



5th Annual Student Research Symposium



Neha Agnihotri

Effects on caspase levels of sea urchin embryos exposed to PAF

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Platelet Activating Factor or PAF¹, a signaling phospholipid, has previously been studied due to its positive correlation with improving fertility, specifically by increasing apoptotic enzymes known as caspases which are essential to the development of an embryo. PAF is produced naturally by the embryos but its mechanisms have not been studied in depth. It is hypothesized that PAF exposure would result in an increase in caspase activity. Using a sea urchin model, we harvested gametes and inseminated them to expose embryos at the 2 cell stage to PAF for 15 minutes. We then allowed the embryos to grow for 24 hours, freezing them at each cell stage to measure corresponding caspase activity. As we wait for the data analysis we suspect that embryos exposed to PAF will show a higher level of caspase activity compared to control embryos. This would support existing literature on the effects of PAF and help us gain a better understanding of PAF and its implications in the pre-implantation process.



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Rabia Anwar

Patient Perspectives on the Acceptability and Feasibility of a Diabetes Mobile Clinic at Upstate Prisma Health

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Prisma Health, Department of Family Medicine

Background: According to the South Carolina Department of Health and Environmental Control, 14% of adults in South Carolina are affected by diabetes. Individuals with type II diabetes are recommended to complete routine screenings for nephropathy, retinopathy, and abnormal blood glucose. To complete these screenings, patients must secure an appointment time and travel to their primary care office. Barriers related to completing all three screenings in a timely manner may hinder diabetes management. We aim to improve diabetes care by proposing the development and use of a mobile unit that offers all three screening tests in one location.

Objective: The purpose of this project is to obtain patient feedback regarding the implementation of a mobile clinic to complete routine screening in diabetic patients.

Methods: Our team will discuss the implementation and goals of the mobile unit with a panel of patient experts through the Patient Engagement Studio (PES). The patient responses will be analyzed to generate a final report.

Expected Results: This study is ongoing; therefore, data collection is still in progress. We anticipate that the patient experts will provide valuable insights regarding the acceptability and feasibility of a mobile unit.

Conclusions: To ensure a patient-centric approach in the implementation of a mobile unit pilot, it is crucial to gain insights from patient experts. Feedback obtained will enable us to optimize a screening program that best fits the needs and preferences of the patients it aims to serve.



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J.Q. Armstrong, IV

Evaluation of Aortic Aneurysm Sac Regression Following Endovascular Repair

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Prisma Health Department of Cardiology

Aims: Implantation of remote patient monitoring (RPM) devices, and studies examining associated clinical outcomes have shown benefit in the management of heart failure (HF). Very few studies exist that investigate and analyze administrative metrics such as cost reduction, return on investment (ROI), or net revenue/reimbursement rates (monthly) from implementation of RPM programs. This study aims to use these metrics to evaluate the financial sustainability of RPM programs.

Methods/Results: Medical record number (MRN) specific International Classification of Diseases (ICD)-10 codes assigned to 122 patients enrolled in a 2017 outcomes study were obtained. Billing data was obtained for cost analysis associated with implantation of two devices (CardioMEMSTM HF System CMEMS and HeartLogicTM HF Diagnostic HL). Mean age was 68 ± 13.77 years; 73.45 ± 8.82 years and 55.96 ± 15.14 years for CMEMS and HL, respectively. Metrics such as hospital and professional billing cost, payer source, time-to-break-even and return-on-investment (ROI) were obtained. The data demonstrated a 51% reduction in annual costs associated with cardiac-related Emergency Department (ED) visits, hospitalizations (CH), and length of stay (CLOS) in the first-year post-implantation compared to prior year pre-implantation. A 2.2 year for CMEMS and a 3.3 year for HL time-to-break-even point existed in this sample. Finally, the required patient load to achieve profitability for 1 registered nurse (RN) full-time equivalent (FTE) was established.

Conclusion: Remote monitoring of HF patients using a dual platform, single-centered approach reduces costs associated with cardiac related ED visits, CH and CLO

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Brittany K. Austin

Racial Analysis in Cancer Patients: Insights from Molecular, Clinical, and Demographic Data at the Prisma Health Cancer Institute

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USC Department of Biomedical Sciences

Introduction: Racial disparities in healthcare, especially in early access to cancer diagnosis and treatment, are a pressing national concern. This study examines the racial composition and potential disparities among cancer patients treated at the Prisma Health Cancer Institute and compares the findings with national trends. Factors such as cancer staging, histology, molecular characteristics, treatment, demographics, and lifestyle are being analyzed to understand their impact on patient treatment outcomes.

Methods: The study includes records of 586 breast (397) and lung (171) cancer patients diagnosed between 2014 and 2022. Patients were categorized by race: Asians, African Americans, Hawaiian/Pacific Islanders, Latinos, Multi-Race, Whites, and patients with missing race information. Racial composition was assessed in diagnosis distribution, cancer staging, cancer histology, smoking status, cancer molecular subtypes, and other factors.

Results: In the studied group, African American men had a higher likelihood (3.17%) of breast cancer diagnosis compared to White men (0.84%). In addition, African Americans showed a greater proportion of stage IV lung cancer (11.11%) compared to Whites (4.63%). Notably, the incidence of triple-negative breast cancer was similar between African Americans (14.63%) and Whites (13.18%) in this cohort.

Conclusion: Our study focuses specifically on Prisma Health Cancer Institute patients and their disease prognosis, identifying population differences in two highly lethal cancers. The research aims to improve treatment and care for minority patients. Findings contribute to a better understanding of racial disparities in cancer outcomes, potentially leading to targeted interventions. Addressing these disparities is crucial for achieving equitable healthcare.



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Anna Elizabeth Bazell

Efficacy of umbilical cord and placenta derived membranes as scaffolds for lysozyme delivery

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Background: Human amniotic membranes (hAM) and umbilical cord membranes have shown potential in tissue regeneration and peripheral nerve regeneration and recovery. However, their limited capacity to produce growth factors restricts their therapeutic applications.

Aims: This study aimed to evaluate the efficiency of umbilical cord and placental membranes as carriers for lysozyme delivery. The assessment included investigating the binding capacity of the double-walled microspheres (DWMS) loaded with lysozyme to the membranes and characterizing the release kinetics of lysozyme once bound.

Methods: Biodegradable lysozyme PLGA/PLLA encapsulated microspheres were fabricated utilizing a modified water-oil-water emulsion solvent evaporation method and incubated with cryopreserved and lyophilized umbilical cord and lyophilized placental membranes for varying time intervals (1 hr, 6 hrs, 24 hrs) to evaluate binding efficacy. Samples were collected at regular time points to measure lysozyme release over time, and subsequent analysis using the Bicinchoninic Acid assay (BCA) assay was conducted to characterize the release kinetics.

Results: Cryopreserved and lyophilized umbilical cord membranes exhibited no significant difference between lysozyme-loaded DWMS and non-loaded membranes. However, placental membranes soaked with lysozyme DWMS for 1 and 24 hours showed a significantly higher release ($p < 0.05$) of lysozyme compared to non-loaded membranes at both the beginning and end of the collection time points. Notably, placental membranes soaked for 24 hours released 1.57 times more lysozyme than the membranes soaked for 1 hour at the 72-hour mark.

Conclusions: Umbilical cord membranes were found to be less effective as a carrier for lysozyme delivery, while placental membranes demonstrated greater effectiveness in delivering lysozyme. Prolonged soaking periods improved the binding efficacy of lysozyme DWMS for placental membranes. Umbilical cord membranes consistently exhibited higher total protein release compared to placental membranes. This study introduces a potential delivery system that could become a standard approach for tissue repair and regeneration across various tissue types.



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Elena Blain

Comparison of Social Determinants of Health between Hispanic and Non-Hispanic Women within the WOW Program

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Prisma Health Department of Medicine

Gestational diabetes mellitus (GDM) is one of the most prevalent metabolic disorders affecting 18% of pregnancies worldwide.^{1,2} There is a large need for a practical lifestyle intervention for women both during and after pregnancy including diet and exercise modification and behavioral support.² Through a new collaborative and interdisciplinary model of care, Wellness and EmpOwerment for All Women (WOW), we aim to enhance diabetes control and education for women with diabetes of reproductive age and achieve improved diabetes control before, during, and after pregnancy. Women are eligible to enroll in WOW if they are 16-45 years old with a diagnosis of diabetes, history of gestational diabetes, or at risk for diabetes. Hispanic women are at increased risk of developing GDM compared to Non-Hispanic women and are less likely to engage in healthy eating and physical activity which leads to an increased risk for future Type 2 diabetes.³ The challenges women face adopting lifestyle interventions postpartum have been poorly documented but some perceived barriers include home stressors, financial and food insecurity, low health literacy, immigration issues, and challenges with physical activity behavior change.⁴ A significant portion of Hispanic women lack awareness of diabetes risk factors and prevention strategies which results in limited access to clinical and public health interventions that promote healthy lifestyles.⁵ This study aims to compare different social determinants of health between Hispanic and Non-Hispanic women within the WOW program. The variables investigated are average income, highest level of education, insurance type, if social support exists, transportation challenges, and food insecurity.



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James R. Bloodworth III

Building Paediatric Surgical Capacity in Rural Malawi - Lessons From the KidSURG Project

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Background: Parkinson's Disease is characterized by an array of subtypes and varieties with two of the prominent ones being tremor dominant (TD) and postural instability and gait disorder (PIGD). While there have been investigations regarding the size of brains and brain structures, there is less research regarding differences in lower body specific cortical areas such as the supplementary motor area (SMA) between TD and PIGD subjects. Our main goal is to differentiate the brain structure measurements between TD and PIGD patients for diagnostic or therapeutic importance.

Methods: Using the latest Computational Anatomy Toolbox (CAT12), we processed 774 MRI images from subjects in the Parkinson's Progression Markers Initiative (PPMI) to compare the TD and PIGD subtypes. For statistical analyses, we intend to run a Two Sample T-Test comparing the atrophy of grey matter to determine a statistically significant association between the TD and PIGD subtypes.

Results: Results are still in progress. We expect to find that cortical areas that are important for lower body functioning such as the SMA will be smaller and thinner in patients with the PIGD subtype when compared to the TD subtype.

Conclusions: Moving forward, additional cortical areas that should be investigated include the cerebellum. There is also some evidence to suggest that the cingulate gyrus may be of interest.

Additionally, we intend to pursue further investigations including the correlation of UPDRS scores with SMA cortical thickness and volume. Through continued research, it is our hope that the diagnosis, treatment, and management of Parkinson's Disease will improve for future patients.



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Philip C. Brewer

Comorbidities Associated with Exclusion from rtPA in Obese Ischemic Stroke Patients with a History of Smoking

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Objectives: This study aims to determine clinical risk factors associated with recombinant tissue plasminogen therapy (rtPA) exclusion or inclusion in obese acute ischemic stroke (AIS) patients with a history of smoking.

Methods: Retrospective data on demographic and clinical risk factors of obese AIS patients with a history of smoking was collected from a large stroke center from January 2010 to December 2016. Univariate analysis was used to differentiate between risk factors and demographics associated with exclusion and inclusion from rTPA. Variables in the univariate analysis were further analyzed using logistic regression. The adjusted odds ratios (ORs) and 95% confidence intervals (CIs) for each clinical risk factor were used to predict the increasing odds of an association of a specific clinical baseline risk factor with exclusion or inclusion from rtPA.

Results: In the adjusted analysis, Obese AIS patients with a history of smoking excluded from rtPA were more likely to present with carotid artery stenosis (CAS) (OR = 0.069, 95% CI, 0.011-0.442), diabetes (OR = 0.604, 95% CI, 0.366-0.997), higher total cholesterol (OR = 0.975, 95% CI, 0.956-0.995), history of drug and alcohol use (OR = 0.438, 95% CI, 0.232-0.828). Higher NIHSS score (OR = 1.051, 95% CI, 1.017-1.086), ambulation improvement (OR = 2.230, 95% CI, 1.423-3.496), higher triglycerides (OR = 1.004, 95% CI, 1.001-1.006), and higher HDL (OR = 1.028, 95% CI, 1.000-1.057) were associated with Obese AIS patients that received rtPA.

Conclusion: Our findings reveal specific risk factors or comorbidities that contribute to the exclusion of Obese AIS patients with a history of smoking from rtPA. These findings suggest the need to develop management strategies to improve the use of rtPA in obese AIS patients with a history of smoking.



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Philip Broughton

Personalized Prognosis: Analysis of Gene Mutations in Breast and Lung Cancer Patients

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Introduction: Cancer, a second leading cause of death in the United States, arises from mutations in oncogenes and tumor suppressor genes. Our study aims to enhance understanding of the impact of hot-spot mutations in 50 cancer-critical genes on specific cancers, such as breast and lung. Additionally, the study aims to explore the integration of artificial intelligence (AI) in predicting personalized treatments based on the identified mutations.

Methods: Analysis of mutations was conducted in 35 breast cancer patients and 39 lung cancer patients of the Prisma Health Cancer Institute. Genomic databases including ClinVar were utilized to gather available information and published literature about these mutations. Characteristics of each mutation, including predicted changes in protein folding, clinical significance and conditions, associated variations, affected signaling pathways, as well as relevant publications, were analyzed and recorded.

Results: Among the 50 cancer-critical genes, previously sequenced for the status of hot-spot mutations, a total of 79 mutations were identified in the studied group of cancer patients. Notably, for 11 of those mutations we did not find any published information. Furthermore, one mutation exhibited high prevalence among cancer patients. We suggest investigating these 12 mutations further for potential medical significance and novelty.

Conclusion: The identified mutations might be of clinical significance and warrant their further investigation. The information collected in this study will also contribute to the development of a comprehensive cancer database accessible to clinicians and researchers. Moreover, the data will be utilized in an AI application to predict personalized treatment approaches for cancer patients.



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Killian J. Bucci

The Expert Learner: Investigating the Characteristics of High-Performing Medical Students

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Objectives: This study intends to identify the learner characteristics of high performing medical students using the Learning and Study Strategies Inventory (LASSI), and how these characteristics correlate with academic performance.

Methods: The LASSI instrument was administered to 514 medical students (class of 2019-2023) during the middle of M1 year. To measure the strength of association between the LASSI 10-scale scores and performance on overall biomedical sciences, USMLE Step 1, and USMLE Step 2 CK, Pearson product-moment correlation analyses were performed. A one-way ANOVA and post-hoc analysis was performed to identify statistically significant differences on LASSI 10-scale scores between students grouped by quartiles according to their performance on overall biomedical sciences, USMLE Step 1, and USMLE Step 2 CK examinations.

Results: Higher scores in motivation, self-testing, and test strategies were significantly correlated with 1st quartile (top scorers) performance when compared to the 4th quartile (bottom scorers) across all performance measures. Along with these aforementioned scales, information processing, selecting main ideas, and time management were to a lesser degree, responsible for variation in student's performance.

Conclusions: High performing medical students acquire motivation, self-testing, and test-taking strategies, which are the three most impactful LASSI scales on students' performance. These important characteristics could be used as a basis for improving students' learning and study strategies.



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Rowan H. Burns

Utilization of virtual reality assisted guided imagery for the treatment of chronic pain in patients with cancer

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Prisma Health Department of Palliative Care

Introduction. Patients with cancer often experience high levels of pain; while there is evidence supporting the utilization of non-pharmacological methods in conjunction with pharmacologic methods for cancer pain management, the preferred treatment remains pharmacological modalities alone. Our study works to provide a complementary cancer treatment modality--Virtual Reality Assisted Guided Imagery VRAGI --for pain management. We aim to assess the effectiveness of VRAGI on managing pain in the home setting, in addition to its impact on opioid use, anxiety, depression, and fatigue.

Methodology. 80 participants will be recruited from Prisma Health or Epic by palliative care providers and Epic Slicer Dicer, respectively. Selected participants will join our prospective 2x2 randomized controlled trial and will be randomized into four groups: 1) VRAGI, 2) laptop-assisted guided imagery, 3) virtual reality without guided imagery, 4) laptop without guided imagery. Reports of pain, anxiety, depression, fatigue, and opioid use will be collected before, during, and 3 weeks after the intervention.

Results. Currently, we have no results to present due to delays that have affected our progress. Delays include the time and effort required to develop a REDCap survey system, refine the VR prototype, and recruit participants.

Conclusions. Due to the lack of data, we cannot make any definitive conclusions at this time. We hope our results will be able to demonstrate the efficiency of VR in treating chronic pain and cancer related psychological distress once obtained.



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Jared A. Buteau

A Medical-Legal Partnership as a Mechanism to Address Inequities

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Purpose statement (Study aims) This study aims to describe differences in impacts of our MLP on equity in health access and access to resources, describe how a Medical-Legal Partnership (MLP) can decrease inequities and discuss how MLPs can drive systems-level change to achieve health equity for low-income individuals.

Study aims

1. Evaluate the differences in HHLN referral and case types by patient race/ethnicity, referral population, and household federal poverty level
2. Evaluate the differences in SDOH by patient race/ethnicity, referral population, and household federal poverty level

Methods

The Upstate MLP is a collaboration between Prisma Health, South Carolina Legal Services, and Furman University's Institute for the Advancement of Community Health. Health-harming legal needs (HHLNs) are complex social conditions rooted in legal issues that impact health. The MLP assists qualified Prisma Health patients with HHLNs by providing free civil legal aid for issues such as guardianship, power of attorney, Medicaid denials, and housing issues. Patients referred to the MLP complete an intake for legal services with a licensed social worker and are screened for Social Determinants of Health. Data are recorded in REDCap. Binary logistic regression analyses were used to determine differences by race/ethnicity, federal poverty level, and referral population (pediatric/geriatric) in referral reason, legal case type, and SDOH. Findings were considered significant at $p < 0.05$.

