared with nonparticipants (n = 101). Students achieving average practical scores greater than 90% (n = 42) exhibited significant exam score improvement once they started using the provided Anki decks ($p = 0.0004$). Across all participants, exam performance showed a weak positive correlation with average daily study time ($r = 0.23$). Conclusion: Use of standardized "type-in-the-answer" Anki decks was associated with improved histology performance, particularly among high-achieving first-year medical students. These findings highlight the potential value of structured, interactive flashcard formats and support further investigation into customizable digital learning tools and their role in promoting durable learning in medical education.

Keywords: Histology, Flashcards, Anki

Variant Mesenteric and Pancreatic Vasculature. A Case Report

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The vasculature of the pancreas and colon is highly variable and clinically relevant in pancreatic and colon surgeries. While previous reports have demonstrated variant anastomoses between the colonic and pancreatic arteries, to our knowledge, the specific variant observed in our study has not previously been reported. The aim of this study was to contribute additional data regarding the complex vasculature of the foregut and midgut to enhance anatomic understanding needed for careful vascular planning in colorectal and pancreatic surgeries. During a routine cadaveric dissection in our medical school anatomy laboratory, we identified an unusual branching pattern of the superior mesenteric artery (SMA) on a 72 y/o male donor. The middle colic artery (MCA) was identified with four branches. An unnamed fourth branch was identified originating from the posterior MCA. This artery descended from its origin and bifurcated into an inferior and a transverse branch that crossed anterior to the SMA. The transverse artery divided into a branch that supplied the small intestine, and a long ascending branch that coursed towards the inferior border of the pancreas with branches supplying the head, uncinate process, body, and tail of the pancreas. This unnamed artery originated from a common trunk with the MCA, with branches that supplied the colon, small intestine, and pancreas. This case represents a novel arterial branching pattern between the vasculature of the colon and pancreas. Knowledge of unique arterial variants benefits fields of anatomy and surgery and supports efforts to reduce operative complications in colorectal and pancreatic surgeries.

Keywords: Variant anastomoses, inferior pancreaticoduodenal artery, middle colic artery, superior mesenteric artery, colorectal surgery, pancreatic surgery

Clinically Relevant Variants of the Brachial Plexus: Implications for Electrodiagnosis, Ultrasound, and Procedural Planning

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Background: Anatomical variations of the brachial plexus are common but underrecognized in medical education. Communicating branches between the musculocutaneous nerve (MCN) and median nerve (MN) have been reported in 10–54% of cases and may significantly impact regional anesthesia, surgical approaches, and electrodiagnostic interpretation. Objective: To characterize anatomical variations of the terminal branches of the brachial plexus, with emphasis on MCN–MN communications and their clinical relevance. Methods: Cadaveric dissections were performed on 31 embalmed donors over two consecutive academic years. Upper extremities (UE) were examined bilaterally in 28 donors and unilaterally in 3 donors (total n = 55 UE). Terminal branches were dissected and evaluated for communicating branches and atypical patterns. Variations were classified using established frameworks, including the Le Minor classification, and documented with cadaveric imaging. Observed patterns were compared with existing literature. Results: MCN–MN communicating branches were identified in 12 of 55 UE (21.8%), with consistent prevalence across cohorts (2025: 6/26, 23.1%; 2026: 6/29, 20.7%). One donor demonstrated a bilateral Type V Le Minor variation. Additional atypical lateral cord branching patterns were observed, including variants with potential implications for altered nerve course and distribution. Discussion: These variations may alter expected motor and sensory distributions, leading to atypical clinical presentations. Clinically, they may reduce the accuracy of nerve blocks, complicate electrodiagnostic interpretation, and contribute to unexpected patterns of weakness or sensory loss. Conclusion: Brachial plexus variations are common and clinically significant. These findings demonstrate consistent prevalence across cohorts and highlight bilateral and higher-order variants, supporting improved recognition in clinical practice, procedural planning, and medical education. Limitations include small sample size and cadaveric design.

Keywords: Anatomy, Brachial Plexus, PM&R, Neurology, Sports Medicine

Quantifying the Anatomical Effects of Adiposity on the Plantar Fascia Angle: A Cadaveric Study

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Pes planus is a common foot deformity characterized by loss of the medial longitudinal arch of the foot during standing. Pes planus has been associated with increased BMI in children, but it is less consistently demonstrated in older adults. Jiang et al. developed a novel tool to diagnose pes planus by measuring the plantar fascia angle (PFA) via ultrasound. This study uses this non-invasive technique to establish a correlation between PFA and percent body fat (%BF) in adult cadaveric subjects. We hypothesize that adult cadavers with increased adiposity will have a higher prevalence of pes planus. Adiposity was characterized by WHtR and B-mode ultrasound measurements of subcutaneous adipose tissue at four landmarks–the tricep, abdomen, thigh, and tibialis anterior. The averages were applied to a regression equation that converts adiposity into %BF. The plantar fascia was imaged with B-mode ultrasound, and angles were measured with RadiANT DICOM software. Simple linear regression analysis of WHtR and PFA demonstrated a modest linear association ($R^2 = 0.2848$). A similar association was found between %BF and PFA ($R^2 = 0.2204$). The association between %BF and PFA was moderate in males ($R^2 = 0.2849$) and females ($R^2 = 0.2717$). These findings suggest that adiposity may contribute to structural changes associated with pes planus in adults. This study provides the first cadaveric evidence linking increased fat mass to an anatomic marker of pes planus. Identifying adiposity as a potential risk factor may improve understanding of pes planus etiology and inform future preventative and diagnostic strategies.

Correlations Between Student Factors and Anatomy Grade Outcomes

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First-year medical students often wonder how best to study anatomy outside of cadaveric dissection. However, there have been few quantitative studies that inform students how to best allocate their time for success on anatomy exams. This study assesses various student factors with performance on musculoskeletal I (MSK I) and cardiovascular/respiratory I (CV/Resp I) written and practical exams. Surveys were collected from 51 first-year students, and included categories such as prior anatomy experience, review habits, and use of specific resources (textbooks, online aids, flashcards). These factors were then anonymously linked to written and practical exam scores in MSK I and CV/Resp I courses and analyzed statistically. Results revealed that prior graduate-level experience consistently relates to higher exam scores, affording a 6-point grade advantage. How many times (frequency), but not how many hours (total time), spent studying in the anatomy lab increased practical exam scores by 1.6 points/session (P=0.0114). Use of flashcards increased practical exam scores by 1 point/hour of use (P=0.0015). The RVU Anatomy Website resources negatively impact written exams, with scores decreasing by 1.3 points/hour of use (P=0.0046). These results indicate that additional repetition is important for anatomy exam scores. Although prior experience provides an advantage, increased frequency in the anatomy lab and the use of flashcards have also been shown to improve scores on practical exams. This study allows faculty and tutors to better advise students on methods that may increase their exam scores.

Concurrent Variations of the Posterior Superior Pancreaticoduodenal and Cystic Arteries: A Cadaveric Case Report

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The celiac axis demonstrates considerable anatomic variability, and awareness of these variations is essential for surgeons performing hepato-pancreato-biliary procedures. The posterior superior pancreaticoduodenal artery (PSPDA) typically arises from the gastroduodenal artery and forms collateral circulation with the posterior inferior pancreaticoduodenal artery (PIPDA) to supply the posterior pancreatic head, duodenum, and common bile duct. The cystic artery typically arises from the right hepatic artery to supply the gallbladder and cystic duct. Both arteries are involved in various abdominal surgeries; thus, describing variations of these vessels adds to the anatomical literature and may improve preoperative planning and intraoperative techniques. A formalin-fixed, 90-year-old male cadaver from the Colorado Anatomical Board's Anatomical Gift Program was dissected by Pre-Doctoral Anatomy Fellows using Rocky Vista University's dissection guide. Two variations were identified: 1) the PSPDA originated from the right hepatic artery, and 2) the cystic artery originated from the PSPDA. Further, the cystic artery exhibited an atypical trajectory, coursing anterior to the cystic duct and common bile duct, rather than posteriorly within the cystohepatic triangle. These variations have important implications in surgical procedures involving the pancreas, duodenum, and gallbladder. A variant origin of the PSPDA, along with an atypical cystic artery arising from it, poses a risk of complications during cholecystectomies, pancreaticoduodenectomies, Frey/Beger procedures, and more. Incorrect ligation or clamping may compromise perfusion to the gallbladder, pancreatic head, and duodenum. Documentation of these variations enhances understanding of regional vascular complexity and highlights the need for imaging to carefully identify arterial patterns before hepato-pancreato-biliary operations.

CT-Negative Fish Bone Impaction in the Pyriform Sinus Requiring Operative Removal – A Case Report

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Fish bone impaction in the oropharynx is a common cause of globus and odynophagia that is typically diagnosed with computed tomography (CT) imaging. While CT is considered the gold standard with reported sensitivities of 83.3%-100%, false negatives can occur with small or deeply embedded fish bones. This case demonstrates the critical importance of clinical judgement when foreign body symptoms persist despite negative imaging findings. A 67-year-old woman presented to the emergency department (ED) twice within 24 hours with persistent odynophagia and globus sensation after eating catfish. CT imaging demonstrated no foreign body on both occasions. Upper gastrointestinal endoscopy and oral exam under anesthesia were performed because of her persistent symptoms. Palpation of the oral cavity revealed a 4 cm fishbone embedded in the left pyriform sinus. The bone was extracted without difficulty. Flexible endoscopy did not reveal esophageal injuries. The patient recovered without complication and had immediate resolution of her symptoms. This case demonstrates that fish bones can be radiologically occult on CT imaging and persistent symptoms of odynophagia and globus sensation following fish ingestion warrant further evaluation regardless of negative imaging findings. Clinical judgement should supersede imaging results in suspected foreign body cases, as delayed removal increases complication risk (esophageal laceration and perforation, ulceration, mediastinitis, as well as abscess formation). Emergency physicians and otolaryngologists should maintain a high index of suspicion when clinical presentation strongly suggests foreign body impaction despite negative imaging findings.

Keywords: Surgery, Fish Bone, Foreign Body, Diagnostic Imaging, Globus, Odynophagia

Exploring Learning Approaches Among Medical and Pre-health Professional Students Using the R-SPQ-2F: A Cross-Sectional Analysis

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Understanding how students approach learning is fundamental to optimizing medical and pre-health professional education. Deep learning is associated with improved retention, reasoning, and competence, whereas surface learning is more closely linked to memorization and short-term performance. This study characterized learning approaches among MMS and MCOM students and examined their associations with academic performance, demographics, and medical residency interest. MMS and MCOM students were invited to participate in a cross-sectional, quantitative study using the Revised Two-Factor Study Process Questionnaire (R SPQ 2F). Responses were linked to academic, demographic, and residency interest. Associations were evaluated using generalized linear models and logistic regression. Analyses were performed using SAS v.9.4. Respondents (n=105) were primarily OMS II (46.7%) and OMS I (34.3%), with a female majority (55.2%). The mean age was 24.4 ± 3.2 years, and most identified as White (83.8%). Mean science GPA and MCAT were 3.57 ± 0.28 and 500.5±5.6, respectively. Among participants, 32 (30.5%) reported a Health Professional Shortage Area background and 22 (21%) an economic disadvantage. Higher academic performance was associated with lower Surface Learning scores (P=0.0259), and higher Deep Learning scores were associated with greater interest in surgical residencies (P=0.0227). In adjusted models, race, first-generation college status, living in an HRSA, and previous academic performance were associated with academic outcomes and residency type interest. This study addresses a critical gap in research by characterizing learning approaches and their associations with residency specialty interest. These findings may inform advising, curriculum refinement, and academic support strategies aimed at promoting long-term student success.

Keywords: Medical Education, Deep Learning, Surface Learning, R-SPQ-2F, Residency Specialty Interest, Academic Performance, Socioeconomic Factors, Osteopathic Medicine

A Comparative Analysis of the Injuries in the Global War on Terror (GWOT) Versus Modern Drone Warfare in the Ukraine War

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INTRODUCTION: The Russia-Ukraine conflict has highlighted the growing lethality and operational impact of drones in modern warfare. Despite the widespread introduction of drones to the modern battlefield, research on drone related injuries remains limited. This analysis will examine injury patterns observed during the Global War on Terror (GWOT) and contrast them with those emerging from the Russia-Ukraine War, the paradigm of drone conflict.

METHODS: A comparative literature review of 25 peer-reviewed articles and surveillance reports (2007–2025) was conducted. Literature evaluating injury patterns, trauma management, prehospital challenges, and psychological effects associated with drone warfare and combat trauma were included. The Injury Severity Score (ISS) served as the primary metric for injury burden comparison; GWOT values were derived from the DoDTR, while Ukraine severity was estimated from polytrauma descriptions, cohort studies, operational reports, and a pediatric ISS cohort from Kharkiv.

RESULTS: GWOT data showed 25% of patients with severe injuries (ISS ≥16). In contrast, a pediatric cohort reported 36% had ISS >16, and multiple independent studies consistently demonstrated a high prevalence of multi-region polytrauma — with 45.5% of TBI patients sustaining concurrent extracranial injuries and maxillofacial cohorts reporting frequent concomitant injuries outside the facial region.

CONCLUSION: Modern drone-dominated warfare appears to shift trauma burden toward higher rates of multi-region, severe phenotype injuries, with lower survivability – a distinction from the GWOT. As Ukraine lacks a formal trauma registry, comparison of ISS-differences remains limited. Standardized trauma data is needed from Ukraine to better describe the impact of drone warfare on injury severity

Keywords: Military medicine, drone warfare, trauma

Treating Radicular Pain After Nucleus Pulposus Exposure: An Immunologic Perspective and Proposal

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Disc herniation commonly causes radicular pain and functional disability. Emerging evidence shows that exposing nucleus pulposus (NP) tissue to the epidural environment can trigger responses contributing to radicular pain and physiological disc resorption, with immune cell infiltration and cytokine-mediated signaling appearing to play central roles. However, early pharmacologically mediated suppression of these mechanisms has unclear implications. This review synthesizes clinical, translational, and experimental evidence regarding immune-mediated mechanisms of radicular pain following NP exposure and discusses pharmacologic strategies that may balance symptom control and preservation of physiological disc resorption. A PRISMA-style literature search of the PubMed database identified peer-reviewed disc herniation studies examining inflammatory biomarkers, immune signaling pathways, pharmacologic interventions, and clinical outcomes. Evidence was analyzed from four complementary domains: human biomarker studies, experimental models of immune-mediated radiculopathy, imaging and histopathologic evidence of immune infiltration, and pharmacologic modulation of inflammatory pathways. Several studies report elevated levels of inflammatory mediators, including TNF-α, IL-1β, IL-6, CCL2, and CX3CL1, in herniated disc tissue and surrounding neural structures, with multiple reports demonstrating associations between inflammatory signaling and radicular pain severity. Experimental models demonstrate that exposing NP tissue to neural elements can induce radicular pain through pathways involving NF-κB activation, TLR4 signaling, and chemokine-mediated recruitment, with evidence of secondary central sensitization in the spinal cord. Dual roles of inflammation and differences in clinical resolution across disc herniation phenotypes introduce a therapeutic dilemma. We propose developing pharmacologic regimens based on injury phase and lesion morphology. Patients with extruded lesions may benefit from NSAIDs, selective cytokine inhibitors, and delayed/limited steroid administration, which partially preserve early immune activity, and may allow physiological resorption while controlling symptoms. Conversely, patients with sequestered herniations, and decreased risk of refractory inflammatory response, may derive a greater benefit from early aggressive anti-inflammatory interventions. Further research would clarify optimal pharmacologic protocols in immune-mediated radiculopathy.

Keywords: Immunology, Radicular Pain, Nucleus Pulposus, Disc Herniation

The Calm After the Neuro Storm: Outcomes of a Novel Treatment in Patients with Paroxysmal Sympathetic Hyperactivity Secondary to Brain Injury

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Paroxysmal Sympathetic Hyperactivity (PSH), also termed neurostorming or dysautonomia, is characterized by persistent or episodic sympathetic and motor hyperactivity. Patients present with tachycardia, hypertension, tachypnea, fever, diaphoresis, impulsivity, and/or posturing. PSH often occurs during recovery from acquired brain injury or trauma and may persist for weeks to months. Uncontrolled PSH contributes to secondary neurologic injury, further delaying recovery and worsening morbidity. This occurs frequently in long-term acute care (LTAC) facilities, where patients are transferred after unsuccessful initial acute management. Based on neurophysiological research examining the impact of sedative agents on cortical electrical activity, we hypothesized that the injured brain can enter a physiologically favorable state to reestablish functional connections by "resting" dysfunctional neural circuits, slowing pathological signaling, and providing a less hindered environment for neuroplastic processes to occur. This prospective study included 80 LTAC patients with brain injury presenting with PSH refractory to conventional treatment. The primary study outcome was cessation of PSH. The secondary outcome was neurological recovery. This novel protocol uses dexmedetomidine (Precedex), with or without the addition of propofol, fentanyl, and/or norepinephrine (Levophed), to achieve a short-term sedation at a Richmond Agitation-Sedation Scale score of -4. Dosages were adjusted based on clinical response and maintaining target sedation. 78 patients demonstrated sustained resolution of PSH without requiring repeat intervention. Two patients experienced incomplete resolution. In most cases, PSH was controlled within hours of reaching the target sedation level and remained controlled following sedation withdrawal. Once stabilized, patients transitioned to rehabilitative therapies to support neuroplastic recovery. The success rate shows that controlled short-term deep sedation effectively targets the underlying pathophysiology of PSH. The immediate and longitudinal clinical outcomes demonstrate that PSH can be treated even in the subacute phase of recovery and may have a significant positive influence on long-term neurological function following severe brain injury.

Keywords: Neurophysiology, Paroxysmal Sympathetic Hyperactivity, Brain Injury, Long-Term Acute Care

Metabolic Signaling meets Vascular Disease: BMPR2-Mutated Adipocytes in Heritable Pulmonary Arterial Hypertension

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Approximately 80% of patients with heritable pulmonary arterial hypertension (PAH) have mutations in the BMPR2 gene, which pathologically causes reduced PPARγ activity, increased MAPK signaling, and altered PDGF–mediated pathways. PAH is a progressive cardiopulmonary disorder characterized by obstructive remodeling of pulmonary arteries, leading to right ventricular heart failure and death. Recent studies suggest that systemic dysfunctions may drive pathogenesis. BMPR2-mutated animal models exhibit pre-existing insulin resistance and subsequently develop lipid accumulation in right ventricular cardiomyocytes, suggesting a metabolic contribution to PAH and lipotoxic cardiomyopathy. Although fat assists in regulating inflammation and metabolism, dysfunctional adipose tissue influences adipokine signaling, oxidative stress, and systemic inflammation. Dysfunctional BMPR2 and fat contribute to pulmonary vascular remodeling, so this study investigated BMPR2 mutation altering gene expression in adipocytes, which affects the physiological responses of pulmonary microvascular endothelial cells (PMVEC). Wild-type PMVEC were cultured alone or with adipocyte stem cells from either wild-type or BMPR2-mutant mice. Gene expression was assessed by RNA-seq, and O-Link Proteomics evaluated secreted molecules in conditioned media. BMPR2 mutations in adipocytes resulted in 2587 of 12848 genes expressing significant changes. PMVEC cocultured with BMPR2-mutated adipocytes had 3120 significantly altered genes when compared to coculture with wild-type adipocytes. Expression of secretory proteins, which included cytokines, semaphorins, and growth factors, correlates well with altered RNA expression within the adipocytes. However, these genes are not differentially expressed in the adipocytes alone. Compared to the BMPR2-mutant adipocytes, wild-type adipocytes have a stronger response to endothelial signaling. Most of the secreted signaling molecules and their mutated effects in PMVEC are consistent when compared to PAH patients, implicating altered PMVEC function in PAH pathogenesis. Since BMPR2 dysfunction, adipose dysregulation, and inflammatory signaling contribute to heritable PAH, future studies will assess the physiological responses of PMVEC cultured in adipocyte-conditioned media and propose novel targets for biomarker and therapeutic development.

Keywords: Cardiopulmonary, Heritable Pulmonary Arterial Hypertension, BMPR2, Adipocytes, Pulmonary Microvascular Endothelial Cells

Assessing the Impact and Efficacy of Anthracyclines and Trastuzumab Alternatives on Potential Cardiotoxicity in Breast Cancer Patients

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Background: Cardiotoxicity is a major determinant of long-term outcomes in breast cancer, particularly with anthracyclines and HER2-targeted therapy. Physiologically, neuregulin-1 driven HER2/HER4 signaling preserves mitochondrial integrity, sarcomere stability, and resistance to oxidative injury; disruption of this axis increases vulnerability to myocardial dysfunction and long-term morbidity.

Purpose: To synthesize mechanistic and clinical evidence on cardiotoxicity from anthracycline- and trastuzumab-based regimens and to evaluate emerging alternatives and cardioprotective strategies that reduce cardiac risk without compromising oncologic efficacy.

Methods: A structured keyword search of PubMed, Embase and Google Scholar identified studies addressing HER2-positive breast cancer, anthracycline/trastuzumab-associated cardiotoxicity, and alternative HER2-directed regimens. Included studies reported mechanistic pathways, left ventricular outcomes, and cardiovascular safety/efficacy of modified regimens and adjunctive cardioprotection.

Results: Anthracyclines caused cumulative oxidative stress, mitochondrial injury with ATP depletion, and topoisomerase Iiβ–mediated DNA damage, leading to progressive left ventricular dysfunction. Trastuzumab compounded risk by inhibiting HER2-mediated neuregulin signaling, impairing myocardial recovery after anthracycline exposure. Sequential or combined use was consistently associated with the highest incidence of left ventricular systolic dysfunction, sometimes appearing years after therapy completion. Strategies that reduced risk included anthracycline-free taxane–platinum plus trastuzumab regimens, modified anthracyclines (liposomal doxorubicin, epirubicin), and newer HER2 agents (pertuzumab-based combinations and antibody–drug conjugates such as ado-trastuzumab emtansine and trastuzumab deruxtecan) with improved cardiovascular safety.

Conclusion/Contribution: Breast cancer therapy is shifting toward anthracycline-sparing and safer HER2-directed approaches. Combined with early biomarker/imaging surveillance and adjunct cardioprotective agents (ACE inhibitors/ARBs, beta-blockers, statins), these strategies preserve cardiac function, enable continuation of life-prolonging treatment, and improve survivorship quality of life.

How Does Isotretinoin Compare to Oral Antibiotics in the Treatment of Moderate-to-Severe Acne in Terms of Patient Outcomes, Perceptions, and Its Role in Reducing Antibiotic Resistance?

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Background: Acne vulgaris is among the most common dermatologic conditions and a leading indication for outpatient antibiotic prescribing. Although oral antibiotics remain widely used for moderate-to-severe acne, increasing attention has been directed toward antimicrobial stewardship and the limitations of prolonged antibiotic therapy. At the same time, isotretinoin offers a non-antibiotic systemic treatment capable of producing durable remission but is often delayed due to patient and clinician concerns regarding safety and treatment burden. Objective: To synthesize current evidence comparing oral antibiotics and isotretinoin in the management of moderate-to-severe acne, with emphasis on clinical outcomes, patient-reported quality of life, treatment perceptions, and implications for antibiotic stewardship.

Methods: A structured narrative review of the literature was conducted using PubMed and related databases to identify clinical studies, systematic reviews, and qualitative research addressing systemic acne therapies. Search terms focused on isotretinoin and systematic oral antibiotics used in acne management, comparative treatment outcomes and safety, patient reported outcomes and QOL, patient perceptions and treatment experiences, and antibiotic resistance and stewardship. Evidence was synthesized across four domains: treatment efficacy and microbiological effects, patient-reported outcomes and quality of life, patient perceptions and treatment expectations, and prescribing patterns relevant to antibiotic stewardship.

Results: Oral antibiotics effectively reduce inflammatory lesions during active treatment but frequently require prolonged or repeated courses to maintain disease control. Observational studies indicate that antibiotic treatment durations often exceed guideline-recommended limits. In contrast, isotretinoin targets multiple pathogenic mechanisms and is associated with durable remission after a finite treatment course. Quality-of-life studies demonstrate substantial psychosocial burden associated with acne and significant improvements following effective therapy. However, qualitative research suggests that patient expectations of cure, concerns about isotretinoin safety, and structural barriers such as monitoring requirements contribute to delayed isotretinoin initiation and continued reliance on antibiotics.

Conclusions: Acne represents a meaningful target for outpatient antimicrobial stewardship due to the frequency and duration of antibiotic prescribing. Integrating patient-centered outcomes, treatment expectations, and stewardship principles may help guide more effective and sustainable management strategies for moderate-to-severe acne.

Postoperative Analgesia in Pediatric Cardiac Surgery: A Review of Erector Spinae Plane Blocks Compared with Fascial Plane Blocks

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Effective intraoperative and postoperative pain control in pediatric patients undergoing cardiac surgeries is essential for recovery enhancement and minimizing postoperative complications. A majority of pediatric cardiac surgeries are done through a median sternotomy, which is known to cause severe postoperative pain and increase the risk of chronic pain. In recent literature, regional anesthesia has been effectively utilized by anesthesiologists in various surgical settings to improve postoperative pain and decrease opioid consumption while carrying minimal risks. The purpose of this literature review is to compare the effectiveness of erector spinae plane blocks and single-shot fascial plane blocks to support clinical decision-making and improve patient recovery. Published case reports and current literature on erector spinae plane blocks (ESPB) and fascial plane blocks used in pediatric cardiac surgery via median sternotomy were collected via PubMed, Google Scholar, and the RVUMCOM Frank Ritchel Ames Memorial Library Literature Database and reviewed. Intraoperative and postoperative opioid use, postoperative pain in the first twenty-four hours, and length of ICU stay in patients receiving ESPBs were compared with those of patients receiving fascial plane blocks. ESPBs were found to have significant benefits when compared with single-shot fascial plane blocks. Total opioid consumption, ICU length of stay, and reported post-operative pain were found to be reduced when compared to single-shot fascial plane blocks. ESPBs may present as a potential complementary analgesic route in multimodal pain management in pediatric cardiac patients. Use of ESPBs in additional disciplines requires further study, as this is beyond the scope of this literature review.

Keywords: erector spinae, plane block, anesthesia, pediatrics

Dissections and Diagnostics: The Effect of an Integrated Anatomy-Imaging Curriculum on Confidence and Career Interest

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Background: Anatomy education has shifted from cadaveric dissection to integrated approaches incorporating imaging modalities such as ultrasound (US), computed tomography, and magnetic resonance imaging, reflecting their growing role in clinical care. Integration may enhance spatial understanding, reinforce three-dimensional learning, and improve clinical relevance. Hands-on tools like US enable real-time visualization, promoting active learning and supporting the transition to clinical training. Confidence in anatomy and imaging interpretation is essential for clinical preparedness and is associated with improved diagnostic reasoning, procedural skills, and engagement. Early imaging exposure may also influence interest in radiology. However, integration varies across institutions, and its educational impact remains unclear.

Objective: To evaluate whether an integrated anatomy–imaging curriculum is associated with differences in medical students' confidence in anatomy and interest in radiology compared with less-integrated curricula.

Methods: This cross-sectional survey will include medical students who have completed third-year clinical rotations at multiple institutions. Surveys will be distributed via institutional listservs after IRB approval. Data collected will include demographics and curricular exposure (cadaveric dissection, US training, imaging lectures, curriculum structure). Likert-scale items will assess confidence in anatomy, clinical preparedness, and radiology interest. Comparative analyses and multivariable regression will adjust for potential confounders.

Results: Data collection is pending. Outcomes include self-reported confidence in anatomy, imaging interpretation, clinical preparedness, and radiology interest. Quantitative and thematic analyses will be performed. Limitations include self-report bias and the cross-sectional design. Conclusions: Findings will inform curriculum development by evaluating medical students' perceptions of integrated anatomy–imaging education and identifying benefits and gaps in current approaches.

Keywords: Radiology, Medical Education, Anatomy

Effectiveness of a Student-Led Neuro I Review in a Two-Pass Neuroscience Curriculum

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At RVU-MCOM, feedback from third-year students highlighted a recurring challenge: many wished they had revisited Neuro I content before beginning Neuro II. Neuro was the only first-year system course students specifically recommended reviewing prior to its second-year counterpart. In response, student leaders in the MCOM Neurology Club developed a pilot review intervention to address this gap. The objective is to evaluate whether providing structured Neuro I review materials during the two-week CARES block before Neuro II improves self-reported preparedness and increases completion of neuro-related Uworld questions. The intervention included five review PowerPoints, two peer-led in-person sessions, and recommended Uworld questions. All materials were accessible online to all OMS II students, and 30 students attended an in-person session. After Neuro II, an anonymous survey was emailed to all OMS II students to assess satisfaction, preparedness, and Uworld question completion. The survey remains open for two weeks, after which results will be analyzed. Likert-scale items and descriptive statistics will be used to compare students who used the materials with those who did not, as well as attendees versus non-attendees. This pilot study aims to assess the feasibility and perceived value of a student-led pre-course review within a two-pass neuroscience curriculum. Although voluntary participation introduces sampling and response bias, findings may inform whether club-led interventions offer meaningful curricular support, guide improvements to the project, and shape future studies. The project may also clarify whether targeted peer-led review of foundational content is a worthwhile supplemental strategy in similar curricular models.

Keywords: Neuroscience, Education, Student Clubs

Clinical Implications of Retroesophageal Aberrant Right Subclavian Artery (ARSA) and Associated Structures in Dysphagia Lusoria

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Introduction: The aortic arch gives rise to the brachiocephalic trunk, left common carotid artery, and left subclavian artery, forming one of several recognized branching patterns. Among these variants, the aberrant right subclavian artery (ARSA) is the most common. ARSA originates distal to the left subclavian artery and most often courses posterior to the esophagus, a configuration identifiable on imaging. Although frequently asymptomatic, its retroesophageal trajectory may compress adjacent structures such as the esophagus or trachea, producing symptoms such as dysphagia lusoria. Case presentation: During routine curricular dissection at RVU MCOM, a single case of ARSA was identified in a female donor. Further dissection revealed the ARSA as a fourth branch of the aortic arch, crossing the midline posterior to the esophagus. No additional vascular anomalies were present, and the caliber of the vessel appeared consistent with the other aortic branches. This anatomy reflects abnormal regression of the right fourth aortic arch with persistence of the right dorsal aorta during embryologic development. We aim to describe our finding of cadaveric ARSA and discuss its embryologic, clinical, and educational implications. Conclusion: Awareness of ARSA is essential during thoracic surgery and right radial or brachial catheterization, where unexpected vascular trajectories may alter procedural planning. Preprocedural recognition on imaging may help prevent such catheterization difficulties or operative complications. This cadaveric finding highlights the educational value of anatomic variation in preparing trainees for radiologic interpretation and clinical decision making.

Keywords: Aberrant Right Subclavian Artery, Cadaveric Donor, Clinical Implications, Internal Medicine, Surgery, Vasculature

Hypomagnesemia as a Potential Risk Factor for Long COVID

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Long COVID, or post-acute sequelae of SARS-CoV-2 infection (PASC), affects a substantial proportion of individuals following acute infection and is characterized by persistent multisystem symptoms including fatigue, cognitive dysfunction, dysautonomia, and exercise intolerance. Multiple mechanisms have been proposed, including viral persistence, immune dysregulation, endothelial dysfunction, autoimmunity, neuroinflammation, and mitochondrial impairment; however, risk factors present at the time of acute infection that predispose individuals to developing Long COVID remain incompletely defined. This study explores hypomagnesemia at the time of SARS-CoV-2 infection as a potential biological contributor to Long COVID pathogenesis. A hypothesis-generating narrative literature review was conducted using PubMed. Keyword searches included long COVID, long COVID hypotheses, magnesium deficiency, and hypomagnesemia. Articles published between 2020 and 2025 were screened for relevance. Peer-reviewed studies and review articles examining magnesium's role in immune regulation, endothelial function, mitochondrial metabolism, autonomic nervous system balance, or viral persistence were included, while non-English articles and studies not addressing mechanistic pathways relevant to Long COVID were excluded. Findings were qualitatively synthesized to identify conceptual links between magnesium-dependent physiologic processes and proposed mechanisms of Long COVID pathogenesis. Prior literature suggests that magnesium deficiency may influence several biological pathways implicated in Long COVID. Hypomagnesemia can promote pro-inflammatory cytokine signaling, impair T-cell regulation, and contribute to persistent immune activation. Magnesium deficiency is also associated with endothelial dysfunction, platelet activation, and hypercoagulability, potentially worsening microvascular injury. Additionally, impaired magnesium-dependent mitochondrial function may reduce ATP production and increase oxidative stress, contributing to fatigue and post-exertional malaise. Magnesium deficiency may also disrupt autonomic regulation and the cholinergic anti-inflammatory pathway. Furthermore, immune dysregulation associated with hypomagnesemia may create conditions favorable for viral persistence or reactivation of latent viruses such as Epstein–Barr virus. Collectively, these mechanisms suggest that low serum magnesium during acute SARS-CoV-2 infection may increase susceptibility to Long COVID and warrants further investigation as a predictive biomarker and modifiable risk factor.

Keywords: Preventative Medicine, COVID, Internal Medicine

MDMA-Assisted Psychotherapy for Treatment-Resistant PTSD: A Scoping Review of Efficacy, Mechanisms, and Long-Term Outcomes

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Rationale: Treatment-resistant post-traumatic stress disorder (TR-PTSD) remains a significant clinical challenge despite the availability of evidence-based psychotherapies and first-line pharmacologic treatments. 3,4-Methylenedioxymethamphetamine–assisted psychotherapy (MDMA-AP) has emerged as a potential intervention because of its unique neuropsychological effects, including enhanced emotional processing and attenuation of fear responses. Objective: This scoping review's objective is to map the clinical data surrounding MDMA-AP for TR-PTSD. Although several early-phase clinical trials have evaluated MDMA-AP, the existing evidence has not been comprehensively mapped with respect to dosing strategies, psychotherapy structure, safety, and long-term outcomes. Methods: This scoping review followed PRISMA-ScR guidelines. A systematic search of PubMed, Embase, Cochrane Library, and ScienceDirect databases revealed studies published between January 2010 and January 2025. Eligible studies included original clinical research evaluating MDMA-AP in adults with TR-PTSD. Six studies ultimately met the inclusion criteria. Data were charted for study design, participant characteristics, dosing protocols, psychotherapy modalities, outcome measures, safety findings, and long-term follow-up. Results: Across the included studies, MDMA-AP produced clinically meaningful reductions in PTSD symptom severity, with full-dose MDMA (100–125 mg) consistently outperforming low-dose or active placebo comparators. Improvements were durable, with follow-up demonstrating sustained symptom reduction for up to 74 months. Safety profiles were favorable, with minimal dropout and no serious adverse events reported. Conclusions: MDMA-assisted psychotherapy shows promising therapeutic potential for adults with TR-PTSD, yielding substantial and durable symptom reductions. Larger, multisite trials with standardized dosing, consistent psychotherapy frameworks, and rigorous safety monitoring are needed to clarify optimal treatment parameters and inform future clinical and regulatory decision making.

Keywords: MDMA-assisted psychotherapy; treatment-resistant PTSD; post-traumatic stress disorder; psychedelic-assisted therapy; entactogens; trauma-focused psychotherapy; clinical trials; long-term outcomes; scoping review

Dexmedetomidine Across the Perioperative Continuum: A Scoping Review of Its Role in Preventing Delirium in Adult Surgical Patients

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Postoperative delirium (POD) is a frequent and serious complication among adult surgical patients, particularly older adults and those with cognitive vulnerability. Despite its prevalence, current prevention strategies remain inconsistent across surgical settings, creating a critical gap in perioperative care. Dexmedetomidine, an Î±2-adrenergic agonist with sedative and analgesic properties, has been increasingly studied for its potential to reduce POD through sympatholysis, sleep preservation, and reduced anesthetic requirements. This review followed the PRISMA-ScR guidelines. A systematic search of PubMed and the Cochrane Library identified studies published between January 2010 and January 2025. Eligible studies included randomized or pilot randomized controlled trials evaluating perioperative dexmedetomidine for prevention of postoperative delirium (POD) in adult surgical patients (≥18 years). Thirty trials met inclusion criteria. Data were systematically charted for study design, surgical population, dexmedetomidine dosing and timing, comparator strategies, delirium assessment methods, and reported safety outcomes, and were synthesized descriptively to map patterns across studies. The 30 trials included 6,630 patients across diverse surgical populations, including noncardiac major surgery, cardiac surgery, neurosurgery, thoracic procedures, hepatic surgery, orthopedic operations, and microvascular reconstruction. Across studies, dexmedetomidine was associated with reduced POD incidence in many trials, with the strongest signals observed in noncardiac major surgery, orthopedic procedures, and selected cardiac ICU sedation settings. Regimens demonstrating benefit most commonly used moderate-dose continuous intraoperative infusion (0.2–0.7 µg/kg/h) or early postoperative sedation, whereas low-dose or intraoperative-only strategies frequently showed little to no effect. Hemodynamic effects, particularly hypotension and bradycardia, were common but generally manageable. Overall, dexmedetomidine shows promise as a perioperative strategy to reduce POD, especially in older or high-risk patients, but standardized protocols and targeted trials are needed to determine.

Keywords: Dexmedetomidine, postoperative delirium, perioperative neuroprotection, α2-adrenergic agonists, intraoperative sedation, ICU sedation, postoperative cognitive dysfunction

Perioperative Ketamine in Opioid-Tolerant and Opioid Use Disorder Patients: A Scoping Review of Protocols, Outcomes, and Safety Gaps

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Patients with opioid use disorder (OUD) present significant challenges in perioperative pain management due to opioid tolerance, opioid-induced hyperalgesia, withdrawal risk, and interactions with medications for OUD such as methadone and buprenorphine. Ketamine, an N-methyl-D-aspartate receptor antagonist with analgesic and antihyperalgesic properties, has been investigated as an adjunct to improve perioperative analgesia and reduce opioid exposure in this population, but existing evidence is fragmented across surgical contexts, dosing strategies, and outcome measures. This scoping review aimed to map the clinical literature evaluating perioperative ketamine for analgesia, opioid-sparing effects, and safety in adults with OUD or opioid dependence undergoing surgery. Following PRISMA-ScR guidelines, electronic searches of PubMed, Embase, the Cochrane Library, and ClinicalTrials.gov identified randomized or pilot randomized clinical trials published between January 2010 and January 2025. Studies involving pediatric populations, non-perioperative ketamine use, or lacking postoperative pain or opioid outcomes were excluded. Six trials involving 860 patients met inclusion criteria. Surgical contexts included orthopedic procedures, lumbar spine surgery, and other operations involving chronic opioid dependence. Ketamine was administered as intravenous bolus dosing, continuous infusion, or combined bolus–infusion regimens. Across studies, ketamine reduced early postoperative opioid requirements, with absolute reductions of approximately 10–35 morphine milligram equivalents within 24–48 hours, and several trials reported 1–2-point decreases in early postoperative pain scores. Safety profiles were acceptable, with mild psychoperceptual effects in fewer than 5% of patients and no increases in serious adverse events. However, heterogeneity in surgical procedures, dosing strategies, comparators, and outcome reporting limited direct comparisons. Perioperative ketamine shows promise as an adjunctive strategy to reduce postoperative opioid consumption and improve early pain control in adults with OUD, but the evidence base remains small and methodologically variable.

Keywords: Ketamine, Opioid use disorder, Perioperative analgesia, Opioid-sparing, Postoperative pain, NMDA antagonists, Surgical outcomes

Rapid Fluorescence Profiling to Differentiate Pseudomonas aeruginosa from Other Uropathogens: A Proof-of-Concept Study

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Background Antibiotic resistance complicates management of urinary tract infections (UTIs), particularly those caused by Pseudomonas aeruginosa, which is frequently resistant to first line therapies. Because culture and sensitivity (C&S) testing requires 48–72 hours, clinicians often rely on empiric therapy that may fail against multidrug resistant organisms. This proof of concept study evaluated whether label free optical spectroscopy can rapidly distinguish P. aeruginosa from other common uropathogens in artificial urine. Methods Absorbance and fluorescence spectroscopy were assessed for differentiating Klebsiella pneumoniae, P. aeruginosa, and Escherichia coli grown in artificial urine and tested under varying pH buffer conditions. Samples were excited at 370 nm on a BioTek Synergy H4 spectrophotometer, and emission spectra were examined for organism specific features. Each condition included technical duplicates across multiple independent experiments at pathological (105 – 106 CFU/mL) bacterial densities. Endpoint spectra were collected after mixing inoculated urine with buffers, and discrimination was based on visual peak differences and signal-to-noise ratios above 3. Results Absorbance spectra showed no organism specific features. In contrast, fluorescence spectra revealed a distinct 460–470 nm emission in bicarbonate (pH 6) and TRIS (pH 8) buffers that consistently identified P. aeruginosa and was absent in K. pneumoniae and E. coli. Conclusion Fluorescence spectroscopy in artificial urine successfully differentiated P. aeruginosa from other uropathogens, supporting feasibility for a rapid, low cost, and label free screening method to complement C&S testing. Limitations include use of artificial urine, small sample size, and absence of rigorous quantitative analysis. Future work will assess performance in clinical urine and expand organism testing.

Too Soon to Tox? Preventative Neuromodulator Use in Young Adults

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Neuromodulators have continued to increase in popularity since their initial US Food and Drug Administration approval of botulinum toxin type A for use in cosmetic dermatology in 2002. Currently, five formulations are approved for aesthetic treatments, sharing similar mechanisms of actions by inhibiting acetylcholine release at the neuromuscular junction causing temporary muscle relaxation. There is an emerging trend amongst younger patients, often referred to as “Baby Botox”, where young adults start receiving neuromodulator injections before the traditional timing. This approach typically emphasizes lower-dose administrations to prevent and/or delay the development of static rhytids. This influence has largely been driven by social media. This narrative editorial examines the available literature and ethical considerations surrounding early neuromodulator use in young adults. A targeted review of published studies reveals no longitudinal clinical studies demonstrating early neuromodulator use alters the development of static rhytids. Limited by no clinical evidence, existing data is composed of expert opinion, marketing efforts, and institutional commentary rather than validated data outcomes. Key ethical considerations include the influence of social media, potential financial conflicts of interests in elective procedures, and the medicalization of normal age-related changes. While toxins are generally safe when administered in a proper setting with the necessary training, the lack of evidence underscores the physician’s responsibility to provide counseling. Dermatologists must balance patient autonomy while providing evidence-based counseling, emphasizing the need for further research to validate the efficacy of this trend.

Jumping into JAK Inhibitors: Counseling Parents

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Janus Kinase (JAK) inhibitors have become increasingly prescribed in pediatric dermatology due to their ability to affect multiple inflammatory pathways. Targeting JAK1, JAK2, JAK3, and TYK2 within the JAK-STAT pathway, these therapies target cytokine driven processes that exist within atopic dermatitis, alopecia areata, psoriasis, psoriatic arthritis, and vitiligo. The aim is to describe the current pediatric safety evidence and counseling responsibilities physicians have prior to prescribing JAK inhibitors. This narrative review was structured around the regulatory framework for the black box warning due to the ORAL Surveillance Trial. This was reviewed to identify major adverse effects and then compared to pediatric safety data from clinical trials and extension studies. Strengthened by clinical commentary, we aim to give parents a clear understanding of these medicines before their children are prescribed JAK inhibitors. Clinical trials reveal statistical improvements in disease severity, showing reductions in EASI scores, enhancing IGA responses, reducing itch, sleep disturbance, overall improving one's quality of life. An FDA required black box warning, issued in 2021, is largely due to data from the ORAL Surveillance Trial in older adults with preexisting cardiovascular comorbidities. Serious adverse events appear much less frequent in otherwise healthy pediatric patients. Reported adverse effects in the pediatric population primarily involve hematologic abnormalities, infections, and musculoskeletal complaints. Topical formulations of the JAK inhibitors carry fewer systemic side effects. Counseling should emphasize the differentiation between adult and pediatric safety profiles while addressing parental concern to promote informed decision making. Overall, JAK inhibitors offer both effective and targeted therapy for pediatric dermatologic disease.

