

## **Introduction to Abstracts from the 2024 University of Kansas Medical Center Student Research Forum**

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The Student Research Forum (SRF) is a student-led activity at the University of Kansas Medical Center (KUMC) that promotes and supports KU student research and professional development. SRF encompasses participation from students, trainees, and faculty from all KUMC schools, including schools of Health Professions, Medicine, and Nursing. This annual campus-wide event uniquely caters to all disciplines on campus with a track of bringing in a diverse range of research. SRF offers a platform for students to present and discuss their research in a conference setting, allowing for a collaborative environment to facilitate communication and connection throughout KUMC.

Highlights of the research forum include our A.L. Chapman distinguished keynote speaker, oral and poster presentations, career development panel, and a three-minute thesis challenge. Presentations are judged by campus faculty and staff as well as volunteer community members with the purpose of gauging how well scientific research is communicated to scientific and lay audiences.

The 2024 Student Research Forum, held from April 1 - 5, included 256 presentations across all platforms. Research areas include: oncology, cell biology, physiology, anatomy, pathology, pharmacology and toxicology, orthopedic surgery, dietetic and nutrition, internal medicine, plastic surgery, general surgery, physical therapy and rehab, audiology, biochemistry, pediatrics, neurology, biostatistics, emergency medicine, microbiology, obstetrics and gynecology, infectious disease, anesthesiology, cancer biology, occupational therapy, radiology, hematology, ophthalmology, family medicine, and history and philosophy of medicine. The A.L. Chapman Keynote Speaker was Dr. Jeffery W. Kelly, the Lita Annenberg Hazen Professor and Professor of Chemistry at the Scripps Research Institute. Dr. Kelly's talk was titled "Pharmacological Adaptation of Proteostasis to Ameliorate Aging-associated Degenerative Diseases".

This special issue collection of abstracts from the KUMC 2024 SRF represents the innovative research conducted by students at KUMC. SRF continues to serve as a connection for research across campus, ensuring the fostering of interdisciplinary collaboration, novel investigation, and improved scientific understanding.

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## Assessing Anesthetic Collaboration between Surgeons and Anesthesiologists

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**Introduction.** Surgeon-anesthesiologist collaboration is essential to the safe performance of surgery, but little research has investigated this interdisciplinary collaboration. Hypothesizing that surgeons were hesitant to collaborate on topics outside their training, we surveyed surgeons to assess their knowledge of anesthesia and their comfort with this interdisciplinary collaboration, including asking about comfort discussing methods of delivering general anesthesia. One safe method, total intravenous anesthesia (TIVA), is associated with improved short- and long-term patient outcomes and is under-utilized in general practice.

**Methods.** Following IRB approval, we surveyed members of the American College of Surgeons Communities. Using Likert scales (1: Not at all comfortable; 5: Very comfortable), surgeons self-reported their comfort in discussing specific anesthetic considerations applicable to a broad range of procedures and practice types and assessed knowledge of general anesthesia approaches. Informed consent was obtained from all participants. Summary statistics were produced to describe responses for each question.

**Results.** In total, 150 surgeons were surveyed. Comfort levels varied across topics: epidural catheter placement vs. spinal anesthesia (Mean: 4.36; Median: 5), peripheral nerve blocks (Mean: 4.43; Median: 5), arterial (Mean: 4.50; Median: 5), and central venous access (Mean: 4.54; Median: 5) but were generally high. Despite surgeons' high comfort levels with focused collaboration, surgeons reported discomfort discussing TIVA vs. volatile anesthesia (Mean: 3.58; Median: 4).

**Conclusions.** Overall, surgeons are very comfortable collaborating with anesthesiologists on focused anesthetic decisions. However, they are less familiar with, and less comfortable discussing, differing approaches to delivering general anesthesia. Improved patient outcomes associated with TIVA adoption likely remain out of reach until surgeon comfort discussing this topic increases.

# **Incarcerated Women and Healthcare: Exploring Disparities and Solutions through Qualitative Insights**

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**Introduction.** The proportion of incarcerated women has been increasing, with a higher prevalence of preventable diseases, particularly among women of color. Previous research, primarily survey-based, has highlighted these disparities. However, interviews with open-ended questions can provide deeper insights and help identify root causes. This project aimed to follow up on data from the S(H)E Women’s survey to assess the experiences and perspectives of women who utilized health services in jails and prisons.

**Methods.** Utilizing a mixed-methods approach, this study incorporated data from Dr. Megha Ramaswamy's annual S(H)E Women survey. A subgroup of women who reported suboptimal care during incarceration participated in semi-structured interviews. Thirteen women were interviewed to gain a deeper understanding of their healthcare experiences while incarcerated.

**Results.** Interviews revealed significant challenges, including financial strain related to medical care, limited medication options, and pervasive distrust and frustration with medical staff. Additionally, extended wait times for medical attention highlighted critical flaws in the delivery of timely healthcare within correctional facilities.

**Conclusions.** The findings highlight the urgent need to address the unique healthcare requirements of incarcerated women using a trauma-informed approach. A one-size-fits-all healthcare model is inadequate and risks retraumatizing individuals. Implementing a tailored approach is crucial to fostering a healthcare environment that meets the specific needs of incarcerated women, contributing to a more equitable and compassionate system.

# The Impact of Caregiver Physical Activity on Caregiver Burden and Quality of Life

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**Introduction.** Caregivers of individuals with Alzheimer's Disease and related Dementia (ADRD) report high levels of burden and poor quality of life. We examined the associations between caregiver's daily minutes of moderate to vigorous physical activity (MVPA) and caregiver burden and quality of life.

**Methods.** A cross-sectional analysis was conducted using baseline data from a longitudinal physical activity trial in adults with ADRD and their caregivers. Caregivers of adults with ADRD wore accelerometers (ActiGraph GT3X) over a seven-day period to monitor physical activity. Caregiver burden (Zarit Burden Interview) and eight domains of quality of life (SF-36) data was collected from self-reported questionnaires. Pearson correlations and linear regressions were used to examine the relationship of MVPA on caregiver burden, and each of the eight quality of life domains.

**Results.** Valid data was obtained from 98 caregivers (~69 years of age, 70% female, 11% non-Hispanic white). Caregivers obtained ~18.6 mins/day of MVPA. MVPA was positively correlated with 6 out of 8 domains of quality of life: physical functioning, physical health, emotional problems, energy/fatigue, pain, and general health (all  $p \leq 0.05$ ). When controlling for age, sex, and BMI there was evidence that MVPA was still positively associated with physical functioning ( $b = 0.26$ ,  $p = 0.011$ ), physical health ( $b = 0.15$ ,  $p = 0.009$ ), and pain ( $b = 0.18$ ,  $p = 0.05$ ). MVPA was not associated with caregiver burden.

**Conclusions.** There is evidence that caregiver MVPA is positively associated with some aspects of quality of life. Future research should investigate if interventions targeting increased caregiver MVPA can effectively increase quality of life.

# Assessing Factors That Determine High Inpatient Utilization in the University of Kansas General Internal Medicine Clinic – A Quality Improvement Needs Assessment

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**Introduction.** Many inpatient hospitalizations are for ambulatory care sensitive conditions (ACSC). High inpatient utilization is problematic as it exposes patients to unnecessary iatrogenic harm and financial costs. At the University of Kansas General Internal Medicine Clinic, inpatient services are overutilized at a rate that is above national benchmarks. We sought to better understand this overutilization by performing a QI needs assessment.

**Methods.** Retrospective chart reviews of patients that had 2+ inpatient admissions from within the last 12 months was performed. An extensive medical history for all patients was analyzed including most recent admission route, comorbidities, and determination if the final discharge diagnosis was an ACSC.

**Results.** Admissions data was collected from 239 patients. Approximately 38% of cases qualified as ACSCs. The most common ACSC-related admissions were determined to be complications of chronic heart failure (CHF; 10.5% total cases), hypertension (5.44%), diabetes and chronic obstructive pulmonary disease (COPD; 5.02%), making up 68.42% of all ACSC cases. Patients had multiple comorbidities with hypertension (73.6%), heart disease (52.8%), and chronic kidney disease (CKD; 40.3%) as the top three. Most patients were admitted through the emergency department (ED; 74.1%) with only 20.5% admitted directly from clinic.

**Conclusions.** In this QI needs assessments, we found that nearly 38% of total admissions within the last 12 months were from an ACSC complication which can be avoided through high-quality, accessible primary care. As the next cycle in this project, we plan to create comprehensive care plans for the most common ACSC – CHF, Hypertension, Diabetes, and COPD – with the goal of improving care outcomes and reducing unnecessary inpatient care.

# Postoperative Pain Management with Metamizole after Orthopedic Surgery: A Systematic Review

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**Introduction.** Postoperative pain control is critical in orthopedic surgery. While efficacious analgesics, opiates have rapid tolerance and addictive potential. Metamizole is a non-opioid analgesic that primarily works by inhibiting COX-3, commonly used in Europe and South America, but banned in the U.S. due to concerns about agranulocytosis risk. However, large meta-analyses have not shown significant agranulocytosis when compared to other commonly used analgesics. The purpose of this review was to assess the analgesic efficacy of metamizole and potential use in orthopedic surgery.

**Methods.** An electronic review was conducted using PubMed, Web of Science, Cochrane, Embase, OVID Medline in October 2023. Studies for inclusion were limited to those in which metamizole use was a primary focus and patients were undergoing orthopedic surgery.

**Results.** 1,112 studies were identified and 15 met inclusion criteria. The use of metamizole as a single agent or in combination therapy was described to be superior or noninferior to alternative analgesics in 10 (66.7%) studies. Metamizole decreased rescue analgesia in 5 (33.3%) of the articles. Compared to other drugs, metamizole did not have significant differences in incidence or severity of side effects and no patients experienced agranulocytosis.

**Conclusions.** Metamizole was efficacious and non-inferior to other non-opioid analgesics by demonstrating an opioid sparing effect in over a third of included studies. Further, no cases of agranulocytosis were seen across the studies. These results indicate the potential for metamizoles use as part of analgesia in the setting of orthopedic surgery. Future studies should focus on larger cohorts to continue to assess efficacy and risk of agranulocytosis.

# Comparative Study of the Mechanical Performance of 2-Tine and 4-Tine Stainless Steel Staples

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**Introduction.** Fractures are common orthopedic injuries affecting all ages. The efficacy of 2-tine staples in surgical fracture fixation is well documented, especially in the foot, but the efficacy of 4-tine staples is not well discussed. This study compares the mechanical performances of 4-tine and 2-tine staples in bending.

**Methods.** Two 4-tine staples (A and B) and one 2-tine staple were designed and fabricated from 316 stainless steel. 4-tine A represents staples with two tines placed closely together on opposite ends, creating a large central gap. 4-tine B represents staples with evenly distributed tines and a smaller gap. The differing 4-tine designs intend to investigate the effect of inner tine proximity on fracture stabilization. Fractures were simulated using two polyurethane foam blocks held together by one staple. Dorsal and lateral 4-point bending tests were conducted with an MTS-858 Mini Bionix II System (n = 10). Fixation stability was determined by the moment produced at the center of each staple with 2mm of actuator displacement.

**Results.** Wilcoxon rank sum tests revealed a significant difference between the moments produced by both 4-tine staples compared to 2-tine staples in dorsal and lateral bending ( $p < 0.001$ ). There was also a significant difference between 4-tine B and 4-tine A staples ( $p < 0.001$ ). 4-tine B staples produced the greatest average moment.

**Conclusions.** The results suggest that 4-tine staples, especially those with evenly spaced tines, offer superior resistance to bending than 2-tine staples. Greater stability offered by 4-tine staples may promote wound healing and should be considered in novel surgical staple design.

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## **Gross Photos: Do They Help Radiologists' Diagnosis of Acute Pedal Osteomyelitis?**

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**Introduction.** Imaging plays a critical role in the evaluation of acute osteomyelitis. Magnetic resonance imaging (MRI) is the most accurate imaging test with meta-analysis demonstrating a 90% sensitivity and 79% specificity for this diagnosis. At our institution, clinical photographs of wounds are routinely viewed with imaging at the time of interpretation. The purpose of this study is to determine the value of clinical photography as an adjunct to MRI in the radiologists' assessment of acute pedal osteomyelitis.

**Methods.** A single-center, retrospective analysis was conducted using an internal database of patients with suspected acute pedal osteomyelitis between November 2019 and August 2023, who underwent gold standard histopathologic analysis. A pre-procedural MRI within two months of biopsy/tissue sampling and clinical photos taken within three weeks of imaging were required for inclusion. Blinded to history and diagnosis, seven readers (three fellowship trained musculoskeletal (MSK) radiologists, three MSK radiology fellows, and two infectious disease fellows) reviewed clinical photographs of foot wounds. Each reader predicted the presence or absence of osteomyelitis. Diagnostic accuracy using clinical photos alone was determined.

**Results.** 96 images from 93 patients were included. The sensitivity was 78% (95% confidence interval, 0.68-0.87) and specificity was 44% (0.19-0.68) for the diagnosis of acute osteomyelitis based on clinical photos alone. Inter-reader agreement was fair (Fleiss'  $\kappa = 0.24, 0.18-0.32$ ).

**Conclusions.** Clinical photos are a useful tool for radiologists in their assessment of acute pedal osteomyelitis. While sensitivity of clinical photography alone to diagnose acute osteomyelitis rivals that of MRI, MRI remains the superior technique.



## Sexually Transmitted Infection Testing at JayDoc Free Clinic

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**Introduction.** JayDoc Free Clinic, a free safety-net clinic run by medical and pharmacy students, serves underprivileged populations in Wyandotte County, Kansas. One of the most frequent complaints managed by the clinic is sexually transmitted infection (STI) testing. This descriptive study aimed to understand patient motivations for seeking STI testing at the clinic.

**Methods.** The authors performed an observational cross-sectional study with patients seeking medical attention at JayDoc Free Clinic. Study participants included patients 18 years and older with a chief complaint of STI testing. Participants completed an anonymous, six-item survey measuring their motivation for using the clinic. Standard descriptive analyses were performed to analyze the data.

**Results.** Of the 52 responses collected, 42% (n = 22) of patients resided in Wyandotte County, KS. The primary reasoning for seeking STI testing at JayDoc Free Clinic included no charge for services (n = 40, 77%), clinic hours (n = 23, 44%), and clinic location (n = 18, 35%). Approximately 71% (n = 37) of respondents had previously received STI testing. Patients primarily reported hearing about JayDoc through the website (n = 23, 44%) and friend referral (n = 17, 27%).

**Conclusions.** The data showed that primary motivations for patients seeking STI testing at JayDoc Free Clinic were the absence of service charges, convenient clinic hours, and its accessible location. These findings underscore the importance of free services and accessibility in healthcare provision for underprivileged communities. Emphasizing these aspects in future outreach and quality improvement initiatives could further enhance the clinic's impact and reach.

## **Innovative Intrauterine Device Training Model as Dynamic New Teaching Tool**

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**Introduction.** Traditional Intrauterine Device (IUD) insertion trainers are made of hard plastic and while useful for initial practice, lack the ability to accurately represent the variations found in uterine anatomy. To address this, we developed and tested an IUD model which would simulate uterus/cervix haptics, could be positioned in anterograde/retrograde flexion, and could simulate uterine perforation.

**Methods.** 3-D models were created using ballistic gelatin. Models were utilized in resident workshops and compared to device manufacturer supplied trainers. Residents used various IUD types in each task trainer. Ultrasound guided placement was also performed with the gelatin model. Anonymous surveys compared the three models.

**Results.** Sixteen residents ranked device parameters on a scale of 1 (Low) to 5 (High). The average results of the gelatin model included realistic feel (4.6), adaptability (4.0), ability to grasp the cervix (3.6), realistic teaching tool (4.5), and useful in teaching (4.6). When evaluated for usefulness in level of self-assigned training/skill (Novice, Mid-level and Competent), the gelatin model ranked 88% and above for each category. The manufactured models dropped in usefulness after novice level. The three models were ranked on a scale of 1 (Low) to 3 (High) in personal practice, teaching, and competency. The gelatin model ranked at least one point on average above the other IUD trainers for each parameter.

**Conclusions.** The ballistic gelatin model provides a new dynamic learning tool for IUD insertion training. Incorporating this model into training can increase the preparedness of providers. Future direction includes strengthening cervix and testing different grasping tools with models.