Results

Approximately 60.6% of those referred to the MLP were classified as pediatric patients; 39.4% were geriatric patients. Approximately 49% of referred patients were female, while 51% were male. Just over half of those referred (52.9%) identified as White, 33.4% identified as Black, 7.6% identified as Hispanic/Latino, and 2.9% identified as multiracial. Patients who identify as Black were more likely (OR: 2.699, CI: 2.20-4.05, $p < .001$) to be referred for housing-related HHLNs compared to patients who identify as White; this finding remained true when controlling for living in Section 8 housing (OR: 2.19, CI: 1.35-3.54, $p = .001$). Patients who identify as Black (OR: 0.57, CI: 0.45-0.73, $p < .001$) and multiracial (OR: 0.5, CI: 0.26-0.94, $p = .032$) were less likely to be referred for personal/family stability related HHLNs than patients who identify as White. When controlling for being referred for a housing-related HHLN and living in section 8 housing, patients who identify as Black are still significantly more likely to have a housing case than patients who identify as White (OR: 5.13, CI: 1.46-18.01, $p = .011$). When controlling for referral rates, most differences in HHLN of legal cases by patient race, ethnicity, or FPL were no longer significant.

Conclusion(s) MLPs can potentially reduce inequities in HHLNs and associated health outcomes by race/ethnicity. Although differences in referral reasons by race/ethnicity were observed across several domains, a notable disparity still exists regarding significant differences in housing cases by race; the reasons for this may be multifactorial and leave room for further investigation. Embedding case management and legal aid in healthcare may alleviate HHLNs and associated health inequities by race/ethnicity and improve system-level healthcare.



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Michael J. Campanelli

Neuro-trauma Feedback System, An investigational study of electroencephalography variability monitoring in emergency care clinicians for the early detection of acute stress disorder

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Studies suggest that 90 percent of the general population experiences highly stressful events, with around 11 percent developing Acute Stress Disorder (ASD), a precursor to Post-Traumatic Stress Disorder (PTSD). Early diagnosis is crucial for timely treatment and prevention of PTSD. This study aims to characterize biomarkers possibly associated with ASD, creating a pipeline for analysis and data mining. We tested the design of a mobile electroencephalography biomonitoring prototype with emergency clinicians who work in highly stressful environments. We then analyzed the biopotential brainwave activity collected from these participants who experience traumatic events regularly. EEG signals were collected from 14 healthy individuals and structured into a tabular format based on wave types. Univariate analysis methods were used to quantify wave statistics and correlations. The waveform distributions determined the necessary smoothing and normalization techniques. Standard statistical methods were used for normalization, and time series analysis revealed underlying trends. Integrating logged participant activities and stress level surveys provided a more nuanced understanding of the relationship between stressors and neural responses. Results show that traumatic events can be characterized based on personalized calculated thresholds. These results will contribute to building an AI engine that monitors neural activity for potential ASD biomarkers. In the future, a comprehensive support system will allow us to understand the disease process further and help inform and support clinicians, potentially helping to prevent the progression of ASD and the risk of PTSD.



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The use of EndFlip in the surgical treatment of gastroesophageal reflux disease

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Gastroesophageal reflux disease (GERD) is a prevalent condition characterized by the chronic backflow of stomach contents into the esophagus. It leads to a variety of troublesome symptoms and potential complications. Accurately assessing esophageal function is crucial for the effective diagnosis and management of GERD. An emerging technology called Endoflip offers a promising approach to evaluating esophageal motility and sphincter function, providing valuable insights into the underlying causes of GERD. The Endoflip system utilizes impedance planimetry to measure the cross-sectional area and pressure of the esophagus, enabling the assessment of its functional properties. By analyzing important parameters such as distensibility index, contractility index, and esophagogastric junction compliance, Endoflip provides objective measurements of esophageal function, surpassing the limitations of traditional diagnostic methods like manometry and pH monitoring.

This paper explores the costs and benefits of implementing Endoflip technology in the surgical management of patients with GERD. We assess the use of Endoflip in evaluating treatment outcomes, including the effectiveness of medical therapies, surgical interventions, and endoscopic procedures. Endoflip represents a significant advancement in the evaluation of esophageal function in GERD patients. By providing objective and quantitative measurements, it enhances our understanding of the underlying mechanisms of GERD and offers valuable insights for personalized treatment approaches.

This study enrolled a total of 474 patients diagnosed with GERD (gastroesophageal reflux disease). Our objective was to assess both long-term outcomes and quality-of-life measurements to obtain a comprehensive understanding of the effectiveness of Endoflip technology. The impact of incorporating EndoFLIP during funduplications on patient outcomes remains uncertain. If the results indicate improved outcomes with the use of EndoFLIP, it would provide support for its more frequent utilization during funduplications. The primary aim of this study is to determine whether the implementation of the EndoFLIP device can enhance postoperative outcomes, including factors such as dysphagia and quality of life measures, following anti-reflux surgery.

Data from the research study is currently pending and will be included. Data has been transferred from patients' charts into RedCap. Statisticians are currently in the process of analyzing the data. Data will be included in the final paper.

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Richard Crowley



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Anna E. Dean

Self-directed learning about LGBTQ populations in three cohorts of first-year medical students

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Background: There has been little research into self-directed learning activities surrounding LGBTQ+ healthcare in undergraduate medical education. At the University of South Carolina School of Medicine Greenville (USCSOMG), one approach has been for students to complete their choice of an online learning module provided via the National LGBTQIA+ Health Education Center. This project aims to describe the modules selected by medical students and explore demographic factors associated with the student's choice of module.

Methods: Subjects are first-year medical students at USCSOMG from academic years 2020-21, 2021-22, and 2022-23. Students' selected module information is drawn from certificates uploaded by students after completing their chosen activity. Additional data is provided by demographics reported at the time of matriculation. A mixed methods approach was utilized for data analysis. The analysis used categorization of qualitative data, chi-square, and regression tests as appropriate.

Results: While data collection and analysis are currently ongoing, initial analysis indicates that overall, 41% of the students completed an introductory/foundational learning module and there are statistically significant differences between the cohorts. Furthermore, a statistically significant regression model ($\chi^2(9) = 19.22, p = 0.02$) reveal variables that predict the likelihood that students would select an intermediate/advanced learning module.

Conclusion: This study addresses the gap in research on self-directed LGBTQ+ healthcare learning in undergraduate medical education, exploring module choices among USCSOMG students. Initial findings highlight module preferences and predictive factors, contributing to inclusive healthcare education for future professionals.



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Shuvangee Dhar

Evaluating the Role of Shoulder and Back Exoskeletons in Augmenting Surgeon Ergonomics during Simulated Surgical Tasks

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Surgical techniques like laparoscopy routinely expose surgeons to increased physical demands. To curb the multiplying rate of work-related musculoskeletal disorders, exoskeletons have been proposed to be adopted in healthcare. These wearable devices mechanically redistribute weight more uniformly across the body to reduce muscle pain and fatigue in the area of interest. However, the capability of exoskeletons to provide physical support under a variety of tasks and user characteristics needs to be further investigated. This study aims to understand the effects of shoulder and back exoskeleton on body kinematics and muscle activity during simulated tasks that are modeled after those frequently performed in the operating room by surgeons. A posture model was developed to include shoulder extension/flexion and abduction/adduction as well as symmetrical/asymmetrical trunk flexion. Participants completed tasks involving specific upper limb and trunk postures as categorized in the posture model while wearing either shoulder, back, or no exoskeleton. Subjective perceptions of the task were recorded using surveys. Body kinematics were measured through a motion capture system and muscle activity using a surface electromyography system. Preliminary results show that shoulder-support exoskeletons decreased more muscle activity across more postures than back-support exoskeletons. A system usability score of 60.6 and 63.1 (out of 100) was obtained for back and shoulder exoskeletons respectively while participants also self-reported the shoulder exoskeleton as being easier to use. Future work includes increasing sample size and performing statistical analysis to better understand the objective implications of the exoskeletons in a simulation before they are implemented in clinical settings.



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Raj S. Dwivedi

Differences in Perceived Concussion Knowledge and Experiences of Middle School, High School, and College Patients That Have Suffered vs. Not Suffered a Concussion

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Introduction: Concussions are common amongst adolescent and college students and student-athletes, causing many academic problems including missed time from school and trouble learning upon returning to the classroom. This often leads to decreased GPAs and poor overall academic performance. Past studies have evaluated academic effects of concussions on students, but few have explored the effects of concussions on students' knowledge and experiences regarding concussions.

Aim: To evaluate differences in the concussion knowledge and experiences of adolescent and college-aged people based on whether they have suffered a concussion or not.

Methods: Patients aged 12-23 (mean 16.4 years) at orthopedic outpatient clinics completed two surveys evaluating their concussion knowledge (0 none – 5 high). The results were then analyzed using independent sample t-tests to compare participants that had suffered a concussion and those that had not.

Results: 20 patients were included (9 concussion and 11 non-concussion). The concussion group had higher average scores but differences were not significant: general concussion knowledge (3.44 v 3.27, $p=0.98$), knowledge on concussion signs and symptoms (3.67 v 3.45, $p=0.86$), potential long-term effects of concussion on health and education (3.22 v 3.00, $p=0.95$), the process of reporting a concussion (3.56 v 3.27, $p=0.98$), and return to school and play protocols after a concussion (3.78 v 3.36, $p=0.25$) when compared to the non-concussion group.

Conclusions: A larger sample size is needed to adequately power the study and form conclusions. However, the current data suggests there may be differences in the participants' concussion knowledge based on whether they have suffered a concussion or not.



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Sameer Y. Ebrahim

Beyond the Break: Assessing Postoperative Complications in Acute Acetabular Fractures - ORIF or THA ”

Sameer Y. Ebrahim, Kyle J. Adams, Michael S. Sridhar
Prisma Health-Upstate Department of Orthopaedic Surgery

Acetabular fractures pose significant challenges for orthopedic surgeons, and the optimal surgical approach between Open Reduction Internal Fixation (ORIF) and Total Hip Arthroplasty (THA) remains a topic of debate due to the associated risks of postoperative complications. In recent years, THA has gained popularity, even in patients traditionally deemed too young, as it may eliminate the significant risk of post-traumatic arthritis. The choice between THA and ORIF continues to captivate the orthopedic community, demanding further investigation.

To contribute to the ongoing discourse, this study presents a retrospective chart review of 250 cases of acetabular fracture patients treated at a Level I Trauma Center (Greenville Memorial Hospital, Prisma Health-Upstate) from 2021-2023. The primary aim is to evaluate and compare the risks of postoperative complications between THA and ORIF by examining key aspects including acetabular fracture characteristics, surgical fixation type, implant details, intraoperative complications, post-operative complications, reoperations, and one-year mortality.

Data collection is ongoing, and results are pending. Descriptive statistics will be used to analyze the patient population. The anticipated findings will provide valuable insights into the correlation between surgical interventions, approaches, and complication risks. Subsequent analyses will utilize the constructed database to investigate topics such as the correlation between the need for a posterior wall spring plate and development of post-traumatic arthritis.

This ongoing study aims to contribute to the understanding of acetabular fracture management. By elucidating risks associated with different surgical interventions and addressing key research questions, we strive to improve clinical decision-making, improve patient outcomes and quality of life.

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Clay Elliott

Elevated expression of high mannose glycans: A potential biomarker for detecting and staging breast cancer tumors

Clay Elliott, Anna V. Blenda

USC SOMG Department of Biomedical Sciences

Glycans are carbohydrate structures readily found intracellularly, extracellularly and embedded on cell surfaces. In breast cancer, glycan expression can become abnormal due to genetic mutations or cellular stressors. Because of this, identifying variations of glycan expression in breast cancer tissue is useful for diagnosis and staging. Abnormal complex glycan expression has been observed in breast cancer. Previous research done by our lab showed that high mannose glycans were upregulated in breast cancer tissue, but no work has been done looking into stage specific changes for each individual glycan. Additionally, we wanted to investigate if factors like smoking history, race, or molecular profile of the cancer had any effect on glycan expression. To investigate these questions, 39 breast cancer tumors biopsies, ranging from stage I-IV, were collected, and analyzed using MALDI mass spectroscopy. We found that in high mannose glycans (H5N2, H6N2, H7N2, H8N2, and H9N2) were all significantly elevated in stage I breast cancer when compared to surrounding control tissue ($p < 0.005$). Stage I breast cancer also had elevated expression of complex and hybrid glycans when compared to the control tissue. Interestingly, currently smokers had elevated high mannose (H6N2) expression in the surrounding control tissue compared to those who had never smoked. Analysis of the effect of sample molecular profile and race on glycan expression is still ongoing. Our data suggests that breast cancer glycan expression is influenced by multiple factors. It is important that as medicine becomes more individualized, we continue to identify external factors that influence a glycan profile.



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Jacob A. Estrada

Analysis of COVID-19 RSV co-infection in pediatric data in Greenville County as assigned by ArcGIS

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University of South Carolina School of Medicine Greenville

One of the leading causes of morbidity and mortality in the pediatric population is lower respiratory infections. There is currently a disparity in the research when it comes to how community-level socioeconomic factors and health disparities affect RSV and COVID-19 infections in pediatrics, and even more so when considering co-infection. The purpose of this study is to construct a map of the Greenville area to be used in the evaluation of patient home addresses in relation to risk of infection. This is a particularly novel analysis as COVID-19's recent inception raised innumerable new questions about the pathology of the disease, and localizing the project to the Greenville area has the potential to create even more research potential at similar and larger scales for the future. The study will utilize ArcGIS, a geospatial mapping software, to generate a map and separate out areas within the country based on zip code. Following the development of the basic zip code map, addresses of pediatric patients who have experienced RSV or COVID-19 infection can be added. Furthermore, this map will allow for visualization of socioeconomic factors collected in the US Census, as well as mapping of important geographical or building features such as industrial sites, highways, or grocery stores. When evaluated as a comprehensive map, we will be able to identify location-specific characteristics that may contribute to an increased risk of RSV or COVID-19 disease, facilitating targeted interventions to limit the burden of disease on at-risk children in Greenville.

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Shiloh S. Eyabi

A Collaborative Care Model: Enhancing Outcomes Among Pregnant and Postpartum Individuals with Substance Use Disorder

Shiloh S. Eyabi, USC School of Medicine Greenville, Morgan Edwards, USC School of Medicine Greenville, Melissa Fair, PhD, Furman University, Hannah McKinnon, Furman University, Kimbley Smith, M.Ed., Phoenix Center, Kacey Eichelberger, M.D.

Background: The prevalence of substance use disorder (SUD) among pregnant and postpartum individuals has significantly increased in recent years, leading to various adverse outcomes such as neonatal withdrawal syndrome and maternal mortality. Pregnant and postpartum individuals with SUD can benefit from a combination of medical treatment for SUD and behavioral health therapy, particularly when integrated within a multidisciplinary approach to prenatal care. Magdalene Clinic utilizes this collaborative care approach to provide specialized prenatal care, recovery support services, and case management for these individuals.

Purpose: To explore and evaluate the available literature on the efficacy of the collaborative care model in treating pregnant individuals with SUD.

Methods/Approach: A comprehensive literature search was conducted on PubMed to identify relevant studies on collaborative care models for pregnant and postpartum women with SUD. Articles were included if they were written in English and published between 2017-2023. The Medical Subject Headings (MeSH) included were collaborative care models, maternal, pregnancy, substance use disorder, and best practices.

Results/Discussion: A total of 17 articles were reviewed, which encompassed literature exploring diverse collaborative and integrative care models, as well as recommendations and best practices for treating maternal patients with SUD. Literature suggests that the delivery of SUD treatment and prenatal care through a collaborative care model, involving coordination of multiple services, enhances treatment adherence, fosters trust between patients and the healthcare system, and promotes engagement in prenatal care. Moreover, research indicates that when care is provided in a trauma-informed, compassionate, and non-judgmental manner, it is more effective in reducing negative outcomes for maternal patients with SUD. However, further evidence is required to determine the quantitative effects of the collaborative care model on maternal and fetal outcomes. Additional studies are needed to identify the essential components of an effective collaborative care model for this population.

Conclusion: In conclusion, the literature provides valuable insights into the efficacy of the collaborative care model in improving outcomes for pregnant and postpartum individuals with substance use disorder (SUD). The Magdalene Clinic employs this approach to meet the needs of this vulnerable population through collaboration with various services to provide comprehensive care that includes therapeutic nursing, specialized prenatal care, recovery support services, and case management. These findings highlight the importance of ongoing research and development of evidence-based practices to optimize the care provided to pregnant individuals with SUD and improve their overall health outcomes.



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Ashleigh Farmer

Retrospective Analysis of Radiation Dose Savings Among Patients Undergoing UAE, PAE, and TIPS Procedures

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Department of Radiology

Prostate artery embolization (PAE), Transhepatic Intrahepatic Portosystemic Shunt (TIPS), and Uterine artery embolization (UAE) are interventional radiology (IR) procedures that offer treatment for benign prostatic hyperplasia, portal hypertension, and uterine fibroids, respectively. IR procedures have been utilized as minimally invasive procedures that allow for lower morbidity, fewer hospital stays, and overall cost savings. However, IR procedures also require the introduction of radiation to the patient and provider. This may cause negative outcomes such as stochastic injuries or skin necrosis. PAE and TIPS are high dose radiation procedures while UAE risks irradiating radiation sensitive reproductive organs. The purpose of this study was to evaluate radiation exposure during these procedures to determine methods of reducing radiation exposure in patients. All patients that underwent UAE, PAE, and TIPS procedures between 8/31/2021 and 4/1/2023 at a single institution were retrospectively evaluated. Typical demographic and clinicopathologic data were collected to include technical variables such as procedure time (PT), number of acquisitions (Naq), and fluoroscopy time (FT). A total of 83 patients underwent PAE (n=34), UAE (n=32), and TIPS (n=17) procedures. PAE and TIPS had the highest averages of contrast dose (148 and 122.2), FT (34.4 and 24.5), Naq (808.38 and 470.8), and PT (108.8 and 84.29) respectively. These parameters may contribute to an increased radiation exposure and demonstrate the need for radiation reduction methods. In addition, all patients underwent some form of prior mapping. This may also offer an avenue for reducing overall radiation exposure by employing non-fluoroscopic guiding methods. Future directions include to determine the significance between the clinicopathologic data and radiation exposure.