Derm-Decoded: Building a High Yield Curriculum for What COMLEX Level 1 and USMLE Step 1 Actually Test

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Dermatology, while being clinically significant, remains an underrepresented portion of undergraduate medical education. Most US medical schools have limited formal dermatologic instruction, although skin disease is a common reason for primary care visits. Despite this, the integumentary system is an explicit body system tested on both COMLEX Level 1 and USMLE Step 1. This creates a disconnect between curricular exposure and board expectations. The aim of this project was to determine the most frequently tested dermatology topics across two popular board preparation resources (Uworld and USMLE ScholarRx). Once these topics were identified, a student-directed learning (SDL) curriculum was developed. A total of 155 questions were reviewed from both Uworld and USMLE ScholarRx. Inclusion criteria were dermatology tagged questions; exclusion criteria were all other questions. Each question was categorized in three ways: topic tested, question type (straight diagnosis, pathophysiology, symptomatology, derm drugs, histological findings, causative agent, normal physiology, and embryology), and question style (image vs. vignette). Of the topics tested melanoma, psoriasis, acne vulgaris, allergic contact dermatitis, atopic dermatitis, skin physiology, and wound healing appeared most frequently. All topics were categorized into Tier 1 (appearing 5+ times), Tier 2 (appearing 3-4 times) or Tier 3 (appearing once or twice). Straight diagnosis questions were the predominant question type, and image containing questions were the most common question style. These findings display a defined subset of high yield dermatological conditions. An SDL was developed from our data analysis of most frequently appearing topics. The hope with this curriculum is to close content gaps, to strengthen diagnostic reasoning, and to align undergraduate medical education with national licensing examination standards.

DERMAL HYPERSENSITIVITY REACTION ASSOCIATED WITH SUBGINGIVAL MINOCYCLINE: AN ATYPICAL CUTANEOUS PRESENTATION

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Cutaneous drug eruptions are a common adverse effect occurring shortly after initiation of a new medication. The morphology of these rashes is commonly described as erythematous macules and papules. We report the case of a 73-year-old male who developed a pruritic macular rash distributed throughout the trunk and extremities three days after being administered subgingival minocycline HCl microspheres following a periodontal procedure. The patient had no recent infections, new medications, or history of tetracycline intolerance. Physical exam revealed erythematous macules and patches, and skin biopsy was consistent with a medication reaction and biopsy findings demonstrated perivascular dermatitis with numerous eosinophils. Given the close temporal relationship, lack of other new medications, and supportive biopsy findings, a drug hypersensitivity reaction was deemed the most probable diagnosis. Clobetasol cream was prescribed, and after approximately seven days, the rash resolved. No recurrence was observed at follow-up. Although systemic minocycline is known to cause hypersensitivity reactions, to our knowledge, there are no previously published reports of cutaneous drug eruptions associated with minocycline HCl microspheres. This case highlights that even local administration has the potential to precipitate clinically significant reactions. Recognition of this potential adverse effect is important for early identification and prevention of unnecessary diagnostic evaluation.

Keywords: Dermatology, Minocycline, Rash, Drug Eruption

Clinical Rotation Attire: Preceptor Preferences and the Influence of Specialty, Training, and Cultural Background at a Multi-Campus College of Osteopathic Medicine

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Professionalism in medicine includes attire, which shapes perceptions of trust, authority, and credibility. Although physician attire has been studied extensively, expectations for osteopathic medical student attire on rotation remain underexplored. This study characterized preceptor preferences regarding student attire and assessed its influence on professionalism and patient trust. RVU preceptors (n=3,434) were invited to participate in a cross-sectional, anonymous Qualtrics survey. The final analytic sample included 162 clinicians (4.7% response). Respondents rated appropriateness and importance of attire combinations and appearance elements using 5-point Likert scales. Associations were analyzed using Goodman–Kruskal's Î³ and chi-square tests. Respondents were primarily male (68%), White (75%), ages 35-64, with DO (43%) and MD (57%) degrees. Business attire was rated most appropriate (M = 4.06), with primary care providers rating it higher than specialists (p=0.022). Business attire with white coat received similar endorsement (M = 4.01). Casual attire was inappropriate (M = 1.47). Ratings of white coat with scrubs varied by specialty (p=0.033). MDs viewed white coat with scrubs more favorably than Dos (p < 0.0001). Name badge visibility was the most important element (80.1%). Older clinicians (p â‰¤ 0.007) and males (p â‰¤ 0.0048) differed in their views of conservative appearance elements. Most agreed that attire influences patient trust (89.3%) and perceived professionalism (86.9%). The single institution, voluntary reliance on self-reported perceptions limit generalizability. Preceptors prioritize core professionalism expectations, but favor specialty-specific guidance over rigid standardization. Explicit, context-sensitive attire guidance is critical to clinical onboarding and professionalism curricula to strengthen professional identity formation and student readiness.

Keywords: Osteopathic Medical Education, Professionalism, Clinical Rotations, Preceptor Expectations, Attire

Sensory-Informed Emergency Care as a Strategy to Reduce Pharmacologic Escalation in Autism Spectrum Disorder

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Patients with autism spectrum disorder (ASD) increasingly utilize emergency departments (ED), where sensory-intensive environments may precipitate distress and behavioral escalation. Sensory processing differences may contribute to increased pharmacologic intervention. This study systematically reviews and critically appraises clinical studies evaluating sensory-informed interventions in ED settings and their impact on sedation-related outcomes among patients with ASD. PubMed, Embase, and Google Scholar were searched from inception through February 2026. Of 112 records identified, 22 duplicates were removed. Four reviewers screened 90 records, with 28 full-text articles assessed for eligibility. After excluding non-ED studies (n=6), non–sensory-focused studies (n=4), and review/editorial articles (n=3), 10 studies were included. Included studies encompassed both pediatric and adult populations, including a large national database analysis of over 25,000 ED visits. The mean adult age was 38 years, with a slight female predominance (56%). Pediatric cohorts (ages 8–10) were predominantly male (up to 88%). Common ED presentations included behavioral dysregulation, psychiatric crises, and acute medical conditions. Sensory-informed interventions””including environmental modifications, communication strategies, and individualized adaptations””were consistently associated with reductions in physiological stress and behavioral distress. Adults with ASD had 4.83-fold higher odds of receiving multiple sedative doses compared with neurotypical patients. Sensory-adapted environments were associated with reductions in escalation behaviors preceding pharmacologic intervention. However, direct evidence linking these interventions to decreased sedative utilization, medication dosing, or ED throughput remains limited. Sensory-informed ED care is associated with reduced distress, but its impact on sedation-related outcomes remains insufficiently characterized. Prospective studies are needed to evaluate sedation frequency, medication dosing, restraint use, adverse events, and ED length of stay.

Keywords: Autism spectrum disorder, Emergency department, Sensory-informed care, Sedation, Behavioral escalation, Environmental modification, Patient-centered care

Urban-Rural Divide in Infant Mortality: A Public Health Analysis of Montana

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Infant mortality is a key public health indicator and remains disproportionately higher in rural regions of the United States, where limited healthcare access may contribute to adverse maternal and infant outcomes. Montana is a predominantly rural state with substantial geographic variation in healthcare access. This study aimed to evaluate county-level patterns of infant mortality and examine associations between healthcare access indicators and maternal or perinatal factors across Montana. A cross-sectional ecological analysis was conducted using publicly available Montana public health data. County-level variables included infant deaths, birth rates, timing of prenatal care initiation, birth facility type, maternal age at delivery, and causes of perinatal death. Healthcare access was assessed using Health Professional Shortage Area (HPSA) scores (range 5–22), with higher scores indicating greater provider shortages. Descriptive analyses evaluated geographic variation and potential relationships between healthcare access and infant mortality indicators. The statewide average birth rate was 10.29 per 1,000 population (range 4.58–21.19). Petroleum County had the highest birth rate (21.19) and one of the lowest HPSA scores (5). In 2022, 52 fetal deaths were reported statewide, with three counties reporting six infant deaths each. Approximately 95% of births occurred in hospital settings. The most common causes of perinatal death were associated with preterm birth, maternal infections, and complications of pregnancy, labor, or delivery. Infant deaths were geographically dispersed across the state, and small county-level numbers limit causal interpretation. Findings highlight the importance of improving early prenatal care access and maternal health services in rural communities.

Keywords: Rural Health, Obstetrics & Gynecology

Adoption of ACL Injury Prevention Programs Among Youth Soccer Coaches in Montana: A Statewide Survey

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Anterior cruciate ligament (ACL) injuries are a significant concern in youth soccer and may have long-term consequences for athlete health and participation. Although ACL injury prevention programs (ACL-IPP) have been shown to reduce injury risk, little is known about the awareness and willingness of youth soccer coaches in Montana to implement these programs. A cross-sectional survey was distributed to youth soccer coaches across Montana during the spring season. The anonymous, voluntary survey collected information on coaching experience, coaching licensure, athlete age and gender, prior experience with ACL injuries among players, and current use of ACL injury prevention programs. Coaches were also asked about their willingness to implement an ACL-IPP if educational resources and implementation guidance were provided. Results showed that 56% of coaches reported having at least one athlete sustain an ACL tear during their coaching career. Despite this, 78% reported not currently implementing an ACL injury prevention program during team training. However, 89% indicated they would be willing to implement an ACL-IPP if provided with resources and education, while the other 11% reported they might consider implementation depending on time constraints. These findings suggest ACL injury prevention programs are currently underutilized in Montana youth soccer but that coaches demonstrate strong interest in adopting them. Accessible educational resources, such as brief online modules or video demonstrations, may facilitate program implementation and improve injury prevention efforts among youth athletes.

Keywords: Sports Medicine

Evolving Perioperative Guidelines for GLP-1 Receptor Agonists: Implications for Retained Gastric Emptying and Procedural Management

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Background: Glucagon-like peptide-1 receptor agonists (GLP-1 Ras) are used for type 2 diabetes and obesity but delay gastric emptying, raising concern for retained gastric contents (RGC) and aspiration. Studies report increased RGC and aborted procedures, though aspiration rates remain low. Guidelines recommend risk-stratified fasting, medication management, and gastric ultrasound. This review quantified perioperative risks of GLP-1 Ras and summarized evidence-based strategies.

Methods: A systematic review of 64 studies (case reports, cohort studies, meta-analyses, and guidelines) published between 2019–2025 was conducted using PubMed/MEDLINE and Embase. MeSH terms included “GLP-1 receptor agonists, gastric emptying, anesthesia, perioperative care, and aspiration. Adult studies of patients on GLP-1 Ras undergoing anesthesia, sedation, or endoscopy were included. Articles were screened using predefined criteria. Outcomes were RGC, aspiration events, procedure interruptions, and management strategies. Findings were synthesized narratively due to study heterogeneity.

Results: GLP-1 Ras had higher rates of RGC (14–56% vs 3–19% controls) and more aborted procedures; while aspiration events were rare and similar between groups. Risk was higher with recent therapy initiation, higher BMI, or recent dosing. Studies suggest longer fasting and gastric ultrasound can help identify higher-risk patients.

Conclusion: Guidelines recommend individualized management of GLP-1 Ras to reduce RGC and procedure interruptions. Low-risk patients may continue therapy, while higher-risk patients may hold doses, follow modified fasting protocols, and undergo gastric ultrasound. Future research should clarify optimal fasting duration, timing of last dose, and risks in urgent surgery and high-BMI patients.

Keywords: GLP-1 receptor agonists, Perioperative Management, Gastric Ultrasound, Retained gastric contents

Use of OMT as a Treatment for Migraines

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Migraine headaches affect over one billion individuals worldwide and remain a leading cause of disability among working adults. Pharmacologic therapies, although frequently effective, are often limited by adverse effects that reduce patient adherence and complicate long-term management. Newer medications offer improved tolerability, yet their long-term safety profiles remain uncertain. Osteopathic Manipulative Treatment (OMT), a nonpharmacologic intervention with a strong safety record, has emerged as a potential adjunct for migraine management. This review evaluated the effectiveness of OMT in reducing migraine frequency and severity in adults. A systematic search of PubMed, MEDLINE, NIH, and Cochrane Library identified studies involving adults with diagnosed migraine receiving any form of OMT compared with sham treatment, usual care, or no intervention. Studies were included if they reported outcomes on migraine frequency, headache intensity, or use of abortive medications. Data were synthesized qualitatively due to heterogeneity in OMT protocols. Several studies met inclusion criteria. Across these, OMT consistently demonstrated reductions in monthly migraine days, with several reporting clinically meaningful decreases of 2–4 days per month. Improvements in pain intensity and reduced reliance on abortive medications were noted in over half of the included trials. However, sample sizes were small, treatment techniques varied widely, and outcome measures lacked standardization, limiting pooled statistical analysis. Overall, available evidence suggests that OMT is a safe, promising adjunct capable of reducing migraine burden. Clarifying which specific osteopathic techniques most effectively target distinct migraine subtypes could inform development of standardized, evidence-based OMT protocols and improve individualized patient care.

Literary Review of Near-Peer Teachers in the Radiologic Education of First-Year Medical Students

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Near-peer teachers (NPTs) are increasingly used in medical education, yet little research has examined their effectiveness in teaching radiologic anatomy to early medical students. This literature review evaluates how instructor preparation influences NPT confidence and perceived teaching effectiveness. A structured literature review is being conducted using PRISMA-informed guidelines. Peer-reviewed studies published from 2020 onward are identified through searches of PubMed, JANE, and Google Scholar. Two reviewers independently screen studies using predefined inclusion criteria focused on near-peer instruction involving radiologic or imaging-based anatomy. Discrepancies are resolved through consensus. Data are extracted on imaging modality (CT, MRI, X-ray, angiography), instructional design, NPT preparation, and educational outcomes. Findings are synthesized using a narrative qualitative approach, and study quality is assessed using established educational research appraisal criteria. Preliminary trends from approximately 12 studies suggest near-peer instruction improves learner engagement and supports students' ability to identify anatomical structures on medical imaging. Structured preparation for NPTs also appears associated with greater teaching confidence and perceived instructional competency, though variability in training and instructional design limits comparison across studies. This review synthesizes recent literature to identify best practices for preparing near-peer instructors and to inform the design of NPT-led imaging sessions for early medical learners.

Keywords: radiology, first year, medical students, peer teaching

Literary review of needle thoracostomy success with analysis of the relationship between patient chest wall thickness and catheter length needed

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Needle thoracostomy is a lifesaving emergency procedure performed in the prehospital setting to relieve tension pneumothorax. Despite its widespread use, reported failure rates remain high. These failures are thought to result in part from variability in patient chest wall thickness and differences in recommended catheter lengths and insertion sites across clinical and EMS protocols. This literature review examines the relationship between chest wall thickness, catheter length, and procedural success in prehospital needle thoracostomy. A review of published studies evaluating needle thoracostomy outcomes is being conducted. Studies are screened for data describing chest wall thickness measurements, catheter length used, anatomical insertion site (midclavicular, anterior axillary, or midaxillary), and reported procedural success rates. Relevant variables are extracted and compared to identify patterns in successful decompression relative to anatomical location and catheter length. Trends in the literature suggest that chest wall thickness varies significantly by insertion site and patient characteristics. Several studies indicate that standard catheter lengths may be insufficient in some patient populations, potentially contributing to failed decompression. Higher success rates have been reported when longer catheters are used or when decompression is performed at alternative anatomical sites where chest wall thickness is typically reduced. However, inconsistencies in measurement techniques and outcome definitions limit direct comparison between studies. By synthesizing available evidence, this review aims to clarify how anatomical variation influences prehospital needle thoracostomy success and to identify trends that may inform future EMS protocol development, equipment selection, and training for prehospital providers.

Keywords: needle decompression, prehospital

Evaluating the Efficacy of Black-and-White Histological Images in Histology Learning

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Histology education requires students to identify tissue types, recognize microscopic structures, interpret staining patterns, and apply organ-system-specific terminology. Prior research has shown that students often struggle with comprehension and identification of histological images, highlighting the need for improved instructional approaches and practical presentation methods (Garcia et al., 2018; Moammedsaleh, 2024). Students have also demonstrated improved learning when modern education technologies are used instead of traditional tools (Lee et al., 2020). However, limited research has examined whether black-and-white histologic images, which emphasize shapes and tonal patterns rather than color cues, affect student learning, confidence, and examination performance. Findings from this protocol study may help guide histology image presentation, curriculum design, and resource allocation, particularly in low-resource settings. This protocol abstract describes a randomized three-group between-subjects study evaluating black-and-white histologic images as a supplemental learning tool. A target sample of 150 volunteer first-year medical students with no prior histology experience will complete a pre-study survey and then be randomly assigned to one of three groups: color images mixed color/ black-and white images, or black-and-white images. The pre-study survey will collect baseline demographic and study-habit information to assess group comparability. We anticipate that students assigned black-and-white images will perform better because they cannot rely on stain color and instead must focus on structural features and tonal patterns. Primary outcomes will include histology practical examination performance, perceived usefulness, confidence in image identification, and study time. Anticipated limitations include volunteer selection bias and limited generalizability to a single institution.

Perceived Value and Utilization of Pre-Recorded Pharmacology Lectures Among Second-Year Medical Students

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Asynchronous video lectures are a core component of contemporary medical education, offering learners flexibility to engage with complex content at their own pace. Despite widespread adoption of pre recorded lectures, the relationship between engagement and academic performance remains incompletely understood.

This study examined whether engagement with pre-recorded pharmacology lectures was associated with exam performance among second-year osteopathic medical students.

A mixed-methods, observational study was conducted using aggregated, de-identified Panopto video analytics (50 sessions, 126 videos), exam item performance (139 items), and an anonymous Qualtrics survey (n = 30). Engagement was operationalized as viewer coverage (unique viewers/cohort size), and performance as weighted percent correct exam item scores. Session level performance and engagement were dichotomized using overall means to classify sessions into four quadrants based on high/low performance and/or engagement. Quantitative data were summarized descriptively and visualized.

Mean viewer coverage was 58.2%. The overall weighted exam performance on video lecture content was 80.9%. Session level analyses demonstrated variability in performance-engagement alignment, with 46% of sessions classified as HH, 6% HL, 28% LH, and 20% LL. A modest positive association between engagement and performance was observed. Survey respondents reported frequent video use, increased playback speeds, and rated lectures as helpful. Key limitations were the observational design, use of aggregated engagement data, and potential response bias in survey findings.

Engagement–performance mismatches highlight opportunities for targeted content redesign and improved alignment between instructional materials and assessment. This session level engagement–performance framework offers a practical approach for evaluating asynchronous instruction, while underscoring the need for future studies incorporating individual level analytics.

Keywords: asynchronous instruction, pharmacology, video lecture engagement, learning analytics, exam performance.

Decoding Histology: Dichotomous Keys as a Tool for DO Student Success

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Dichotomous keys provide a systematic approach to classification and identification but have been minimally explored as a teaching tool in medical histology education. Active learning strategies have been shown to improve engagement and retention, yet structured identification tools remain underutilized. This study aimed to evaluate whether peer-led dichotomous key sessions improve confidence, knowledge, short-term retention, and practical examination performance among osteopathic medical students. Two 60-minute peer-teaching sessions were conducted with voluntary first-year DO students enrolled in musculoskeletal and gastrointestinal histology courses. A pre-session survey assessed eligibility and excluded students repeating the course or enrolled in a master's program. Baseline confidence was measured at four time points using self-reported Likert scales. Pre-quizzes assessed baseline knowledge and confidence. Sessions included brief instruction on dichotomous key construction, followed by individual practice and team-based application using premade keys. Post-quizzes assessed knowledge and confidence after instruction, and a post-survey following the practical reassessed confidence. Practical exam scores of participants (n = 32–36) were compared with nonparticipants (n ≈ 145) using independent-samples t-tests. Participants achieved an average musculoskeletal practical score of 86% compared with 83% among nonparticipants ($p = 0.089$). In the gastrointestinal session, participants scored 89.5% compared with 85.9% ($p = 0.046$). Quiz scores improved by 34%. Qualitative feedback indicated increased confidence, engagement, and recognition of histologic features. Limitations include self-selection bias, single-institution design, and a smaller intervention group. Peer-led dichotomous key instruction may offer a low-cost, structured strategy to enhance early histology learning and student confidence.

Keywords: Histology, Dichotomous Keys, Medical Education

Multimodal Analgesia in Spine Surgery: A Scoping Review of Protocols, Outcomes, and Implementation Gaps

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Background: Postoperative pain after spine surgery has traditionally been managed with opioids, but opioid-related adverse effects, complications, and long-term dependence have driven interest in opioid-sparing strategies. Multimodal analgesia (MMA) and Enhanced Recovery After Surgery (ERAS) pathways aim to improve perioperative pain control while reducing opioid exposure, yet the evidence base remains difficult to apply due to heterogeneous protocols and inconsistent reporting. This review maps current MMA approaches in adult spine surgery, summarizes outcomes, and identifies implementation and research gaps. Methods: This review synthesized English-language clinical studies, case reports, and guidelines published from January 2010 through July 2025 evaluating perioperative MMA strategies in adult spine surgery. A comprehensive search was performed across PubMed, Embase, Scopus, Web of Science, Cochrane Library, and ClinicalTrials.gov. Studies were excluded if they involved pediatric populations, non-surgical spine pain, single-agent analgesia, or non-English publications. Records were screened by title/abstract followed by full-text review, with discrepancies resolved by consensus. Extracted data included surgical type, MMA components, and outcomes including pain scores, opioid consumption, mobilization time, length of stay, and complications. Results: MMA protocols commonly combined systemic non-opioid agents with regional techniques, targeting multiple pain pathways to reduce opioid requirements. Across studies, multimodal regimens were frequently associated with lower inpatient opioid use and earlier mobilization, with some cohorts demonstrating shorter hospital stays, particularly when MMA was integrated into ERAS pathways. Regional adjuncts such as ESPB showed more consistent opioid-sparing benefits in invasive procedures (e.g., lumbar fusion and multilevel surgery), whereas systemic MMA alone produced mixed effects in randomized trials. Substantial variability in medication selection, dosing, timing, and block technique limited cross-study comparisons, and post-discharge opioid use and long-term outcomes were rarely reported. High-risk populations (obesity, obstructive sleep apnea, chronic opioid use) were underrepresented, reducing generalizability and limiting guidance for individualized perioperative planning. Conclusions: MMA in adult spine surgery is a promising opioid-sparing approach, especially when tailored to surgical invasiveness and combined with ERAS protocols, but outcomes remain inconsistent due to protocol heterogeneity and limited long-term follow-up. Future research should prioritize standardized, procedure-specific MMA bundles, bundle-versus-bundle comparisons, inclusion of high-risk populations, and consistent reporting of short- and long-term outcomes. Strengthening implementation science and ERAS compliance tracking will be critical to translating MMA evidence into reproducible, real-world spine surgery pathway

Surveillance After Melanoma Diagnosis: A Review of United States Guidelines

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Surveillance following a melanoma diagnosis is critical because recurrence is common and often depends on the stage at which the cancer was initially detected. Regular follow-up examinations allow for early detection of recurrent or new melanomas, helping reduce morbidity and mortality. However, organizations across the United States differ in their recommendations regarding the frequency and duration of routine dermatologic surveillance. These variations may influence patient outcomes, as surveillance timing affects the likelihood of identifying melanoma at a treatable stage. This review compares surveillance guidelines from four major organizations: the American Academy of Dermatology (AAD), National Comprehensive Cancer Network (NCCN), American Cancer Society (ACS), and MD Anderson Cancer Center. Publicly available guideline documents and supporting literature were reviewed to identify differences in recommended follow-up strategies after melanoma diagnosis. Guidelines were compared using several criteria, including the frequency and timing of dermatologic follow-up visits after surgical treatment, the duration of intensified surveillance during the years following diagnosis, and recommendations for lifelong monitoring. The primary comparison focused on follow-up intervals across melanoma stages (Stage 0–IV). Additional comparisons included imaging surveillance, laboratory testing, lymph node monitoring, and patient self-examination education when available. Across organizations, surveillance is generally most frequent during the first 2–5 years after diagnosis, when recurrence risk is highest, before transitioning to long-term or lifelong monitoring. However, differences exist in the intensity and structure of follow-up schedules. These findings suggest melanoma surveillance may benefit from individualized, risk-based approaches rather than strictly universal guidelines.

Keywords: Melanoma, melanoma surveillance, clinical guidelines, long-term monitoring

Discovery of an X-Shaped Anterior Cerebral Artery Union: A Rare Anatomical Variant of the Circle of Willis in a 77 y/o Woman – A Case Report

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Introduction: Although variations of the circle of Willis (CoW) anastomotic network are often clinically silent, their presence may influence cerebral hemodynamics and carry implications for neurosurgical and endovascular procedures.

Research Question/Objective: This case report describes a rare X-shaped anterior cerebral artery (ACA) union identified during cadaveric dissection of a 77-year-old female donor body.

Materials and Methods: The CoW of a 77-year-old female donor was dissected to demonstrate the arterial network. The donor's documented cause of death was cholangiocarcinoma with widespread metastatic disease, with a medical history notable for coronary artery disease.

Results: Examination of the CoW demonstrated an unusual anterior communicating artery (AcomA) morphology in which the communicating segment formed a distinct intersecting, X-shaped union between the left and right A1 ACA segments. Rather than a single transverse vessel, the AcomA more accurately was instead a crossing of arterial channels connecting the A1 and A2 segments of the ACA. The contributing vessels did not appear symmetric in caliber, with hypoplasia documented in the right A1 segment. No focal aneurysmal dilation or luminal narrowing was observed.

Discussion: This X-shaped ACA union instead of an apparent AcomA represents an uncommon anatomical variant that may alter local flow dynamics at the level of anterior cerebral circulation. This variant was not documented in the robust classification system established by Ayre, et al. and is not found elsewhere in the literature.

Significance and Implications: We report a novel variation in the collateral circulation of the CoW that has not been previously reported in reviewed literature. Awareness of such anatomical variation, particularly those involving hypoplasia and duplication, is important for clinicians performing surgical or endovascular interventions involving the anterior communicating complex. These variations may have a profound effect on surgical approach, difficulty, and accuracy of endovascular coil or aneurysm clip placement. They may also have implications in postoperative complications. Thus, awareness of CoW variations are implicated in surgical accuracy and clinical outcomes.

Keywords: Circle of Willis, cerebrovascular anatomy, arterial morphology, vascular neurosurgery

A Rare V-Shaped Anterior Communicating Artery Variant With Fenestrated A1-A2 Junction: A Cadaveric Case Report

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Duplication of the anterior communicating artery (AcomA) in the circle of Willis (CoW) anastomotic network is a recognized anatomical variant. However, complex interconnections between segments are not as frequently reported.

Research Question/Objective: This case documents an unusual V-shaped AcomA configuration with a fenestrated A1/A2 anterior cerebral artery (ACA) junction observed in an elderly female cadaver. Materials and Methods: The CoW of an 87-year-old female donor body was dissected to demonstrate the arterial network. The donor's cause of death was attributed to failure to thrive, with contributing conditions including a hip fracture and chronic kidney disease.

Results: Dissection of the CoW revealed duplication of the AcomA, consisting of separate superior and inferior transverse communicating vessels. These duplicated AcomA segments were connected by a short vertical anastomotic channel, creating an overall V-shaped configuration. The split in the artery lumen created a fenestrated A1/A2 junction where the ACA and AcomA meet. Both communicating vessels were patent and of similar diameter, and the vertical connection provided direct communication between the AcomA and A1/A2 union. No aneurysmal changes or other gross vascular abnormalities were identified. The remaining components of the CoW demonstrated otherwise typical morphology.

Discussion: This V-shaped AcomA with a fenestrated A1/A2 junction represents a rare and anatomically complex variant that may alter hemodynamic flow at the level of anterior cerebral circulation and has proven to be a diagnostic pitfall in diagnosing unruptured aneurysms by Tsukada, et al. This CoW variation has been reported with an incidence of <4.5% across 2329 vessels in the current literature by Triantafyllou, et al. However, we hypothesize the prevalence is significantly less due to the inclusion of two other variations within the reported data.

Significance and Implications: Awareness of CoW anatomical variation, particularly those involving hypoplasia and duplication, is important for clinicians performing surgical or endovascular interventions involving the anterior communicating complex. These variations may have a profound effect on surgical approach, difficulty, accuracy of endovascular coil or aneurysm clip placement, and postoperative complications. Thus, awareness of CoW variations are implicated in surgical accuracy and clinical outcomes.

Keywords: Circle of Willis, cerebrovascular anatomy, arterial morphology, vascular neurosurgery

VR IN MEDICAL SCHOOL ANATOMY EDUCATION

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Introduction: Virtual reality (VR) has become a popular teaching modality for undergraduate and graduate anatomy courses, allowing for interaction with 3D models of human anatomy through rotation, magnification, and cross-sectioning. While students have generally responded positively to the use and benefits of using VR to learn anatomy, an area of concern is the implementation of teaching students how to efficiently and effectively use VR to complement their study of anatomy.

Purpose: In this study, we plan to investigate the impact that Virtual Reality Education can have when assigned as an additional study modality throughout a course block on a student's practical exam scores, overall course grades, and if it leads to further utilization of VR as a study tool.

Methods: We will conduct an in-person focus group with twenty 1st year medical students, selected on a first come, first serve basis, that will introduce them to VR and its application to anatomy learning. Participants will complete pre- and post-session surveys assessing prior exposure to VR, understanding of its uses, likelihood of incorporating VR in their studies, and feedback on the session itself. Throughout a course block, supplemental VR sessions aligned with system-based courses will be provided to participants, focusing on specific strategies to optimize VR use in learning anatomy. Post session surveys will assess student confidence, satisfaction, and perceived effectiveness. Anatomy practical scores will be compared between the focus group and the rest of the class as well as final course grades.

Results: Study is ongoing.

Contribution to the Field: By better equipping students with a structured introduction and targeted strategies for using VR to complement anatomy education, this study seeks to enhance student understanding of anatomical concepts, leading to improved exam performance and better application of anatomy knowledge in clinical practice.

Keywords: Virtual Reality Education, Anatomy Education, Medical Student Learning, 3D Anatomy Models, Supplemental Study Modality, VR Training, Anatomy Practical Performance, Educational Technology

Evaluation of Naloxone Training and Cultural Tailoring Recommendations from Billings Urban Indian Health Staff

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American Indians in Montana experience a disproportionate amount of fatal opioid overdose, with recent data indicating that American Indian/Alaska Native individuals are 3.3 times more likely to die from opioid overdose compared with white Montanans. This disparity highlights the need for culturally responsive harm reduction strategies. The objective of this project was to evaluate changes in confidence and identify cultural adaptation needs for a student created naloxone training among staff at the Billings Urban Indian Health and Wellness Center.

Fifteen participants completed pre and post training surveys using a 5 point confidence scale. Confidence to recognize opioid overdose increased from 2.9 to 4.7 ($p < 0.001$), and confidence in administering naloxone increased from 3.4 to 4.9 ($p = 0.005$) based on paired statistical testing, demonstrating significant improvement across both domains.

A focus group discussion was conducted immediately after concluding the naloxone training. This identified the need to simplify terminology, improve visuals, integrate culturally grounded examples, and clarify naloxone use, storage, and access. Although limited by a small sample size, these quantitative and qualitative findings will serve to guide a culturally tailored overdose response training program for Native American communities in Billings, MT.

Ultrasound, Artificial Intelligence, and 3D Printing in Airway Assessment: A Literature Review on Indications for Use in Difficult Airway Management

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Background**:** Difficult airway management remains the leading cause of anesthesia-related morbidity and mortality. The 2022 American Society of Anesthesiologists (ASA) Airway Guidelines emphasize structured preoperative assessment using bedside tools (e.g., Mallampati classification, thyromental distance) with use of adjunctive technologies when indicated. Emerging modalities, including ultrasound, artificial intelligence (AI), virtual reality (VR), and three-dimensional (3D) modeling, aim to improve predictive accuracy of airway management strategies; however, most studies evaluate these tools in isolation. This study addresses this gap by examining how these modalities can be incorporated into a standardized, multimodal airway risk stratification model. Additionally, this project aims to synthesize current evidence regarding their indications, limitations, and clinical integration.

Methods**:** A structured narrative review of PubMed, Google Scholar, Embase, and Scopus (2010–2026) evaluated studies on the aforementioned modalities used in airway assessment. Evidence on predictive performance, feasibility, and clinical utility was qualitatively synthesized.

Results: Traditional bedside assessments demonstrate limited sensitivity. Airway ultrasound shows improved predictive value over physical examination alone, but operator skill remains a limitation. Advanced imaging and 3D modeling support planning in patient cases with complex anatomy but are limited by cost and practicality. AI demonstrates promise in automated image analysis and predictive modeling; however, external validation is limited.

Conclusions**:** We propose that an integrated, tiered model should be implemented: (1) universal clinical assessment; (2) selective ultrasound and AI use for intermediate risk; and (3) advanced 3D imaging (CT/MRI, 3D printing) for complex or high-risk cases when feasible.

Keywords: Airway assessment; Ultrasound; Airway Assessment; 3D modeling

OPTIMIZING OPIOID-SPARING ANESTHESIA IN LAPAROSCOPIC ABDOMINAL SURGERY: A SYSTEMATIC REVIEW OF QUADRATUS LUMBORUM BLOCK APPROACHES

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Background: Efforts to reduce perioperative opioid exposure have intensified in response to opioid-related morbidity and the risk of persistent postoperative use. Although laparoscopic abdominal surgery is minimally invasive, it generates clinically meaningful somatic and visceral pain that may delay recovery and increase opioid requirements. The quadratus lumborum block (QLB) has emerged as a multimodal complement with broader dermatomal coverage than transversus abdominis plane blocks. Its use is somewhat complicated by four anatomical approaches: lateral, posterior, anterior (transmuscular), and subcostal, all of which need further comparison in adult laparoscopic populations.

Methods: This review synthesizes evidence published since 2020 comparing QLB approaches in patients undergoing laparoscopic abdominal surgery. Outcomes of interest included analgesic efficacy, opioid consumption, dermatomal spread, and recovery metrics that are underrepresented in current postoperative literature. Systematic database searches identified 317 studies, of which 20 met inclusion criteria: (1) peer-reviewed original research, (2) human subjects undergoing laparoscopic abdominal procedures, (3) evaluation of QLB as a primary or adjunct analgesic technique, and (4) reported postoperative analgesic or recovery outcomes including opioid consumption, pain scores, or complications. Randomized controlled trials, prospective and retrospective cohort studies, and meta-analyses were included. Only articles published in English were considered.

Results: Lateral and posterior approaches provide analgesia for up to 24 hours but inconsistently reduce opioid use when added to contemporary pain regimens. Anterior and supra-arcuate variants may prolong analgesia and decrease opioid requirements, likely due to their greater dermatomal spread.

Conclusion: Interpretation is limited by procedural discrepancies, technique variations, and the predominance of small single-center studies. Despite these constraints, approach selection, particularly the anterior QLB technique, may contribute to increased analgesic effectiveness directly translating to post-operative opioid-sparing potential. Larger standardized trials are needed to clarify technique-specific advantages and guide evidence-based practice, to potentially enhance perioperative pain control and improve patient-centered surgical outcomes.

Keywords: Laparoscopic surgery, opioid-sparing anesthesia, quadratus lumborum block, regional anesthesia

Building Better Board Prep Using AI

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Preparation for the Comprehensive Osteopathic Medical Licensing Examination Level 1 (COMLEX USA Level 1) represents a critical and often stressful milestone for osteopathic medical students, yet available board preparation resources frequently fail to align with diverse learning preferences or the specific structure of National Board of Osteopathic Medical Examiners (NBOME)–style questions. Existing third party study tools are largely designed for the United States Medical Licensing Examination (USMLE) and are often costly, limited in osteopathic manipulative medicine (OMM) content, or inaccessible in format, creating financial and pedagogical barriers for students.

This project aims to redesign board preparation resources into student centered, cost free platforms tailored to osteopathic learners. We hypothesize that repackaging traditional COMLEX focused materials using modern, technology enhanced approaches will improve accessibility and alignment with student learning preferences.

A mixed educational design approach was employed, beginning with a survey of third year medical students to identify board preparation behaviors and preferred learning modalities. The OMT Review book 3rd edition by Dr. Robert Savarese, a traditional low cost COMLEX resource, was then transformed into a more accessible digital format. Artificial intelligence tools were used to identify system based keywords and phrase patterns within existing questions, which were subsequently leveraged to generate new NBOME style practice questions. These questions were curated into a centralized, no cost COMLEX USA Level 1 question bank integrated within the MCOM curriculum. Expected outcomes include increased student engagement with COMLEX specific practice questions, reduced financial burden, and improved alignment between board preparation resources and osteopathic exam content. This work contributes to medical education by addressing a critical gap in equitable, COMLEX focused board preparation and offers a scalable model for leveraging artificial intelligence to support diverse learning needs in osteopathic medical training.

Building Confidence and Competence with Early POCUS Exposure: A Student-Centered Perspective

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Despite growing adoption, integration of point-of-care ultrasound (POCUS) in undergraduate medical education remains inconsistent in structure, depth, and reinforcement, limiting consensus on best practices. POCUS uniquely enhances visualization of living anatomy and integration of foundational science with clinical reasoning. Early, longitudinal exposure may improve spatial understanding, procedural confidence, and readiness for time-sensitive applications, including focused assessment with sonography in trauma (FAST) exam, the rapid ultrasound for shock and hypotension (RUSH) exam, and deep vein thrombosis (DVT) evaluation. This opinion-based analysis evaluates a longitudinal, preclinical POCUS curriculum at the Montana College of Osteopathic Medicine to generate actionable recommendations for implementation. We performed a targeted review of contemporary medical education literature and synthesized reflections from a medical student and two pre-doctoral ultrasound teaching fellows involved in curriculum design and delivery. Three principal findings emerged. First, longitudinal integration with deliberate, systems-based reinforcement promotes cumulative skill acquisition and durable anatomical understanding. Second, a near-peer teaching model improves learner engagement, increases instructional scalability, and reinforces instructor competency. Third, the absence of standardized competency assessments represents a key barrier to consistent skill validation and curricular benchmarking. This model is distinguished by its structured longitudinal design, integration across preclinical systems, and reliance on trained peer instructors to deliver high-frequency, hands-on learning. While limited by its non-empirical design, the analysis identifies reproducible strategies for sustainable POCUS integration. Early incorporation of ultrasound may facilitate transition to clinical training by strengthening diagnostic reasoning and real-time decision-making. Further study is warranted to assess effects on clinical performance and patient outcomes.

Key words: Ultrasonography; Point-of-Care Systems; Education, Medical, Undergraduate; Curriculum; Clinical Competence; Anatomy; Osteopathic Medicine; Students, Medical

Medical students report Optimal Learning & Performance System improved their MCM Exam 1 performance

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Background: At-risk medical students experience higher rates of academic difficulty and attrition. Many begin training using ineffective study strategies despite strong evidence supporting structured, evidence-based approaches. Mandatory study skills programs provide early support, but their effectiveness from students' perspectives is not well characterized.

Objective: To evaluate whether medical students perceived that a mandatory study skills program improved their exam performance.

Methods: This study included first-year medical students enrolled in an orientation course at a US medical school in Fall 2025. All 177 students participated in the Optimal Learning and Performance System (OLPS), a required curriculum delivered during the first two weeks. OLPS included 7.25 hours of instruction and 1.5 hours of structured self-directed learning focused on time, learning, performance, and self-optimization. After the first exam, a survey assessed percent of exam performance attributed to the sessions. 113 students completed that survey. At-risk students were defined as those in the lowest quintile.

Results: After the first exam, students across quintiles attributed ~9% of their exam score to OLPS (highest quintile: 11.75%, SD = 12.35%; lowest quintile: 8.46%, SD = 8.32%). Limitations include self-report bias and lack of causal inference.

Conclusion: A mandatory, early study skills program was associated with improved perceived exam performance, including among at-risk students. Universal instruction may offer a scalable, equitable strategy to reduce preventable academic failure.

Key words: Medical education, at-risk students, study skills program, exam performance, equity

EFFECT OF SIMULATION-BASED AUSCULTATION TRAINING ON MEDICAL STUDENT DIAGNOSTIC ACCURACY OF PATHOLOGIC HEART SOUNDS

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Cardiac auscultation remains a core component of physical diagnosis, yet medical students demonstrate low accuracy in identifying common pathologic heart sounds. Although simulation-based instruction has shown promise, the effectiveness of Student Auscultation Manikin® (SAM)-based training alone versus SAM training reinforced with Osteopathic Clinical Skills (OCS) curricular content remains unclear. We hypothesize that preclinical learners who receive SAM heart sound training supplemented by OCS content will demonstrate greater improvement in diagnostic accuracy than learners receiving SAM curriculum alone or no intervention. We will conduct a randomized, three-arm, pretest-posttest pilot study at Rocky Vista University Montana College of Osteopathic Medicine involving 30 preclinical learners, including OMS I, OMS II, and Master of Medical Sciences students. Participants' results will be deidentified and assigned to participant groups. Participants will complete a baseline assessment, a 30 minute intervention or control period, and an immediate post-intervention reassessment using SAM 3G® Adult Auscultation Manikins, standardized clinical vignettes, and eight cardiac findings. The primary outcome will be overall and sound-specific diagnostic accuracy from pre- to post-intervention. Statistical analyses conducted by Dr. Zapata will evaluate group differences, error patterns, and performance using blinded data and mean difference scores. We expect baseline accuracy to be suboptimal, with the greatest improvement in the SAM + OCS group, intermediate gains in the SAM-only group, and minimal change in controls. As a pilot study, this work will generate preliminary data to inform the design of larger future studies. Findings will also support integration of simulation-based cardiac auscultation training into the preclinical curriculum and may inform broader best practices in medical education.

Keywords: cardiac auscultation; simulation-based education; student auscultation manikins; diagnostic accuracy; heart sounds; osteopathic medical education

Designing a Bidirectional Global Health Partnership Between Rural Montana and Entepesi Kenya: A Review of Shared Clinical Priorities and Educational Exchange Models

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Global health training opportunities continue to expand, yet many educational exchanges remain unidirectional and may risk inequities. For rural health systems, pairing geographically isolated areas internationally may enable reciprocal learning focused on shared issues such as physician shortages, limited specialty access, long travel distances, and resource variability. The objective of this literature review is to identify evidence that supports the design of an equitable, bidirectional partnership between MCOM and Entepesi Kenya, with a focus on shared maternal-postpartum and chronic disease priorities, as well as exchange models that promote bidirectional cultural humility and sustainability. Evidence supports intentionally bidirectional exchange models that improve equity and program relevance (Sors et al., 2023). Studies of bidirectional exchanges discuss benefits at the faculty, trainee, and institutional levels (Bodnar et al., 2015). This literature review includes peer-reviewed literature and selected sources compiled for the Entepesi Kenya collaboration. Sources were identified through searches of global health and rural health literature and organized into thematic domains. Findings were grouped into maternal and postpartum health, perinatal mental health and substance use, chronic disease management in rural settings, access barriers and enabling technologies, and sustainable models supporting bidirectional global health education. Across both countries, perinatal mental health conditions are common and combine with social and personal stressors, with demonstrated unmet needs in rural Montana and Kenya (Ongeri et al., 2018; Hanson et al., 2023). Maternal morbidity and mortality are strongly influenced by time-sensitive yet preventable obstetric emergencies such as hemorrhage, hypertensive disorders, and infection or sepsis, as well as by the capacity of the healthcare system regarding the availability of emergency obstetric care, referral systems, and transport. Perinatal mental health, especially postpartum depression, emerges as a cross-cultural priority, with additional emphasis in the United States on postpartum substance use. Chronic disease burdens and diagnostic gaps are amplified in rural settings due to distance, workforce constraints, and limited care availability. Interventions that strengthen primary care teams, expand screening, and use telehealth or community-based platforms may help address these challenges. Medical students have shown increasing interest in global health, and many academic centers have expanded global health programming. However, many experiences still follow a one-way model, mainly from high-resource areas to low-resource ones, which raises ethical concerns regarding equity and the risk of reinforcing colonial perspectives rather than collaborative learning approaches. Studies of bidirectional exchanges report gains in institutional development and strengthened faculty relationships over time, suggesting that exchanges can mature into long-term partnerships when sustained collaboration is present (Bodnar et al., 2015). Longstanding Kenya–North America partnerships demonstrate that these programs can be structured through formal curricula, community integration, and long-term institutional partnerships. A Montana–Entepesi Kenya partnership should be built around shared clinical priorities, a bidirectional trainee and faculty exchange, and a learning-health-system approach. The literature supports implementation beginning with relationship building and virtual collaboration, followed by carefully supervised exchanges and jointly developed initiatives. While the available literature highlights the benefits of bidirectional exchange, there is limited research specifically examining rural-to-rural global health partnerships, indicating an important area for future study. A bidirectional partnership between rural Montana and Entepesi, Kenya, supports a collaborative learning approach to shared healthcare challenges while respecting different cultures.