## The Potential Correlation Between Postpartum Hemorrhage and Postpartum Depression: A Retrospective Cohort Study

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**Introduction.** Postpartum depression is a major cause of maternal morbidity and mortality that affects an estimated 10-15% of people within one year of delivery. As postpartum depression can have detrimental effects on both the mother and the child, the identification of potential risk factors is crucial. Several previous studies have had varying results when investigating the potential connection between postpartum hemorrhage and postpartum depression. This study sought to further investigate if postpartum hemorrhage increases the risk for the development of postpartum depression.

**Methods.** This retrospective study analyzed data from women who delivered and received postpartum care at The University of Kansas in the years 2020-2022. Multivariable logistic regression was used to determine if there is an association between postpartum hemorrhage (blood loss greater than 1000ml at the time of delivery) and postpartum depression (EPDS of 7 or greater) while controlling for pre-existing mental health diagnoses.

**Results.** Of the 2,338 women included in the study, 17% experienced a postpartum hemorrhage and 30% met criteria for postpartum depression. There was no statistically significant difference in the prevalence of postpartum depression between those with and without postpartum hemorrhage (29.8% vs 29.6%, respectively;  $p = 0.93$ ). There was also no association found between postpartum depression and postpartum hemorrhage in a multivariable model controlling for age, smoking status, drug use, insurance, race, ethnicity, and preexisting mental health conditions (aOR 0.98, 95% CI 0.76-1.25).

**Conclusions.** Women who experience a postpartum hemorrhage are not at an increased risk for the development of postpartum depression. The findings of this study do not support the need for additional measures to increase follow-up and screening in patients who have experienced a postpartum hemorrhage.

# APOE Genotype Impacts Mitochondrial Dynamic Response to Insulin in Induced Pluripotent Stem Cells

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**Introduction.** Variants of the apolipoprotein E (APOE) gene impact the risk of developing late onset Alzheimer's disease (AD), insulin resistance, and influence mitochondrial dynamics. A single nucleotide variant (SNV) of the APOE gene (APOE E4) results in an increased risk for these pathologies, while another SNV, APOE Christchurch (APOE Ch) is protective, yet there is little data on how insulin and APOE genotypes interact to influence mitochondrial dynamics. This study found that in Crispr edited induced pluripotent stem cells (iPSCs) with different APOE SNVs, mitochondrial dynamic protein levels differ at baseline and in response to insulin treatment.

**Methods.** Utilizing iPSCs from the same cell line and changing only APOE genotype, we compare mitochondrial dynamic protein levels at baseline and in response to physiologically relevant levels of insulin. Specifically, we investigate iPSCs that are homozygous for detrimental (E4/E4) and protective (Ch/Ch) mutations, as well as cells that are considered a baseline genetic risk (E3/E3) for these diseases. We measure the relative abundance of protein levels using nano liquid chromatography tandem mass spectrometry.

**Results.** In response to insulin, mitochondrial fusion protein OPA1 increased in Ch/Ch iPSCs, decreased in E3/E3s, and had no effect on E4/E4s. Regardless of insulin treatment, fission protein Drp-1 was higher in E4/E4s compared to E3/E3s.

**Conclusions.** This data suggests that APOE SNVs differentially impact mitochondrial dynamics and responses to insulin treatment in iPSCs. However, further studies are needed to determine post translational modifications or epigenetic changes that may mediate relevant differences in mitochondrial dynamics.

## Incidence of Residual Squamous Cell Carcinoma in Situ on Excision Specimens following Shave Biopsy

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**Introduction.** Squamous cell carcinoma (SCC) is the second most common skin cancer in the US, and its incidence and treatment costs are rising. Previous work remains unclear on the incidence of residual SCC in situ (SCCis) and of SCCis upstaging to invasive SCC on excision specimens. The present investigation aimed to understand the incidences of residual SCCis, upstaging to invasive SCC, and residual positive margins on excision specimens following an initial positive SCCis shave biopsy.

**Methods.** A retrospective chart review was conducted using charts obtained from the University of Kansas Health System to include those with an initial positive SCCis shave biopsy and subsequent treatment with excision. Statistical analysis was performed utilizing a 95% confidence interval to evaluate rates. A chi square test was performed for bivariate analysis.

**Results.** The chart review yielded 665 patients (age, [mean  $\pm$  SD]  $69.8 \pm 9.73$ ; male, 401 (60.3%); tumor size,  $1.01 \pm 0.65$  cm<sup>2</sup>). Following an initial positive SCCis shave biopsy, 244 (36.7%) cases had residual tumor, 1 (0.2%) was upstaged to invasive SCC, and 11 (1.7%) had residual positive margins after excision. Bivariate analysis revealed both older age ( $z = -2.1$ ,  $p < 0.05$  years) and larger tumor dimension ( $\chi^2_2 = 19.2$ ,  $p < 0.001$ ) were associated with residual tumor. Those with residual tumor were  $70.9 \pm 9.31$  years old and 54.5% had the largest tumor dimension of  $>1.0$  cm.

**Conclusions.** The present study aids patients and physicians with decision making regarding treatment following a shave biopsy for SCCis.

## Systematic Review of the Representation of Female Athletes in Rehabilitation Following Anterior Cruciate Ligament Reconstruction

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**Introduction.** Despite a worldwide rise in female athletic participation, females remain underrepresented in sports medicine research. Females have a relatively high prevalence of anterior cruciate ligament (ACL) injury; however, the representation of female athletes in the science driving postop ACL rehabilitation is not clear. This study systematically reviews the literature on postop ACL rehabilitation and assesses the representation of female athletes.

**Methods.** A systematic review was conducted, adhering to PRISMA guidelines. Studies were analyzed based on: study population, athletic caliber, menstrual status, research theme, study impact, sample size, time to return to sport (RTS), and graft failure rate. Population categories included males-only, females-only, mixed-sex, and male vs. female comparisons. Athletic caliber had six tiers. Menstrual status was categorized as natural, hormonal contraception, irregularities, mixed, or unclassified. Research themes were health-focused, performance-focused, or combined. Study impact was assessed via journal impact factor.

**Results.** Females comprised 44.6% of ACLR participants. No female-only studies were found; 9% were male-only, 69.7% mixed-sex, 9% male vs. female sub-analysis, and 6% male vs. female features. Top athletic tiers and menstrual status were not considered. Females were underrepresented in studies evaluating RTS timeline and graft failure rate.

**Conclusions.** Female representation in ACLR postop rehabilitation research is disproportionately low. Studies that include female athletes at equal or near-equal rates overlook biological differences such as hormonal variations, which may influence recovery outcomes. The lack of tailored rehabilitation protocols could result in suboptimal recovery outcomes for female athletes. Level of Evidence: Level IV, Systematic Review of Level I – IV studies.

*Bryan Vopat reports relationships that include: consulting or advisory with Artelon and Stryker Orthopaedics; equity or stocks in Carbon 22, Spinal Simplicity, and Altior; and board membership in American Orthopaedic Foot and Ankle Society. Ashley Herda reports a relationship with The University of Kansas Health System that includes: consulting or advisory. The other authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.*

# Understanding Cervical Screening Rates at TUKHS Division of General Internal Medicine

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**Introduction.** The cervical cancer screening rate at The University of Kansas Health System (TUKHS) Division of General Internal Medicine was 72.73% in October 2022, falling short of the goal threshold of 79%. Detection of cervical cancer in initial stages is associated with favorable prognosis. We hypothesized differences in cervical screening rates were due to communication preference, language, gender identity, race, insurance status, ZIP code, county, and Social Determinants of Health (SDOH). Cervical screening rates at TUKHS Internal Medicine clinic were calculated between these demographics in this quantitative descriptive study.

**Methods.** Data was collected from the records of every patient fitting the eligibility criteria of the U.S. Preventative Services Task Force screening recommendations. This includes patients with a cervix from ages 21-64. Only patients from Kansas and Missouri were included in the analysis. Screening rate was defined as number of patients not due for cervical screening/total number of eligible patients. Significance was determined with chi-square and confidence interval calculations, alpha level of 0.05.

**Results.** Data was collected from 10704 patients fitting criteria. There was no significant difference in screening adherence based on primary language ( $P = 0.64651055$ ), gender identity ( $P = 0.24698923$ ), county ( $P = 0.1757628$ ), or SDOH ( $P = 0.84776161$ ). Significant screening adherence differences were seen by age group ( $P = 5.21448E-42$ ), ethnicity ( $P = 8.29037E-23$ ), race ( $P = 0.001464833$ ), portal status ( $P = 2.76523E-08$ ) communication preference ( $P = 0.049528$ ), insurance status ( $P = 4.28234E-32$ ), and last PCP visit ( $P = 3.03611E-61$ ).

**Conclusions.** This quality improvement needs assessment demonstrates that efforts should include uninsured patients, trans men, and patients of Latino or Spanish Origin as intervention cohorts to improve cervical cancer screening adherence.



## iAmHealthy's Effects on Stigma and Bullying Perpetration

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**Introduction.** Overweight youth experience increased rates of victimization and are more likely to engage in bullying perpetration. Within rural areas, there is minimal research examining the impact of pediatric obesity interventions on bullying and the stigma associated with obesity interventions. This study aims to fill that gap by evaluating if iAmHealthy, a pediatric obesity intervention delivered virtually to youth in rural Kansas, results in any stigma for participants and if iAmHealthy resulted in improvements in perceived stigma and bullying perpetration when compared to a Newsletter Control.

**Methods.** At baseline, post (eight months), and follow-up (20 months), participants completed questionnaires assessing weight stigma (Teasing subscale of “Sizing Me Up”), bullying perpetration (“Schwartz Peer Victimization Scale”), and a question regarding stigma experienced as a result of the intervention. Children (n = 148) from 2nd-4th grade were randomized at the school-level to either iAmHealthy (n = 64) or Newsletter Control (n = 84).

**Results.** Repeated measures ANOVAs revealed no significant interactions between treatment group and time for weight stigma ( $F(2,232) = 0.07, p = 0.931$ ) or bullying perpetration ( $F(2,232) = 0.15, p = 0.863$ ). Few participants in the iAmHealthy cohort (n = 1) and the Newsletter Control (n = 3) reported intervention-related stigma.

**Conclusions.** Participation in iAmHealthy had no significant effect on weight stigma, bullying perpetration, and intervention-related stigma. Of note, baseline levels of bullying perpetration and stigma were low in the study population. Future research should explore the impact of pediatric obesity interventions on youth who initially report higher levels of stigma and bullying perpetration.



# Oxidative Stress Regulator NRF2 Controls Inflammatory T-helper 1 (Th1) Subset Differentiation by Modulating Glycolysis and Protects against Colitis Progression in Mice

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**Introduction.** CD4 T cells are the orchestrators of adaptive immunity and a disbalance in their effector responses is implicated in multiple inflammatory diseases, like Ulcerative Colitis (UC). In this project, we aim to identify if/how Nrf2 (nuclear factor erythroid 2–related factor 2), an oxidative stress regulator controlled by Keap1 (Kelch-like ECH-associated protein1), impacts the differentiation of inflammatory (Th1) or regulatory (Treg) T-cell subsets and in turn, the disease outcome of Colitis.

**Methods.** To answer this, we used mice with T-cell specific knock outs (KO) of Nrf2 (N-KO) or Keap1 (K-KO). We performed *in vitro* assays in KO mice and validated results *in vivo* using OTII mice (with OVA antigen specific T-cell receptor). IFN- $\gamma$  and T-bet expression were measured for Th1 and Foxp3 for Tregs differentiation, respectively. To dissect metabolic mechanisms, levels of glycolysis intermediates lactate and pyruvate were measured (Th1 differentiation is Glycolysis dependent). Further, to elucidate if/how NRF2 in T cells plays a protective role in Colitis, we performed T cell specific adoptive transfer experiment in immunodeficient RAG1 KO mice.

**Results.** Our data overall depicts lower Th1 differentiation *in vitro* as well as *in vivo* in K-KO mice along with lower glycolysis compared to Wild type (WT) and N-KO CD4 T-cells. Conversely, we observed increased Foxp3 expression indicative of Nrf2 promoting Treg cell differentiation. We also observed better disease outcomes in RAG1 KO mice adoptively transferred with K-KO T cells.

**Conclusions.** These results suggested the protective role of NRF2 in UC, making it an attractive therapeutic target for the same.

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## Infant Safe Sleep Spaces Following Free Portable Crib Provision

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**Introduction.** Sudden infant death syndrome (SIDS) remains a leading cause of infant death in the United States, even after implementation of safe sleep recommendations in the 1990s. The objective of this study is to better understand parental implementation of safe sleep recommendations after receiving a free crib. Previous investigation by this team using structured interviews with 11 parents who received a free portable crib revealed parents could recall detailed safe sleep counseling but described habits not consistent with recommendations.

**Methods.** Parents were invited to participate in a videotaped evaluation of the sleep space via direct observation using a structured checklist, which was created by adaptation from the AAP Safe Sleep Recommendations with input from content experts. Team members separately viewed video recordings and completed checklists for each sleep space; then checklist results were compared.

**Results.** Results were obtained from five sleep spaces, which all consisted of a firm and flat safety-approved crib. Consistent with recommendations, 4/5 sleep spaces were in the same room and next to where the parent(s) sleep. The majority (3/5) of sleep spaces had a blanket or pillow in the sleep area, which is explicitly prohibited by recommendations; two participants reported the pillow or blanket is removed when the infant uses the sleep space. This study was limited by only 5/11 (45%) participants agreeing to a visual assessment of the sleep space and that sleep spaces were observed without the infant present.

**Conclusions.** Further research is necessary to overcome the disconnect between safe sleep knowledge and practice.

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# Baseline Hip Internal Rotation Measurements in Asymptomatic Baseball Athletes: A Systematic Review with Implications for Training and Rehabilitation

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**Introduction.** Deficits in hip range of motion (ROM), particularly internal rotation (IR) of the nondominant leg, have previously been shown to be associated with increased risk of injury in baseball athletes. Prevention programs aimed at increasing hip ROM have been proposed to reduce injury, but the ideal target population is unknown. The aim of this systematic review was to examine hip IR ROM of baseball athletes to assess which population has the greatest risk of injury.

**Methods.** The systematic review was conducted through September 2023. Key words in the search included: “hip” AND “baseball” AND “internal rotation” OR “medial rotation.” For data analysis, studies were grouped into four categories based on the mean age of the participants. College-aged and professional populations were stratified to pitchers and position players, and measurements were compared bilaterally.

**Results.** A total of 23 articles and 2,196 bilateral hip IR ROM measurements met inclusion criteria. Hip IR ROM was decreased in all populations compared to normative values, though the decrease was most pronounced in the high school and college-aged populations. An increase in ROM of over seven degrees was seen in the professional population compared to the college-aged population.

**Conclusions.** The findings suggest a successful intervention for increasing hip IR ROM in professional populations. There may be a lack of effective injury prevention programs at the high school and collegiate levels. Future research should examine professional injury prevention programs, and how to modify them for lower-level populations where resources are less readily available.

## Quantitative Analysis of Free Radiology Services

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**Introduction.** Healthcare disparity is a widespread problem in the U.S. that plagues nearly every field of medicine. Though disparities in access to radiological services negatively impact many populations, there is inadequate literature addressing the potential cost savings in free clinics, and there is a need to quantify the amount saved using radiological services in these clinics. The aim of this project is to determine the amount patients saved using a single institution's free clinic compared to the cost-based service at the same institution as well as private practice.

**Methods.** The number of patients that used image services, conventional radiography and ultrasonography, from 2018-2021 at the Jaydoc free radiology clinic were recorded, along with the price and type of service. The expenses for the cost-based services were obtained using the host institution's and private practice's price transparency documents. These reports included the out-of-pocket costs for each imaging service, which was then matched to the respective free service provided at the clinic.

**Results.** The costs for the imaging services totaled \$74,177 and \$41,014 for the host institution and private practice, respectively, compared to the same services provided by the free clinic. This equated to roughly \$241 and \$148 saved per patient using the free clinic, respectively, but can expect to save anywhere from \$90-\$350 based on the service provided.

**Conclusions.** Patients utilizing radiological services at the Jaydoc free radiology clinic can expect to save \$90-\$350, based on the service provided. Most patients saved under \$300, which is lower than expected but still meaningful in this low socioeconomic status (SES) patient population.