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Amaya D. Farr

Primary Care Establishment During the Postpartum Period in Women Diagnosed with Gestational Diabetes

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Prisma Health Department of Internal Medicine; Prisma Health Department of Family Medicine

During the gestational period, the prevalence of gestational diabetes mellitus among women in the U.S. is 5-10 percent, and these women have a seven-fold increased risk of developing type 2 diabetes in the postpartum period. Research suggests that women diagnosed with GDM should follow-up with their primary care provider within 6-12 weeks following delivery to reduce risks of T2DM, and this period after labor is widely considered an opportunity for establishment of primary care and intervention. However, less than half of women with GDM complicated pregnancies return to primary care for follow-up screening. The primary aim of this study is to identify the rate at which women of reproductive age (16-45) diagnosed with GDM, T2DM, T1DM, or at risk of diabetes establish primary care. The second aim is to identify barriers present in individuals with and without primary care establishment. In this retrospective cohort study, 66 women meeting the criteria just previously outlined were referred to one of two primary care clinic sites and included in the sample of this research. The primary outcome was the establishment of primary care defined by distinct timing parameters, and patients were subsequently screened at their first intake visit, by telephone interview, or chart review to identify any barriers to establishing care—barriers specifically included food insecurity and transportation accessibility. It is hypothesized that individuals with GDM will be less likely to establish care, however the percentage could be more than the general population given the multidisciplinary approach to care through the WOW program.



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Christine Fasana

Understanding the Mechanisms by which SARS-CoV-1 Nsp1 Contributes to Host Immune Evasion and Host RNA Regulation

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USC SOMG Department of Biomedical Sciences

The COVID-19 pandemic intensely highlighted the devastating impact of coronavirus-family infections. Two notable coronaviruses, Severe Acute Respiratory Syndrome Coronavirus 1 and 2 (SARS-CoV-1 and SARS-CoV-2) are capable of causing significant human disease with the ongoing SARS-CoV-2 pandemic resulting in over 670 million reported infections and nearly 7 million deaths. One reason coronaviruses may produce such severe pathology is the production of virus-encoded proteins that hijack host cell machinery, allowing for extensive viral proliferation while evading the host immune response. SARS-CoV-1 non-structural protein 1 (Nsp1) is one such protein. Nsp1 maintains two defined functions during viral replication: (1) inhibition of host protein translation and (2) dysregulation of the Type I interferon antiviral response to evade the host's immune response. A potential mechanism by which Nsp1 could achieve these functions is through interaction with immune regulatory proteins such as ADAR1, which localize in stress granules during infection. To study the immunomodulatory actions of Nsp1, eukaryotic expression plasmids encoding wild-type SARS-CoV-1 Nsp1 and three Nsp1 functional mutants were designed and produced: M4, which lacks both translational and immune inhibition functions; M16, which lacks immune inhibition alone; and M27, which has increased translational and immune inhibition. The Nsp1 wild-type and Nsp1 mutants will be transfected into the human lung epithelial cell line, A549, to mimic the infection environment. Fluorescent microscopy allows for visualization to assess the relationship between Nsp1, ADAR, and stress granules, indicated punctate by G3BP1 protein staining. Understanding the mechanisms by which SARS-CoV-1 evades immune responses can be employed in the development of novel therapeutics against coronavirus infections. Therefore, the knowledge gained from this project about SARS-CoV-1 Nsp1 could improve patient outcomes during current or future coronavirus outbreaks.



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Research Seed Grant



Melanie M. Gainey

Integrating Expert Perspectives on Current and Future Challenges for Robotic Assisted Surgery RAS Workflow

Melanie M Gainey, M.S., Jackie Cha, Ph.D., Alfredo Carbonell, DOClemson University Department of Engineering; Prisma Health Department of Surgery

Robotic assisted surgery (RAS) is a form of minimally invasive surgery. During RAS, surgical instruments are connected to a robotic system that is controlled by a surgeon located at an isolated console. Although RAS has advantages such as faster recovery times and less post-operative pain for patients, there are challenges that the technology brings to the operating room such as changes in workflow and space constraints. Therefore, we sought to understand expert perspectives on current and future challenges of surgical team members during the use of RAS. This study aims to identify expert perceptions of RAS for potential future opportunities and improvements for RAS workflow. In-person observations were conducted to learn more about the overall process and workflow of RAS. Focus groups were conducted with eleven surgical techs, eight circulating nurses, and two medical administrations. The focus group questions were used for insights on staff demographics, RAS experience between different hospitals, built environments, training, and interactions. These results were then used to perform a thematic analysis, and the following themes emerged: training, usability, communication, environment, management, and scheduling. These themes were further broken down into subthemes. Definitions and quotes were used to help define each subtheme. Further thematic analysis needs to be conducted to gain additional perspectives from other RAS operating room team members.



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Mallorie M. Gainey

Evaluation of FcγR Expression and Fertilization Potential through the Utilization of Nanodrop 33 and Flow Cytometry

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Introduction/Background: There are many sperm surface receptors that play a role in fertilization and the malfunction of these proteins could induce a failure in spermatozoa function. Previous research has shown that the interaction between IgG, an immunoglobulin, and Fc gamma receptors (Fc γ Rs) may play a role in fertilization and infertility, but none have specified the classification of Fc γ Rs. Fc γ Rs function is mediated by the Fc region of IgG, in which its interaction is critical to produce an effector response. Though Fc γ Rs central role is to generate pro and anti-inflammatory responses, their presumed involvement in fertilization may lead to an exciting discovery.

Methods/Results: To understand more about their interaction, the aim for this project was to identify and distinguish Fc γ Rs for IgG while also utilizing a Fc block to evaluate Fc γ R binding specificity for IgG. There are several other receptors that bind to IgG, and three of those receptors were selected for further study: CD16, CD32, and CD64. Two additional receptors for other antibody isotypes were also selected for study: CD23, a receptor for IgE, and FAIM3, an IgM receptor. To identify these receptors on sperm from sea urchins and humans, each sample retrieved will be stained with the designated primary antibody conjugated with a fluorescent tag. Once each sample is stained with the primary conjugated antibody, two instruments will be used to assess their expression: Nanodrop 3300 and an NxT Attune Flow Cytometer. The Nanodrop 3300 will be used to detect the presence of fluorescence within the sample as a whole, while the Flow Cytometer will detect the amount of fluorescent antibody present on single sperm cells.

Conclusion/Future Directions: Nanodrop and Flow Cytometry will be compared based on their efficacy in analyzing data. Once the expression of specific Fc γ Rs and other FcRs are identified on sperm cells, a platelet activating factor will be utilized to modulate FcR expression over time, with the potential to impact fertilization success. Future research on these factors will produce a robust understanding of regulated Fc γ R expression and male fertility in both humans and other animal species.



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Sahil Garg

A Preliminary Review: PROMIS-10 as a Predictor of Surgical Candidacy for the Minimally Invasive Transforaminal Lumbar Interbody and Fusion (MI-TLIF)

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C-Path's Cure Drug Repurposing Collaboratory,
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Background: Preoperative screening tools such as Oswestry Disability Index (ODI), Visual Analog Scale (VAS), and Short Form 36 have been used to quantify the relative disability of patients. A relatively new metric, PROMIS-10, offers potential advantages as a preoperative screening tool assessing both mental and physical components of disability. PROMIS-10 Physical Health (PH) T-scores of <42 and PROMIS-10 Mental Health (MH) T-scores of <40 have been preliminarily established as threshold values in a non-operative cohort of patients with chronic back pain. PROMIS 10 utilization as potential screening tool for patients undergoing spine surgery has not been extensively studied. Thus, the objective of this study is to assess baseline preoperative PROMIS-10 scores in patients surgically indicated for a minimally invasive fusion operation. **Methods:** A retrospective chart review was performed including nineteen consecutive patients who underwent single level MI-TLIF, two level MI-TLIF, and single level MI-TLIF with adjacent level decompression(s) by a single surgeon. Subjects were evaluated based on preoperative PROMIS-10, ODI, and VAS scores. Data was evaluated to illustrate potential trends among patients using standard statistical modeling. **Results:** 16 patients underwent a single level MI-TLIF, and 3 patients underwent a two-level MI-TLIF. Mean PROMIS-10 Physical Health T-Score is 40 and mean PROMIS-10 Mental Health T-Score is 46. Mean ODI is 36% and mean average VAS score is 5/10. All patients demonstrated clinical improvement after surgery with an increase in baseline strength scores with no complications. **Conclusion:** The PROMIS-10 questionnaire offers a novel approach to determining a patient's preoperative disability. PROMIS-10 T-scores of <42 and <40, PH and MH respectively, in combination with clinical presentation, presence of neurological weakness, and imaging, may serve as useful clinical tool to guide minimally invasive surgical treatment.



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Caleb T. Godbee

Outcomes of Primary Rotator Cuff Repair Augmented with Cadaver Dermal Allograft

Caleb T. Godbee, Stephan G. Pill, MD

Prisma Health Steadman Hawkins Clinic of the Carolinas

Background: Rotator cuff tears can cause significant pain, functional loss, and financial burden for patients. While rotator cuff injuries are increasingly common, successful rotator cuff repair (RCR) of large tears (>3cm) remains a challenge for surgeons due to high retear rates (30-40%). Recently, literature suggests that cadaver dermal allograft augmentation of the cuff tendon may bolster tendon healing, reduce retear rates, and reduce pain during recovery. The purpose of this study is to examine retear rates and patient reported outcomes of RCR with human dermal allograft augmentation as compared to the control of non-augmented RCRs. We hypothesize a statistically significant reduction in retear rate, along with higher patient reported outcome scores, in the group receiving allograft augmented RCR.

Methods: Retrospective analysis of patient records is currently being conducted. Once experimental (>21 patients) and control groups are finalized, we will statistically compare retear rates and patient reported outcome scores (ASES, SANE, VAS) between augmented RCR and non-augmented RCR groups at specific follow up intervals.

Results: Pending finalization

Conclusions: We anticipate that our results will contribute to studies with greater levels of evidence. Results from this study will contribute to a better understanding of allograft augmentation as a possible standard of care for complex primary rotator cuff tears. Gaining more insight on the efficacy of allograft augmented RCR is additionally valuable because allograft augmentation adds significant financial cost to RCR procedures, which are ultimately absorbed by the patient and their insurance.



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James Graham

Improving Diabetes Management Through a Mobile Clinic

James W. Graham, Rabia Anwar, Andrew Albano, Caroline Rudisill, Jason Weshler

USC Arnold School of Public Health

The prevalence of diabetes in the United States is increasing and consistent monitoring of diabetes through screening modalities has been shown to improve diabetic management and health outcomes. These tests typically occur in a patient's primary care office, and the successful completion of one or more of these tests can be limited by a clinic's workflow and resources. This study aims to evaluate the effectiveness of a mobile clinic in improving the completion of three common screening tests for diabetes: hemoglobin A1c, nephropathy, and retinopathy. The lag time between eligibility for a test and the date the test is due will be examined, as will the time taken to complete the tests in a primary care clinic versus a mobile clinic. This novel clinic will first be made available to Prisma Health employees with diabetes. Patients visiting the mobile clinic will have their testing results uploaded into the electronic medical record and sent to both the patient and their provider to facilitate further care. Those patients who utilize the clinic will be compared to all patients with diabetes within the Prisma Health Upstate system, and data regarding screening completion will be analyzed. This study is ongoing, but we anticipate the mobile clinic will improve the completion rates of all three measures and the timeliness of completion. This study will determine broader rollout of the mobile clinic to the population at large.



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Neorgia A. Grant

Updates in Sex and Gender in Medical Education Since: A 2 1 National Survey

Neorgia A Grant, Jennica P Siddle, Mary K Rojek, Alyson J McGregor

USC SOMG; Prisma Health Department of Emergency Medicine; USC SOMG Department of Clinical Faculty Affairs; Prisma Health Department of Emergency Medicine and USC SOMG Department of Faculty Affairs and Development

Sex- and Gender- Based Medicine (SGBM) incorporates understanding of sex, as a biological variable, and gender, as a sociocultural variable, in the pathogenesis of disease and in the sphere of medicine.¹ Studies on the integration of SGBM into medical curricula suggests that medical education, research and clinical practice largely still center on a white, male, cisgendered and heteronormative narrative. In a 2016 national survey of U.S. allopathic and osteopathic medical schools, 1097 students' opinions on the role of gender specific medicine in their respective medical school curriculum revealed that 63.2% of students identified their curriculum as relating primarily to males.⁴ This updated survey therefore, aims to measure the extent to which SGBM concepts have been integrated into medical education compared to the results of the 2016 survey. Accordingly, this will provide insight on the development of medical education and practice towards a more patient-centered and personalized approach. In addition, by including more sex and gender demographic descriptors in the updated survey, this study also hopes to capture the current diversity and opinions of medical students on the inclusion of sex and gender minority health topics in their school's medical curriculum. Overall, the diversity and intersectionality of sex and gender differences within the patient population, their pathophysiology, interactions with the healthcare environment, and their diagnostic and therapeutic options, are important SGBM concepts to integrate into medical education, with continued progress in incorporating the available scientific evidence of the role sex and gender plays in disease and health outcomes



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Maria Guerra-Velasquez

Hold on to that juice The Epigenetic Profile of Blastocoel Fluid-Conditioned Media May Predict Pre-Implantation Embryo Viability

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Department of Biomedical Sciences, University of South Carolina School of Medicine Greenville; Department of Obstetrics and Gynecology, University of Texas Health, San Antonio

Introduction: In vitro fertilization (IVF) is one of the most commonly used methods of Assisted Reproductive Technology (ART). According to the 2020 National ART Summary provided by the CDC, the percentage of subsequent embryo transfers that result in a live birth can vary from 10.6% to 42.7%. Pre-implantation testing of the IVF embryo focuses mainly on morphological character and pre-implantation genetic testing for aneuploidy. However, the selection process for embryos may be improved by the analysis of other molecular markers, though there exist gaps in our current knowledge of this area.

Purpose: Our goal is to assess the epigenetic state of cell-free DNA contained in the blastocoel conditioned media of day-5 human embryos to identify the presence of post-translational histone modifications associated with apoptosis.

Methods: Blastocoel fluid-conditioned media was collected from day-5 IVF blastocysts that underwent preimplantation genetic testing for aneuploidies at The University of Texas Health-San Antonio. Media from euploid and aneuploid embryos (10 per group) were pooled. A 1 L aliquot per pooled sample was assessed for cell-free DNA size and quantity via a High Sensitivity DNA Analysis Kit with the Agilent Bioanalyzer. The pooled samples were acid extracted (Histone Acid Extraction Kit, Active Motif) and histone modification status was detected by Western Blot.

Results: Western blot analysis detected histone H4K16ac, H3K9me3, and H3K27me3 modifications in the histones extracted from pooled blastocoel fluid-conditioned media samples. Analysis of the DNA content in the media revealed DNA fragments in the range of 1910-6400bp

Conclusions: This study demonstrates that histone modifications can be detected in pooled blastocoel fluid-conditioned media. Histone H4K16ac, H3K9me3, and H3K27me3 modifications may be implicated as apoptotic histone modifications, as well as crucial for early embryo development. Additional work to determine if these modifications are associated with implantation outcomes is ongoing.



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Caroline Gunter, M.A.

Resilience in Medical School: Our Students Stories

Caroline Gunter, M.A., Helen Kaiser, Ph. D.
University of South Carolina School of Medicine Greenville

Medical students suffer from anxiety, depression and burnout at rates higher than similar-aged college graduates. One potential solution for this problem is psychological resilience. Resilience is positive adaptation after adversity. This summer, a literature review was conducted to validate psychological resilience as a coping tool for medical students and design a study examining resilient behaviors in our student body.

The literature review revealed higher levels of resilience are associated with lower levels of psychological distress. Previous studies, using the Connor-Davidson Resilience Scale (CD-RISC), have shown that medical students exhibit lower levels of resilience compared to the general population. The purpose of this study is to determine how medical students are practicing resilience successfully.

We will use the CD-RISC to determine how resilient our student body is and to selectively sample medical students exhibiting high levels of resilience. We will then use semi-structured interviews exploring specific ways in which this sample of students practice resilience. Qualitative coding will be used to identify common themes in interviews. The results from this study will be used to create “lessons learned” and to tell the stories of resilience in medical students.



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Sierra M. Gurtler

Everywhere All at Once: The Effects of Azole Antifungals on Cryptococcus Growth

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Cryptococcus neoformans is a pervasive fungus found throughout the environment. While the typical human population is generally unsusceptible to infection, *C. neoformans* is particularly harmful to immunocompromised populations such as those undergoing chemotherapy and diagnosed with AIDS. Pathogenesis leads to cryptococcal meningitis, an opportunistic infection that is especially fatal to the immunocompromised. Out of 220,000 global cases of cryptococcal meningitis, 180,000 are lethal. Fluconazole, a member of the azole family, is the current drug of choice for the treatment of cryptococcal infection in Sub-Saharan Africa where cryptococcosis is most prevalent and where more effective yet more toxic drugs are unavailable. Unfortunately, development of resistance towards fluconazole constitutes a considerable problem during therapy. To better understand the basis of resistance to azole-based drugs, this study compares fluconazole to four other azole antifungals: two clinical antifungals, isavuconazole, voriconazole, and antifungals utilized in agriculture, tebuconazole, and cyproconazole. Via 96 well microplate assays, the experimental minimum inhibitory concentration (MIC) necessary to inhibit the growth of *C. neoformans* was determined for each compound. The resulting MIC was then applied to an experiment analyzing the consequences of incubation with the antifungals, estimating whether the drug exhibits primarily an inhibitory or killing effect. Viability of cells was estimated based on microscopy analysis of colony formation. Investigation revealed that isavuconazole and cyproconazole serve a majority inhibitory effect while fluconazole, tebuconazole, and voriconazole appear to have killing potential against *C. neoformans*. Further research will be performed to investigate the mechanism by which these azoles affect *C. neoformans* growth such as with reactive oxygen species and inhibition of cell division.