SO JUST HOW BAD IS SUPPORTING A FOOTBALL TEAM FOR YOUR HEALTH?

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Sports viewership is a global activity, with many individuals engaging as highly invested fans throughout the year. Prior research has shown that emotionally salient sporting events—such as championships, finals, and tournament rounds—are associated with acute physiological stress responses, including elevations in heart rate, blood pressure, and stress biomarkers such as cortisol. These transient responses have potential clinical relevance, as repeated sympathetic activation has been linked to adverse cardiovascular outcomes. However, the real-time physiological effects of routine sports viewing among passionate fans remain incompletely characterized. The objective of this study was to determine whether viewing a self-selected competitive sports event elicits measurable changes in heart rate, blood pressure, and oxygen saturation among long-term sports viewers at MCOM.

We conducted an ongoing prospective observational study of students who reported watching organized sports involving a team which they have supported for five or more years. Participants selected a single live or recorded match or game of personal interest. Heart rate, blood pressure, and pulse oximetry were measured at predefined timestamps throughout the event to assess acute physiological changes associated with sports viewing. These measures were selected as indicators of sympathetic nervous system activation.

Preliminary results demonstrate consistent increases in heart rate and blood pressure during gameplay compared with baseline measurements, accompanied by minimal declines in oxygen saturation. This physiological pattern is consistent with acute sympathetic stimulation and aligns with findings from prior studies examining stress responses during emotionally charged sporting events. Limitations of this pilot study include a limited sample size, lack of a control condition, and potential confounding variables such as caffeine consumption, baseline anxiety, and physical movement during viewing.

Despite these limitations, this study contributes to the literature by providing real-time, multi-parameter physiological monitoring in a student fan population during self-selected sporting events. These findings support the feasibility of this approach and may inform future studies incorporating electrocardiography, biomarker analysis, and longitudinal assessment of cardiovascular risk associated with repeated sports-related stress exposure.

Exploring the Efficacy of Sound Frequencies During Sleep for Trauma Recovery: A Neuroplastic and Epigenetic Perspective

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Sleep disturbance is a persistent feature of Post-Traumatic Stress Disorder (PTSD), a psychiatric condition affecting approximately 6% of Americans, or nearly 13 million individuals. Individuals with PTSD frequently experience insomnia, fragmented sleep, and recurrent nightmares, which contribute to hyperarousal, intrusive symptoms, and impaired cognitive functioning. Research suggests that sleep represents a critical window for neurological recovery following trauma. Adequate sleep duration and quality have been associated with improved emotional memory processing, reductions in fear responses, and improved regulation of the hypothalamic–pituitary–adrenal axis, processes that are often disrupted in individuals with PTSD.

Auditory stimulation has been proposed as a low-cost, non-invasive intervention that may improve sleep quality and support neurological recovery. One method, Binaural Beats, presents slightly different auditory frequencies to each ear, producing the perception of a third frequency that may promote brainwave entrainment. Frequencies in the delta (0.5–4 Hz) and theta (4–8 Hz) ranges are commonly used due to their association with slow-wave sleep, memory consolidation, and neural restoration. Additional auditory stimuli, including Pink Noise and Solfeggio Frequencies, have also been explored for their potential roles in promoting sleep stability, stress reduction, and emotional regulation. These auditory stimuli may reduce cortical hyperarousal and promote neural synchronization, mechanisms relevant to trauma-related sleep disturbances.

This literature review evaluates research examining the use of sleep-based auditory stimulation as a supportive intervention for individuals experiencing trauma-related sleep disruption. Particular emphasis is placed on studies investigating auditory frequencies delivered through headphones or other audio devices during sleep. Across the reviewed studies, auditory stimulation has been associated with improvements in subjective sleep quality, increased slow-wave activity, and reductions in physiological markers of stress.

In addition, this review outlines the framework for an ongoing investigation in which participants experiencing PTSD-related sleep disturbances are exposed to sleep-targeted auditory stimulation. Outcome measures include self-reported sleep quality and standardized PTSD symptom assessments. The objective is to evaluate the feasibility, safety, and potential therapeutic benefits of sleep-based auditory stimulation as an accessible tool for trauma recovery.

Keywords: PTSD, CPTSD, Binaural Beats, sound frequency, auditory stimulation, neuroplasticity

Validating a Cadaveric Biorepository for Diagnostic Pattern Recognition in Medical Education

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Background: Traditional medical education separates gross anatomy, histopathology, and clinical pathology, limiting early development of integrated clinical reasoning. While cadaveric dissection provides high-fidelity macroscopic insight, it lacks systematic integration with histopathologic features. Conversely, digital tools offer scalability but often fail to capture gross pathological variability. This study explores the feasibility of a digitally curated cadaveric biorepository integrating macroscopic anatomy with histopathology, with potential for future linkage to systemic disease. We hypothesized that cadaveric tissues retain sufficient architectural integrity for histologic analysis, with preservation quality varying across tissue types.

Methods: Three board-certified pathologists performed blinded binary assessments of 214 cadaveric tissue samples. “Scorability” was defined as preservation of architecture sufficient for diagnostic evaluation. Features (fibrosis, atrophy, inflammation, epithelial disruption) were assessed only if tissues met scorability criteria. Samples were stratified into consensus clusters (Unanimous vs. Split-Decision). A one-sample t-test evaluated agreement relative to random ($\mu = 0.50$).

Results: Unanimous consensus was achieved in 72.9% of samples, with strong alignment in scorability (71.5%). Split-decision classifications occurred in 17.8%. Agreement was significant across all domains ($p < 0.05$), with fibrosis and inflammation showing the highest significance ($p \leq 0.001$; CI: 0.046–0.146). Brain tissues demonstrated 100% consensus, while pancreatic tissue showed high variability (75% split-decision), likely due to autolysis. Findings consistent with systemic pathology, including acute myeloid leukemia, were observed across organs.

Conclusion: These findings support the feasibility of integrating cadaveric anatomy with histopathology, with high interobserver reliability and tissue-specific limitations that inform future applications in education and research.

Keywords: Cadaveric biorepository, digital pathology, histopathology, clinical reasoning, medical education, anatomical dissection, osteopathic medicine

Ulnar Collateral Ligament (UCL) Injuries of the Thumb

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Ulnar collateral ligament (UCL) injuries of the thumb metacarpophalangeal (MCP) joint, commonly known as gamekeeper's thumb or skier's thumb, represent one of the most frequently encountered ligamentous injuries of the hand. These injuries carry significant clinical importance across both athletic and general populations. This narrative review examines the anatomy, etiology, epidemiology, pathophysiology, clinical evaluation, imaging modalities, and management strategies for thumb UCL injuries. This narrative review synthesizes current evidence from peer-reviewed literature identified through PubMed and Google Scholar, including landmark studies, systematic reviews, and clinical series, supplemented by established reference texts. A thorough review of the current literature demonstrates that partial UCL tears respond well to conservative management with immobilization, while complete ruptures—particularly those complicated by Stener lesions, which occur in an estimated 40–87% of complete tears—typically require surgical intervention. Imaging modalities, including ultrasound and MRI, play complementary roles in diagnosis, with MRI demonstrating superior specificity for distinguishing displaced from non-displaced tears. Surgical repair yields excellent outcomes, with systematic reviews reporting return-to-play rates exceeding 98% in athletic populations, though generalizability to non-athletic cohorts remains limited. Conservative management of partial tears also demonstrates favorable results, with success rates exceeding 90% reported in clinical series, though high-quality comparative data remain sparse. Limitations of the current evidence base include reliance on retrospective surgical cohorts, heterogeneous outcome measures, and a relative paucity of prospective comparative studies evaluating conservative versus operative management across diverse patient populations. This review synthesizes published evidence with particular attention to diagnostic accuracy of imaging modalities, prevalence and significance of Stener lesions, and evidence-based treatment thresholds—areas in which recent literature has provided important new data. Early recognition and appropriate management are essential to preventing chronic instability and long-term functional impairment.

Keywords: Orthopedic Surgery, Ulnar Collateral Ligament, Gamekeeper's Thumb, Skier's Thumb, Thumb MCP Joint, Stener Lesion, Hand Injuries

Empathy in Action: Evaluating a Choice-Based Empathy Lab for Medical Learners

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Background Empathy is a core physician competency associated with improved patient satisfaction, adherence, and clinical outcomes. Empathy Lab is an experiential assignment, designed by course director Dr. Mary Wilde, within Interprofessional Education at RVU. Students completed two activities of their choice to support the preservation and development of empathy amid the demands of medical training. This report evaluates OMS-I perceptions of their engagement in Empathy Lab activities. Methods Student experiences (n = 243) were assessed using surveys containing reflections and Likert-scale questions. Items measured were: manageability of the activities, connection to Interprofessional Education Collaborative competencies (IPECC), and perceived contribution to becoming a more caring provider. A de novo scale was created to analyze qualitative responses to identify themes related to empathy, self-awareness, and professional growth. One-way ANOVAs were conducted to compare outcomes across each activity. Significant effects were followed by Bonferroni-adjusted pairwise t-tests. Results Manageability did not differ across activities ($p = .163$) and was rated moderately high overall ($M = 3.83/5$, $SD = 1.11$). Activity connection to IPECC varied significantly ($p < .001$), with trauma-informed care highest and renewal lowest. Perceived contribution to becoming a more caring provider also differed ($p < .005$), with book reading highest and renewal lowest. Findings are limited by self-reported data and a cross-sectional design. Conclusions Empathy Lab activities differentially impacted connection to IPECC and perceived development as caring providers. These findings support incorporating diverse empathy-focused interventions in medical education, though further study with objective measures is needed.

Keywords: Empathy, Medical Education, Interprofessional Education

More Than Just "Tiny Adults": A Literature Review on the Importance of Pre-clinical Pediatric Education

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The transition from preclinical to clinical medical education represents a critical shift in training, yet many medical students report feeling underprepared for pediatric clerkships. Preclinical curricula are largely focused on adult medicine, which may limit the development of pediatric-specific competencies, including physical examination skills, communication with children and caregivers, and clinical reasoning in pediatric contexts. A narrative literature review was conducted to evaluate the role of preclinical pediatric education in preparing medical students for pediatric clerkships. Multiple databases, including PubMed, CINAHL, EMBASE, and Google Scholar, were searched from 2015 through 2026 using keywords related to pediatrics, preclinical education, curriculum development, and clinical competence. Articles were screened by multiple reviewers using predefined inclusion and exclusion criteria. Three major themes emerged: early pediatric exposure, active learning strategies, and persistent skill gaps. Early exposure to pediatric patients and clinical environments was associated with improved student confidence and preparedness. Active learning methods, including simulation and experiential learning, enhanced clinical skills, communication, and knowledge retention. Despite these advances, significant gaps remain in pediatric physical examination skills, communication with pediatric patients and families, and documentation. Additionally, discrepancies between preclinical instruction and clerkship expectations highlight a lack of curricular continuity. Targeted interventions such as longitudinal pediatric programs, bootcamps, and flipped-classroom models demonstrated improvements in student preparedness and clinical competence. Preclinical medical education remains predominantly adult-focused, contributing to gaps in pediatric preparedness. Integrating structured pediatric curricula, increasing early clinical exposure, and incorporating active learning strategies may enhance student readiness for pediatric clerkships. Standardization of pediatric training across institutions is needed to better align preclinical education with clinical expectations and improve competency development in pediatric care.

Keywords: Pediatrics, Pre-Clinical Education, Clinical clerkships

Shaping the Hidden Curriculum: Do Small Group Discussions Increase Empathy in the Cadaveric Anatomy Lab?

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Background- For centuries, cadaveric dissections have been the hallmark of medical school anatomy curricula. Beyond short-term, testable anatomical knowledge, there might be lessons about professional development, emotional development, and humanistic empathy that cadaveric dissections impart on students. Research supports the positive impact that donor appreciation ceremonies and small group discussions can have on students' anxiety levels, comfort, and emotional processing of the experience. (1,2,3) We theorize that implementing small group discussions into the medical anatomy curriculum can positively augment the cadaveric dissection experience for students, resulting in potentially increased emotional growth, reflected in increased empathy scores as measured by the Interpersonal Reactivity Index.

Methods- First-year students enrolled in the MSK I course at Rocky Vista University's College of Osteopathic Medicine in Colorado will be randomly assigned to an intervention or control group. The intervention group will participate in one 60-minute facilitated small-group reflective discussion during the course, while the control group will complete the standard curriculum without structured reflection. The Interpersonal Reactivity Index was administered pre- and post-course. Small group participants will be asked to write a short reflection on their experience immediately following discussion. Students who do not complete both surveys or do not participate in cadaveric dissection will be excluded. Written responses were analyzed using Braun and Clarke's six-phase thematic analysis framework.

Results- A total of 21 participants completed pre- and post-intervention empathy assessments. Overall empathy scores increased modestly from baseline, though this change was not statistically significant (mean total difference = +1.38, $p = 0.37$). Among empathy domains, perspective-taking demonstrated the greatest improvement, with a mean increase of 1.52 points, approaching statistical significance ($p = 0.078$). No significant pre–post changes were observed in fantasy, empathic concern, or personal distress domains. Subgroup analyses revealed no statistically significant differences by discussion participation, prior experience, age, or gender; however, older participants and those with prior experience exhibited larger mean increases in perspective-taking and total empathy scores. Written responses demonstrated common themes of validation of the students' emotions, peer-bonding, and increased appreciation for the sacrifice that donors make.

Conclusion- Although statistically significant changes were not observed, perspective-taking emerged as a potentially responsive empathy domain. This underpowered pilot suggests that structured reflective discussion may positively influence the educational experience and supports further study with a larger sample.

Keywords: Medical education, Anatomy, Professional Development, Cadaveric Anatomy

Comparing current and novel antipsychotic regimens and their implications on metabolic health in patients with schizophrenia

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Metabolic syndrome (MetS) is prevalent in patients with schizophrenia (SCZ); highest amongst those on antipsychotics, driving cardiovascular risk and premature mortality. While previous studies have investigated the nuanced connections between SCZ and MetS, gaps remain in understanding pathways driving long-term metabolic outcomes. This narrative review addresses these gaps by comparing drug-targeted mechanisms of metabolic risk in SCZ and aims to inform personalized treatment regimens. Review of randomized controlled trials (RCTs), meta-analyses and longitudinal studies from 2006-2025 was conducted, focusing on effects of antipsychotics on metabolism in those with SCZ. OpenEvidence, PubMed, Embase, Cochrane Review, and ClinicalTrials.gov were used and scanned with the following MeSH terms: SCZ, metabolism, antipsychotics, cardiovascular, diabetes. Through literature analysis, trends in receptor modulation, downstream intracellular pathways, and organ system-specific effects were used to compare the mechanisms behind metabolic outcomes shared amongst many antipsychotics. 18 total antipsychotics were investigated, including haloperidol, chlorpromazine, clozapine, olanzapine, aripiprazole, risperidone, xanomeline-trospium chloride (KarXT). Through potent central and peripheral receptor binding, alterations to appetite, inflammation, and glucose/lipid-related processes occur via activation of ER stress, MAPK, AMPK, TLR4, and NF-kB signaling pathways. Findings demonstrate that olanzapine and clozapine induce dyslipidemia, polyphagia, and insulin desensitization. In comparison, xanomeline likely enhances insulin secretion via M3 receptor agonism. Thus, patients with SCZ and type 2 diabetes (T2D) may benefit from therapies like KarXT. Nonetheless, there were limitations in data interpretation, population access, and study duration. Future directions should involve long-term RCTs that evaluate metabolic outcomes of novel vs. conservative antipsychotic regimens in patients with SCZ.

Keywords: schizophrenia, metabolism, diabetes, obesity, cardiovascular

Staged Pelvic Ring and Acetabular Fixation in the Setting of Open Abdomen Management: A Case Report

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Falls from height represent a significant mechanism of high-energy trauma with substantial morbidity and mortality. We present a 28-year-old male who sustained a suspected 6-story fall resulting in hemorrhagic shock and a mechanically connected acetabular and pelvic ring injury (MCAPI). MCAPIs are a rare injury pattern that only occurs in 3-15.7% of all patients with pelvic or acetabular fractures. Management typically involves a single operation of pelvic ring fixation followed by acetabular fixation. This case presents a unique challenge of an AbThera wound vac obstructing surgical access for acetabular fixation, which lacks guidelines in the literature. The patient presented a positive FAST exam, prompting emergent laparotomy, which revealed multiple hepatic lacerations and mesenteric injuries requiring hemorrhage control. Given hemodynamic instability, a massive transfusion was required. Due to planned re-exploration, an AbThera wound vac was placed following laparotomy. Imaging revealed extensive injuries consistent with a diagnosis of polytrauma, including bilateral acetabular fractures, sacral wing fracture, and bilateral SI joint widening. Following early appropriate care guidelines, approximately 36 hours of post-injury, posterior pelvic ring stabilization was performed while the AbThera remained in place. However, bilateral acetabular fixation could not be completed due to inaccessibility from the AbThera. Following abdominal closure 48 hours later, definitive acetabular fixation was performed, achieving anatomic reduction. On hospital day 14, the patient was discharged to home health with wheelchair mobility, tolerating brief weight bearing, and follow-up imaging suggested maintained anatomical reduction. At one-year follow-up, the patient has returned to pre-injury status with a primary complication of pain and gluteal weakness. This case highlights a unique staged approach of pelvic ring and acetabular fixation necessitated by surgical inaccessibility due to AbThera placement, leading to anatomic reduction and no postoperative infection.

Keywords: Orthopedics, Pain

Marked Length Disparity in Bilateral Popliteal Artery Aneurysms: Limitations of Diameter-Based Risk Stratification

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Popliteal artery aneurysms (PAAs) are the most common peripheral arterial aneurysms, predominantly affecting older males. They carry risks of thromboembolism, distal embolization, limb ischemia, and amputation, with bilateral involvement in up to 50% of cases. Current management is largely diameter-based, with repair typically recommended at ≥20–25 mm or in symptomatic patients. However, large duplex ultrasound and CT angiography series report considerable variability in thrombus burden and embolic events at similar diameters, while computational models demonstrate that aneurysm geometry influences flow dynamics. The clinical relevance of aneurysm length and inter-limb asymmetry remains less well defined, particularly in cases with marked morphologic disparity. During routine lower limb dissection of an 83-year-old male cadaver, bilateral PAAs were identified within the popliteal fossae. Caliper measurements demonstrated diameters of 23.46 mm (right) and 34.80 mm (left), both exceeding repair thresholds, with substantial length asymmetry (32.34 mm vs 73.41 mm). While most reported PAAs are relatively focal, the left-sided aneurysm demonstrates pronounced longitudinal extension, representing a morphologic extreme compared to imaging series. Both aneurysms were fusiform and contained gross thrombus without rupture or calcification. Measurements were obtained on formalin-fixed specimens, which may affect vessel dimensions. No additional aneurysmal disease was identified. Clinically, both aneurysms would meet criteria for repair; however, the marked elongation of the left-sided lesion may confer disproportionately higher embolic risk. Hemodynamic studies link increased aneurysm length to reduced wall shear stress and prolonged flow residence time, promoting thrombus formation. This raises the possibility that geometrically complex aneurysms represent a higher-risk phenotype not captured by diameter alone. As a cadaveric case, no outcomes can be assessed; this report serves as an anatomical and pathophysiologic illustration. Future prospective imaging cohorts correlating aneurysm geometry with thromboembolic events, alongside computational modeling, are needed to determine whether length and asymmetry should refine risk stratification.

Keywords: Popliteal artery aneurysms

Recurrent Ascending Cholangitis: A Case of Preventative ERCP

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Background Recurrent choledocholithiasis after cholecystectomy presents a therapeutic challenge, particularly in patients who are not candidates for surgical intervention. Risk factors for de novo stone formation include advanced age and periampullary diverticulum. Evidence guiding preventative endoscopic management strategies remains limited, and optimal approaches to reduce recurrent cholangitis are not well defined.

Objective To describe the clinical course, management rationale, and outcomes of recurrent ascending cholangitis managed with scheduled ERCP and serial stent exchange. Methods We reviewed the clinical presentation, laboratory data, imaging, and longitudinal procedural history of an 88-year-old male with type 2 diabetes mellitus, chronic obstructive pulmonary disease, atrial fibrillation, and prior cholecystectomy.

Results The patient presented with altered mentation, respiratory distress, and right upper quadrant abdominal pain. Laboratory evaluation demonstrated leukocytosis (WBC 20.8 Ã— 20.8 ×10⁹/L), cholestatic liver injury (AST 516 U/L, ALT 219 U/L, alkaline phosphatase 412 U/L), hyperbilirubinemia (2.9 mg/dL), and elevated lactate (5.28 mmol/L); blood cultures grew Escherichia coli. Imaging revealed biliary ductal dilation (15 mm) and inflammatory changes near the porta hepatis. ERCP demonstrated purulent bile, sludge, choledocholithiasis, and an intradiverticular papilla; stone extraction and stent placement were performed. Since 2015, he has undergone 36 ERCPs with stent exchanges every 6–10 weeks, with five documented episodes of ascending cholangitis since 2018. Missed scheduled ERCP was associated with recurrent infection, suggesting a temporal relationship between biliary obstruction and clinical deterioration.

Conclusion Scheduled ERCP with serial stent exchange was used to maintain biliary drainage in a non-surgical patient. This case highlights a potential preventative strategy and underscores the need for further studies to define optimal procedural intervals, outcomes, and long-term risks.

Keywords: Ascending cholangitis, endoscopic retrograde cholangiography, postcholecystectomy syndrome

Why Chronic Pain Persists: Unresolved Mechanistic Gaps in Predictive Processing, Neuroplasticity, and Central Sensitization

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Chronic pain affects a large portion of the global population and represents a major public health burden due to its impact on physical function, mental health, and quality of life. Importantly, many individuals experience persistent pain despite minimal or absent ongoing tissue damage, and structural abnormalities on imaging frequently fail to correlate with symptom severity. This mismatch highlights the need for mechanistic frameworks that explain chronic pain beyond peripheral pathology. A narrative review was conducted using PubMed and Google Scholar with keywords including chronic pain, central sensitization, neuroplasticity, predictive processing, and nociplastic pain. Peer-reviewed human and translational studies published within the past decade examining mechanistic contributors to chronic pain were included, while non-peer-reviewed sources and studies not directly addressing pain mechanisms were excluded. This narrative review examines interacting mechanisms that may contribute to chronic pain persistence. Central sensitization describes increased nociceptive gain within spinal and supraspinal pathways, explaining phenomena such as hyperalgesia and allodynia but lacking reliable biomarkers and standardized diagnostic criteria. Neuroplasticity research demonstrates structural and functional reorganization within pain-related brain networks. Predictive processing proposes that pain perception is shaped by expectations, prior learning, and threat appraisal, offering insight into cognitive amplification of pain. Stress and emotional circuits further interact with these mechanisms through limbic activation, fear learning etc. Despite advances in each domain, significant limitations remain, including unclear transition mechanisms from acute to chronic pain. Integrating cellular, neural, cognitive, and stress-related processes into a unified framework may improve mechanistic understanding and guide future diagnostic and therapeutic strategies.

Keywords: Chronic pain, Central sensitization, Neuroplasticity, Predictive processing, Nociplastic pain

Glucagon-Like Peptide-1 Receptor Agonists in Pediatric Populations: Current Evidence, Developmental Considerations, and Gaps in Knowledge

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This poster reviews current evidence on glucagon-like peptide-1 receptor agonist (GLP-1 RA) use in pediatric populations, highlighting limitations, developmental considerations, and future research needs. Pediatric obesity and youth-onset type 2 diabetes mellitus (T2DM) are increasing at alarming rates, prompting guidelines to discourage watchful waiting and instead recommend early, multifactorial intervention. GLP-1 Ras are increasingly used in pediatric patients; however, ongoing growth, pubertal development, and neuroendocrine maturation limit direct extrapolation from adult data. This narrative literature review evaluated randomized controlled trials, meta-analyses, and observational studies identified through PubMed and MEDLINE, including patients aged â‰¤18 years treated with GLP-1 Ras for obesity and/or T2DM. Primary outcomes included changes in body weight, body mass index (BMI), BMI z-score, and hemoglobin A1c, while secondary outcomes included cardiometabolic parameters such as systolic blood pressure, adverse effects, and safety outcomes, with developmental and long-term effects noted when available. Lifestyle modification remains foundational but demonstrates modest and variable effectiveness in adolescents. Across studies, GLP-1 RA therapy was associated with significant improvements in weight, BMI, BMI z-score, hemoglobin A1c, and systolic blood pressure, with gastrointestinal symptoms as the most common adverse effects. However, most studies were short in duration and did not adequately assess long-term developmental, pubertal, or neurocognitive outcomes. Overall, GLP-1 Ras show short-term efficacy and acceptable safety in select pediatric patients, but important gaps remain regarding long-term effects, durability, and optimal monitoring, supporting cautious, individualized use and the need for pediatric-specific longitudinal research.

Keywords: Pediatrics, Adolescent medicine, GLP-1 receptor agonist, obesity, type 2 diabetes mellitus

Angiolipoma Causing Ulnar Neuropathy at the Elbow with Nondiagnostic MRI: Importance of Electrodiagnostic Localization

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Ulnar neuropathy at the elbow is a common entrapment neuropathy, typically caused by mechanical compression within the cubital tunnel. Less commonly, space-occupying lesions such as lipomas may contribute, but are rarely reported in the literature and may be difficult to detect on standard imaging. Electrodiagnostic testing aids localization of focal lesions when imaging is inconclusive. A 19-year-old left-hand-dominant female presented with a 1-2 year history of progressive left medial elbow pain and paresthesias radiating to the fourth and fifth digits, worsened by elbow flexion and pressure. Physical exam revealed decreased sensation in the ulnar distribution, positive Tinel's sign, full strength, and no atrophy. There was a painful, palpable subcutaneous mass distal to the cubital tunnel, with differential including ganglion cyst, lipoma, or other soft tissue mass. MRI demonstrated nonspecific soft tissue edema without a discrete mass. Electrodiagnostic testing showed a left ulnar motor neuropathy with normal conduction velocities but focal slowing on ulnar inching studies between 4-6 cm distal to the elbow, localizing the lesion. Given her persistent symptoms, palpable mass, and electrodiagnostic findings despite nondiagnostic imaging, a compressive etiology was supported. The patient underwent ulnar nerve transposition and mass excision. Pathology revealed a benign angiolipoma. At four months postoperatively, she had resolution of pain and paresthesias with full return to activities and no distal neurologic deficits aside from mild surgical site numbness. Long-term outcomes remain to be evaluated, though prognosis is favorable after excision with low risk of recurrence. This case highlights a rare cause of ulnar neuropathy due to angiolipoma, an uncommon lipoma subtype infrequently reported in the literature, especially at the elbow. While MRI typically identifies soft tissue masses, small or poorly defined lesions like angiolipomas may be missed. Thus, electrodiagnostic testing, combined with clinical findings, is critical for lesion localization and management when imaging is nondiagnostic.

Keywords: Physical medicine and rehabilitation, electrodiagnostic testing, angiolipoma, ulnar neuropathy

Rehabilitation Beyond the Clinic: Community-Based Approaches to Limb Loss Recovery and Reintegration

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Background: Limb loss significantly impacts physical function, psychosocial well-being, and community participation. Community-based rehabilitation (CBR) aims to address these needs, yet its role in limb-loss care remains incompletely defined. Objective: To synthesize current evidence on CBR for individuals with limb-loss, focusing on functional outcomes, psychosocial recovery, participation, and equity. Methods: A scoping review was conducted using PubMed, Embase, and CINAHL (inception–2025). Search terms included amputation, limb-loss, community-based rehabilitation, home-based rehabilitation, participation, and peer support. Studies involving adults with limb-loss evaluating community- or post-discharge rehabilitation outcomes were included. Studies on inpatient care, non-amputee populations, or non-rehabilitation interventions were excluded. Of 30 records identified, 12 met inclusion criteria. Results: Twelve studies were included. Community-based interventions (n=5) showed mixed but overall positive effects on mobility, pain, and quality of life, with greater benefit in supervised, higher-intensity programs. Peer support (n=4) improved psychosocial adjustment, self-efficacy, and satisfaction, with potential mobility benefits. Qualitative and mixed-methods studies (n=5) highlighted the role of psychosocial factors, environmental barriers, and identity reconstruction in reintegration. Prosthetic provision was essential but limited by access, comfort, and contextual factors. Studies in low- and middle-income settings (n=4) identified significant disparities in access to rehabilitation and prosthetic care. Participation outcomes were inconsistently measured despite their importance to recovery. Conclusion: CBR extends beyond physical rehabilitation to include psychosocial adaptation and participation. Integrating peer support, prioritizing participation outcomes, and addressing inequities are critical to optimizing care.

Keywords: Physical Medicine and Rehabilitation, Community Based Rehab, Limb loss

A Year in Review: Rocky Vista University Pediatrics Club for the 2025-2026 Academic Year

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Background: The Rocky Vista University (RVU) Pediatrics Club promotes interest in pediatric medicine among medical and physician assistant students through education, service, and advocacy. The club offers experiential learning opportunities that deepen understanding of pediatric care while encouraging students to support children and families in the community. During the 2025–2026 academic year, the club implemented initiatives focused on community outreach, hospital-based volunteering, pediatric health advocacy, and specialty-focused professional development. Key activities included: (1) Food, Fun, Fitness school outreach presentations educating elementary students on healthy lifestyles through interactive lessons on nutrition, hygiene, safety, exercise, and basic anatomy; (2) monthly craft fairs at Children's Hospital Colorado providing creative activities for pediatric patients and families; (3) a drowning prevention presentation by Nicole Hughes highlighting pediatric risk factors and prevention strategies; (4) a Sexual Health Summit session led by Dr. Tiemdow Phumiruk on discussing pediatric sexual health; (5) an informational session on Camp Wapiyapi, a nonprofit serving pediatric cancer patients and families; and (6) guest lectures in pediatric gastroenterology, critical care, and allergy/immunology. The club also raised funds through apparel sales to support supplies, research, and conference attendance. Research Question/Aim: This project summarizes RVU Pediatrics Club programming and engagement during the 2025–2026 academic year by characterizing initiative types, summarizing participation, and demonstrating how activities support the club's mission to promote student involvement in pediatrics while serving the Denver community. Study Design: This descriptive retrospective review summarizes club activities using internal records and event documentation. No patient or identifiable data were included.

Keywords: Rocky Vista University, Pediatrics Club, Pediatric

Air, Inequality, and Health: Evaluating the Respiratory Disease Crisis in Latin America, Literature Review

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Introduction Air pollution, health prevention, and socioeconomic status have gained attention, with evidence indicating a rising risk of largely preventable respiratory diseases. These illnesses remain a leading cause of morbidity and mortality in Latin America, disproportionately affecting vulnerable populations. We hypothesized that environmental and behavioral factors significantly influence respiratory diseases. Despite growing recognition, gaps remain in understanding their interactions across diverse settings. This review aims to inform targeted public health strategies to reduce respiratory morbidity, mortality, and health inequities.

Methods We conducted a narrative review using PubMed to identify observational and epidemiological studies in English and Spanish examining environmental exposures and respiratory outcomes in Latin America. Inclusion criteria were studies focused on the region, environmental exposures, and chronic or infectious respiratory diseases. Results Particulate matter, indoor and outdoor air pollution, and tobacco use are key contributors to chronic respiratory diseases, including asthma and lung cancer, and infectious diseases such as pneumonia, tuberculosis, and COVID-19. These exposures disproportionately affect children, older adults, women, and socioeconomically disadvantaged groups, with disparities exacerbated during the COVID-19 pandemic due to disrupted healthcare access and increased mortality. Discussion Interventions including tobacco control, cleaner cooking fuels, improved ventilation, vaccination, and increased access to trained respiratory specialists could improve population health. Although findings were broadly consistent, heterogeneity in study design, potential confounding, and limited data from certain countries and populations may reduce generalizability.

Conclusion Lifestyle and infrastructural interventions may improve overall health in Latin America. Further research is needed to better define respiratory outcomes and guide targeted improvements.

Keywords: Respiratory diseases, Air pollution, Latin America

Factors Contributing to the Underdiagnosis Obstructive Sleep Apnea

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Objectives: Obstructive Sleep Apnea (OSA) remains substantially underdiagnosed in the United States despite advances in home-based diagnostic technologies. As of 2020, an estimated 5.9 million adults had been diagnosed with OSA, while 23.5 million remained undiagnosed (Conte et al., 2020). This scoping review synthesizes recent U.S.-based evidence from the era of expanded home sleep apnea testing (HSAT) to identify factors contributing to persistent underdiagnosis and to highlight gaps not addressed in prior reviews.

Methods: A scoping literature search was conducted using PubMed, Embase, and the Cochrane Library to identify studies examining contributors to OSA underdiagnosis. Search terms included obstructive sleep apnea, OSA, underdiagnosis, polysomnography, home sleep apnea testing, socioeconomic factors, and population at risk. Eligible studies were peer-reviewed English-language articles published in the United States between 2015 and 2025 involving adults ≥18 years. Investigators independently screened titles, abstracts, and full texts following PRISMA guidelines. Themes were derived through iterative consensus review of included studies. Study quality was not formally assessed, consistent with scoping review methodology. Of 213 articles identified, seven met final inclusion criteria, representing a key limitation of the evidence base.

Results: Five themes associated with undiagnosed OSA emerged: inadequate screening in high-risk medical populations (n = 6), presence of comorbid conditions (n = 4), limitations or improper use of diagnostic devices including HSAT (n = 3), restricted access to testing and patient reluctance (n = 2), and insufficient physician training in OSA identification (n = 1). Notably, few studies evaluated interventions targeting provider education or implementation of diagnostic tools in high-risk groups.

Conclusions: Persistent OSA underdiagnosis reflects systemic and clinical barriers that remain despite broader HSAT availability. This review highlights the need for targeted interventions addressing provider training, device implementation, and screening integration in high-risk populations. Further research should evaluate strategies to improve diagnostic uptake and clarify how timely OSA treatment affects outcomes in vulnerable groups.

Keywords: Sleep Apnea Obstructive, Sleep Apnea Obstructive, Upper Airway Resistance Sleep Apnea Syndrome, Sleep Apnea Hypopnea Syndrome, Snoring, Snoring, Diagnosis, Diagnosis, Missed Diagnosis, Missed Diagnosis, Underdiagnosis, Prognosis, Prognosis, Prognostic Factors, Sensitivity and Specificity, Sensitivity and Specificity, False Negative Reactions, False Negative Reactions, False Positive Reactions, False Positive Reactions, Delayed Diagnosis, Delayed Diagnosis, Early Diagnosis, Early Diagnosis, Diagnostic Errors, Diagnostic Errors, Polysomnography, Polysomnography, Nocturnal Polysomnography, Sleep Monitoring, Home Sleep Apnea Testing, Wearable Devices, Wearable Electronic Devices, Wearable Electronic Devices, Monitoring Ambulatory, Monitoring Ambulatory, Outpatient Monitoring, Technology Assessment Biomedical, Technology Assessment Biomedical, Health Behavior, Health Behavior, Health Risk Behaviors, Health Risk Behaviors, Risk Assessment, Risk Assessment, Health Risk Assessment, Benefit-Risk Assessment, Risk Factors, Risk Factors, Health Correlates, Social Risk Factors, Population at Risk, Symptom Assessment, Symptom Assessment, Symptom Evaluation, Socioeconomic Factors, Socioeconomic Factors, Healthcare Disparities, Healthcare Disparities, Patient Acceptance of Health Care, Patient Acceptance of Health Care, Social Determinants of Health

Nature Deficit Disorder: Evaluating Knowledge and Barriers Among Physicians

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Spending time outdoors is associated with numerous physical and mental health benefits in children, including improved motor skills, reduced ADHD symptoms, increased creativity, and lower obesity rates. Nature Deficit Disorder (NDD) is an informal diagnosis that remains poorly defined and underrecognized among physicians, highlighting a gap in clinical awareness and counseling practices. We hypothesized that physicians caring for pediatric patients have limited knowledge of NDD and face barriers to effectively counseling families on outdoor activity. To test this, we distributed a 29-question survey to primary care physicians who see pediatric patients to assess NDD awareness, counseling practices, and perceived barriers. Among 44 physicians across diverse practice settings and experience levels, 70.5% had never heard of NDD and 88.6% reported no prior training on discussing outdoor time, despite 88.6% rating it as highly important. Outdoor activity was also the least frequently discussed counseling topic, with screen time, unsafe environments, and lack of motivation identified as key barriers. Study limitations included selection bias, and multiple responses may have been recorded from a group dedicated to nature with a greater awareness of NDD than other physicians. These findings demonstrate a significant gap in physician education and counseling regarding NDD and outdoor activity. Future research should include additional data collection, analysis of counseling methods, and strategies to overcome barriers.

The Role of Social Determinants of Health in Non-Urgent Emergency Department Utilization

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Emergency department (ED) utilization for non-urgent conditions remains a persistent challenge in healthcare systems, contributing to overcrowding, increased healthcare costs, and strain on emergency services. These pressures may also reduce efficiency and quality of care within emergency settings. Growing evidence suggests that social determinants of health (SDOH), including socioeconomic status, housing instability, lower educational attainment, and insurance coverage, play an important role in shaping patterns of healthcare utilization. However, the role of social and structural factors in non-urgent emergency department use remains complex and not fully understood. This narrative review aimed to synthesize current evidence evaluating how social determinants of health contribute to patterns of non-urgent emergency department utilization. Relevant literature was identified through searches of PubMed and Google Scholar using the terms “social determinants of health,” and “non-urgent emergency department use.” Peer-reviewed studies examining the relationship between SDOH and non-urgent ED utilization were included, while studies focused on pediatric or emergent ED utilization were excluded. Across studies, several SDOH were associated with increased reliance on the emergency department for non-urgent conditions. Socioeconomic disadvantage, housing instability, lower educational attainment, and limited insurance coverage were frequently associated with higher rates of ED visits classified as non-urgent. These findings suggest that non-urgent ED use often reflects barriers to primary care access and broader structural challenges within the healthcare system rather than individual misuse of emergency services. This highlights the need for interventions targeting upstream barriers to care that may help reduce reliance on emergency services. However, variations in study populations, definitions of non-urgent ED use, and measurement of SDOH may limit comparability of findings across studies. Despite these limitations, addressing social and structural determinants may help reduce non-urgent emergency department utilization and improve patient care outcomes.

Keywords: Emergency Room, Non-urgent visit, Social Determinants of Health

Management of Type 1 Diabetes Without Insulin

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Diabetes is classically categorized as Type 1 and Type 2. However, the prevalence of Type 2 diabetes in children is increasing and latent autoimmune diabetes in adults (LADA) is becoming a common variant of autoimmune diabetes. It's also possible to have a mixed diabetic diagnosis making management more challenging. Most patients with autoimmune diabetes progress to insulin dependence within several years. We present a case of autoimmune diabetes with features of insulin resistance successfully managed without insulin for over a decade. A male patient in their 40s was diagnosed with Type 2 diabetes in 2011 after presenting with polyuria, polydipsia, and blurry vision. At diagnosis, BMI was 39 kg/m2 and hemoglobin A1C was 9.1% with a family history of Type 2 diabetes. At initial evaluation, low levels of insulin prompted further testing. C-peptide was found to be 3.9 ng/mL indicating insulin resistance; however, GAD autoantibodies were positive (>30 U/mL). This result led to the diagnosis of autoimmune diabetes. Despite autoantibodies, insulin therapy was deferred due to sufficient glucose level maintenance. Initial management included metformin, GLP-1 receptor agonist, and lifestyle modification. In 2015, a SGLT2 inhibitor was added. By 2019, A1C improved to 5.7% with 56 pounds of weight loss, allowing the discontinuation of metformin. At the most recent visit, the patient is on tirzepatide and a SGLT2 inhibitor, with a total weight loss of 61 pounds, BMI of 30.1 kg/m2 and A1C of 5.8%. For over 10 years, A1C has remained <7% without insulin, with no episodes of ketoacidosis, severe hypoglycemia, or microvascular complications. Although findings are limited to a single case, select patients with autoimmune diabetes and preserved endogenous insulin production may achieve glycemic control without insulin. An individualized approach to diabetic management is encouraged while integrating immunologic, pharmaceutic, and lifestyle modifications to help guide therapy and optimize outcomes.

Keywords: Diabetes, insulin, GLP-1 agonist

Physical Therapy as an Opioid-Sparing Strategy in Chronic Low-Back Pain: A Review of Functional Outcomes

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Background: Chronic low-back pain is a leading cause of disability and a major driver of opioid prescribing. Opioids provide limited long-term benefit and carry risks including dependence and adverse effects. PT is a first-line, non-pharmacologic intervention that may improve function and reduce opioid use, yet comparative evidence remains limited. Objective: This review compares functional outcomes and opioid utilization between PT and opioid therapy in adults with chronic low-back pain.

Methods: A literature review was conducted using PubMed, MEDLINE, and Cochrane Library for studies published in English from 2000-2025. Eligible studies included RCTs, cohort studies, and systematic reviews reporting pain, function, or opioid outcomes. Two reviewers screened abstracts and full texts. Study quality and risk of bias were assessed using the Cochrane Risk of Bias tool, Newcastle-Ottawa Scale, and AMSTAR. Findings were synthesized qualitatively. Of 56 studies screened, 22 met inclusion criteria.

Results: Opioids provided modest short-term pain reduction (<1 point/10) and minimal functional improvement, limited to 3-6 months. PT improved function (1-3 points), mobility, and pain-related disability; 10 of 12 RCTs showed significant gains. Cohort studies and systematic reviews reported reduced opioid use in PT patients. No studies favored opioids. Limitations included heterogeneity in protocols, outcome measures, and short follow-up.

Conclusion: PT yields superior functional outcomes and lower risk compared with opioid therapy for chronic low-back pain. By synthesizing high-quality evidence, this review reinforces rehabilitation-first strategies and addresses gaps in prior pain-focused reviews.

Keywords: Pain Management, Physical Therapy and Rehabilitation, Musculoskeletal Disorders, Chronic Disease Management, Pharmacology and Opioid Therapy

Non-malignant histologic correlates for FDG-avid lymph nodes in patients with metastatic melanoma: a dual case report

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Melanoma is the most deadly form of cutaneous malignancy, and accurate staging is critical for prognosis and management. Positron emission tomography/computed tomography (PET/CT) is commonly used in staging advanced disease, with increased (18)F-fluorodeoxyglucose (FDG) uptake indicating hypermetabolic activity. However, benign processes (e.g., sarcoidosis, foreign body reactions, immune-related granulomatous inflammation) may also be FDG-avid, creating potential for overstaging. We present two cases of metastatic melanoma with concurrent benign FDG-avid lymphadenopathy confirmed histologically, highlighting diagnostic and management implications. In case 1, a patient with scalp melanoma and biopsy-proven regional nodal metastasis developed progressive disease on immunotherapy. PET/CT demonstrated FDG-avid thoracic and abdominal lymphadenopathy concerning for stage IV disease. Fine needle aspiration of pulmonary nodes revealed non-necrotizing granulomas consistent with sarcoidosis, and subsequent neck dissection confirmed both metastatic melanoma and granulomatous inflammation. Recognition of benign distant FDG uptake prevented overstaging and enabled surgical management of true metastatic sites. In case 2, a patient with vulvar melanoma and a positive sentinel lymph node underwent immunotherapy, radiotherapy, and nodal excision. PET/CT later showed FDG-avid inguinal and axillary nodes. Excision demonstrated metastatic melanoma in the inguinal node, while the axillary node contained foreign material with giant cells. Histologic differentiation guided management, and the patient elected surveillance rather than additional systemic therapy, with no recurrence at 3 months. In both cases, FDG-avid nodes beyond the locoregional basin suggested distant metastasis, but histologic examination revealed both malignant and benign etiologies and clarified the anatomic distribution of each, allowing for appropriate staging. These findings underscore the importance of biopsy in atypical distributions and careful pathologic documentation of both metastatic and non-malignant processes to ensure accurate staging and appropriate treatment.