## Reduced Function of the Vascular Endothelium via Fatty Acids and the Role of Oxidative Stress

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**Introduction.** Evidence suggests that ascorbic acid improves function of the vascular endothelium via suppression of oxidative stress. Therefore, we tested the hypothesis that ascorbic acid (AA, a water-soluble antioxidant) would prevent lipid-mediated reductions in function of the vascular endothelium via antioxidant properties.

**Methods.** A 20% IV fat emulsion (Intralipid) was administered for two hours to eight healthy, middle-aged adults (two men/six women) with and without co-infusion of AA (separate visits) in a double-blinded, crossover study design. Endothelium-dependent dilation was assessed via brachial artery flow-mediated dilation and immunocytochemistry was used to assess oxidative stress (nitrotyrosine) and phosphorylated endothelial nitric oxide synthase (eNOS) in cultured human umbilical vein endothelial cells (HUVEC).

**Results.** Within 20 min of infusion, Intralipid increased plasma fatty acid concentration ( $+36 \pm 18$   $\mu\text{mol/L}$ ,  $P < 0.05$ ) and significantly reduced flow-mediated dilation ( $-53\%$ ,  $P < 0.05$ ). In contrast to our hypothesis, co-infusion of AA did not prevent the reduction in flow-mediated dilation ( $-41\%$ ,  $P < 0.05$ ). In HUVECs, AA did not prevent the increase in oxidative stress following incubation with lipid (Lipid:  $+53\%$  vs. Lipid+AA:  $+35\%$ ). An increase in phosphorylated eNOS was observed with incubation of both AA ( $+28\%$ ) and lipid+AA ( $+24\%$ ).

**Conclusions.** These preliminary findings suggest that increased oxidative stress and impaired function of the vascular endothelium via fatty acids cannot be prevented by ascorbic acid despite increased phosphorylated eNOS.

## Variables Predicting Clinical Decision-Making to Drive: A Retrospective Analysis

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**Introduction.** Driving is a dynamic activity involving physical, visuo-perceptual, and cognitive skills. There are multiple domains to assess in persons returning to drive –visual, cognitive, motor, and on-road assessments. It is recommended to perform an on-road driving assessment based on a battery of off-road tests. The objective was to identify the most important tests from the battery of tests that best predict the recommendation for an on-road driving assessment in our Driving and Mobility Services (DMS) Clinic.

**Methods.** A retrospective analysis of our driving service data was gathered from 2017 to 2019. We analyzed data from 98 patients (65 men; mean age 68.8±14.2 years). The patients were referred to the DMS by clinical departments in the University of Kansas Health System. Four key functions that were extracted from the dataset were: vision, motor function, cognition, and simulated driving assessments.

**Results.** A backward linear regression identified possible predictors of the outcome, the clinical decision to drive. The analysis showed that the Montreal Cognitive Test (OR = 1.17, p = 0.01), break reaction time (OR = 0.12, p = 0.002), history of at-fault collision in the past five years (OR = 0.16, p = <0.001), Trail Making Test A (OR = 0.96, p = 0.01), Road Sign Recognition Test (1.42, p = 0.005), Dot Cancellation Test (OR = 0.97, p = 0.03) had the most influence on our decision to recommend a practical driving assessment or not; 52.9% of variance in the decision was explained by the model.

**Conclusions.** Among several physical, visual, cognitive, simulator-based assessments, we were able to identify the top six variables that were predictive of clinical decision-making to permit driving.

## KUMC Student Awareness of Burn Surgery as a Subspecialty

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**Introduction.** In 2004, a shortage of burn surgeons was cited in the literature, motivating the burn surgery community to improve recruitment and retention of burn surgeons. The authors sought to analyze the awareness of burn surgery at our institution to determine how KUMC medical students' understanding of burn surgery compares to other populations.

**Methods.** A survey was disseminated to students and allowed respondents to indicate their level of knowledge and interest in the field of burn surgery.

**Results.** Responses indicate that 64% don't know enough about burn surgery to consider it a career; 77% of students would attend burn surgery educational events, 4.5% of students in their final year of school agreed to this statement. 69% agree they would be more likely to choose burn surgery with the help of a mentor and 68% agree they would be more likely to choose burn surgery if exposed to it earlier.

**Conclusions.** Analysis confirmed that there is not a difference in the level of knowledge based on year in school, suggesting that students in the later years of their education have not had enough exposure to burn surgery. The lack of interest demonstrated by M4s supports our hypothesis that earlier exposure to burn surgery will be most beneficial. The positive response regarding interest in learning more about burn surgery provides evidence to move forward with this research. A survey of students from another institution will increase our findings' power and support the goal of creating online educational resources available to students.



## How Insurance Status Affects Where People Experiencing Homelessness Seek Out Healthcare

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**Introduction.** Homelessness continues to have an increasing effect around the United States, and those individuals who are experiencing homelessness often use free health clinics to receive medical care.

**Methods.** This study assessed the free health clinic Care Beyond the Boulevard (CBB) and the population of people it serves. The authors collected survey data from 110 patients about their experiences with CBB between August 2023 and September 2023.

**Results.** Survey data found that two-thirds of patients seen at these clinics had some form of insurance, and half of all patients reported that they had Medicaid. The results revealed that insured patients were more likely to seek out medical care at safety-net medical centers than those who were uninsured, and the uninsured were less likely to seek out medical care at all compared to those who were insured.

**Conclusions.** Although safety-net clinics are intended for individuals who are low-income or uninsured, uninsured patients were less likely to use these resources than comparable insured patients of this population experiencing homelessness. Certain barriers, such as health insurance competency, access to consistent cellphone use and transportation, and previous negative experiences in the medical system, may have an impact on the perception of and hesitation to seek out care in the traditional health care setting. Future studies should explore the specific reasons individuals continue to use safety-net and free health clinics despite having health insurance coverage as well as how previous negative experiences impact future medical care in this population.



# Primary Mitochondrial Dysfunction Promotes Mitochondrial DNA Copy Number Upregulation to Maintain Mitochondrial Functionality in Neuronal Models

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**Introduction.** There is growing evidence supporting the critical role of mitochondrial function in the progression of Alzheimer's Disease (AD), yet the direct mechanisms are still unclear. We predicted that primary mitochondrial dysfunction would cause an upregulation in mitochondrial DNA copy number (mtDNA<sub>cn</sub>) to maintain protein and energetic homeostasis.

**Methods.** We generated human SH-SY5Y neuron models of broad and fine-tuned mitochondrial dysfunction using chloramphenicol or a knockdown of PTCD1 (PTCD1-KD), a nuclear-encoded RNA-binding protein essential for mitochondrial translation, respectively to assess alterations in mtDNA<sub>cn</sub>, respiratory chain and AD-associated targets, and cellular respiration.

**Results.** Both chloramphenicol and PTCD1-KD treatments showed a significant increase in mtDNA<sub>cn</sub>. We observed no changes in respiratory chain proteins, ATP5A, UQCRC2, and SDHB, expression for either group, except for a significant reduction of UQCRC2 in chloramphenicol-treated neurons. Total amyloid precursor protein (APP) expression was unchanged in either group, but interestingly the non-glycosylated to glycosylated APP ratio was significantly increased. Additionally, APOE mRNA was significantly elevated by 26% in PTCD1-KD cells. Chloramphenicol treatment significantly reduced oxygen consumption (OCR). PTCD1-KD showed no changes respiration function, however, there was a significant reduction in the PTCD1-KD neurons when basal OCR was normalized for mtDNA<sub>cn</sub>.

**Conclusions.** In this study, we showed that chloramphenicol and PTCD1-KD produce mitochondrial dysfunction via disruptions to mtDNA translation. When neurons are placed under mtDNA translational stress, they increase mtDNA copy number to attempt to maintain mitochondrial functional homeostasis until it overcomes their adaptive capacity and show alterations to AD-related markers.

# Rural Healthcare Providers' Perceptions and Opinions of Their Own Scope of Practice: A Survey

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**Introduction.** Rural healthcare providers, including physicians and Advanced Practice Providers (APPs), play a critical role in ensuring access to healthcare for individuals living in rural areas. However, their scope of practice varies widely. This study assessed rural healthcare physicians' perceptions of their scope of practice and the impact of APPs on their practice in Kansas.

**Methods.** A cross-sectional survey was conducted at 30 practice sites across rural areas in Kansas. Responses from 68 MDs and DOs practicing in rural areas were analyzed. Participants reported their scope of practice and perceptions regarding the independent practice of APPs and team-based care.

**Results.** Physicians indicated notable skepticism towards the independent practice of APPs, with 58% of MDs and 71% of DOs disagreeing that it would improve access to care. However, strong support for team-based care was observed, with 90% of MDs and 100% of DOs agreeing it results in the best care outcomes. No significant differences were found based on gender or years of experience.

**Conclusions.** There is a dichotomy in attitudes towards independent practice by APPs and team-based care among rural healthcare providers. While there is skepticism about the former, there is strong support for the latter. These findings suggest that rural healthcare providers value collaborative approaches and have reservations about the expansion of independent practice by APPs. The study highlights the need for careful consideration and dialogue when addressing the role of APPs in rural healthcare settings.

# A Systematic Review of Sex-Related Differences in Response to Post-Operative Orthopaedic Pain Management Protocols

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**Introduction.** Current literature indicates that sex and gender impact the pain experience, with increased incidence and intensity of clinical pain being observed among women. Much of orthopaedic literature, across conditions, does not consistently disaggregate study results based on sex. The purpose of this study was to review the literature concerning orthopaedic surgery post-operative pain and whether (and how often) sex was considered when assessing results of pain management interventions.

**Methods.** Literature searches utilized PubMed, Science Direct, ClinicalKey, and CINAHL Complete. Articles that described pain management after orthopaedic surgery published in English between January 25, 2016 and April 30, 2022, were included. The data abstracted included study type, type of pain management, and presence of sex-based reporting of results.

**Results.** Of the 8,610 article abstracts reviewed, 48 articles were included for further evaluation. Nine (19%) discussed the differences in pain between women and men in terms of opioid consumption. 37 (77%) of the articles mentioned sex in the demographics but stated “no difference in treatment or response” between sexes in the results, without providing raw data or related statistics, preventing further interpretation of results. Two (4%) articles did not report the sex of participants within the publication.

**Conclusions.** Clinical research suffers from underrepresentation of women participants and underreporting of results based on sex or gender. The incorporation of sex and gender as variables in health outcomes is critical for optimal care for patients. Further research is needed to fully understand how sex affects the pain experience and post-operative pain management.

# The Effect of Sex and Ethnicity on the Relationship between Added Sugars Exposure in the First 1,000 Days and Offspring Body Composition at 24 Months

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**Introduction.** Added sugars (AS) intake is positively related to obesity risk. Intake among pregnant women, infants, and toddlers exceeds recommendations. Studies have not examined how AS exposure in the first 1,000 days relates to offspring adiposity, and if relationships vary by biological characteristics.

**Methods.** This secondary analysis assessed data from two NIH-funded trials, a prenatal DHA supplementation RCT (ADORE) and its follow-up (GAINS). Mother-child pairs were followed from pregnancy to 24 mo. Prenatal dietary intake was collected between 12-20wk gestation and offspring 24-hour dietary recalls were collected at 2wk, 6mo, 12mo, and 24mo. To reflect AS intake during infancy and toddlerhood, offspring recalls were averaged between 2wk/6mo (Year 1) and 12mo/24mo (Year 2). DXA measured offspring body composition at 24mo. Adjusted multiple hierarchical linear regression was completed.

**Results.** Maternal models (n = 55) showed a positive relationship between prenatal AS intake and fat-free mass (FFM) among female offspring. Offspring models (n = 54) also showed that outcomes varied by offspring sex. Year 1 AS intake was positively related to FM and FFM measures among male offspring, whereas Year 2 AS intake was positively related to only FM measures among female offspring. Ethnicity also modified outcomes. Among Hispanic offspring, higher Year 1 AS intake predicted higher FFM while higher Year 2 intake predicted lower central FM.

**Conclusions.** Offspring sex and ethnicity modified the relationship between AS exposure in the first 1,000 days and offspring body composition at 24mo. Further studies are needed to confirm our findings and understand if relationships impact later obesity risk.

# Olecranon Stress Fracture Treated with Headless Compression Screws and Bone Marrow Aspirate Concentrate Augmentation: A Case Report and Systematic Review of the Literature

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**Introduction.** An olecranon stress fracture (OSF) is an uncommon phenomenon in the context of sports injuries, with a prevalence of 5.4% among baseball-related elbow disorders. A variety of surgical techniques have been described to treat OSFs, most commonly involving the use of cannulated screws placed perpendicular to the fracture line. However, hardware removal due to mechanical failure, infection, and pain is commonplace. We present a novel surgical approach using ORIF with two headless compression screws and augmented with bone marrow aspirate concentrate treated cancellous allograft bone to avoid complications associated with prominent compression screws.

**Methods.** A literature search was performed following the PRISMA guidelines utilizing six separate online databases using search terms “Screw” AND “Olecranon stress fracture”. The databases were searched from inception to the original search date February 22, 2024 for text on olecranon stress fracture management.

**Results.** At final follow up, the patient had radiographic and clinical evidence of fracture union, full range of motion, and was able to resume full baseball activities. In the systematic review, across the three included studies, 12 throwing athletes were treated for olecranon stress fractures with headless compression screws either after unsuccessful conservative treatment or due to a desire for expedited return to high-level play. All athletes returned to their throwing sport between four to six months post-surgery.

**Conclusions.** This is a novel surgical approach to treating olecranon stress fractures resistant to conservative management and may assist in minimizing known complications associated with prominent olecranon hardware.

## Upper Limb Movements in Experimental Falls among Older Adults

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**Introduction.** Recent data suggests arm bracing increases the risk of head injuries in long-term care residents. This contradicts the commonly held belief that upper limb movements (ULMs) are protective against fall-related head impact (HI) and injuries.

**Methods.** This study analyzes ULMs and head-to-ground impacts in video-recorded experimentally induced falls among older adults. Participants completed six experimental falls in the directions of backward, left, and right (two in each direction) with standardized lean-and-release paradigm. Falls were video recorded. Two independent researchers characterized ULMs and HI in video-recorded falls using a standardized video analysis tool.

**Results.** 166 falls from 29 participants ( $73.1 \pm 5.8$  years, 25 females, 4 males) were included in the final analysis. 35 falls exhibited no ULMs, of which 32 (91.4%) had HI with 27 (84.4%) being “severe”. The remaining 131 falls exhibited ULMs, of which 58 (44.3%) had HI with 30 (51.7%) being “severe”. When ULMs presented, forearm was the primary site of greatest energy absorption in falls (56/131 falls), among which 16.1% had HI. Notably, 46 falls had no apparent energy absorbed when ULMs presented, among which 71.7% had HI.

**Conclusions.** Results suggest older adults tend to present ULMs during falls. ULMs, particularly when significant energy is absorbed by the forearm, could reduce the likelihood and severity of head-to-ground impacts in experimental induced falls. This study displays potential benefits of ULMs to prevent fall-related head injuries. Environmental factors may affect ULMs in real-world falls, necessitating further study.

# Paramedic Student Perspectives Toward Evidence-Based Medicine and Research Methods

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**Introduction.** There is a growing emphasis for students in all fields of medicine to become familiar with and engage in research. Medical and nursing schools in the United States have begun implementing robust curriculum changes to reflect this, and opportunity is growing for paramedic schools to implement similar changes. This study aims to better understand how paramedic students view research and determine potential barriers to entry for Emergency Medical Services (EMS) providers in the research process.

**Methods.** A survey assessing student demographics and perspectives toward evidence-based medicine and research methods was sent to four midwestern paramedic schools.

**Results.** Nineteen responses were obtained. Respondents were a mean age of 26.6 years old (SD 9.8) and mostly White (N = 15, 79%) men (N = 10, 53%) with an average of five years (SD 8.4) of EMS experience. Although every respondent agreed that prehospital Emergency Medicine research is important, 95% (N = 18) had no previous research experience and most participants (N = 10, 53%) only read research a couple of times per year. When asked about barriers to participating in research, most (N = 11, 58%) identified a lack of time; others identified not knowing how to find or understand research (N = 8, 42%), and discomfort with involving a patient in a clinical trial, even after proper training (N = 10, 53%).

**Conclusions.** These data suggest that paramedic students continue to face barriers to understanding and participating in research. Given the rapidly changing landscape of medical practice, it is imperative that EMS providers are included in research education.

