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USC School of Medicine Greenville

4th Annual Student Research Symposium

Nathan Abdo

School of Medicine Greenville

TIES: 4 Attributes of Successful Studies in Implementation Science –Thoroughness, Individualization, Expandability, and Scale

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Implementation science is a rising discipline of research that develops, executes, and examines evidence-based protocols or tools. Often highly complex, careful design and communication are essential at all phases of an implementation study, from initial conceptualization to protocol development to grantsmanship and ultimate publication. I performed a targeted review of recently published implementation studies. I first identified studies with methodologies similar to our targeted methods, and then evaluated a focused subset of key studies to identify components of communication and methodological design in published studies similar to our intended design. With the help of a physician mentor and the Prisma librarians, I designed a PubMed search utilizing 20 MeSH terms and 17 keywords to identify 561 studies published within the last 5 years. Results were evaluated on basis of generalizability and handling of implementation-related challenges to identify candidates for focused analysis.
2 implementation studies and one controlled cohort study with a multifaceted implementation intervention were chosen for focused analysis. Additionally, study designs that required communication of patient data outside of the hospital system, a key element of our intended design, were closely analyzed.
As a result, 4 common attributes of successful implementation studies related to design and communication were evident (TIES): Thoroughness – multidimensional protocols are broken into the simplest possible units for description; Individualization – clear provisions are made to tailor the intervention to specific patient needs when possible (45 CFR 46.111 point 6); Expandability and Scale – implementations are designed for consistency across initial multisite rollout and optimized for subsequent expansion.

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Brionna Bennett

Alterations of Antibiotic for the Treatment of Bacterial Infections

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Antibiotic resistance refers to a bacteria's ability to evolve by metabolizing, destroying or evading drugs that are designed to treat an infectious disease. Because of these tactics, bacteria can continue to grow and spread within their host while the host is being administered antibiotics. To combat this evolutionary tactic, recent studies have examined siderophore-based iron acquisition as a potential target of antibiotics as many pathogenic bacteria require siderophores for the uptake of iron for physiological processes. Covalently binding siderophore molecules to pre-made effector antibiotics such as SB-217452, a process known as the "Trojan horse" strategy, can be highly effective in delivering antibiotics to bacteria. Similarly, gallium (III) has also been shown to be a powerful antimicrobial that can replace Fe (III) within iron-containing biological compounds. In this study, we plan to utilize Ga-ferrichrome as a potential antimicrobial against multidrug resistant, Klebsiella pneumonia (Klebsiella). The bacterial pathogen, Klesbsiella was cultured in Muller Hinton broth and serial dilutions were performed to determine optical density values that represent colony-forming units at different bacterial concentrations. Next, we will determine the MIC of Ga-ferrichrome using the antimicrobial broth microdilution technique. Later, we will analyze the effect of Ga-ferrichrome on multi-drug resistant Klesbsiella isolates, determine the potential cytotoxic effects of Ga-ferrichrome on host cells, and test the efficacy of Ga-ferrichrome in treating Klebsiella infection using the A549 infection model. We hypothesize because gallium alone has potent antimicrobial effects against bacteria that Ga-ferrichrome will also be effective against Klebsiella without exhibiting any cytotoxicity on A549 cells.

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Nicholas Beraho

Evaluation of Aortic Aneurysm Sac Regression Following Endovascular Repair

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Objectives: Aneurysm sac regression is an important marker for both patient outcomes and their overall recovery following endovascular aneurysm repair (EVAR). Monitoring the size of the aneurysm sac post- operatively is an effective method of gauging the patient's risk of aneurysmal rupture and is related to patient outcome. Sac regression has been correlated to better patient outcomes. We examined the extent of the regression in 560 patients as well as a variety of other factors that may influence sac regression including comorbidities and endoleak presence upon completion of the surgery.
Methods: Data collection was done via patient chart analysis in the EPIC electronic medical record system. This data was put into RedCap and subsequently analyzed for trends in aortic aneurysm sac regression.
Results: Although data analysis is still ongoing, preliminary results suggest that sac regression has been found in a majority of the patients so far in this study, and this trend is expected to continue.
Conclusion: Sac regression would suggest both successful repair of the aortic aneurysm and proper post- operative care and is correlated with better patient outcomes. No change or an increase in aneurysm sac size may indicate an increased influence of patient comorbidities on the sac, the presence or persistence of an endoleak following EVAR, problems with patient compliance, or the need to revise surgical techniques and the type of stent employed.

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Darby Billing

Pleomorphic Lobular Carcinoma in situ

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Pleiomorphic lobular carcinoma in-situ (PLCIS) has recently been differentiated as a rare pathologic subtype of classic lobular carcinoma in-situ (LCIS), and as such the actual incidence is unknown. PLCIS is thought to be a precursor to invasive disease rather than simply portend an increased risk of invasive disease like LCIS; however, there is currently no consensus regarding prognosis, treatment guidelines and outcomes. Currently, PLCIS is treated aggressively like another subtype of LCIS, Ductal carcinoma in situ (DCIS). Following IRB approval, a single institution evaluation of all PLCIS diagnosed on biopsy at a single institution between 3/2016 and 6/2022 was completed. Typical demographic and clinicopathologic data were collected. Fisher's t-tests and chi-square analyses were completed as appropriate ($p<0.05$). A comprehensive review of the literature was also completed.

Overall, 82 patients were identified. There were 3 patients with PLCIS only (3.66%), 15 patients with PLCIS with ADH, ALH, and/or LCIS (18.29%), and 64 patients with PLCIS with IDC, ILC, and/or DCIS (78.05%). Patients who had pure PLCIS received an excision, lumpectomy, adjuvant endocrine therapy, and/or radiation, and had no recurrences or mortalities. In the PLCIS with ADH, ALH and/or LCIS, there were no recurrences or mortalities. PLCIS patients with IDC, ILC, and/or DCIS, had 2 recurrences (3.13%) and 4 mortalities (6.25%).

The current WHO consensus recommends excision to negative margins or mastectomy for PLCIS. This evaluation supports excision to negative margins with adjuvant endocrine therapy, and/or mastectomy or radiation for pure PLCIS patients, supporting the previous recommendations to treat PLCIS like DCIS.

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Christian Brayman

Overcoming the Falls and Failures of Screenings and Referrals in the ED

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Background: Falls are the leading cause of death and nonfatal injuries among older adults. It is estimated that 1 in 4 older adults fall each year, leading to 3,000,000 ED visits. Despite this, screening older patients for fall risk and referring them to a falls prevention program (FPP) rarely occurs.
Aim: Optimizing the methodology for an implementation science study of a new ED-based referral mechanism for high fall-risk older adults.
Methods: To identify comparable implementation studies, we worked with Prisma Health Librarians to conduct a literature review. Key words included: “Electronic Health Records,” “Referral,” “Prevention,” “Screening,” and “Implementation Study.” 561 articles were initially identified. Through subsequent reviews we cut the number of articles to 100, then 30, then 5 that were presented for our team to review.
Results: The literature review helped us identify critical information on linking data, the cost-effectiveness of FPPs, and how to build a referral mechanism that can be incorporated into current workflow practices. Furthermore, we learned the effect viewing falls as controllable, modifying homes and everyday routines, and increasing strength and balance has on reducing falls.
Conclusions: While there is no dedicated tool for searching by methodology, strategic search design in collaboration with Prisma Health librarians allowed us to identify and refine a plethora of resources that strengthened our IRB. Once the referral mechanism is implemented, a retrospective analysis will be done to evaluate the impact that FPP completion has on patient health outcomes. If successful, it will be deployed across the Prisma Health system.

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Adam Brockway

A Case Report of Successful Treatment of Invasive Gastrointestinal Mucormycosis in a Patient with History of Acute Lymphocytic Leukemia

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Gastrointestinal mucormycosis is a rare and deadly complication that puts patients suffering from hematologic malignancy at risk. We report a case of a 23-year-old male with a history of acute lymphocytic leukemia (ALL) that presented with right lower abdominal pain and fever. Progression of infection was followed through radiographic imaging. A Karius test led to the diagnosis of invasive mucormycosis. A right nephrectomy, right colectomy, and liver resection were performed. Pathologic examination of tissues specimens confirmed the diagnosis of mucormycosis. This case demonstrates that prompt diagnosis, surgical debridement, appropriate antifungal therapy, and reduction of risk factors are essential when treating mucormycosis.

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Niamh Cahill

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

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Background: Paediatric surgical conditions have been overlooked for many years in Sub-Saharan Africa despite their impact on the global burden of disease. In countries like Malawi, the lack of equipment, supplies and trained paediatric surgeons at district hospitals means limited capacity for paediatric surgery, with many children with treatable surgical conditions remaining untreated. The kidSURG project aims to improve the paediatric surgical capacity of district hospitals in Malawi by connecting specialists from Queen Elizabeth Central Hospital (QECH) in Blantyre with designated district hospitals. Those specialists conduct monthly visits to train the district teams in diagnosis and basic paediatric surgical treatment to streamline the referral process between district hospitals and specialist services at QECH.
Methods: Participatory methods are being used to guide the design, implementation and evaluation of the surgical training intervention in district hospitals. Project review workshop was held in May 2022 with 35 project participants (supervisors and district clinicians). Data was collected in written format.
Results: Preliminary findings have revealed that the surgical intervention in the district hospitals has been successful in increasing the capacity for paediatric surgical diagnosis and treatment. The district hospitals have also seen an improvement in referral practices since the intervention began. Further results including encountered challenges will be presented once the analysis has been completed.
Conclusions: Interim review of the project suggests the feasibility and effectiveness of the proposed model to address the surgical capacity of district hospitals in Malawi as a way to address the shortage of surgical specialists in the immediate future.

Ashlyn Chea

Hard Pills to Swallow: Attitudes Concerning Opioid Use Disorder and Factors Influencing Support of Specific Medications for Opioid Use Disorder Among A Rural, Appalachia Community

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Purpose: To evaluate attitudes concerning opioid use disorder (OUD) and factors influencing support of specific medications for opioid use disorder (MOUDs) in a rural, Appalachia community as part of broader initiatives to reduce stigma and increase treatment.
Methods: Dissemination of a 38-question survey followed by comparative analyses assessing the relationships between recognition of OUD as a real illness, believing that MOUDs are effective treatment for OUD, and what factors are related to support of methadone and buprenorphine.
Findings: 372 individuals responded. Overall, 76.9% agreed that OUD is a real illness. Respondents recognizing OUD as a real illness were more likely to recognize MOUDs as effective treatment (p=.001584). 238 individuals answered if they would support the use of methadone, buprenorphine, and/or naltrexone. 24.8% more individuals supported the use of methadone than buprenorphine. Among those who agreed that MOUDs are an effective treatment, those with a household income greater than $50,000 were more likely to support the use of methadone than those with a household income less than $50,000 (p=.008614). Those aged 45+ were less likely to support the use of buprenorphine than those aged 12-44 (p=.03294).
Conclusions: Recognizing OUD as a real illness is associated with general support of MOUDs and traits such as age and household income may influence support of specific MOUDs. Further study should focus on how to better inform communities that OUD is a real illness and the benefits of MOUDs while also investigating beliefs affecting support of specific MOUDs.