Keywords: Pathology, Radiology

Evaluation of Low-Cost Models for Simulating Ultrasound-Guided Regional Anesthesia Nerve Blocks In Undergraduate Medical Education: A Literature Review

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Medical education is increasingly shifting toward competency-based training, with simulation playing a central role in procedural skill acquisition. Ultrasound-guided regional anesthesia (UGRA) is a standard technique in anesthesiology and acute pain management, yet it remains underrepresented in undergraduate medical curricula, leaving many students underprepared for clinical practice. This review evaluates the effectiveness and feasibility of simulation modalities, including cadavers, commercial task trainers, and low-cost gel-based phantoms, for teaching UGRA to medical students.

A structured literature review was conducted using PubMed and Google Scholar to assess educational outcomes and identify barriers to implementation. Studies published within the past 10 years that evaluated UGRA simulation in medical students were included. Across studies, simulation-based instruction consistently improved procedural competence, ultrasound image interpretation, and learner confidence in performing nerve blocks. Despite these benefits, adoption of UGRA training remains limited by high costs, restricted access to high-fidelity models, and time constraints within already dense curricula.

Findings suggest that early, hands-on exposure to UGRA accelerates skill acquisition and enhances confidence prior to clinical rotations, supporting the integration of structured procedural training earlier in medical education. To address cost and accessibility barriers, we are developing and validating a low-cost, reusable gel-based phantom model for femoral nerve blockade training. An upcoming study will evaluate long-term skill retention and subsequent performance on cadaver-based assessments.

By synthesizing current evidence and proposing an accessible training solution, this work aims to inform curricular design and expand opportunities for early procedural education, ultimately better preparing medical students for safe and effective clinical practice.

Keywords: Anesthesiology, Ultrasound, Medical Education

ApoB-Independent Atherogenesis and Inflammation-Dissociated Cardiovascular Risk

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Background/Objectives: Despite widespread use of low-density lipoprotein cholesterol (LDL-C)-lowering therapies, substantial residual atherosclerotic cardiovascular disease (ASCVD) risk persists in primary care populations. Lipoprotein(a) [Lp(a)] is a common, genetically determined lipoprotein and is not routinely measured on standard lipid panels. Unlike LDL, Lp(a) contains an apolipoprotein(a) moiety with unique biological properties, including oxidized phospholipid transport, pro-inflammatory vascular signaling, and antifibrinolytic effects. This narrative literature review examines the hypothesis that Lp(a) represents a distinct, causal atherogenic lipoprotein with ASCVD risk independent of apolipoprotein B (apoB) and systemic inflammation. This review draws from cardiovascular prevention and risk stratification literature. No human subjects were involved.

Methods: Targeted searches of PubMed and major cardiovascular and lipidology journals were performed to identify English-language peer-reviewed studies published from 2000-2026 examining Lp(a) biology and cardiovascular outcomes. Representative search terms included combinations of lipoprotein(a) or Lp(a) with atherosclerotic cardiovascular disease, coronary heart disease, stroke, apoB, LDL cholesterol, and C-reactive protein. Titles and abstracts were screened for relevance, followed by full-text review of potentially eligible articles. Included sources comprised Mendelian randomization studies, large prospective cohorts, randomized trial sub-analyses, and high-quality reviews; small case series and non-peer-reviewed reports were excluded. Study relevance was assessed based on sample size, adjustment for major confounders, and consistency of findings across populations. Measurement techniques included immunoassays for Lp(a) and apoB, enzymatic assays for LDL-C, and high-sensitivity C-reactive protein (hsCRP) assays. Results were derived from adjusted analyses accounting for key confounders, including age, sex, cardiometabolic comorbidities, smoking status, and lipid-lowering therapies; no formal meta-analysis was performed. Primary outcomes assessed associations between elevated Lp(a) and ASCVD outcomes independent of LDL-C, apoB, and inflammation, with supporting mechanistic measures of vascular dysfunction and thrombosis.

Discussion/Results: This review identifies Lp(a) as an under-recognized source of inherited cardiovascular risk in family medicine. Limitations include reliance on published data and heterogeneous study designs. Increased awareness of Lp(a) is directly relevant to primary care risk assessment. Elevated Lp(a) is causally associated with ASCVD independent of LDL-C, apoB, and hsCRP, with greater per-particle atherogenicity and mechanistic links to endothelial dysfunction and thrombosis.

Conclusions: Lp(a) is a causal, apoB-independent driver of residual ASCVD risk. Incorporating Lp(a) testing into primary practice may improve cardiovascular risk strat

Keywords: Lipoprotein(a), atherosclerotic cardiovascular disease (ASCVD), cardiovascular risk assessment, primary health care, population screening, gene silencing therapies

Food Insecurity and Weight Discrimination: A Gender-Based Study

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Background Food insecurity is associated with negative physical and mental health outcomes and may increase weight-based stigma. Mechanisms include poor diet, disordered eating, metabolic disruption, and chronic stress. Gender is important, as women experience higher food insecurity and greater susceptibility to weight discrimination. This study examines the relationship between food insecurity and weight-based discrimination, considering gender and BMI.

Method The study used cross-sectional data from a July 2020 online survey of adults in the Intermountain West (N = 1,904). Participants were recruited via Qualtrics. Weight discrimination was measured as a binary outcome using the Everyday Discrimination Scale. Food security status was assessed with the 10-item U.S. Adult Food Security Survey Module. Analyses adjusted for sociodemographic factors, BMI, and disability status under approved ethical protocols. Logistic regression models were used to estimate the association between food security status and self-reported weight discrimination.

Results Women reported more weight-based discrimination than men (23.7% vs. 14%), while food insecurity was similar across genders. Food insecurity increased the odds of weight discrimination overall (OR = 1.39) and specifically among women (OR = 1.59), with no significant BMI moderation.

Conclusion Food insecurity is significantly linked to weight-based discrimination, particularly among women, independent of BMI. Findings highlight the need for longitudinal research and integrated public health strategies that address food insecurity, reduce weight stigma, and promote body positivity and protections against discrimination. The use of a cross-sectional, regionally limited, quota-based sample limits causal inference and generalizability to the broader U.S. population.

Keywords: food insecurity, weight discrimination, gender, body mass index (BMI)

The Plasma-First Paradigm: AI-Enabled Workflows and Multimarker Panels Across the Alzheimer's Disease Continuum

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Alzheimer's disease (AD) is biologically heterogeneous, motivating a shift from symptom-based diagnosis toward biomarker-defined disease. The NIA-AA AT(N) framework formalizes this transition by defining AD through amyloid-β deposition, pathologic tau, and neurodegeneration, independent of clinical presentation. This narrative review synthesizes literature from 2018–2025—identified through structured searches in PubMed and *Alzheimer's & Dementia* using terms such as p-tau217, GFAP, and plasma-first. Studies were included if they were large-scale, prospective, or autopsy-validated; screening prioritized cohorts with standardized plasma assays and reported diagnostic performance. This timeframe was selected to capture the emergence of high-accuracy plasma biomarkers and the first clinically validated assays. Empirical evidence demonstrates that blood-based biomarkers now enable scalable detection across the AD continuum. Plasma p-tau231 increases early with emerging amyloid-β pathology, while glial fibrillary acidic protein reflects astroglial activation in cognitively normal individuals. For established pathology, plasma p-tau217 shows superior diagnostic accuracy and is increasingly supported as a clinically actionable marker. Building on these findings, we conceptually outline a three-stage diagnostic architecture integrating primary care plasma screening, digital cognitive assessment, and specialist interpretation. Modeled projections, informed by the Taiwan-ADNI triage framework, suggest that such a system could reduce reliance on confirmatory PET imaging by up to 80%. Implementation must address biological confounders, cross-assay variability, and bias inherent in high-resource research cohorts. As multimarker panels expand, artificial intelligence offers a theoretical mechanism for integrating high-dimensional signatures, adjusting for demographic variables, and supporting longitudinal monitoring at scale. Ultimately, a plasma-first, AI-enabled diagnostic framework provides a blueprint for scalable, population-level precision screening.

Keywords: Alzheimer's disease (AD), Plasma biomarkers, Artificial intelligence (AI)

The Influence of Preceptor and Student Gender on Clerkship Evaluation Scores

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Clerkship evaluations play a critical role in assessing medical student performance and informing residency selection, yet little is known about how evaluator characteristics may influence grading patterns in clinical education. Prior studies have identified gender-related differences in narrative feedback and numerical evaluations of medical trainees, although findings remain inconsistent across specialties and institutions. This study examined whether preceptor gender and student gender were associated with differences in numerical clerkship evaluation scores among third-year medical students. A retrospective analysis was conducted using 6,855 clerkship evaluations from students in the graduating classes of 2022-2024 at a U.S. osteopathic medical school. Evaluations were completed by 2,425 preceptors across six required clerkships: Family Medicine, Internal Medicine, Obstetrics and Gynecology, Pediatrics, Psychiatry, and Surgery. The cohort included 3,978 male students and 2,877 female students. Associations between preceptor gender, student gender, and evaluation scores were analyzed using generalized linear mixed models while accounting for academic year and clerkship rotation. Preceptor gender was significantly associated with evaluation scores, with female preceptors assigning modestly lower Total Average and Clinical Competence scores than male preceptors ($p < 0.0001$). Student gender demonstrated smaller effects, with female students receiving slightly higher Total Average scores ($p = 0.0260$) and Professionalism scores ($p = 0.0026$). No significant interaction between preceptor and student gender was observed. Clerkship rotation was strongly associated with evaluation scores, with higher adjusted scores in Family Medicine and Pediatrics and lower scores in Surgery and Internal Medicine. As this study was conducted at a single institution, generalizability may be limited. These findings suggest that evaluator characteristics and specialty-specific grading cultures may influence clinical assessment and highlight the potential value of increased standardization and preceptor training in clerkship grading.

Keywords: Clerkship evaluation, Medical education, Preceptor gender bias

Early-Life Stress as a Determinant of Diabetes Risk: A Narrative Review

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Type 2 diabetes mellitus (T2DM) remains a major public health concern in the United States, with rising prevalence and a large population at risk for disease progression. Although T2DM is traditionally associated with adult lifestyle factors such as obesity, diet, and physical inactivity, growing evidence suggests that susceptibility to metabolic dysfunction may also be shaped by early-life experiences. Adverse childhood experiences (ACEs), including abuse, neglect, and household dysfunction, have been consistently associated with increased diabetes risk, earlier disease onset, and poorer glycemic control in adulthood. This narrative review synthesizes epidemiologic, behavioral, and biological evidence, linking ACE exposure to T2DM risk across the life course and highlights mechanistic pathways that may contribute to metabolic dysregulation.

Literature was identified through PubMed and Google Scholar using the keywords for adverse childhood experiences and type 2 diabetes. Peer-reviewed human studies published between 2015 and 2025 examining associations between ACE exposure and diabetes-related outcomes were included, while non–peer-reviewed sources and studies outside this time frame were excluded. Across studies, cohort and population-based analyses consistently demonstrate a dose–response relationship between cumulative ACE burden and diabetes risk, with higher levels of childhood adversity associated with increased disease prevalence and poorer metabolic outcomes. Behavioral pathways, including reduced adherence to diabetes self-management and stress-related coping behaviors, may partially explain this relationship. Biological mechanisms provide additional insight, as early-life stress has been linked to dysregulation of stress-response systems, gut microbiome alterations, and chronic inflammatory signaling that influence insulin sensitivity and glucose regulation. However, much of the available evidence remains observational, and further mechanistic and longitudinal research is needed to clarify causal pathways.

Keywords: Type 2 Diabetes, Adverse Childhood Experiences, Early-Life Stress, Metabolic Dysregulation

Multimodal AI Imaging: The Evolving Landscape of Radiologist Efficiency and Decision Making

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Artificial Intelligence (AI) has gained momentum in medicine, with radiology leading its adoption. Traditionally, radiologists maintain high diagnostic accuracy by integrating multiple imaging modalities to make diagnostic decisions for patients. Early efforts to incorporate AI into radiology utilized singleâ€‘modality image analysis, which has low clinical utility and accuracy. AI multimodal image analysis represents the next major innovation, as it extracts properties of each imaging modality (e.g., CT density, MRI soft tissue contrast, PET metabolic activity). This concept is significant, as it may improve the increasingly strained process of analyzing imaging data, which has raised radiologist workload. This narrative review analyzes literature on multimodal AI, diagnostic accuracy, workflow efficiency, and radiology applications, aiming to evaluate how multimodal AI image analysis can impact radiologist efficiency. Search terms including radiology AND artificial intelligence AND workflow, accuracy, and multimodal were used in PubMed and Google Scholar to identify 41 peer-reviewed articles published within the last 10 years. Findings showcase the ability to reduce reading errors and match experienced radiologist abilities. Incorporation into workflow reduces reading times by 11.3% and lowers interpretation delivery times from 11.2 days to 2.7 days . This allows radiologists to interpret more scans quicker and treat critical patients sooner. However, conclusions are limited by study heterogeneity. Ethical implications and limitations also arise, including lack of trust and interpretability, cybersecurity risks, and poor generalizability. Concerns that multimodal AI capabilities could eventually replace radiologists bring unease in the community. This review offers synthesized evidence showing that multimodal AI is a complementary tool for radiologists rather than a replacement.

Keywords: Radiology, Multimodal, Artificial intelligence, Image analysis

Risk Factor Association in Hypertensive Disorders of Pregnancy

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Background: Hypertensive disorders of pregnancy (HdoP) include gestational hypertension (GH), preeclampsia, eclampsia, and HELLP syndrome (HELLP). These affect 5-10% of pregnancies and account for 16% of maternal deaths. Typically, they are grouped together when assessing risk factors since the etiology is thought to be the same. Appropriate preventative measures like aspirin 81mg daily should be taken in high-risk patients. This study explores the relationship between GH, preeclampsia, and HELLP with individual risk factors.

Methods: Participants were surveyed from the HELLP syndrome survivors and preeclampsia- survivors, experiences, and information Facebook pages. The survey relied on self-reported data. Inclusion criteria included females >18 years old who had developed a HdoP.

Results: 273 participants filled out the survey and T tests were used comparing each risk factor with or without each HdoP. Gestational diabetes, anxiety, history of (hx/) hypertension, hx/ autoimmune disease, family hx/ preeclampsia, personal history of HdoP, and first pregnancy had positive relationships with GH and preeclampsia and negative relationships with HELLP. Each of these risk factors had at least one HdoP which was found to be significant based on p value ($p \leq 0.05$). Hx/ diabetes, hx/ kidney disease, multiple gestation, and age >30 did not have significant relationships with any HdoP. Limitations include self-reported data and sample size.

Conclusions: This study shows GH and preeclampsia tend to have similar relationships with risk factors while HELLP tends to have the opposite relationship. HELLP needs to be further studied for potential unknown risk factors so clinicians can appropriately screen pregnant patients.

Keywords: OBGYN, pregnancy

Breastfeeding Education For Medical Students

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Introduction: For infants, breastfeeding is associated with lower risks for allergies, obesity, gastrointestinal illnesses, and respiratory infections. For breastfeeding individuals, breastfeeding reduces the likelihood of developing breast and ovarian cancers, and metabolic disorders. With the lack of education medical students receive on breastfeeding, as attendings they are less likely to initiate and support patients through breastfeeding, resulting in decreased patient breastfeeding rates. The aim of this study is to evaluate the impact of breastfeeding education on medical students' knowledge and confidence levels with supporting breastfeeding dyads.

Methodology: Participants were asked to complete identical pre-and-post surveys on breastfeeding as well as self-reported confidence and preparedness. Between the pre-and-post surveys participants were given a 10–15-minute presentation on breastfeeding as well as hands-on demonstration of techniques using models. Scores were evaluated via paired T-tests. Limitations include small sample size and single institution design.

Results: 55 people participated in the survey. Data demonstrated significant improvement in scores (scores increased nearly 50% per class, p value <0.0001 OMSI , <0.0001 OMSII, and 0.0045 OMSIII), along with increased confidence in providing support for breastfeeding patients (scores increased at least 20% per class. P value <0.0001 OMSI, <0.0001 OMSII, and 0.05 OMSIII). Previous breastfeeding individuals and parents had more knowledge and confidence.

Conclusion: Overall, this study demonstrates that effective breastfeeding education is beneficial for medical students' knowledge and confidence in caring for breastfeeding individuals, reinforcing the importance of integrating such education into the curriculum. Future directions should involve expanding to different institutions and increasing sample size.

Keywords: OBGYN, Pediatrics, Family Medicine, Breastfeeding, Postpartum

Characterizing Patient Factors Associated with IUD Displacement and Early Discontinuation

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Intrauterine devices (IUDs), both copper and hormonal, are highly effective and convenient forms of long-term contraception, with failure rates below 1%. However, complications such as malposition, expulsion (reported in 10-30% of postpartum insertions), and migration remain clinically significant. Despite these risks, current guidelines for IUD candidacy do not incorporate individualized risk factors. This is problematic, as migration can cause complications, including uterine, bladder, and gastrointestinal perforation, abnormal bleeding, pain, and unintended pregnancy. This study aims to perform a structured narrative synthesis of patient-specific and procedural factors associated with IUD malposition, migration, and expulsion to inform a risk-stratified framework for IUD candidacy. A comprehensive literature search was conducted using PubMed, Embase, and CINAHL Ultimate, following PRISMA recommendations. Inclusion criteria included studies of reproductive-age individuals with IUDs, focusing on postpartum, post-abortion insertion, or parity. Studies published before 2015, non-English articles, and animal studies were excluded. Screening and qualitative synthesis were conducted by independent reviewers with group consensus. IUD displacement was associated with higher BMI, younger age, multiparity, and certain racial and ethnic groups. Immediate postpartum insertion and vaginal delivery were associated with higher expulsion risk, whereas breastfeeding, delayed insertion, and cesarean delivery were protective. Additional factors included heavy menstrual bleeding, menstrual cup use, device characteristics, uterine anatomy, and provider experience. Smaller IUDs and ultrasound-guided insertion were associated with improved positioning and lower complication rates. These findings support a risk-stratified approach to improve patient selection and outcomes. Interpretation is limited by heterogeneity in study design, variable outcome definitions, and study populations.

Keywords: Intrauterine Devices, Copper IUD, Hormonal IUD

Sustained Disability Reversal in Progressive Multiple Sclerosis Following Modified Wahls Protocol: A Case Report

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Background: Relapsing-remitting multiple sclerosis (RRMS) is a demyelinating central nervous system disease affecting approximately 2.2 million people globally. The majority of disability accumulation occurs during progression independent of relapse activity (PIRA), which responds poorly to disease-modifying therapies (DMTs). While dietary interventions for MS may improve fatigue and quality of life, no controlled trials have demonstrated effects on objective measures of disability. Methods: We present a 60-year-old woman with RRMS diagnosed in 2000 who experienced progressive functional decline despite continuous DMT treatment. The Expanded Disability Status Scale (EDSS)—a spectrum from 0 (neurologically normal) to 10 (death)—was used to estimate disability. In 2018, she initiated a modified Wahls protocol—a Paleolithic-based diet emphasizing vegetables and organ meats while excluding dairy, grains, and legumes, modified to permit oats. Results: Her EDSS scores increased from 4.0 in 2014 to 6.0 in 2017, with clinical findings including unilateral ambulation support, Romberg sway, and widened-base gait. Following diet initiation, her EDSS decreased and stabilized to 2.5 by 2022. In 2025, examination showed normal gait and negative Romberg. She has remained relapse-free since 2016 and discontinued DMTs in 2024. This represents a 3.5-point sustained EDSS improvement, compared to approximately 0.6-point improvements observed with high-efficacy DMTs. Conclusion: Potential mechanisms include anti-inflammatory effects via Nrf2 pathway activation, though the contribution of late DMT effects, natural disease fluctuation, or concurrent lifestyle modifications cannot be excluded. This case highlights the need for controlled trials investigating anti-inflammatory diets with objective disability measures as outcomes in MS.

Keywords: Multiple Sclerosis, Dietary Intervention, Progression independent of relapse activity

For-Profit Hospital Acquisition in the U.S.: Implications for Underserved Populations in Denver Metropolitan Area

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With the rise of profit-driven healthcare organizations, including private equity and for-profit hospital acquisitions, concerns emerge about patient care. Private equity acquisition correlated to reduced staff salary expenditures and increased emergency department (ED) deaths, disproportionately affecting underserved populations who rely more on ED services. This literature-based synthesis examines the hospitals of Denver, Colorado and investigates how profit-driven organizations negatively affect outcomes for vulnerable communities. Searches were conducted using RVU library databases, including PubMed and Google Scholar, to identify 20+ peer-reviewed studies, articles, and policy analyses. Included articles highlight profit-driven involvement in Eds of U.S. hospitals. Articles excluded are from outside of the United States, without relevance to keywords, or published earlier than 2000. Thematic categorization of findings from for-profit hospital acquisition allowed us to analyze potential impacts on the Denver community. While there are currently no private equity Eds in Denver, important trends show negative impacts on patient care quality, expenditure, underserved patient representation, increased adverse events in the ED, and higher costs. Findings indicate that profit-driven ownership of Eds will specifically increase risk for individuals with low socioeconomic status in Denver, specifically uninsured individuals. These findings provide important data to guide future policy in hospital administration, as for-profit healthcare organizations must ensure equitable treatment. As certain data is inferential, it is important to be aware of potential limitations in the results. Future Denver and hospital-specific research is imperative to uncovering the impacts on underserved populations.

Keywords: For-Profit, Private Equity Acquisition, Hospital, Emergency Department, Underserved Populations

Subclinical Cortisol-Producing Adrenocortical Adenoma Presenting with Nonspecific Systemic Symptoms

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As abdominal imaging becomes more widespread, adrenal incidentalomas are increasingly detected. These are typically followed without intervention by physicians. However, growing evidence suggests that even benign-appearing adrenal lesions may be active, producing subtle but meaningful symptoms without clear initial biochemical findings. To illustrate the difficulties in diagnosis and management of patients with an incidentaloma, we present the case of a 61-year-old woman with an incidentally discovered left adrenal mass.

The patient's past medical history is significant for hypertension and major depressive disorder, as well as a 9-month history of progressive morning anxiety, hot flashes, depressed mood, palpitations, chest discomfort, tremor, decreased appetite, and 17-lb unintentional weight loss with partial regain. Over the same interval, hormone replacement therapy (HRT) was initiated. Symptoms worsened and HRT was discontinued. Medications include triamterene–hydrochlorothiazide. The mass was identified 2 months before endocrine consult during imaging for post-influenza hepatomegaly. MRI demonstrated a 3.0 cm heterogeneous lesion.

Physical exam showed fine tremor without overt Cushingoid features (no striae, dorsocervical fat pad, central adiposity, or proximal weakness). Morning cortisol was 17 µg/dL (normal 5–19 µg/dL). A 24-hour urinary free cortisol was normal (19 µg/day; normal is 8–51 µg/day), but the urine cortisol/creatinine ratio was elevated (40; normal is 12–19). A 1-mg dexamethasone suppression test showed inadequate suppression (cortisol 5.3 µg/dL; normal is <1.8 µg/dL) with suppressed ACTH <1.5 pg/mL, supporting ACTH-independent cortisol secretion. Repeat CT at 3 months showed interval growth to 3.2 cm.

The patient was started on ketoconazole while awaiting surgery and underwent uncomplicated laparoscopic adrenalectomy 6 months after discovery. Pathology confirmed a low-grade adrenocortical adenoma. Postoperatively, she received physiologic hydrocortisone (20 mg AM/10 mg PM) with taper and reported improvement in blood pressure, mood, energy, appetite, and resolution of both anxiety and palpitations.

This case demonstrates that clinically significant but nonspecific symptoms with improvement after adrenalectomy can occur even with normal initial cortisol testing. This case emphasizes individualized evaluation and that suppression testing plus phenotype may justify adrenalectomy in selected patients with incidentaloma and suspected MACE.

Keywords: Adrenal incidentaloma, Mild autonomous cortisol excess, Subclinical Cushing syndrome, Endocrine evaluation, Surgical management

AI-Enhanced Simulation for Improving Telemedicine Communication Skills in Physician Training

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Since the COVID-19 pandemic in 2020, telemedicine has become central to healthcare delivery, with physician use rising from 15.4% in 2019 to over 70% in 2024. Effective virtual care requires distinct adaptations not addressed by traditional training models, and inadequate communication is associated with reduced patient trust and satisfaction. Current training frameworks, such as OSCEs and standardized patients, are designed for face-to-face interactions. However, these approaches do not account for the distinct interpersonal constraints of virtual care. This gap underscores the need for scalable, modality-specific training approaches tailored to telemedicine. This work describes the theoretical framework and design of TellyComm, an AI-enhanced, web-based training model developed to improve physician communication in telemedicine settings. This platform uses brief clinical video vignettes demonstrating effective and ineffective telemedicine behaviors. Each vignette includes embedded pause points prompting users to select appropriate communication strategies. Responses are evaluated using a large language model, guided by established frameworks such as Calgary–Cambridge, NURSE, and SPIKES. Planned evaluation includes pilot implementation within a population of physicians in communication-intensive specialties. Platforms like EQClinic demonstrate improvements in communication scores following virtual interventions. Strategies such as teach-back and deliberate eye contact are key to effective virtual care. However, these approaches have limited generalizability across specialties, rely on self-assessment, and underemphasize non-verbal communication differences in virtual settings. As telemedicine expands, the need for targeted communication training is increasingly evident. Conceptual models like TellyComm represent promising AI-supported approaches to improve both physician communication and patient health outcomes.

Keywords: Digital Health, Telemedicine, Artificial Intelligence, Physician Communication, Medical Education

Kratom (Mitragyna speciosa) Use and Altered Opioid Responsiveness in the Perioperative Period

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Background: Kratom (Mitragyna speciosa) is an increasingly used, largely unregulated botanical product in the United States, commonly taken for analgesia, mood symptoms, and mitigation of opioid withdrawal. Its primary alkaloids, mitragynine and 7-hydroxymitragynine (7-HMG), exhibit opioid and non-opioid receptor activity that may alter perioperative responses to anesthetic agents, sedatives, and opioids. Despite rising use, perioperative guidance remains limited.

Methods: A focused literature review was conducted using PubMed/MEDLINE, Embase, and Web of Science. Search terms included kratom, mitragynine, 7-HMG, anesthesia, perioperative, sedation, analgesia, respiratory effects, withdrawal, and CYP-mediated drug interactions. Peer-reviewed human studies, case reports, and relevant translational research were included.

Results: Evidence suggests multiple mechanisms by which kratom may impact anesthetic care. Kratom alkaloids act as partial agonists at opioid receptors and may contribute to altered analgesic responsiveness and opioid cross-tolerance. Clinical interaction studies demonstrate modest intestinal CYP3A inhibition, increasing exposure to substrates such as midazolam by approximately 39–50%, potentially augmenting early sedative effects. Respiratory effects appear alkaloid-dependent and bidirectional, with 7-HMG producing opioid-like respiratory depression and mitragynine demonstrating stimulant effects. Chronic use may be associated with withdrawal symptoms and variability in perioperative opioid requirements. Additional concerns include product variability and contamination risks.

Conclusion: Current evidence, largely mechanistic and limited clinical data, suggests kratom may significantly influence anesthetic management through opioid-like effects, drug–drug interactions, and unpredictable respiratory physiology. Targeted preoperative screening, individualized anesthetic planning, multimodal analgesia, and enhanced monitoring are recommended. Prospective perioperative studies are needed to establish evidence-based management strategies.

Keywords: Kratom, Mitragyna speciosa, Perioperative anesthesia, Opioid cross-tolerance, CYP3A drug interactions

Uncommon Presentation of Median Arcuate Ligament Syndrome in a Young Male Treated with Simultaneous Robot-Assisted Release and Cholecystectomy

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Median arcuate ligament syndrome (MALS), also known as celiac artery compression syndrome, is a rare vascular and neurogenic disorder caused by external compression of the celiac artery and surrounding neural structures by the median arcuate ligament. It typically presents with postprandial abdominal pain, nausea, and weight loss and is most commonly reported in females between the third and fifth decades of life. We present an unusual case of a 20-year-old male with persistent postprandial abdominal pain for years who lost 20 pounds over the past year. He was found to have greater than 70% celiac artery stenosis on mesenteric duplex ultrasound, with elevated peak systolic velocities consistent with hemodynamically significant compression. Additional imaging demonstrated no significant biliary obstruction but identified gallbladder sludge, contributing to diagnostic complexity due to overlapping symptom profiles. The patient underwent simultaneous robot-assisted median arcuate ligament release with celiac plexus neurolysis and robot-assisted cholecystectomy. The procedure was completed without complications, with minimal blood loss and rapid postoperative recovery. The patient experienced prompt resolution of symptoms and was discharged in stable condition on postoperative day one. This case highlights an atypical demographic presentation of MALS and demonstrates the feasibility and safety of performing concurrent robotic procedures to address coexisting abdominal pathology in a single operative session. Increased awareness of atypical presentations may reduce diagnostic delay, while robotic-assisted approaches may offer a precise and effective minimally invasive treatment strategy for carefully selected patients.

Keywords: Robotic cholecystectomy,Median arcuate ligament syndrome, MALS, Celiac artery compression syndrome

Trazodone: its use, efficacy, and safety

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Background: While originally developed for major depressive disorder, trazodone is a second-generation antidepressant known for its additional uses in sleep disorders, anxiety, chronic pain, and dementia, especially in older adults and long-term care settings.

Objective: This research aims to create a monograph summarizing the pharmacological properties, safety profile, adverse effects, and therapeutic uses of trazodone since the last edition of Meyler's Side Effects of Drugs in 2016. The intention is to cover any new findings published between 2016 and 2025 to create an updated profile on trazodone.

Methods: Sources were selected based on the following pre-set criteria from the publisher: English language, full length, peer-reviewed, systematic reviews, meta-analyses, placebo-controlled studies, observational studies, comparative studies, future or prospective studies. Case studies and editorials were excluded. Studies were compiled from databases including PubChem, PubMed, Embase, and Google Scholar, with 23 sources contributing to this work. By nature of being a review, each source's authors had their own aims for their research, limiting the generalizability of these collated findings.

Results: Topics covered include indicated and off-label uses, the safety profile, adverse effects, and drug interactions. When compared to other antidepressant and antipsychotic agents, trazodone has a higher incidence of adverse events. These adverse events include falls, movement disorders, respiratory arrest, heart arrhythmia, suicidal ideation, and drowsiness. Trazodone has been found to interact with other drugs including CNS depressants, CYP3A4 enzyme modulators, MAO inhibitors, and serotonergic medications.

Conclusion: Despite its side effects, trazodone has an acceptable safety profile, with benefits outweighing risks in most patients. Care should be taken in the elderly, those predisposed to cardiac abnormalities, and those taking multiple medications to ensure optimal treatment outcomes. Future research was not discussed as trazodone is well-established. Gaps in this research included pharmacogenomics and drug-supplement interactions.

Impact of Pelvic Floor Physical Therapy on Postpartum Patients with Obstetric Injury

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Background: Pelvic floor dysfunction (PFD) includes urinary and fecal incontinence, pelvic pain, and pelvic organ prolapse, resulting from impaired pelvic floor support and function. Pregnancy and childbirth, particularly when complicated by obstetric trauma, are major contributors to PFD. Purpose: To evaluate longitudinal changes in patient-reported outcome measures (PROMs) following pelvic floor physical therapy (PFPT), in postpartum patients with obstetric injury. Methods: We retrospectively analyzed PROM data collected as part of standard of care between October 1, 2019 and July 31, 2025. Clinical data were obtained from an honest broker and linked to PROMs. Obstetric trauma was identified using ICD-10 codes (O70.0–O70.3, O71.6). Linear mixed-effects models assessed longitudinal changes in PROM scores, with timepoint as a fixed effect and a random intercept for patient. Model-based inference was performed using Type II ANOVA ($\alpha = 0.05$). Results: Sixty-eight patients completed at least one PROM. Estimated marginal means showed an initial reduction in symptom scores, with greater variability at later timepoints. There was a significant effect of time on UDI-6 scores ($p = 0.021$). At 1 month, UDI-6 scores decreased by 9.46 points (95% CI: −23.11, 4.20; $p = 0.29$), and at 3 months by 9.17 points (95% CI: −19.13, 0.79; $p = 0.08$), with similar reductions at 6 and 9 months. There was a trend toward improvement in PFDI-20 scores that did not reach statistical significance ($p = 0.067$). Scores decreased by 15.49 points at 1 month (95% CI: −36.44, 5.45; $p = 0.23$) and 14.25 points at 3 months (95% CI: −29.44, 0.94; $p = 0.07$), with similar patterns at later timepoints. POPDI-6 and CRADI-8 scores also improved but were not statistically significant. Conclusion: PFPT was associated with improvements in urinary symptoms and pelvic floor distress in postpartum patients with obstetric injury. Larger prospective studies are needed to further define long-term outcomes.

Keywords: pelvic floor physical therapy; postpartum; obstetric trauma; urinary incontinence; pelvic floor dysfunction; UDI-6; PFDI-20; patient-reported outcomes

Impact of Pelvic Floor Physical Therapy on Postpartum Urinary Incontinence

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Background: Pregnancy and childbirth are well-established risk factors for urinary incontinence (UI). Pelvic floor physical therapy (PFPT) is commonly used to restore pelvic floor function and improve quality of life in postpartum patients; however, few studies have quantified treatment effects using patient-reported outcome measures (PROMs). Purpose: To evaluate the effect of PFPT on UI in postpartum patients using validated PROMs, including PFDI-20 and UDI-6. Methods: We retrospectively analyzed PROM data collected as part of standard of care between October 1, 2019 and July 31, 2025. Diagnoses were obtained from an honest broker and linked to PROM data. Postpartum patients with UI were identified using ICD-10 codes (N39.3, N39.41, N39.42, N39.46, N39.491, R32). Linear mixed-effects models were used to assess longitudinal changes in PROM scores, with timepoint as a fixed effect and a random intercept for patients. Model-based inference was performed using Type II ANOVA ($\alpha = 0.05$). Results: Thirty-six patients with UI completed at least one PROM. Estimated marginal means demonstrated an initial reduction in symptom scores from baseline, followed by increased variability at later timepoints. There was a significant effect of time on UDI-6 scores ($p = 0.006$). At 1 month, UDI-6 scores decreased by 21.69 points from baseline (95% CI: −42.61, −0.77; $p = 0.04$), with continued reductions at 3-, 6-, 9-, and 18-month timepoints, but not at 2 or 12 months. A significant effect of time was also observed for PFDI-20 ($p = 0.002$). At 1 month, scores decreased by 38.99 points (95% CI: −71.53, −6.45; $p = 0.01$), with similar improvements at 3-, 6-, and 9-month timepoints. Conclusion: PFPT was associated with improvements in UI symptoms and overall pelvic floor distress in postpartum patients. Early improvements were observed and may be clinically meaningful, though variability increased at later timepoints. Further prospective studies are needed to assess long-term durability.

Keywords: pelvic floor physical therapy; postpartum; urinary incontinence; UDI-6; PFDI-20; patient reported outcomes; pelvic floor dysfunction

Postpartum Patients and Effects of Physical Therapy of Those with Pelvic Floor Dysfunction

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Background: Pelvic floor dysfunction (PFD) includes urinary and fecal incontinence, pelvic organ prolapse, and pelvic pain. Pregnancy and childbirth are major contributors, placing postpartum patients at risk for persistent symptoms. Pelvic floor physical therapy (PFPT) is widely used as first-line treatment; however, longitudinal changes in patient-reported outcomes (PROMs) remain poorly characterized.

Purpose: To evaluate the effect of PFPT on pelvic floor dysfunction in postpartum patients using PROMs.

Methods: We retrospectively analyzed PROM data collected as part of standard of care between October 1, 2019 and July 31, 2025. Postpartum patients with pelvic floor disorders were identified using ICD-10 codes (M62.89, N81.84, N81.89, N81.9). Linear mixed-effects models assessed longitudinal changes in PROM scores, with timepoint as a fixed effect and a random intercept for patient. Model-based inference was performed using Type II ANOVA (Î± = 0.05).

Results: Forty-three patients completed at least one PROM. Estimated marginal means demonstrated an initial reduction in symptom scores with increased variability at later timepoints. There was a significant effect of time on POPDI-6 ($p = 0.001$), UDI-6 ($p < 0.001$), and PFDI-20 ($p < 0.001$), but not CRADI-8 ($p = 0.085$). POPDI-6 scores significantly decreased at 9 months (−10.33; 95% CI: −20.39, −0.27; $p = 0.04$) and 24 months (−17.00; 95% CI: −30.90, −3.09; $p = 0.01$). UDI-6 scores significantly decreased at 1, 6, 18, and 24 months (all $p < 0.05$). PFDI-20 scores significantly decreased at 1, 6, 9, 18, and 24 months, with the largest reduction at 24 months (−40.92; 95% CI: −72.63, −9.21; $p < 0.001$).

Conclusion: PFPT was associated with significant improvements in pelvic floor dysfunction and overall pelvic floor distress in postpartum patients. Improvements were observed by 1 month and persisted over time, although variability increased at later timepoints. These findings support PFPT as an effective intervention. Further prospective studies are needed to evaluate long-term outcomes.

Keywords: pelvic floor dysfunction, pelvic floor physical therapy, postpartum, PFDI-20, UDI-6, POPDI-6, patient-reported outcomes, pelvic floor rehabilitation

How can physicians better recognize the clinical presentation of macrophage activation syndrome compared to sepsis?

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Macrophage activation syndrome (MAS) is a rare condition, but is often fatal due to misdiagnosis. Rapid, intensive treatment is necessary in order to prevent death in patients. MAS presents with multi-organ dysfunction and shock and is commonly confused with sepsis. The objective of this literature review is to identify clinical and laboratory features that differentiate MAS from sepsis to aid early recognition in both children and adults. Many studies have shown that MAS will often present with extremely high ferritin levels, elevated soluble IL-2 receptor, soluble CD163+ macrophages, decreased fibrinogen and increased triglycerides. The main distinguishing factor is ferritin levels, as sepsis usually presents with ferritin levels around 500-1,000ng/mL, while in MAS, ferritin levels are frequently >10,000ng/mL in children, and around 3,000-5,000ng/mL in adults. MAS should not be ruled out if a patient does not fit in this box. For this reason, bone marrow biopsy and analysis are indicated earlier when the patient is at higher risk of experiencing MAS. When MAS is suspected, it should be immediately treated with intravenous immunoglobulin, glucocorticoids, and/or anakinra, and IL-1 blockade biologic therapy. Through this literature review, we have seen the importance of considering MAS and treating it early. We see that there are factors that may distinguish it from routine disease flare and sepsis. We discuss early signs and outline steps physicians can take to prevent patient misdiagnosis and ultimately death.

Keywords: Macrophage Activation Syndrome, Sepsis, IL-1 blockades

Informing Diabetes Prevention in Rural Panama: Evidence from a Knowledge, Attitudes, and Practices Survey

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Type 2 Diabetes mellitus (T2DM) imposes a major economic burden in Latin America, costing $45–55 billion in 2016 and projected to rise disproportionately relative to GDP. In Panama, research gaps persist regarding diabetes-related complications, treatment patterns, cultural perceptions, and health system performance, with most studies focusing only on prevalence. The objective assesses knowledge, attitudes, and practices (KAP) regarding T2DM among adults in rural Panama to inform targeted education and healthcare strategies. A 40-item KAP survey was conducted in a cross-sectional study of adults (≥18) in La Garciana, RincÃ³n Largo, Llano Largo, and Isla Cebaco using convenience sampling. The Spanish-translated, pilot-tested survey assessed T2DM knowledge, attitudes, practices, and demographics among individuals with and without prior diagnosis. Descriptive statistics and group comparisons were performed using chi-square and t-tests ($p < 0.05$). Knowledge gaps were most evident in identifying T2DM markers and diagnostic criteria. A total of 70 responses were recorded. Physical activity differed markedly, with most non-diagnosed individuals reporting ≥5 hours/week of exercise compared to minimal activity among diagnosed participants. Despite these disparities, many participants expressed high confidence in their ability to access resources and manage T2DM. Findings reveal discordance between beliefs, practices, and perceived self-efficacy. These site-specific insights highlight the need for culturally tailored education, improved lifestyle interventions, and community-based strategies to enhance T2DM prevention and management in rural Panama.

Keywords: Rural Health, Global Health, Panama, Health Literacy, Health Education, Type 2 Diabetes, Diabetes mellitus, Knowledge, Attitudes, Practices

Syphilis in Older Adults: Epidemiologic Trends and Dermatologic Implications

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Syphilis has resurged as a major public health concern in the United States, with increasing attention focused on congenital and reproductive-age infections. However, recent surveillance data reveal a concurrent and under-recognized rise in syphilis among older adults. This narrative review examines trends in primary and secondary syphilis among adults aged 65 years and older in Texas, comparing state-level patterns with national epidemiologic data. Surveillance data were obtained from the Centers for Disease Control and Prevention (CDC) National Center for HIV, Viral Hepatitis, STD, and Tuberculosis Prevention (NCHHSTP) AtlasPlus platform and the Texas Department of State Health Services (DSHS) Sexually Transmitted Disease Surveillance Report. National cases of primary and secondary syphilis among adults aged ≥65 years increased from approximately 123 in 2012 to 1,021 in 2023, representing an over eightfold rise. In Texas, cases increased from 13 in 2012 to 59 in 2023, reflecting a more than fourfold increase. In 2023, most cases occurred in male patients (947/1,021). Despite this rise, syphilis in older adults remains underrecognized, and cutaneous manifestations may be misattributed to age-related dermatoses or medication reactions. Because secondary syphilis often presents with characteristic skin findings, dermatologists are uniquely positioned to serve as frontline diagnosticians in this population. Increased awareness of syphilis epidemiology in older adults and maintenance of age-inclusive differential diagnoses may improve early detection, reduce progression to systemic disease, and help address an overlooked reservoir of infection.

Keywords: Syphilis; Older Adults; Sexually Transmitted Infections; Epidemiology

Bridging the Language Gap: The Impact of Interpreter Use on Patient Safety and Health Care Disparities in Limited English Proficiency Populations

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Language access is a critical component of high-quality, patient-centered care, yet patients with limited English proficiency (LEP) experience significant disparities in the healthcare system. LEP patients demonstrate poorer understanding of diagnoses, medications, and discharge instructions, placing them at higher risk for medical errors, decreased adherence, increased emergency service use, and hospital readmissions. Professional interpreter use improves comprehension, patient satisfaction, and clinical outcomes while reducing errors compared with ad hoc interpreters or no interpreter use. Interpreter use is also supported by legal frameworks, including Title VI of the Civil Rights Act, Executive Order 13166, and Section 1557 of the Affordable Care Act. This review examines how interpreter use impacts patient safety and identifies common sources of error/barriers to utilization in inpatient and outpatient settings. A narrative review was conducted using peer-reviewed articles, systematic reviews, and policy guidelines published in the United States over the past two decades. Interpreter use remains inconsistent, particularly during high-risk encounters such as rounds and discharge planning. Studies show interpreter errors are common and clinically significant, with omissions representing the majority and often involving critical medical information. Evidence also identifies systemic barriers, including limited availability, time constraints, and insufficient clinician training. Existing studies are largely observational and vary in methodology, limiting generalizability. Notably, while physician and resident practices are well described, there's limited literature examining medical student attitudes toward interpreter use. These findings highlight the need for targeted educational interventions and integration of interpreter services into clinical training to promote equitable, patient-centered care for LEP populations.