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## Depression and Quality of Life Following Kidney Transplantation

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**Introduction.** Depression and diminished quality of life (QOL) are common in kidney failure. In this study we investigate whether kidney transplant (KT) improves depression and QOL across lifespan and whether this effect is sustained.

**Methods.** In this study, we assessed depression and QOL in patients on the KT waitlist before and after surgery. We measured depression using the Beck Depression Inventory-II (BDI-II) and QOL using the Kidney Disease Quality of Life Short Form Version 1.3 (KDQOL-SF) physical health composite score (PCS) and mental health composite score (MCS). We used linear mixed effect models with random intercepts to evaluate the effect of time, age, and KT status on BDI-II score, PCS, and MCS. For models with significant age interactions, we estimated this effect for baseline age groups.

**Results.** We analyzed 239 BDI-II assessments and 143 KDQOL-SF assessments. The BDI-II scores improved pre- to post-KT (10 pre-KT vs 5 post-KT,  $p < 0.001$ ). Overall, PCS did not change pre- to post-KT (42 pre-KT vs 49 post-KT,  $p = 0.11$ ). There were interactions between KT status, age, and years since baseline assessment. The magnitude of change in PCS post-KT decreased with older age ( $p = 0.01$ ). In the sub-group analysis by age, PCS improved post-KT in patients  $< 60$  years. The MCS improved from 47 pre-KT to 51 post-KT ( $p < 0.001$ ), and the magnitude of improvement decreased with older age ( $p = 0.03$ ).

**Conclusions.** Depression and QOL improve with KT. This improvement is sustained at one-year post-KT. While depression improves in all age groups, the improvement in QOL is more evident in younger patients.

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## Analysis of Pediatric Mail Order Pharmacy Usage Throughout the COVID-19 Pandemic

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**Introduction.** Mail order pharmacies offer increased convenience, higher rates of patient compliance, and lower costs to both patients and the health care system. This study attempts to review the relationship between demographics and social needs of pediatric families and use of mail order at a single institution.

**Methods.** This cross-sectional, retrospective study reviewed mail order prescription completion at an a midwestern academic medical center for children less than 18 years old from June 2020 to December 2022. Demographic features that were significant at  $p < 0.1$  from the univariate analysis were subjected to multivariate logistic regression analysis to obtain the adjusted odds ratio (OR) and 95% confidence interval (CI).

**Results.** In 2020, mail order pharmacy prescription completion occurred more frequently by families who identified as English speaking (OR: 3.61, 95% CI: 1.22-10.70, p-value: 0.02) and religious (OR: 2.38, 95% CI: 1.68-3.40, p-value:  $< 0.001$ ). Less frequent use of this service is seen among patients who identified as non-white (OR: 0.31, 95% CI: 0.17-0.59, p-value: 0.002). Percentage of mail order pharmacy use increased from 2020 to 2022.

**Conclusions.** This study reiterated disparities in mail order pharmacy utilization for recognized vulnerable populations such as families with limited English proficiency and identifying as non-white. Mail order was utilized less often at the height of the COVID-19 pandemic when health disparities were most evident. Finding means to engage vulnerable families in alternative care delivery methods remains a challenge and an important priority for the health care system.

## Depression Screening at KUMC: Examining PHQ2/9 Positivity and Intervention

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**Introduction.** In primary care, the U.S. Preventative Services Task Force recommends universal depression screening using tools like the Patient Health Questionnaire (PHQ2/9). This study assesses intervention frequency for screened, depressed patients and frequency of missed positive screens.

**Methods.** A retrospective QI project at KUMC Internal Medicine Clinic examined adult patients diagnosed with depression from January 1 to December 31, 2022. It focused on individuals with PHQ2/9+ screening tests that lacked appropriately documented interventions or referrals. Provider notes were reviewed for those not meeting intervention criteria to identify false negatives. Significant differences were determined through qualitative analysis of the different outcome groups.

**Results.** Of 492 patient encounters, 35% (n = 174) were PHQ2/9+, with 61% (n = 107) receiving referrals or interventions correctly documented in the PHQ2/9 flowsheet tool. Chart review of the 39% (n = 67) encounters that lacked Electronic Medical Record trackable interventions found that every patient had an appropriate intervention within the provider's notes. Between groups, 75% (n = 50) of the false negative intervention group and 14% (n = 15) of the true positive intervention group started or continued medications. No significant differences were observed between common patient identifiers or raw PHQ2/9 scores.

**Conclusions.** 100% interventions challenged ideas that automatic screening would increase rates of missed diagnosis in patients with positive PHQ2/9 scores. Evaluating only trackable interventions suggested that 39% of patients did not receive adequate care; however, the issue was related to non-standardized documentation that could not be tracked by the EMR. Calls for improved, standardized documentation is necessary for better analysis and ensuring quality care of the depressed patient population.

## Subjective Cognitive Workload is Higher During a Sustained Visual Search Task in Individuals with a Mild Traumatic Brain Injury Compared to Controls

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**Introduction.** Persistent symptoms after a mild traumatic brain injury (mTBI) are associated with reduced activity and reports of mental fatigue. Our aim was to compare objective and subjective cognitive workload during a sustained visual task between people with persistent symptoms after a mTBI and controls.

**Methods.** The Dot Cancellation Task, a sustained visual search task, was completed and change in pupil diameter during the task was collected and converted to the Index of Cognitive Activity (ICA). Subjective cognitive workload was collected through the NASA-TLX Questionnaire. Patient reported outcomes included the Post-Concussion Symptom Scale (PCSS) and the Mental Fatigue Scale (MFS).

**Results.** Fifty-two subjects, 27 with mTBI ( $29.59 \pm 23.1$  weeks post injury; aged  $56.78 \pm 10.2$ ) and 25 controls (aged  $55.52 \pm 8.9$ ), participated in the study. Individuals with mTBI took  $536.6 \pm 9.93$  seconds to complete the Dot Cancellation Task, while controls took  $437.2 \pm 6.2$  seconds ( $p = 0.002$ ). The ICA was not different between groups for the right eye ( $p = 0.74$ ) or left eye ( $p = 0.71$ ). The average NASA-TLX score for mTBI participants was  $35.43 \pm 18.31$  while the average for controls was  $14.53 \pm 12.65$  ( $p < 0.001$ ). The NASA-TLX score correlated moderately with both the PCSS ( $\rho = 0.57$ ) and the MFS ( $\rho = 0.59$ ).

**Conclusions.** Individuals with persistent symptoms following a mTBI take longer to complete a sustained visual task, report higher cognitive workload, higher symptom burden, and higher mental fatigue compared to controls despite no difference in objective measures of cognitive workload. Interventions to reduce symptoms that persist after a mTBI are essential.

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# Understanding Physician Characteristics of Cervical Cancer Screening Rates at TUKHS Division of General Internal Medicine

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**Introduction.** The cervical cancer screening rate at The University of Kansas Health System (TUKHS) Division of General, Geriatric, & Hospital Medicine was 72.73% in October 2022, falling short of the 79% goal threshold. We hypothesized that there are differences in cervical screening rates between physician resident or attending status, and between physician gender.

**Methods.** Data was collected from the records of every patient within eligibility criteria of the U.S. Preventative Services Task Force screening recommendations. This includes patients with a cervix from ages 21-64. Cervical screening rate was defined as number of patients not due for cervical screening/total number of eligible patients. Outcome variables include adherent, non-adherent, or no record. Significance was determined with chi-square calculations. The alpha level was set at 0.05.

**Results** Data was collected from 10,704 patients fitting criteria. To minimize margin of error, a sample size of at least 371 was needed. Data from 500 patients were randomly selected and analyzed. Due to hysterectomy history, 63 were excluded. There was no significant difference in screening adherence based on physician gender ( $P = 0.22$ ). Of the physicians adherent to screening guidelines, 43% were attendings and 57% were residents. Of the physicians who were non-adherent, 82% were attendings, and 18% were residents. Overall, the rate of screening adherence between attending vs. resident physicians was significant ( $P = 0.015$ ).

**Conclusions.** There is a significant difference in the screening adherence of resident physicians compared to attending physicians. This identifies future intervention areas for efforts to improve physician cervical cancer screening compliance at TUKHS.

## Apical Support Procedure at Time of Hysterectomy

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**Introduction.** This study was performed to investigate The University of Kansas Health System's (TUKHS) compliance with current recommendations to perform Apical Support Procedures (ASP) at the time of hysterectomy performed for uterovaginal prolapse. Hysterectomy is one of the most common surgical procedures in the United States; 17% of which are performed for prolapse. Hysterectomy alone is an ineffective treatment for prolapse as it does not restore Level 1 support. Therefore, performance of an ASP is crucial to prevent future and recurrent prolapse.

**Methods.** This was a retrospective cohort study of patients who underwent benign hysterectomy at TUKHS identified by ICD and CPT codes.

**Results.** 388 patients underwent benign hysterectomy. The mean age was 58; most were white, non-Hispanic, with private insurance. 259 (66.7%) had uterovaginal prolapse and 289 (74.5%) underwent an ASP. On multivariable analysis, patients were nearly 3-fold more likely to undergo an ASP if they held a diagnosis of uterovaginal prolapse and nearly 70% less likely to undergo an ASP if their procedure was performed only by a general gynecologist.

**Conclusions.** At our institution, approximately 75% of hysterectomies performed for prolapse incorporate an ASP. Although this is better than the rates in other regions, ongoing efforts to educate surgeons, particularly non-subspecialists, on the importance of re-establishing apical vaginal support at time of hysterectomy for prolapse is needed.

## The Dangers of Xylazine Mixed with Non-Pharmaceutical Fentanyl (NPF)

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**Introduction.** Xylazine hydrochloride and non-pharmaceutical fentanyl (NPF) are addictive illicit drugs of abuse, whose abuse in combination has gained popularity in last few years. Xylazine has gone from a drug that was hardly seen in U.S. drug markets in 2018, to one of the commonly abused additive drugs. Xylazine added to these drugs is thought to increase their duration of action, potentially leading to the increased popularity of the mixture. This is of concern due to its increasing involvement of xylazine mixed fentanyl in drug overdose deaths. This case highlights a case of lack of patient knowledge while using xylazine.

**Methods.** A retrospective chart review of the patient's presentation, workup, treatment, and follow up was conducted.

**Results.** A 43-year-old male presents for methadone clinic for the third time in his life. At the age of 23 he started to use illicit opiates and heroin. His recently began using a new drug he reports as "carfentanil." He describes it as a powerful sedative and that he uses it as the same dose as he uses fentanyl. Considering that carfentanil has a potency that is 100 times that of fentanyl, the patient would have noticed if he had been taking actual carfentanil. Thus, it was determined that the patient incorrectly named the xylazine mixed fentanyl as "carfentanil."

**Conclusions.** Xylazine mixed fentanyl is an increasingly popular drug combination that is finding its way across the country with potential for fatal consequences.

## Providers' Perspectives on Social Determinants of Health That Impact Patients' Engagement in HIV Care

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**Introduction.** Human immunodeficiency virus (HIV) infection imposes threats to physical health and psychological well-being and requires effective long-term management to achieve viral suppression. A patient's ability to seek care is largely influenced by social determinants of health (SDOH) and the provider's ability to help manage social needs. This study aims to elucidate how SDOH impact the provider's practice and well-being. We also assessed how provider burnout plays a role in the patient-provider relationship.

**Methods.** This cross-sectional qualitative study was conducted with 86 HIV providers across the United States that completed an electronic survey about their perceptions of SDOH, barriers to social needs screening, and their personal experience of burnout. Providers identified several unmet social needs, such as financial instability, transportation, and appointment logistics, as major barriers for the patients to engage in HIV care.

**Results.** The lack of resources and insufficient time were barriers preventing clinicians from inquiring about social needs. Providers from the West and Midwest were more likely to report burnout compared to providers from other regions. Provider burnout was significantly associated with feeling emotional exhaustion.

**Conclusions.** These findings suggest the importance of improving provider well-being as well as optimizing practices to effectively bridge the community with social services in our quest to end the HIV epidemic.

**Potential Conflicts of Interest:** *All authors report no conflicts of interest.*

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# Auditing the Representation of Female Athletes in Sports Medicine Research: Rotator Cuff Repair

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**Introduction.** The rotator cuff stabilizes the glenohumeral joint and enables shoulder movement. Injuries can cause weakness, pain, and restricted movement, especially in female athletes. This project reviewed rotator cuff repair and evaluated female athlete representation in current literature using a standardized protocol.

**Methods.** A systematic audit of rotator cuff repair literature following Smith et al.'s 2022 protocol was performed. Factors identified included study population, athletic caliber, menstrual status, research theme, sample size, journal IF, and Altmetric score.

**Results.** Twenty articles met the inclusion criteria. 650 rotator cuff repairs were identified with 514 (79.08%) of repairs males and 136 (20.92%) females. Most studies (15/20, 75%) were mixed cohort, while the others were three male studies (3/20, 15%), and two female studies (2/20, 10%). Out of 479 shoulders involved within the mixed-sex cohort, 353 (73.69%) were male while 126 (25.68%) were female. In the mixed-sex cohort, studies investigated sedentary populations (2/15, 13.33%), recreationally active participants (3/15, 20%), trained athletes (7/15, 46.66%), national athletes (2/15, 13.33%), and international athletes (1/15, 6.66%). Among male studies, two investigated international athletes (2/3, 66.66%) and one investigated recreationally active participants (1/3, 33.33%). One female study investigated national athletes, and the other investigated international athletes. All mixed-sex cohorts investigated health outcomes. One male study (33.33%) investigated performance outcomes within MLB players, while the other two investigated health outcomes (66.66%). The female studies only investigated health outcomes. All female studies and mixed-sex cohort studies failed to include menstruation as a variable.

**Conclusions.** Females are not adequately represented in research regarding rotator cuff repair.



# Utilization Patterns, Outcomes & Complications of 300 Consecutive Robotic-Assisted Spinal Procedures and 1454 screws by a Single Surgeon

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**Introduction.** Literature related to robotic spine procedures report relatively high accuracy with low robot-abandonment, however, several are multi-center, multi-surgeon series with high variability or report on previous generation robot systems. The purpose of this study was to review all single-surgeon consecutive robot-assisted cases using a single robotic-platform and report utilization patterns, outcomes, and robot-related complications.

**Methods.** A review of all robotic spine surgeries performed by a single surgeon at an institution was performed. All cases utilized the same robotic-navigation system.

**Results.** Between August 2019 and July 2023, 300 consecutive robotic cases were identified. 53.3% were female with mean age 65.3yrs (range 20-92) and BMI 29.5 (19-47). Spinal pathologies included: Degenerative (88.7%), Deformity (16.3%), Trauma (10.0%), Neoplastic (5.7%), and Spondylodiskitis (1.7%). Cases were performed Open (10.3%), Minimally Invasive (MIS; 85.3%) and Hybrid (Open and MIS; 4.3%). Imaging sources included: Pre-Operative CT-merge (84.9%) and Intra-Operative 3D scan (15.1%). Patient tracker placement was: Posterior Superior Iliac Spine (81.6%) and spinous process (18.4%). Spine regions and screws placed included (% cases; # screws): Cervical (0.3%; 2), Thoracic (13.7%; 137), Lumbar/Sacral (96.3%; 1,231), Pelvic (12.7%; 78). There were 1,448 total screws placed. Mean total robot time was 38.75min (range 13-97; n = 228 cases). Six screws (0.4%) in six cases were malpositioned and removed intraoperatively. There was 0% robot abandonment, 0 returns to Operating Room and 0 neurologic deficits. Four patients (2%) had intraoperative durotomies and 22 (7%) had post-operative wound complications.

**Conclusions.** This report demonstrates that modern robotic platforms can be used across all spinal regions, using various imaging sources, with high accuracy and low complication rates.

## Time to Appendectomy: A Review of Disparities in Time to Appendectomy at a Midwest Hospital System

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**Introduction.** Previous studies have indicated that Black patients wait longer for appendectomies after arrival to the hospital for appendicitis. Our study investigated whether race and ethnicity-related discrepancies in time to appendectomy exist at a Midwest institution.

**Methods.** All appendectomies from July 2022 to September 2023 at The University of Kansas Health System were analyzed. Using chart review, patient records were organized by self-reported race and ethnicity. Time from emergency department arrival to surgery start was determined for each patient, and the average elapsed time was calculated in minutes for each category.