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Sherry Chen

Impact of Preoperative Bathing Pathway on Postoperative Outcomes

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Introduction: Surgical site infections (SSIs) can lead to detrimental health outcomes. Most healthcare settings utilize chlorhexidine gluconate (CHG) baths and wipes as a measure of preoperative antiseptic control. There are many factors that lead to the acquisition of SSIs but there is a limited understanding on CHG bathing over other soap products playing a role in decreasing SSIs.
Study Design: Preoperative bathing instructions were carried out by the authors in 2021. A retrospective cohort study of 1000 Prisma Health patients undergoing surgical procedure were instructed on specific preoperative bathing with recommendations of either CHG wipes, antimicrobial soap, or generic soap use. Follow-up with patients on the type of preoperative bathing they actually did was implemented and documented. Comparative analysis of incidence of SSI acquisition and type within 30 days after the procedure was performed.
Results: This is an ongoing study, with statistical analysis to occur soon. We expect there to be no significant difference between different preoperative bathing conditions on the incidence of surgical site infections.
Conclusions: If results demonstrate that there is no significant difference between different preoperative bathing conditions on the incidence of surgical site infections, an argument can be made about elimination of CHG wipe use for at-home pre-surgical scrub and instead resorting to bathing with antimicrobial soap across the Prisma Health System. This would lead to a reduction of hospital supply expenditures. This standardization would be achieved through system-wide implementation of new preoperative bathing instructions utilized by surgeons based on their evaluation of patient comorbidities.

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Carson Collins

Is gene expression altered in blastocoel fluid from preimplantation euploid IVF-embryos that result in miscarriage?

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Approximately 10 to 20 percent of pregnancies end in miscarriage. Infertility is one of the leading causes of recurrent miscarriages and affects approximately 14% of reproductive-age couples. Recurrent miscarriages are presumed to be the result of embryonic chromosomal abnormalities such as aneuploidy. In response to infertility, many couples seek IVF, often without reliable guidelines on which embryo has the best potential for leading to a live birth. This study seeks to identify gene expression signatures from blastocoel fluid-conditioned media collected from preimplantation euploid IVF-embryos that resulted in miscarriage. Candidate genes were previously identified through whole transcriptome (RNASeq) analysis of blastocoel fluid from euploid IVF-embryos that resulted in successful or unsuccessful implantation. Blastocoel fluid from a new set of euploid IVF-embryos resulting in miscarriage or successful implantation were selected for specific gene expression analysis using RT-qPCR. RNA was first purified from the fluid, then cDNA was synthesized for use in RT-qPCR reactions with gene-specific TaqMan primers. Genes assessed using RT-qPCR were BCL2L12, SHARPIN, CUL2, Ill and DRAP1 with GAPDH as a control. These genes represented pathways involved in apoptotis and protein degradation via ubiquitination. Gene expression analysis is ongoing and future studies will continue to assess the expression of these genes in additional samples. If genes could be identified that are associated with miscarriage, this additional embryo quality metric may improve the success of each IVF-embryo transfer potentially reducing the number of miscarriages.

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Sam Cumby

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Exploring Cognitive Control in Buprenorphine-Maintained Patients with Opioid Use Disorder

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Background: Maintenance treatment through medications for opioid use disorder (OUD) including Buprenorphine has demonstrated to be effective at producing substantial reductions in drug use and risk of overdose among patients with OUD. Still, most patients continue to struggle with relapse. Deficits in cognitive functioning has been identified among people with OUD, which have also been associated with poor treatment outcomes.
Aims: This study examined cognitive control by comparing Stroop Test and Continuous Performance Test (CPT) scores between people with OUD on buprenorphine (MOUD) and healthy controls (HC); and explored the association between Stroop and CPT scores with drug use.
Methods: Participants (n=39) were 16 buprenorphine-maintained individuals and 23 HCs. Participants completed a 60-minute laboratory session during which drug use was measured via self-report and saliva tests; the Stroop Test and CPT were performed using the CNSVitalSigns Software.
Results: Participants in the MOUD group had longer reaction time during the Stroop Test [MMOUD = 800.5, MHC = 719.3, p=.05] and more commission errors for both Stroop [MMOUD =2.4, MHC=0.7, p=.05] and CPT [(MMOUD=3.1 MHC=0.3, p=.045]. MOUD participants reported using illicit drugs during 11 days over the past 30 days; 56% (9/16) of MOUD participants tested positive in a screening. Stroop and CPT parameters were not associated with drug outcomes (ps>.05).
Conclusion: Cognitive control, as assessed by the Stroop Test and CPT, was worse in the MOUD group compared to HCs. Providers should explore interventions to address these cognitive control deficits in MOUD patients through proven adjunctive therapies such as Cognitive-Behavioral Therapy.

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Ayan Dasgupta

Mechanisms of SARS-CoV-1 Non-Structural Protein 1 (Nsp-1)-Mediated Immune Regulation

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The SARS-CoV-1 outbreak and SARS-CoV-2 pandemic have made it evident that coronavirus infections can cause severe pathology in humans. Studies suggests that non-structural protein 1 (nsp1) could contribute to infection severity. SARS-CoV-1 Nsp1 has two primary functions during the viral life cycle, inhibition of host protein translation and dysregulation of the Type I interferon antiviral response. The latter of which is of specific interest as this is how the virus evades a host's immune response, leading to a more severe infection. It has been speculated that nsp1 accomplishes this by inhibiting viral detection by retinoic acid inducible gene-1 (RIG-1)-like receptors (RLRs). One potential mechanism by which Nsp1 could achieve this is through interaction with RLR regulators such as ADAR1, which localize in stress granules during infections. To study the actions of Nsp1, we created three variants, an immune inhibition knockout, a double function knockout, and a gain of function mutant. Simulated infection in human epithelial lung cells (A549s) in the presence of wild-type or mutant Nsp1 will aid in understanding Nsp1's mechanism of immune evasion. Utilizing fluorescent microscopy, we will visualize Nsp1 and ADAR1 cellular localization, and potential colocalization in stress granules. Host gene and protein expression will be studied via qRT-PCR and flow cytometry or western blot to elucidate the downstream effects of specific nsp1 functions. By understanding the mechanisms by which SARS-CoV-1 Nsp1 evades immune responses, we will be able to provide new ways to target and treat coronavirus infections to increase clearance and decrease severity.

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Sarah Davis

Can CT Imaging Predict the Need for Transversus Abdominis Release in Ventral Hernia Repairs?

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Background: A ventral hernia is a protrusion through a defect in the abdominal wall fascia that often requires surgical intervention. One option for repair is the robotic extended Totally Extraperitoneal (eTEP) repair, a minimally invasive approach. This technique has many benefits but, as in an open repair, the use of additional techniques to fix the defect is left to the surgeon's discretion intraoperatively. Previously, computed tomography (CT)-measured rectus width to hernia width ratio (RDR) proved to be a useful decision-making tool preoperatively. We expand the use of this method to robotic eTEP repairs.

Methods: A retrospective chart review of 190 patients who underwent midline ventral hernia repair via robotic eTEP was conducted. Variables included demographic information and preoperative CT measurements to calculate RDR (Love et al., 2020) and component separation index (CSI)(Christy et al., 2012). The RDR and CSI were compared to operative findings, specifically the need for transversus abdominis release (TAR) to achieve fascial closure.

Results: Preliminary findings indicate that TAR was required for 14.4% of patients with an RDR ≥ 2 (n=152). For patients with an RDR between 1.5 - 1.99 (n=19), the need for TAR increased to 26.3%. Patients with an RDR <1.5 (n=19) experienced the greatest need for TAR, occurring in 42.1% of cases.

Conclusion: The data is expected to demonstrate similar findings as the previous study with open ventral hernia repairs (Love et al., 2020). We anticipate that RDR will be a useful indicator of the need for additional TAR during robotic eTEP procedures.

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Alondra DeSantiago

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Assessment of Nutrition Education Needs Among Patients with Chronic Diseases

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Primary care physicians have the potential to reduce morbidity and mortality for chronic diseases via nutrition counseling to patients; however, in practice, nutrition counseling in primary care settings may be brief or infrequent. A component of effective nutrition counseling system in a primary care setting consists of assessing patient's motivations for receiving dietary counseling. This study aims to understand patient motivations for receiving nutrition education and assess patient interests in developing cooking skills. Patient responses can inform effective tools for primary care physicians to improve counseling for patients with chronic diseases. Patient surveys (N=94) were self-administered at a Prisma Health Upstate internal medicine resident clinic in 2022. The top responses were used to evaluate patients' motivations regarding nutrition education and cooking skills. Descriptive statistics were obtained using patient responses in REDCap. Among the surveys, primary patient motivations for learning about nutrition were: weight loss (61.7%), getting off medications (52.1%), preventing and treating chronic conditions, including diabetes (42.6%), heart disease (42.6%), and stroke (42.6%). The culinary skills of most interest among patients were cooking healthy meals quickly (74.5%), low-cost meal preparation (69.1%), and preparing meals for an entire family (42.6%). Nutrition education needs assessments can inform future training curricula to provide primary care physicians with the necessary tools to improve comprehensive health care for their patients. Nutrition education at the Prisma Health Upstate internal medicine resident clinic should promote weight loss and the prevention and treatment of chronic diseases, as well as counseling patients on preparing healthy meals in less time.

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Leila Djerdjour

Gender differences in risk factors for recurrent Ischemic Stroke with previous history of TIA

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Background: Despite progressive research, recurrent strokes remain a common occurrence affecting approximately 25% of ischemic stroke patients, thereby putting patients at a significantly higher risk for mortality and physical disability. Although gender differences in primary stroke risk are highly studied, recurrent stroke gender risk factors are not. This study focused on a subset of recurrent stroke patients who also experienced a transient ischemic attack to compare recurrent ischemic stroke risk factors between men and women.
Methods: A retrospective analysis was conducted on patients who presented with an acute ischemic stroke from January 2010 through January 2016 to Prisma Health Upstate. Binary logistic regression was used to determine risk factors associated with recurrent strokes with and without history of TIA. Our model was tested using the Hosmer-Lemeshow test for the overall correct classification percentage, while interactions and multicollinearity between independent variables were examined using variance inflation factors.
Results: In the adjusted analysis, smoking history (OR=2.763, 95% CI, 1.063-7.185, P=0.037) , dyslipidemia (OR=1.073, 95% CI, 1.039-1.108, P< 0.001), and higher heart rate (OR=1.049, 95% CI, 1.017-1.082, P=0.002) were associated with female patients with history of recurrent stroke and TIA. On the other hand, men were shown to have a higher incidence of coronary artery disease (CAD), elevated diastolic blood pressures and creatinine levels.
Conclusion: Results identified modifiable risk factors in ischemic stroke patients with history of TIA that will encourage continued monitoring of varying comorbidities by gender to prevent and manage recurrent ischemic strokes properly.