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William T. Haselman

Passive Exoskeletons to Reduce Muscle Activity and Metabolic Demand in Surgical Staff

William T Haselman, Shuvangee Dhar, Alec J Gonzales, Dechristian F Barbieri PhD, Alfredo Carbonell DO, Anjali Joseph PhD, Divya Srinivasan PhD, Jackie S Cha PhD"

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Introduction: Surgical staff including nurses, surgical technicians, and central processing technicians work in compromising positions that can cause chronic musculoskeletal pains and injuries. Exoskeletons are a potential intervention to help minimize these symptoms; however, the effects of these wearable devices to aid surgical staff have not been systematically investigated. We hypothesize that using passive exoskeletons will minimize extreme postures, decrease muscle activity, and decrease energy expenditure while performing strenuous surgical tasks.

Methods: After observing work tasks performed by surgical staff, simulation tasks were developed. Participants are recruited to perform tasks representative surgical staff work tasks. Participants will perform the tasks using no exoskeleton support and back- and shoulder-exoskeletons. Participants' energy expenditure, movement, and muscle activity will be recorded.

Results: Pilot testing has found that participants subjectively feel that they are using less exertion while performing tasks with the exoskeletons. This suggests that the back-exoskeleton could lower the muscle activity while performing patient transfer tasks and the shoulder-exoskeleton could reduce the muscle activity of the shoulder muscles in static holding tasks. These outcomes will be compared for the trials with and without the exoskeletons. Additional data collection is ongoing.

Discussion: Implementation of exoskeletons in the practice of surgical staff could decrease the physical workload of their jobs, improving their quality of work. We expect to see a decrease in lower back muscle activation for the patient transfer tasks with the exoskeleton based on previous research, supporting that exoskeleton implementation for nurses could be beneficial to their career longevity.



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Anna Hayden

Outcomes of Subsequent Abdominal Operations after an Initial Ventral Hernia Repair

Anna Hayden BS, Samantha Worth BS, Brittany Kothari BS, Weston Keller MD, Emily McGill BS, Dawn Blackhurst PhD, William S Cobb MD, Alfredo M Carbonell DO, Jeremy A Warren MD

Prisma Health Department of Surgery

Introduction: Surgical staff including nurses, surgical technicians, and central processing technicians work in compromising positions that can cause chronic musculoskeletal pains and injuries. Exoskeletons are a potential intervention to help minimize these symptoms; however, the effects of these wearable devices to aid surgical staff have not been systematically investigated. We hypothesize that using passive exoskeletons will minimize extreme postures, decrease muscle activity, and decrease energy expenditure while performing strenuous surgical tasks.

Methods: After observing work tasks performed by surgical staff, simulation tasks were developed. Participants are recruited to perform tasks representative surgical staff work tasks. Participants will perform the tasks using no exoskeleton support and back- and shoulder-exoskeletons. Participants' energy expenditure, movement, and muscle activity will be recorded.

Results: Pilot testing has found that participants subjectively feel that they are using less exertion while performing tasks with the exoskeletons. This suggests that the back-exoskeleton could lower the muscle activity while performing patient transfer tasks and the shoulder-exoskeleton could reduce the muscle activity of the shoulder muscles in static holding tasks. These outcomes will be compared for the trials with and without the exoskeletons. Additional data collection is ongoing.

Discussion: Implementation of exoskeletons in the practice of surgical staff could decrease the physical workload of their jobs, improving their quality of work. We expect to see a decrease in lower back muscle activation for the patient transfer tasks with the exoskeleton based on previous research, supporting that exoskeleton implementation for nurses could be beneficial to their career longevity.



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Reaching for Reciprocity in the Southeast Community Health Worker Network

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USC Arnold School of Public Health Center for Community Health Alignment

Despite well-established evidence of community health worker (CHW) models addressing health disparities and improving health outcomes, barriers to the sustainability of CHW programs persist. Establishing reciprocity may be a strategy to overcoming barriers to sustainability including health systems integration and reliable funding. Regional consensus could help clinicians and administrators alike to understand the role and value of CHWs within their organizations and may serve as a precursor to payment models that reimburse CHWs meeting specified qualifications based on the defined services they offer. This study seeks to catalog disparate CHW training and certification standards in the Southeast CHW Network and use this understanding to assess current and proposed policies, identify barriers, and evaluate opportunities for establishing reciprocity.

Initial information was gathered from the publicly listed data of CHW associations, credentialing bodies, and other stakeholders. Supplementary information was obtained from correspondence with representatives of these organizations. The first deliverable of this study is a dashboard on the Southeast CHW Network website that will include a regional map of state standards, a table comparing state competencies against nationally accepted competencies, and a table highlighting states with standards conducive to reciprocity. The second deliverable is a policy brief synthesizing the aforementioned information with the perspectives of CHWs and other stakeholders gained from a roundtable discussion at the annual Southeast CHW Network Summit. These deliverables aim to support policymaking, program planning, and professional development from a shared understanding of regional standards that can support cohesive advancement and ultimately sustainability of the Southeast CHW workforce.



Haley Hirth



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Epidemiology of PEComas: A Scoping Review

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UoSC SOMG Department of Biomedical Sciences; Critical Path Institute CURE Drug Repurposing Collaboratory

Background: Perivascular epithelioid cell neoplasms (PEComas) are a family of rare mesenchymal tumors that form around various blood vessels throughout the body. Like other rare cancers, research on PEComas is currently limited. Therefore, the purpose of our study is to examine the epidemiology of PEComas, particularly its patient demographics, genetic mutations, comorbidities, and subtypes.

Methods: A PubMed literature review using a pre-defined search string was completed to examine the available research on PEComas. A total of 1267 relevant articles were uploaded into Rayyan for title-abstract screening, resulting in the inclusion of 153 articles. All study types were included, while articles discussing surgical therapies only or unavailable in English were excluded. A full-text review of the included articles was performed for data extraction. Data analysis was conducted using Microsoft Excel. **Results:** Data analysis is ongoing. Preliminary results are from 76 case reports involving PEComa patients. Demographic data showed a predominance towards females (79%), ages 21 to 40 (57%), and Europeans (46%). The most common genetic mutations involved the TSC1/TSC2 genes (47%). Few comorbidities were found, but the most frequent were immunosuppressant use (7%) and hypertension (5%). Angiomyolipomas (54%) and lymphangioliomyomatosis (43%) were the most prevalent subtypes.

Conclusion: Our study comprehensively aggregates the current epidemiological data on PEComas. Understanding the epidemiology will help establish the typical phenotype and clinical manifestations of PEComas, aiding clinicians and researchers in its diagnosis and treatment. These identified characteristics can guide future studies in developing potential targets for therapy and result in improved outcomes for PEComa patients or groups affected by these disparities.



Vivian Ho



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Braxton A. Howell

Clinician absenteeism at two networked emergency departments prolongs patient Length of Stay across a simulated network of emergency departments

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Prisma Health Department of Emergency Medicine

The recent COVID-19 pandemic demonstrated the fragility of our emergency department (ED) medical safety net. Overwhelming patient volumes combined with illness-induced absenteeism to cause widespread congestion and slow patient care. Simulation-based stress testing of ED staffing systems supports the development and optimization of staffing policies that increase ED resilience. Our preliminary stress testing of the Prisma Health – Upstate network of EDs using a discrete-event network simulation model suggested that clinician absenteeism at Greenville Memorial Hospital (GMH) and Oconee Memorial Hospital (OMH) disproportionately affected patient Length of Stay (LOS) across the network. This study evaluates the impact of local clinician absenteeism (20% and 40%) at these locations on patient LOS across the network. Using Microsoft Excel, I calculated and compared the simulated LOS by location in the context of 20% and 40% clinician absenteeism at GMH and OMH. Absenteeism at either location is correlated with increasing patient LOS across the network. Isolated absenteeism at OMH is associated with significant LOS increases across the network. Isolated absenteeism at GMH is associated with significantly increased LOS across the network, excluding OMH. In our network simulation model of the Prisma Health-Upstate ED system, localized absenteeism at two EDs increases patient-centered LOS across the network. Our work emphasizes the importance of understanding interactions between ED sites, as network effects may propagate the effects of shortages across the network. We will further clarify the underlying network interactions in future work and link our findings to qualitative expert insights.



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Tanner D. Huyck

Does expedited multidisciplinary limb salvage care improve outcomes

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Introduction: Multidisciplinary limb salvage programs have demonstrated effectiveness in enhancing amputation-free survival and reducing major amputations in patients with critical limb ischemia. This study aims to compare effectiveness of an expedited multidisciplinary limb salvage team to a routine team in terms of wound healing rates among patients with critical limb ischemia. At Prisma Health Upstate, a program was implemented allowing wound care physicians to directly refer patients for an angiogram before patient consultation with the Vascular service physician, expediting patient care. In contrast, routine management involves wound care physicians referring patients to the Vascular service physician, followed by scheduling an angiogram after an office visit. Concerns have been raised that the routine process might lead to a significant delay in the angiogram procedure. We hypothesize that patients with “expedited” multidisciplinary limb salvage team care will have faster wound healing rates and lower amputation rates compared to those who received “routine” care.

Methods: Retrospective chart review of patient medical records in EPIC and data management via Redcap for wound center patients > 18 years old with critical limb ischemia at Prisma Health Upstate.

Outcome Measures: The primary outcome measure is wound healing rates, while secondary outcomes include amputation rates and overall survival.

Results and Discussion: Although analysis is ongoing, our data suggest that expedited multidisciplinary limb salvage team program leads to improved wound healing rates and amputation-free survival compared to routine care. This study aims to highlight the potential benefits of an expedited care approach in optimizing patient outcomes and improving the quality of life for individuals with critical limb ischemia.



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Department of Surgery



Christian James

Analysis of TbSETD Binding to Pex19 for Potential Drug Therapies

Christian James, Meredith Morris
EPIC Labs of Clemson University

The aim of this study is to determine if TbSETD (a methyltransferase that binds lysine residues, and is essential to proper mitochondrial/glycosomal function in parasites) binds Pex19 (a chaperone protein that guides trafficking to the glycosome – an organelle that is responsible for metabolic processes such as glycolysis and beta oxidation), which will provide insight on the efficacy of targeting Pex19 with drug therapies. The methods of this study first consisted of identifying proteins involved in regulating glycosomes. A trypanosome genome database (tritrypdb.com) containing functional domains of peroxins was used to achieve this. After collecting bioinformatic data from the database, a protein with a putative Pex19 binding domain was isolated. Experimental methods of analysis consisted of expressing recombinant versions of TbSETD and Pex19. Pex19 was then amplified from genomic DNA and was cloned using PGEMT (vector that is often used in cloning PCR products) so that the protein binding sites could be further analyzed.



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Kate K. Jensen

IR Thermography in Ex Vivo Preservation of Porcine Vascularized Composite Allografts

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Purpose: Ex-vivo perfusion (EVP) has been utilized to limit irreversible tissue damage and reduce failure in organ transplantation. Viability assessment of vascularized-composite allografts (VCA) during EVP is challenging because of lack of organ-specific viability parameters. Infrared thermography (IRT) provides a non-invasive method of measuring skin temperature, a parameter associated with perfusion adequacy. We hypothesize that temperature changes are correlated with edema formation during perfusion and can be used to assess VCA viability.

Methods: Eleven fasciocutaneous-abdominal flaps were procured from Yorkshire pigs and preserved by EVP for 12 & 24hrs at 30 C. IRT images were recorded hourly & percent temperature changes were analyzed. Indocyanine Green (ICG) angiography was performed before pedicle division and at perfusion endpoint to assess peripheral perfusion. Median pixel brightness (MPB) was determined & normalized. Flap temperature changes & MPB were compared with endpoint weight change (edema)

Results: Flap weight at 12 & 24hrs of EVP was not significantly different between groups but was significantly different from baseline: 12hr EVP 1.12% -3.49-4.5% vs. 24hr EVP 1.69% 0-1.81% (p=0.23). Normalized MPB at endpoint was 0.55 0.48-0.59 . Skin temperature was not significantly different at 12hrs (28.09 C, 27.56-29.1) vs. 24hrs (28.1 C, 26.9-29) (p=0.4923). Percent weight change of flaps significantly correlated with both skin temperature-change (r=-0.7399, p=0.00924)& MPB(r= -0.8335, p=0.01983).

Conclusion: IR thermography skin temperature correlates with flap weight gain. This suggests that a decline in allograft temperature could serve as a quantitative indicator of flap injury during EVP.



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Abigail G. Kammerer

Oxidative Stress in Entamoeba Histolytica

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Entamoeba histolytica, the protozoan parasite that is the causative agent of intestinal amebiasis and amebic dysentery, has two life forms: the highly stable, dormant cyst and the growing amoeba form called a trophozoite. Both forms are passed in stool, however, the cyst form is the only form that persists and is transmitted fecal-orally to cause amebiasis. Once ingested, the cyst undergoes excystation to the trophozoite form to colonize in the large intestine where it proliferates. E. histolytica cysts have four hallmark characteristics: round shape and small, a cell wall made of chitin, four nuclei, and detergent resistance. Lack of glucose causes encystation to begin but it is unclear whether other stresses also play a role. In this project, I studied whether oxidative stress can also cause E. histolytica to begin encystation. To analyze the effect of oxidative stress, I used reverse transcription-polymerase chain reaction to examine expression of Jacob, an encystation gene that encodes a chitin binding lectin that helps form the characteristic chitin shell, and the heat shock protein 70 (Hsp70) and heat shock protein 90 (Hsp90) genes which are general stress response genes. Applying oxidative stress and glucose deprivation had no effect on expression of Jacob. However, expression Hsp90 was up-regulated in response to both oxidative and nutritional stress, suggesting there is some crosstalk between stress responses. This crosstalk must be explored further to determine whether oxidative stress in combination with nutritional stress would increase encystation.

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SARS-CoV-2 Vaccination Status in Prisma Health Emergency Department Patients: Improving Care for Underserved Populations

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Prisma Health Department of Emergency Medicine

Introduction: The health costs of the SARS-CoV-2 (COVID-19) pandemic have been disproportionately borne by our most vulnerable populations, many of which are overrepresented in the US South and the Emergency Department (ED) patient population. Although SARS-CoV-2 vaccines significantly reduced rates of severe COVID-19 illness, hospitalization, and death, less than two-thirds of eligible South Carolinians (SC) received a dose.

Aim: Our goal was to obtain demographic and health-related factors associated with a lack of SARS-CoV-2 vaccination in the Prisma Health Upstate (PHU) ED patient population to provide insights into how to improve current and future care of this population.

Methods: A retrospective cohort study was performed on 54,468 adult patients visiting six PHU EDs from August 1 to October 31, 2022. Demographic and health-related factors were extracted from electronic medical records to examine potential associations with vaccination status.

Results: Documented or self-reported SARS-CoV-2 vaccination was observed in 38.6% of patients. Within the unvaccinated population, there was an increased frequency of male, Black, Hispanic, uninsured, actively smoking patients, as compared to the vaccinated population and female, White, government-insured, non-smoking patients. A logistic regression analysis is currently being performed to better evaluate these relationships.

Conclusion: Preliminary data suggest the unvaccinated ED patient population in the PHU may have disproportionately increased representation of specific underserved or medically at-risk populations. These findings may be used to better optimize vaccine distribution strategies, including adapted educational strategies, to better serve these patients.



Alessia M. Keane



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Gina S. Kim

Retrospective Review of Efficacy of Single Shot and Continuous Catheter Popliteal Nerve Blocks for Elective Foot and Ankle Surgery

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Introduction: More than 40% of ambulatory patients undergoing foot and ankle surgery experience moderate to significant postoperative pain. This pain is modulated using single shot or continuous catheter popliteal nerve blocks that improve analgesia, lower hospital costs, decrease opioid consumption, and lead to earlier hospital discharges. Continuous nerve blocks are used because they have greater efficacy than single shot nerve blocks. However, patients with continuous nerve blocks can experience neuropathies, pump leakage, catheter dislodgement or displacement, greater rates of falling, infections, and drug toxicities, and allergies; these may decrease patient satisfaction with popliteal catheters.

Purpose: This study will compare patient satisfaction and outcomes of single shot and continuous popliteal nerve blocks in elective foot and ankle surgery.

Methods: Patients having any type of nerve block at Prisma Health are entered into a RedCap registry. We performed a retrospective analysis of this registry for patients undergoing foot and ankle surgery. Data points available included demographics, type of nerve block, comorbidities, pain scores, medications, case length, and type of surgical procedure were collected through subsequent chart review (Epic). After discharge, patients complete an open-ended questionnaire regarding satisfaction with care. The groups were propensity matched based on variables that influence the pain and overall satisfaction. Patient satisfaction with qualitative feedback and postoperative opioid consumption are compared between the groups.

Results: Data collection and analysis are currently being performed. There will be approximately 100 patients in each group. We plan to use a composite score of satisfaction responses on the discharge questionnaire to compare the types of block.



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Allen M. Knepper

Comparison of Rectopexy Approaches: A Prisma Health Retrospective Review

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Prisma Health Department of Colon and Rectal Surgery

Background: Rectal prolapse is a debilitating diagnosis that involves an inversion of the rectum through the anal canal and can cause discomfort and incontinence, reducing quality of life for the patient. Rectopexy is a surgical procedure to repair a rectal prolapse and can be accomplished through several different approaches.

Purpose: The goal of this study is to compare recurrence, morbidity, and functionality outcomes of open, robotic, and laparoscopic rectopexy. Data obtained will be used to make more informed decisions regarding patient surgical and care plans. **Methods:** The study is a retrospective chart review utilizing electronic medical record data, via Epic Systems, from all patients who have undergone rectopexy surgery for rectal prolapse repair since 2015. Data regarding existing comorbidities, approach, and 30-day outcomes were collected for all patients and analyzed to compare the effectiveness of open vs laparoscopic/robotic approaches.

Results: A total of 244 patients were identified that met the criteria for participation in this study. Data collection and analysis is ongoing, but it is hypothesized that all surgical approaches have similar rates of recurrent prolapse and prevalence of adverse outcomes when controlling for existing comorbidities.

Conclusion: Findings from this study will be used to modify and create more informed surgical guidelines to provide the best surgical outcomes while minimizing cost and procedural risk to the patients.