**Results.** Our study included 119 patients who presented to this institution's emergency department and subsequently underwent appendectomy. Of these, 64 identified as White and 55 identified as non-White or Multiracial. Additionally, 77 identified as non-Hispanic and 40 identified as Hispanic. On average, appendectomies occurred after 832.5 minutes and 875.1 minutes, respectively, for White patients and Multiracial patients. For Hispanic versus non-Hispanic patients, average time to appendectomy was 841.9 minutes and 861.2 minutes respectively. Results showed no significant difference between White and non-White groups ( $p = 0.2769$ ) or Hispanic and non-Hispanic groups ( $p = 0.3119$ ).

**Conclusions.** Results showed no indication of disparity in time to appendectomy between patients who identified as White and patients of other races, as well as between patients identifying as Hispanic and non-Hispanic, as the time differences between groups was neither clinically significant nor statistically significant. We hope this study will serve as a reminder of the importance of providing equitable care for all patients.

# An Integrative Machine Learning Approach in Detecting Gene Networks Predicting Liver Cancer Incidence and Survival

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**Introduction.** Liver cancer (LC) is one of the most common types of cancer and the third largest cause of cancer-related deaths globally. Although there is no known cause of LC, the disease has some associated risk factors. Studies have also linked genetic mutations to LC. Patients who receive early diagnosis have a five-year relative survival rate of ~36%, whereas ~3% for late diagnoses.

**Methods.** In this study, we employed a novel machine learning technique called netLDA which initially identified predictive strong DE genes and used as them hubs genes to identify coregulating genes that may only exhibit marginally weak DE effects. The detected genes form predictive gene networks (PGNs), which are used to make predictions.

**Results.** Our study detected previously identified LC occurrence susceptibility strong genes; *GPC3*, *STMN1* and *TCF19*. Potential biomarker genes for LC occurrence such as *MTIE* and *PLVAP* were detected as co-regulating weak genes. In our one-year survival study, *SPP1* and *ADH4* were detected as strong genes whilst *MFAP4* was identified as novel co-regulating weak gene. The PGNs achieved an AUC of about 1.00 in our case-control study and 0.77 in our one-year survival study. Some of the detected genes overlapped with some significant LC related pathways to provide additional layers of biological significance.

**Conclusions.** With our study, the identified predictive genes can propel studies into understanding the underlying mechanisms for LC development and prognosis. These identified biomarker genes can be used as new therapeutic targets by industries in the development of new drugs for LC.

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## Productivity in Radiology: Remote vs On-Site Work Environments

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**Introduction.** Since the COVID-19 pandemic, there has been a shift to remote and hybrid work schedules in radiology. Remote and hybrid work schedules have become a key factor in recruiting new employees. Diagnostic accuracy has been shown to be preserved in remote work. However, differences in productivity between work environments within a hybrid work schedule has not been studied.

**Methods.** This study included data from 22 radiologists of the body, chest, and ultrasound divisions at a single academic medical center where data was retroactively observed. Radiologists' locations (on-site vs remote) and relative value unit (RVU) data was recorded for a six-month period from July to December 2022. A random intercept model was used to account for the correlation between productivity by the same physician.

**Results.** Radiologists working remotely generated on average 2.31 more RVUs per day than while working on-site ( $p = 0.0004$ ). Observing individual divisions, for body imagers, work location was not statistically significant ( $p = 0.6807$ ). For chest imagers, work location was significant ( $p = 0.0213$ ). Chest imagers working remotely generated on average 1.58 more RVUs per day than while working on-site. For ultrasound imagers, work location was significant ( $p < 0.0001$ ). Ultrasound imagers working remotely generated on average 7.04 more RVUs per day than while working in person.

**Conclusions.** Radiologists may be more productive while working remotely than on-site. Differences between individual divisions are likely due to limitations including differences in resident support between remote and on-site locations, internet connectivity issues for remote workers, and small sample size.

## Determinants of Financial Distress in Cancer Patients Receiving Radiation Therapy

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**Introduction.** Financial toxicity is an important source of morbidity and mortality in cancer patients. We hypothesize that patients who received radiation therapy may experience financial distress after treatment.

**Methods.** Patients were recruited from a single institution from October 2022 to July 2023. Financial distress was measured using the validated Comprehensive Score for Financial Toxicity (COST) questionnaire. Lower COST score (0-44) indicates higher financial distress. COST was prospectively collected in all patients prior to radiation therapy and among patients who presented for follow-up on January 2023 or July 2023. Worsening financial distress was defined as a change in COST of 3 points or more. Baseline demographic and clinical information were abstracted from the medical record. Univariate and multivariate analysis was used to identify patient and treatment factors associated with worsened financial toxicity.

**Results.** 84 patients were identified who had completed pre-radiation and at least one follow-up COST. The median pre-radiation COST was 26 (range 1-44, IQR 21-33). The median change in score was +2 ( $p < 0.01$ ), indicating less financial distress. Overall, 13% of patients had worsening financial distress. On univariate analysis, older age ( $p = 0.02$ ), concurrent chemotherapy ( $p = 0.02$ ) and greater travel time ( $p = 0.09$ ) were associated with worsening financial distress. Type of radiation, type of cancer, and pre-treatment COST were not associated. Concurrent chemotherapy was borderline significant ( $p = 0.06$ ) on multivariable analysis.

**Conclusions.** Only a minority of patients experienced worse financial toxicity after radiation therapy. Providers should evaluate for potential financial toxicity in older patients, patients getting multi-modality therapy, and those who live greater distances from the treatment facility.

# Evaluating the Management and Outcomes of Acute Extracranial Occlusions of Internal Carotid Arteries with Patent Intracranial Vasculature

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**Introduction.** Acute occlusion of the internal carotid artery (ICA) is implicated in a significant proportion of ischemic strokes and associated with severe outcomes. Extracranial ICA occlusion without tandem intracranial occlusion lacks standardized management guidelines. Endovascular recanalization risks distal embolization or hemorrhagic transformation, yet medical management may not prevent deterioration. This study aims to understand the natural history, management trends, and outcomes of isolated extracranial ICA occlusions.

**Methods.** Retrospective chart review of patients aged  $\geq 18$  with isolated extracranial ICA occlusion treated at one academic center between 2021-2023 was conducted. Outcome measures included mortality, symptomatic intracranial hemorrhage (sICH), and modified Rankin scale (mRS) at discharge; univariate analysis was conducted.

**Results.** 35 patients were included, with mean age 62.1 (37% female). 45.7% underwent endovascular therapy (EVT) with angioplasty; 20% additionally received intravenous thrombolysis (IVT). Most who underwent EVT received it promptly upon arrival, whereas 18.8% received it after a delay. Discharge mRS of patients who received EVT promptly was significantly worse versus those who received it after a delay (5 vs. 2.3;  $p = 0.042$ ). Also, in those who received EVT versus medical management alone, there was a nonsignificant trend towards higher admission NIHSS (16.5 vs 12.7), sICH (25% vs 5.3%), and mortality (37.5% vs 15.8%).

**Conclusions.** This study with limited numbers suggests that there may be improved discharge outcomes in those who receive EVT after a delay as opposed to promptly upon arrival. Further research is needed to identify clinical criteria in those with isolated extracranial ICA occlusions who would benefit from EVT.

## Foot-strike Hemolysis: A Systematic Review of Long-Distance Runners

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**Introduction.** Endurance athletes are subject to rigorous physiological demands, leading to a multitude of effects on the human body. In endurance runners, sports-related anemia has been described as commonplace, due to hemodilution, metabolic injury, and direct mechanical injury to red blood cells (RBCs), known as foot-strike hemolysis. This phenomenon has been theorized to contribute to anemia in long-distance runners.

**Methods.** A systematic review of literature was performed following PRISMA guidelines by three independent authors. The review was registered with PROSPERO and no similar meta-analyses or systematic reviews were identified. Nine studies containing a total of 267 runners met all inclusion criteria. Most runners included in the study were male (n = 236/267), with mean age of 38 years. The runners' average best marathon time was 220 minutes. Three studies examined races of marathon distance (42.2 km), three examined races between 42.2 km – 160 km, and two studies examined a one-day and six-day ultra-marathon race, respectively. The average distance ran was 54.4 km.

**Results.** Reticulocyte count showed a 16% increase between pre- and post-race measurements, while haptoglobin levels decreased by 21%. Hemoglobin, hematocrit, and RBC count values remained within accepted normal limits.

**Conclusions.** This systematic review has demonstrated an appreciable change in both reticulocyte count and haptoglobin levels in runners following a race of at least marathon distance, indicative of hemolysis. Appreciable changes in hemoglobin and hematocrit were not identified, which may be attributable to dehydration and subsequent hemoconcentration, advances in shoe technology, or physiological adaptations in endurance athletes.



# Factors Associated with Satisfaction and Success in Ultra-Marathons of 200 Miles or Greater

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**Introduction.** Ultra-marathons encompass distances greater than the traditional 26.2 miles; often 200 miles or greater, lasting days at a time. This cross-sectional study aimed to identify factors associated with ultra-marathon performance and satisfaction.

**Methods.** An electronic survey was distributed to 200-plus mile race competitors, including questions about demographics, ultramarathon experience, sleep-related factors, race strategies, and adverse events. Continuous variables were summarized as mean (standard deviation) and categorical variables as N (%). Logistic regression was used to quantify associations with five goal-related outcomes: finishing in the top 25%; finishing in the bottom 25%; exceeding performance expectations; underperforming against expectations; and being satisfied with performance.

**Results.** Of 117 respondents (mean age 47.2 (SD 11.0), 67.0% male), factors significantly associated with finishing in the top 25% included having a performance-related goal, sleeping  $\geq 7$  hours the night before the race (compared to  $< 7$  hours), and having a healthy BMI (compared to BMI  $> 25$ ). Finishing in the bottom 25% was associated with a smoking history, experiencing a sleep-related adverse event, sustaining an injury, sleeping  $< 7$  hours during the race, and not consuming a caffeinated beverage during the race. A lower likelihood of exceeding race expectations was observed for runners screened as having subclinical/clinical insomnia. A lower likelihood of race satisfaction was associated with regularly drinking alcohol (weekly).

**Conclusions.** This study has identified potentially modifiable factors related to ultramarathon outcomes. Future longitudinal research should ascertain whether optimizing sleep improves ultramarathon performance and could also help determine any causal role of caffeine or alcohol consumption on outcomes.

## Periorificial Dermatitis: Patient Satisfaction on 1% Topical Metronidazole

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**Introduction.** Dermatologic conditions that primarily affect the facial region have profound impacts on individuals physical and emotional wellbeing. Despite its benign course, periorificial dermatitis (POD) significantly impacts patients' quality of life due to its prominence in the oral-facial region, along with its chronic and relapsing nature. This study investigates patient satisfaction with 1% topical metronidazole for treating POD, a condition prevalent in young women. Current treatment guidelines lack consensus, leaving clinicians uncertain about optimal management strategies. Topical metronidazole is commonly prescribed, but evidence on patient satisfaction remains limited. We prospectively evaluated patient-reported outcomes to provide valuable insights into the effectiveness of this treatment regimen from the patient's perspective.

**Methods.** We enrolled participants diagnosed with POD and assessed their satisfaction on 1% topical metronidazole. We evaluated patients' subjective ratings of redness, bumps, and overall discomfort caused by their POD at 30 days of treatment.

**Results.** Our current data suggests decreases in redness and overall discomfort of the skin, but no changes in skin bumps or texture at 30 days of treatment.

**Conclusions.** Understanding patient satisfaction with topical metronidazole is clinically relevant as it guides treatment decisions, improves patient-provider communication, and ultimately enhances treatment outcomes and patient satisfaction. POD can be emotionally distressing, impacting patients' self-esteem and mental well-being. Thus, identifying effective treatments that align with patient preferences is crucial for optimizing care and improving patient satisfaction. Future plans include following up with a 90-day post-treatment survey. By addressing the gap in literature regarding patient satisfaction with topical treatment options, this study contributes to the development of evidence-based treatment guidelines, ultimately benefiting patients with POD.

# Perceptions of Mechanical Massage Chair and Mindfulness for Stress Relief: A Qualitative Study

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**Introduction.** Evidence has shown that, individually, massage and mindfulness exercises impact systolic blood pressure. What has not been studied is how these compare to each other and what effect the order of presentation (mindfulness first or massage first) has on outcomes. This study sought to determine participants' perceptions regarding participation either in first massage, then mindfulness, or first mindfulness, then massage.

**Methods.** Twenty participants with prehypertension were selected to participate in this study, and each spent six sessions doing one of the interventions (massage chair or mindfulness) then six sessions doing the other intervention. The order in which they did these was randomized. After completion of all 12 sessions, we recorded and reported each participant's interview about their experience with the study.

**Results.** Six themes were identified regarding participant experience with this study. Many participants enjoyed it and had a positive change in their opinions of massage chairs and mindfulness. They spoke about the relaxation they experienced, plans to incorporate these methods into their daily routines, and suggested improvements to the study design. Participants did not report differences in their experiences when comparing reports between groups.

**Conclusions.** Qualitative data suggest that participants are eager to participate in studies that have potential to impact on themselves or others and learn new methods for managing stressors in their daily lives. They found their participation to be beneficial to them and appreciated being provided with tools that they can continue to use even after completion of the study.

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## **Patient Access at The University of Kansas Health System IM Outpatient Clinics: Examining the Effect of Adding Nurse Practitioners to the Team**

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**Introduction.** The national average wait time for a new patient to get a primary care appointment is 26 days, while at The University of Kansas Health System it is 45. If patients are not seen, their health may get worse which increases their mortality, emergency department utilization and hospitalizations. To alleviate the continuously long wait time, the internal medicine outpatient department hired nurse practitioners and assigned them to several physicians. The purpose of this study is to evaluate the influence that hiring nurse practitioners (NP) had on patient access.

**Methods.** Data on third next available appointment wait times was collected for physicians comparing six months before a NP was assigned to them, and six months after. These dates were within the window of 2019 and 2023. A RedCap survey was sent to the physicians to gauge what type of appointments they assign their NP to.

**Results.** Wait times improved for about half of the physicians. In the surveys, physicians reported varied uses for their NPs, but all included urgent care. A possible explanation as to why there was not a decrease in wait time for some is that due to demand, when appointments were available, they still filled quickly.

**Conclusions.** Further investigating needs to be conducted about the significant variation in the results. Physician maternity leave and full time equivalent (FTE) need to be accounted for in the data, and then reevaluated. Since patient access is a significant problem at KU, this is an important step to addressing long wait times.

## Conservative Management of Medial Femoral Condyle Osteochondritis Dissecans in the Pediatric Knee

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**Introduction.** Osteochondritis Dissecans (OCD) is osteonecrosis of the subchondral bone frequently found in active pediatric knees. While surgical intervention is often successful, nonoperative options are still used. It is unclear which non-operative treatment of medial femoral condyle (MFC) OCD lesions is most effective.

**Methods.** Patients with MFC OCDs, treated conservatively with activity modification, cylinder casting, or knee ranger brace immobilization at a single academic pediatric center, were retrospectively analyzed. Treatment effectiveness was evaluated by radiographic healing, symptom resolution, and return to activities, with failure defined as progression to surgery.

**Results.** 148 patients with 168 MFC OCDs lesions of the knee were identified. Median age of presentation was 11 years old, 65.5% male, average BMI was 18.8 with 77.2% of patients participating in sports. A total of 62(36.9%) lesions were treated in a knee ranger brace with 54 (32.1%) lesions casted in a cylinder cast and 52 (31.0%) received activity modification alone. 19.3% of knee ranger and 20.4% of casted MFC OCD lesions progressed to surgery while 15.4% of activity modified MFC OCD lesions progressed to surgery. At six months, 75.8% of the knee ranger brace group, 71.4% of the cylinder cast group, and 71.2% of the activity modification group had complete resolution of symptoms and were able to return to activity.

**Conclusions.** MFC OCD lesions of the knee can be appropriately treated with a knee ranger brace, cast, or activity modification with no significant difference between the groups. This study provides practical evidence regarding conservative management of MFC OCD lesions.

## Efficacy of PHQ-2 vs PHQ-9 Screener in Pediatric Visits

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**Introduction.** Rates of adolescent depression are increasing. As such, it is essential that clinics who provide care to pediatric populations utilize a depression screener. The University of Kansas Health System (TUKHS) recently standardized workflows utilizing the Patient Health Questionnaire (PHQ) screeners within the electronic health record system. The primary objective is to investigate the completion rates of the PHQ-2 and PHQ-9 screener in both the Department of Pediatrics and the Department of Family Medicine. The secondary and tertiary objectives are to assess the outcomes of the shortened version of the screener against the full-length questionnaire and to evaluate if patients received interventions based on the results of the screener.