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Rebecca Early

Rica Salud: Evaluation of Lifestyle Medicine Program Utilization and Future Directions

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Background: Obesity is one of the most prevalent chronic health conditions in children. Many existing treatment programs require tertiary care referrals and face high attrition rates. Rica Salud is an innovative program where obesity management is embedded within the medical home and patients are recruited based on readiness to change.
Methods: This is the first assessment of program utilization since Rica Salud's inception. Given that obesity programs are notoriously difficult to evaluate, we focused on reviewing process and outcome measures prioritized by the National Collaborative on Childhood Obesity Research. This included evaluating patterns of program referral, enrollment, attendance, and completion, as well as analysis of BMI and lifestyle behavior change.
Results: Since 2021, we have enrolled 89 patients in Rica Salud, 75% of whom identify as Hispanic/Latino. So far, we've had 4 patients complete the program, 21 patients in progress, and 64 patients drop out. While a 72% attrition rate is high, 53% of those patients have completed at least 3/7 visits, and 28% have completed more than half of the program. Of the 4 completed patients, 3 experienced an overall reduction in BMI and 11/13 current patients (with data) have either maintained or decreased their BMI thus far.
Conclusion: While there is promising data from patients who have completed Rica Salud, there are many changes needed to improve program efficacy and reduce attrition. Most importantly, there needs to be greater consistency amongst providers, better screening for readiness to change, and more effective tools to address barriers to program completion.

School of Medicine Greenville

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Merve Ertem

Identifying Physiomarkers for Prediction of Response to Achalasia Treatment

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Background: Achalasia is a rare esophageal motility disorder where impaired relaxation of the lower esophageal sphincter (LES) and disrupted primary peristalsis leads to dysphagia, and regurgitation. Achalasia is diagnosed by High Resolution Manometry (HRM) which can confirm high LES pressure (Integrated Relaxation Pressure or IRP) and unorganized peristalsis. Definitive therapy options for disrupting the tightness in the LES include pneumatic dilation, laparoscopic heller myotomy or per-oral endoscopic myotomy. Even though these therapies are successful in improving esophagogastric junction (EGJ) physiologic parameters, this improvement in EGJ parameters does not reflect the clinical treatment outcomes in achalasia with residual dysphagia symptoms in subset of patients. There are currently no markers available to identify this subset of patients to predict the response to current achalasia treatment options.

Aim: We aimed to identify prognostic markers in High Resolution Manometry to predict clinical response to current achalasia treatment modalities.

Methods: Using a prospectively maintained esophageal motility database, adult patients who had undergone therapy for achalasia and completed HRM after therapy were identified. Demographics, clinical outcomes such as Eckardt score (ES) and HRM parameters were recorded. Normal IRP on HRM was defined as <15 mmHg. Panesophageal pressurization and Impedance bolus height at one and five minutes were recorded during rapid swallowing challenge. A poor symptomatic outcome was defined as ES >3. Upon collection of the abovementioned data, multivariable analysis will be conducted between HRM variables and clinical outcomes.

Results: A cohort of 241 patients were identified and data collection is still in the process.

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School of Medicine Greenville

Madisen Faulkner

Investigating the Demographics of TBI+ and TBI- Patients with Alzheimer's Disease

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Dementia and its impact on the aging population is a growing public health concern. Alzheimer's Disease (AD) is the most common form of neurodegenerative disease and is characterized by a decline in cognitive function that affects a person's day-to-day activities. Research demonstrates a connection between traumatic brain injury (TBI) and AD, resulting from the debilitating defects that head trauma has in comparison to features of AD. This study investigates the demographics of TBI+ and TBI- AD patients in an attempt to discover alternative indicators for the development of AD. AD diagnosis occurs in stages, beginning with cognitive symptoms and progressing to mild cognitive impairment (MCI) then mild, moderate, or severe AD. 981 AD patients were analyzed, examining the impacts of TBI, smoking, and marital status on the onset of cognitive symptoms, MCI, and AD symptoms. Aligning with the literature, results indicate that TBI+ patients report earlier onset of MCI ($F(1, 114) = 5.660$, $p < .05$). Additionally, results show that smokers report AD symptoms later ($F(1,23) = 9.211$, $p < .01$) and divorcees report cognitive impairment earlier ($F(4,813) = 2.750$, $p < .05$). Although the stages of AD are well-described, its diagnosis presents a challenge as its symptoms are often attributed to the consequences of aging. These results support previous research describing TBI effects on the development of AD and may provide diagnostic insight regarding AD. Future research should focus on improving diagnostic criteria for AD, providing guidance to researchers and physicians on the implementation of early interventions.

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Melanie Gainey

There's no place like home, but where's home when you are in recovery?

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Introduction: Opioid Use Disorder (OUD) is an epidemic in the United States and has greatly affected the quality of life for many individuals. Opioid Use Disorder affects over 2.1 million people in the United States. Provisional data from the CDC for 2021 indicated that overdose deaths increased by 28.5% to 103,306 in the U.S. A medication for opioid use disorder (MOUD) that has been shown to improve the outcomes of OUD is Suboxone. Suboxone is a partial opioid agonist therapy. Suboxone has been shown to be a safe therapy due to it not being able to be changed to more stronger forms, milder withdrawal symptoms, longer duration of action, and a reduced risk of overdose. Many individuals who present with an OUD are also experiencing deficits in social determinants of health (SDOH). One of the SDOH deficits identified was housing. One housing option for individuals entering recovery is called recovery housing or sober living homes. Recovery houses are a service that provides housing, individualized OUD treatments, and social support to persons with an OUD. Many recovery houses do not accept patients currently utilizing Medications for Opioid Use Disorder (MOUD).

Research Question: This study aims to explore the accessibility of housing options in South Carolina and its impact on retention in care for patients in recovery being maintained on Suboxone. This study will utilize a mixed-methods approach to explore the impact of housing and retention of care of patients in recovery maintained on Suboxone. Protocol and preliminary findings will be presented.

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William Gardner II

Exploring Drug Efficacy in the Pediatric Population: Determining the Differences Among Various Drug Classes

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Introduction: Pharmacodynamics is commonly defined as what the drug does to the body. The pharmacodynamic effects of a drug are required to determine its efficacy and safety. Due to the unique nature of pediatric development, and the challenges in doing research on children, the efficacy and safety of many drugs are not well defined in the pediatric population.

Methods: Over 60 scientific research articles were evaluated to assess the safety and efficacy of drugs in children. The pediatric data that were obtained included age, body weight, race, dosing, adverse effects, efficacy, and safety. Antibiotics, analgesics, anti-inflammatory, and chemotherapy medications were compiled to evaluate the usage and activity of each drug during development.

Results: Data suggests that the administration of anti-inflammatory and analgesic drugs both in-creased with age. Antiviral and anti-cancer drugs both had a consistent number studied across age groups, while limited studies were available for anti-fungal and anti-malarial drugs (1 study each). Of the drugs studied, the administration of sulfadoxine-pyrimethamine, anti-thymocyte globulin (ATG), and esomeprazole were the only ones where the doses tested did not result in adequate treatment in children.

Conclusion: Limited studies are available regarding the pharmacodynamics of drugs in children throughout development. The current study suggests that the administration of various drugs may change with age. However, several studies that are available obtained their pediatric pharmacody-namic data from computer simulations. The lack of pediatric pharmacodynamic data for many drugs may produce gaps in knowledge that could impact the clinical care of children.

UofSC School of Medicine Greenville

Summer Research Scholar funded by UofSC SOMG and the Sargent Foundation

Eli Goodwin

School of Medicine Greenville

Delay Discounting as a Potential Therapeutic Target for Patients with Opioid Use Disorder on Buprenorphine Maintenance

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Background: Buprenorphine is an evidence-based medication for treating Opioid Use Disorder (OUD). Common problems seen with buprenorphine-assisted treatment is low retention in treatment and ongoing polysubstance use. The delay discounting task is a measure of preference for immediate, smaller rewards over delayed, larger ones. Steeper discounting has been associated with worse treatment outcomes for patients with substance use disorders, including OUD.
Aims: The aims of this study were to compare delay discounting rates in participants with OUD and healthy controls, and explore the association between delay discounting, substance use, and depressive symptoms.
Methods: Buprenorphine-maintained adults with OUD participating in a clinical trial (N=22) and healthy controls (N=20) performed the delay discounting task. We used the logk parameter to describe the rate of discounting, with higher values of logk indicating greater discounting and impulsivity. Additional assessments included self-reported drug use and the Patient Health Questionnaire-9 to assess depressive symptoms.
Results: The final sample was predominantly female (61%) and White/Caucasian (88.1%). Mean age was 33.5 (37.2 OUD participants and 29.6 Healthy controls). T-tests showed that participants with OUD had larger logk values (-2.21 vs. -3.31, p=.006). Logk values and PHQ-9 were positively correlated (p=.018).
Conclusion: Our results showed that patients with OUD on buprenorphine exhibit greater delay discounting relative to healthy controls, showing greater impulsivity in OUD patients. Delay discounting rates may be an important therapeutic target to improve treatment outcomes among patient in buprenorphine assisted treatment. Depressive symptoms could be significant as an underlying factor of impulsive decision making.

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Mary Grant

Dietary Excess of Caffeine and Sodium (DECaffS) and effect on weight and BP in healthy adolescents

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Prisma Health, Department of Pediatric Nephrology

Introduction: 90% of children consume excess sodium and 70% consume excess caffeine. Studies have shown that sodium and caffeine analysis tools have the potential to be valid and reliable measures of dietary intake in adults but are underutilized in pediatric populations.
Objectives: Our primary objective is to evaluate sodium and caffeine consumption among adolescents to establish a relationship between intake, body mass index (BMI), and office blood pressure (BP).
Methods: We recruited patients ages 12-18 who attended adolescent well check exams at a busy pediatric practice. We conducted a mixed methods study using data collected from validated surveys that measured sodium and caffeine intake. We measured linear correlation using Pearson's correlation coefficient.
Results: We recruited 72 patients (58% male) and split them into two groups: 12-15.5 and 15.5-18 years old. We found a statistically significant relationship (P=0.018) between sodium intake and BMI percentile in the 12-15.5 age group, but not in the 15.5-18 group (P=0.682). The correlation between caffeine intake and systolic BP percentile was statistically significant (P=0.005) in the older age group, but not in the 12-15.5 age group (P=0.452). We did not find a significant correlation between sodium and systolic BP percentile in either group.
Conclusion: Our study confirms that increased sodium intake is correlated with high BMI in younger teens, and caffeine intake is correlated with higher BPs in older teens. While there is a need for more pediatric specific tools, current intake tools prove useful. Pediatricians should be encouraged to use these in adolescent dietary decision-making.