Keywords: Language access, limited English proficiency, interpreter services, patient safety, health disparities, health equity, communication barriers, clinical outcomes

Determinants of Autonomy and Well-Being in Long-Term Care: A U.S. and International Comparative Study

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Autonomy is a central component of the quality of life among older adults in long-term care settings. However, many institutional care environments, particularly in the U.S., are structured in ways that limit resident independence and decision-making. In contrast, several international models of care emphasize greater personal autonomy. This study aims to identify which autonomy-related factors are most strongly associated with resident satisfaction and quality of life among older adults in long-term care settings, and to compare these associations between U.S. and international models of care. We conducted a comparative literature review examining determinants of autonomy and wellbeing in long-term care facilities. Databases such as Google Scholar and PubMed were searched using targeted keywords. To ensure reliability, studies were critically appraised for methodological quality, sample size, and potential bias. Studies were included if they examined older adults living in longâ€'term care settings in both the U.S. and international contexts. Autonomy-related determinants consistently emerged as predominant to what older adults value in long-term care and as key contributors to satisfaction and quality of life: self-determination, shared decision-making, dependability, environment, and personally-tailored care. Comparisons indicate that international models of care emphasizing resident-directed and home-like environments demonstrate stronger associations between autonomy and well-being compared to traditional U.S. long-term care settings. These findings highlight optimizing resident outcomes requires healthcare systems to prioritize autonomy, communication, and person-centered organizational cultures as core components of clinical quality. Strengthening staff education and organizational awareness of these determinants is essential for translating these principles into practice.

Keywords: long-term care, assisted living, nursing home, autonomy, self-determination, international comparison

Reverse Total Shoulder Arthroplasty Baseplate Screw Trajectory: Are We Trading Fixation for Iatrogenic Risk?

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Reverse total shoulder arthroplasty (rTSA) has expanded rapidly in indications and volume, with increasing use for cuff-tear arthropathy, fractures, instability, and revision surgery. Glenoid baseplate fixation remains the primary determinant of implant survivorship. Biomechanical strategies including inferior baseplate tilt, longer anteroinferior screws, and cortical-engaging central fixation, improve stability and reduce micromotion, but may increase proximity to critical neurovascular and cortical structures, increasing the risk of iatrogenic injury. This narrative review synthesizes biomechanical, cadaveric, imaging, and clinical studies identified through a structured search of PubMed, Embase, Scopus, and Web of Science from 2005 to 2025. Studies evaluating screw trajectory, fixation mechanics, cortical breach, and neurovascular proximity were qualitatively integrated due to heterogeneity. Across studies, safe screw placement was often limited to narrow margins (<5 mm), with superior and posterior trajectories demonstrating the highest risk of cortical breach and nerve proximity, alongside substantial interpatient variability in anterior bone corridors. Collectively, evidence suggests that strategies maximizing fixation strength may narrow an already limited margin of anatomic safety. Although patient-specific instrumentation (PSI), navigation, and 3D-planning improve accuracy and reproducibility, they do not inherently prevent iatrogenic injury without defined safety constraints. We propose a three-dimensional, anatomy-based “Safe Triangle” for glenoid screw trajectory planning, bounded by the coracoid base anteriorly, suprascapular notch posteriorly, and inferior glenoid rim inferiorly. Within this corridor, inferior and anteroinferior screws may optimize fixation while minimizing iatrogenic injury. This framework provides a reproducible method to balance fixation and safety, with future work needed for prospective validation and integration into surgical planning platforms.

Accuracy of Large Language Model–Generated Translations of Pediatric Patient Education Materials into Asian Languages: A Comparison With American Academy of Pediatrics Standards

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Patients with limited English proficiency face persistent barriers to equitable healthcare. Large language models (LLMs) may expand access to translation services; however, their accuracy for Asian languages and clinical contexts remains understudied. Prior work suggests LLMs may produce clinically meaningful errors despite strong automated metric performance.

This study evaluates LLM accuracy in translating pediatric patient education materials into Asian languages, using American Academy of Pediatrics (AAP) translations as the reference standard. Source documents were originally in English, with AAP translations serving as gold-standard comparators. Languages included Chinese, Korean, Vietnamese, Arabic, Bengali, and Hmong. Twenty-four documents were selected based on availability across all languages and standardized for topic and reading level. Translations were generated using a consistent prompt template for ChatGPT and Gemini and default settings for Google Translate. Translation fidelity was assessed using corpus-level Bilingual Evaluation Understudy (BLEU) scores, selected for standardized comparison of n-gram overlap despite known limitations in capturing clinical nuance. Differences were evaluated using one-way ANOVA with post hoc comparisons. Google Translate demonstrated the highest fidelity (mean BLEU 0.817 ± 0.111), outperforming ChatGPT (0.133 ± 0.063) and Gemini (0.132 ± 0.061) in five of six languages; ChatGPT performed slightly better in Bengali. Differences were statistically significant ($p = 0.0143$), with large magnitude gaps suggesting meaningful discrepancies in lexical alignment.

These findings indicate that traditional neural machine translation currently outperforms LLMs for pediatric patient materials. Clinically, LLM-generated translations should be used cautiously and supplemented with human review, particularly for lower-resource languages. Limitations include reliance on BLEU and a lack of human evaluation. Future work should incorporate clinically grounded metrics and expand low-resource language representation.

Keywords: Pediatrics, AI, Large language models, BLEU, Asian language translation

AI Enhanced Magnetic Resonance Fingerprinting in Neuro-Oncology: A Narrative Review of Diagnostic Performance and Clinical Readiness

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Magnetic resonance fingerprinting (MRF) is a quantitative magnetic resonance imaging technique that generates tissue signals that vary based on chemical, physical, and biological properties called "fingerprints." MRF enables simultaneous estimation of multiple tissue properties, distinguishing it from classic MRI. As AI assistance within radiology expands, it's important to understand techniques like MRF that address limitations of imaging in clinical settings. MRF bridges the gap between diagnostic accuracy and speed, allowing faster reading times and differentiation of tissue markers in neuro-oncology. This narrative review analyzes literature on MRF within neuro-oncology to improve understanding of diagnostic accuracy, machine learning integration, and clinical implementation, with the goal of evaluating MRF performance before clinical adoption. Searches utilized PubMed, identifying peer-reviewed studies published within the last thirteen years. The search using the keyword "MRF" provided 1,716 studies. Studies were included if they reported clinically relevant MRF applications, 22 studies met inclusion criteria. Literature shows MRF can distinguish between normal tissues and neurologic tumors by providing quantitative relaxometry values, enhancing diagnostic precision. MRF grades gliomas with 88.9% and 75% accuracy for low- versus high-grade gliomas, respectively. MRF also shows promise when paired with machine learning to improve efficiency compared to standard dictionary matching methods. Machine learning–integrated MRF enables faster, more accurate tissue mapping, reducing acquisition time while maintaining imaging quality. Studies showed that MRF can be applied across specialties but remains concentrated in neurology, with limited reproducibility in non-neurologic fields. Many studies lacked large population sizes, limiting conclusions about clinical readiness. Limitations include technological constraints, interpretation variability, and restricted applications. This review extends existing evidence on AI-enhanced MRF for neurologic tumors and emphasizes the need for larger, reproducible studies and further AI integration before clinical adoption.

Keywords: Magnetic Resonance Fingerprinting, MRI, Machine learning, AI, Neuro-oncology, Radiology

The Impact of AI-Driven Clinical Note Taking on Patient Experience in the Psychiatric ED

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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.

Superior Mesenteric Artery Syndrome Complicated by Nutcracker Syndrome: Diagnostic and Therapeutic Challenges

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Vascular compression syndromes are disorders in which adjacent anatomical structures compress blood vessels, impairing arterial flow or venous drainage. Superior mesenteric artery (SMA) syndrome causes duodenal obstruction due to a reduced aortomesenteric angle and distance. Nutcracker syndrome (NCS) occurs when the left renal vein (LRV) is compressed between the SMA and aorta. Although individually rare, concurrent SMA syndrome and NCS are reported only in limited cases, with prevalence estimates of 0.1–0.3% and 0.6–3%, respectively, contributing to nonspecific symptoms, diagnostic delay, and increased morbidity. We report a 42-year-old female presenting with two months of chronic abdominal pain with acute worsening, associated with early satiety, nausea, diarrhea, and a 10-pound unintentional weight loss. Physical examination demonstrated left-sided abdominal tenderness, while laboratory findings were largely unremarkable. Initial evaluation, including an upper gastrointestinal series and gastric emptying study, did not demonstrate obstruction or delayed transit, prompting further investigation. Symptoms partially improved with dietary modification but recurred with normal oral intake, suggesting a structural rather than purely functional etiology. Computed tomography (CT) demonstrated a reduced aortomesenteric angle of 28Â° and distance of 3.5 mm with duodenal narrowing. Imaging also showed greater than 50% compression of the LRV, dilation of the gonadal veins, and pelvic varices, findings consistent with concurrent SMA syndrome and NCS. The patient was counseled on conservative management options, including weight gain and nutritional rehabilitation, as well as surgical interventions when conservative therapy fails, such as duodenojejunostomy or renal vein procedures. Close follow-up was recommended to evaluate response to therapy and determine the need for operative management. This case highlights the importance of maintaining clinical suspicion for vascular compression syndromes and demonstrates the diagnostic value of advanced imaging when routine testing is inconclusive.

Keywords: Superior mesenteric artery syndrome, SMA syndrome, Nutcracker syndrome, Left renal vein compression, Vascular compression syndromes,

Beyond Exposure: Evaluating the Impact and Design of Healthcare Pipeline Programs on Student Career Pathways

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Diversity in the medical workforce is essential, as provider–patient concordance improves trust, satisfaction, and health outcomes. Despite increasing representation, underrepresented groups remain disproportionately excluded from healthcare careers. Pipeline programs aim to address this gap by offering early exposure, mentorship, and skill-building opportunities for students from underrepresented and low socioeconomic backgrounds. This narrative review examined whether healthcare pipeline programs influence educational pathways and career aspirations in STEM and health professions, and identified effective program structures. Literature searches were conducted using PubMed, Google Scholar, and Cochrane with terms such as healthcare pipeline programs, underrepresented minorities, and career aspirations. Studies were included if they targeted high school students, described program structure, and reported measurable outcomes. Nine studies met inclusion criteria. Findings demonstrate that pipeline programs generally have a positive impact on academic trajectories and interest in healthcare careers. Longitudinal, immersive programs were associated with higher college enrollment and progression into health-related fields, with some studies reporting over 70% of participants pursuing related degrees. Effective programs emphasized sustained engagement, hands-on learning, strong mentorship, and integrated academic and professional support. Mentorship and self-efficacy were particularly influential. In contrast, short-term or primarily didactic programs improved knowledge but showed limited long-term impact. A key limitation is that many successful programs relied on substantial institutional funding and partnerships. These findings highlight the importance of program design and suggest mentorship-focused models as scalable strategies for initiatives such as the Youth in Medicine program at Rocky Vista University.

Keywords: Healthcare pipeline programs, Underrepresented minorities, Mentorship, Career aspirations, Medical education, Workforce diversity

Survey Evaluation of Female Menstrual Cycle Education in Health Professions Medical Education

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Interest in fertility awareness–based methods (FABMs) is rising, yet formal instruction within U.S. health professions education remains limited, potentially affecting clinicians' preparedness to counsel patients. This study evaluated health professions students' baseline knowledge, attitudes, and interest in FABMs, as well as perceived educational needs following a targeted instructional intervention. A pre–post survey study was conducted among health professions students at RVUCOM. Participants (N=13) completed a pre-survey, viewed an educational webinar on FABMs, and then completed a post-survey using deâ€'identified IDs. Quantitative data were analyzed with paired tâ€'tests ($p<0.05$), and qualitative responses were examined using thematic analysis. Following the intervention, students reported significant increases in perceived knowledge, confidence discussing FABMs, and understanding of clinical applications. Participants also demonstrated improved ability to identify appropriate patient clinical scenarios and reported greater awareness of FABMs' relevance to reproductive and hormonal health. Despite these gains, students identified notable barriers to implementation, including limited visit time (50%) and challenges related to patient communication and health literacy (50%). A majority (75%) reported being somewhat or extremely likely to incorporate FABMs into future clinical practice and expressed interest in additional training. Study limitations include small sample size, single-institution setting, and incomplete post-survey responses. Nonetheless, findings indicate a clear desire for expanded FABM education at the pre-clinical level. This pilot study may inform future curriculum development aimed at strengthening clinicians' competence in reproductive health counseling.

Keywords: Female Health, Survey, Medical Education

Renal Denervation Beyond Blood Pressure: Effects on Variability, Medication Adherence, and Cardiovascular Risk Surrogates

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Hypertension remains poorly controlled in patients often due to medication nonadherence, increased blood pressure variability (BPV), and limitations of traditional surrogate markers in predicting cardiovascular (CV) risk. Renal denervation (RDN), a device-based therapy targeting renal sympathetic nerves, is an option for patients with resistant hypertension. When used alongside antihypertensive therapies, RDN improves BP control, reduces BPV and medication burden, and favorably modifies surrogate CV risk markers without compromising renal safety. This is a narrative review without subjects. A comprehensive literature search of PubMed, Embase, and the Cochrane Library was performed for studies published between 2017 and 2025 evaluating contemporary radiofrequency and ultrasound-based renal denervation systems. BP, BPV, antihypertensive medication, major CV events, left ventricular hypertrophy, arterial stiffness, and renal function. Outcomes show a decrease in all the criteria used to assess the function of RDN including BP, BPV, medication count, major CV events, left ventricular hypertrophy, arterial stiffness, and renal function. This review identifies RDN as a safe adjunct that improves BP control, reduces BPV, and favorably affects surrogate CV risk markers. Limitations include heterogeneity of study designs, inconsistent BPV metrics, and lack of event-driven randomized trials. In family medicine, RDN may be most relevant for patients with resistant hypertension, poor medication adherence, or intolerance to polypharmacy. Our review shows RDN reduced BP between 4–6 mmHg. Evidence suggests improvements in BP variability, particularly nighttime and early morning blood pressure and regression of left ventricular hypertrophy, improved arterial stiffness, and preserved renal function without renal artery complications. Observational registry data suggest associations between greater BP reduction and lower CV event rates, though causality remains unproven. RDN provides sustained, adherence-independent BP reduction with favorable effects on surrogate CV risk markers. Ongoing outcome-driven trials are needed to define its long-term role, and family physicians should be aware of RDN as an emerging option for patients with resistant hypertension who struggle with medication adherence or polypharmacy.

Keywords: renal denervation, renal sympathetic denervation, hypertension, sham-controlled, ambulatory blood pressure, blood pressure variability, left ventricular hypertrophy, pulse wave velocity, renal function, cardiovascular outcomes

Efficacy of Multimodal Non-Opioid Analgesia in Total Knee Arthroplasty: A Literature Review

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Background: Total knee arthroplasty (TKA) is associated with significant postoperative pain, and opioid-centered strategies contribute to adverse effects, delayed mobilization, and prolonged opioid use. Multimodal non-opioid analgesia, combining pharmacologic and regional techniques, is central to enhanced recovery protocols. Purpose: To synthesize current evidence evaluating multimodal non-opioid strategies for reducing postoperative pain and opioid consumption after TKA. Methods: A narrative review of PubMed, EMBASE, and Scopus identified systematic reviews, meta-analyses, randomized controlled trials, and clinical reviews (2010-2025). Evaluated components included acetaminophen, NSAIDs (including COX-2 inhibitors), perioperative corticosteroids, gabapentinoids, duloxetine, targeted local infiltration anesthesia, peripheral nerve blocks (such as the adductor canal block), and cryoneurolysis. Results: Multimodal regimens consistently reduced early postoperative pain and opioid consumption. NSAIDs (including COX-2 inhibitors) and acetaminophen remain foundational due to efficacy and cost-effectiveness, though NSAID use may be limited by adverse effects. Regional techniques, including targeted local infiltration anesthesia with dose optimization to minimize toxicity and cryoneurolysis, further enhanced analgesia, reduced opioid consumption, and supported early mobilization. Intraoperative dexamethasone improved pain control and decreased postoperative nausea and vomiting. Gabapentinoids and duloxetine demonstrated opioid-sparing effects, though tolerability varied. Study heterogeneity precluded identification of a single optimal regimen. Conclusions: Evidence supports a protocol-driven multimodal approach combining systemic and regional strategies to optimize postoperative pain control after TKA. Standardized frameworks improve consistency, but individualized adjustments based on patient comorbidities and risk factors remain essential. Close collaboration among the patient, surgeon, and anesthesiologist is critical to maximizing recovery while minimizing opioid exposure.

Keywords: Multi-modal analgesia, Opioid-sparing, Postoperative pain

Pain and Emotional Distress in Outpatient Gynecologic Procedures: A Survey of Patient Experiences

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Background: Pain management during outpatient gynecologic procedures remains controversial, with prior studies reporting frequent under-treatment of procedural pain and associated emotional distress. Patient perspectives on preparation and counseling remain inconsistently described. Objective: To evaluate patient-reported pain and emotional distress, preparation, and counseling during outpatient gynecologic procedures and identify associated factors.

Methods: A cross-sectional anonymous survey of 49 participants recruited via convenience sampling from Rocky Vista University, OB/GYN clinics, and online platforms was conducted due to feasibility constraints. Inclusion criteria were age ≥18 years and prior outpatient gynecologic procedure. Mean age was 27 years; IUD insertion was most common. Sample size was based on feasibility without formal power calculation. Pain was assessed during, 0–12 hours, and 12–48 hours post-procedure using a 0–10 scale and categorized per Serlin et al. (1995), with ≥5 indicating insufficient control. Emotional distress was assessed using investigator-developed, non-validated self-report items. Considered covariates included anxiety, dysmenorrhea, sexual trauma, analgesic type, and procedure type. Analyses used t-tests and ANOVA; no confounder adjustment was performed. Missing data were handled using available-case analysis.

Results: Nearly half reported no discussion of pain expectations (49%), and 22% reported no counseling. Moderate-to-severe pain occurred in 87% during procedures, 67% at 0–12 hours, and 47% at 12–48 hours; emotional distress followed a similar pattern. Inadequate preparation was reported by 58% (pain) and 63% (distress). Anxiety was associated with higher pain at 12 and 48 hours ($p=0.0015$; $p=0.0081$), sexual trauma with higher pain at 12 hours ($p=0.0158$), and less recent procedures with higher procedural pain ($p=0.003$).

Conclusion: These findings extend prior literature on undertreated procedural pain by identifying associations between psychosocial factors and pain variability in a mixed-recruitment outpatient sample. Findings support improved counseling and consideration of screening for anxiety and trauma to individualize pain management. Limitations include modest sample size, single-region recruitment, and potential residual confounding.

Keywords: Gynecologic procedures, procedural pain, emotional distress, pain management

Neurodevelopmental Effects of Organophosphate Pesticide Exposure During Critical Periods

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Organophosphate (OP) pesticides are widely used in agricultural settings and pose significant public health concerns due to their ability to cross the placenta and blood–brain barrier. By inhibiting acetylcholinesterase, Ops disrupt cholinergic signaling and may interfere with neurodevelopment. Pregnant women, children, and underserved communities remain disproportionately vulnerable. This literature review evaluates the neurodevelopmental effects of chronic, low-level OP exposure during prenatal and early childhood periods.

Relevant peer-reviewed studies were identified that assessed exposure using urinary dialkylphosphate metabolites, geographic proximity to pesticide application, biomarker analyses, and self-reported histories. Inclusion criteria included human studies assessing prenatal or early childhood OP exposure and neurodevelopmental outcomes. Neurodevelopmental outcomes were measured through standardized cognitive assessments, behavioral evaluations, and neuroimaging modalities. Analytical methods included regression models, mixed-effects models, and Bayesian Kernel Machine Regression.

Across studies, higher OP exposure was associated with lower IQ scores, reduced memory and verbal comprehension, impaired executive function, and increased ADHD-related behaviors. Neuroimaging findings demonstrated altered prefrontal–parietal networks and disrupted central executive network activity with reduced working memory performance. Children with elevated prenatal exposure also exhibited lower developmental quotients across language, motor, and social domains.

Limitations include potential residual confounding, variability in exposure assessment, and heterogeneity in outcome measures. Chronic low-level OP exposure appears to adversely affect neurodevelopment, and these findings emphasize the need for strengthened regulatory policies, increased clinician awareness, and targeted community education. Future research should prioritize long-term follow-up and evaluation of combined environmental exposures, while policy efforts should promote safer agricultural practices and enhanced public health interventions.

Keywords: Organophosphate pesticides, neurodevelopment, environmental health disparities

Hike Smart: Footwear Effects on Balance

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Background: Below-ankle hiking shoes have grown in popularity, raising debate over whether traditional above-ankle boots or lower-cut shoes provide better ankle support and post-hike stability. Falls are a leading cause of hiking injuries, and little research has examined whether footwear type affects balance after strenuous hikes, creating uncertainty for hikers and footwear designers. This study aims to provide preliminary data on how different hiking footwear affects post-hike static stability. Methods: A cross-sectional observational study of 29 adults (18–44 years) immediately after summiting Mt. Bierstadt (14,000 ft) in Colorado. Participants completed a Balance Error Scoring System (BESS) assessment within 15 minutes of descent and reported demographics, footwear type, and annual hiking mileage. Hikers were grouped by self-selected footwear ankle height. One-way ANOVA compared total BESS scores across age, footwear type, and annual mileage ($\alpha = 0.05$). Results: No significant differences were observed between BESS scores and age ($F = 2.02$, $P = 0.35$), footwear ankle height ($F = 0.27$, $P = 0.77$), or annual hiking distance ($F = 0.49$, $P = 0.62$). Age showed the greatest between-group variation but was not statistically significant. Discussion: Footwear type, age, and hiking experience did not significantly impact post-hike balance. Lack of significance may reflect small sample size, fatigue, terrain, or environmental factors. Future studies should test a larger sample of participants multiple times in different footwear types to better isolate the effect of shoe design on balance. Controlled pre- and post-hike testing would also reduce environmental and fatigue-related confounding. Additionally, other balance and stability assessments beyond BESS could be incorporated to capture a more complete picture of postural control.

Obstructive Sleep Apnea and Risk of Postoperative Respiratory Complications: A Review of Current Evidence

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Obstructive sleep apnea (OSA) is a common, underdiagnosed condition affecting up to 20–30% of surgical patients and is characterized by recurrent upper airway obstruction and intermittent hypoxia (1,9). In the perioperative setting, OSA increases risk for respiratory complications due to anesthesia, sedatives, and opioids (6,10). This study evaluates whether OSA is associated with increased postoperative respiratory complications in adult surgical patients compared to those without OSA. A focused narrative review using systematic methods was conducted with PubMed and related databases to identify studies published from 2015–2025. Search terms included obstructive sleep apnea, perioperative, anesthesia, and respiratory complications. Inclusion criteria included adult surgical populations reporting outcomes such as hypoxemia, airway obstruction, reintubation, or respiratory failure. Pediatric and non-surgical studies were excluded. Twelve studies (systematic reviews, meta-analyses, and cohort studies) were included. Data were reviewed and summarized, with study quality assessed. OSA was consistently associated with increased postoperative respiratory complications, with approximately 1.5–2.5 times higher odds of cardiopulmonary complications and ICU admission, particularly hypoxemia and ICU utilization (2,3,5). Screening tools such as STOP-BANG and interventions including CPAP and enhanced monitoring were associated with improved outcomes (4,7,8). Limitations include observational designs, residual confounding, and variability in OSA definitions. OSA is an independent risk factor for postoperative respiratory complications. These findings highlight the importance of improved screening and perioperative management strategies to reduce complications and optimize patient outcomes.

Keywords: Obstructive Sleep Apnea (OSA), ostoperative Respiratory Complications, Perioperative Complications

The Association Between Preoperative Iron Deficiency Anemia and Postoperative Neurological Complications in Adults Undergoing Major Surgery

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Iron deficiency anemia (IDA) is a major perioperative risk factor affecting nearly 2 billion people worldwide and occurs in 30–60% of patients undergoing major surgery, with particularly high rates in colorectal (58%) and gynecologic procedures (64%). Preoperative anemia is linked to increased perioperative morbidity, though its relationship with postoperative neurological complications is less clearly defined. This narrative review evaluates the association between preoperative IDA and postoperative neurological complications, including postoperative delirium (POD), postoperative cognitive dysfunction (POCD), and stroke, in adults undergoing major surgery. PubMed and Google Scholar were searched for studies published between 2015 and 2025 using keywords related to IDA, preoperative anemia, and neurological outcomes. 36 studies met the inclusion criteria, including randomized controlled trials, systematic reviews, meta-analyses, and observational studies. IDA may increase neurological vulnerability during surgical stress through reduced oxygen delivery, impaired neurovascular regulation, and disruption of iron-dependent cellular processes such as mitochondrial function and myelination. Most studies assessed preoperative anemia rather than confirmed IDA, limiting the ability to isolate ironâ€‘specific effects. Across observational studies, preoperative IDA was consistently associated with increased risk of POD and POCD, particularly in older adults and high risk surgical populations. In a cohort of 62,600 patients aged ≥60 years, POD incidence within 7 days postoperatively was 3.9%. Lower preoperative hemoglobin (<11.1 g/dL) correlated with higher delirium risk. POCD incidence reached 14.75%, with moderate anemia linked to greater cognitive decline. Evidence connecting preoperative anemia to postoperative stroke is limited and heterogeneous, with reported rates ranging from 0.3–8%. Preoperative anemia is also associated with longer hospital stays and increased healthcare costs. Overall, IDA is an under-recognized yet modifiable risk factor for postoperative neurological complications. Routine preoperative screening and optimization of iron status may improve outcomes, though further research using standardized definitions and confirmed IDA cohorts is needed.

Keywords: iron deficiency anemia, preoperative anemia, postoperative delirium, postoperative cognitive decline, postoperative neurological complications

Literature Review: Efficacy and Safety of Salmon Sperm DNA for Skin Rejuvenation

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Background: Polynucleotide (PN) and polydeoxyribonucleotide (PDRN) injectables derived from salmon sperm DNA have gained global popularity as regenerative “skin boosters,â€ largely driven by social media and expanding aesthetic applications. Despite increasing clinical use, their mechanisms, efficacy, and safety remain incompletely characterized, particularly in the United States where regulatory guidance is limited.

Objective: To synthesize current evidence on the efficacy, safety, and mechanisms of PN/PDRN injectables for skin rejuvenation and to highlight key gaps relevant to dermatologic practice. Methods: A narrative literature review was conducted using PubMed, Embase, and Cochrane databases (2010–2025). Search terms included combinations of salmon sperm DNA, polynucleotide, polydeoxyribonucleotide, and skin rejuvenation. Studies were limited to English-language, peer-reviewed human studies. Eligible designs included randomized controlled trials, observational studies, case reports/series, and consensus guidelines evaluating cosmetic dermatologic use. Studies reporting efficacy or safety were included, while non-dermatologic or preclinical studies were excluded. Studies were screened for relevance and synthesized qualitatively.

Results: A total of 22 studies met inclusion criteria, including randomized trials, prospective studies, observational studies, surveys, and case reports, with sample sizes ranging from 5 to >200 participants. PN/PDRN injectables improved skin texture, elasticity, hydration, wrinkle severity, and scar appearance, though effect sizes varied. Mechanistic studies support adenosine A2A receptor activation, fibroblast proliferation, collagen synthesis, angiogenesis, and anti-inflammatory effects. Safety profiles were favorable, with mild, transient injection-site reactions. However, heterogeneity in formulations, dosing, and outcomes limits comparability, and long-term durability remains unclear.

Conclusions: PN/PDRN injectables show promising regenerative benefits but remain limited by heterogeneity and lack of standardization. Larger, controlled trials are needed before routine integration into evidence-based dermatologic practice.

Keywords: salmon sperm DNA, polynucleotides, polydeoxyribonucleotide, collagen stimulator, skin rejuvenation, Rejuran, anti-aging, safety testing

Skin-Lightening Among Filipinos: Cultural Influences, Social Media Trends, and Dermatologic Implications

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Background**:** Cosmetic skin lightening (SL) involves topical or systemic agents used to reduce melanin pigmentation for aesthetic purposes. While widely practiced globally, SL remains understudied among Filipino populations in the United States, where culturally specific influences such as historical colorism and digital trends are often overlooked.

Objective: This review examines cultural drivers, commonly used agents, and associated dermatologic risks of SL among Filipino populations.

Methods: This commentary synthesizes relevant literature identified through PubMed and Google Scholar, supplemented by publicly available information and social media trends (e.g., TikTok, Reddit). Search terms included skin lightening, bleaching, hydroquinone, mercury, and Filipino, with inclusion of English-language sources on dermatologic outcomes and cultural drivers published between 2000–2025. Sources were screened for relevance and synthesized thematically across peer-reviewed and public data. Non-dermatologic, non-English, or irrelevant sources were excluded.

Results: Available literature suggests that lighter skin has been associated with higher socioeconomic status and desirability within Filipino communities, now amplified by social media. Evidence is drawn primarily from observational studies, reviews, and regional dermatologic literature, supplemented by online discourse. Common agents include hydroquinone, corticosteroids, mercury-containing products, and glutathione. Use—especially from unregulated sources—poses risks including exogenous ochronosis, post-inflammatory hyperpigmentation, acne, barrier disruption, HPA axis suppression, nephrotoxicity, and neurotoxicity. Filipino populations remain underrepresented and often aggregated within broader "Asian" categories. Findings are derived from limited, heterogeneous sources.

Conclusion: Dermatologists play a key role in mitigating risks through culturally sensitive counseling. Future research should incorporate real-world digital data, including qualitative analysis of online platforms, to better characterize behaviors and inform targeted interventions.

Keywords: Skin lightening, Filipino population, Colorism, Dermatologic complications, Social media

Artificial intelligence predictive modeling of primary care visit time and patient panel size: a pilot study

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Background: Physician burnout rates have been on the rise in the United States healthcare system, especially within primary care. Administrative burden, a key burnout contributor, is itself related to patient panel size, clinical time per patient, and non-clinical administrative duties. Addressing all three with emerging artificial intelligence models may serve to reduce administrative burden and reverse burnout rates.

Objective: The aim of this study was to develop a machine-learning model to predict primary care appointment time from patient demographics and medical history.

Methods: The desired output metric for this study was accumulated annual duration of time (AADT), average time per visit multiplied by average number of visits per year. Predictions of AADT were compared between linear regression, random forest, gradient-boosting machine, support vector regression, and neural network models via root-mean-square-error (RMSE) and Shapley values.

Results: The random forest and gradient-boosting machine outperformed linear regression with a trial set of 100 patients, but no differences in RMSE between any models were noted with the full 20,000 patient set. The highest Shapley value returned was 0.025 with most values ranging from 0 to 0.008, indicating low predictive power for all models.

Conclusion: The investigators suspect that the Synthea patient database might generate timestamp data independently from patient demographics or clinical status. As such, this synthetic data contains no correlation between patient characteristics and visit time, and the models have no means of predicting a meaningful pattern. The models should be retrained on actual patient data to evaluate this hypothesis.

Keywords: Artificial Intelligence, Machine Learning, Primary Care

Association Between Body Mass Index and Duration of Mechanical Ventilation in Critically Ill Patients

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Obesity is a growing health issue associated with changes in respiratory physiology, including decreased lung compliance, increased airway resistance, and impaired gas exchange. These changes may impact patients requiring mechanical ventilation. Over 40% of adults in the United States meet criteria for obesity, highlighting the clinical relevance of this population in ICU settings. This literature review evaluates the relationship between body mass index (BMI) and duration of mechanical ventilation in critically ill patients. A literature review was conducted using studies from the last ten years examining BMI in relation to mechanical ventilation outcomes. Databases, including Google Scholar, were used to identify articles. Search terms included obesity, mechanical ventilation, and ICU. Ten studies focusing on adult ICU populations reporting ventilation duration or weaning outcomes were evaluated and then included. Across studies, higher BMI was associated with prolonged mechanical ventilation and more complex weaning. Obese patients were more likely to experience delayed weaning, with some studies suggesting delays of several days compared to normal BMI patients. This is likely due to decreased chest wall compliance and increased work of breathing. However, findings were inconsistent. Some studies reported that BMI was not an independent factor when controlling for confounders such as illness severity and comorbidities. Evidence suggests an obesity paradox, where obese patients may have similar or lower mortality despite longer ventilation duration. Limitations include reliance on observational data. Overall, increased BMI appears associated with longer mechanical ventilation duration, though its independent impact remains unclear. Further research is needed to clarify this relationship.

Keywords: Obesity, Body Mass Index, Mechanical Ventilation, ICU, Critical Care

Exploring the Role of Microbiome Dysregulation in PCOS: Pathophysiology, and Emerging Therapies Toward Targeted and Personalized Treatment

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Polycystic Ovarian Syndrome (PCOS) is an endocrine disorder characterized by reproductive, metabolic, and psychological dysfunction, often exacerbated by obesity (1,3). Core features include hyperandrogenism, insulin resistance, ovulatory dysfunction, and chronic low-grade inflammation (4,5). Emerging evidence implicates gut microbiome dysregulation in PCOS pathogenesis; however, existing models remain limited in integrating microbiome-endocrine interactions. This review synthesizes mechanistic and therapeutic evidence linking gut microbiome alterations to PCOS and evaluates their potential as treatment targets. A narrative review was conducted using peer-reviewed clinical and experimental studies published within the past decade. Databases included PubMed and Google Scholar, with search terms such as PCOS, gut microbiome, dysbiosis, and insulin resistance.â€ Studies were selected based on relevance to microbiome-mediated mechanisms or therapeutic interventions. Evidence indicates that increased intestinal permeability promotes endotoxemia and inflammation, contributing to insulin resistance (9,10). Reduced short-chain fatty acids and altered bile acid metabolism also disrupt metabolic and hormonal homeostasis (7,8). Microbiome-targeted therapies, including probiotics, prebiotics, GLP-1 receptor agonists, SGLT2 inhibitors, and fecal microbiota transplantation, show potential in improving metabolic outcomes and gut barrier integrity (3). However, findings are heterogeneous, with limited large-scale clinical trials and variability in study design. Current PCOS management emphasizes weight loss with modest long-term success (1). Targeting the gut microbiome may offer a more personalized adjunctive strategy. This review integrates mechanistic pathways with emerging therapies, highlighting microbiome modulation as a promising but evolving approach requiring further investigation.

Keywords: PCOS, Womens Health, Gut Microbiome, Metabolic Dysfunction

Evaluation and Treatment of Turf Toe (First MTP Plantar Complex Injuries): A Practical Review

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Background: Turf toe is a spectrum of plantar soft-tissue injuries involving the first metatarsophalangeal (MTP) joint, usually caused by hallux hyperextension. Injury severity ranges from mild sprain to complete disruption of the plantar plate-sesamoid complex. Because the first MTP joint is essential for push-off, sprinting, and cutting, delayed diagnosis may lead to persistent pain, instability, stiffness, and functional limitation. This review aimed to synthesize current evidence and outline a practical diagnostic and treatment framework. It adds value by combining diagnosis, imaging, management, and return-to-play guidance into a single practical framework for clinical decision-making. Methods: A narrative clinical review was conducted using PubMed, Embase, ClinicalKey, PubMed Central, and Open Evidence. Searches were performed from January 20, 2026, to March 6, 2026, and captured all indexed literature meeting search criteria. English-language human studies published in 2015 or later were considered. Titles, abstracts, and full texts were screened for relevance. Evidence was synthesized narratively by clinical domain, with attention to study design, consistency, and major limitations. Results: The literature supports a practical 3-grade classification system for diagnosis and management. Key findings included plantar first MTP pain, swelling, ecchymosis, painful or limited dorsiflexion, and instability. Weight-bearing radiographs remain first-line imaging, while MRI best characterizes soft-tissue injury severity. Grade I and most Grade II injuries are typically managed nonoperatively, whereas Grade III injuries may require surgery. Return-to-play recommendations were grade-based and criteria-driven. Evidence was limited by lower-level studies, heterogeneous methods, inconsistent grading, and variable return-to-play reporting. Conclusion: Turf toe is a clinically significant but inconsistently studied injury. A structured, grade-based approach may improve recognition and management, but higher-quality studies are needed to standardize rehabilitation and return-to-play recommendations.

Keywords: Turf-toe, 1st MTP injury, Sports related injury

The Readiness-First Paradigm: Digital Prehabilitation and Standardized Optimization Metrics in Elective Total Knee Arthroplasty

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Outcomes after total knee arthroplasty (TKA) vary, with differences in pain, function, and length of stay across patients. This variability highlights the need for presurgical assessment models that account for modifiable, behavior-based readiness factors. Although multimodal prehabilitation improves outcomes, workflow friction and patient-level barriers limit routine implementation. Digital platforms enable scalable remote monitoring, yet the absence of a standardized, interoperable readiness framework prevents multimodal data from informing individualized care pathways. Existing tools (e.g., RAPT, PROMs) offer modest predictive value and are static, limiting dynamic, domain-specific optimization. Our objective was to develop and conceptually validate a standardized readiness framework to support digital prehabilitation in TKA.

A multi-stage scoping review (PubMed, Embase, Cochrane; 2015–2026) established the evidence base. First, a discovery phase identified metaâ€‘analyses and systematic reviews demonstrating the efficacy of multimodal TKA prehabilitation. Second, targeted searching extracted biometric thresholds and digital delivery models from randomized trials and predictive outcome studies. Finally, gray literature review integrated ERAS nutritional consensus statements and institutional workflows, including Washington University's SPAR Program and the Living Well Center. Domains and specific scoring thresholds were systematically synthesized from the sources using a criteria extraction matrix to ensure clinical alignment. The framework integrates seven domains—Knowledge, Nutrition (>1.2 g/kg protein), Movement (TUG < 12.3 sec OR 6MWT > 328m), Resilience, Sleep, Substance Cessation, and Environment—each scored 0–3 to generate a 21-point composite readiness score. Designed for digital integration, it applies dynamic decision rules whereby subthreshold scores trigger targeted 14-day prehabilitation boosts, offering adaptability beyond static tools.

Keywords: Total Knee Arthroplasty, Prehabilitation, Digital Health, Surgical Readiness, Risk Stratification, Lifestyle Medicine, Enhanced Recovery After Surgery, Patient Optimization, Orthopedic Surgery, Multimodal Intervention, Remote Patient Monitoring

A Systematic Review of Calcium Homeostasis Loops in Medical Education

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Calcium homeostasis is a fundamental topic taught in medical education. Due to variation in the scope and complexity of calcium homeostasis feedback loops across medical texts, a classification table can help medical educators in selecting a figure that best aligns with their curriculum, allowing for educator optimization in improving student learning. This literature review aims to identify textbook figures representing calcium homeostasis, analyze their characteristics, and create a resource to guide medical educators in selecting appropriate figures. Medical physiology textbooks reviewed were chosen from curricula at 22 MD and 13 DO U.S. medical schools. Publications prior to 2020 or intended specifically for board preparation were excluded, resulting in six English-language textbooks matching inclusion criteria. Chapter titles were filtered by calcium, renal, kidney, endocrine, or endocrinology. Then, figures were filtered by homeostasis or feedback loop and chosen if the caption included calcium and the figure represented feedback or homeostasis loops. As such, eight figures were identified. Each figure was assessed for inclusion of hormones, albumin, phosphate, vitamins, organ systems, visuals, concentrations, and the type of feedback loop. Figures were then grouped into three categories. Group 1 figures do not include concentrations, albumin, or phosphate; they can be utilized as introductory figures to the topic. Group 2 figures contain chemical names, formulas, and/or include concentrations, targeted towards an intermediate knowledge base. Group 3 figures include complementary processes with phosphate and/or albumin, making them for a comprehensive review. Out of the eight figures analyzed, two are in Group 1, two are Group 2, and four are in Group 3. This literature review not only guides medical educators and students, but also lays groundwork for future research regarding individualized learning.

Effect of a 3-Hour Food as Medicine Course on Nutrition Knowledge and Counseling Confidence Among Osteopathic Medical Students: A Pre–Post Study

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Background: Chronic diseases, including cardiovascular disease, type 2 diabetes mellitus, and colorectal cancer, remain leading contributors to morbidity and mortality in the United States. Despite strong evidence linking these conditions to modifiable dietary behaviors, nutrition education in medical training remains limited and often lacks clinically applicable counseling strategies. Scalable, evidence-based nutrition education may help address this gap.

Objective: To evaluate the effectiveness and feasibility of Food as Medicine: Nutrition for Treatment and Risk Reduction, a structured educational program developed by the American College of Lifestyle Medicine (ACLM).

Methods: We conducted a prospective, single-group, quasi-experimental pre–post study among 64 osteopathic medical students (OMS I–III) who completed a three-hour course on preventive nutrition, evidence-based dietary patterns, and practical implementation strategies. The cohort was primarily aged 23–28 years (89%) and predominantly female. Pre- and post-course surveys assessed nutrition knowledge, confidence and attitudes, satisfaction, and perceptions of lifestyle medicine in clinical practice and medical education. Paired comparative analyses evaluated pre–post changes.

Results: Mean nutrition knowledge scores increased from 86.4% to 89.9%. Participants reported high satisfaction and increased confidence in applying nutrition knowledge and counseling skills, with shifts from lower to higher confidence levels. Positive changes were also observed in perceptions of lifestyle medicine, patient counseling, and its role in clinical practice and medical education.

Conclusions: A brief, standardized nutrition education intervention is feasible and improves nutrition knowledge, confidence, and perceptions among medical trainees. Limitations include absence of a control group and reliance on short-term, self-reported outcomes.

Recommendations for Waist Circumference Measurement and Ultrasound in Early Detection of NAFLD in Lean Patients of Asian Descent

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The incidence of Nonalcoholic Fatty Liver Disease (NAFLD) in lean and low-risk patients, specifically of Asian descent, has been on the rise. Obtaining an ultrasound from ages 40 to 65 in populations of Asian descent has led to earlier diagnoses and treatment of NAFLD lowering the risk of cirrhosis. Current methods of screening, such as abdominal ultrasound, have been found to be sensitive in early detection, however, this imaging is not routine for annual physicals. A cost-effective way to initially screen for lean NAFLD is by obtaining waist circumference, a measurement that is not typically included in annual physicals. This review aims to evaluate evidence for waist circumference as an initial screening tool for lean NAFLD in Asian adults and to identify appropriate cutoffs. A structured literature search of peer-reviewed articles was conducted using PubMed and Google Scholar, focusing on search terms: waist circumference, visceral adiposity, and NAFLD and Asian adult populations. Studies published in the last 10 years examining screening thresholds, diagnostic correlations, and risk stratification in lean or normal-BMI individuals were prioritized, with exclusion criteria of pediatric or non-Asian population and patients with known liver disease. Current research indicates that a waist circumference of >80 cm for Asian females and >85 cm in Asian males indicates abnormal waist circumference requiring further work up. These numbers differ vastly from the current recommendations of waist circumference of >88 cm in Caucasian females and >102 cm in Caucasian males. This review summarizes evidence supporting the benefits of obtaining waist circumference in Asian populations to reveal visceral adiposity that may not be visible to the naked eye.

Keywords: Non-alcoholic fatty liver disease, Lean NAFLD, waist circumference, Asian descent, ultrasound

Unlocking Calm Part 2: Using OMT For the Treatment of Anxiety

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Background: Anxiety disorders are increasingly prevalent worldwide, affecting an estimated 31% of adults and contributing to decreased quality of life, reduced productivity, and increased healthcare costs. Conventional treatments, including benzodiazepines, selective serotonin reuptake inhibitors (SSRIs), and psychotherapy can relieve symptoms but may be limited by side effects, cost, and challenges with long-term sustainability. As interest grows in integrative approaches to mental health care, osteopathic manipulative treatment (OMT) has emerged as a potential complementary therapy that may help regulate the autonomic nervous system and support long-term anxiety management. This study sought to identify whether a designated OMT protocol produced a greater reduction in self-reported anxiety levels than therapeutic touch.

Methods: A total of 25 participants, including master's students and osteopathic medical students (OMS-I and OMS-II), were enrolled in the study. Baseline anxiety levels were assessed using the Generalized Anxiety Disorder-7 (GAD-7) questionnaire, with follow-up surveys administered weekly for three weeks post-intervention. Participants were randomized into either a sham group or a treatment group, but were uninformed about which group they were in. Initial anxiety scores at week zero were found to be 11.83 for the sham group, and 9.08 for the treatment group. The sham group received an upper extremity lymphatic drainage sequence emphasizing therapeutic touch without targeted intervention. The treatment group received a standardized OMT protocol consisting of cervical kneading, suboccipital release, rib raising, and CV4. Statistical analysis was completed using a repeated measures ANOVA model. Four participants were lost to follow-up by week three of the study.