**Methods.** This study was determined as Quality Improvement by the University of Kansas Medical Center IRB. Patients must have completed an outpatient appointment in Family Medicine or Pediatrics in a three-month time frame. They must be between the ages of 12 and 18 at the time of the visit and must be English or Spanish speaking. Eligible visits included well child visits, new patient visits, physicals, return visits, and telemedicine visits. Retrospective chart review investigated if any interventions were implemented for patients with a PHQ-9 screener score 10 and greater. This subset also was evaluated for chronic diseases and mental health conditions on the problem list. Statistical significance is set at  $p = 0.05$ .

**Results.** The Department of Pediatrics screened 69.3% of eligible patient visits and the Department of Family Medicine screened 64.5%, with overall 68% of eligible patient visits screened. There was not a statistically significant difference in completion rates between departments ( $p = 0.38$ ). In the Department of Pediatrics, 17 patients scored a two or less on the PHQ-2 but a 10 or greater on the PHQ-9. Our sensitivity is 60% and our specificity is in the process of data abstraction. Analysis of additional objectives is ongoing.

**Conclusions.** Our study suggests that current rates of depression screening at pediatric visits is below the standard in the literature. Future analysis will investigate completion rates by visit type. Additional analysis will evaluate interventions, chronic disease, and problem list diagnoses.

## Hormone Replacement Therapy Usage among Midlife Women After Hysterectomy and Response to a Multicomponent Lifestyle Intervention

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**Introduction.** Hysterectomy is associated with increased abdominal adiposity, cardiovascular disease risk, and metabolic dysfunction. Hormone replacement therapy (HRT) may reduce these risks, impacting weight change and body composition in midlife women after hysterectomy participating in a multicomponent lifestyle intervention.

**Methods.** A secondary analysis was conducted in obese/overweight women (N = 30), with hysterectomies and self-reported HRT use, participating in a three-month behavioral weight-loss intervention including behavioral counseling, reduced energy intake (~1200-1500kcal/d), and increased exercise (100 min/wk). After the intervention and  $\geq 5\%$  weight loss, women completed a 12-month weight maintenance intervention (150, 225, or 300min/wk) of moderate-intensity exercise. Comparisons of anthropometrics, weight loss, weight regain, and body composition by HRT status were analyzed with Kruskal-Wallis test and SAS 9.4.

**Results.** In 30 women reporting a hysterectomy, 23 were HRT- and 7 were HRT+. There were no differences in weight loss (-3-0 mo) in HRT- ( $-8.51 \pm 3.14$  kg) compared to HRT+ ( $-7.55 \pm 1.89$  kg;  $p = 0.405$ ) or weight regain (0-12 mo) in HRT- ( $2.05 \pm 6.61$  kg) compared to HRT+ ( $3.59 \pm 4.49$  kg;  $p = 0.750$ ). There were no differences in changes in body composition across the intervention by HRT usage.

**Conclusions.** No differences were found in response to a multicomponent lifestyle intervention in midlife women after hysterectomy by HRT usage. Further exploration of HRT administration should be examined to determine impacts on weight change and body composition in midlife women.

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## Knowledge and Perception of Rural Non-Physician Healthcare Providers towards Full Practice Authority for APRNs

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**Introduction.** Full practice authority (FPA) allows advanced practice registered nurses (APRNs) to legally perform their full scope of practice without physician oversight or collaboration. In July 2022 Kansas authorized FPA. Proponents argue FPA improves healthcare access and efficiency, but it is controversial. This study was designed to understand the perspectives of physician assistants (PAs) and APRNs (collectively advanced practice providers or APPs) toward FPA.

**Methods.** A survey was developed and administered to APPs at 27 rural healthcare sites in Kansas between June and July 2023.

**Results.** The survey generated responses from 36 APPs (7 PAs, 29 APRNs). All respondents indicated awareness of the change allowing FPA. Many (59%) reported knowing of an APRN altering their practice to operate without physician oversight. APPs reported belief that FPA will improve healthcare access, without altering patient management or costs. APPs indicated rarely requiring physician collaboration with APRNs requiring collaboration less frequently than PAs. A majority (85%) of PAs, but not APRNs, believe patients prefer APPs to be in a collaborative agreement with a physician. Most (60%) of APPs felt discussions of FPA caused tension between providers.

**Conclusions.** This study demonstrates that FPA is impacting rural healthcare in Kansas. APPs are aware of the changes and are modifying practices accordingly. APP opinions on FPA are mixed. Some differences are associated with healthcare roles. Tension caused by discussions of FPA may affect future practice. Additional research should include a larger sample of APPs, especially independently practicing APRNs, and comparing responses between APPs, physicians, and patients.

# Puppies and PICCs: A Rare Development of Infantile *Pasteurella Multocida* Bacteremia, Empyema, and Nosocomial *Stenotrophomonas Maltophilia* Septicemia

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**Introduction.** *Pasteurella multocida* (PM) classically presents as local cellulitis or abscess inoculated via animal bite. Most patients recover; however, rarely some patients develop life threatening complications due to hematogenous spread.

**Methods.** A retrospective chart review studied a patient's presentation, workup, and treatment.

**Results.** An eight-month-old infant living with two dogs was presented to an outside hospital after developing a fever of 103°F. Pain was localized to left-lower extremity with an MRI, concerning for cellulitis. Blood cultures were obtained, and broad-spectrum antibiotics started at the outside hospital prior to transfer. Culture results were positive for PM. A lumbar puncture demonstrated pleocytosis, concerning for meningitis.

The head MRI depicted bifrontal subdural empyemas requiring craniotomy for washout. Patient was discharged with a PICC-line on IV ceftriaxone based upon culture susceptibility. Repeat brain MRI revealed near-complete resolution of the bifrontal subdural collections. Despite initial improvement, the patient was re-admitted for sepsis rule-out due to a fever in the setting of a central-line. The central-line and peripheral blood cultures revealed *Stenotrophomonas maltophilia* septicemia. Treatment included a two-week TMP/SMX course and PICC-line removal.

**Conclusions.** Classic PM cases present with local cutaneous manifestations, with only 7.8-11% disseminating to blood. Few cases of hematogenous spread resulting in subdural empyema are reported. Patients with severe manifestations of PM should be vigilantly monitored for further complications caused by *Stenotrophomonas maltophilia*, a multi-drug resistant and morbid bacterium, especially in immunocompromised and patients with central venous lines. This case highlights the importance of understanding the life-threatening complications of PM and central lines.

## A Mechanistic and Proteomic Analysis of Tumor MK2's Promotion of Tumor Metastasis and Cell Migration-Invasion in Head and Neck Cancer

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**Introduction.** Metastasis is a major contributor to the high mortality rates observed in head and neck cancer (HNC), necessitating a deeper understanding of the mechanisms involved to identify potential treatment targets for improved patient outcomes. This study focuses on investigating the role and mechanism of MAPK-activated protein kinase 2 (MK2) in HNC progression.

**Methods.** Using lentiviral and CRISPR-Cas9 systems, we modified MK2 expression in human and murine HNC cell lines, conducting *in vivo* experiments using syngeneic orthotopic mouse models. *In vitro*, we evaluated cell migration and invasion in both 2D and 3D culture systems, supported by mass tag proteomic and phospho-proteomic analyses for an unbiased assessment of protein expression/phosphorylation changes regulated by MK2.

**Results.** The results showed that knocking out (KO) MK2 in the metastatic murine cell line Ly2 abrogates tumor growth and metastases in orthotopic *in vivo* models. *In vitro* experiments demonstrated that MK2 KO significantly decreased their migratory and invasive capacity in 2D & 3D models. Proteomic/phospho-proteomic analysis of Ly2 WT vs MK2 KO cells revealed significant variations in proteins involved in integrin- $\beta$ 4 signaling, cMET receptor pathway, and focal adhesion/actin remodeling dynamics.

**Conclusions.** These results implicate MK2 in promoting metastasis in HNC *in vivo*, and the regulation of migration and invasion likely contributes to this phenotype. This study uncovers several pathways not previously associated with MK2 signaling that may regulate the progression of these tumors. Further deconstructing these novel signaling cascades will expand our understanding of HNC spread and validate MK2 and its related proteins as therapeutic targets for metastatic HNC patients.

## Lateral Femoral Condyle Pathology: A Systematic Review

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**Introduction.** Knee trauma impacting the lateral femoral condyle (LFC) may result in the lateral femoral notch sign (LFNS) or bone bruise/contusion findings indicates an impaction injury with potential damage to cartilage or bone. Despite historical associations with anterior cruciate ligament (ACL) tear, a comprehensive review is needed to explore LFC pathology associations with other injuries, long-term outcomes, and indications for procedures.

**Methods.** A systematic literature review following PRISMA guidelines was conducted. We searched PubMed, CINAHL, and Cochrane databases using specified keywords related to LFC pathology.

**Results.** This review encompassed 54 studies, five case reports, and one surgical technique paper. Diagnostic investigations revealed LFNS depth (1.0mm) as a reliable predictor of ACL injury, with deeper LFNS (>1.8mm) indicating high positive predictive value for concomitant ACL/ALL rupture. ACL injury rates varied among different LFC pathologies, including kissing contusion and bone bruise, with associations to cartilage outcomes, knee stability, and patient-reported outcomes. Concomitant injuries linked to LFNS, bone bruise, and femoral impaction were explored in 19 studies, revealing relationships with lateral meniscus injury, posterolateral corner injury, medial meniscal ramp lesion, anterolateral ligament injury, and medial collateral ligament injury. Four case studies demonstrated effective surgical treatment for LFNS (>5mm).

**Conclusions.** Various LFC pathologies, including bone bruise, LFNS, and BMELs, serve as diagnostic tools for ACL injury, exhibiting different rates among populations and injuries. These signs correlate with cartilage, knee stability, and patient-reported outcomes, as well as meniscus, ALL, and MCL injuries. Cartilage damage negatively impacts outcomes, while surgical treatments for LFNS (>5mm) shows positive results.

## Season of Delivery and Postpartum Depression Symptom Severity

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**Introduction.** Previous meta-analyses suggest that the season in which a patient gives birth impacts the likelihood they are to develop postpartum depression (PPD). These studies find that patients who deliver in warmer seasons are less likely to develop PPD than those who give birth in cooler seasons. This study aimed to determine if the season of delivery has an impact on PPD symptom severity.

**Methods.** A retrospective chart review was conducted on all singleton deliveries at a single large academic medical center between 2020 and 2022 including data on demographics, details of delivery, and PPD symptom severity quantified by the Edinburgh Perinatal Depression Scale (EPDS) conducted at six-week postpartum visits. Patients who had fetal demise and patients without EPDS scores were excluded.

**Results.** Among the 2,364 included patients, approximately 30% of patients experienced symptoms of PPD (EPDS score >7); there was no statistically significant difference in symptom severity by season of delivery (summer: 27.6%, spring: 28.9%, fall: 30.8%, winter: 30.5%,  $p = 0.59$ ). In a multivariate model controlling for age, smoking status, drug use, insurance, race, ethnicity, and preexisting mental health conditions, patients who delivered in winter months were 16% more likely to experience symptoms of PPD compared to those who delivered in summer months; however, this finding was not statistically significant (aOR 1.16, 95% CI 0.89-1.50).

**Conclusions.** The season in which a patient delivers does not impact their PPD symptom severity. However, the high prevalence of PPD throughout the year demonstrates the need to prioritize PPD symptom recognition and treatment.

## Examining the Relationship between DTI Tractography and Epilepsy Localization

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**Introduction.** Epilepsy localization is critical in surgical intervention for patients with drug resistant epilepsy (DRE). Current presurgical workup may include scalp EEG and stereo EEG, brain MRI, PET, neuropsychological examination, and more to establish localization. However, information from these studies sometimes provides equivocal conclusions. Diffusion tensor images (DTI) with existing magnetic resonance imaging technology and measures water diffusion through anisotropy to highlight white matter tracts and could potentially provide additional localization information.

**Methods.** We obtained and retrospectively analyzed FA values for 17 white matter tracts from the bilateral hemispheres of 73 patients undergoing pre-surgical workup for DRE. Patient's FA values were calculated using DSI Studio, a tractography software tool for DTI. The laterality of the patient's epilepsy was determined using the epileptologist's report in the patient's chart. A total of 21 patients were excluded because source of epilepsy was bilateral or unable to be definitively localized by the epileptologist. We compared right and left FA differences for individuals to the standard deviation across the population for each tract.

**Results.** We found the hemisphere with smaller FA values corresponded with the clinically determined epileptic localization 76.8% of the time. Furthermore, when FA value differences between hemispheres were >2.5 standard deviations, the localization accuracy increased to 86.7% of the time.

**Conclusions.** This study suggests that differences in FA values between hemispheres may provide evidence for laterality localization with smaller FA values indicating higher likelihood of epileptic onset. Additionally, higher specificity was observed when differences in each patient were increased.

## **Pathologic Node-Positive Disease in cT3N0 Patients Undergoing Mastectomy: Evaluation of Frequency, Multidisciplinary Approach to Management, and Recurrence**

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**Introduction.** Patients undergoing surgery first with cT1-2N0 disease with 1-2 positive sentinel lymph nodes may forgo axillary lymph node dissection (ALND). The approach to cT3 tumors is not well established. We hypothesized cT3N0 mastectomy patients may have varied ALND or radiation alone for node-positive disease, without axillary management tied to adjuvant recommendations.

**Methods.** Single center retrospective chart review of cT3N0 mastectomy patients (2/2016 to 7/2023) to evaluate clinical management of patients with pathologic node-positive disease.

**Results.** Analysis of 84 cT3N0 patients showed 50% (n = 42) with node-positive disease. Thirty-five patients received ALND. Patients with positive sentinel lymph node biopsy (SLNB) after neoadjuvant chemotherapy (NACT) underwent ALND. SLNB alone was performed in nine surgery-first patients with node-positive disease. SLNB and ALND cohorts were clinicopathologically similar. Adjuvant radiation was more common in ALND (88% versus 54%, p = 0.001), however, 81.6% of the SLNB cohort (n = 40) was node-negative. ALND correlated with higher adjuvant chemotherapy (p = 0.02) and endocrine therapy compliance (p = 0.04). One patient had local regional recurrence (LRR) after SLNB with node-negative disease; no axillary recurrences occurred. Nine had metastatic recurrences (MR). Recurrence was not associated with SLNB versus ALND (p = 0.27).

**Conclusions.** Many cT3N0 patients (52%) have node-positive disease on surgical pathology, with varied axillary surgical approaches. ALND remains standard of care for node-positive disease after NACT. ALND versus SLNB alone was not associated with LRR or MR but revealed statistically significant variations in adjuvant treatment. A multidisciplinary review is recommended for cT3N0 mastectomy patients with node-positive disease on pathology to assess the value of ALND in radiation and systemic therapy planning.



## Calling the Midwife in the 21<sup>st</sup> Century: A Qualitative Analysis of Women's Desires in the Provider-Patient Relationship During Perinatal Care

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**Introduction.** Midwifery care is on the rise. From 2003 to 2018, midwife-assisted deliveries in the United States increased 11.83%, while physician-assisted hospital births witnessed a 9.73% decrease. It is evident that women perceive benefits in the midwife-mother relationship. This project addressed the questions: During perinatal care, what is the desired role of a woman's midwife in the midwife-mother relationship? How do midwives fulfill this role according to patient desires?

**Methods.** Interviews were conducted with fifteen women who chose midwifery care at the University of Kansas Hospital. Data was analyzed in the context of a study entitled, "Four Models of the Physician-Patient Relationship".

**Results.** The midwife's role aligned with the "Interpretive" model because she acted as a counselor, capable of interpreting patient desires. Patient desires had a compounding effect. Once foundational desires were met, further desires could be addressed. Foundational desires included slow-paced appointments, respect for patient values, and an options-based approach to decision-making. These desires, once fulfilled, culminated in a relationship that was personal, flexible, and trusting.