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Prisma Department of Surgery



Christopher A Koons

Neuro-trauma Feedback System, An investigational study of electroencephalography variability monitoring in emergency care clinicians for the early detection of acute stress disorder

"Christopher Koons, Michael Campanelli, MacKenzie Meier, Hailey Sparks, Ava Wickberg, Yogesh Rana, Sam Yeboah, Brandon Williams, Ronald Pirrallo, Nicholas Boltin
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Studies suggest that 90 percent of the general population experiences highly stressful events, with around 11 percent developing Acute Stress Disorder (ASD), a precursor to Post-Traumatic Stress Disorder (PTSD). Early diagnosis is crucial for timely treatment and prevention of PTSD. This study aims to characterize biomarkers possibly associated with ASD, creating a pipeline for analysis and data mining. We tested the design of a mobile electroencephalography biomonitoring prototype with emergency clinicians who work in highly stressful environments. We then analyzed the biopotential brainwave activity collected from these participants who experience traumatic events regularly. EEG signals were collected from 14 healthy individuals and structured into a tabular format based on wave types. Univariate analysis methods were used to quantify wave statistics and correlations. The waveform distributions determined the necessary smoothing and normalization techniques. Standard statistical methods were used for normalization, and time series analysis revealed underlying trends. Integrating logged participant activities and stress level surveys provided a more nuanced understanding of the relationship between stressors and neural responses. Results show that traumatic events can be characterized based on personalized calculated thresholds. These results will contribute to building an AI engine that monitors neural activity for potential ASD biomarkers. In the future, a comprehensive support system will allow us to understand the disease process further and help inform and support clinicians, potentially helping to prevent the progression of ASD and the risk of PTSD.



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Isaac Korver

Comparative Analysis of Outcomes for Hiatal Hernia Repair with Concomitant Transoral Incisionless Fundoplication Versus Laparoscopic Partial Fundoplication

Isaac Korver, Trip Crowley, Leah Kreutziger, Marvin Rhodes MD, George Godwin MD, Alfredo Carbonell DO, Ed Rapp MD, Shanu Kothari MD, Jeremy Warren MD, Brian Hodgens MD
Prisma Health Department of Surgery

Background: Concomitant transoral incisionless fundoplication (cTIF) with hiatal hernia (HH) repair is considered as a therapeutic option for patients with gastroesophageal reflux disease (GERD) who, additionally, have a HH greater than 2 cm. Some data has begun to emerge comparing this procedure with a traditional laparoscopic hiatal hernia repair with a partial fundoplication, but the results are largely inconclusive. We performed a pilot analysis to compare these two approaches' postoperative complications and long-term clinical outcomes.

Methods: A single center retrospective electronic chart review of data on 254 adult patients undergoing cTIF with HH repair or laparoscopic partial fundoplication with HH repair was conducted. Postoperative complications were obtained from the patient record. Quality of life questionnaires were utilized before surgery and after surgery at 2, 6, and 12 months.

Results: The results are still being analyzed to determine our findings for this study. We do not expect to find any significant difference in postoperative complications or long-term clinical outcomes between HH repair with cTIF versus laparoscopic partial fundoplication.

Discussion: If our results are as expected, then the question arises of whether cTIF is warranted for patients with GERD due to the cost difference. Further study is necessary to understand the possible benefits of cTIF for patients with GERD as opposed to partial laparoscopic fundoplication. We hope that this project will serve as pilot data for a randomized control trial in the future.



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Department of Surgery

A New Era: Analyzing the Clinical and Laboratory Response to Voxelotor in Pediatric Patients Treated at the PRISMA Health Comprehensive SCD Program

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Prisma Health Department of Pediatrics

Sickle Cell Disease (SCD) is an inherited blood disorder characterized by a mutation in hemoglobin (HbS), resulting in a decrease in the oxygen affinity of HbS as well as the polymerization and change in the shape of red blood cells. Voxelotor, a relatively novel drug, inhibits the polymerization of HbS, which could target the effects of SCD. The aim of this retrospective study is to explore the clinical and laboratory response to voxelotor with or without medications like hydroxyurea. The study's population consists of patients from the ages of 4-18 who have been enrolled in the PRISMA Health Comprehensive SCD program. Variables such as hemoglobin will be collected in the twelve months prior and the six months after voxelotor initiation. The start of voxelotor will be measured by the date the patient received their first shipment and patient adherence will be determined by receiving at least 75% of the monthly shipments. Results are currently being collected, but a decrease in the overall incidence of SCD complications is hypothesized. Previous studies focused on an adult population have discovered a clinically significant improvement in baseline hemoglobin and a reduction in hemolysis factors, which is also predicted in the study's pediatric population. Despite sickle cell disease being a devastating lifelong illness with limited curative options, there are not many approved medications that prevent the onset of symptoms. Voxelotor, through its mechanism of action, has the potential to provide disease modification and reduction in organ complications, ushering in a new era of SCD treatment.



Amelia H. Lewis



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Elizabeth Lofurno

Evaluating Physical Activity Behaviors and Skeletal Muscle Mitochondrial Oxidative Capacity in Patients undergoing Chemotherapy for Breast or Gynecologic Cancer

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University of South Carolina School of Medicine Greenville; Prisma Health Cancer Institute; Furman University

Introduction: Patients undergoing chemotherapy often experience cachexia due to extensive oxidative stress and subsequent skeletal muscle mitochondrial dysfunction. This chemotherapy-induced dysfunction is related to a decrease in physical activity (PA) and increased fatigue. However, there is a lack of information demonstrating whether continuing PA throughout chemotherapy attenuates mitochondrial dysfunction.

Purpose: To determine if PA at baseline and throughout chemotherapy treatment correlates with mitochondrial function and fatigue. We hypothesize that patients with higher physical activity levels at baseline and throughout chemotherapy will attenuate mitochondrial dysfunction and increase resistance to chemotherapy-induced fatigue.

Methods: Data collection is in process. Non-metastatic breast and gynecologic cancer patients are recruited prior to their first chemotherapy infusion. PA behaviors are tracked at baseline and throughout chemotherapy using a physical activity recall (PAR) questionnaire. Following ACSM guidelines via the FITT principle, subjective intensity PA levels are converted to metabolic equivalents (METs), allowing for quantification. This data will be compared to trends in oxygenated and deoxygenated hemoglobin using near infrared spectroscopy (NIRS), a non-invasive assessment of mitochondrial oxygenation capacity, of the vastus lateralis muscle during moderately intense exercise on a stationary bike.

Results: Eight patients who have completed surveys with two reporting the continuation of PA throughout chemotherapy treatment.

Conclusion: To improve patient responses in PAR questionnaires, future surveys can be administered by a team member to ensure PA is appropriately quantified. The results of this study will provide insight into how PA prior to and during treatment may be used to alleviate chemotherapy-induced fatigue and maintain mitochondrial function.



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Experiences of Self-reported Stigma Among Pregnant People with Substance Use Disorders at the Magdalene Clinic

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University of South Carolina School of Medicine Greenville, Prisma Health Upstate

Introduction: Existing research demonstrates that pregnant people with substance use disorder (SUD) diagnoses face many barriers to access prenatal care, one of which includes stigma. Further research is warranted to quantify the experience of stigma in patients receiving care in a comprehensive prenatal addiction medicine collaborative care model, such as the Magdalene Clinic.

Purpose: The objective of this study is to describe differences in self-reported experiences of various subtypes of stigma for pregnant people with SUD receiving care in a prenatal addiction medicine collaborative care model.

Methods: This study evaluates patient-reported stigma (n=168) associated with SUD at the Magdalene Clinic. Qualitative data is sourced from a Substance Use Stigma Mechanism Scale (SU-SMS) questionnaire using a 5-point Likert Scale (1=never to 5=very often) during routine prenatal care visits. The SU-SMS has proven to be a reliable and valid indicator of stigma that includes the following: Enacted Stigma (personal experiences of discrimination from others in the past or present), Anticipated Stigma (expectations of experiencing discrimination from others in the future), and Internalized Stigma (endorsement and application of negative feelings and beliefs about people with SUDs to oneself). Higher scores indicate increased levels of stigma. Scores by patient characteristics including age, race or ethnicity, and trimester of prenatal care were compared using one-way ANOVAs. Enacted and anticipated stigma were split into subscales evaluating enacted or anticipated stigma from family and healthcare workers.

Results: One hundred and sixty-eight people completed the SU-SMS instrument and are included in this analysis. Overall, pregnant people receiving prenatal care in the Magdalene Clinic had a mean Enacted Stigma score of 2.31 (SD=1.00), a mean Anticipated Stigma score of 1.81 (SD=0.90), and a mean Internalized Stigma score of 3.14 (SD=1.06). Patients less than 25 years of age reported lower mean Enacted Stigma from Healthcare Workers compared to patients ages 25-29 (M=1.35 vs. 2.03, p=.008) and patients 35 years or older (M=1.35 vs. 2.27, p=.001). Additionally, patients less than 25 years of age reported a lower mean Anticipated Stigma from Healthcare Workers compared to patients ages 35 or older (M=1.34 vs. 2.06, p=.008). Patients who initiated prenatal care in the first trimester compared to the third trimester reported lower Internalized Stigma scores (M=2.85 vs. 3.83, p=.003).

Conclusion: Stigma has a negative impact on initiation of prenatal care, which results in delayed care leading to more adverse outcomes for both mother and baby. A collaborative care model such as the Magdalene Clinic that includes an advanced practice provider or maternal and fetal medicine physician, a nursing staff with trauma-informed training, a peer support specialist, a licensed professional counselor, a social worker, and a case manager improves maternal and fetal health outcomes.



Courtney Lubaczewski



School of Medicine
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Julia M. Lunt

Difference in Treatment Practices of Emergency Medicine vs. Family Medicine Trained Sports Medicine Physicians

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Prisma Health Department of Family Medicine

Introduction: There are multiple paths to becoming a Sports Medicine Physician including family medicine and emergency medicine residency. Previous studies have investigated treatment practices between orthopedic surgeons and primary care sports medicine physicians; however, our study solely looks at primary care physicians and investigates if the primary specialty training impacts treatment.

Aim: To evaluate differences in treatment of acute injuries based on primary specialty.

Methods: Patients that fit inclusion criteria at Steadman Hawkins orthopedic outpatient clinics were included. Treatment recommendations were compared between Emergency Medicine (EM) and Family Medicine (FM) trained Sports Medicine Physicians. Treatment options evaluated were: additional imaging, medications, injections, physical therapies, durable medical equipment (DME, e.g. splint, brace), activity restrictions, and follow up. Data was input into RedCap and analyzed using Fisher's exact test.

Results: 26 patients were included, 7 received care from EM physicians and 19 from FM physicians. FM physicians prescribed medication more frequently than EM physicians (52.6% vs 0%, $p=0.02$). There were no significant differences between frequency of recommendations for additional imaging, injection, physical therapy, stabilization, activity restrictions, surgery or follow up. There was a non-significant trend with EM physicians prescribing more DME than FM physicians (85.7% vs 47.4% of patients, $p=0.09$).

Conclusions: A bigger sample size is needed prior to making conclusions; however, the initial data collected suggests there are differences in documented treatment recommendations based on the residency completed prior to sports medicine fellowship.



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Liz Marcedes

Protocol to Quantify the Effect of Stray Light on Near Infrared Spectroscopy Measurements of Skeletal Muscle Oxygenation During Cycling

Liz Marcedes, Liz Lofurno, Sara Biddle, Frankie Bennett, Larry Gluck, Randolph Hutchison, Jennifer Trilk
UofSC SOMG Department of Biomedical Sciences

Introduction: Near Infrared Spectroscopy (NIRS) uses the principles of the modified Beer-Lambert Law to measure oxygenated and deoxygenated hemoglobin in skeletal muscle (O₂Hb & HHb) to calculate the Tissue Saturation Index (TSI), a measure of muscle oxygenation. This technology is currently being used in clinical research studying the impact of chemotherapy on mitochondrial function in cancer patients. NIRS device manufacturers recommend blocking as much stray light as possible. Methods of blocking stray light include taking measurements in the dark, wrapping the device with a black cloth or using a light shield cover.

Purpose: Determine the magnitude of the effect of ambient light on measurements from NIRS devices and create a correction algorithm for NIRS data that have been contaminated by stray light

Methods: Participants will complete on/off kinetics cycling tests with and without a stray light blocker. The measurements will be compared across conditions using paired t-tests and reliability assessed with Cronbach Alpha coefficients.

Results: This study is in the data collection phase with n=21 participants having been tested. We expect O₂Hb measurements to be more robust to stray light effects than HHb measurements. Improvement in HHb signals can improve the quality of Tissue Saturation Index (TSI) measurements, which are more useful as absolute measurements for longitudinal studies.

Conclusion: The results of this study will provide insight of how stray light affects NIRS data collection sensitivity in clinical research. To improve patient outcomes, this data is instrumental in furthering research involving the impact of chemotherapy on mitochondrial function.

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Blake Martin

Utility of adrenal vein sampling in the diagnosis and treatment of patients with primary aldosteronism: a single institution review

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Primary aldosteronism (PA) is the leading cause of secondary hypertension worldwide. While Endocrine Society guidelines have provided direction on which patients to screen for PA, it remains increasingly underdiagnosed. Patients typically present with hallmark symptoms of resistant hypertension and hypokalemia. There are a variety of PA subtypes but the two most common are aldosterone producing adenoma (APA) and bilateral adrenal hyperplasia (BAH). Their distinction is of importance as APA can be treated with adrenalectomy while BAH is treated with a mineralocorticoid-receptor antagonist (MRA). In our institution, we evaluated the utility of AVS on the diagnosis of PA subtypes and clinical outcomes in patients.

Following IRB approval, all patients with PA who underwent AVS between 2016 to May 2023 at a single institution were retrospectively evaluated.

Of the 20 patients included in this study, the mean age was 53.3 years (range 29-74). Both adrenal veins were catheterized in 16 patients (80%); of the 9 patients (56%) with unilateral aldosterone hypersecretion, two (22%) had normal adrenal CT findings and one patient (11%) had an adenoma found on CT contralateral to AVS-indicated APA. Additionally, those with unilateral aldosterone hypersecretion had a 23 mmHg decrease in their median systolic blood pressure, 8mmHg decrease in their median diastolic blood pressure and all patients discontinued potassium supplementation following adrenalectomy. In the patients with BAH (n=7;44%), two patients (29%) had normal adrenal CT findings, 3 (43%) had a right adrenal adenoma identified on CT, one (14%) had a left adrenal adenoma identified on CT and one (14%) had bilateral nodules identified on CT. On the basis of CT findings alone, two patients (10%) would have been incorrectly excluded as candidates for adrenalectomy, and five (25%) might have had unnecessary or inappropriate adrenalectomy. AVS remains a vital diagnostic step in most patients to distinguish between unilateral and bilateral adrenal aldosterone hypersecretion.

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Endogenous Production of PAF and Caspase From Sea Urchin Embryos

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Platelet activating factor (PAF) is a signaling phospholipid produced in developing embryos. Embryo-derived PAF (ePAF) levels have been shown to be linked with better fertility outcomes and has shown to increase implantation success. PAF's mechanism of action as well as expected levels of production of PAF regarding fertility and embryology has not been fully elucidated. One hypothesis is that PAF production is correlated to caspase activity in the developing embryo which results in regulating apoptosis, which plays a significant role in pre-implantation embryonic development. In this experiment, ePAF production was determined in sea urchin embryos at multiple stages of development. PAF and caspase (3 and 8) specific ELISAs were performed on the samples to measure expression of ePAF. It was found that PAF is produced in an undulating manner progressing from the 2-cell stage to the pluteus stage. Production of caspase 3 and caspase 8 levels were also measured (data pending) at each cell stage. It is suspected that the embryos will alter expression of caspase as they progress from the 2-cell stage. Learning about the relationship between PAF and caspase expression by sea urchin embryos will enhance knowledge about early embryo development and help understand the events that may aid in explaining why some normal embryos fail to develop.



Faith R. Martin



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Jose G. Martinez

Radial Scar Excisions

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Radial scars, are benign fibroelastic formations within breast and breast tissue. Histologically, they are characterized by a central fibroelastic core from which ducts radiate outward in a stellate morphology. Radial scars are characterized as being less than 10mm in length, while over 10mm would be referred to as a complex sclerosing lesion. We conducted a retrospective analysis to look at radial scar incidence rate, radial scar excision or non-excision, follow up outcomes such as cancer upgrade rate if a radial scar was not excised, and upgrade rate was completed. We aim to form our own answer and opinion to the question of the necessity for radial scar excisions when only radial scars are found in imaging and core needle biopsy. Our results indicate a low upgrade rate from radial scars to carcinoma. One possible explanation may be the presence of radial scars with atypia (abnormal cells) having higher upgrade rates compared to the low upgrade rate radial scars without atypia, in any case, biopsy is always recommended over the “wait and see” method. Further research studies should focus on closer pathology and radiology correlations, and perhaps the future of AI in accurately diagnosing radial scars verses carcinomas.



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Kaylee Massman

Using targeted mass spectrometry to screen euploid IVF-embryos for markers to predict implantation outcomes

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Introduction: Assisted reproductive technologies like in vitro fertilization (IVF) are used to treat infertility, which affects ~19% of reproductive aged couples. However, live birth rates per IVF cycle are estimated between 25-50%. Women of advanced maternal age (≥ 35 years old) trend toward the lower end of this range, often requiring multiple IVF cycles, due to a decline in oocyte quality and ovarian reserve. Currently, embryos are selected based on morphology and ploidy status via preimplantation genetic testing for aneuploidy (PGT-A). Embryo selection can be enhanced with identification of additional molecular markers with the goal of improving IVF success rates.

Purpose: To identify proteins present in blastocoel fluid-conditioned media from aneuploid and euploid IVF embryos of known implantation status.

Method: Blastocoel fluid-conditioned media was collected from day 5 IVF-embryos following PGT-A. Aneuploid or euploid samples were pooled accordingly. In-solution trypsin digestion was performed on pooled samples. Initial mass spectrometry was performed to validate efficiency of the trypsin digestion and appropriate protein concentration. Predicted trypsin digested peptides were also assembled in silico to use for subsequent targeted mass spectrometry experiments.