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School of Medicine Greenville

Ashley Hall

“Great job - 3/5”: Assessing Student and Faculty Opinion on Narrative Feedback in Medical Education

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Background: Despite its frequently established value, narrative feedback is often misunderstood or underutilized. Previous research has shown that feedback is most effective when it is specific, timely, and able to be incorporated into subsequent attempts by the student. Attempts to improve the quality of narrative feedback have been made in numerous residency programs, but few attempts have been made in a pre-clinical setting.
Methods: In this pilot study, Likert-style questions were used to assess student opinion on the effectiveness of narrative feedback they have received in the past, and during Structure Function I/II (SF I/II) lab sessions. Students and faculty also produced ranked lists of the qualities they deemed most important when receiving or giving high quality narrative feedback. These results will be used to design a new method for delivering narrative feedback to be incorporated into the SF I/II curriculum for the incoming class of 2026.
Results: When choosing qualities that are most important for high quality narrative feedback, >95% of students and faculty included timeliness and specificity, and >85% included feedback that points out areas of improvement and strength, as well as feedback that is generated by the supervisor/professor/mentor.
Conclusions: Based on our results, a new method of delivering narrative feedback will be tested in SF I/II lab sessions that is: 1) delivered within days of observing student performance; 2) specific to each student, highlighting areas for improvement as well as areas of strength; 3) generated by a professor who directly observed the evaluated student.

School of Medicine Greenville

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Coral Holt

Concussion Occurrence, Knowledge, and Attitude Across Gender in Upstate South Carolina Youth and College Athletes

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Prisma Health, Department of Family Medicine

Purpose: Concussion is a prevalent cause of sports injury in youth and young adult athletes across the country. However, previous studies demonstrate a lack of knowledge around concussions as well as negative attitudes toward reporting such injuries in young athletes. Moreover, research has shown a difference in concussion occurrence, knowledge, and attitude between male and female athletes. The Greenville County Schools system takes actions to educate young athletes on concussions, including the distribution of a CDC fact sheet to every athlete. The aim of this study is to investigate the differences in these measures between genders in upstate South Carolina

Methods: Middle and high school student-athletes will be invited to complete an electronic survey, and data will be compared across gender to look for potential differences in incidence, confidence in knowledge, tested knowledge, and attitude surrounding concussions and reporting.

Results: Based on previous studies, we predict we will find higher concussion incidence and tested knowledge in female athletes, while seeing higher confidence in knowledge and more negative attitude toward reporting in male athletes.

Significance: The results of this study are predicted to point to a difference in the culture around athlete safety in male versus female sports that may stem from larger societal gender roles and expectations. This study will add to a growing base of information regarding health education in young athletes, prompting improvements in communication and contributing to a safer climate in scholastic athletics.

USC School of Medicine Greenville

Mohammad Hooshmand

Virtual Mindfulness Training for Adults with History of Depression

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Prisma Health, Department of Internal Medicine

Mindfulness Based Cognitive Therapy (MBCT) has shown to be an effective method of preventing relapse of Major Depressive Disorder (MDD). MBCT is a group program that integrates mindfulness skills training with cognitive-behavioral strategies. However, the cost of MBCT is not affordable to many families. The aim of this study is to explore the feasibility and efficacy of an MBCT intervention designed to be delivered at low cost through a virtual delivery format. We will recruit 240 participants who are in remission from depression and randomize them to an 8-week MBCT group intervention or treatment as usual (TAU) control group. The TAU control group will complete the intervention after 8 weeks. Assessments will take place at baseline, 8 weeks, and 16 weeks. The primary outcome is to test the efficacy of this community-based delivery in preventing relapse of an episode of MDD. The secondary outcomes include depression severity, psychiatric distress, perceived stress, post-traumatic stress symptoms, adherence to treatment plans not given as part of this study, mindfulness skills, and quality of life. We will also examine the following potential moderators and correlates of intervention outcomes: comorbid diagnoses, life events history, and MBCT intervention adherence. Finally, we will examine the following mediators of intervention outcome: mindfulness skills, emotion regulation skills, executive functioning skills, savoring, and positive and negative affect.

School of Medicine Greenville

Project funded by the Prisma Health Department of Internal Medicine

Mia Jeanty

School of Medicine Greenville

Stakeholder Perspectives on Screening and Addressing the Social Determinants of Health at Prisma Health

Mia L Jeanty, Caroline Rudisill, Darin Thomas, Stella Self, Mark Macauda, Ann Blair Kennedy, Deeksha Gupta, Jackson Hartley, Tanisha Elder-Kirk, Meredith Eicken
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Background: Social determinants of health (SDoH) are social factors, such as housing, safety, transportation, and social connection, that can effect health outcomes of patients. Screening for social factors in primary care practices can improve health outcomes by presenting an opportunity for intervention in patient's lives.
Aim: To have the greatest benefit to patients, proper screening barriers must be addressed through communication with facilitators of that screening, such as physicians, nurses, nurse assistants, or administrative staff. Forty interviews will be conducted with facilitators in primary care clinics to gain information of the current utilization of a SDoH screening questionnaire.
Methods: Prisma Health has utilized a SDoH screening questionnaire in primary care practices since February 2022. This 18-question questionnaire addresses food insecurity, financial strain, transportation, stress, social connections, safety, housing, and exercise level of effort. After completion, patients receive referrals to resources through a system called NowPow via their After Visit Summary. To understand practice uptake and experiences of team members, forty interviews will be conducted with team members in low and high adopting clinics. Interviews will address employee utilization, practice implementation, workflow incorporation, and effectiveness of the questionnaire.
Expected Results: Data from interviews will be used to offer guidance on potential change to the questionnaire, its presentation to patients, and its implementation into the workflow.
Conclusion: SDoH screening process for Prisma Health will be revised so more patients are screened for SDoH, further rollout of screening will be informed by experience, and patients will benefit from having non-health care needs addressed.

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Jamila Johnson

Systematic Review of PEComa Treatments

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C-Path's Cure Drug Repurposing Collaboratory

Background: Perivascular epithelioid cell neoplasms (PEComas) are rare tumors formed by epithelioid cells. As with other rare cancers, funding, trial recruitment, and other concerns pose a significant barrier to obtaining Food and Drug Administration (FDA) approval for treatments. To date, the FDA has approved only one agent, Nab-Sirolimus, for the treatment of PEComa. However, there is a lack of research that systematically addresses the current landscape of available drug treatments for PEComas. Our research aims to identify repurposed pharmacological treatments for PEComas and their associated subtypes.
Methods: We first conducted a PubMed search with a specific search string. All study types were included. Articles not available in English were excluded. We screened titles and abstracts for inclusion. Data entry and analysis are still underway using Rayyan software.
Findings/Results: A total of 1267 articles were retrieved from PubMed and uploaded in Rayyan database for review. After the first pass, a total of 197 articles were included for full-text screening in the second pass. Of these articles, 153 were included in the data entry and analysis. Results show that the majority of research for PEComa treatment focuses on the mTOR inhibitors, with the FDA approved agent, Sirolimus, accounting for 78 articles.
Conclusion: These findings demonstrate the extensive availability of research on PEComa treatment. Our review offers a comprehensive analysis of the current pharmaceutical treatment options for PEComas including FDA approved (i.e., Nab-Sirolimus) and repurposed agents. Our analysis can provide useful information for further research identifying potential targets for repurposed pharmaceutical treatments.

UofSC School of Medicine Greenville

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Philip Johnston

Safe supplies straight to your doorstep: improving harm reduction access in South Carolina

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Prisma Health, Department of Medicine and Addiction Medicine Center

Every year thousands of people deal with adverse effects of drug use including overdose, HIV/Hep C contraction, and other complications such as infections from injecting drugs. Harm reduction services such as access to safe drug use supplies such as clean syringes, fentanyl test strips, and Narcan are evidence-based practices to decrease the incidence of these adverse effects among communities of people who use drugs. Mail order harm reduction services have been suggested as the answer to the access issues that people from rural areas, specifically in South Carolina, face when it comes to obtaining safe supplies for drug use. This study will seek to evaluate what was learned about feasibility and acceptability of providing mail order harm reduction supplies to people who use drugs in South Carolina over the last 6 months. This study will utilize a mixed methods approach to evaluate this program. Both quantitative analysis of utilization data and qualitative analysis of comments by consumers on the website used to order supplies will be conducted. This data was collected by organizers of this program who packaged and mailed supplies. Quantitative data will be analyzed using descriptive statistics. Qualitative data will be analyzed by thematic analysis. Results are still pending analysis of data.

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USC School of Medicine Greenville

Elise Kao

Patient Perspectives on Screening and Addressing the Social Determinants of Health at Prisma Health

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Prisma Health, Internal Medicine Clinic

Background: Social determinants of health are defined as "conditions in the environments where people are born, live, learn, work, play, worship, and age that affect a wide range of health, functioning, and quality-of-life outcomes and risks." Up to 80% of patient medical problems can be connected to negative outcomes from social determinants of health (SDoH), however standardized screening of SDoH is not widely implemented in primary care settings. An 8 part questionnaire was created to screen patients for select SDoH during their visits at Prisma Health primary care clinics. This project aims to analyze preliminary results and obtain patient and provider feedback to provide guidance for future screening initiatives.

Methods: The project was presented to the University of South Carolina's Patient Engagement Studio (PES) where the research team discussed the implementation and process of the SDoH screening with a panel of expert patients. A final report was generated by analyzing the patient responses.

Results: Meeting with the PES provided important patient insight on the implementation and follow-up process for the SDoH screening tool. Their suggestions included how to increase patient rapport, when and through what medium to provide the screening, altering the phrasing of several questions, and how to follow-up after the screening.

Conclusion: Gathering the feedback from patient experts will allow us to further improve the SDoH screening process. The patient recommendations as well as qualitative interviews underway in primary care practices will contribute to forming an evidence-based method for screening SDoH at Prisma Health primary clinics.

USC School of Medicine Greenville

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Himashreya Katti

Investigation of the impact of mTBI and poor sleep on cognitive decline in Alzheimer's disease patients

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Traumatic brain injuries (TBIs) have been strongly linked to Alzheimer's disease (AD) progression. While a wide field of literature exists for biomarkers and other factors linking AD to TBIs, sleep disturbances and their ties to mTBIs (mild traumatic brain injuries) have not been investigated. This study aimed to examine whether the rate of cognitive decline is increased for individuals with a self-reported mTBI, compared to those without a self-reported mTBI, along with whether an mTBI is associated with increased sleep disturbances. The rate of patients' cognitive decline was measured using a longitudinal analysis of cognitive tests, such as the Mini-mental State Examination (MMSE), over a period of time. Other factors that have been shown to lead to a potential decline in cognitive function were also compared between the two groups, including total tau protein, phosphorylated tau, alcohol use, drug use, presence of the APOE4 allele, SUVr levels, and smoking status. The sample included 1496 participants from the Alzheimer's Disease Neuroimaging Initiative (ADNI) database. All individuals included in this study were required to have a SUVr level equal to or greater than 1.2 at some point during the study. Data analysis is currently in progress, and strong clinical implications may be ascertained from the findings. If sleep disturbances have a significant correlation to cognitive performance and AD progression, then methods of quantifying sleep quality clinically could be used in the treatment and diagnosis of mTBIs and AD in the future.