**Conclusions.** Trust was a reciprocal value in the midwife-mother relationship. Midwives expressed trust in mothers by viewing birth as an un-hurried, physiologic process. In return, mothers trusted midwives who supported their autonomy and built a personal relationship. This was apparent in the delivery room, where patients adopted a flexible approach to labor plans because they trusted their midwife to accurately interpret patient values. As midwifery grows in popularity, these findings contribute to an understanding of women's desires when choosing a perinatal care provider.

## Patient Transportation Barriers and Solutions at JayDoc Free Clinic

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**Introduction.** JayDoc Free Clinic serves patients in Kansas City that experience difficulties with access to care. This study evaluated transportation barriers for patients at JayDoc via a survey. The goal of the study was to understand transportation difficulties for JayDoc patients and to obtain data to use for grant applications to fund transportation programs.

**Methods.** A prospective, cross-sectional study was used. Surveys were given to patients that presented to JayDoc clinic on “general medicine nights”. The front desk distributed the survey, which asked Likert scale, categorical “yes” or “no”, and transportation services questions.

**Results.** 230 patients completed the survey. Approximately 26.4% of patients had delayed medical care in the past year because they didn’t have transportation. Around 15.2% answered that they delayed coming to JayDoc due to transportation difficulties, and 16% said they knew people that couldn’t come to JayDoc due to transportation difficulties. Approximately 44.5% stated that it was occasionally a problem, sometimes a problem, or a major problem finding transportation. The cost of transportation was also an issue, with around 45.2% answering that it was at least occasionally an issue. Around 43.1% answered they would use a ride service that could offer pickup and drop-off services at the clinic and their home.

**Conclusions.** Transportation barriers are preventing patients from receiving care at JayDoc, a safety-net clinic for underserved patients. Improving JayDoc transportation resources will relieve financial burdens on the health care system via preventative health care and improve patient health by eliminating barriers to care.

# Repeatability of Hyperpolarized Xenon MRI in Stable Pulmonary Artery Hypertension

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**Introduction.** Pulmonary artery hypertension (PAH) is a disease of pulmonary vasculature, leading to right heart failure and death. Right heart catheterization is the gold standard for diagnosis, but other methods of evaluating disease status are limited. Xenon MRI (XeMRI) is an imaging method enabling measurement of lung function, including gas uptake by red cells (RBC) and pulmonary tissue/blood plasma (membrane). Additionally, oscillations in RBC signal from XeMRI provide a measure of microvascular health. Patients with PAH exhibit reduced oscillation amplitude versus healthy individuals. This imaging method may provide a non-invasive measure of microvascular dysfunction; however, short- and long-term repeatability has not been assessed. This study examines same-day and six-week repeatability of XeMRI in patients with stable PAH.

**Methods.** Seven participants with PAH were imaged at baseline and six-week timepoints. At baseline, imaging was repeated twice over 10 minutes. Standard gas exchange metrics were calculated, including RBC/Membrane, Membrane/Gas, and RBC/Gas ratios. RBC oscillation amplitude was calculated.

**Results.** Six participants completed same-day imaging. Seven completed six-week repeatability imaging. Same-day imaging showed strong correlation between RBC/Membrane ( $R = 0.996$ ,  $P < 0.001$ ), Membrane/Gas ( $R = 0.92$ ,  $P = 0.009$ ), and RBC/Gas ( $R = 0.94$ ,  $P = 0.005$ ) ratios, but poor repeatability for RBC oscillation ( $R = 0.38$ ,  $P = 0.45$ ). Six-week imaging showed strong correlation between RBC/Membrane ( $R = 0.93$ ,  $P = 0.003$ ), Membrane/Gas ( $R = 0.95$ ,  $P = 0.001$ ), and RBC/Gas ( $R = 0.89$ ,  $P = 0.007$ ) ratios, but poor repeatability for RBC oscillation ( $R = 0.24$ ,  $P = 0.6$ ).

**Conclusions.** Gas exchange metrics are highly repeatable in patients with PAH in both same-day and six-week XeMRI imaging, but RBC oscillation demonstrated poor repeatability at both timepoints, highlighting the need for further research.

# Clinicopathologic Factors Associated with Readmissions and ED Visits after Cytoreductive Surgery and Hyperthermic Intraperitoneal Chemotherapy (CRS-HIPEC)

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**Introduction.** Peritoneal surface metastases (PSM) treated with systemic chemotherapy alone rarely result in long-term survival. Cytoreductive surgery and hyperthermic intraperitoneal chemotherapy (CRS-HIPEC) is important in treating PSM. Considered the ultimate major abdominal operation, it often requires multiple peritonectomies and multi-visceral resections followed by direct application of high-dosed hyperthermic chemotherapeutic agent(s), each with its own side-effects. Recovery can be difficult, often requiring readmissions and ED visits after discharge. This study analyzes clinicopathologic factors contributing to ED visits and readmissions up to 90 days after CRS-HIPEC.

**Methods.** Patient records from a comprehensive HIPEC databank from 2018-2022 were analyzed.

**Results.** 216 patient records were analyzed, which included 62.5% females, average age of 56.8 years. Most patients were ASA 3, ECOG 0, with an average peritoneal cancer index (PCI) of 11.5 (0-39). Mean length of stay (LOS) was 10.6 days. Ninety-day mortality equaled 1.4%. Approximately 89% of patients went home, 10% to transition care, and 1% to hospice. Average number of organs removed were 2.6; bowel was the most common (56%). 32% of all patients required readmissions, via the ED or other means, most within 30 days, average 25.5 days. 10.6% had >1 admission. Only 16.7% visited the ED. Factors significantly ( $p < 0.05$ ) associated with readmissions included: LOS, discharge to transitional care facility, history of diabetes, ASA class, high PCI, complete RUQ peritonectomy, cholecystectomy, splenectomy, and bowel resection (most notably low anterior resection).

**Conclusions.** Specific clinicopathologic factors need to be considered and targeted to improve readmissions and ED visits.

## Geriatric Patients and Providers: An Assessment of Needs, Education, and Retention in Rural Kansas

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**Introduction.** Physicians raised in rural areas comprise many rural physicians today; however, provider shortages remain abundant. As the rural population ages, shortages among geriatric providers are especially concerning. This project seeks to determine (1) geriatric patient needs and access to medical care across rural Kansas by survey of their providers and (2) geriatric care provider needs, education, and retention. We hypothesize lack of transportation will be the most common geriatric patient need and that most rural geriatric physicians remain in rural practice due to having a rural upbringing, finding relationships with patients the most desirable aspect of their practice.

**Methods.** Rural providers were surveyed at STORM program sites across rural Kansas. Data from cross sectional surveys was collected and summary statistics were performed, such as frequencies and percentages, for each survey item.

**Results.** Cost is the greatest obstacle for geriatric patients to access healthcare. Geriatric providers most desire access to mental healthcare and find workforce availability to be the greatest obstacle in their rural practices. Additionally, 76% of providers had a rural upbringing, with 68% planning to retire in their current community. Providers indicated relationships with patients as most desirable factor in their practice, with 62% of providers believing they could not achieve these same practice values in an urban setting.

**Conclusions.** By prioritizing the needs of providers, efforts can be made to improve patient outcomes, the desirability to reside in a rural community. Further studies can investigate factors in rural communities that correlate with improved physician retention.

## Review of Hospital Follow Up Clinic in its First Year

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**Introduction.** Hospital readmissions continue to pose a challenge for both patients and hospitals nationwide, and strategies to reduce readmissions remain a major area of focus within quality improvement research. The purpose of this study was to investigate the effectiveness of Pre-Visit Planning (PVP) by the KU Internal Medicine follow-up clinic in reducing hospital readmission within 30 days. Pre-Visit Planning was implemented in December of 2022 and consists of a thorough and stepwise chart review of patient electronic medical records prior to patient encounters at the clinic.

**Methods.** Retrospective chart reviews that analyzed the implementation of PVP were performed for all patients seen in the clinic for hospital follow-up from December 1, 2022, through May 31, 2023. A readmission rate was then calculated for this group using the dependent variable of hospital readmission in 30 days, and it was compared to the 30-day readmission rate for all Internal Medicine inpatient teams.

**Results.** Between December 1, 2022, and May 31, 2023, within the hospital follow-up patient population, 11.2% (10 out of 89 total patients) were readmitted within 30 days of hospital discharge. The readmission rate calculated for all Internal Medicine inpatient teams within the same time frame was 11.6%. This demonstrated a 0.4% difference.

**Conclusions.** The hospital follow-up clinic, through its use of PVP, improved hospital readmission rates in Internal Medicine by 0.4% between December 2022 and May 2023. Although this is a small reduction, it is a positive outcome worthy of additional research and analysis.

# The Effects of Paid Clinical Employment Prior to Medical School Matriculation on Happiness & Overall Well-being During Residency

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**Introduction.** Burnout among resident-physicians is correlated with increased medical errors, job dissatisfaction, depression, and suicide. Despite efforts to combat burnout, data indicates it continues to increase among U.S. physicians. Suggested by limited studies, medical career exposure and perceived clinical skills aptitude correlates with job satisfaction. The present study hypothesized a beneficial relationship exists between prior clinical experience and overall wellbeing during residency.

**Methods.** A cross-sectional and quasi-experimental study was completed at the University of Kansas Medical Center, utilizing the Professional Quality of Life (ProQoL) scale to measure resident physicians' Secondary Traumatic Stress, Compassion Satisfaction, and Burnout.

**Results.** Item analyses of 51 resident-physicians determined that 33% of responders' past clinical experience influenced their choice of residency specialty; however, influence did not differ by clinical experience ( $\chi^2 = 0.2$ ,  $p = 0.9$ ). Our data discovered a trend towards decreased frequency of low Secondary Traumatic Stress rating with increased clinical experience ( $\chi^2 = 5.6$ ,  $p = 0.06$ ). Of note, none of the resident responders scored in a pathologic range for Burnout, Secondary Traumatic Stress, or Compassion Satisfaction, though we did find 47% of female responders and 75% of male responders scored in the low range for Secondary Traumatic Stress ( $\chi^2 = 3.1$ ,  $p = 0.08$ ).

**Conclusions.** Evidenced through our study, the level of prior clinical experience was not related to Burnout or Compassion Satisfaction; yet, increasing professional responsibility in a clinical care setting was associated with significantly higher ratings for Secondary Traumatic Stress, especially in female respondents. Our results theorize clinical experience prior to medical school may contribute to psychological burden risk as future resident-physicians.



# Treatment of Complex Pilon Fractures: Pilot Study Comparing Primary Arthrodesis to Open Reduction and Internal Fixation

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**Introduction.** Open Reduction and Internal Fixation (ORIF) is preferred to Primary Arthrodesis (PA) following acute pilon fractures despite high complication rates, including the need for arthrodesis as a secondary procedure. This study serves to investigate patient-reported outcomes and physical functionality in patients who underwent PA versus ORIF following an acute pilon fracture.

**Methods.** Fifteen patients treated for pilon fracture (12 ORIF and 3 PA) were included. PA was performed via a novel surgical technique, and the ORIF group served as the control. The Foot and Ankle Outcome Score (FAOS) and 12 Item Short Form Survey score (SF-12) assessed patient-reported outcomes. Opal sensor data recorded timed-up-and-go (TUG) time (s), manual ROM (dorsiflexion-plantarflexion and inversion-eversion; degrees from neutral position), walking cadence (steps/min), walking speed (m/s), double support (% gait cycle), stride length (m), and walking ankle ROM (dorsiflexion-plantarflexion and inversion-eversion; degrees from neutral position).

**Results.** Demographic data was comparable between groups for age, body mass index, and post-operative follow-up time (months). Sex significantly differed between groups ( $p = 0.044$ ). FAOS and SF-12 scores, ankle ROM while standing, treated versus untreated ankle inversion-eversion while standing, walking ROM, spatiotemporal gait (cadence, walking speed, double support, and stride length), and TUG time were statistically similar between groups. ORIF patients exhibited significantly decreased treated versus untreated ankle dorsiflexion-plantarflexion while standing ( $p = 0.007$ ) compared to PA patients.

**Conclusions.** Minimal physical functionality and no patient-reported differences exist between pilon fracture patients treated with ORIF versus PA. This pilot study serves as a basis for future investigations and improves future pilon fracture treatment recommendations.

## Exploring Characteristics of Patients Using Telehealth vs In-Person Visits in General Internal Medicine Clinic

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**Introduction.** There is a lack of research regarding health disparities in the population using telehealth as we move farther from the start of the COVID-19 Pandemic. The goal of this study was to determine if patients' use of telehealth or in-person appointments differed based on payor type, age, race, ethnicity, language, sex, social determinants of health (SDOH) screening answers, PHQ-9 scores, and reason for visit.

**Methods.** A retrospective chart review was conducted using patients who completed a visit in Ambulatory Internal Medicine at The University of Kansas Health System from December 1, 2022 through January 31, 2023. Of this patient pool, four different patients were randomly selected from each provider, two patients who used telehealth and two who used in-person visits. The final sample size was 111 patient charts. The primary outcome was the use of telehealth or in-person appointments.

**Results.** Differences in visit type (telehealth or in-person) were identified for the "reason for visit" ( $P < 0.001$ ) and "new or returning patient" ( $P = 0.027$ ). Statistically significant differences were not found for sex ( $P = 0.052$ ), payor type ( $P = 0.094$ ), language ( $P = 0.477$ ), ethnicity ( $P = 0.102$ ), race ( $P = 0.727$ ), age ( $P = 0.227$ ), or PHQ-9 score ( $P = 0.173$ ). No statistically significant difference was found for all 14 SDOH screening questions.

**Conclusions.** More acute visits occurred via telehealth, therefore additional quality improvement studies could determine if telehealth visits for acute care effectively reduce patient visits to the emergency department. Although a priori power analysis was conducted, many variables had low counts, so repeating the study with a larger sample size and further statistical analysis would be beneficial.

## Rural Patients' Perceptions and Opinions of Scope of Practice

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**Introduction.** Primary care shortages pose a challenge to healthcare access in rural communities. In April 2022, Kansas granted “full practice authority,” permitting advanced practice registered nurses (APRNs) to manage treatments and prescribe medication without supervision or collaboration with a physician. This study investigated patients’ perceptions and opinions surrounding scope of practice and healthcare accessibility.

**Methods.** Researchers conducted a cross-sectional survey of rural patients seen in participating clinics in the Summer Training Option in Rural Medicine (STORM) program in Kansas between June and July 2023. Chi-square tests of independence were employed to test differences between age groups, education level, and years rural.

**Results.** Respondents (n = 272) reported feeling familiar with scope of practice and understanding differences in training, licensure, or oversight, but often answered “I am not sure” when asked about provider-specific practice settings and oversight. Many respondents (42.0%) felt neutral towards preferring a physician PCP, but statistically significant reductions in neutrality were associated with increased age ( $\chi^2 = 16.04$ ,  $p = 0.003$ ). Education level was less influential than other demographics in provider preference. Most (54.6%) rural patients felt independent practice by APRNs would lead to improved access to care, though many (59.2%) reported not knowing about the new law.

**Conclusions.** Results of this study imply that rural patients have mixed understanding of their healthcare provider’s legal scope of practice and how to apply their understanding in utilization of services. Additional studies examining patients’ values, health outcomes, and access increases would provide more information about influences in preference and improving rural healthcare delivery.

## Socioeconomic Barriers to Referral for Patients with Idiopathic Pulmonary Fibrosis

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**Introduction.** Socioeconomic status (SES) impacts treatment decisions and outcomes for patients with idiopathic pulmonary fibrosis (IPF). In this study, we hypothesized that SES would negatively impact IPF patient referrals to subspecialty care at the University of Kansas Medical Center (KUMC).

**Methods.** A HERON search of electronic medical records was utilized to identify patients with IPF who were seen in primary care practices at KUMC in the last 10 years. SES status was determined by Area Deprivation Index (ADI) using the Wisconsin Neighborhood Atlas. Next, a 23-item qualitative survey instrument was administered to KUMC pulmonary fibrosis patients.

**Results.** 841 subjects fit the search inclusion criteria. A weakly negative correlation (-0.06) was identified between lower SES and pulmonary referral but was not significant ( $p = 0.08$ ) adjusting for age. There was no significant association between SES, age, and gender with referral to IPF specialty care. Regarding the survey, 18 patients participated (47.1% male,  $65 \pm 17.5$  years old, median ADI 63). The general theme was that overall, patients viewed their referral experience positively. Physician communication was the main contributor to a patient feeling well taken care of in their diagnostic process independent of time to diagnosis.