Results: Initial results suggest the trypsin digestion protocol is appropriate, as trypsin digested bovine serum albumin (BSA) was detected as well as other human proteins, including Apolipoprotein A1.

Conclusions: Mass spectrometry can be applied to assess protein content in pooled blastocoel fluid-conditioned media samples. This initial study reports the identification of Apolipoprotein A1 in the blastocoel fluid which has been shown to be produced by preimplantation embryos. Ongoing studies will utilize targeted mass spectrometry for proteins in the apoptosis and ubiquitin-proteasome pathway, thought to be associated with preimplantation development.



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Kristina Mathis

Clinician Absenteeism Prolongs Patient Length of Stay Across a Simulated Network of Emergency Departments

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Prisma Health Emergency Department

Adequate emergency department staffing is essential for patient care. Understaffing strains emergency departments (EDs), delays care and negatively impacts patients. To optimize staffing resources, healthcare systems must evaluate the effects of clinician absenteeism on patient care. We model the impact of length and degree of clinician absenteeism on patient Length of Stay (LOS) across a simulated network of EDs. Our simulation model is calibrated with real-world patient flow data and clinician staffing levels from the Prisma Health Upstate network of EDs; it calculates patient LOS based on patient flow and clinician staffing. We explored scenarios of varying lengths (2, 10, and 24 hours) and degrees (20% and 50%) of absenteeism across a 1-week simulation run time. To evaluate the impact of clinician absenteeism on patient LOS in the ED, we calculated the weighted averages and confidence intervals for patient LOS across 30 model runs.

Longer and greater clinician absenteeism increases patient length of stay at all locations. Absenteeism length and degree correlate nonlinearly with length of stay across the network. We note variation across locations: the effect of absenteeism on LOS appears greatest at Hillcrest Hospital and least at Greenville Memorial Hospital.

In future work, we will validate our quantitative results with qualitative operational perspectives, using a mixed-methods approach to link quantitative simulation results with qualitative analyses of real-world expertise.

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Ellen J. McAlpine

Frequency and Timing of Perinatal Mood Disorder Diagnoses: Background and Project Implementation

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Purpose and Background: The most common complication of pregnancy is perinatal depression and anxiety. Mental health disorders are the leading cause of maternal death. Although the American College of Obstetrics and Gynecologists (ACOG) recommends screening once during the perinatal period, the need for enhanced screening for a high risk population has not been thoroughly examined. The literature demonstrates the need for more thorough guidelines regarding perinatal depression and anxiety screening to be investigated.

Objective: To determine if enhanced perinatal depression and anxiety screening practices at more frequent intervals, via automated MyChart questionnaire, increases the diagnosis and referral practices in an obstetric population consisting of high risk and general population patients.

Design and Methods: This study is a prospective, randomized controlled trial encompassing a high risk and general patient population receiving perinatal care at the Prisma Health Obstetrics and Gynecologist (OB/GYN) Center. MyChart will be utilized to send patients automated depression and anxiety questionnaire at 12-weeks, 24-weeks, 36-weeks, 2- and 4-weeks postpartum. Patient recruitment is set to begin in July of 2023 and data will be collected through July of 2024.

Outcomes and Expected Results: Our study expects to find that enhanced screening practices for anxiety and depression symptoms will result in increased identification of clinical anxiety and depression diagnoses and subsequent referral to treatment. It is also predicted that participants that have higher risk based on demographics, social determinants of health, and past history will have enhanced findings of anxiety and depression diagnosis



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Andrew McCaffrey

Pediatric Gastroenterology May Underutilize Services of the Medical Legal Partnership

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Prisma Health Pediatric Gastroenterology

Background: Medical Legal Partnerships (MLP) are collaborations that address health-harming legal needs (HHLN) to improve patient outcomes. The Upstate MLP in Greenville is made up of the Prisma Health Network, South Carolina Legal Services, Furman University, and the University of South Carolina.

Objectives: Characterize patients followed by pediatric gastroenterology referred to the Upstate MLP and compared to non-GI patients.

Methods: Retrospective review of Upstate MLP patients. Statistical analyses included Chi-square and logistic regression evaluating differences in HHLN and SDOH between pediatric GI and non-GI patients.

Results: Since 2018 the Upstate MLP has seen 840 pediatric patients, 92 of which were seen by pediatric gastroenterology. Referral reasons included issues around income benefits (26%), personal/family stability (76%), and education (9%), similar to non-GI patients. Pediatric specialists were responsible for 60% of MLP referrals, with only 5% from pediatric gastroenterologists. 41% percent of pediatric GI MLP patients saw gastroenterology for nutritional issues, 80% for symptom management, and 29% had a primary GI diagnosis.

Conclusion: GI patients seen by the MLP tend to have more cases than non-GI patients, perhaps representing higher complexity. GI patients had higher average income relative to FPL therefore less likely to qualify for services. Notably, only a small percentage of GI patients referred to MLP were referred from the GI practice, with other specialties much more likely to make referrals. Possibly because other specialties follow patients that are more commonly associated with MLP services. Our study suggests that the gastroenterology practice in Greenville is less familiar with the Upstate MLP and underutilizes its services. Increasing awareness of MLP among pediatric gastroenterologists may lead to improved care for their patients.



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Megan S. McFarland

Childcare as Healthcare: Assessing the Demand for Afterschool Program “Prescriptions”

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Introduction: Hypertension is a growing problem among pediatric populations that can increase the chance of developing cardiovascular disease later in life. Afterschool programs (ASPs) may be useful for providing structure in a child’s day, reducing their risk for hypertension by decreasing time to engage in obesogenic behaviors. However, there are significant barriers to accessing ASPs, especially among low socioeconomic status groups at the highest risk for health disparities.

Objective: The objective of this study was to establish a need in the Greenville area for free ASPs, and assess barriers to accessing existing ASPs which will be targeted in our upcoming lifestyle intervention study.

Methods: We developed an anonymous survey in Qualtrics accessible via QR code on fliers in 30 locations throughout the Greenville area and on social media. Reasons for use or disuse of ASPs were assessed and descriptive statistics were examined.

Results: Forty caregivers of children ages 8-12 (36% accessing financial assistance programs) completed the survey. Of those forty, 80% were interested in free ASPs for their child at the YMCA, and 61% do not yet have ASP plans for their child this upcoming academic year. For those not currently accessing ASPs, cost (32%), location (23%), and transportation (20%) were the largest barriers.

Conclusion: Overall, this study establishes the need for low-cost ASPs in the Greenville area and identifies key barriers. Our intervention study providing ASP scholarships using existing school-to-YMCA infrastructure will address the three largest barriers, aiming to reduce hypertension and cardiovascular risk for children ages 8-12 years.



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Micayla A McMahon

Tandem VR: Synchronized Nature-Based Experiences in Virtual Reality for Hospice Patients and their Caregivers

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Prisma Health, Department of Hospice and Palliative Care

Introduction: Hospice is essential for facilitating end-of-life (EOL) care filled with dignity, comfort, and support. Despite this, patients often experience dispiriting emotions and pain. Informal caregivers may also experience psychological and emotional burdens while caregiving. Nature-based virtual reality (VR) experiences in head-mounted displays (HMDs) offer a non-pharmacologic intervention for providers to engage patient-caregiver dyads in meaningful experiences.

Purpose: Our goal is to analyze the benefits of a personalized Tandem VR experiences for the dyad. Informal caregivers, including family or friends, play a crucial role in EOL care. By investigating the psychological state of the dyad, this study will fulfill a current gap in the public health realm - a strategy to reduce psychological and emotional burden for the dyad.

Methods: Tandem VR intervention will include an audio-visual experience via Pico Neo 3 HMDs. Using novel software, experiences will be personalized and span 5-15 minutes. Each dyad (N=20+) will complete these pre/post-intervention surveys: McGill QOL Questionnaire-E measures well-being; Wisconsin Brief Pain Questionnaire and Collett-Lester Fear of Death Scale measures pain and fear of death; semi-structured interviews will discuss perceived benefits of Tandem VR.

Results: Investigation is ongoing, with data collection through December 2023. Projected results include improved QOL during EOL phases and decreased psychological and emotional burden for caregivers.

Conclusions and Impact: Our study aims to demonstrate a non-pharmacological intervention for dyad well-being during EOL phases. An additional impact of this study will be the provision of special memories during EOL phases to alleviate symptom and caregiving burden.



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Haley C. Meltzer

Detection of SARS-CoV-2 Immunity in Pre-Pandemic Salivary Samples from South Carolina Emergency Healthcare Workers

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USCSOMG Department of Biomedical Sciences

Background: The first cases of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection in the United States and South Carolina were identified on 19 January 2020 and 06 March 2020, respectively. However, infection statistics from the early stages of the pandemic are likely incomplete as a result of limited testing capabilities and the potential for asymptomatic transmission. Thus, it is feasible that immunity to SARS-CoV-2 was present prior to the first documented cases of COVID-19.

Methods: Salivary samples were collected from 13 September 2019 to 08 March 2020 from 55 emergency department physicians, Emergency Medical Services (EMS) providers, and medical students working in EMS, as part of a separate study and stored frozen. To determine the presence of anti-SARS-CoV-2 antibodies, post-shift saliva were analyzed by Enzyme-Linked Immunosorbent Assay. Positive or inconclusive results were subjected to further testing of both pre- and post-shift samples.

Results: The presence of SARS-CoV-2-reactive salivary IgG was detected in two participants, which were then confirmed with repeat and follow-up testing. Positive saliva samples were collected on 30 October 2019 and 23 November 2019 from medical students working in EMS.

Conclusions: The successful detection of antibodies against SARS-CoV-2 in saliva collected pre-pandemic suggests that immunity to SARS-CoV-2 existed in South Carolina and the United States prior to the first reported cases, either through exposure to SARS-CoV-2 or a related pathogen that produced cross-reactive antibodies. Further, these findings indicate that saliva is an effective, noninvasive tool for surveillance of infectious diseases and that emergency healthcare workers represent a high-risk population that should be the focus of immunity surveillance programs.



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Joanna Mendez-Silva

Caring for Latinx Children with Special Healthcare Needs in the U.S.: Perspectives from Latinx Immigrant Caregivers

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Background: Latinx immigrant caregivers for children with special healthcare needs (CSHCN) in the United States (U.S.) experience numerous barriers contributing to high levels of caregiver stress. Current literature lacks a qualitative understanding of caregivers' perspectives, particularly in newer destination states and in the Southeast.

Objectives: Describe the challenges that Latinx caregivers face in meeting the needs of CSHCN in the U.S. and explore the impact of these challenges on their well-being.

Methods: A convenience sample of 29 Latinx caregivers were sourced from their child's primary healthcare providers at two sites in one health system in South Carolina. In-depth interview guides were developed and refined by the research team. A bilingual investigator conducted semi-structured interviews in person or over the phone. Interviews were recorded, transcribed in Spanish, and translated into English. Constant comparison, an approach to grounded theory, was used to analyze data and delineate themes.

Results: 29 interviews were completed with 13 caregivers from Prisma Health Ferlauto Center for Complex Pediatric Care and 16 caregivers from Center for Pediatric Medicine. Preliminary analysis of five interviews reveals four emerging themes: 1) experiencing a lack of resources in country of origin, 2) immigrating to the U.S. for their child's healthcare, 3) limited access to resources due to their immigration status, and 4) appreciating supportive care in their physicians.

Conclusions: Our findings are relevant for healthcare professionals who seek to better understand how to support Latinx caregivers of CSHCN to reduce caregiver fatigue and ultimately improve their child's overall health and wellbeing.



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Elsa Meyer

Association of depression with elevated blood pressures in adolescents attending hypertension clinic

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Introduction: Adolescent hypertension has been on the rise, especially among overweight and obese individuals. There is an increasing prevalence of depression and anxiety in adolescents, particularly after the pandemic, in addition to increasing obesity rates. In adults, there is an established relationship between hypertension and depression, as well as with obesity and depression. This association has not been thoroughly explored for adolescents. Understanding the interplay between depression, hypertension, and BMI can provide expanded pathways for the treatment and management of adolescent patients.

Aim: Elucidate the association of depression scores with obesity and elevated blood pressure in adolescents attending a hypertension clinic.

Methods: A retrospective chart analysis was conducted on adolescent patients attending a nephrology clinic in 2018-2019 and compared with patients during 2021-2022. Patients were screened with the PHQ-2/9 Questionnaire, and eligible patients were compared to actual screened patients to determine the screening rates. Statistical analysis will be conducted on the groups to determine the relationship between elevated blood pressure, PHQ-2/9 scores, and BMI. Subgroup analysis will be completed for groups taking sleep aids and antidepressants to evaluate the association of depression with sleep apnea.

Results: The PHQ-2/9 Questionnaire screening rate was 0.79% in 2018-2019 and 34.43% in 2021-2022. Results are still being obtained, and we expect to find an association between BMI, PHQ-2/9 scores, and elevated blood pressure.

Conclusion: Ongoing studies will continue to evaluate the potential association between depression, hypertension, and BMI within the adolescent population attending the hypertension clinic. Further results will provide insight to enhance the treatment of adolescents with elevated blood pressure.



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Murphy Miller

Infecting cultured macrophages with *T. brucei* causes decreased ABCA1-dependent cholesterol efflux

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CU Dept: Department of Food, Nutrition, and Packaging Sciences

T. brucei is a eukaryotic pathogen that causes sleeping sickness. Infection with *T. brucei* causes a potent pro-inflammatory immune response, but it is not entirely elucidated whether this response is beneficial or deleterious to the host. This response appears to be partially mediated by *T. brucei* surface proteins activating host cell surface toll-like receptors (TLRs); therefore, altering TLR activation may influence *T. brucei* pathogenicity. It is important to emphasize that activation of certain TLR-mediated pro-inflammatory pathways require TLRs to translocate into lipid rafts, so reducing cellular lipid raft content may attenuate inflammation. One such method of reducing lipid raft content involves the ABCA1 cholesterol transporter, which participates in apoAI-mediated cholesterol efflux. This transporter is considered anti-inflammatory due to cholesterol efflux promoting lipid raft disruption. In this pilot study, we tested whether *T. brucei* infection in the mouse macrophage cell line RAW 264.7 causes altered ABCA1 expression and apoAI-mediated cholesterol efflux. In our experiments, we incubated three groups of macrophages with either: 1) vehicle only; 2) non-human pathogenic strain *Trypanosoma brucei brucei* (Tbb), or; 3) heat-killed Tbb, which eliminates virulence but retains surface proteins. In our results, we detected a drastic decrease in ABCA1 expression in the Tbb infected macrophages when compared to the other two groups of cultured cells. We additionally observed a significant reduction in apoAI-mediated cholesterol efflux within the macrophages infected with Tbb. From these results, future studies will now focus on whether this decrease in ABCA1-dependent cholesterol efflux impacts TLR-mediated inflammation that occurs from *T. brucei* infection.



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Yousuf Mohammad

Investigating the Use of Exoskeletons for Reducing the Risk of Musculoskeletal Injuries in Emergency Medical Technicians (EMT's)

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Clemson Ergonomics and Computational Human Operations (ECHO) Lab

Emergency Medical Technician's (EMT's) experience high rates of musculoskeletal (MS) injuries often due to frequently lifting patients, maintaining awkward postures for long periods of time, and performing CPR. The implementation of guidelines and advanced loading systems (easy-load stretchers and electric lifts) has led to a reduction of MS injuries. However, despite these efforts, the number of injuries still remains significant. Additionally, these systems fail to provide support throughout the duration of the lifting process. Exoskeletons are a possible solution to those limitations given that they provide continuous support throughout a wide range of motion. Exoskeletons have been used widely in industrial settings and more recently in healthcare settings to reduce the prevalence of MS injuries as well as reduce fatigue. This study aims to examine the effects of exoskeletons on the muscle activity of EMT's. Simulation scenarios will be conducted to mimic the motions commonly experienced by EMT's, comparing participants wearing the exoskeleton with a control group without exoskeleton assistance. To measure muscle activity, 12 electromyography (EMG) sensors will be placed on the deltoids, trapezius, erector spinae, and rectus abdominis. Inertial measurement units will be utilized to capture and record position data. With this study, we hope to assess the effectiveness of exoskeletons within the field of EMT's, as well as encourage further research into the implementation of exoskeletons within the field



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Return of Investment for the Upstate Medical Legal Partnership

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USC SOMG, Department of Biomedical Sciences

Objectives

1. Estimate outpatient (OP) expenditures for MLP clients before, during, and after services
2. Examine changes in ER and inpatient visits (IP) for MLP clients before, during, and after services
3. Discuss the implications for changes in policy, payor strategy, and healthcare system delivery

Background: Medical Legal Partnerships (MLP) address health-harming civil-legal needs to improve patient health outcomes. In addition to improving patient outcomes, MLPs can potentially reduce avoidable healthcare utilization and spending through quality improvement measures. These measures can bridge gaps in health outcomes for patients whose social determinants of health provide obstacles for their ability to receive care. **Methods:** The Upstate MLP is a collaboration between a large local health system, a legal aid office, and an undergraduate institution in South Carolina. Medicaid claims data from 263 MLP clients between 2018-2022 were analyzed to evaluate healthcare utilization and spending changes before, during, and after MLP intervention. Summary statistics were used to analyze the data.

Results: Pre- and post-MLP services, there was an average monthly reduction of \$188 among pediatric patients (n=235) and \$208 among geriatric patients (n=28) for Medicaid payments related to outpatient visits. Reductions in self-pay/ other sources of payments per month was \$1,434 for pediatric patients and \$596 for geriatric patients. There was a 3% reduction in ER visits and a 4% reduction in IP visits among pediatric patients (n=133). Geriatric patients had a 7% decrease in ER visits but a 7% increase in IP visits (n=16).