School of Medicine Greenville

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Alexandra Kesic

Analysis of glycan expression in malignant versus para-cancerous, benign tissue in breast cancer patients

Alexandra E. Kesic, Avery T. Funkhouser, Jonah C. Shealy, Julie C. Martin, W. Larry Gluck, Connie M. Arthur, W. Jeffrey Edenfield, Xuezheng Song, Anna V. Blenda

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Glycans are complex carbohydrates containing glycosidic linkages and are found on the surface of most eukaryotic cells. They are classically divided into two categories, N-linked and O-linked. N-linked glycans are then further divided into three subtypes—high mannose, complex, and hybrid. Aberrant glycan expression in cancer is well-studied in relation to cancer tumorigenesis and metastasis. Previous studies have proposed possible biomarkers such as glycans with increased sialyation and fucosylation pointing to progression of the cancer. However, to our knowledge, there is no known signature glycan expression between malignant and surrounding benign tissue that can be applied in a clinical setting. This study examines N-linked glycan composition and expression in cancerous tissue and surrounding healthy tissue of breast cancer patients. MALDI-TOF mass spectroscopy was used to detect and quantify glycans on malignant and surrounding healthy tissue samples collected from 39 breast cancer patients of stages one through four. The known masses of sixty-one glycans were then compared to the masses of the glycans isolated from the samples to determine their composition. Preliminary data analysis confirms increasing sialyation and fucosylation as a possible means to establish a signature glycan expression between malignant and healthy tissue. Additionally, a higher concentration of high mannose subtype glycans was noted in malignant tissue. This could lead to important clinical applications such as being a helpful distinction in obtaining negative margins during tumor resection, as well as providing a more refined diagnostic method and more informed treatment decisions.

School of Medicine Greenville

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Aaron Kesinger

The safety of injecting corticosteroid injections prior to total shoulder arthroplasty

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Prisma Health, Department of Orthopedic Surgery

There is abundant medical research on cortisone injections in the presence of hip and knee arthroplasty, with little research on cortisone injections surrounding total shoulder arthroplasty; an arthroplasty being the surgical reconstruction or replacement of a joint. The goal of the research is to investigate the safety of injecting corticosteroid injections prior to elective total shoulder arthroplasty. In order to do this, the charts of 192 patients who elected to have total shoulder arthroplasty between 7/14/2016 and 6/26/2020 were reviewed. This date range was chosen so that there would be sufficient post-surgery follow up data. The number of injections they received 1 year prior to surgery and any post-surgery injections was then documented. The study then also documented whether or not there were any complications post-surgery such as continued pain, revision surgery, infection or implant failure. The electronic medical record EPIC was used to review patient charts, and then collected the data in the program RedCap. Currently the data is being analyzed in order to see if there is any increased risk of complication post-surgery related to the number of cortisone injections administered. The results are currently being processed. The study's hypothesis is that the number of cortisone injections a patient receives prior and post-surgery is positively correlated to the risk of having complications post total shoulder arthroplasty. The results of the study will be used to help dictate and guide treatment of shoulder pain prior to and post total shoulder arthroplasty.

School of Medicine Greenville

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John King

Repurposing an Old Blood Pressure Medication as an Antiamebic: A Novel Treatment for *Entamoeba histolytica* using Wytensin™ (Guanabenz Acetate)

John T King, Ashleigh Walsh, Lesley A Temesvari
Clemson University, Eukaryotic Pathogens Innovation Center

Entamoeba histolytica causes amoebic dysentery and liver abscess and is prevalent in countries lacking proper sanitation. Infection is acquired by ingesting the cyst form of the parasite from contaminated food and water. The parasite colonizes the colon, where it may escape through the hepatic portal system to establish extra-intestinal infection. In the colon, the parasite may also form additional cysts, which are shed into the environment to facilitate host-to-host spread. The current treatment for *Entamoeba* infections is high doses of metronidazole, which often lead to severe side effects, including liver toxicity. Wytensin™ is an adrenergic agonist, originally designed to treat hypertension. At the molecular level, it has been shown to prevent dephosphorylation of eukaryotic initiation factor 2-α (eIF2α). In its phosphorylated state, eIF2α blocks protein translation. Thus, prolonged phosphorylation of eIF2α is detrimental to cells. We have previously shown that *E. histolytica* possesses an eIF2α homolog (EheIF2α). Therefore, we hypothesized that exposure to Wytensin™ might reduce protein translation in and be detrimental to the parasite. *E. histolytica* cells were exposed to a range of concentrations of Wytensin™. We also tested the ability of the drug to block parasite cyst formation. The drug was shown to reduce parasite viability and block cyst formation in a dose-dependent fashion. Western blots to test the effect of Wytensin™ on the phosphorylation status of EheIF2α are underway. These data suggest that Wytensin™ (alone or in conjunction with low-dose metronidazole) could be a viable and safer alternative to the current treatment protocol.

School of Medicine Greenville

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Nykia King

Treatment of Pediatrics Mental Health Patients in Upstate South Carolina

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Prisma Health, Bradshaw Institute of Community Child Health and Advocacy

Background: 1 in 6 children in the U.S. aged 6-17 experience a mental health disorder or behavior problem each year. Each year; only 14% of those children receive treatment. A key barrier to treatment is the unequal distribution of mental health resources. This study specifically evaluates the health inequities and social disparities in pediatric patients' mental health treatment of upstate South Carolina. It focuses on identifying and addressing service gaps for pediatric patients at Bradshaw Institute for Community Child Health and Advocacy who need mental health treatment.
Method: Comparative analysis method was used to compare patients aged 1 to 18 referral data. This analysis was conducted with REDCap-Upstate and CORD resource databases. Patients' service gaps were observed based on their overall connection rate to mental health treatment, cultural preferences, personal barriers, age, and zip code.
Results: Preliminary findings reveal that there is not a statistically significant difference in connection rate of pediatric patients based on race. Children aged 5 and under with a provider preference had a significantly higher non connection rate. Their preferences revolved around providers' language, faith, or race. It was also found that patients in rural areas receive less treatment. These results indicate a need for expanded mental health resources available for children 5 and under and children in rural areas in the upstate. Additionally, these resources need to match the patient population's cultural make-up to better address their preferences.

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USC School of Medicine Greenville

Alexandra Koberlein

Granular Cell Tumors of the GI Tract

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Prisma Health, Department of Surgery and Pathology Associates

Granular cell tumors (GCTs) are rare neoplasms of Schwann cell origin primarily found in the skin or soft tissues. GCTs comprise 0.5% of all soft tissue tumors with an incidence of 0.03%. Although typically benign, malignant transformation has been reported. The rarity of GCTs, particularly in the GI tract, has resulted in controversy regarding prognosis and treatment.

Following IRB approval, all GI GCTs diagnosed/ treated at a single institution between 1/1/2001 and 6/1/2022 were retrospectively evaluated. Typical demographic, clinicopathologic, treatment, and outcome data were collected. Data were stratified based on location in the GI tract. All data were compared to the literature. Statistical analyses using Fischer's t-tests were completed ($\alpha<0.05$). Overall, 28 patients with GI GCT were evaluated; average age was 50 years (32-71). 75% of patients were symptomatic (abdominal pain, change in bowel movements) while 25% were asymptomatic. Mean tumor size was 0.85 cm (0.2-2.7); tumors were noted in the esophagus (n=16, 51.61%), colorectum (n=13, 41.94%), and stomach (n=2, 6.45%). 38.7% of tumors were identified in submucosa, 29% were identified in mucosa, and 32.3% presented in both regions. All cases were histologically benign with no recurrence. GERD was associated with esophageal GCT while H. pylori was associated with gastric GCT. With limited information in literature, GCTs continue to challenge physicians. This study provides further characterization of GI GCTs and suggests that patients may present with broad abdominal complaints. Although malignant transformation is rare, we are still faced with significant ambiguity regarding treatment: is biopsy sufficient or is surgical excision necessary?

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UofSC School of Medicine Greenville

Anna Kofoed

The association between 1860 chattel slavery and excess burden of contemporary adverse pregnancy outcomes: An exploratory ecological analysis

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In the United States, disparities in rates of morbidity and mortality between non-Hispanic Black and White birthing people has been well described in literature, though their etiologies remain incompletely understood. Our research team is testing the hypothesis that the degree of a given state's past involvement in chattel slavery is positively correlated with excess burden of adverse pregnancy outcomes for contemporary populations. For this ecological study, we will estimate Pearson correlation coefficients to understand the degree of association between the proportion of enslaved persons per state in the 1860 US Census (defined as N of enslaved persons/total N of persons) and select contemporary adverse pregnancy outcomes publicly available, courtesy of the March of Dimes Peristats database. These adverse outcomes include preterm birth rate, infant mortality rate, obesity rates in reproductive age women, inadequate prenatal care, and rate of low birthweight deliveries. A second exploratory investigation is planned, repeating the analysis described above but using county level data for the 46 counties in South Carolina. Ultimate findings of these studies can help us better define health inequities in these populations, and eventually lead to practices that promote a more equitable state for groups affected by these disparities.

School of Medicine Greenville

Project funded by the Prisma Dept of Obstetrics and Gynecology

Olivia Larner

Genetic Variants in the *LARP1* Gene are Associated with Neurodevelopmental Delays and Autism

Olivia M. Larner, Raymond J. Louie, Robert G. Best

UofSC SOMG, Department of Biomedical Sciences

The *LARP1* gene, located at 5q33.2, is an RNA binding protein that is involved in the mTORC1 signaling pathway. *LARP1* specifically regulates the translation of terminal oligopyrimidine (TOP) mRNA in the context of nutrient availability. Studies have shown that the *Drosophila* equivalent of *LARP1* is important for embryogenesis and spermatogenesis. In humans, *de novo* mutations in the *LARP1* gene have been reported in large cohorts of individuals with developmental disabilities and autism, but there is not sufficient evidence to validate a gene-disease association. We report seven unrelated individuals with *de novo* loss-of-function or missense variants in the *LARP1* gene. The cohort of patients, identified through GeneMatcher, present with a variable neurodevelopmental phenotype including intellectual disability, hypotonia, motor delay, and/or autism spectrum disorder. These individuals have clinical features that may represent a novel autosomal dominant neurodevelopmental disorder associated with *LARP1* haploinsufficiency. Ongoing functional studies are in progress to elucidate the cellular consequences of *LARP1* alterations.