**Conclusions.** This analysis may be underpowered given the non-significant result and the method used to determine SES. However, the results are reassuring. Globally, IPF is under-recognized and undertreated in low SES individuals, however, our data indicate that referral bias for patients in the KUMC system likely is not a significant contributor.

# The Use of Diabetes Educational Videos for Enhancing Medical Student Volunteers' Patient Education Skills at a Student-Run Clinic

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**Introduction.** JayDoc Diabetes Night is a free student-run clinic at Kansas University School of Medicine, treating underserved patients with diabetes in Wyandotte County, Kansas. Medical students are heavily involved in patient education, which is limited by their preexisting knowledge of diabetes.

**Methods.** To improve the quality of education provided, volunteers watched short videos on the following topics: how insulin functions in the body, injecting insulin, storing insulin, using a glucometer, and finding past blood glucose values on a glucometer. Students were surveyed using Likert scales assessing their comfortability educating patients on each topic before and after watching the videos.

**Results.** Using Wilcoxon Signed-rank tests, we found that students felt significantly more knowledgeable on all five topics after watching the videos. The largest improvement was seen in comfortability finding past values on a glucometer with an average difference of 1.91, nearly two levels of confidence on a Likert scale. Educational videos on critical tasks, such as injecting and storing insulin, improved comfortability of students by an average of 1.6 and 1.62 respectively. According to students, videos on how insulin functions in the body (11/39 responses) and insulin injection (7/39 responses) were most often discussed during patient encounters.

**Conclusions.** These results demonstrate the efficacy of brief education on key topics in increasing students' comfortability in patient education. We suggest that student-run specialty clinics can increase student knowledge by employing similar interventions. Further research may explore the effect of this intervention on patient education, compliance, and long-term outcomes.

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# Universal Mental Health Screening in Teens at BullDoc Health Clinic – A Quality Improvement Project

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**Introduction.** Wyandotte county is ranked 104<sup>th</sup> out of 104 counties in Kansas with regards to health outcomes. Student health is the leading factor impacting mental stability and school-wide success for high schoolers in Wyandotte county. BullDoc Health Clinic is a free clinic embedded within Wyandotte High School. Our goal is to improve access to healthcare for students so they can be healthier, happier, and more successful in school. The purpose of this project was to implement a structured mental health screening process to increase identification of teenagers with mental health disorders and refer them to the school's social workers for treatment.

**Methods.** We conducted an observation period of five weeks, then began screening every patient with the Patient Health Questionnaire- Modified for Teens (PHQ-A) for several weeks. After nine weeks, we began screening patients with a history of a traumatic event with the UCLA 9-Item Trauma Screen in addition to the PHQ-A. Data was collected via a RedCap<sup>®</sup> survey completed by student-physicians and analyzed with Wilcoxon rank sum in Matlab<sup>®</sup> (Version 3).

**Results.** Patients who scored higher on screening tests were more often referred to social workers ( $p < 0.05$ ). Additionally, this project identified other reasons for elevated PHQ-A scores, aside from underlying depression, such as lack of access to corrective lenses or housing insecurity.

**Conclusions.** This led to the development of a new leadership position, Director of Community Resources. Future directions include improving optometry resources, providing patients with hygiene products to take home, and continuing to screen for mental illness.

## Subjective Memory Complaints and Cognitive Decline

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**Introduction.** Approximately two-thirds of Americans experience some level of cognitive impairment at an average age of 70 years. This study analyzed the relationship between Subjective Memory Complaints (SMCs) and cognitive decline in a cohort at the University of Kansas Alzheimer's Disease Research Center (ADRC).

**Methods.** We examined longitudinal data from 560 participants (average age 72.6 years), with varying levels of cognition, who underwent annual assessments (average 3.9 years). Data collection took place 2011-2022. Assessments included a clinical dementia rating (CDR), cognitive diagnosis, and SMC score. SMCs were assessed using two subjective questions, which were summed to determine a total SMC score (range 2-10), with higher scores indicating more cognitive complaints.

**Results.** At baseline, individuals with mild cognitive impairment (MCI) had the highest average SMC score (7.9), compared to dementia (7.4) and cognitively normal (CN) (6.4) groups. 298 subjects with complete data sets were CN at baseline. Of those, 226 (75.8%) remained CN throughout the study, while 72 (24.2%) had a decline in cognition at some point. Those who were CN throughout had a baseline SMC score of 6.28 (SD = 1.24, 95% CI = 6.12-6.44,  $p < 0.001$ ) and the decline group had a baseline SMC score of 6.93 (SD = 1.08, 95% CI = 6.33-7.53,  $p < 0.001$ ). Further analysis examined participants who at any point had a diagnosis other than CN and their likelihood of having a baseline SMC score  $\geq 7$  (ROC AUC = 0.66, odds ratio = 3.91, sensitivity = 0.57, specificity = 0.75).

**Conclusions.** This study demonstrates the potential of utilizing SMCs to predict future cognitive decline, especially during the pre-clinical phase of disease progression.

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# Esophagogastroduodenoscopy (EGD) v. Trans Nasal Endoscopy (TNE) in the Diagnosis and Management of Eosinophilic Esophagitis (EoE)

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**Introduction.** Patients diagnosed with eosinophilic esophagitis (EoE) undergo frequent endoscopies for diagnosis, monitoring, and possible therapeutic dilation. Esophagogastroduodenoscopy (EGD) allows for visualization, dilation, and obtaining biopsies. Although it does not allow for dilation, transnasal endoscopy (TNE) is an alternative for diagnosis and surveillance, potentially offering reduction of risks with sedation required for EGD at a lower cost and may improve quality of life in those diagnosed with EoE.

**Methods.** Individuals with EoE who had experienced EGD and TNE were eligible. Patients were selected by the authors through chart review and invited to participate in the study. Data was collected through an online self-reported REDCap survey using Likert scale-type questions. The main outcomes measured were patient perception of the two procedures regarding tolerability, preference, and well-being.

**Results.** Of the authors' small number of patients sampled, half elect for TNE for future management of EoE due to factors including satisfaction of procedure location, less post-procedural adverse events, and overall satisfaction. Most patients described less income lost due to time away with TNE. Therefore, overall satisfaction results were inconclusive favoring EGD or TNE.

**Conclusions.** This study aids in increasing the understanding of the utility of TNE for the diagnosis and management of EoE alternatively to EGD. TNE provides an adequate biopsy sample in less time, without sedation, and at decreased cost and time away from work/school. TNE is a safe and effective procedure for those with EoE and may be preferred by some patients.

## Comparison of Driving Simulator and Visuo-Cognitive Test Performance between CDL and Non-CDL Drivers

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**Introduction.** This cross-sectional study investigated driving simulator and visuo-cognitive test performance in commercial driver license (CDL) participants and non-CDL participants to examine what differences exist between the two populations.

**Methods.** CDL participant performance data was acquired from a separate longitudinal study that examined factors predicting CDL simulator performance. Non-CDL participants were recruited through printed flyers, an online website, and word of mouth. The performance of 31 CDL participants (average age 52.58±12.20, 28 men (90.3%)) and 25 non-CDL participants (average age 48.36±21.90, 11 men (44.0%)) were analyzed. The assessed parameters included demographics, visuo-cognitive testing, and simulator performance.

**Results.** Demographic analysis via independent t-tests demonstrated that CDL drivers had significantly higher BMI and increased annual driving mileage, yet no significant difference in prescription medications. Analysis of cognitive variables via independent t-test showed statistically significant lower scores in MoCA ( $p = 0.001$ ) and Dot cancellation ( $p = 0.02$ ) when compared to non-CDL drivers. Analysis of driving performance demonstrated significantly higher brake reaction time ( $p = 0.042$ ), less off-road accidents ( $p < 0.001$ ), and less road edge excursions in the CDL population.

**Conclusions.** Overall, when compared to the general population, CDL drivers exhibited better driving performance, despite decreased cognitive test parameters. Based on the results, future research should investigate any causal links that could explain the statistically significant difference in reaction times between non-CDL and CDL drivers. Additional research should also examine potential undertreatment of comorbidities within the CDL population.

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# Sphingosine Kinase 2 Modulates DNA Damage and Immune Pathways in Triple-Negative Breast Cancer Cells

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**Introduction.** Triple-negative breast cancer (TNBC) is aggressive and lacks targeted therapies. Damaged DNA from radiation or chemotherapy can elicit anti-tumor immune responses. The immunomodulatory biolipid sphingosine-1-phosphate (S1P) is produced by sphingosine kinase 2 (SPHK2), which is elevated in TNBC. Global protein pathways regulated by SPHK2 in TNBC, especially regarding DNA damage immune responses, are unknown. In this study, we globally analyzed protein pathways that SPHK2 modulates using a mouse TNBC model.

**Methods.** We engineered the mouse TNBC cell line KPB25L to stably overexpress lentiviral vectors with SPHK2 (SPHK2-OE) or scrambled control, and we performed mass spectrometry proteomics. Cellular pathways were analyzed and visualized using Metascape and Cytoscape.

**Results.** Proteomic analysis detected 4,726 proteins total. 435 proteins were significantly increased and 303 were significantly decreased in SPHK2-OE compared to control cells. SPHK2 expression was increased by a fold-change of 4.623 in SPHK2-OE. The proteins increased in SPHK2-OE were significantly enriched for pathways including protein localization, chromatin remodeling, positive cell cycle regulation, and autophagy. DNA damage enriched pathways include DNA damage/telomerase stress induced senescence, negative regulation of DNA recombination, and regulation of cellular stress responses. Additionally, enriched immune pathways include tumor necrosis factor receptor signaling and regulation of interferon beta production.

**Conclusions.** Elevated SPHK2 in intrinsic tumor cells perturbed several pathways involved in the DNA damage and immune responses. This study warrants further understanding of SPHK2 modulation for therapeutic potential in TNBC.

## Dissecting the Impact of Anatomy Lab Policies on Pregnant Medical Students

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**Introduction.** Research surrounding the unique occupational hazards facing pregnant medical students is lacking, particularly surrounding pregnant students' exposure to formaldehyde during cadaveric dissection. Formaldehyde is potentially teratogenic and mutagenic and has been associated with spontaneous abortion and birth defects. This project investigated the prevalence and content of policies at U.S. medical schools concerning pregnant students' participation in gross anatomy lab.

**Methods.** The U.S. News and World Report's top 50 medical schools were systematically reviewed for policies pertaining to pregnant students' participation in gross anatomy lab. Email contact was made with each school to confirm the policy or to inquire whether non-publicly available policies or guidance existed instead.

**Results.** Among the 50 schools reviewed, 12 (24%) had written policies, 6 (12%) were publicly available, and 6 (12%) had policies obtained via email, while 7 additional schools (14%) responded with unofficial policies or internal guidance used by their anatomy departments. Twenty-nine schools (58%) were categorized as having no policies, of which sixteen were unresponsive to email, one declined participation, and one was excluded. The content and scope of both official and unofficial policies varied widely.

**Conclusion.** The lack of codified policies at most medical schools regarding safety considerations for pregnant students in gross anatomy lab indicates that more can be done to accommodate this group of students. Creating official, publicly available policies would promote a more inclusive environment for these trainees and signal to students that the institution is prepared to support them should they become pregnant during medical school.

## A Needs Assessment of Contraception Prescription in Rural Kansas

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**Introduction.** Approximately 40% of pregnancies in the U.S. are unintended, often due to inconsistent or absent contraception use, despite efforts to enhance accessibility to contraceptive options. Discrepancies in access persist, leaving a need for contraceptive services. The CDC prioritizes long-acting reversible contraception (LARC), but past studies have shown that in Kansas, LARC usage was found to be the lowest of contraception methods. The scarcity of LARC services is particularly pronounced in rural areas where 27.7% of the Kansas population resides. Previous research found that rural physicians provide LARC less frequently due to training gaps, low demand, cost considerations, and personal beliefs. This study aimed to assess the contraception prescription patterns among rural providers, recognize barriers to providing LARC, and identify intervention opportunities.

**Methods.** In this cross-sectional, descriptive study, the research team administered surveys through REDCap at Summer Training Options in Rural Medicine (STORM) sites. Inclusion criteria were providers who practice in a rural or frontier county based on the Rural-Urban Continuum Codes and were STORM preceptors.

**Results.** Results revealed a positive correlation between increased comfortability and the number of IUDs and implants inserted annually. Significant difference was observed in the comfort with IUD insertions observed between physicians and non-physicians ( $p = 0.050$ ).

**Conclusions.** To increase LARC utilization, continuing medical education could provide hands-on training for IUD and implant insertion to interested providers. Further studies could assess the impact of such education on LARC use, with the goal of contributing to improved contraceptive access and reduction in unintended pregnancies in rural areas.

## Evaluation of Unipolar and Bipolar Left Bundle Branch Area Pacing

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**Introduction.** Left bundle branch area pacing (LBBAP) recruits the cardiac conduction system from the left interventricular septum. LBBAP output can be programmed in unipolar or bipolar for some devices. In contrast to unipolar pacing, bipolar pacing can additionally recruit the right side of the septum. The objective of this study is to compare differences in paced ECG with unipolar vs. bipolar LBBAP and compare with traditional right ventricular pacing (RVP).

**Methods.** We retrospectively reviewed 288 patients who underwent a LBBAP lead implantation between 2020-2023 and 172 RVP controls from 2018-2019 at The University of Kansas Medical Center. These patients routinely get ECGs with unipolar and bipolar pacing polarity. We compared the paced QRS duration, left ventricular activation time (LVAT), and V6-V1 interpeak time between unipolar and bipolar LBBAP, and also with bipolar RVP controls.

**Results.** Compared to RVP controls, LBBAP was associated with shorter paced QRS duration ( $118.9 \pm 16.8$  ms vs.  $143.2 \pm 23.2$  ms,  $p < 0.01$ ) and LVAT ( $73.7 \pm 18.1$  ms vs.  $87.5 \pm 23.9$  ms,  $p < 0.01$ ). LBBAP leads had a lower threshold ( $p < 0.01$ ) immediately after implant, though the difference in threshold disappeared by three months ( $p = 0.52$ ). The sensing was higher with LBBAP than traditional RV at three months ( $p = 0.007$ ). There were no statistical differences in the QRS duration, LVAT, and V6-V1 interpeak times with unipolar vs. bipolar LBBAP.

**Conclusions.** LBBAP has better ECG synchronization than traditional RVP. There was no difference in QRS duration, LVAT, or V6-V1 interpeak time with unipolar vs. bipolar LBBAP.

# Central Venous Catheter-Associated Complications in Pediatric Patients with Acute Myeloid Leukemia

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**Introduction.** Central venous catheters (CVCs) are mainstays of pediatric cancer treatment but can cause complications, including local-site infections and central-line-associated bloodstream infections (CLABSIs). Analyzing CVC-associated complication rates may inform future decisions about CVC choice. We hypothesized that tunneled-cuffed catheters (tunneled) have higher rates of CLABSIs than implanted ports (ports) and ports have higher rates of local-site infections than tunneled.

**Methods.** A retrospective chart review identified patients diagnosed with acute myeloid leukemia (AML) at Children's Mercy Hospital from 2010-2022. Demographic data and CVC details were collected. CVCs were categorized as tunneled, port, peripherally inserted central catheter (PICC), or other. One-tailed t-tests compared rates of CLABSIs and local-site infections per 1000-line days for port and tunneled catheters. ANOVA compared rates of non-infectious complications per 1000-line days for the three CVC types.

**Results.** Ninety patients identified included 48 females, 42 males; median age 7.54 years. Tunneled averaged 10.1 CLABSIs and 1.56 local-site infections per 1000-line days, and ports averaged 4.18 CLABSIs and 3.08 local-site infections per 1000-line days. T-tests showed significantly higher rates of CLABSIs for tunneled compared to ports ( $t = 1.99$ ,  $df = 139$ ,  $p = 0.049$ ), but a nonsignificant difference in rates of local-site infections. Non-infectious complications occurred 32 times, and ANOVA showed a significant effect of CVC type on instance per 1000-line days ( $F = 6.17$ ,  $df = 2$ ,  $p = 0.003$ ). PICCs caused significantly more than ports ( $p = 0.026$ ) and tunneled ( $p = 0.003$ ).

**Conclusions.** In this single center review, the choice of tunneled catheter increased risk of CLABSI but not local-site infections. The choice of PICCs increased the risk of non-infectious complications.