Results: A reduction in GAD-7 scores from baseline to week three was demonstrated by both the sham ($p=0.01$) and treatment ($p=0.0003$) groups, suggesting a potential benefit from therapeutic touch and participant engagement. However, the treatment group exhibited a greater reduction in anxiety scores across the study period, with an overall reduction of 4.6 points compared to a reduction of only 2.9 points demonstrated by the sham treatment group. By week three, participants receiving OMT demonstrated lower overall GAD-7 scores, with a statistically significant difference compared with the sham group ($p=0.02$). Limitations of this study include a small sample size of 25 participants and a short follow-up time. Subsequent studies investigating larger populations in a longitudinal manner will hopefully reinforce these results.

Conclusion: While both therapeutic touch and OMT were associated with improvements in self-reported anxiety, participants receiving OMT experienced greater reductions in GAD-7 scores over the three-week period. These findings suggest that targeted osteopathic manipulative techniques may provide additional therapeutic benefit beyond therapeutic touch alone. OMT may therefore represent a valuable adjunctive modality for anxiety management, supporting a more integrative and sustainable approach to mental health care.

Keywords: Osteopathic Manipulative Treatment (OMT), anxiety disorders, therapeutic touch

Neuro-Inflammatory Predictors of Chronic Pain: The Role of Pro-Inflammatory Cytokines in Post-Operative Neuropathic Pain

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Purpose: Low back pain continues to be a leading form of disability, with chronic pain post spinal surgery representing a significant contributor. Characterized as persistent spinal pain syndrome (PSPS) or failed back surgery syndrome (FBSS), ongoing postsurgical pain continues to be a significant clinical challenge due to its multifactorial etiology. Emerging evidence suggests pre- and post-operative inflammatory responses are critical in the development of FBSS. This literature review evaluates correlation between proinflammatory cytokines including interleukin- 1b (IL-1b), interleukin-6 (IL-6), and tumor necrosis factor- alpha (TNF-a), and development of chronic back pain.

Methods: A formal literature review using publications from PubMed/MEDLINE and Google Scholar was conducted to identify clinical studies evaluating proinflammatory cytokine levels and chronic pain outcomes post spinal fusion in adults. Inclusion criteria included peer-review articles published between 2015-2026 focusing on human clinical trials and longitudinal cohort studies. Titles and abstracts were screened, followed by full-text review. Findings were synthesized qualitatively due to heterogeneity in outcome measures and study design.

Results: Included studies supported the use of predominantly IL-6, preoperative and postoperative levels, for predicting the development of FBSS/PSPS. Higher intradiscal and systemic IL-6 levels were associated with greater postoperative back pain, disability, and poor recovery trajectories. Studies also identified TNF-a and IL-1b as predictors of the development of chronic pain. However, studies lacked consistent cytokine measurement timing as well as longitudinal data on the course of chronic postoperative pain.

Conclusion: IL-6, along with TNF-a and IL-1b, show promise as predictors of FBSS/PSPS across multiple clinical studies, showing consistent linkage to poor recovery trajectories. Due to limitations in cytokine measurement and available longitudinal data, a definitive correlation to proinflammatory cytokines cannot be made. However, future prospective studies should standardize cytokine measurement and provide long term data to establish if early modulation of inflammatory pathways can reduce the incidence of FBSS/PSPS.

Key Words: Chronic pain, failed back surgery syndrome, persistent spinal pain syndrome, spinal fusion, cytokines, postoperative pain, IL-6, TNF-α, IL-1β

Menstrual Cycle Phase and Sports Injury Risk: A Literature Review

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Background: Female participation in sports has continued to increase substantially since the Title IX Act was passed in the 1970s. Female athletes experience higher rates of Musculoskeletal (MSK) injuries than males at similar levels (ACL tears 2-8x more frequently). Injuries carry significant physical, psychological, and financial burdens. Hormonal fluctuations across menstrual cycle phases (MCP) have been proposed as contributors to sports injuries. Understanding hormonal influences on injury risk is essential as female participation in athletics continues to rise.

Purpose: To evaluate the relationship between MCP and sports injury incidence in female athletes, while identifying methodological limitations and areas for future research.

Methods: A narrative review of PubMed, EMBASE, OpenEvidence, and Clinical Key identified systematic reviews, meta-analyses, randomized trials, and cross-sectional studies (2016-2026), with 2 foundational studies 20 years old (total n=21). Search terms included MCP, female athletes, sports injuries. Included studies examine injury incidence or risk factors across MCP.

Results: Evidence demonstrates inconsistent findings regarding which MCP is associated with greatest injury risk. Several studies report increased injury incidence during high estrogen phases, related to increased LL and altered NMC. Several report higher rates during the luteal phase, related to altered proprioception, fatigue, connective tissue modulation. Other studies demonstrate no significant relationship. Methodological variability limits cross-study comparisons.

Conclusions: Current evidence does not support phase-specific injury prevention. Gaps include inconsistent MCP definitions, limited hormonal verification, small sample sizes, and focus on elite athletes. Future research should standardize MCP tracking, objectify hormonal measurements, and diversify cohorts to clarify hormonal effects on injury risk and guide injury prevention strategies.

Keywords: Menstural Cycle, Phase of Menstural Cycle, Ligament Laxity, Follicular Phase, Luteal Phase, Injury Prevention, Athletes, Female Athletes, Sports, Sports Injuries, Musculoskeletal Injuries, Proprioception;

Evaluating a Multifaceted Ultrasound-Guided Procedural Intervention in Preclinical Medical Education

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Background & Purpose: Point-of-Care Ultrasound (POCUS) is essential in orthopedic pain management. Ultrasound guidance increases procedural accuracy over "blind" techniques. Integrating intensive, hands-on needle-based training into undergraduate medical education (UME) is challenging due to demanding curricula and cost-prohibitive simulators. This study evaluates a reproducible, low-cost simulation model designed to facilitate preclinical psychomotor skill acquisition. The primary objective was to assess a multifaceted educational approach combining didactics and simulation, to teach first- and second-year osteopathic medical students ultrasound-guided joint injections and nerve blocks. Secondarily, it assessed academic proficiency and confidence, bridging the gap between didactic learning and clinical practice.

Methods: A prospective cohort analysis was conducted with 35 volunteer medical students. The multi-modal intervention included a didactic session followed by peer-model landmark identification. Participants practiced needle guidance using a novel phantom model (pork chop, gel-filled straw, braided string) simulating nerves and veins. Evaluation utilized a 19-point knowledge quiz featuring orthopedic cases and a 1–10 confidence scale. An ultrasound-trained physician assessed procedural proficiency based on landmark identification and needle-guidance technique. Pre- and post-intervention data were compared using paired-samples t-tests.

Results: Statistically significant improvements occurred across all domains. Knowledge scores rose from a pre-test mean of **12.83** (SD=2.88) to a post-test mean of **16.00** (SD=1.53); $t(34)=-7.57$, $p<.001$. Student confidence increased from **2.4/10** to **5.83/10**. Physician observation confirmed immediate procedural proficiency in ultrasound alignment and anatomical identification for all participants.

Discussion & Conclusion: Limitations include small sample size, short-term assessment, and potential selection bias. While the porcine model was effective, accessibility and fidelity concerns suggest a need for standardized non-porcine alternatives. This study demonstrates that a low-cost, multifaceted training framework is a viable, scalable addition to UME. Future research should evaluate longitudinal skill retention and explore synthetic models or AI-assisted needle tracking.

Keywords: Orthopedic Ultrasound; Medical education; Musculoskeletal; POCUS; Ultrasound, Joint injections; nerve block

The Effect of Structured Context on Chest Radiograph Interpretation by a Multimodal Large Language Model: A Pilot Comparative Study

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Background: Multimodal large language models are increasingly discussed as potential adjuncts for medical image interpretation, yet the extent to which structured contextual guidance affects performance remains uncertain.

Objective: The aim of this study was to determine whether a structured contextual intervention improves ChatGPT performance on chest radiograph interpretation.

Methods: We conducted a comparative pilot study using 50 chest radiographs with established reference diagnoses. In the baseline condition, ChatGPT interpreted each image using only the standardized prompt, “Diagnose this X-ray image.” In the structured-context condition, the model first reviewed a Radiopaedia-derived teaching module containing 100 labeled chest radiographs spanning 10 common diagnoses and then interpreted the same test set using an author-developed radiologic framework that emphasized study identification, image quality assessment, systematic visual review, separation of findings from diagnostic impressions, explicit communication of uncertainty, and structured reporting. Performance was assessed with percent-correct scoring, with partial credit awarded when responses demonstrated appropriate reasoning but lacked full specificity.

Results: Overall accuracy improved from 28% at baseline to 62% after the structured-context intervention. Accuracy reached 100% for chronic obstructive pulmonary disease, pulmonary edema, and foreign body identification, and improved to 80% for pneumothorax, cardiomegaly, and pleural effusion. Performance remained limited for lung cancer (20%) and feeding tube placement (40%), and rib fractures were not identified in either condition. Accuracy for atelectasis declined from 40% to 20%.

Conclusions: Structured contextual guidance improved performance on selected chest radiograph tasks, but overall diagnostic reliability remained inadequate for independent clinical use. Larger studies with standardized scoring, external validation, and imaging-specific evaluation are needed.

Keywords: artificial intelligence in radiology, chatgpt, chest x-ray, deep learning artificial intelligence, msk radiology, musculoskeletal radiology

National Trends and Socioeconomic Determinants of Sepsis-Related Healthcare Charges (2019-2021)

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As the cost of modern healthcare increases, sepsis remains one of the most clinically complex and expensive diagnoses. This study investigated the correlation between sepsis-related charges, trauma center designation, and region-specific socioeconomic factors across the United States (US). A retrospective observational study was conducted using deidentified data from the Healthcare Cost and Utilization Project (HCUP). Sepsis was defined by the following ICD-10 codes: A41.9, A41.81, A41.89, R65.20, and R65.21. The analytic dataset comprised all US adult inpatient hospitalizations with a sepsis diagnosis from January 2019 through December 2021 (n = 1,807,958). Linear Mixed Models assessed longitudinal patterns in total charges, while between-subjects ANOVAs compared mean differences across patient demographics and hospital characteristics. Sepsis cases increased concurrently with the COVID-19 pandemic (2020–2021). Results indicated that emergency department (ED) sepsis charges were significantly influenced by the intersection of regional context, hospital trauma designation, and neighborhood socioeconomic status (n=620,540, p-value <0.001). Level I trauma centers consistently reported the lowest adjusted charges across all years (2019: $4871; 2020: $4495; 2021: $5387), while non-trauma and Level III centers reported the highest (2019: $6032 and $5964; 2021: $6919 and $6796). Geographically, adjusted mean charges were highest in the West and lowest in the Northeast. These findings suggest that hospital charges are heavily influenced by median income and regional location, highlighting systemic disparities where socioeconomic markers may be greater determinants of healthcare costs than clinical severity alone. While this study identifies significant cost disparities, it is limited by reliance on administrative billing data, which may not capture granular clinical nuances or specific bedside rationing. Future research should integrate clinical outcomes data to determine if these cost variations correlate with differences in quality of care or patient mortality across diverse socioeconomic strata.

Keywords: Sepsis, COVID-19, Emergency Department, Healthcare Costs, Socioeconomics

Developmental Versus Proliferative Context of DNMT3B Expression Across Age-Stratified Glioblastoma

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Glioblastoma exhibits marked biological heterogeneity that varies with patient age, reflecting differences in cellular origin, epigenetic state, and tumor evolution. DNA methyltransferase 3B (DNMT3B), a key mediator of de novo DNA methylation during embryonic development, is aberrantly expressed in multiple cancers, including glioblastoma, where its function may diverge between regulating developmental programs and sustaining uncontrolled proliferation. Pediatric and adult glioblastomas differ substantially in their epigenomic landscapes, suggesting that DNMT3B expression may reflect age-dependent contexts such as neural progenitor maintenance in younger patients versus proliferation-associated epigenetic dysregulation in adults. Understanding whether DNMT3B activity in glioblastoma aligns more closely with developmental lineage programs or with cell-cycle–driven tumor expansion across age strata is essential for clarifying its biological role and therapeutic relevance.

Keywords: Neurological Surgery

Anatomical Variation of the Palmaris Longus and Its Impact on Simulated Surgical Precision

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Background: The palmaris longus (PL) is a forearm muscle that is absent in a large portion of the population whose contribution to hand function is not fully understood. This work aims to determine if the PL influences hand steadiness during simulated surgical tasks which would have implications for procedural success.

Methods: Fifty participants ranging in age from 22-53 underwent bilateral PL assessment using Schaeffer's test and ultrasonography. The outcomes tested were the number and time of successful or failed removals in a simulated surgical task (Operation game), grip strength measured by dynamometer, and fatigue resistance measured by total time spent doing constant 5-pound wrist curls.

Results: The PL was present in 76% of dominant hands and 82% of nondominant hands. Participants with PL in the dominant hand showed significantly faster successful removal times and prolonged time to failure compared to those without a PL. PL status was not linked with grip strength but males did display significantly greater grip strength than females in all conditions. When PL was present, there were no significant differences between fatigue resistance in dominant and nondominant hands. When PL was absent, there was significantly greater fatigue resistance in dominant hands.

Conclusions: The presence of the PL tendon in an already dominant hand appears to enhance hand steadiness in simulated surgical tasks while attenuating dominance-related differences in fatigue resistance tasks. This indicates that having the PL in a dominant hand may have advantages in high-dexterity procedures such as surgery where prolonged fine motor control is necessary.

Keywords: Palmaris longus, hand steadiness, surgical task

Empathy in Action: Evaluating a Choice-Based Empathy Lab for Medical Learners

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Background Empathy is a core physician competency associated with improved patient satisfaction, adherence, and clinical outcomes. Empathy Lab is an experiential assignment, designed by course director Dr. Mary Wilde, within Interprofessional Education at RVU. Students completed two activities of their choice to support the preservation and development of empathy amid the demands of medical training. This report evaluates OMS-I perceptions of their engagement in Empathy Lab activities. Methods Student experiences (n = 243) were assessed using surveys containing reflections and Likert-scale questions. Items measured were: manageability of the activities, connection to Interprofessional Education Collaborative competencies (IPECC), and perceived contribution to becoming a more caring provider. A de novo scale was created to analyze qualitative responses to identify themes related to empathy, self-awareness, and professional growth. One-way ANOVAs were conducted to compare outcomes across each activity. Significant effects were followed by Bonferroni-adjusted pairwise t-tests. Results Manageability did not differ across activities ($p = .163$) and was rated moderately high overall ($M = 3.83/5$, $SD = 1.11$). Activity connection to IPECC varied significantly ($p < .001$), with trauma-informed care highest and renewal lowest. Perceived contribution to becoming a more caring provider also differed ($p < .005$), with book reading highest and renewal lowest. Findings are limited by self-reported data and a cross-sectional design. Conclusions Empathy Lab activities differentially impacted connection to IPECC and perceived development as caring providers. These findings support incorporating diverse empathy-focused interventions in medical education, though further study with objective measures is needed.

Keywords: Empathy, Medical Education, Interprofessional Education

Staples or Sutures? The Impact of Closure Methods on Cesarean Wound Complications

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Cesarean sections, defined as the surgical delivery of a neonate via abdominal incision, are one of the most frequently performed surgical procedures globally, with some countries reaching rates over 50% according to a 2025 scoping review. Despite its prevalence, significant debate persists regarding optimal skin closure technique. While surgical staples and subcuticular sutures are the primary methods utilized, evidence remains divided on their relative impact on wound complications, cost-effectiveness, and patient satisfaction. Methods This literature review aims to elucidate these differences, providing a comprehensive comparison to guide clinical decision-making and improve postoperative maternal outcomes by analyzing clinical data from PubMed and Google Scholar published between 2010 and 2025, investigating the efficacy, cost, and patient-centered outcomes of various skin closure techniques. Results Evidence consistently identifies subcuticular sutures as the superior closure method for cesarean sections, particularly in reducing composite wound morbidity. While staples offer a significant advantage in operative speed (saving roughly 8 minutes or less), they are associated with a 2.5-fold increase in wound separation and higher overall complication rates compared to sutures. Interestingly, while sutures correlate with higher surgeon satisfaction and better long-term cosmetic scores, patient satisfaction based on the Patient and Observer Scar Assessment Scale (POSAS) remains largely comparable across both groups once wound separation is controlled for. Conclusion Ultimately, sutures provide a more cost-effective, durable recovery, whereas staples excel only in procedural efficiency. Future research should investigate hybrid closure techniques and evaluate whether patient-specific factors such as BMI, diabetes, or repeat cesarean procedures can guide individualized skin closure protocols.

Keywords: Women's health, Surgical

The Effects of Water Quality and Food Insecurity on Inflammatory Gastrointestinal Disorders in the United States

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Background: There has been a nearly 50% increase in the prevalence of inflammatory gastrointestinal disorders (IGD) in recent years, largely driven by poor diet and lifestyle factors. However, limited research has evaluated the impact of water quality, access to fresh food, and food insecurity on IGD. This study assessed whether these factors influence the prevalence of IGD in the United States.

Methods: 398 articles from PubMed, Embase, CINAHL, Cochrane, and Google Scholar were used for lexical searches; Undermind, OpenEvidence, Consensus AI were used as semantic search tools. Titles and abstracts were screened by two authors to ensure inclusion and exclusion criteria were met. Articles were included if they addressed IGD (e.g. IBD or gastroenteritis), explored at least one of the three metrics hypothesized, and examined the U.S. population. The exclusion criteria were non-inflammatory, unspecified gastrointestinal disorders, and non-human studies. 22 studies met these criteria.

Results: Only one study examined possible environmental influences on IBD rates, suggesting that IBDs are impacted by broader environmental factors, including diet and infection. Infection was identified as a prevalent factor contributing to acute gastroenteritis. The remaining 21 articles suggested an association between poor water quality and increased rates of acute IGDs, particularly acute gastroenteritis. Foodborne contamination, specifically from Norovirus, was a frequent source of acute gastroenteritis. These results demonstrate that areas with limited access to clean water or less strict drinking water laws may be at increased risk for developing acute gastroenteritis. Further targeted research is needed to examine the question proposed in this review.

Keywords: Gastrointestinal Illness, Drinking Water, Food Insecurity

Perioperative Outcomes in Patients with Central Sensitization Syndromes Undergoing General Anesthesia

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Background: General anesthetics (GA) are widely used in surgical procedures due to their effectiveness and broad effects on the central nervous system. Although complications are generally limited, certain patient populations—particularly individuals with central sensitization syndromes (CSS)—may be more likely to experience adverse postoperative outcomes. CSS is characterized by heightened central nervous system responsiveness to stimuli that would not normally elicit pain, as well as nociceptive signaling occurring without external input. This review explored whether patients with CSS experience increased postoperative pain, longer recovery times, and higher analgesic requirements.

Methods: Eleven studies were reviewed evaluating postoperative outcomes in patients with a diagnosed CSS who underwent surgery with GA. Studies were excluded if they did not specify the use of GA, if patients lacked a confirmed CSS diagnosis, or if they did not report a Central Sensitization Inventory score ≥ 40. Searches were conducted in PubMed, Google Scholar, Cochrane, CINAHL, and Embase (2005–2025) using terms related to central sensitization, general anesthesia, and surgery. All studies were screened to ensure inclusion and exclusion criteria were met.

Results: Across the included studies, patients with CSS experienced higher postoperative pain, greater and more prolonged analgesic use—including opioids—and lower postoperative satisfaction compared with patients without CSS. These findings suggest a meaningful association between CSS and worse postoperative outcomes. Given these patterns, future research should focus on improving perioperative care, including enhanced screening, diagnostic practices, and tailored interventions for patients with CSS. Limitations include the review's secondary nature and the exclusion of studies that did not specify anesthesia type or clearly define CSS.

Keywords: Central Sensitization, Anesthesia, Perioperative Outcomes

Guiding the Beam: DDR Biomarkers as a Compass for Radiotherapy in Bladder Cancer

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Background: Trimodality therapy (TMT) offers comparable survival to radical cystectomy for bladder cancer patients with better life quality, but limited evidence exists to guide treatment modality selection. One key factor is radiosensitivity. Advances in molecular understanding have allowed us to use predictive biomarkers to evaluate this, particularly DNA Damage Response (DDR) genes, which regulate DNA damage. Hence, they could serve as potential predictors. While prior narrative reviews have explored molecular biomarkers in TMT, evidence linking DDR alterations to radiotherapy outcomes is scattered across numerous studies with different biomarkers, assays, and outcomes. This review synthesizes and evaluates existing evidence to identify promising DDR biomarkers to guide treatment decisions.
Methods: PubMed and Embase were systemically searched from 2002 through 2026 for studies that looked at the pre-treatment DDR gene status in bladder cancer patients receiving radiotherapy. Inclusion criteria required original data, a sample size of ≥10 patients, and reported response outcomes.

Results: Ten studies met inclusion criteria. DDR genes alterations were associated with better radiotherapy outcomes, although effect sizes and evidence of strength varied. One study of MRE11 emphasized assay standardization challenges, while four studies with high MRE11 expression demonstrated improved responses with radiotherapy (HR range 0.42-0.64). Additionally, ERCC2 mutations showed the largest individual effect: one cohort reporting significantly improved survival (HR 0.15) and another showing zero metastatic recurrences in mutant patients. Various other DDR genes were also linked to improved recurrence-free survival (HR range 0.32-0.51), and germline RAD51 and XPD/XRCC1 polymorphisms also showed associations with improved outcomes. Certainty of evidence was moderate due to limitations by retrospective designs, small sample sizes for some markers, assay variability, and potential publication bias.

Conclusion: In conclusion, both MRE11 and ERCC2 are consistently linked to better radiotherapy results, with MRE11 being proposed as the most reliable biomarker and ERCC2 mutations having the most impact. These markers, with germline SNPs, hold promise to guide treatment decisions in bladder cancer.

Corticosteroid Therapy in Duchenne Muscular Dystrophy: A Comparative Literature Review of Prednisone, Deflazacort, and Vamorolone

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Duchenne muscular dystrophy (DMD) is a progressive X-linked neuromuscular disorder affecting approximately 1 in 5,000 male births, causing deterioration of skeletal, cardiac, and respiratory muscle function.1 Corticosteroid therapy remains the cornerstone of management, with prednisone and deflazacort as standard of care.2 This narrative review compares prednisone, deflazacort, and vamorolone in pediatric DMD across four domains: motor function, linear growth, bone health, and overall safety. Semantic Scholar, PubMed, Embase, and ClinicalTrials.gov were searched for English-language studies (2000–2024) using terms including "Duchenne muscular dystrophy," "prednisone," "deflazacort," and "vamorolone," yielding approximately 1,100 records after deduplication. Titles and abstracts were screened against prespecified inclusion criteria (pediatric DMD, efficacy or safety outcomes), excluding case reports, editorials, and non-human studies. Fifty studies were selected by relevance ranking prioritizing RCTs, meta-analyses, and recency. Findings were organized thematically by the four predefined domains, with RCTs appraised using the Cochrane Risk of Bias tool.

Both prednisone and deflazacort preserve muscle strength and delay loss of ambulation by approximately 2–3 years, with deflazacort associated with less weight gain but potentially greater bone health impact.3,4 Both carry significant adverse effects including growth stunting, bone loss, adrenal suppression, and mood disturbances.5 Vamorolone at 6 mg/kg/day provides comparable efficacy to prednisone across TTSTAND, NSAA, and 6MWD, while preserving linear growth up to 30 months and improving bone biomarkers.6,7,8,9

Extending prior reviews by integrating 2024 trial data through a growth- and bone-health–focused lens, this synthesis positions vamorolone as a promising option for younger prepubertal patients, while acknowledging evidence-base limitations: short follow-up, no head-to-head deflazacort trials, and heterogeneous dosing regimens.

Keywords: Neurology, Pediatrics

A Protocol for the Clinical Validation of Wearable Sweat Electrolyte Testing Devices Against Serum Electrolyte Analysis

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Accurate monitoring of electrolyte loss during exercise is critical for guiding hydration strategies, maintaining performance, and reducing the risk of electrolyte deficiency disorders. Electrolyte deficiencies, particularly in sodium, potassium, and chloride, can lead to muscle cramps, fatigue, impaired neuromuscular function, arrhythmias, and, in severe cases, life-threatening complications such as hyponatremia. While several commercially available sweat-testing devices, including the LEVELENâ„¢ Sweat Test, Gx Sweat Patch, Nix Biosensor, and hDrop Hydration Monitor, claim to provide individualized electrolyte data, their accuracy compared with standard blood serum testing has not been systematically evaluated. This study aims to assess the validity and reliability of these devices by comparing their results to changes in serum electrolytes measured before and after exercise. Methods: Participants will undergo a baseline venous blood draw to measure sodium, potassium, and chloride levels followed by a standardized 60-minute treadmill session while wearing the sweat-testing devices. A second blood draw will follow exercise to capture exercise-induced electrolyte shifts. Device outputs will be compared against serum results and evaluated statistically using a paired t-test and Friedman test to assess differences in agreement across devices and serum results. We hypothesize that sweat-testing devices will show variable agreement with blood-based measures, with certain devices demonstrating closer accuracy and reliability than others. Findings from this study will provide a systematic evaluation of sweat electrolyte testing technologies against the current clinical gold standards and inform evidence-based recommendations for athletes, coaches, and clinicians seeking effective hydration and electrolyte monitoring tools.

Keywords: Exercise Physiology, Electrolyte, Performance Optimization

Orbital exenteration for necrotizing fasciitis of the eyeball: A case report

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Abstract: Background: Necrotizing fasciitis due to Streptococcus pyogenes (Group A Streptococcus) is a rapidly progressive and life-threatening infection, rarely occurring after minor blunt facial trauma in otherwise healthy individuals. Case Presentation: A previously healthy young male presented to the emergency department with a forehead laceration following blunt trauma and was discharged after initial management. Six days later, he returned via ambulance in septic shock with complete vision loss in the right eye and extensive necrosis of the surrounding facial tissues. He was diagnosed with necrotizing fasciitis secondary to Streptococcus pyogenes. After stabilization, he underwent urgent debridement followed by facial reconstruction with a static pectoralis myocutaneous flap on hospital day four. Conclusion: Early single-stage debridement with interposition of vascularized soft tissue may improve antibiotic delivery, reduce dead space, and shorten hospital course compared to serial debridement techniques. This case supports consideration of early reconstructive intervention in severe necrotizing fasciitis requiring orbital exenteration.

Keywords: Ophthalmology, Necrotizing fasciitis, Group A Strep, Exenteration, Dead space management

The Hidden Burden of Sepsis Survival: A Review of the Current Literature on Post-Sepsis Syndrome

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INTRO: Post-sepsis syndrome (PSS) refers to the constellation of physical, cognitive, and psychological impairments experienced by sepsis survivors in the weeks to years following hospitalization. As advances in critical care improve sepsis survival, the long-term consequences of sepsis are emerging as a significant and underrecognized public health challenge. PSS affects millions of individuals worldwide and is associated with markedly diminished quality of life. Despite its growing impact, PSS remains understudied. This review evaluates the clinical manifestations, risk factors, and long-term health outcomes associated with PSS.

METHODS: A comprehensive literature search was conducted using MEDLINE via PubMed. Eligible studies were peer-reviewed, published in English between 2015 and 2025, and focused on adult survivors of sepsis or septic shock. Two independent reviewers screened studies for inclusion based on relevance to post-sepsis syndrome. Data extracted included study design, patient demographics, and reported clinical outcomes. RESULTS: The review identified 9 articles, of which 4 met the inclusion criteria. Four majorh themes emerged from the literature: (1) persistent physical and metabolic dysfunctions, (2) cognitive and psychological morbidity, (3) physiological mechanisms underlying PSS, and (4) demographic and sex-based variations in PSS outcomes.

DISCUSSION: This review highlights sepsis as an independent risk factor for long-term cognitive decline, functional impairment, and new psychiatric diagnoses. Notably, patients with pre-existing mental health disorders demonstrate a disproportionately higher risk of post-sepsis psychological deterioration. These findings underscore the burden of PSS. Greater recognition of PSS and the development of structured post-discharge care pathways are essential to mitigate long-term morbidity among sepsis survivors.

Factors Contributing to the Underdiagnosis Obstructive Sleep Apnea

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Objectives: Obstructive Sleep Apnea (OSA) remains substantially underdiagnosed in the United States despite advances in home-based diagnostic technologies. As of 2020, an estimated 5.9 million adults had been diagnosed with OSA, while 23.5 million remained undiagnosed (Conte et al., 2020). This scoping review synthesizes recent U.S.-based evidence from the era of expanded home sleep apnea testing (HSAT) to identify factors contributing to persistent underdiagnosis and to highlight gaps not addressed in prior reviews.

Methods: A scoping literature search was conducted using PubMed, Embase, and the Cochrane Library to identify studies examining contributors to OSA underdiagnosis. Search terms included obstructive sleep apnea, OSA, underdiagnosis, polysomnography, home sleep apnea testing, socioeconomic factors, and population at risk. Eligible studies were peer-reviewed English-language articles published in the United States between 2015 and 2025 involving adults ≥18 years. Investigators independently screened titles, abstracts, and full texts following PRISMA guidelines. Themes were derived through iterative consensus review of included studies. Study quality was not formally assessed, consistent with scoping review methodology. Of 213 articles identified, seven met final inclusion criteria, representing a key limitation of the evidence base.

Results: Five themes associated with undiagnosed OSA emerged: inadequate screening in high-risk medical populations (n = 6), presence of comorbid conditions (n = 4), limitations or improper use of diagnostic devices including HSAT (n = 3), restricted access to testing and patient reluctance (n = 2), and insufficient physician training in OSA identification (n = 1). Notably, few studies evaluated interventions targeting provider education or implementation of diagnostic tools in high-risk groups.

Conclusions: Persistent OSA underdiagnosis reflects systemic and clinical barriers that remain despite broader HSAT availability. This review highlights the need for targeted interventions addressing provider training, device implementation, and screening integration in high-risk populations. Further research should evaluate strategies to improve diagnostic uptake and clarify how timely OSA treatment affects outcomes in vulnerable groups.

Keywords: Sleep Apnea Obstructive, Sleep Apnea Obstructive, Upper Airway Resistance Sleep Apnea Syndrome, Sleep Apnea Hypopnea Syndrome, Snoring, Snoring, Diagnosis, Diagnosis, Missed Diagnosis, Missed Diagnosis, Underdiagnosis, Prognosis, Prognosis, Prognostic Factors, Sensitivity and Specificity, Sensitivity and Specificity, False Negative Reactions, False Negative Reactions, False Positive Reactions, False Positive Reactions, Delayed Diagnosis, Delayed Diagnosis, Early Diagnosis, Early Diagnosis, Diagnostic Errors, Diagnostic Errors, Polysomnography, Polysomnography, Nocturnal Polysomnography, Sleep Monitoring, Home Sleep Apnea Testing, Wearable Devices, Wearable Electronic Devices, Wearable Electronic Devices, Monitoring Ambulatory, Monitoring Ambulatory, Outpatient Monitoring, Technology Assessment Biomedical, Technology Assessment Biomedical, Health Behavior, Health Behavior, Health Risk Behaviors, Health Risk Behaviors, Risk Assessment, Risk Assessment, Health Risk Assessment, Benefit-Risk Assessment, Risk Factors, Risk Factors, Health Correlates, Social Risk Factors, Population at Risk, Symptom Assessment, Symptom Assessment, Symptom Evaluation, Socioeconomic Factors, Socioeconomic Factors, Healthcare Disparities, Healthcare Disparities, Patient Acceptance of Health Care, Patient Acceptance of Health Care, Social Determinants of Health

Healing What History Hurt: Bridging Barriers to Native American and Indigenous Dermatologic Care

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Native American and Indigenous communities experience a disproportionate burden of dermatologic disease, yet remain underrepresented in dermatology research and underserved in clinical care. This narrative review synthesizes current evidence on common skin conditions and barriers to achieving positive dermatologic outcomes.

A total of 173 articles were screened from PubMed, Google Scholar, Embase, Consensus AI, Cochrane, and CINAHL using predefined inclusion and exclusion criteria focused on Native American and Indigenous populations, dermatologic conditions, and access to care. Twenty-two articles met full inclusion criteria. Dermatologic disease burden was consistently high. Reported conditions included acne with a 79 percent lifetime prevalence and 55 percent scarring, atopic dermatitis and eczema with rates as high as 91 percent in northern Canadian Indigenous communities, psoriasis at 72 percent, actinic prurigo, and acanthosis nigricans in children. Several studies also identified elevated melanoma incidence, regional variation in risk, and later-stage diagnoses among American Indian and Alaska Native individuals. Chronic wounds and skin and soft-tissue infections were frequently described, including those related to diabetes, vascular disease, and inadequate wound-care resources.

Barriers to care were substantial. Rural Indian Health Service facilities required median travel distances of 68 miles to reach dermatology services, and few homelands had even one dermatologist. Additional obstacles include long wait times, limited Medicaid acceptance, formulary restrictions, underrepresentation in clinical trials, and inconsistent teledermatology availability. Cultural and historical factors such as mistrust, insufficient patient education, and limited culturally grounded care further shaped outcomes.

Evidence gaps included small or region-specific samples, limited tribal-level stratification, reliance on retrospective or self-reported data, and minimal Native representation in dermatology clinical trials. Improving outcomes will require expanding dermatology workforce capacity, strengthening culturally informed teledermatology, and addressing structural inequities in access and treatment.

High Occupational Ultraviolet Exposure and Hypertrophic Scarring Outcomes in Sunny Climates

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Hypertrophic scars (HTS) arise from dysregulated wound healing characterized by excessive inflammation, fibroblast hyperactivity, and extracellular matrix (ECM) imbalance, as described across multiple mechanistic reviews in the included dataset. Several UV-focused articles identify ultraviolet (UV) radiation as a major environmental stressor capable of inducing oxidative DNA damage, cellular injury, and persistent inflammatory signaling. Environmental studies examining outdoor workers report substantial cumulative UV exposure and inadequate photoprotection, underscoring the relevance of occupational risk in high-sun environments. This review aimed to evaluate the potential influence of high occupational UV exposure on hypertrophic scar healing among outdoor workers in sunny climates.

A comprehensive literature review was conducted using PubMed, Embase, Cochrane, CINAHL, OpenEvidence, Consensus AI, and Undermind to identify studies related to high occupational UV exposure and hypertrophic scarring. The search identified 183 articles, which were independently screened by six reviewers using predefined inclusion criteria focusing on adult participants with hypertrophic scars, high occupational sun exposure, and relevance to sunny climates. Of the 183 articles screened, 19 met inclusion criteria.

Across the included literature, UV radiation was consistently associated with biological pathways that overlap with known drivers of hypertrophic scarring. Mechanistic HTS studies emphasized cytokine-mediated inflammation, fibroblast overactivation, and ECM dysregulation, while UV-focused articles detailed oxidative stress, DNA damage, and deep-penetrating UVA1 injury as key consequences of chronic exposure. Environmental studies confirmed high UV burden among outdoor workers, though none directly evaluated hypertrophic scar outcomes in high-UV occupational settings. The evidence base was heterogeneous, with most studies being mechanistic or environmental rather than clinical.

The findings suggest that high UV exposure may exacerbate hypertrophic scar dysregulation through oxidative damage and inflammation. However, the absence of direct clinical studies in high-UV-exposed workers highlights a critical gap for future research.

How the Gut Microbiome May Shape the Future of Treating Eating and Mood Disorders

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Changes in the gut microbiome have been linked to both eating disorders (EDs) and mood disorders (MDs), but it is unclear whether these conditions share similar microbial patterns or show distinct profiles. This review examined whether specific microbiome features are consistently seen in EDs and how they compare with findings in MDs.

We searched PubMed, Google Scholar, CINAHL, Cochrane, ConsensusAI, OpenEvidence, and Embase, identifying 229 studies. Twenty-one met our inclusion criteria, which required human participants and original microbiome sequencing, metabolomic data, or immune-related findings. We extracted information on microbial diversity, key taxa, metabolites, inflammatory markers, and associations with clinical symptoms.

Across ED studies, mainly anorexia nervosa, several patterns appeared repeatedly. Patients showed lower gut microbial diversity, higher levels of certain taxa such as Coriobacteriaceae, and shifts in short-chain fatty acid–producing bacteria. Some studies also linked microbiome changes with inflammatory markers, including relationships between IL-18 and *Bacteroides*, IL-15 and *Romboutsia*, and TNF-α with *Lachnospiraceae* genera. Early fecal microbiota transplantation (FMT) trials showed short-term shifts toward donor microbiota but no immediate changes in psychiatric symptoms. MD studies showed dysbiosis as well, but patterns were more variable. Mendelian randomization studies suggested possible two-way relationships between certain microbes and mood symptoms.

EDs and MDs both show gut dysbiosis, with anorexia nervosa demonstrating the most consistent microbial pattern. Mood disorders show overlapping but less uniform changes, and no reliable microbiome “fingerprints” currently distinguish these conditions. Key gaps include limited longitudinal data, inconsistent sequencing methods, unclear causal pathways, and a lack of validated microbial biomarkers. Ongoing trials such as the DIAMOnDS refeeding-phase microbiome study and an interventional fecal microbiota transplantation trial in anorexia nervosa highlight the shift toward mechanistic and interventional research needed to understand how microbial changes influence brain function and behavior.

The Overtreatment of Chronic Disease in Geriatric Populations: A Comprehensive Literature Review

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Abstract Background As the population continues to age, more older adults are living with multiple chronic conditions. Hypertension and diabetes are especially prevalent. Managing these conditions often requires several medications, which has led to a growing prevalence of polypharmacy, defined as the use of five or more medications. Current evidence shows that polypharmacy is very common in older adults and is linked to increased risks of adverse drug events, hospitalizations, cognitive decline, and mortality. Objective This narrative review explores the causes and consequences of polypharmacy in adults aged 65 and older, with a focus on hypertension and diabetes. Methods A targeted literature search was conducted using PubMed and Embase to identify studies examining how intensive medication regimens impact outcomes such as frailty, functional decline, and quality of life. Results This review identified three key findings: polypharmacy is largely driven by intensive guideline-based management and the prescribing cascade; increasing medication burden is consistently associated with worse outcomes, including adverse drug events, falls, hospitalization, cognitive decline, and mortality; and emerging evidence supports deprescribing and individualized treatment targets as effective strategies to reduce harm without compromising overall disease control. Conclusions Deprescribing is an important strategy to address this issue. It involves carefully reducing or stopping medications that may no longer be beneficial or may be causing harm. Current approaches emphasize individualized care, shared decision-making, and adjusting treatment goals based on a patient's overall health and frailty. However, this review is limited by its narrative design and non-systematic search strategy, which may introduce selection bias. Overall, polypharmacy is a significant but modifiable issue in geriatric care. Shifting focus from aggressive disease control to thoughtful medication management may help improve outcomes and quality of life for older adults. Keywords: Polypharmacy; older adults; hypertension; diabetes; frailty; functional decline; quality of life; adverse drug events; deprescribing; prescribing cascade; multimorbidity; geriatric care. Types of Studies Included: This narrative review incorporated evidence from observational studies (cross-sectional and longitudinal), epidemiologic association studies, comparative effectiveness research, and intervention studies evaluating deprescribing strategies, as well as guideline-informed and health services research, synthesized through a targeted database search.

Keywords: Polypharmacy; older adults; hypertension; diabetes; frailty; functional decline; quality of life; adverse drug events; deprescribing; prescribing cascade; multimorbidity; geriatric care.

Gut Microbial Modulation of Immune Checkpoint Inhibitor Efficacy: Mechanisms, Evidence, and Hypothesis-Generating Candidates

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Background: The gut microbiome is a key determinant of response to cancer immunotherapy; however, current research has focused on a limited number of well-characterized commensal taxa. This narrow scope may overlook a broader range of microbial species that contribute to variability in tumor response, limiting a comprehensive understanding of microbiome-driven immunomodulation.

Hypothesis: We hypothesize that underexplored gut microbial taxa may influence tumor response through shared immunomodulatory functions similar to those observed in established immunotherapy-associated microbes.

Methods: A targeted narrative literature review was conducted using PubMed and additional scholarly databases, with article organization performed in Zotero. MeSH terms and microbiome–immunology–focused keywords were used to identify peer-reviewed studies describing immune-modulating effects of candidate gut microbial taxa. Representative organisms were selected to capture both established and underexplored contributors to host immune regulation, including *Bacteroides thetaiotaomicron*, segmented filamentous bacteria, *Helicobacter* spp., *Lactobacillus plantarum*, *Clostridium butyricum*, and *Eubacterium limosum*, as well as emerging candidates such as *Oscillibacter* spp. and *Veillonella atypica*. Studies were evaluated for evidence of immune interaction, including effects on innate and adaptive immune pathways, and for relevance to tumor biology and immunotherapy response. Studies were included if they (1) were peer-reviewed, (2) provided mechanistic, preclinical, or clinical evidence of microbiome–immune interaction, and (3) demonstrated relevance to tumor biology or immunotherapy response. Studies were excluded if they lacked immune-related outcomes, were non-peer-reviewed, duplicative, or not relevant to cancer or host immune modulation. Selected studies were qualitatively synthesized to evaluate shared immunomodulatory functions across taxa.

Results: Preliminary synthesis suggests that while certain taxa demonstrate well-established roles in modulating host immune responses, a broader group of underexplored microbes may exert similar functional effects on immune tone. Most available evidence is derived from preclinical and mechanistic studies, with limited direct evaluation in cancer-specific clinical contexts.

Conclusion: These findings support a shift toward a functional framework of microbiome–immune interaction and highlight underexplored microbial taxa as potential contributors to variability in cancer immunotherapy response. Further research is needed to validate these associations in clinical settings and to define their therapeutic potential.

Keywords: Gut microbiome, Immune modulation, Microbiome-immune axis, Immunotherapy

Understanding Nitrogen Narcosis in SCUBA Diving: Mechanisms, Effects, and Potential Treatment with Lipid Emulsion Therapy

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SCUBA diving at technical depths exposes divers to toxic effects of compressed air, specifically from N2 – this is nitrogen narcosis. It is a reversible condition when making a proper ascent, but has no current underwater treatment aside from depth and gas mixture precautions. After evaluating existing evidence, this work proposes that taking an oral lipid emulsifier, immediately prior to SCUBA diving, can prevent symptoms associated with nitrogen narcosis. Databases such as Google Scholar and PubMed were utilized to search for appropriate articles. From this, 21 papers were ultimately categorized as the most relevant, given the following parameters – SCUBA diving, nitrogen narcosis, LAST, lipid emulsion therapy, and GABA receptor. Factors such as recency and strength of provided evidence were ultimately used to rank the papers, along with exclusion criteria of general anesthesia. This review aims to evaluate existing mechanistic and preclinical evidence to support the hypothesis that LE can reduce nitrogen narcosis in divers. As such, this work is presented as a hypothesis-generating review, and the included studies were summarized using a narrative synthesis. When hyperbaric nitrogen reaches lipid-rich neural tissue, it binds to hydrophobic pockets on the GABA-A receptor – leading to impaired cognition and decreased neuromuscular function. Current literature suggests the use of lipid resuscitation for LAST may also be applied as treatment for the associated CNS toxicity of nitrogen narcosis. This is highlighted through proposed targeting of hyperbaric N2 by the multimodal mechanism of LE therapy. Studies have been performed on mice in hyperbaric chambers, but it is still unknown if results translate to humans under hyperbaric conditions. This proposed therapy can potentially reduce risk for divers who descend to technical depths. Ethical issues surrounding testing serve as a limitation, and further research is needed to assess the safety and efficacy of such therapy in mitigating nitrogen narcosis symptoms.