Univ of SC School of Medicine Greenville

Branum “Bo” Layton

Shouldering disparities: do neighborhood socioeconomic characteristics influence outcomes after rotator cuff repair?

Branum O. Layton, Stephan G. Pill
Prisma Health, Department of Orthopedic Surgery

Introduction: Rotator cuff tears are common and often thought of as a normal side effect of aging. Rotator cuff repair (RCR) can improve symptoms and function when conservative treatments fail. Risk factors for a compromised outcome can include both patient factors and tear characteristics. However, other external factors like healthcare disparity may also play a role in a patient’s outcome by leading to limited access to effective treatment. Area Deprivation Index (ADI) is a tool that assesses 17 areas of possible socioeconomic disparities and allows for ranking of individual neighborhoods based on relative disadvantages. The purpose of this study was to determine if levels of healthcare disparity, as measured by ADI scores, affected surgical outcomes of patients following RCR. We hypothesized that patients having greater levels of disparities in their home neighborhoods would have worse outcomes following RCR surgery.
Methods: A retrospective chart review of 308 patients who had undergone RCR from 2015-2020 was performed on patients who had at least two-year patient reported outcome (PRO) data. After ADI scores were calculated for each patient based on their home address, we categorized patients based on levels of relative neighborhood disadvantage and compared PRO scores between sample groups.
Results: Pending analysis.
Discussion: If PRO data supports our hypothesis, it will give supporting evidence to the need to target an array of socioeconomic variables in the fight to ensure equitable healthcare for all populations. With RCR being a common orthopedic procedure, working to improve outcomes in this population is a high-yield endeavor.

School of Medicine Greenville

Autumn Leggins

Creating A Medical School-Oriented Map of Immunologic Processes

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UofSC SOMG, Department of Biomedical Sciences

During non-clinical years of medical school, students learn about the human body's immune system. The process of protecting individuals from foreign entities and abnormally acting "self" cells consists of a complicated network of immune cell reactions and interactions. While the content of medical immunology is extensive, it differs in focus from what is needed to earn or work after attaining a graduate degree in immunology. Because of this, many of the available immunology resources are organized into networks and maps that are more in-depth than medical students need. This results in these maps being unhelpful since students have to sift through the presented information and determine what is relevant for their studies and what is outside the scope of their learning objectives. In this project, we are creating a concept map of immunologic processes focused on medically-relevant information without extraneous details found in other online mapping resources. A concept map based on medical school lecture content and the NBME Step 1 content outline is being generated in Adobe Illustrator. After the map has been completed, we will have medical students give feedback about the usefulness, alignment of information to school and STEP 1 learning objectives, ease of use, and visual presentation of the map. With this feedback, we will optimize the immunology map before making the final product available to students, with the goal of creating a useful tool to medical students and educators.

School of Medicine Greenville

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Megan Leonard

Concussion Occurrence, Knowledge, and Attitude Across Sports in Greenville County School System Student Athletes

Megan M. Leonard, Coral R. Holt, Aaron T. Kesinger, Abigail K. Posta, Vicki R. Nelson

Prisma Health, Department of Family Medicine and Sports Medicine

Purpose: Concussions rank among the top causes of pediatric traumatic brain injury; however, previous studies suggest concussion related knowledge in student athletes is lacking. As a result, Greenville County Schools issue student athletes a CDC authored Concussion Fact Sheet and consent form before student athletes step foot onto a field or court. This study aims to assess the efficacy of these efforts across different sports by measuring concussion knowledge and attitudes towards concussion reporting in Greenville County School System student athletes.

Methods: An online qualitative survey is being administered electronically to Greenville County School System student athletes. This retrospective observational cohort study continues to collect data on student athlete compliance to medical advice, student perceived attitudes of teachers and coaches to return to learn and play protocols, student confidence in knowledge about concussion signs and symptoms, actual student knowledge of concussion signs and symptoms, and student attitudes towards concussions and concussion reporting.

Results: We predict there to be no significant difference in concussion knowledge across sports based on previous studies; however, we predict there to be higher confidence levels of concussion knowledge and more negative attitudes towards concussion reporting in sports where concussion incidence is greatest.

Significance: If the data shows significant differences among sports, it will allow educators to tailor their interventions more specifically to sports with the largest knowledge gaps. In doing so, education may prove to be more effective in improving knowledge of and attitudes towards concussions among student athletes.

School of Medicine Greenville

Krystal Magwood

Assessing LGBTQ+ Competency, Comfort, and Education in Ob/Gyn residents

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Introduction: Research studies suggest that discrimination against persons within the LGBTQ+ community is associated with increased rates of psychiatric disorders, substance abuse, and suicide. These disparities could be a result of a shortage of healthcare providers with appropriate training and competency in LGBTQ+ health. Therefore, identifying gaps or areas of weakness within resident education may lead to a more knowledgeable workforce and ultimately a more inclusive and safer environment for LGBTQ+ patients.
Objective: To assess the comfort, competency, and educational experiences of South Carolina Ob/Gyn residents in providing care to patients within the LGBTQ+ population.
Methods: This was a self-administered survey of residents within Ob/Gyn residency programs in South Carolina. The survey was administered to residents in attendance at weekly didactic sessions of participating residency programs. Participation in the study was voluntary. The study was approved by the Institutional Review Board of the investigators' institution. The survey consists of 28 Likert scaled questions divided into three domains: comfort, competency, and training in delivering care to patients within the LGBTQ+ community.
Results: We aim for > 50% survey response rate. Perceived competence, comfort, and training of the residents to be analyzed using descriptive analyses. Means and standard deviations will be reported. Differences in mean responses will be compared using Student's t test and ANOVA for parametric data and Kruskal Wallis Test for nonparametric data.
Conclusion: This survey aims to provide insight into the educational experiences and needs of Ob/Gyn residents in the state of South Carolina regarding the LGBTQ+ population.

School of Medicine Greenville

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Dakota Makulec

PEComas

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C-Path's Cure Drug Repurposing Collaboratory

Background: Perivascular epithelioid cell tumors (PEComas) are tumors of mesenchyme made of perivascular epithelioid cells with smooth muscle expression. These tumors appear sporadically or in the context of tuberous sclerosis, and are usually benign, but can be malignant. The aim of the study is to identify genetics, epidemiology, and demographics associated with PEComas as part of a scoping review of PEComa treatments.
Methods: A systematic literature review using a pre-defined search string on PubMed was conducted to analyze current research on drug therapies for PEComa. Articles available in English discussing PEComa drug therapies were eligible for inclusion. A total of 1267 articles were retrieved and uploaded in Rayyan for review. The title-abstract screening was done for 1267 articles. A total of 197 articles were included for full-text screening. Reviewers screened included articles for genetic subtypes, epidemiologic data, and demographic information. A second-pass full text review will be completed. Following this, reviewers will perform data entry and analysis on an excel workbook containing predefined variables in the form of a case report form.
Results: Data analysis is still underway. The most commonly found genetic mutations are in the TSC1 and TSC2 genes (tuberous sclerosis complex). Reviewers found that TFE3 gene rearrangement was also associated with PEComas in some articles, as well as a gender skew to females.
Discussion: Many PEComas found are associated with TSC. Understanding PEComas and their related genetics and demographics will help to further the creation of targeted therapies and treatments to provide a better outcome to patients.

UofSC School of Medicine Greenville

Summer Research Scholar funded by UofSC SOMG and the Sargent Foundation

Sanjana Mandilwar

Platelet Activating Factor Enhances FcR Expression in Human Sperm

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UofSC SOMG, Department of Biomedical Sciences

Introduction: Platelet-activating factor (PAF) is a signaling phospholipid that plays an important role in functional spermatozoa physiology and subsequent embryonic development and implantation. In spermatozoa, PAF functions to increase intracellular calcium levels which affects motility. Further, PAF has been associated with an increase in fertility and improved pregnancy outcomes. Human sperm contain a membrane bound Fc Receptor (FcR) that is associated with many different operations critical for effector cell function. FcR activity appears to move in cyclic waves that correspond to fertility potential. The relationship between PAF and FcR expression is currently unknown. The study objective was to determine the effect of exogenous PAF on FcR in human spermatozoa.

Materials and Methods: Washed (seminal fluid free) human semen samples (Prisma Health Andrology) were split equally, one served as control (untreated) while the second was exposed to exogenous PAF (10-7M) for 15 minutes. Both samples were subsequently processed with a commercially available FcR assay (Arex Life Sciences) per manufacturer's instructions and analyzed via flow cytometry.

Results: Preliminary results show a relative positive change in FcR expression in the PAF over the control spermatozoa samples.

Discussion: Provided the known current mechanism of action of PAF on the physiology of spermatozoa, the data suggests that the FcR plays a pivotal role in cell sperm motility and fertilization potential.

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Summer Research Scholar funded by UofSC SOMG and the Sargent Foundation

Mary Britt McDonald

Extra-Esophageal Eosinophilia in Patients with Eosinophilic Esophagitis

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Eosinophilic gastrointestinal disorders (EGIDs) include Eosinophilic Esophagitis (EoE), Eosinophilic Gastritis (EG), and Eosinophilic Duodenitis (ED). EoE is characterized by increased eosinophils isolated to the esophagus and is often managed differently from the non-EoE EGIDs, which are rare, poorly defined, and challenging to treat. The purpose of this study is to determine how frequently patients with an established diagnosis of EoE subsequently develop eosinophilia in the stomach and/or duodenum, and to determine if density of eosinophils in these locations persists over time and correlates with symptoms. We retrospectively analyzed EGDs performed on a population of 428 pediatric EoE patients treated at a single tertiary care center between 2004-2021. 245 patients with EoE had 3 or more endoscopies performed. Of those patients, 26 developed increased eosinophils in the stomach and/or duodenum on at least one subsequent endoscopy. 23 patients had increased eosinophils in the stomach, while 7 patients had increased eosinophils in the duodenum. Among these patients, the extra-esophageal eosinophilia recurred in 3 of 26 patients. Symptoms suggestive of extra-esophageal disease were present in 65% of patients. Patients with EoE occasionally develop eosinophilia in the stomach and/or duodenum on subsequent biopsies, which may lead to recharacterization of their disease to a different EGID. In our database, over 10% of EoE patients were found to have eosinophilia elsewhere in the GI tract at some point post-diagnosis. However, this finding persisted in only 3 of 26 patients. Symptoms and eosinophilic density may help determine if eosinophilia signifies another EGID vs an incidental finding.