Conclusion(s): MLPs have the potential to reduce avoidable healthcare expenditures and visits for MLP patients. Reductions in costs and visits for pediatric patients indicate better management of health issues. General cost and visit reduction also play a key role in a patient's ability to seek out or receive care. Changes in OP, ER, and IP costs and visits for geriatric patients may reflect the increasing complexity of health as individuals age; however, the geriatric sample was small and should be interpreted cautiously. Findings from this study emphasize the importance and potential of multi-disciplinary and collaborative initiatives, such as MLPs, in improving the quality of care provided by health systems and health outcomes received by patients. As such, this study can have important implications for future healthcare reform within the context of SDOH, patient-health system literacy, and beyond.

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Christopher J. Moloney



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Allen Mundok

Investigating the Impact of a Virtual Reality Experience on Medical Student Empathy

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Background: Physician empathy has been associated with healthy patient outcomes, increased clinical competence, and may decrease burnout. However, empathy tends to decline over the course of medical training. Empathy can be experienced through perspective taking - imagining another person's experiences - being "in someone else's shoes". To help medical students become more empathetic, professors must find ways to put students into "the patient's shoes".

Methods: We designed an innovative virtual reality (VR) experience to facilitate empathetic perspective-taking. The goal of this study was to compare a novel virtual reality (VR) experience (intervention) to traditional teaching methods (control). We performed a mixed-methods secondary content analysis of qualitative textual data provided by participants. First, we employed a modified thematic analysis approach, incorporating grounded theory as a guiding framework. Additionally, we assigned a quantitative score to each participant based on signs of empathy present in their responses.

Results: We identified four themes within each group that diametrically opposed each other. The intervention group showed higher markers of empathy, more student engagement, found deeper meaning, and demonstrated more learning of empathy than the control group. The intervention group also had a significantly higher mean assigned empathy score than the control group according to a t-test, $t(48) = 3.9595$, $p=0.0088$.

Conclusion: Overall, analyses suggest the VR experience uniquely engaged students and elicited more empathetic responses compared to the traditional lecture. Increasing medical student empathy could critically impact patient and provider outcomes. This application of VR may also be a beneficial, cost-effective tool for teachers.



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Dami T. Ojo

Differences in comorbidities and clinical factors between males and females in AIS patient population with a history of smoking and obesity

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UofSC SOMG

Background: Gender differences between AIS population who were both smoking and obese were compared to AIS population who only smoked or were only obese

Methods: Retrospective data containing various comorbidities, demographic and clinical factors was obtained from a regional stroke center between January 2010 and June 2016. Univariate analysis was first used to scan for gender differences between the whole AIS population. The population was grouped based on smoking, obesity, and smoking obesity and the same statistical tests were run. Significant variables exposed by the univariate analysis were placed into a logistic regression model. Variables displaying multicollinearity were excised from the data revealing odds ratios (ORs) which were used to determine the strength of impact the various comorbidities, demographic and clinical factors had on gender.

Results: Within the population of AIS patients who were both smokers and obese, coronary artery disease (OR = 1.806, 95% CI, 1.028–3.174, P = 0.040*), a history of drugs and alcohol (OR = 2.873, 95% CI, 1.349–6.166, P = 0.006), Serum Creatinine (OR = 4.724, 95% CI, 2.171–10.281, P < 0.001), Age (OR = 1.024, 95% CI, 1.022–1.047, P = 0.033), and systolic blood pressure (OR = 1.029, 95% CI, 1.011–1.047, P < 0.002) were significantly associated with male gender. Depression (OR = 0.432, 95% CI, 0.244–0.764, P < 0.004), Previous TIA (OR = .319, 95% CI, 0.142–0.714, P < 0.005), and Higher levels of HDL (OR = 0.938, 95% CI, 0.915–0.962, P < 0.001) were associated with female gender.



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Mueenat Ositelu

Substance use disorder diagnoses and remission outcomes among pregnant individuals receiving care in a collaborative prenatal addiction medicine clinic model

Mueenat Ositelu, Hannah McKinnon, Kara Davis, Nicole Cabrera, Kimbley Smith, Kacey Eichelberger, Melissa Fair

UofSC SOMG Department of Obstetrics and Gynecology Prisma Health Upstate

Background: Substance use in pregnancy can lead to poor health outcomes for mothers and their infants. Collaborative care models provide a specialized approach to treating pregnant and postpartum women with SUD. These clinics provide women with a safe and comforting space for prenatal and postpartum care, oftentimes encouraging them to seek SUD treatment as well. **Purpose Statement:** The objective of this study is to quantify the impact of exposure to a collaborative prenatal addiction medicine clinic model (The Magdalene Clinic) on disease remission rates for pregnant people with SUD diagnoses.

Methods: This is an IRB approved prospective cohort study. All patients receiving prenatal care through the Magdalene Clinic between 2018 and 2022 who had complete delivery information were eligible for inclusion. The primary exposure of interest was SUD diagnosis. The primary outcome of interest was the difference in SUD disease remission (none versus early or sustained) from first clinic visit to last, as defined by the DSM-5 classification. Analysis was performed with SAS statistical software.

Results: 440 patients were included in our analysis, the vast majority of whom were non-Hispanic white (84.5%); a smaller percentage was non-Hispanic black (10.5%), Hispanic (2.0%) or some other race (3.0%). The most common SUD diagnosis was opioid use disorder (n=234, 57.4%), followed by methamphetamine use disorder (n=212, 52.0%), cannabis use disorder (n=128, 31.4%), alcohol use disorder (n=50, 12.3%), and sedative use disorder (n=42, 10.3%).

Approximately 43.8% of patients had more than one SUD diagnosis. Of the cohort, slightly more than half (N= 385, 51%) of patients enrolled in Phoenix Center recovery services. Among those with opioid use disorder, 86 (37.9%) patients were not in remission at intake compared to only 26 (12.3%) at discharge, an absolute difference of 25.6%. Among those with methamphetamine use disorder, 107 (52.5%) were not in remission at intake compared to 46 (22.6%) at discharge, an absolute difference of 29.9%. Among those with cannabis use disorder, 64 (53.3%) of patients were not in remission at intake compared to 28 (26.2%) at discharge, an absolute difference of 27.1%. Lastly, among those with alcohol use disorder 20 patients (40.0%) were not in remission at intake compared to 6 (13.0%) at discharge, an absolute difference of 27%.

Conclusion: : Exposure to a collaborative prenatal addiction medicine clinic model was associated with significant increased SUD remission rates among pregnant people with opioid, methamphetamine, cannabis, and alcohol use disorders.



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Michelle A. Ozog

Impact of Heat Shock and Glucose Deprivation on Encystation of *Entamoeba histolytica*

Michelle A. Ozog and Cheryl Ingram-Smith
Clemson University; Eukaryotic Pathogens Innovation Center

Introduction: The purpose of this study is to investigate the influence of heat shock and glucose deprivation on the encystation process of *Entamoeba Histolytica*, a leading cause of diarrheal disease and invasive amoebiasis worldwide, affecting millions of people annually. Encystation, the conversion between the growing trophozoite form that colonizes the large intestine and the dormant cyst form that spreads disease, plays a critical role in the transmission and survival of *E. histolytica*. Understanding the factors that affect this process is crucial for developing strategies to control and prevent the spread of the parasite.

Methods: *E. Histolytica* trophozoites were subjected to controlled heat shock and glucose-deprived conditions. We used RNA isolation followed by reverse transcriptase-PCR to assess the impact of these stresses on encystation-related gene expression. Expression of Jacob2, a known component of the chitin cyst wall, and Hsp70 and Hsp90, nonspecific molecular chaperones that are expressed in response to stress, were monitored.

Results: The results of the experiment demonstrated an overall increased expression of Jacob, Hsp70, and Hsp90 in response to stress.

Conclusion: This experiment demonstrated that genes related to encystation and heat shock were both stress-responsive, suggesting they may both have a positive impact on heat tolerance. These findings provide insights into the role of Jacob and Hsp70/90 as potential regulators of the stress response and may contribute to our understanding of cellular mechanisms involved in coping with thermal stress by this parasite.



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Wesley Pittman

Optimization of Immunology Pathway Map for Medical Education

Wesley Pittman, Autumn Leggins, Jacob Estrada, Anne Nguyen, Dr. Jennifer Grier, Ph.D.

UofSC SOMG Department of Biomedical Sciences

Pre-clinical years of medical education require students to master many sciences including anatomy, physiology, and biochemistry. While each of these studies are extensive in nature, one that arguably provides a significant portion of the foundation of knowledge for clinical experience is immunology. Despite its long-lasting relevance for medical professionals, there are far fewer third-party resources for learning immunology in a reliable fashion than its counterparts. This disparity continues to contribute to increased confusion and a lack of confidence in pre-clinical medical students attempting to navigate the key topics of immunology that prove to be significant for years to come. In this project, we are evaluating student perceptions of a medically-focused Immunology Pathway Map previously designed by researchers at the University of South Carolina School of Medicine Greenville. The map will be introduced to first-, second-, and third-year medical students at the University of South Carolina School of Medicine Greenville, who will then be instructed to complete an academic exercise using the map. Student participants will then provide feedback about the usefulness, alignment of information with learning objectives, visual presentation, and clarity of the map. The resulting feedback will be used to optimize the map and increase its usefulness and relevance to medical education. The goal of this work is to design and implement an effective tool for improving understanding of medically-focused immunological concepts covered in the pre-clinical years of medical education.



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Cassidy M. Rahn

Identifying and Characterizing Infliximab and Human Anti-Chimeric Antibody Concentrations in Pediatric Patients with Inflammatory Bowel Disease

Cassidy M. Rahn, Liz Dancel

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In adults with Irritable Bowel Disease (IBD), studies have shown that the use of therapeutic drug monitoring has led to improved outcomes in patients such as less adverse effects and sustained efficacy. Currently however, there is limited information available about the association of Infliximab (IFX) levels and drug responsiveness in pediatric patients. Data has shown that pediatric patients are at risk for more severe disease phenotypes and extensive symptoms compared to adults, so it is vital that optimal IFX dosing in pediatric patients be studied further. The purpose of this retrospective chart analysis is to characterize IFX use and the use of drug level monitoring in pediatric patients with IBD. Data from patients from the Prisma Pediatric Gastroenterology database were analyzed using statistical and descriptive methods in order to identify common variables and trends. All patients included in the study were under the age of 18 during our study period (2020-2023) and met certain inclusion criteria. Data analyzed included length of diagnosis, C-Reactive Protein (CRP) levels before and after treatment, most recent IFX trough levels, and other pertinent variables. Results of this study are currently pending; however, we expect to find a better response to IFX treatment associated with more frequent drug level monitoring. The conclusions drawn from this study will contribute to a better understanding of Infliximab use and therapeutic drug monitoring in pediatric IBD patients.



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Lane Elisabeth Roth

Granulosa cell tumors of the ovary metastatic to the liver: a case report and review of the literature

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Granulosa cell tumors (GCT) are tumors originating from ovarian sex-cord stromal cells and represent 2% to 5% of ovarian cancers. These slow growing tumors are classified as adult (95%) or juvenile (5%) with 20% to 30% exhibiting malignancy. GCTs found in stage I have a recurrence rate of 20%, while stage II-IV GCTs have a recurrence rate of 43 to 48%. Hepatic metastases are rare for GCT and have been reported in 5% to 6% of patients, occurring between five and 27 years post-initial diagnosis, and are commonly misdiagnosed as mucinous cystadenoma or primary liver cancer. Here we report a case of multiply recurrent GCT metastatic to the liver which underwent repeated surgical debulking, chemotherapy, and hormone therapy. A comprehensive literature search revealed 18 reported cases of GCT metastasizing to the liver. The literature revealed metastasis was late with an average of 153.47 months post primary GCT diagnosis, with only 44.4% of cases reported metastatic recurrence post hepatic metastasis, and only 7.69% reported death. Compared to the literature, the case reported here also has late metastasis, metastatic recurrence post hepatic metastasis and resulted in death. Given these data, a diagnostic and follow-up algorithm has been developed to include: CT scan for ovarian mass followed by a total hysterectomy including a bilateral salpingo-oophorectomy and a total pelvic lymphadenectomy, and a pathological and histological examination assessing for Call-Exner bodies and coffee-bean like nuclear grooves. Follow up includes serial imaging and tumor markers as well as monitoring for clinical signs such as abdominal pain and ascites. Once liver metastasis is identified, hepatic resection, systemic therapy and long term follow up imaging are recommended.



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Luis J. Sanchez Ferrer

Assessing an actin-binding protein, Thymosin Beta-4, for the treatment of Acanthamoeba keratitis

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Acanthamoeba castellanii is an amoeba that causes eye (*Acanthamoeba keratitis* (AK)) and CNS (granulomatous amebic encephalitis (GAE)) infections. AK, the majority of which occurs in contact lens wearers, is characterized by severe pain and corneal and retinal damage, which can lead to vision loss. Treatment requires hourly administration of broad-spectrum antimicrobial eye-drops for two days, followed by daytime-only hourly eye-drops for five days.

Since

amoebae can transform into drug-resistant cysts, this challenging treatment regimen is necessary to kill the amoebae before they transform. Thus, novel treatments are desperately needed. Thymosin Beta-4 (T β 4) is an actin-binding protein that regulates wound healing and inflammation. It has been clinically evaluated for wound healing in patients with epidermolysis bullosa, pressure or venous stasis ulcers, and in patients who have undergone eye surgery or with dry eye syndrome. We hypothesize that T β 4 may be used in AK to mitigate eye damage.

To test this, we developed an in vitro epithelial damage assay. Human retinal epithelial-1 cells were cultured to confluent monolayers and “infected” with *Acanthamoeba* \pm T β 4 for 18-24 hours.

The monolayers were fixed and stained with crystal violet. Damage was assessed by image analysis using NIH ImageJ software. Addition of T β 4 prior to or during infection prevented monolayer destruction by up to 46%. Treatment of *Acanthamoeba* alone with T β 4 did not kill the parasite, suggesting that protection occurred by altering parasite virulence and/or the epithelium. These are promising results that support our hypothesis that T β 4 may be used in the treatment of AK.



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Zoe E. Sanders

Severity Score Variability for Pediatric Respiratory Syncytial Virus (RSV) Infections: A Systematic Review

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USC SOMG, Department of Biomedical Sciences

Purpose: Respiratory syncytial virus (RSV) is the leading cause of acute bronchiolitis in children worldwide. Several clinical scoring tools have been developed to evaluate the severity of bronchiolitis infections and aid in treatment decisions. However, these tools often lack validation, exhibit parameter variations, and may not specifically address RSV infections. This study aims to establish a comprehensive understanding of the classification of RSV infection severity in pediatric patients (<18 years old) by reviewing previously published papers that utilized severity scoring systems.

Methods: A systematic review of studies describing the development or use of severity scores (≥ 2 variables) was conducted using PubMed. Search terms included severity, severe, severity of illness index, classification, RSV, respiratory syncytial virus, respiratory syncytial infection, and respiratory syncytial viruses. A total of 4884 articles were identified, 334 were screened, and 66 were included. Reviews, systematic reviews, meta-analyses, commentaries, letters, and cohort studies with populations aged >18 years old were excluded.

Results: Among the 66 studies included, 28% (19/66) developed independent scores, while 71% (47/66) used or modified four frequently encountered tools. Notably, all tools incorporated clinical and physical exam findings into their scoring criteria. However, results indicate substantial variation in these parameters.

Significance: Our findings demonstrate the extensive variability in classifying RSV infection severity. Further review will guide the development of a severity score applicable to pediatric patients in Upstate, South Carolina to inform the local community about their risks. Classifying patients using an evidence-based scoring tool will support educational efforts, enhance clinical decision-making, and improve patient outcomes.



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Erin M. Seawright

Clinician absenteeism increases patient length of stay in a network of emergency departments

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Emergency Departments (EDs) have been understaffed, overstrained, and therefore congested for decades. When typical lean staffing plans cannot compensate for clinician absenteeism, patients may suffer prolonged ED length of stay (LOS). Increased LOS is associated with delayed care, compromised patient safety, and worse patient outcomes. To avoid these harms, healthcare systems must preemptively evaluate the effects of reduced clinician staffing on patient outcomes, define severity warning signals for inadequate staffing, and optimize staffing resources in times of strain. We developed a network simulation model to stress test ED staffing; we define and test scenarios across degrees of clinician absenteeism to quantitatively define the link between staffing strain and patient LOS. We explore a discrete-event simulation model of the six EDs in the Prisma Health-Upstate system. Model input data include patient flow data within and between EDs, collected from EPIC, and staffing, from ShiftAdmin. To test the effects of staffing strain on patient LOS, we analyzed LOS outcomes at 20, 40, and 50% clinician absenteeism. Across the network of EDs, patient LOS increases proportionally with clinician absenteeism. Our simulation models patient LOS across a network of EDs and builds the groundwork for future clinician staffing plan stress testing to improve the system's resilience. In future work, we will leverage this relationship to analyze potential preemptive approaches to staffing policies and correlate our data clinically through qualitative interviews with staffing personnel within a network of ED's.





MacRegga Severe

A Student and Faculty Snapshot of Next-Generation Medical Schools Compared to Legacy Medical Schools

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Department of Biomedical Sciences

Aim: To comprehensively investigate the characteristics of the faculty and student populations in Next-Generation Medical Schools (NGMS) and compare them to Legacy Medical Schools (LMS).
Methods: Using quantitative data from The Association of American Medical College (AAMC) annual reports on faculty profiles, student demographics, and school metrics, this study conducted comparisons to assess the performances of Next Generation Medical Schools (schools founded and accredited after 2002) and Legacy Medical schools (LMS).

Results: NGMS accounted for a smaller proportion of medical schools than LMS (21% to 79%). Most LMS were established before 1942, comprising approximately 46% of the schools. Florida and Texas founded the most NGMS, establishing at least four NGMS since 2002. Regarding faculty profiles, LMS reported higher percentages of new hires and departures than NGMS. Compared to men, fewer women in NGMS departed (women: 39%, men 62%); however, they were less likely to get promoted. Across both NGMS and LMS, male faculty members were more frequently promoted than their female counterparts. For student demographics, NGMS had a slightly higher number of underrepresented minority enrollment (21%) and graduates (17%) compared to LMS (19% and 15%, respectively).