Patient Management and Outcomes with Ultrasound Imaging in a Prehospital Setting

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Portable imaging technology, mainly point-of-care ultrasound (POCUS), is becoming more prevalent in prehospital care for trauma and medical calls. The portability of POCUS allows for the potential to help refine the working diagnosis, guide field interventions, and assist in refining prehospital triage. The objective of this work is to identify gaps in the research by compiling existing evidence on prehospital US, and determine whether it improves patient survival and long-term outcomes. Consensus—an AI academic search engine—was used to obtain evidence from over 170 million research papers, including Semantic Scholar, PubMed, and other trusted databases to scan studies on prehospital imaging. From this search, 50 papers were ultimately categorized as the most relevant papers given the presented parameters: POCUS, prehospital, diagnostic accuracy, patient management, and outcomes. Factors such as recency and strength of provided evidence were ultimately used to rank the papers, along with exclusion of other imaging modalities. Current literature suggests that the use of prehospital US does help improve diagnostic accuracy in both trauma and non-trauma calls, particularly in cases involving major respiratory or cardiac abnormalities. For trauma patients, the use of Focused Assessment with Sonography for Trauma (FAST) and extended FAST scans was shown to alter patient management in 6%–49% of cases; additionally, this change in management influenced the destination hospital or the transport modality of the patient in 22% of cases. Despite this, the current evidence is largely observational and heterogeneous, which limits conclusions regarding survival and long-term patient outcomes. The effect of prehospital US on these outcomes remains unproven because the available evidence is quite limited. There is still a need for outcome-focused trials that highlight the true impact of prehospital US. This may be done by creating larger population studies that implement standardized training to reduce the heterogeneity and bias present in current studies.

Ulipristal Acetate: A Call to Action for Over-the-Counter Access to Oral Emergency Contraception in the United States

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Background: Emergency contraception (EC) is essential to reproductive autonomy, yet access to ulipristal acetate (UPA), the most effective oral option, remains restricted in the United States. Despite superior efficacy compared with over-the-counter (OTC) levonorgestrel (LNG), UPA requires a prescription. LNG became OTC within seven years of approval, whereas UPA remains prescription-only sixteen years later despite comparable safety and efficacy. This commentary evaluates whether UPA meets criteria for OTC reclassification.

Methods: Targeted searches (2010–2025) in PubMed and Embase identified randomized trials, meta-analyses, and clinical guidelines. Studies comparing UPA and LNG or evaluating safety and timing were prioritized. Evidence was synthesized through narrative review and supplemented with pharmacovigilance data from FAERS and EudraVigilance.

Results: Across studies involving over 3,000 participants, UPA demonstrates greater effectiveness than LNG and maintains efficacy up to 120 hours after unprotected intercourse, reducing pregnancy risk by nearly half. This advantage is most pronounced beyond 72 hours and in individuals with a higher BMI, where LNG is less effective. ACOG supports these findings and recommends UPA as the preferred oral option, including advance prescribing to improve access. Pharmacovigilance data support safety. In the U.S., FAERS includes 96 UPA reports compared with 160,882 for LNG, reflecting limited use due to prescription-only access. In Europe, where UPA has been OTC since 2014, EudraVigilance reports 3,207 cases, mostly non-serious. Interpretation is limited by underreporting and utilization differences.

Conclusion: UPA meets criteria for OTC access based on efficacy, safety, and clinical guidance. Reclassification would align U.S. policy with global standards, reduce delays, and improve reproductive equity.

Keywords: Ulipristal, Levonorgesterol, emergency contraception, efficacy, access, United States

Beyond Intake: Continuity of Contraceptive Care for Incarcerated Women in the United States

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Background: Incarcerated women represent one of the most medically underserved populations in the United States and face unique barriers to reproductive autonomy. While prior research has explored contraceptive access at intake, less is known about access throughout incarceration. Disruptions in refills, counseling, and follow-up may compromise reproductive planning and contribute to health inequities after release. This review evaluates continuity of contraceptive access and identifies barriers, facilitators, and system-level gaps affecting sustained use.

Methods: A systematic search of PubMed, Embase, Google Scholar, and OpenEvidence identified English-language studies published between 2010 and 2025. Search terms combined incarceration, women, contraception, and continuity of care. Included studies were relevant to contraception access during incarceration in the United States. Screening and data extraction were performed using predefined criteria, and study quality was systematically evaluated to inform interpretation of findings.

Results: Of 637 articles initially identified, 25 remained after screening. Contraceptive care is often discontinued after intake, with limited follow-up or refills available during incarceration. Barriers include institutional policy restrictions, inconsistent provider training, and fragmented coordination between intake and ongoing medical care. Facilities that maintained provider continuity or implemented reproductive health programs reported improved adherence and better access to follow-up care. Existing research is limited by small sample sizes, regional variability, and inconsistent reporting across facilities, which constrains generalizability and highlights the need for broader data collection.

Conclusion: A significant gap exists between initial access and sustained contraceptive care during incarceration. Strengthening institutional protocols, provider training, and continuity-of-care models may improve reproductive autonomy and health outcomes for incarcerated women.

Keywords: Incarceration, Women, Contraception, Continuity of Care

Clinically Significant Errors in AI-Translated Patient Education Materials and Medical Instructions: Implications for Patient Safety

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Language barriers and limited health literacy contribute to poor patient understanding and increased risk of adverse healthcare outcomes. Artificial intelligence (AI) tools are increasingly used to generate and translate patient education materials, including discharge instructions and surgical procedure explanations; however, their accuracy and clinical safety remain variable. This review systematically evaluated the accuracy and clinical reliability of AI-generated patient education and discharge materials and examines clinically significant errors with potential implications for patient safety and follow-up care. A structured literature review was conducted across ten major databases (including PubMed, Embase, and CINAHL), identifying 417 candidate studies. Inclusion criteria targeted studies evaluating AI-generated adult patient education materials and discharge instructions. Studies published prior to 2020, as well as pediatric, psychiatric, duplicate, and review articles, were excluded. Eighteen studies met inclusion criteria for final analysis. Extracted data were analyzed to identify trends in translation accuracy, types of errors, and potential clinical impact. Across studies, AI-generated translations demonstrated inconsistent accuracy, with substantial variation by language and clinical context. Errors affecting linguistic fluency were the most frequently reported across all languages and commonly reduced comprehensibility of translated materials. Clinically significant errors, including omissions, mistranslations, and altered meaningâ€”were more prevalent in less commonly supported languages, encompassing most languages aside from Spanish. These findings highlight the potential risks associated with unreviewed AI translation of medical information and highlight the need for human oversight to ensure patient safety. Further research focusing on under-represented languages in AI translation is essential to mitigate healthcare disparities and improve equitable access to safe, comprehensible patient education.

Keywords: Patient Education, Translation, AI, Language Barrier, Language, AI Translation, Large Language Model

Fascial Plane Blocks Do Not Reduce Opioid Use When Added to Intrathecal Morphine for Cesarean Delivery: A Literature Review

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Background: Intrathecal morphine is the gold standard for post-cesarean analgesia. Fascial plane blocks, including transversus abdominis plane (TAP) and quadratus lumborum (QL) blocks, have been proposed as adjuncts; however, their incremental benefit when combined with neuraxial opioids remains unclear. Methods: A structured review of randomized controlled trials, systematic reviews, and meta-analyses published between 2014–2024 was conducted using major medical databases. Studies comparing neuraxial anesthesia with and without TAP or QL blocks in cesarean delivery were included. Primary outcomes were 24-hour opioid consumption and pain scores. Results: TAP and QL blocks reduced opioid consumption and improved early pain scores when intrathecal morphine (ITM) was not used. Reductions of approximately 6–15 mg morphine equivalents for QL blocks and modest, variable reductions for TAP blocks, though findings were heterogeneous. In contrast, when ITM was included, neither TAP nor QL blocks provided clinically meaningful reductions in opioid consumption or pain scores. These findings were consistent across multiple meta-analyses and supported by randomized controlled trials showing no additive opioid-sparing effect with TAP plus ITM. Although QL blocks may provide slightly longer analgesia than TAP blocks, both techniques are largely redundant when effective neuraxial opioid analgesia is used. Conclusions: Fascial plane blocks provide opioid-sparing benefits when neuraxial opioids are not used but offer minimal additional benefit when combined with intrathecal morphine. Their use should be reserved for patients with contraindications to neuraxial opioids.

Osteopathic Manipulative Treatment Targeting Viscerosomatic Reflexes in the Management of Gastroesophageal Reflux Disease: A Case Report

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Gastroesophageal reflux disease (GERD) is a highly prevalent condition associated with substantial symptom burden and reduced quality of life, resulting from dysfunction of the antireflux barrier, particularly the lower esophageal sphincter (LES) and its diaphragmatic support. Although lifestyle modification and proton pump inhibitor (PPI) therapy remain first-line management, many patients experience persistent symptoms or seek additional nonpharmacologic options. Prior studies suggest osteopathic manipulative treatment (OMT), particularly techniques targeting the diaphragm and thoracoabdominal region, may influence LES pressure and esophageal motility through autonomic and neuromusculoskeletal mechanisms. We present a 53-year-old male with a several-year history of symptomatic GERD despite intermittent PPI therapy who demonstrated recurrent thoracic somatic dysfunction on osteopathic structural examination. The patient received OMT directed at the thoracoabdominal diaphragm, middle thoracic spine, and abdominal restriction using both direct and indirect techniques. Symptom response was assessed using the validated GerdQ questionnaire retrospectively at baseline, immediately post-treatment, and at five-month follow-up. GerdQ improved from 9 at baseline to 0 immediately following treatment. Symptoms gradually returned in the two weeks preceding the five-month follow-up, with GerdQ again measuring 9. During the interim, the patient reported reduced reflux frequency and fewer nocturnal symptoms without medication changes. While alternative causes like functional heartburn or motility disorders cannot be excluded, this case highlights a potential relationship between thoracic somatic dysfunction and GERD symptom burden and supports the physiologic plausibility of OMT as an adjunctive therapy. Limitations include retrospective baseline assessment and single-patient design. The observed temporal relationship supports further prospective studies evaluating OMT in GERD.

Keywords: Gastroesophageal reflux disease (GERD); osteopathic manipulative treatment (OMT); diaphragm; lower esophageal sphincter; somatic dysfunction; GerdQ; viscerosomatic

Beyond Decannulation: Long-Term Outcomes of ECMO in Congenital Heart Disease

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Introduction: Extracorporeal membrane oxygenation (ECMO) is a life-saving intervention for pediatric patients with congenital heart disease (CHD), but survival to hospital discharge does not fully reflect prognosis. Increasing focus has shifted to long-term outcomes, including neurodevelopment, organ function, and quality of life, yet prognostic factors remain poorly defined. A comprehensive synthesis is needed to guide patient selection and optimize care. Objective: To identify prognostic factors associated with positive and negative long-term outcomes in pediatric CHD patients supported with ECMO. Methods: A systematic review was conducted using PubMed/MEDLINE, Embase, Cochrane Library, and grey literature (2016–2026). Studies were included if they evaluated clinical, temporal, or treatment-related variables in relation to long-term outcomes (≥6 months), including survival, neurodevelopment, organ function, and quality of life. Studies limited to short-term outcomes were excluded. Data were extracted across three domains: (1) timing and indication for ECMO, (2) technical and institutional factors, and (3) peri-ECMO complications and outcomes. Study quality and heterogeneity were assessed, and thematic synthesis was performed. Results: Earlier ECMO initiation in reversible pathology and lower pre-ECMO end-organ dysfunction were associated with improved survival and neurodevelopment. Poorer outcomes were linked to prolonged ECMO duration, neurologic injury, renal failure requiring dialysis, and complex single-ventricle physiology. Additional factors, including financial burden, bridge-to-transplant use, and feeding or developmental disorders, showed uncertain prognostic significance. Conclusions: Long-term outcomes in pediatric CHD patients on ECMO are influenced by patient factors, timing of support, and complications. Standardized outcome reporting and multicenter longitudinal studies are needed to improve prognostication and guide care.

Keywords: Congenital Heart Disease

Beyond Glycemic Control: The Role of GLP-1 Agonists in Preventing Neurodegeneration

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Background: Neurodegenerative diseases affect more than 65 million people worldwide and significantly reduce quality of life while contributing to a leading cause of global mortality. Disorders such as Alzheimer's disease and Parkinson's disease currently lack treatments that effectively slow disease progression. Modifiable risk factors of these diseases include diet, body mass index (BMI), and diabetes . Furthermore, Glucagon-like peptide-1 receptor agonists (GLP-1 RAs), commonly used to treat type 2 diabetes and obesity, have recently shown potential neuroprotective effects, including reduced neuroinflammation and improved neuronal survival. Objective: This project hypothesizes that GLP-1 receptor agonists may reduce neurodegenerative disease progression through neuroprotective mechanisms independent of, or partially related to, glucose lowering. Methods: We conducted a systematized literature review by searching PubMed, Embase, Cochrane, and CINAHL. Inclusion criteria include studies that use semaglutide or other GLP-1 RAs and assess neuroprotective markers or neurological outcomes. Exclusion criteria include studies focused solely on weight loss or non-GLP-1 diabetes medications. Results: Preclinical studies have shown that GLP-1 agonists are a promising treatment for neurodegenerative diseases.

In Alzheimer's disease mouse models treated with liraglutide (a GLP-1 agonist for mice), there was a decrease in Î²-Objective: This project hypothesizes that GLP-1 receptor agonists may reduce neurodegenerative disease progression through neuroprotective mechanisms independent of, or partially related to, glucose lowering. Methods: We conducted a systematized literature review by searching PubMed, Embase, Cochrane, and CINAHL. Inclusion criteria include studies that use semaglutide or other GLP-1 RAs and assess neuroprotective markers or neurological outcomes. Exclusion criteria include studies focused solely on weight loss or non-GLP-1 diabetes medications. Results: Preclinical studies have shown that GLP-1 agonists are a promising treatment for neurodegenerative diseases. In Alzheimer's disease mouse models treated with liraglutide (a GLP-1 agonist for mice), there was a decrease in Î²-amyloid plaques and tau levels, which also led to a decrease in active microglia and an overall reduction in inflammation. In Parkinson's disease mouse models treated with extendin-4 (a GLP-1 agonist), motor impairment decreased, and protection against loss of dopaminergic neurons was observed.

Conclusion: Overall, there is promising evidence supporting the use of GLP-1 agonists as a treatment for neurodegenerative diseases. The first clinical trial that was done showed that it was a safe drug to use for Alzheimer's patients, but the study had too small a sample size to generate significant results. The next step is to conduct more clinical trials with larger experimental populations to further validate its effectiveness in preventing neurodegeneration in humans.

Keywords: Alzheimer Disease, Neuroprotection, Parkinson Disease, Glucagon-Like Peptide-1 Receptor Agonists

Integrating Cognitive Behavioral Therapy into Rehabilitation for Chronic Low Back Pain: Effects on Pain, Opioid Use, and Surgical Outcomes

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Background: Chronic low back pain (CLBP) is a leading cause of disability and contributes to long-term opioid prescriptions and spinal surgery. Psychosocial factors - including depression, anxiety, and chronic stress - amplify pain intensity, increase opioid reliance, and predict poorer functional recovery and higher postoperative complications. Multidisciplinary rehabilitation combining exercise or physiotherapy with psychological approaches such as cognitive behavioral therapy (CBT) is recommended; however, the independent and additive effects of CBT on pain, opioid use, and subsequent surgical rates remain uncertain. Methods: We conducted a focused literature review using PubMed and Embase, including randomized controlled trials, meta-analyses, systematic reviews, and large cohort studies evaluating CBT-based interventions delivered alone or combined with rehabilitation in adults with CLBP. Outcomes included pain intensity, functional measures, opioid use or taper success, and rates of spinal surgery. High-quality RCTs and recent pragmatic trials were prioritized.

Results: Evidence shows that psychological interventions combined with physiotherapy or exercise produce moderate improvements in pain and function. Long-term outcomes remain heterogeneous due to variability in intervention delivery and patient populations. Pragmatic trials yield mixed but generally favorable results, with some showing reduced pain and improved function versus usual care. Emerging data suggest CBT and mindfulness-based therapies reduce self-reported pain and are associated with decreased opioid dosing at 6–12 months. Direct evidence linking CBT to reduced spinal surgery rates remains limited. Conclusions: CBT is a low-risk, clinically meaningful adjunct that improves pain, function, and opioid stewardship in CLBP. Its greatest value lies in targeting maladaptive pain behaviors and central sensitization, key drivers of chronic pain and treatment resistance. Integrating CBT early in care pathways has the potential to reduce progression to high-risk interventions, including long-term opioid therapy and potentially surgery. Future studies should standardize interventions and evaluate long-term outcomes, particularly surgical utilization, to better define CBT's role in altering disease trajectory.

Keywords: Chronic low back pain, cognitive behavioral therapy (CBT), multidisciplinary rehabilitation, opioid use, pain management, functional outcomes, central sensitization, psychosocial factors, opioid tapering, nonpharmacologic treatment

Creatine Monohydrate Supplementation and Fracture Healing: A Literature Review of Effects on Bone and Muscle Recovery

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Fracture healing remains a significant clinical challenge, with delayed union and nonunion occurring in 5-10% of all fractures and contributing to prolonged disability, muscle atrophy, and substantial healthcare costs. While calcium, vitamin Dâ,*f*, and early mobilization are routinely recommended, few affordable adjuncts directly target the energy-dependent processes underlying bone and muscle repair. Creatine monohydrate, a widely used supplement with a well-established safety profile, has demonstrated benefits in skeletal muscle energetics, hypertrophy, and recovery through enhanced phosphocreatine stores and ATP availability. Preclinical evidence suggests potential effects on bone metabolism through improved cellular energetics and modulation of oxidative stress pathways. This literature review synthesizes interdisciplinary evidence assessing whether oral creatine monohydrate supplementation positively impacts healing outcomes following fracture diagnosis. A systematic search of PubMed, Cochrane, Embase and related databases yielded studies across preclinical and human models. Studies were screened by authors Sierra H Jones, Samuel Majka, Dylan Johnson, Dillon Sorensen, Andrew Dong, and Rayna Carlson with conflict resolution by Sierra H Jones. Evidence consistently supports creatine as a low-cost, well-tolerated supplement with adequate absorption and bioavailability. Across the included literature, findings demonstrate that creatine supplementation may benefit muscle preservation during immobilization, with robust benefits observed during post-immobilization rehabilitation following disuse atrophy. Creatine improves bone geometric properties predictive of bending strength under mechanical loading, though effects on bone mineral density remain inconsistent. Additionally, creatine may indirectly affect bone fracture healing through metabolic amplification via increased intracellular phosphocreatine availability, which serves as a rapidly mobilizable energy buffer during high ATP demand. Under certain conditions, creatine has been shown to enhance mTOR/P70S6K anabolic signaling and modulate AMPK activity, though these effects are context-dependent and have not been demonstrated in bone tissue. The creatine kinase/phosphocreatine system is essential for osteoblast energy metabolism and differentiation, with phosphocreatine promoting mineralization via SIRT1/FOXO1/PGC-1Î± signaling and suppressing oxidative stress in vitro, though direct evidence linking oral creatine supplementation to bone tissue creatine accumulation is lacking. Critically, no studies directly evaluate creatine supplementation in fracture healing populations, and no data exist regarding time to radiographic union or functional recovery. Targeted trials should evaluate creatine's impact on time to radiographic union, functional recovery milestones, and patient-reported outcomes in both operatively and non-operatively managed fractures.

Keywords: Creatine monohydrate, creatine, creatine supplementation, phosphocreatine, Fracture healing, muscle atrophy, disuse atrophy, immobilization, skeletal muscle, muscle preservation, Bone metabolism, nonunion, bone geometry, nutritional supplementation

Exposure-related ocular surface disease in facial nerve palsy: mechanisms and determinants of severity

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Background: Facial nerve palsy is a common cause of acute unilateral facial paralysis that impairs eyelid closure (lagophthalmos), placing the ocular surface at risk for exposure-related injury and vision loss. This review aims to summarize the mechanisms underlying ocular surface disease in facial nerve palsy and to evaluate current management strategies.

Methods: A structured literature search of PubMed and Google Scholar was conducted (February–April 2026) using keywords including facial nerve palsy, lagophthalmos, exposure keratopathy, and ocular surface disease. Studies were included if they described pathophysiologic mechanisms or clinical management of ocular surface complications. Articles lacking mechanistic or clinical relevance were excluded. Evidence was synthesized narratively.

Results: Facial nerve palsy contributes to ocular surface injury through lagophthalmos, reduced blink reflex, and tear film instability. Orbicularis oculi dysfunction impairs eyelid closure, while reduced corneal sensation diminishes reflexive blinking, increasing exposure. These changes promote epithelial breakdown, inflammation, and infection risk, potentially progressing to corneal ulceration and vision loss. Evidence, largely from observational studies, supports stepwise management with lubrication, eyelid taping, and surgical interventions in refractory cases.

Conclusions: Early recognition and intervention are critical to preventing ocular surface complications. This review integrates pathophysiology with management and highlights the need for higher-quality evidence to guide treatment selection.

Keywords: Facial nerve palsy, ocular surface disease

Does an Individual's Understanding of the Scientific Method Impact Their Decision to Receive Vaccines?

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INTRO: Vaccine hesitancy has been identified by the World Health Organization as a top threat to global health. Between 2019 and 2024, MMR vaccination rates dropped from 95% to 92.5% in the United States, with rates being lower than 80% in some states. The hypothesis is that the speed of the development of the Covid-19 vaccine spurred mistrust in the process, leading to increased hesitancy. This review aims to identify and synthesize existing evidence connecting an individual's understanding of the scientific method with vaccine hesitancy.

METHODS: Lexical searches in PubMed, Embase, Cochrane, and CINAHL databases and semantic searches of OpenEvidence, Consensus AI and EBSCO were completed, using terms such as vaccine hesitancy in conjunction with scientific method or scientific reasoning. Two reviewers independently screened the studies and extracted the data. Articles had to be published in English. Studies of all populations and research designs were included.

RESULTS: The retrieved articles were assessed for scientific reasoning among respondents using tools such as the Scientific Reasoning Scale. The SRS uses true/false questions about scientific concepts, such as causality and blind studies. No link between scientific reasoning and vaccine hesitancy was established nor did articles assess understanding of the scientific method specifically.

DISCUSSION: A limitation of the literature review is that the search retrieved a limited number of results. However, it is evident that this connection requires further study. The research team will proceed by developing and distributing a survey to assess scientific method understanding and whether there is any correlation to vaccine hesitancy.

Feasibility of a Brief, CBT-Informed Cognitive Workbook as an Adjunct to Transcranial Magnetic Stimulation for Major Depressive Disorder

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Repetitive transcranial magnetic stimulation (rTMS) is effective for treatment-resistant depression. While combining rTMS with psychotherapy has theoretical appeal, meta-analyses show no significant benefit of concurrent or pre-rTMS psychological interventions over rTMS alone. However, rTMS induces neuroplastic changes that persist beyond stimulation, and the immediate post-rTMS window (0-10 minutes) remains unexplored. Brief cognitive exercises completed after rTMS may leverage this plasticity period for skill consolidation without the sensory interference that has limited during-session interventions. Objective: To assess the feasibility and acceptability of a brief (5-10 minute), CBT-informed cognitive workbook completed immediately after rTMS sessions for major depressive disorder. Methods: We propose a single-arm feasibility study to enroll 20-30 patients receiving rTMS for major depressive disorder. Participants would complete a structured, progressive workbook with CBT-informed exercises (cognitive restructuring, behavioral activation, thought records) immediately after each rTMS session. Minimal guidance would be provided through brief weekly check-ins. Primary outcome would be workbook completion rate across sessions. Secondary outcomes would include Patient Health Questionnaire-9 (PHQ-9) scores at baseline, week 3, and week 6; patient satisfaction; and qualitative feedback on barriers to engagement. Expected Results: We anticipate the possibility of establishing feasibility benchmarks for completion rates and identifying patient-reported barriers and preferences. Preliminary depression symptom trajectories will inform future controlled trials. Significance: This study addresses a critical gap by testing a novel post-rTMS timing approach that differs from previously studied concurrent or pre-rTMS interventions. This scalable, theoretically-grounded intervention targets the unexplored post-stimulation neuroplasticity window and may inform strategies to enhance rTMS outcomes in treatment-resistant depression.

Keywords: Transcranial Magnetic Stimulation, Major Depressive Disorder, Cognitive Behavioral Therapy, Neuroplasticity

Osteopathic Manipulative Medicine for Shoulder Instability, Sling-Related Dysfunction, and Psychosocial Resilience in Ehlers-Danlos Syndrome: A Case Report

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Introduction: Hypermobile Ehlers-Danlos syndrome (hEDS) is characterized by joint hypermobility, chronic pain (>90%), and significant psychosocial burden, with high rates of anxiety and depression. Conventional treatments often fail to address functional and psychosocial domains. This case describes OMT aimed at improving psychosocial health and function in severe hEDS refractory to standard care. Case Description: A 25F with hEDS presented with chronic low back and pelvic pain, with diffuse, bilateral upper extremity symptoms after seven prior shoulder surgeries. Exam showed paraspinal hypertonicity (C3–L5), sacroiliac dysfunction, and pelvic asymmetry. Pain was 8–10/10 during daily flares and 7/10 baseline. She reported significant anxiety, social isolation, poor sleep, and limited exercise tolerance. Physical therapy worsened symptoms; opioids caused cognitive impairment. She continued aquatic and cognitive behavioral therapy. Intervention/Results: The patient received nine OMT sessions over 16 weeks using counterstrain, muscle energy, myofascial release, and balanced ligamentous tension. By week 16, she reported reproducible anxiety reduction lasting 4–6 hours post-treatment, improved sleep, and increased social activity tolerance. Pain flares decreased from daily to 4–5 times weekly, with reduced intensity (8–10/10 to 6–7/10). Functional capacity improved, including tolerance of light resistance exercise. Discussion: Differential considerations include central sensitization and comorbid anxiety. OMT may influence autonomic regulation and pain perception, contributing to observed psychosocial improvements. Concurrent therapies limit attribution, but consistent post-treatment effects support a potential neuromodulatory role. Conclusion: OMT may improve psychosocial health, function, and pain in severe hEDS within multidisciplinary care, warranting further study with standardized outcome measures.

Keywords: Hypermobile Ehlers-Danlos Syndrome, Osteopathic Manipulative Treatment, Psychosocial Functioning

Psychiatric Effects of Exogenous Testosterone in Women: A Narrative Review and Synthesis of Limited Evidence

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Testosterone therapy in women has become increasingly common, particularly for hypoactive sexual desire disorder in postmenopausal women. While psychiatric and cognitive effects have been thoroughly reviewed in men, no comparable synthesis exists for women. Available evidence is limited and often inconclusive. Given expanding clinical use, a comprehensive review is needed to inform practice and identify safety considerations. Objective: This narrative review synthesizes current evidence on psychiatric, mood, and cognitive effects of testosterone in women, evaluating associations between endogenous and exogenous testosterone and outcomes including depression, anxiety, mood instability, and cognitive function, while identifying methodological limitations and evidence gaps. Methods: A targeted literature search was conducted using PubMed/MEDLINE, Embase, and PsycINFO to identify studies evaluating testosterone levels or therapy in adult women in relation to psychiatric or cognitive outcomes. Emphasis was placed on randomized controlled trials, systematic reviews, and clinical guidelines. Findings were synthesized thematically with critical appraisal of study quality. Results: Preliminary findings reveal substantial evidence gaps. One meta-analysis of 36 RCTs (8,480 women) shows physiologic-dose testosterone does not significantly affect depressive mood or psychological wellbeing. No trials report mania, suicidality, or significant anxiety as adverse effects. Limited cognitive data (three studies, 159 women) show no effect. Major limitations include short trial durations (median 4 months), focus on postmenopausal women, and insufficient data on premenopausal women or long-term safety. Conclusion: This review provides a comprehensive synthesis of testosterone's psychiatric and cognitive effects in women, clarifying current evidence to inform clinical decision-making and future research.

Keywords: Testosterone Therapy, Women, Cognition, Mood Disorders, Neuropsychiatric Effects

From Trend to Trauma: The Burn Risks of Vaping Devices

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INTRODUCTION Electronic cigarette (e-cig) use has risen dramatically over the past decade, emerging as a widespread form of nicotine consumption. Among the risks, burn injuries represent an underrecognized complication of e-cig use, often resulting from a lithium-ion battery explosion. This study reviews the literature on e-cig-associated burns to characterize injury patterns and inform targeted prevention strategies.

METHODS A systematic review was conducted using MEDLINE via PubMed to identify studies reporting burn injuries related to e-cig devices. Eligible studies were published in English from 2006 onward and involved human subjects with e-cig-related burns. The search identified 21 articles, which were independently screened by four reviewers. Of the articles, 19 met inclusion criteria and were included in the final analysis. Extracted data included demographics, injury mechanism, burn characteristics (location, depth, and total body surface area (TBSA)), management, and outcomes.

RESULTS Burns predominantly affect young men (mean age 30-40) and most commonly result from battery explosions, often when devices are carried in pockets. Injuries frequently involve the thigh, hands, genitalia, and face. Burns are typically mixed partial- and full-thickness, with a mean TBSA of 5%, yet many require operative management. Hospital stays average 6-12 days, with 35-61% of patients undergoing skin grafting. Complications include infection and maxillofacial injury, contributing to significant morbidity.

DISCUSSION E-cig burns are a preventable source of traumatic injury with consistent injury patterns, frequent operative intervention, and disproportionate morbidity relative to burn size. These findings underscore critical opportunities for prevention through patient education, improved device design, and strengthened regulatory oversight.

Subclinical Cortisol-Producing Adrenocortical Adenoma Presenting with Nonspecific Systemic Symptoms

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As abdominal imaging becomes more widespread, adrenal incidentalomas are increasingly detected. These are typically followed without intervention by physicians. However, growing evidence suggests that even benign-appearing adrenal lesions may be active, producing subtle but meaningful symptoms without clear initial biochemical findings. To illustrate the difficulties in diagnosis and management of patients with an incidentaloma, we present the case of a 61-year-old woman with an incidentally discovered left adrenal mass.

The patient's past medical history is significant for hypertension and major depressive disorder, as well as a 9-month history of progressive morning anxiety, hot flashes, depressed mood, palpitations, chest discomfort, tremor, decreased appetite, and 17-lb unintentional weight loss with partial regain. Over the same interval, hormone replacement therapy (HRT) was initiated. Symptoms worsened and HRT was discontinued. Medications include triamterene–hydrochlorothiazide. The mass was identified 2 months before endocrine consult during imaging for post-influenza hepatomegaly. MRI demonstrated a 3.0 cm heterogeneous lesion.

Physical exam showed fine tremor without overt Cushingoid features (no striae, dorsocervical fat pad, central adiposity, or proximal weakness). Morning cortisol was 17 µg/dL (normal 5–19 µg/dL). A 24-hour urinary free cortisol was normal (19 µg/day; normal is 8–51 µg/day), but the urine cortisol/creatinine ratio was elevated (40; normal is 12–19). A 1-mg dexamethasone suppression test showed inadequate suppression (cortisol 5.3 µg/dL; normal is <1.8 µg/dL) with suppressed ACTH <1.5 pg/mL, supporting ACTH-independent cortisol secretion. Repeat CT at 3 months showed interval growth to 3.2 cm.

The patient was started on ketoconazole while awaiting surgery and underwent uncomplicated laparoscopic adrenalectomy 6 months after discovery. Pathology confirmed a low-grade adrenocortical adenoma. Postoperatively, she received physiologic hydrocortisone (20 mg AM/10 mg PM) with taper and reported improvement in blood pressure, mood, energy, appetite, and resolution of both anxiety and palpitations.

This case demonstrates that clinically significant but nonspecific symptoms with improvement after adrenalectomy can occur even with normal initial cortisol testing. This case emphasizes individualized evaluation and that suppression testing plus phenotype may justify adrenalectomy in selected patients with incidentaloma and suspected MACE.

Keywords: Adrenal incidentaloma, Mild autonomous cortisol excess, Subclinical Cushing syndrome, Endocrine evaluation, Surgical management

Clouded Complexions: Dermatologic Effects of Electronic Cigarettes

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Electronic cigarettes (e-cigs) are widely used as an alternative to traditional smoking. Although often perceived as safer, emerging evidence suggests e-cig use may adversely affect skin health through proinflammatory signaling and oxidative stress. Existing studies typically examine dermatologic disease states in isolation. This study synthesizes current literature to provide a comprehensive understanding of e-cig use and dermatologic disease. A systematic review was conducted using a MeSH-guided PubMed search. Four reviewers independently screened 78 articles using predefined inclusion criteria; discrepancies were resolved by consensus. Eligible studies were published in English from 2006 onward and analyzed dermatological diseases and electronic cigarette use in humans. Thirteen studies met the inclusion criteria, and study characteristics and outcomes were extracted. The most frequently reported conditions included atopic dermatitis (n=7), impaired wound healing (n=3), psoriasis (n=2), and nonmelanoma skin cancer (n =2). E-cig use was associated with both development and exacerbation of dermatologic disease. Human studies suggested links to inflammatory signaling, while mechanistic pathways (oxidative stress, tissue hypoxia) were largely inferred. Multiple studies demonstrated a significant association with atopic dermatitis, while one identified a male-specific association with psoriasis. Evidence also suggests impaired wound healing and increased carcinogenic risk. Findings were limited by heterogeneous study designs and small sample sizes. E-cig use worsens skin integrity, inflammation, healing, and carcinogenic risk, challenging its perception as a safer alternative to cigarette use. These findings support the need for targeted public health education and regulatory efforts to mitigate harm.

In Patients Undergoing General Anesthesia, Does the Combination of Remifentanil and Propofol Compared to Propofol with Other Analgesics Result in Improved Perioperative Outcomes?

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Background: In patients undergoing general anesthesia, the combination of remifentanil and propofol is widely used for its rapid onset, short context-sensitive half-time, and predictable pharmacokinetics. However, rising costs and drug shortages have prompted an evaluation of alternative adjuncts. This study aimed to determine whether remifentanil–propofol provides superior perioperative outcomes compared to propofol combined with other analgesics, including alfentanil, sufentanil, fentanyl, ketamine, dexmedetomidine, and lidocaine. Methods: A narrative literature review was conducted using PubMed and Embase, focusing on randomized controlled trials, observational studies, and pharmacokinetic analyses relevant to anesthetic practice. Search terms included propofol, remifentanil, opioids, ketamine, dexmedetomidine, lidocaine, and pharmacokinetics. Studies relevant to pharmacokinetics and perioperative outcomes were selected, while non-clinical and non-comparative studies were excluded. Data were synthesized qualitatively, emphasizing elimination half-life, context-sensitive half-time, metabolism, and accumulation; formal quality assessment was not performed. Results: Remifentanil demonstrated a unique context-insensitive half-life (3–10 minutes) with minimal accumulation, enabling precise titration and rapid emergence, supporting improved intraoperative control and shorter recovery times. In contrast, fentanyl, alfentanil, and sufentanil exhibited longer, infusion-dependent context-sensitive half-times, leading to accumulation and delayed or less predictable recovery. Ketamine, dexmedetomidine, and lidocaine provided favorable adjunctive effects such as hemodynamic stability and postoperative analgesia but demonstrated longer elimination profiles and less predictable offset. Conclusion: Remifentanil–propofol is associated with improved perioperative outcomes, particularly in settings requiring rapid titration and predictable emergence. While alternative agents offer specific advantages, their pharmacokinetic limitations reduce their ability to consistently replicate this efficiency. These findings should be interpreted within the limitations of a narrative review without formal quality assessment.

Keywords: Anesthesiology, Pharmacokinetics, Pain Management

Favorable Early Outcome with Conservative Management of Humeral Head Osteonecrosis: A Case Report

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Background: Humeral head osteonecrosis (AVN) occurs when disruption of the vascular supply to the proximal humeral head leads to bone necrosis. Radiographical staging is based on the extent of subchondral destruction and integrity of the articular surface and glenoid cavity. Once AVN progresses to subchondral collapse, treatment requires shoulder arthroplasty. Early-stage disease may be managed with conservative approaches aimed at improving perfusion, stabilizing bone, and slowing disease progression; however, there is little literature evaluating outcomes of conservative management in early-stage AVN. Case presentation: A 74-year-old female with hypertension, hyperlipidemia, osteopenia, and a 56-pack-year smoking history presented with 6 months of progressive right shoulder pain and functional limitation with overhead activity. She denied trauma or corticosteroid use. Exam revealed mild weakness in shoulder abduction, painful range of motion, and a positive Empty Can Test. Initial differential included rotator cuff tendinopathy and glenohumeral osteoarthritis. CT and MRI demonstrated early-stage (Ficat-Arlet II, pre-collapse) osteonecrosis of the superior-medial humeral head with mild acromioclavicular arthropathy and rotator cuff tendinopathy. No alternative etiologies were identified. The patient was treated with atorvastatin 20 mg daily, alendronate 70 mg weekly, a home exercise program, and reduced tobacco use. At 3-month follow-up, she showed increased range of motion and reported improved pain and function. Conclusion: Conservative management may provide favorable early outcomes in patients with early-stage AVN. Statins may improve perfusion and osteogenesis, while bisphosphonates may delay subchondral collapse by inhibiting osteoclastic activity. Home exercise program supports joint functionality. Short follow-up and lack of repeat imaging limit definite conclusions.

Keywords: Osteonecrosis, Avascular Necrosis, Conservative management

Kinesiology Taping versus Myofascial Release: A Comparative Review of Mechanisms and Effects on Pain, Functional Movement, and Athletic Performance

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Background: Athletes often use conservative treatments such as kinesiology taping (KT) and myofascial release (MFR) to address musculoskeletal discomfort, improve functional movement, and enhance performance; however, few studies have directly compared their effectiveness. This review aims to inform future primary research by comparing mechanisms and outcomes of KT versus MFR and evaluating their combined use.

Methods: A narrative review was conducted using PubMed with keywords including "[kinesiology tap*]" and "[myofascial release]." Studies were included if they evaluated KT or MFR in human subjects, with emphasis on clinically relevant outcomes. Articles were screened by four reviewers and qualified based on study design and bias risk.

Results: Both KT and MFR are proposed to influence mechanoreceptors, fluid movement, and tissue tension within the myofascial system. KT acts by lifting superficial skin layers, whereas MFR acts through targeted pressure. Evidence suggests both KT and MFR may modestly improve musculoskeletal pain, range of motion, and functional movement; however, little evidence supports a significant relationship with athletic performance. Other evidence suggests that combining the therapies may provide improved outcomes in pain relief, flexibility, mobility, function, blood flow, and proprioception compared with either intervention alone; however, protocol heterogeneity and small sample sizes limit definitive conclusions.

Conclusions: While few studies have directly compared KT to MFR, both techniques continue to be widely used because of their benefits to athletic performance, post-injury recovery, or functionality. Due to slight mechanistic differences, combining KT and MFR may incur the most benefit.

Keywords: Kinesiology Taping, Myofascial Release, Musculoskeletal Pain, Athletic Performance

Pediatric Hemifacial Spasm: A Narrative Review and Call to Action

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Background: Hemifacial spasm (HFS) is a chronic hyperkinetic facial nerve disorder characterized by involuntary, unilateral facial muscle contractions. While well-described in adults, where neurovascular compression of the facial nerve root exit zone predominates, pediatric HFS remains profoundly underrecognized. Fewer than 50 cases have been reported worldwide, and no standardized diagnostic criteria, imaging protocols, or treatment guidelines exist for this population. Clinicians are forced to extrapolate from adult data despite fundamental differences in anatomy, etiology, neurodevelopment, and psychosocial impact. Objective: This narrative review and call to action synthesizes the existing literature on pediatric HFS, identifies structural gaps impeding standardized care, and proposes a foundational framework for diagnostic classification, etiological investigation, and age-stratified treatment. Methods: A comprehensive search of PubMed, EMBASE, Cochrane, CINAHL, and Google Scholar was performed using terms including hemifacial spasm, facial nerve hyperkinesia, pediatric, children, and adolescent. All case reports, case series, and review articles describing HFS in patients under 18 years of age were included. Evidence was synthesized across 6 domains: clinical phenotyping, etiological and neuroimaging characterization, treatment modalities, procedural standardization, longitudinal follow-up, and patient-centered outcome measurement. Results: The literature encompassed fewer than 50 pediatric cases, reflecting profound underreporting and the absence of a unifying diagnostic framework. Etiological heterogeneity was a defining feature. Posterior fossa lesions, vascular anomalies, demyelinating disease, and idiopathic presentations were all represented but inconsistently evaluated. Treatment approaches, where reported, included botulinum toxin injection and microvascular decompression, with selection appearing to reflect institutional preference rather than evidence-based criteria. Age-stratified protocols were absent, longitudinal data were sparse, and quality-of-life measures were virtually nonexistent.

Keywords: Pediatric, Physical Medicine and Rehabilitation

Cultural Background, Stigma, and Help-Seeking for Mental Health Among Medical Students: A Comparison of International and U.S.-Born Students

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Depression and anxiety are common among medical students, yet many do not seek professional help due to stigma, perceived barriers, and culturally influenced beliefs about mental illness. These barriers may differ across cultural backgrounds. This study examines cross-cultural differences in mental health help-seeking among medical students, with particular attention to stigma and barriers to care, comparing international and U.S.-born students.

This cross-sectional, anonymous Qualtrics survey recruited medical students at Rocky Vista University across the Utah, Colorado, and Montana campuses. Of 47 eligible responses, 18 identified as international students and 29 as U.S.-born. After electronic consent, participants completed a vignette-based survey assessing help-seeking intentions (GHSQ), self-stigma of seeking help (SSOSH), perceived barriers to care (BACE-3), depression and anxiety symptom severity (PHQ-9, GAD-7), individualism-collectivism, and demographics. Participants received a $5 Amazon gift card through a separate end-of-survey link, preserving response anonymity.

Data are currently being analyzed using descriptive statistics and multiple linear regression to examine whether self-stigma predicts help-seeking intentions after adjustment for demographic factors and symptom severity. Group comparisons will assess differences in stigma, barriers, and help-seeking patterns between international and U.S.-born students. Limitations include the small sample size and single-institution design, which may limit generalizability. Nevertheless, findings may help identify culturally influenced barriers to mental health care and inform targeted interventions, including tailored psychoeducation, peer or faculty mentorship, and institutional support strategies for medical students across cultural backgrounds.

Keywords: Mental health help-seeking, Self-stigma, Medical students, Cross-cultural, International students, barriers to care, help-seeking intentions, depression, anxiety

The Efficacy of Dexmedetomidine in Mitigating Anesthetic-Induced Neurotoxicity in Neonates Undergoing Congenital Cardiac Surgery: A Literature Review

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Introduction: Neonatal brain development is vulnerable to anesthetic-induced neurotoxicity from multiple exposures, especially during complex cardiac surgery. While brief exposures to anesthetics in healthy children are safe, the risks of systemic inflammation and instability in neonates remain a concern. Dexmedetomidine (DEX), an alpha-2 agonist, offers potential neuroprotection without the GABA-mediated toxicity seen in other agents. This review evaluates DEX's efficacy in mitigating neurotoxicity and improving outcomes in high-risk neonates. Objective: To investigate the impact of perioperative dexmedetomidine on molecular markers of neurotoxicity, perioperative clinical outcomes, and long-term neurodevelopment in neonates undergoing congenital cardiac surgery. Methods: PubMed, Google Scholar, ClinicalKey, and OpenEvidence were searched. Keywords included Dexmedetomidine, Neonatal Neurotoxicity, and Congenital Heart Surgery. Inclusion criteria focused on human clinical trials (neonates to infants <1 year) and supporting preclinical neonatal models. Analysis included data from randomized controlled trials (RCTs), meta-analyses, and preclinical studies focusing on cellular apoptosis and cognitive metrics. Results: Mechanistically, DEX exerts neuroprotection by stabilizing mitochondria and preserving membrane potential, thereby reducing isoflurane-associated caspase-3 activation. Clinically, DEX administration suppressed pro-inflammatory cytokines (IL-6) and brain injury markers (NSE) during CPB. While DEX improved perioperative stability, enhanced pain management, and reduced emergence delirium, long-term neurodevelopmental assessments spanning from neonates through age 3 (e.g., Bayley Scales at 1–2 years) remain inconclusive. Large RCTs showed no significant long-term neurodevelopmental difference compared to standard regimens. Conclusion: DEX provides promising anti-inflammatory and anti-apoptotic benefits during neonatal cardiac surgery. Although clinicians must monitor for bradycardia and hypotension, DEX improves perioperative stability. However, further longitudinal research is necessary to determine if these molecular advantages translate into superior long-term neurodevelopmental outcomes.