Student stipend provided by the Prisma Health Department of Pediatrics

School of Medicine Greenville

Fadiana Mendoza

School of Medicine Greenville

Effects of Age and Gender on Empathy in EMS Personnel

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Background: Empathy is a fundamental building block in the relationship between patients and pre healthcare providers. Past literature has explored interpersonal behaviors of EMS personnel and the impacts on patient outcomes; however, there are limited studies available examining age and gender differences and their effect on empathy in prehospital healthcare. The objective of this study is to analyze the effects of provider demographics on empathy in EMS personnel.
Methods: Thirty EMS professionals, 10 paramedics and 20 EMTs, from Greenville County EMS were assessed. Of the 30 EMS personnel, 17 identified as female and 12 identified as male. Cognitive empathy, measured with the Reading the Mind in the Eyes Test (RMET) and affective empathy, measured with the Toronto Empathy Questionnaire (TEQ) were administered via Redcap prior to a 12-hour EMS shift.
Results: The effect of gender on cognitive and affective empathy was assessed with a multivariate analysis of variance. No significant effect of gender was found. However, a Pearson correlation revealed a moderate, positive correlation between TEQ and age, $r(58) = .437$, $p < .001$. RMET was not found to be significantly affected by age or associated with TEQ.
Conclusions: For EMS personnel, older providers demonstrated increased affective empathy. . However, affective and cognitive empathy were perceived distinctly, which is unique to this study. Unlike other studies, there was no effect of gender on empathy. Further research should explore the relationship between empathy in EMS personnel based on age and years of experience, and the impact different types of on self-reported empathy.

Andrew Miller

Thinking about diabetes: illness perception in patients with diabetes

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Prisma Health, Department of Internal Medicine

Introduction: Diabetes mellitus, a condition marked by hyperglycemia, either due to insulin resistance or insufficient levels of insulin in the blood, affects more than 37 million people in the United States alone, and was listed as the 7th leading cause of death in 2019. With such a burden, new understandings of treatments, management, and therapies as well as insights into patients' thinking are necessary to reduce the morbidity and mortality.

Aim/Purpose: This study is aimed to look at patient illness perception to obtain a baseline understanding of what patients believe causes their diabetes and analyze differences in illness perception between populations of diabetics in the upstate of South Carolina.

Methods: Patients (n=17) were interviewed in person using a revised version of the Brief Illness Perception Questionnaire (IPQ) and recorded using RedCap. A t-test analysis was used to determine if any statistical differences were found between groups.

Findings: The top 5 most common reported cause were hereditary (76.5%), patient's own behavior (76.5%), diet or eating habits (70.6%), patient's emotional state (64.7%), and aging (64.7%). Differences between groups based on gender and ethnicity are expected once data has been analyzed.

Conclusion: This information gives a look into the thoughts of diabetic patients in the Upstate of South Carolina and can be valuable as physicians consider the role of education in diabetes management and treatment. Further studies should investigate the connection between illness perception and educational impact on patients.

USC School of Medicine Greenville

Project funded by the Prisma Health Department of Internal Medicine

Brittany Moore

Diverticulitis in Octogenarians

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Diverticulitis is a colonic disease that is common in the elderly population, but surgical treatment can be difficult due to complications such as advancing age and prior medical diagnoses. More minimally invasive surgical techniques, such as laparoscopic and robotic-assisted surgeries, have shown to be associated with reduced morbidity and mortality rates for diverticulitis cases. This study will examine diverticulitis in octogenarians at Prisma Health-Upstate, specifically investigating the types of treatments that patients received and the outcomes of those interventions. A retrospective chart review was conducted using patients between the ages of 80 and 89 who were diagnosed with diverticulitis at Prisma Health-Upstate from January 2017 to May 2022. Data was collected from the patients' electronic health records and entered into a REDCap database. This data was then compared to a similar data set from a control group of patients younger than 80 and older than 89. Data collection and analysis is still in progress.

Student stipend provided by the Prisma Health Department of Surgery

School of Medicine Greenville

Zachary Morgan

School of Medicine Greenville

Evaluating Physical Activity, Behavior, and Skeletal Muscle Mitochondrial Oxidative Capacity in Breast Cancer Patients using Near-Infrared Spectroscopy

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UofSC SOMG, Department of Biomedical Sciences

Adjuvant chemotherapy is a known cause of mitochondrial dysfunction and cachexia. This dysfunction is often associated with increased fatigue, sedentary lifestyle, and risk of cardiovascular disease, while decreasing physical activity levels and muscle strength. As a result, patients with cancer undergoing adjuvant chemotherapy experience a decrease in health-related quality of life. The purpose of this ongoing mixed-methods cohort study is to determine if physical activity at baseline and throughout chemotherapy regimens correlates with mitochondrial oxygenation function and fatigue. Non-metastatic breast cancer patients are recruited before their first chemotherapy infusion. Physical activity behavior will be tracked at baseline and throughout chemotherapy treatment regimens using a physical activity recall (PAR) questionnaire. Following the FITT-VP principle, subjective intensity physical activity levels will be converted to metabolic equivalents (METs), allowing for the calculation of both volume and progression. This data will then be compared to trends in oxygenated and deoxygenated hemoglobin, using near infrared spectroscopy (NIRS) assessment of mitochondrial oxygenation capacity of the vastus lateralis muscle. Mitochondrial oxygenation will be measured under moderately intense exercise on a stationary ergonometric bike. It is anticipated that patients with higher physical activity levels at baseline and throughout their chemotherapy treatment regiment will maintain lower levels of mitochondrial dysfunction, indicating an increased resistance to chemotherapy-induced fatigue. The results of this study will provide insight into how physical activity prior to and during chemotherapy treatment can be used to alleviate chemotherapy-induced fatigue and maintain mitochondrial oxygenation function for breast cancer patients.

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Sydney Morris

Evaluating the correlation between accuracy of FAST exams in pediatric patients with blunt abdominal trauma and level of resident training

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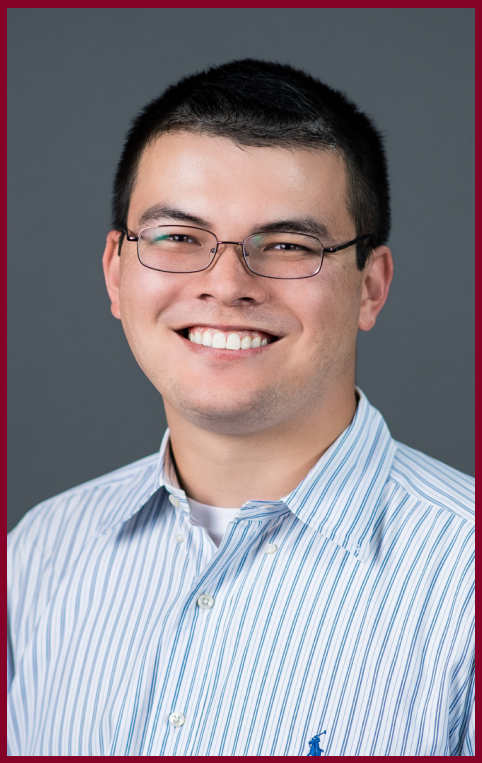
Prisma Health, Department of Pediatrics

Traumatic injury is a leading cause of disability and death in pediatric patients. Blunt abdominal injuries account for roughly 90% of all cases and if missed can have profound consequences. Abdominal ultrasound may be done in the acute care setting to determine if there is free fluid in the pelvis or around the heart, liver, or spleen. While ultrasound has been proven to be beneficial, its lack of sensitivity often warrants use of additional imaging techniques such as CT. This may be due in part to lack of training and interrater reliability among those performing and interpreting the exams and calls into question the utilization of FAST as a diagnostic technique. This retrospective chart review will examine 1,003 patients aged 0 to 17 years presenting to the Prisma Health Emergency Department for blunt abdominal injury from 01 January 2017 through 31 December 2021. It will evaluate the accuracy of FAST exams and determine if a correlation exists between diagnoses and level of provider and/or interpreter training. This research is still currently ongoing, but we believe the results of this study will have implications on the process and quality of care for pediatric trauma patients as well as medical ultrasonography training.

Summer Research Scholar funded by UofSC SOMG and the Sargent Foundation

School of Medicine Greenville



Daniel Ngov

School of Medicine Greenville

Radiation Dosage to Patients During Prostatic Artery Embolization

Daniel H. Ngov, Christine Schammel, Aron M. Devane
Prisma Health, Department of Radiology and Pathology Associates

Background: Prostate artery embolization (PAE) is a minimally invasive treatment for benign prostatic hyperplasia (BPH), and imaging is indispensable for the technical success of PAE. Consequently, imaging is a major source of radiation exposure for patients and healthcare providers.
Objectives: Radiation emission during PAE procedures at a single institution was evaluated and compared to published reports to evaluate radiation exposure of patients and healthcare providers, and ultimately work towards minimizing exposure.
Materials and Methods: Following IRB approval, all patients at a single institution that underwent outpatient unilateral/bilateral PAE between 1/4/2019 and 11/16/2021 were retrospectively evaluated. Typical demographic and clinicopathologic data were collected to include patients' body mass index (BMI), prostate volume, and indications for PAE. Technical parameters recorded were air kerma (AK), procedure time, fluoroscopy time, number of acquisitions, and intra-procedural imaging modalities. Fisher's t-test, ANOVA and Chi-square analyses were used as appropriate for statistical analysis ($p<0.05$).
Results: Overall, 56 patients were included in the study. BMI (obesity; $p=0.0017$) was a significant predictor of increased AK; prostate size and bilateral vs. unilateral PAE were not significantly associated with increased AK despite the number of acquisitions being significantly different between bilateral and unilateral embolizations ($p=0.0064$).
Conclusions: When evaluating radiation exposure during PAE, obesity was the most significant predictor of increased AK. Contrary to the literature, the extent of embolization (bilateral vs. unilateral) was not associated with increased AK despite higher acquisitions and procedure time associated with bilateral PAE. Increased radiation protection efforts should be considered for patients with higher BMI.

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Dieu Thao Nguyen

School of Medicine Greenville

Identification of specific genes in blastocoel fluid of IVF-embryos from women of advanced maternal age

Dieu Thao L. Nguyen, Hannah C. Archer, Carson M. Collins, Kayla Vaillant, T. Arthur Chang, Rich Kordus, Lisa Green, Molly A. Riehs, Sarayu R. Bethi, Renee Chosed
UofSC SoMG, Department of Biomedical Sciences

Introduction: Women ≥35 years old are categorized as "advanced maternal age" (AMA) and are at an increased risk for a decline in ovarian reserve and oocyte competence. Therefore, they may seek fertility assistance through IVF. Pre-implantation genetic testing for aneuploidy (PGT-A) is recommended to AMA women undergoing IVF to determine an embryo's ploidy status. However, PGT-A findings are currently a point of contention due to mosaicism.
Purpose: To identify gene expression patterns found in blastocoel fluid from IVF-embryos from mothers of advanced maternal age that resulted in successful pregnancy outcomes.
Method: Blastocoel fluid-conditioned media was collected from day-5 IVF-embryos that underwent PGT-A biopsy. RNA was purified from the fluid and cDNA was synthesized. Genes identified from a previous RNASeq study were selected for further analysis using RT-qPCR. GAPDH, BCL2L12, CUL2, SHARPIN and DRAP1 gene expression were assessed using RT-qPCR in blastocoel fluid samples from AMA mothers and mothers <35.
Findings: Preliminary analysis on 78 blastocoel fluid samples, indicates that BCL2L12, SHARPIN, and DRAP1 are upregulated in AMA samples.
Conclusions: Initial findings suggest that BCL2L12, SHARPIN, and DRAP1 genes might be associated with AMA. BCL2L12 is an anti-apoptotic gene involved in regulated cell death. SHARPIN stimulates the formation of linear ubiquitin which regulates NF-KB signaling and inhibits extrinsic apoptosis. DRAP1 regulates gene transcription, while CUL2 supports ubiquitin ligase activities within cells. Ongoing studies aim to identify gene expression patterns associated with AMA, which could serve as an additional marker alongside PGT-A to aid in selecting the most viable embryo for transfer.