Conclusions: The formation of Next generation medical school (NGMS) has influenced medical education. Continual studies on these newer schools are warranted to ensure optimal student preparation and their ability to address the evolving healthcare needs of diverse populations and communities effectively.



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Manav Shah

Comparing Robotic Cholecystectomy Using Indocyanine Green vs Laparoscopic Cholecystectomy Without the Use of Indocyanine Green

Manav Shah, Ella Abraham, Elias Wheibe, Andrew Schneider, MD
Prisma Health Department of Surgery

Introduction: Cholecystectomy is one of the most common general surgery procedures performed in the United States today. Over the past decade both indocyanine green (IcG), a dye used in medical diagnostics, and robotics have become available to surgeons for use during this procedure. It remains unclear how this new technology affects clinical outcomes and cost.

Methods: We are performing a retrospective review of all cholecystectomies performed within the Prisma Upstate System by general surgeons between October 2021 - October 2022 (n=3,292). Both inpatient and outpatient cholecystectomies are being included while cholecystectomies performed for malignancy are being excluded. Patient and operative characteristics are being collected along with 30-day post-operative outcomes.

Result: Current research has been mixed. Some studies have found no benefit to performing cholecystectomy using the robotic approach (1). However, others have found robotics to be associated with significantly less complications including bile leaks and conversions to open (2). However, we are expecting our results to show that the use of both IcG as well as robotic-assisted surgery will result in less complications. This includes decreased conversions to open, reduced rate of bile leak, reduced blood transfusions, and reduced length of stay and readmissions.

Discussion: We are hoping to complete this project along with statistical significance using Chi-square analysis and risks ratio by the end of this year. Although we are lacking in data, we are hoping to see if the use of robotic-assisted surgery with the guidance of indocyanine green will result in fewer complications.



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Creating Initiatives within the USCSOMG Office of Research to offer Increased Support for Medical Students Involved in Research

Jonah Shealy, Melissa Usoz, Sabrina Carrel, Alexandra Brady, Anna Blenda, Renee Chosed, Victoria Costello, Arwen Declan
USCSOMG Office of Research

The University of South Carolina School of Medicine Greenville (USCSOMG) is a young, vibrant institution with growing research activity. As student interest in research has grown, research needs have also grown. This abstract describes the development of two new student-initiated, student-led groups in collaboration with the Office of Research. We believe that our collaborative process can serve as a model for future ventures.

A group of four USCSOMG students identified a need for enhanced mentorship and student-led support. With guidance from USCSOMG mentors, students formed a research working group. The research working group met monthly to iteratively brainstorm, refine, and develop a formal proposal to meet the need for mentorship and student-led support. Throughout this process, the working group collaborated with the research coordinator and research mentors. The group formally presented its ideas to the USCSOMG Research Stakeholders, a group of physicians, professors, and medical students who meet quarterly to advise and support the Office of Research. The Stakeholders supported the working group's two-pronged proposal: to pilot a student-led, research-focused peer mentoring program and to form a Physician Scientist Interest Group.

The first of these, the Student Led Research Mentorship Program, is a pilot program under the Office of Research that pairs first and second year medical students with upper classmen for research-focused peer mentoring on practical topics such as abstract writing, poster preparation, and overall research support. Individuals will be paired based on research experience using a debiased matching process overseen by the Office of Research to optimize and individualize support. Currently, 10 mentors are mentoring 27 mentees. The second group is the Physician Scientist Interest Group. This group will operate through the Office of Student Affairs as a student interest group with close collaboration with the Office of Research. The goal of this group is to create a place for medical students to engage with the USCSOMG and Prisma Health research community and explore careers in research. Meetings will begin in Fall 2023 with the start of the Fall semester. We hope to create avenues for students passionate about research to develop relationships with professors and physicians who share those passions. Thus, by collaborating with USCSOMG mentors and stakeholders including the Office of Research, this student-initiated working group has developed two distinct mechanisms that augment current USCSOMG research offerings. We believe that these student-led groups will support student researchers early in their medical school journey. Our experience demonstrates the impact of student-led, faculty-supported initiatives to develop new opportunities within USCSOMG.



Jonah Shealy



**School of Medicine
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Adarsh Shidhaye

Assessment of intracellular and extracellular bacterial levels following THP-1 monocyte infection with Type and Necrotizing Fasciitis strains of *A. Baumannii*

Adarsh Shidhaye, Alia T. Sadek, Elias M. Wheibe, Kyleigh Connolly, Neha Bhatnagar, Maria Soledad Ramirez, Luis A. Actis, Elizabeth Hogue, Steven Fiester, Jennifer Grier

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Purpose: *Acinetobacter baumannii* (*A. baumannii*) is multidrug-resistant pathogen with increasing involvement in the development of necrotizing fasciitis in hospitalized patients, often leading to rapid patient deterioration and death. Two isolates of necrotizing fasciitis-causing *A. baumannii* (NFAb1 and NFAb2) from a single patient were found to be resistant to all antibiotics except colistin, a last-line therapeutic. Investigating the virulence mechanisms of necrotizing fasciitis-causing strains of *A. baumannii* is crucial in the discovery and development of novel therapeutics.

Methods: THP-1 macrophages were infected with Type (19606, 17978) or NF (NFAb1, NFAb2) strains of *A. baumannii* for two hours then incubated for an additional two hours with colistin to eliminate extracellular bacteria. After removal of colistin, the cultures were allowed to continue for 24 hours. Media was collected for extracellular bacterial analysis, followed by lysis of cells to assess intracellular survival.

Results: While all strains were capable of intracellular survival, NFAb1 tended to produce more viable intracellular bacteria than the 19606 Type strain. Both NFAb1 and NFAb2 demonstrated the ability to escape the macrophage intracellular space, as demonstrated by the presence of viable bacterial in the media at 24 hours after colistin treatment.

Conclusions: These results indicate that necrotizing fasciitis-causing strains of *A. baumannii* can survive within human macrophages for long periods. Furthermore, these intracellular bacteria may evade antibiotic treatment and escape the host cells, prolonging infections despite last-line antibiotic treatment. The pathways involved in these bacterial survival processes may be key targets for treatment of antibiotic resistant infections.



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Zachary Taylor

Evaluating the Need for DVT POCUS Training: Current Diagnostic Practices at a Family Medicine Residency Clinic

Zachary Taylor, Vicki Nelson, Joy Shen-Wagner
Prisma Health Department of Family Medicine

Purpose: Deep Vein Thrombosis (DVT) is a common topic in point-of-care ultrasound (POCUS) curriculums. We aim to investigate the benefits and applicability of DVT scanning in the ambulatory setting and to investigate current practices for diagnosing DVT in an urban family medicine (FM) residency clinic. Literature shows that clinical guidelines for DVT diagnosis are commonly underutilized or misused by physicians. Our hypothesis is that our FM clinic faces similar barriers to evaluating DVT and following guidelines, and thus that most patients are evaluated elsewhere. There is growing research surrounding POCUS as a tool in DVT diagnosis in the PC setting, showing high accuracy and decreased ED referrals despite limited implementation. This study will lay the groundwork to see if POCUS in the residency curriculum can change practice behaviors.

Methods: Data was obtained using Epic's SlicerDicer search function. The sample studied included all adult patients of a FM residency clinic in the past year. Measures included venous lower extremity ultrasounds ordered, d-dimer lab tests ordered, departments of the ordering physicians, and DVT diagnoses.

Results: Fewer ultrasound studies and d-dimers were ordered by family medicine physicians when compared to ED physicians and total secondary care specialties. When comparing family medicine and the emergency department using chi-square testing, there was a significant difference between d-dimer usages.

Conclusions: The results suggest that most DVT evaluations for patients of our FM clinic are performed outside the clinic. This may indicate an opportunity for POCUS training to improve diagnostic practices and decrease referrals in primary care.



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Madelaine R. Tedrick

Exploring the Relationship between Disturbed Sleep and Pain Interference in Breast Cancer Survivors

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Wake Forest University School of Medicine

>Introduction: Breast cancer survivors (BCS) are often prescribed estrogen deprivation therapy (EDT) to prevent tumor recurrence. Patients taking EDT frequently experience adverse reactions, including disturbed sleep and pain. Many studies on sleep in BCS have employed subjective sleep measures over short time periods; however, little research has explored objective sleep in BCS over longer periods of time. The aim of this longitudinal study is to examine the effects of disturbed sleep on reported pain interference (PI) in BCS taking EDT.

>Methods: Thirty-three women taking EDT were enrolled in the study. Participants wore ReadiWatch™ actigraphy devices for two months. These devices measured various metrics to examine sleep disturbances. Additionally, participants answered pre- and post-study questionnaires, including the Pittsburgh Sleep Quality Index (PSQI) and the Patient-Reported Outcomes Measurement Information System (PROMIS) questionnaire for PI.

>Results: A paired samples t-test was used to compare PSQI data prior to and following the study, revealing a significant decrease in PSQI across the 2-month study period ($p < 0.05$).

Spearman correlation was used to examine the relationship between ReadiScore and PI, revealing a significant negative correlation, $\rho(32) = -0.44$, $p < 0.05$.

>Conclusions: Data suggest that participants' perceived sleep quality increased by participating in the study. Additionally, participants with lower measured sleep effectiveness experienced increased interference from pain. This study can provide insight into the effects of disturbed sleep on pain interference, as well as the improvement of perceived sleep quality with the use of ReadiWatch™ actigraphy devices.

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Abigail K. Trippel

Scoping Review of Pharmacologic Treatments for PEComas

Abigail K. Trippel, Vivian Ho, Jamila Johnson, Dakota Makulec, Reema Charles, Smith Heavner

CURE Drug Repurposing Collaboratory – Critical Path Institute

Background: Perivascular epithelioid cell neoplasms (PEComas) are a group of rare tumors of mesenchyme origin that typically arrange around the walls of blood vessels. Due to the rarity, there is a lack of research on drug treatments for PEComas. To date, the FDA has only approved one drug, Nab-Sirolimus. The aim of this study is to aggregate and describe additional pharmacologic treatments for PEComas in the existent literature.

Methods: A scoping review of the literature on PEComas was conducted using a pre-defined search string in PubMed. A total of 1267 articles were identified and uploaded into Rayyan for further review. During the title-abstract screening, articles were included if they were written in English, were relevant to PEComa, and included drug treatment information. A total of 153 articles met inclusion criteria. Data was extracted from these articles and input into Microsoft Excel (Microsoft Corporation, 2018) for data analysis.

Results: A preliminary analysis of 76 case studies has been completed. A total of 30 unique drug treatments have been documented. Nab-Sirolimus (n=20) and Everolimus (n=18), are mentioned in the highest number of case reports. The next most commonly mentioned was Rapamycin (n=13), followed by Medroxyprogesterone acetate (n=7) and Lynestrenol-tamoxifen (n=6). The most commonly reported PEComa subtypes were Angiomyolipoma (AML)(n=41) and Lymphangioliomyomatosis (LAM) (n=33). The most common PEComa anatomical sites included renal (n=51), followed by lungs (n=38), brain (n=18), and uterus (n=10). Further analysis is still underway.

Conclusion: Our study offers a comprehensive review of the available research on pharmacological treatments for PEComas. Through our analysis, we are able to cumulate information on drug treatment outcomes and adverse effects, to identify which drugs may be most promising for future research.



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Max Vogel

Neuroendocrine Tumors of the Small Bowel

Max Vogel, Steven Trocha, Christine Schammel

Prisma Department Of Pathology, Prisma Department of Surgical Oncology

Gastrointestinal neuroendocrine tumors (GI-NET) represent 2% of all gastrointestinal tumors and are the most common small bowel tumors in Western countries, with an incidence of 01.05/100,000 in the United States. Small bowel neuroendocrine (SB-NET) are more often located in the ileum (76%) and distal jejunum (24%), with the majority arising from serotonin-producing enterochromaffin cells (EC) cells (functional). Lesions in the jejunum may also produce gastrin. SB-NET of the jejunum or ileum may present as functional hormone-producing tumors or non-hormone-producing tumors. Despite the fact that these lesions are low-grade, 60% of patients have distance metastasis at the time of diagnosis. Metastases are often in the liver. Half of patients that present with stage IV unresectable metastatic disease at the time of diagnosis and are asymptomatic. Small primary tumors are rarely visualized on CT. Delays in diagnosis of SB-NETs may lead to peritoneal carcinomatosis or carcinoid syndrome, portending a poor prognosis. The goal of this study was to retrospectively evaluate SB-NET diagnosed/treated at a single institution for the purpose of developing a diagnostic algorithm for earlier detection to optimize patient outcomes. Typical demographic and clinicopathologic data were collected to include historical imaging, presenting symptoms, stage at diagnosis, treatments, and outcomes. On evaluation of the patient population, 84.62% of patients that underwent surgical resection (n=39) were found to have lymphovascular invasion at the time of surgery, and 32.5% examined patients (n=40) developed hepatic metastases. Of the patients in the study, 72.5% had their tumor diagnosed by scan prior to surgery, while 25% had no scans prior to surgical resection and 112.5% had prior scans that did not detect their tumor (n=40). For patients that did have their tumor diagnosed by radiological review (n=29), they waited an average of 3.5 months from to detection to surgical resection. Of patients included in this study, 32.5% developed distant metastases (n=40) compared to up to 60% of patients in previous studies. Compared to previous studies, which found detection rate of SB-NET on radiological review to be around 60%, our patient population had their tumors detected at a similar rate prior to surgery.



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Dontaevious Watts

Outcomes In Total Percutaneous ECMO Using An Arterial Preclosure Device

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Prisma Health Department of Cardiothoracic Surgery

Background: Extracorporeal membrane oxygenation (ECMO) support patients with severe heart or lung failure, bypassing the failing organ system to aid recovery while maintaining bodily functions. Peripheral cannulation, the preferred method for non-sternotomy patients, and ongoing alternative arterial closure device research aim to minimize complications. The growing population and heart failure treatment advancements underscore the increasing demand for safe and effective ECMO techniques.

Purpose: In 2017, the use of Perclose devices for arterial cannulation sites in peripheral veno-arterial ECMO (VA ECMO) began and showed favorable outcomes, leading to its adoption as the standard cannulation method. This study aims to evaluate the outcomes of this fully percutaneous approach and determine its suitability as the preferred VA ECMO cannulation method.

Methods: A retrospective chart review of 20-30 patients using the EPIC and STS databases evaluated patient characteristics, preoperative echocardiography, ECMO cannulation indications, presence of other mechanical circulatory assist devices, cannulation methods, ECMO duration, postoperative outcomes, and potential additional surgeries. Primary endpoints include survival to explant, extremity complications, and conversion to open surgical shutdown. Secondary endpoints encompass 30 and 90-day mortality, survival to discharge, ECMO duration, renal failure requiring hemodialysis, neurological complications, morbidity, and significant bleeding. Statistical analysis will be conducted based on chart review results.

Results: Data collection and analysis are ongoing. We expect reduced complications and non-inferior survival involving total percutaneous ECMO cannulation techniques.

Conclusion: Total percutaneous cannulation for VA ECMO can potentially reduce many limb-related complications associated with ECMO cannulation compared to open surgical shutdown, thus becoming the standard cannulation method.



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Noah White

Second to Last Step: Understanding Enolase Inhibitors Effect on Fungal Growth

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Invasive fungal infections cause nearly one and a half million deaths annually, accounting for nearly 50% of all AIDS-related deaths. Greater than 90% of all reported fungal deaths results from species of the genera *Cryptococcus*, *Candida*, *Aspergillus*, and *Pneumocystis*. Current treatment for invasive fungal infections relies on the use of antifungals, such as azoles, polyenes, and echinocandins, that target the fungal cell wall and membrane. Although frequently used, these drugs are subject to antifungal resistance, renal toxicities, and unfavorable drug-drug interactions. To address the compromised efficacy and unfavorable side effects, new targets for antifungal therapy are needed. In this study, we target the protein enolase which catalyzes the penultimate step of glycolysis and contributes to tissue invasion and nutrient acquisition during fungal infection. By using small-molecule enolase inhibitors such as HEX, POMHEX, and Baicalein, we seek to inhibit the glycolytic pathway in the fungal pathogens *Candida albicans* and *Cryptococcus neoformans*, two fungi the World Health Organization recently identified as critical priority fungal pathogens. We grew both fungi in media with glucose as the sole carbon source, a condition which required a functioning glycolytic pathway, with various concentrations on enolase inhibitor. HEX and POMHEX inhibitors have not shown significant inhibition of growth, and Baicalein is currently being studied. Observing the effects of metabolic inhibitors on the growth of fungal pathogens allows for further investigation into other protein targets that can be used to develop novel antifungal therapies to increase efficacy in the treatment of fungal infection.



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Pediatric Firearm Related Injuries in Upstate South Carolina

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Objectives: To evaluate all firearm related injuries in the Upstate of South Carolina, a diverse rural and urban population, and identify commonalities. **Methods:** A retrospective review was performed for patients under 17 years presenting with a firearm related injury to our trauma center between 2017 and 2023. Data collected included demographics, intent, location, residence zip code, injury zip code, social service and legal involvement, availability of psychology consult, and disposition at discharge. Data regarding rural/urban status, distressed community index (DCI) was also obtained.

Results: In patients who sustained firearm injuries, 77% were male, 55% were Black, and the average age was 9 years. The average residence to injury distance was 4 miles. 46% of incidents occurred in a residence, and 44% of incidents were unintentional. 25% had confirmed history with DSS, 14% had confirmed history with DJJ, and 15% had confirmed or concern for gang involvement. 22% of patients eligible received a psychology consult. 28% required immediate operative intervention, and 11% resulted in death. 55 injuries occurred in a zip code with the same DCI, 10 had a higher DCI, and 37 had a lower DCI. The majority of both residence and incidence zip codes had more alcohol retailers than grocery retailers.

Conclusion: The results obtained show similarities with reports from urban centers. Disparities based upon socioeconomic status, gender and race exist with regards to prevalence of firearm related injuries. Community involvement and public health strategies are paramount in the effort to reduce firearm related injuries in the Upstate.

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