Keywords: Anesthesiology, Neuroprotection, Neonate

Long-Term Bile Duct Injury After Cholecystectomy: A Comparative Study of Robotic and Laparoscopic Approaches

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Background: Cholecystectomy is the definitive treatment for gallbladder disease. Bile duct injury (BDI) is a rare but serious complication associated with long-term morbidity.. Robotic platforms offer enhanced visualization and dexterity compared with laparoscopy. This study evaluates whether robotic assistance reduces long-term BDI incidence. Methods: A systematic review was performed. PubMed, Embase, Google Scholar, and Open Evidence were searched for studies (2015–2025) comparing BDI after robotic versus laparoscopic cholecystectomy. Eligible studies included English-language randomized controlled trials and longitudinal cohort studies in adults. Due to heterogeneity in design, a qualitative narrative synthesis was conducted. Risk of bias was assessed using study design appropriate tools. Twenty-five studies met inclusion criteria, representing â‰¥744,543 patients. Results: BDI incidence ranged from 0.19% to 0.4%, with no significant difference between approaches ($p > 0.05$). Robotic surgery demonstrated lower conversion-to-open rates, including zero conversions in some complex cases; conversion has been associated with BDI rates up to 15%. Long-term morbidity remained substantial, with 36% developing recurrent biliary complications and strictures occurring a mean of 3.3 years after repair. Quality of life was similar, though robotic patients reported less neuropathic pain. Repairs at specialized hepatobiliary centers after >6 weeks achieved higher success (~90% vs. 68%). Conclusion: Robotic cholecystectomy does not reduce BDI incidence but may lower conversion rates in complex cases. BDI outcomes are driven more by post-injury management than operative modality. Delayed repair and referral to specialized hepatobiliary centers yield superior outcomes, emphasizing early recognition and structured referral pathways. Future work should improve intraoperative decision-making, access to specialized care, and patient selection for robotic approaches.

Keywords: Laparoscopic, surgery, robotic, bile duct

Standardizing Language Preference Assessment To Reduce Wait Times At A Student-Run Free Clinic

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Background: In resource-limited settings such as student-run free clinics with few bilingual volunteers, lack of standardized language documentation can create inefficiencies. At the Doctor's Volunteer Clinic (DVC), the intake form does not assess language preference. As a result, some bilingual (Spanish-English) patients may be labeled as "Spanish-speaking," potentially prolonging visit times by assigning them unnecessary Spanish-language assistance. Objective: To implement a standardized language preference question upon intake and reduce wait times for bilingual patients. Methods: This study will be conducted at the DVC in St. George, Utah, using the Plan-Do-Study-Act (PDSA) model. The intake question selected was: In what language would you prefer to receive your medical care today? with response options, English, Spanish, Other, or I am comfortable in either language. Existing data includes total wait time and total visit time per patient. Data will be stratified by English-only, Spanish-only, and bilingual patients. Outcomes from 20 clinic hours pre-intervention will be compared to 20 clinic hours post-intervention using statistical process control charts and comparative analysis. Results: Expected outcomes include reduced visit times for bilingual patients selecting "English" or "either," maintained or improved wait times for Spanish-only patients through better allocation of bilingual volunteers, improved accuracy of language preference documentation, and enhanced clinic efficiency. Conclusions: A single standardized language preference question is a feasible, low-cost intervention to improve clinic efficiency. Distinguishing between Spanish-speaking and Spanish-preferring patients may reduce unnecessary delays while preserving access for those requiring care in Spanish.

Sex-Based Disparities in Coronary Artery Bypass Grafting: Evidence from National Registry and Meta-Analysis Data

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Background Sex-based disparities in coronary artery bypass grafting (CABG) persist despite improvements in cardiothoracic surgery. A review of approximately 1.3 million CABG procedures performed in the US between 2011 and 2020 found that operative mortality was higher among females compared to males (2.8% vs. 1.7%), as was the occurrence of major complications in the postoperative period (22.9% vs. 16.7%) [1]. Females are also found to be at a disadvantage in the use of guideline-based multi-arterial and complete revascularization strategies. Objective To synthesize evidence on sex-based differences in CABG outcomes, including operative mortality, graft failure, and use of multi-arterial grafting, and to evaluate potential mediated factors such as intraoperative anemia and disparities in practice patterns.

Methods This narrative review integrates findings from retrospective studies, Society of Thoracic Surgeons Adult Cardiac Surgery Database, and published meta-analyses of studies. Studies were identified through review of major registry reports and peer-reviewed literature evaluating sex-based CABG outcomes and were selected for relevance to sex-stratified CABG outcomes. The odds ratio for operative mortality and graft failure was assessed in females compared to males.

Results Female gender was found to be independently associated with increased operative mortality with an adjusted ratio (aOR) of 1.28–1.41 [1]. A pooled analysis found a ratio of approximately 1.77 for mortality in females after undergoing CABG [2]. Females were found to be 14–22% less likely to receive multi-arterial grafting strategies [3]. Graft failure at one year was higher in females (37.3% vs. 32.9%) [4]. A significant proportion of mortality risk in females was mediated through intraoperative anemia [4].

Conclusion Females undergoing CABG procedures have worse short-term outcomes. These sex-based disparities are a result of biological and systematic factors. The use of sex-based risk assessment tools and revascularization strategies is crucial in reducing preventable mortality and morbidity.

Keywords: Sex-based disparities, cardiology, cardiothoracic surgery, CABG

Neutrophil Extravasation Inhibitors as Therapeutic Targets in Acute Pancreatitis: A Literature Review

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Background: Acute pancreatitis remains a major clinical challenge, with treatment largely limited to supportive care. Neutrophil-driven inflammation plays a central role in disease progression, contributing to pancreatic injury, systemic complications, and organ failure. Targeting neutrophil recruitment and activation has emerged as a potential therapeutic strategy. Objective: This review synthesizes current evidence on neutrophil extravasation inhibitors in acute pancreatitis, focusing on chemokine-mediated recruitment pathways and neutrophil extracellular trap (NET) formation.

Methods: A structured review of preclinical studies examining neutrophil-targeted therapies in experimental pancreatitis models was conducted, with emphasis on CXCR2 signaling inhibition, NET degradation and prevention, and modulation of alternative chemokine pathways.

Results: Multiple approaches demonstrate protective effects. CXCR2 inhibition shows robust efficacy in acute and chronic models, including post-onset treatment. NET-targeted therapies, such as DNase I and peptidylarginine deiminase inhibitors, significantly reduce pancreatic injury, systemic inflammation, and multi-organ damage. Combination therapy with N-acetylcysteine and DNase I produces synergistic effects by preventing NET formation and degrading existing NETs. Additional strategies, including gasdermin D inhibition, AXL/MERTK antagonism, and selective chemokine blockade, offer complementary benefits. Clinical relevance is supported by elevated NET biomarkers in severe cases. Mechanistic studies indicate that NETs amplify neutrophil recruitment and directly induce trypsin activation in acinar cells, forming a pathological feedback loop.

Conclusions: Targeting neutrophil extravasation and NET formation is a promising therapeutic strategy in acute pancreatitis. Multi-mechanistic approaches may improve outcomes and warrant clinical investigation.

Keywords: Immunology, Gastroenterology

Potential Impacts of the Carnivore Diet on Chronic Inflammatory Disease

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The "Carnivore Diet," characterized by a high intake of animal proteins and fats with minimal to no carbohydrates, has gained traction among individuals with chronic inflammatory conditions who report improved quality of life. Despite its rising popularity, there is limited scientific literature evaluating its long-term health outcomes. This literature review explores the potential effects of a high-protein, zero-carbohydrate dietary pattern on chronic and inflammatory conditions, identifying populations that may benefit or be at risk. A comprehensive search across seven databases was conducted to assess existing studies on similar dietary approaches, including ketogenic and paleolithic diets, with relevance to the Carnivore model. Due to lack of peer-reviewed research specific to the Carnivore diet, grey literature was included to capture public perspectives and self-reported outcomes. Findings suggest that the Carnivore diet may offer benefits for select patient populations, particularly where elimination strategies help mitigate chronic inflammation, such as in irritable bowel syndrome (IBS). However, it may exacerbate conditions like gout and hyperlipidemia and introduce additional long-term risks. This project has revealed significant gaps in current research, underscoring the need for further investigation into the Carnivore diet's long-term effects and clinical implications. This review aims to inform personalized nutritional guidance and contribute to the evolving discourse on restrictive dietary patterns.

Keywords: Carnivore diet, high-protein diet, nutrition, chronic inflammatory disease

Emergency Department Visits for Suicidal Ideation Among Gender-Diverse Adolescents: A Literature Review

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Emergency department (ED) visits for suicidal ideation among adolescents have increased over the past two decades, with a higher risk among gender-diverse youth. However, limited evidence describes how these trends vary by race and ethnicity among adolescents with ICD-10 gender identity-related diagnoses in the United States (US). To address this gap, this review aimed to synthesize evidence on ED utilization and suicidality patterns across racial and ethnic groups among gender-diverse adolescents.

We conducted a scoping review using PubMed, Google Scholar, and Scopus for studies published between 2005 and 2025 with terms LGBTQ+, gender identity, suicidality, emergency department, adolescents, and United States. Of 1047 records identified, 272 underwent full-text review after applying inclusion criteria (US-based, English-language, adolescent population, and focus on suicidality or ED use). A total of 29 studies were included and categorized by ED utilization patterns, mental health outcomes, and disparities across gender identity and race/ethnicity.

Findings show elevated suicidality and ED utilization among gender-diverse adolescents, with key themes including higher psychiatric ED use and hospitalization, variability in suicide risk screening, and the impact of social determinants such as discrimination and access to affirming care. Intersectional disparities by race and ethnicity remain underexplored, and inconsistent demographic reporting limits comparability across studies.

Current evidence is limited by heterogeneous methodologies, inconsistent demographic reporting, and retrospective data analysis. Future research should prioritize intersectional, prospective approaches with improved measures to inform equitable policy, resource allocation, and affirming care for gender-diverse youth across racial and ethnic groups.

Keywords: Gender-diverse adolescents, LGBTQ+ youth, Suicidality, Emergency department utilization, Mental health, Racial and ethnic disparities, Intersectionality, United States

Low Dose Radiation for Treating Arthritis: Safety and Efficacy

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Low-dose radiation therapy (LDRT) is gaining attention as a safe and noninvasive option for treating osteoarthritis (OA), particularly in patients who remain symptomatic despite standard therapies such as medications, physical therapy, and injections. The purpose of this review is to evaluate the efficacy, safety, and proposed mechanisms of LDRT in OA using recent evidence. A structured literature search of major medical databases was conducted, focusing on studies published within the past decade. A total of 23 sources were included, consisting of randomized controlled trials, retrospective cohort studies, and narrative reviews that assessed pain, function, and safety outcomes following LDRT. Overall, the majority of studies report clinically meaningful pain reduction, typically in the range of 20–50% improvement, along with improved joint function and quality of life. Response rates frequently exceeded 70% of treated joints, with benefits sustained over follow-up periods ranging from weeks to several months, and some studies demonstrating additional improvement after repeat treatment courses. Standard dosing regimens (3–6 Gy delivered in small fractions over 2–3 weeks) were consistently well tolerated, with minimal side effects and a very low estimated risk of radiation-related complications, particularly in older patient populations. While some randomized trials report mixed or neutral findings, these are often limited by small sample sizes, short follow-up durations, and variability in treatment protocols, whereas observational studies more consistently demonstrate positive outcomes. Evidence suggests that LDRT exerts anti-inflammatory and immunomodulatory effects, supporting its clinical benefit. Overall, the available evidence suggests moderate-quality support for LDRT as a promising, practical, and underutilized treatment option for OA, though further large-scale, well-designed randomized trials are needed to better define its optimal use in clinical practice.

Keywords: Osteoarthritis, Low-Dose Radiation, Pain Management, Joint Function, Anti-Inflammatory Effects

A Shifting Paradigm: Why Is Colorectal Cancer Increasing in Adults Under 50?

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Early-onset colorectal cancer (EOCRC), defined as colorectal cancer diagnosed before age 50, represents an urgent and growing public health concern worldwide. Traditional screening often fails to detect EOCRC early, underscoring the need to identify modifiable risk factors and implement proactive prevention strategies. A structured literature review was performed using PubMed to evaluate studies on EOCRC epidemiology, risk factors, and disease mechanisms. Of 245 articles screened, 25 met inclusion criteria based on relevance, methodological quality, and recency. Data were extracted and synthesized regarding lifestyle, metabolic, inflammatory, environmental, and genetic contributors to EOCRC. Modifiable lifestyle factors, including obesity, Western dietary patterns, alcohol use, smoking, and sedentary behavior, consistently correlated with elevated EOCRC risk. Metabolic syndrome and chronic low-grade inflammation further promote early tumorigenesis. Chronic inflammatory gastrointestinal conditions, like inflammatory bowel disease, were associated with earlier disease onset. Emerging evidence implicates gut microbiome dysbiosis, bacterial toxin production, and environmental exposures as additional contributors. At the molecular level, dysregulation of signaling pathways such as WNT/Î²-catenin may link environmental and metabolic factors to early neoplastic transformation. While hereditary syndromes such as Lynch syndrome, mismatch repair gene mutations, and NTHL1 variants account for a minority of cases, most EOCRC arises sporadically, highlighting the growing impact of modifiable factors. The rapid rise of EOCRC demonstrates that age-based screening alone is insufficient. Integrating lifestyle, metabolic, inflammatory, environmental, and molecular risk factors into comprehensive, risk-stratified detection and prevention strategies is essential to enable earlier diagnosis, improve patient outcomes, and reduce morbidity and mortality in younger populations globally.

Keywords: EOCRC, Lifestyle Factors, Prevention

Mucosal Advancement Flap Reconstruction of the Inferior Vermillion Lip Following Mohs Micrographic Surgery for Invasive Squamous Cell Carcinoma

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Reconstruction of lower lip defects following Mohs micrographic surgery presents significant functional and aesthetic challenges, particularly for large vermilion defects with muscle exposure and high-risk pathologic features. The mucosal advancement flap (MAF) is a technique that preserves blood supply, maintains sensation, and conserves aesthetic contour. A 65-year-old Caucasian male presented with invasive squamous cell carcinoma of the left inferior vermilion lip measuring 0.8 Ã— 0.8 cm on biopsy. Four stages of Mohs micrographic surgery were required to achieve clear margins, with final pathology notable for perineural invasion. The final defect measured 8.7 Ã— 2.4 cm with depth to the orbicularis oris muscle, resulting in removal of most of the lower vermilion lip. Reconstructive options considered included primary closure, Karapandzic flap, and Abbe flap. A mucosal advancement flap was chosen to preserve oral competence, sensation, minimize microstomia, and optimize cosmetic outcome. Adjacent mucosal epithelium was advanced over the exposed orbicularis oris and elevated to the gingival sulcus with preservation of neurovascular structures. The flap was successfully elevated and inset without complication. At three-month follow-up, the patient demonstrated good flap viability, preserved oral competence, intelligible speech, resolution of mild dribbling, and satisfactory cosmetic outcome. Due to tumor size greater than 2 cm, perineural invasion, and muscle involvement, the patient was referred for oncologic evaluation. This case highlights MAF as an effective single-stage option for large vermilion defects, balancing oncologic safety with functional and aesthetic preservation, and provides a practical example for reconstructive decision-making in similar patients.

When Steroids Backfire: Tinea Incognito Following Treatment for Presumed Psoriasis

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Tinea incognito occurs when a dermatophyte infection is masked or worsened due to misdiagnosis and inappropriate treatment with corticosteroids or other anti-inflammatory agents. It is frequently misdiagnosed as psoriasis or eczema, particularly in adults, highlighting the need for early recognition and confirmatory potassium hydroxide (KOH) testing for early detection and prevention of misdiagnosis. A 43-year-old male presented with broad, well-demarcated erythematous, scaly plaque involving the upper neck and posterior back. He had been treated with topical clobetasol and topical roflumilast for presumed psoriasis, resulting in temporary improvement followed by recurrence and progressive worsening over three months. Upon presentation to dermatology, the working differential included psoriasis, eczema, and dermatophyte infection. The lack of sustained response to potent corticosteroids, combined with annular plaques with scaling prompted KOH testing, which revealed fungal hyphae, confirming tinea incognito. Topical clobetasol and roflumilast were discontinued, and the patient was initiated on topical econazole 1% cream twice daily and oral terbinafine 250 mg daily for three weeks. The patient presented for follow-up one month after the initial presentation to assess clinical response. Improvement in erythema and pruritus were observed and a 3 month follow up was scheduled to monitor for recurrence. Compared with typical tinea presentations, this case underscores the potential for anti-inflammatory agents to mask or exacerbate dermatophyte infections. This report emphasizes maintaining a high index of suspicion for fungal infections in refractory, scaly eruptions and reinforces the utility of KOH testing before corticosteroid therapy, providing a timely and clinically actionable lesson for all physicians.

Expanding the Spectrum of Glomangioma: Extreme Pain Phenotype and Type 4 Smooth Muscle Atrophy in an Extradigital Lesion

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Glomangiomas are rare benign vascular neoplasms arising from glomus bodies, accounting for a minority of glomus tumors and infrequently presenting in extradigital locations such as the elbow. These atypical presentations lack the classic triad of paroxysmal pain, point tenderness, and cold sensitivity, often leading to misdiagnosis. We report a 75-year-old male with a 40–50 year history of a stable but progressively painful left elbow lesion. Ultrasound revealed a 1.1 cm subcutaneous hypoechoic mass with internal vascularity. The lesion lacked overlying skin changes, and the differential diagnosis included neuroma, hemangioma, lipoma, and peripheral nerve sheath tumor; neuroma was initially favored given focal hypersensitivity and activity-related pain. During excision, palpation under anesthesia elicited involuntary patient movement, demonstrating extreme nociceptive sensitivity. Histopathology showed a well-circumscribed dermal neoplasm composed of uniform cells surrounding vascular channels. Immunohistochemistry was positive for smooth muscle actin and negative for endothelial and epithelial markers, confirming glomangioma. Notably, features of type 4 smooth muscle atrophy rarely described in these tumors were identified. The patient experienced complete resolution of pain postoperatively and remained asymptomatic without recurrence at follow-up. This case highlights an uncommon extradigital glomangioma with unusually prolonged symptom duration and striking nociceptive response under anesthesia. It underscores the importance of including glomangioma in the differential diagnosis of chronic localized pain despite absence of classic features, and supports surgical excision as definitive management for symptom resolution.

The Effectiveness of Dermatology Education in Preparing Medical Students for Global Health Trips

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Medical students frequently participate in global health experiences where they encounter dermatologic conditions, yet gaps in dermatology training, particularly in recognizing conditions in patients with skin of color, are well documented. This study evaluated medical students' ability to accurately describe and diagnose skin lesions during global medical trips to Panama and the Dominican Republic and assessed whether a pre-trip dermatology education session improved diagnostic accuracy. Students from the Utah campus who received a dermatologist validated pre-trip training session were compared to students from the Colorado campus who did not receive training. Following IRB approval (#2024-266) and patient consent, students photographed skin lesions, documented descriptive characteristics, and recorded their working diagnoses. After the trips, a board certified dermatologist with multiple years of global mission trip experiences reviewed all images and evaluated diagnostic accuracy. Among 17 cases from the Dominican Republic, trained students achieved 70% diagnostic accuracy compared to 42% among untrained students. Among 42 cases from Panama, diagnostic accuracy was 46% in trained students versus 38% in untrained students. These findings suggest that targeted pre-trip dermatology education may improve diagnostic accuracy in global health settings. Incorporating structured dermatology training into pre-departure curricula may help address gaps in medical education and improve clinical preparedness in diverse patient populations.

Breaking the Barrier: Lipopolysaccharides and Skin Dysfunction in Atopic Dermatitis

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Atopic dermatitis (AD) is a chronic inflammatory skin disorder characterized by impaired epidermal barrier function and immune dysregulation. Emerging evidence suggests that lipopolysaccharides (LPS) contribute to cutaneous inflammation and barrier disruption, but the direct impact of LPS on skin barrier integrity in AD remains unclear. This study reviews the current literature to evaluate how LPS exposure contributes to epidermal barrier dysfunction in AD. A systematic review was conducted using a MeSH-guided PubMed search. Five reviewers independently screened 27 articles using predefined inclusion criteria; discrepancies were resolved by consensus. Eligible studies were published in English from 2010 onward and analyzed LPS exposure and barrier-related outcomes in humans with AD and in vivo keratinocyte models. Of 27 articles screened, 13 met the inclusion criteria. The included literature demonstrates that LPS triggers a robust inflammatory response. At the cell surface, LPS activates the TLR4 receptor complex, initiating MyD88 dependent signaling that drives NF ÎºB mediated production of pro-inflammatory cytokines. These effects were associated with reduced expression of key barrier proteins, including filaggrin, loricrin, involucrin, and caspase 14, indicating impaired differentiation and barrier integrity. Overall, these findings support a mechanistic link between LPS driven inflammatory signaling and epidermal barrier dysfunction in AD. However, the evidence is limited to in vitro models, and further in vivo and clinical studies are needed to confirm translational relevance. This review highlights LPS as a potential contributor to AD pathogenesis and underscores the importance of investigating targeted therapeutic strategies and environmental LPS exposure in patients with severe disease.

Pseudocholinesterase Deficiency and Laboratory Testing to Avoid Adverse Outcomes

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Pseudocholinesterase deficiency is an underrecognized cause of prolonged neuromuscular blockade following administration of succinylcholine or mivacurium, with reported incidence of hereditary forms ranging from approximately 1 in 3,000 to 1 in 5,000 individuals. Resulting paralysis, particularly when accompanied by preserved consciousness, can lead to significant psychological distress and prolonged mechanical ventilation. Despite these risks, routine preoperative screening remains controversial and is not widely recommended outside of patients with suggestive histories. This commentary aims to evaluate whether broader preoperative screening for pseudocholinesterase deficiency is justified in elective surgical populations. A narrative review of published case reports, observational studies, and current anesthesia guidelines was conducted via PubMed to assess incidence, clinical outcomes, and existing screening practices. Existing literature suggests that most cases are identified only after unexpected, prolonged paralysis, with reported ventilation times extending several hours postoperatively. While laboratory testing for pseudocholinesterase activity is inexpensive and accessible, universal screening may not be cost-effective given the relatively low prevalence. Current guidelines emphasize targeted screening based on personal or family history, though this approach may fail to detect asymptomatic individuals. Given the potential severity of complications, increased awareness and consideration of targeted preoperative testing, particularly in patients undergoing procedures where succinylcholine use is anticipated, may improve patient safety. Further research evaluating cost-effectiveness and risk stratification strategies is needed to determine whether broader screening protocols should be implemented.

Incidental Diagnosis of African Tick Bite Fever During Preoperative Evaluation in Central Utah

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African tick bite fever (ATBF) is a spotted fever group rickettsiosis caused by Rickettsia africae and is often identified among travelers returning from sub-Saharan Africa. Clinical presentation may be mild or nonspecific, often delaying diagnosis despite characteristic findings such as inoculation eschars. A 52-year-old male presented to the preoperative holding area prior to a scheduled left-sided inguinal hernia repair after recently returning from a game-hunting trip to Africa. During preoperative intake, he was noted to have a fever of 106°F despite being otherwise asymptomatic. Physical examination revealed two black eschars on the patient's back and right shin. Given the presence of high-grade fever, the scheduled procedure was canceled, and the patient was discharged for outpatient evaluation. He was subsequently treated with a 10-day course of doxycycline for suspected African tick bite fever. At two-week follow-up, the patient remained asymptomatic, his fever had resolved, and repeat preoperative evaluation was unremarkable. Surgical repair of the inguinal hernia was performed without complications. This case underscores the importance of maintaining clinical suspicion for ATBF in returning travelers and highlights the diagnostic value of inoculation eschars, even in the absence of systemic symptoms. Early recognition and prompt doxycycline therapy can result in rapid clinical resolution and prevent unnecessary delays in care

ASLEEP ON THE TABLE, AWAKE TO THE EVIDENCE: ANESTHESIA AND LUNG CANCER PROGNOSIS

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Emerging evidence suggests anesthetic agents may influence tumor biology and micrometastasis in lung cancer patients, as the perioperative period represents a vulnerable window during which surgical stress suppresses antitumor immunity and may facilitate disease progression. This narrative review synthesizes mechanistic and clinical evidence on anesthetic management and lung cancer prognosis. Preclinical studies demonstrate biological plausibility: propofol inhibits lung cancer proliferation via the miR-21/PTEN/AKT pathway, while volatile anesthetics may promote progression through HIF-1Î± upregulation. However, high-quality clinical evidence does not support these findings the GA-CARES trial (n=1,766) showed propofol-based anesthesia does not improve outcomes compared to volatile anesthetics (HR 1.16; 95% CI 0.96-1.41), and large registry studies similarly show no survival benefit. Meta-analyses suggest opioid use is associated with worse outcomes in patients receiving immune checkpoint inhibitors, though confounding remains problematic. Lung cancer patients frequently present with COPD and obesity, which influence anesthetic selection; however, no studies examine whether comorbidity-tailored protocols affect oncologic outcomes representing a critical gap for future research.

Keywords: Anesthesia, Oncology

Impact of Global Health Trips on Osteopathic Medical Students' Perceptions of Osteopathic Manipulative Treatment

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Osteopathic Manipulative Treatment (OMT) is a central component of Rocky Vista University education, yet student perceptions of its value and application vary depending on clinical exposure. Global health trips provide a unique environment where students can observe and apply OMT in underserved settings, potentially shaping their future use of this skill.This study asks: How does participation in a global medical trip influence osteopathic medical students' perceptions of OMT? A pre–post quasi-experimental study design is being employed with a cohort of osteopathic medical students from the Utah and Colorado campuses participating in global health trips to Peru and Panama in Spring 2026. All participating students on these trips are eligible for inclusion. Students completed a baseline survey prior to departure and a post-trip survey after returning. Surveys include Likert-scale items assessing confidence in clinical application, perceived effectiveness, and intention to incorporate OMT into future practice, along with demographics and prior exposure. Surveys were distributed electronically. Paired analyses was conducted on matched responses. This study included 18 pre-trip responses and 12 post-trip responses, with 6 matched pairs. Preliminary findings highlight challenges in participant matching and response retention. Limitations of the study include a small sample size, incomplete matched responses, and variability in clinical exposure across different global health trips. This project contributes to osteopathic medical education by exploring how global health experiences influence students' perceptions of osteopathic manipulative treatment (OMT). The findings may help inform curriculum development and support the broader integration of OMT in global and underserved healthcare settings.

Keywords: Osteopathic Manipulative Treatment, Global Health, Medical Education, Osteopathic Medical Students, Clinical Exposure, Student Perception

Efficacy of Multimodal Non-Opioid Analgesia in Total Knee Arthroplasty: A Literature Review

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Background: Total knee arthroplasty (TKA) is associated with significant postoperative pain, and opioid-centered strategies contribute to adverse effects, delayed mobilization, and prolonged opioid use. Multimodal non-opioid analgesia, combining pharmacologic and regional techniques, is central to enhanced recovery protocols. Purpose: To synthesize current evidence evaluating multimodal non-opioid strategies for reducing postoperative pain and opioid consumption after TKA. Methods: A narrative review of PubMed, EMBASE, and Scopus identified systematic reviews, meta-analyses, randomized controlled trials, and clinical reviews (2010-2025). Evaluated components included acetaminophen, NSAIDs (including COX-2 inhibitors), perioperative corticosteroids, gabapentinoids, duloxetine, targeted local infiltration anesthesia, peripheral nerve blocks (such as the adductor canal block), and cryoneurolysis. Results: Multimodal regimens consistently reduced early postoperative pain and opioid consumption. NSAIDs (including COX-2 inhibitors) and acetaminophen remain foundational due to efficacy and cost-effectiveness, though NSAID use may be limited by adverse effects. Regional techniques, including targeted local infiltration anesthesia with dose optimization to minimize toxicity and cryoneurolysis, further enhanced analgesia, reduced opioid consumption, and supported early mobilization. Intraoperative dexamethasone improved pain control and decreased postoperative nausea and vomiting. Gabapentinoids and duloxetine demonstrated opioid-sparing effects, though tolerability varied. Study heterogeneity precluded identification of a single optimal regimen. Conclusions: Evidence supports a protocol-driven multimodal approach combining systemic and regional strategies to optimize postoperative pain control after TKA. Standardized frameworks improve consistency, but individualized adjustments based on patient comorbidities and risk factors remain essential. Close collaboration among the patient, surgeon, and anesthesiologist is critical to maximizing recovery while minimizing opioid exposure.

Keywords: Multi-modal analgesia, Opioid-sparing, Postoperative pain

Ultrasound Guidance Improves First-Pass Success in Neuraxial Epidural Placement

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Background Epidural anesthesia is widely used but remains challenging with landmark-based techniques. Anatomical variability of neuraxial structures complicates identification. Ultrasound allows visualization of neuraxial anatomy and needle trajectory, potentially improving accuracy and safety. We aimed to evaluate whether ultrasound-guided epidural placement improves first-pass success, procedural efficiency, and complication rates compared with landmark-based.

Methods A systematized review of randomized controlled trials, prospective cohort studies, and meta-analyses was conducted using PubMed, Embase, Cochrane, CINAHL, EBSCO, and Open Evidence from database inception through 2025. Eligible studies included adults undergoing epidural procedures comparing ultrasound-guided with landmark-based techniques. Primary outcomes were first-pass success and complication rates. Secondary outcomes included needle attempts, needle passes, and procedural duration. Study selection followed PRISMA principles.

Results Across studies including >7,000 adult patients, ultrasound-guided epidural placement consistently improved procedural success. Meta-analyses demonstrated increased first-pass success (RR 1.40, 95% CI 1.29–1.52; $P < 0.001$) and fewer attempts (MD −0.41, 95% CI −0.51 to −0.31; $P < 0.001$). Prospective studies reported fewer needle passes and shorter procedural time. In a thoracic epidural cohort ($n = 128$), first-pass success was 75%, first-attempt success 95%, and overall success 98%, with a median needling time of 59 seconds and no complications. Findings were consistent across study designs.

Conclusion Ultrasound-guided epidural placement improves first-pass success and procedural efficiency while reducing needle manipulation and radiation exposure. This review consolidates contemporary evidence across neuraxial procedures, particularly in patients with difficult anatomy, although implementation may depend on operator experience and resource availability.

Keywords: Epidural anesthesia, epidural injection, spinal puncture, lumbar puncture, neuraxial anesthesia, epidural placement, ultrasound-guided, ultrasonography, interventional ultrasonography, ultrasound imaging, anatomic landmarks, landmark-based technique, palpation technique, free-hand technique, first-pass success, clinical competence, clinical skill, insertion attempts, needle redirection, procedure success, complications, adverse events, adverse effects, side effects, adverse outcomes

Comparative Effectiveness of Active Cooling Strategies for Temperature Reduction in Malignant Hyperthermia

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Introduction: Malignant hyperthermia (MH) is a life-threatening pharmacogenetic muscle disorder triggered by volatile anesthetics, characterized by a hypermetabolic state, metabolic acidosis, and rhabdomyolysis. While dantrolene is the primary treatment, the comparative efficacy of cooling adjuncts—surface cooling, cold intravenous (IV) fluids, and intravascular systems—remains poorly defined.

Objective: To assess the relationship between active cooling approaches and the rate of core temperature reduction, while identifying early clinical response patterns and adverse events.

Methods: A structured PubMed search (2000–2025) using the terms malignant hyperthermia, cooling, and dantrolene was conducted to identify English-language cases. Inclusion required documented serial core temperatures starting within 60 minutes of treatment initiation. Following manual screening, cases were categorized by primary modality: surface cooling, cold IV fluids, or intravascular devices. Rates of decline (°C/min) were calculated via linear approximation from baseline to the one-hour mark.

Results: Two case reports provided sufficient serial data. In the surface cooling case (baseline 40.7°C), a reduction of 0.044°C/min was achieved. The intravascular case reached a peak of 41.4°C before cooling at 0.029°C/min. Notably, 2 L of cold IV fluids failed to arrest rising temperatures prior to catheterization. Hemodynamics stabilized in both cases following temperature decline, though data are confounded by variable dantrolene timing.

Conclusion: Surface cooling offered the fastest early temperature control (0.044°C/min). Intravascular devices provided reliable ongoing cooling but involved a delayed onset compared to surface methods. Cold IV fluids appeared ineffective within the first hour. These findings highlight a critical need for standardized MH registries to capture adjunct cooling efficacies.

Keywords: Anesthesia, Malignant Hyperthermia

Exploring Nitrous Oxide: Labor Effects and Outcomes

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Understanding the indications and consequences of analgesia options on labor outcomes is essential for effective patient counseling and informed decision-making during childbirth. In recent years, the use of nitrous oxide for labor analgesia has increased in the United States; however, its impact on key maternal and neonatal outcomes remains incompletely understood. These outcomes include mode of delivery, labor duration, patient satisfaction, neonatal Apgar scores, neonatal intensive care unit (NICU) admissions, and rates of conversion to alternative analgesia. The objective of this study was to conduct a comprehensive literature review evaluating the association between nitrous oxide use and labor outcomes while identifying gaps in the current evidence. A systematic PubMed search was performed for articles published within the past 10 years using the terms nitrous oxide, labor outcomes, and labor analgesia. Studies of laboring patients receiving nitrous oxide that reported maternal or neonatal outcomes were included. Articles lacking relevant outcomes or not involving labor analgesia were excluded. Of over 100 articles identified, 36 met inclusion criteria. Data were extracted and qualitatively synthesized due to heterogeneity in study design and outcome measures. Overall, nitrous oxide provides modest analgesia with relatively high patient satisfaction; however, its effects on labor outcomes remain inconclusive. Multiparous patients may have a lower likelihood of conversion to epidural analgesia, while no difference is observed in nulliparous patients. Cesarean delivery rates do not appear to differ with nitrous oxide use. Compared with opioids, nitrous oxide demonstrates similar analgesic efficacy with fewer side effects and no significant differences in labor outcomes. Evidence regarding labor duration is conflicting, and neonatal outcomes are comparable across analgesic modalities. Although nitrous oxide appears safe, current evidence is limited by small sample sizes and heterogeneous methodologies. Further large-scale, prospective studies are needed to better define its impact on maternal and neonatal outcomes.

Keywords: obgyn, nitrous oxide, labor, outcomes, neonatal, analgesia

Fasting Mimicking Diet and Cancer Dormancy: A Critical Review of Whether Dietary Interventions Risk Awakening Metastatic Disease

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Background: Fasting-mimicking diets (FMD) are studied as adjunctive cancer therapies, with trials supporting chemotherapy synergy. Yet research focuses solely on primary tumor response. No studies have examined FMD's effect on recurrence. This gap is clinically significant, as late metastatic recurrences stem from dormant disseminated tumor cells persisting post-treatment. Autophagy, which FMD modulates, plays a paradoxical role: sensitizing primary tumors to therapy while sustaining dormant cell survival. Whether FMD-induced autophagy influences dormant cell fate is entirely unstudied.

Methods: A literature review was conducted using PubMed and Embase with MeSH-controlled vocabulary. Search terms included fasting-mimicking diet, caloric restriction, autophagy, cancer dormancy, disseminated tumor cells, and metastatic recurrence. Peer-reviewed preclinical and clinical studies from 2010–2025 were included. After duplicate removal, articles underwent title/abstract screening followed by full-text review. Studies were organized into three streams: (1) FMD and autophagy, (2) autophagy in dormancy, and (3) dormancy reactivation. Evidence was weighted by study design with limitations noted. Results: Synthesis of preclinical data reveals FMD produces context-dependent autophagy effects, with inhibition observed in some cancers and induction in others. Dormancy literature shows autophagy inhibition can either eliminate dormant cells or trigger reactivation depending on tumor type and microenvironment. No studies directly address FMD's impact on minimal residual disease or include recurrence endpoints.

Conclusion: This review identifies a critical gap at the intersection of FMD, autophagy, and cancer dormancy. Findings are limited by selection bias and preclinical predominance but highlight the need for trials incorporating recurrence endpoints and may inform guidance for survivors exploring dietary interventions.

Keywords: Oncology, Fasting, Fasting Mimicking Diet, Chemotherapy, Dormant cancer cells, Metastasis, Tumor

Nivolumab-Associated Polymyalgia Rheumatica-Like Syndrome with Normal Inflammatory Markers

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Immune checkpoint inhibitors (ICIs) are increasingly encountered in primary care, and rheumatologic immune-related adverse events (irAEs) can rarely mimic polymyalgia rheumatica (PMR). We describe an 83-year-old male with metastatic melanoma treated with Nivolumab who developed debilitating proximal muscle weakness over the course of 6 months. Repeated testing of ESR and CRP yielded normal results, which is a finding at odds with standard PMR criteria. Further evaluation did not support differential diagnoses of subclinical adrenal insufficiency, atypical myositis or atypical cardiomyopathy. Given the temporal relationship to ICI therapy and pattern of symptoms, an ICI associated PMR-like irAE was favored. The patient completed a one-month prednisone 15 mg taper and physical therapy. At follow-up, marked improvement of proximal muscle weakness and mobility led to increased quality of life. This case demonstrates that normal inflammatory marker results do not rule out PMR-like disease in the setting of checkpoint inhibition. For primary care, prompt recognition of PMR-like irAE and timely initiation of corticosteroid treatment with physical rehabilitation may shorten time to treatment and preserve function. It also decreases the risk of unintended sequelae such as giant cell arteritis.

Keywords: Immune checkpoint inhibitor, nivolumab, PD-1 inhibitor, polymyalgia rheumatica-like syndrome, PMR-like syndrome, immune-related adverse event, rheumatic immune-related adverse event, normal inflammatory markers, normal ESR and CRP, checkpoint inhibitor toxicity, metastatic melanoma, proximal girdle weakness

Perceptions of vaccination in Latin America: Insights from Panama, Dominican Republic, and Guatemala

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Public perceptions of vaccines were evaluated through a survey conducted by medical students from Rocky Vista University in March 2025. The survey included 252 patients attending medical outreach clinics in Panama, the Dominican Republic, and Guatemala. Results revealed a surprisingly high self-reported vaccination rate of 77.8% across the three countries, reflecting widespread vaccine acceptance and uptake. More than half of participants (54.4%) identified clinics or hospitals as their primary source of vaccine-related information, positioning health institutions at the forefront of information dissemination. Although 57.9% of respondents rated access to vaccines as easy overall, suggesting that physical access may not represent a major barrier, the survey highlighted other key obstacles, including fears of side effects and insufficient information. These findings provide valuable guidance for targeted health communication initiatives and may inform the development of broader strategies to address community-level barriers to vaccination and improve overall uptake.

AI-Enhanced Simulation for Improving Telemedicine Communication Skills in Physician Training

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Since the COVID-19 pandemic in 2020, telemedicine has become central to healthcare delivery, with physician use rising from 15.4% in 2019 to over 70% in 2024.1 Effective virtual care requires distinct adaptations not addressed by traditional training models, and inadequate communication is associated with reduced patient trust and satisfaction.2, 22 Current training frameworks, such as OSCEs and standardized patients, are designed for face-to-face interactions. However, these approaches do not account for the distinct interpersonal constraints of virtual care. This gap underscores the need for scalable, modality-specific training approaches tailored to telemedicine. This work describes the theoretical framework and design of TellyComm, an AI-enhanced, web-based training model developed to improve physician communication in telemedicine settings. This platform uses brief clinical video vignettes demonstrating effective and ineffective telemedicine behaviors. Each vignette includes embedded pause points prompting users to select appropriate communication strategies. Responses are evaluated using a large language model, guided by established frameworks such as Calgary–Cambridge, NURSE, and SPIKES. Planned evaluation includes pilot implementation within a population of physicians in communication-intensive specialties. Platforms like EQClinic demonstrate improvements in communication scores following virtual interventions. Strategies such as teach-back and deliberate eye contact are key to effective virtual care.10,13,20 However, these approaches have limited generalizability across specialties, rely on self-assessment, and underemphasize non-verbal communication differences in virtual settings. As telemedicine expands, the need for targeted communication training is increasingly evident. Conceptual models like TellyComm represent promising AI-supported approaches to improve both physician communication and patient health outcomes.

Keywords: Digital Health, Telemedicine, Artificial Intelligence, Continuing Medical Education, Physician Communication, Large Language Models, Empathy, Non-Verbal Communication, Medical Simulation, Remote Healthcare Delivery, Body Language, Virtual Care

Navigating the Natural Family Planning Landscape

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Fertility-Based Awareness Methods (FBAM) have seen a resurgence in popularity. These various methods rely on menstrual cycle awareness and physiologic biomarkers to identify the fertile window, allowing users to either avoid or achieve pregnancy by determining peak conception days.

Despite its growing interest, research found that half of physicians do not offer FBAM as a contraceptive option during patient counseling. This review aims to identify and synthesize the social, cultural, and practical factors that drive patient interest in FBAM and contribute to limited clinician endorsement.

Relevant literature for this narrative review was identified through keyword searches using terms such as "natural family planning," "fertility-based awareness methods," and "non-hormonal contraception." Searches focused on peer-reviewed articles published within the past 10 years, with additional sources included when necessary to provide historical and cultural context.

A review of the literature shows that religious groups and hormone-free social media personalities are the specific groups who are increasingly shaping contraceptive discussions. The non-hormonal nature of FBAM appeals to individuals seeking a more "natural" lifestyle. Five papers specifically document that "the pill" is losing popularity. Cultural shifts toward natural health practices contribute to growing skepticism toward hormonal contraception, a trend often amplified by misinformation. Knowledge of these influences is necessary for clinicians to more effectively navigate these socially charged conversations.

The AAFP recognizes seven different FBAM. Each method requires different patient education and reports a large range of typical uses. The different reported contraceptive effectiveness of FBAM across papers limits the research. The variety of methods, dependence on clinicians' time to educate patients, and strong reliance on patient compliance all explain FBAM's low clinician support. Successful FBAM implementation by clinicians requires overcoming the barriers, identified by our research as a lack of awareness of the many methods, and increased patient education time.

Keywords: Fertility awareness-based methods (FABM), Fertility awareness methods (FAM), Natural family planning (NFP), Non-hormonal contraception, Menstrual cycle tracking, Reproductive health, Patient-provider communication, Contraceptive counseling

Mapping Modifiable Contributors to Adult Depression A PHQ-9—Based Integrative Review and Factor Contribution Analysis

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Background: Major depressive disorder (MDD) is a multifactorial condition influenced by biological, behavioral, psychosocial, medical, and lifestyle-related factors. Although antidepressants remain a common treatment approach, symptom severity measured by the Patient Health Questionnaire-9 (PHQ-9) may also reflect modifiable contributors that are not routinely prioritized during clinical evaluation. A structured framework capable of comparing heterogeneous contributors may improve individualized depression management.

Objective: To synthesize human literature linking modifiable factors to adult depression severity measured by PHQ-9 outcomes and to prioritize contributors using a pragmatic Factor Contribution Index (FCI) integrating association strength, evidence quality, and estimated population impact.

Methods: An integrative review of primary human studies published between 2015 and 2025 was performed using studies assessing adults ≥18 years old with depression measured using PHQ-9 outcomes. Included studies evaluated at least one modifiable exposure with extractable statistical associations. Factors were grouped into biological, lifestyle, psychosocial, sleep-related, substance-related, and medical domains. The FCI framework incorporated effect size magnitude, evidence quality characteristics, and estimated population attributable influence to compare heterogeneous contributors across studies.

Results: Sleep disturbance consistently emerged as one of the strongest and most clinically relevant contributors to elevated PHQ-9 severity. Tobacco use, unhealthy lifestyle combinations, psychosocial stressors, nutritional risk, and inflammatory biomarkers also demonstrated meaningful associations with depressive symptom burden. Higher prevalence contributors with moderate effect sizes frequently demonstrated substantial estimated population impact. The FCI framework allowed heterogeneous findings to be translated into a clinically interpretable prioritization model.

Conclusion: Depression severity appears to reflect the cumulative influence of multiple modifiable contributors rather than a singular mechanistic pathway. A structured contributor-based framework may help clinicians identify personalized intervention targets alongside standard pharmacologic treatment. Future work should evaluate reproducibility and prospective clinical application of the FCI model

Keywords: Major Depressive Disorder; Depression; PHQ-9; Modifiable Risk Factors; Lifestyle Medicine; Sleep Disturbance; Inflammation; Tobacco Use; Integrative Review; Mental Health; Personalized Medicine

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