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Catherine O'Leary

School of Medicine Greenville

Studying the unique Social Determinants of Health for the 29203 Zip Code and greater Columbia area

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Prisma Health, Family and Preventative Medicine (Columbia, SC)

Introduction: Efforts to improve health equity should include informing healthcare providers about the specific needs of the unique patient population which they serve. Improving the understanding of the social determinants of health (SDOH) of the specific community that physicians are serving allows for targeted interventions based on population needs and prioritization of community partnerships.

Methods: In this study, responses to five specific SDOH screening questions were extracted from Epic for the 8,265 patients who visited Prisma Health Family Medicine Center (FMC) at Colonial Drive from March 2021 through May 2022. These responses were examined to determine the most common health barriers faced by the FMC patient population. The responses from patients residing in the 29203-zip code were compared to that of the rest of the FMC patient population for appreciable differences in SDOH.

Results: For all patients, regardless of zip code, financial resource strain was the most common social determinant of health barrier, with 33.1% of the population claiming financial instability, followed by food insecurity at 20.52% of respondents. Reported financial resource strain among patients residing in 29203 was higher than non-29203 FMC patients (40.9% vs 33.10%, respectively). However, food insecurity, housing insecurity, social connectivity, and transportation needs were within ± 5.0% when compared between 29203 and the larger population.

Discussion: FMC providers can benefit from the knowledge that a significant portion of their patient population may face financial instability and food insecurity, both of which can greatly impact patient and population health.

Chada Pitiranggon

Nutrition Optimization Before Bariatric Surgery: Does Required Dietitian Follow-up Improve Patient Outcomes?

Chada Pitiranggon, Deborah A. Hutcheon, John D. Scott
Prisma Health, Weight Loss Institute

Introduction: Obesity is the most rampant disease affecting the United States today with a prevalence of 41.9% from 2017-2020. The initial treatment of obesity consists of diet, exercise, and the aid of medication. When those methods fail, oftentimes bariatric surgery is seen as a way of treatment. Roux-en-Y Gastric Bypass (RYGB) and Vertical Sleeve Gastrectomy (VSG) are the surgeries offered by the Prisma Weight Loss Institution. A RYGB involves bypassing part of the small intestines to alter food absorption, while a VSG removes part of the stomach so that patients feel satisfied after ingesting smaller meals.
Methods: The purpose of this study is to identify and evaluate post-operative outcomes in patients who received a Roux-en-Y Gastric Bypass (RYGB) or Vertical Sleeve Gastrectomy (VSG) at the Prisma Health Weight Loss Institution. A retrospective chart review was conducted on 920 patients, using EPIC, to assess their nutrition optimization status prior to receiving bariatric surgery, whether the patients were placed on a nutrition hold prior to surgery, as well as how long patients followed up with a dietitian after receiving surgery and whether these factors affected their weight loss post-operatively.
Results: Data collection is still on-going.
Conclusions: Although this study is still on-going and in the data collection stage, it is expected that we will find a positive relationship between patients who followed up with their dietitian preoperatively and postoperatively and their weight loss. If so, this study will validate the efficacy and importance of integrating dietitian follow-up with bariatric surgery treatment.

UofSC School of Medicine Greenville

Summer Research Scholar funded by UofSC SOMG and the Sargent Foundation

Rebecca Pontius

The Malignant Risk of Benign Breast Disease in Patients in the Upstate

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Every year, approximately one million American women receive a diagnosis of benign breast disease. Benign breast disease describes the growth of non-malignant lesions within the breast. These include non-proliferative masses such as fibroadenomas and cysts, proliferative masses without atypia such as papillomas and radial scars, and proliferative masses with atypia such as atypical ductal hyperplasia (ADH) and atypical lobular hyperplasia (ALH). Surgical recommendations for these masses vary based on their respective associated risk of a nearby malignancy. In non-proliferative masses, no increased risk is observed. In proliferative masses without atypia, a 1.5-2.0 fold risk is reported. Proliferative lesions containing atypia carry a greater than 2.0 fold risk. Additionally, atypical hyperplasia (AH) has been suggested as a precursor lesion that may develop into breast cancer. In patients who develop breast cancer within the first ten years following a diagnosis of atypical hyperplasia (AH), the tumors predominantly occur in the ipsilateral breast. The specific rate of pathologic upstaging varies widely with each diagnosis, and with possible regional differences.

The overall goal of this retrospective study is to investigate the rate of pathological upstaging of papillomas, radial scars, ADH, and ALH on core needle biopsy at time of excision in patients in the Upstate region of South Carolina. Analyzing these conditions as individual diagnoses and their associated cancer risks will help healthcare professionals better select appropriate high-risk lesion management and screening methods. Data collection is currently ongoing. Future studies will investigate the 5-year risk of developing invasive carcinoma in patients with AH.

Uof SC School of Medicine Greenville

Shelby Rader

Longitudinal Assessment of the Relationship Between Sleep, Fatigue, Pain, Cognition, and Quality of Life in Breast Cancer Survivors

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UofSC SOMG, Department of Biomedical Sciences

Introduction: Existing research demonstrates that breast cancer survivors (BCS) report poor sleep, cognitive change, and fatigue as side effects of endocrine therapy (ET). This project aims to employ ReadiBand™ actigraph technology to capture real-time sleep, fatigue, and cognitive impairment data in a population of BCS on ET. Other studies have shown that patients report feeling dismissed or not taken seriously when discussing their experience of ET side effects with providers. This study aims to capture data on the patient perspective during clinical encounters in which sleep is discussed.
Methods: A sample of 50 participants were recruited from the Prisma Health Cancer Institute and set up with a ReadiBand™. Complementary data was captured using a RedCap survey at baseline, after one month, and at the study's conclusion. Survey instruments included a HOPE scale, ISI, PSQI, VOICES, PROPr, and PROMIS-Cognitive-Function-8a-SF. Participants were able to track their sleep data using the ReadiBand™ Application after one month of watch wear.
Results: Data collection are ongoing, but results are expected to show an increased correlation between objective and subjective measures of fatigue, cognition, and sleep with the use of a real-time feedback device by participants. Additionally, results are expected show an increase in participant reported confidence in discussing their sleep with their provider with the use of the ReadiBand™.
Conclusions: This study's findings could help inform sleep, fatigue, and cognition change mitigation for BCS. Additionally, this study may provide insight into the value of ReadiBand™ technology within clinical encounters.

School of Medicine Greenville

Summer Research Scholar funded by UofSC SOMG and the Sargent Foundation

Rachel Reed

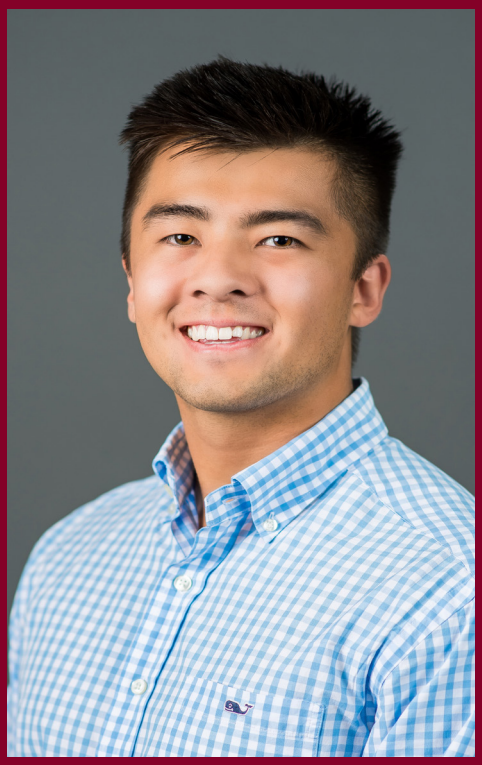
ExsoMed INnate Intramedullary Headless Screw Use for Metacarpal Fractures

Rachel J Reed, Andrew W Cross
Prisma Health, Department of Orthopedic Surgery

Many devices have been utilized for the repair of metacarpal fractures. While intramedullary compression screws have been shown to be a reliable technique for the repair of transverse and short oblique fractures of the metacarpal, they are not as effective for long oblique and comminuted fractures of the metacarpal due to their compressive nature. The ExsoMed INnate intramedullary headless screw is a more recent technology that features a non-compressive design and therefore may be a more favorable alternative. Thus far, there are no studies that describe the overall experience and complications of the ExsoMed INnate technology outside of content from the manufacturer. This study aims to fill this gap in the literature to better inform the treatment of metacarpal fractures. The objectives of this study are to 1) assess the overall experience of using the ExsoMed INnate intramedullary headless screw for metacarpal fractures at our institution and 2) evaluate any resulting complications. A retrospective chart review is being conducted of patients who received the ExsoMed INnate screw for metacarpal fracture(s) at the Prisma Health Hand Center in Greenville, SC from June 2019 to June 2022. 119 charts were identified for review with manual collection of data being performed utilizing EPIC and managed using REDCap. Descriptive statistics will be used to report experiences relating to complications and surgical outcomes. The conclusions resulting from this study will be beneficial to the treatment of future patients through the knowledge of best practices for metacarpal fracture repair.

School of Medicine Greenville

Summer Research Scholar funded by UofSC SOMG and the Sargent Foundation



Ryan Reyes

The Evaluation of Clinicopathologic Data of Synchronous Breast Cancer at a Single Institution

Reyes R, Guerry S, Edwards A, Gathers S, Fairbairn M, Self S, Rippon M, Schammel CMG, Schammel DP

Prisma Health, Department of Surgery and Pathology Associates

Background: Synchronous breast cancer (SBC) are two or more primary cancers that occur ipsilaterally or bilaterally within 12 months and accounts for up to 10% of all breast cancers. The increasing incidence of SBC leaves etiology uncertain; increased efficacy of imaging is thought to promote detection. SBC portends a worse prognosis (60% versus 78%), with 27% developing metastasis after 5 years. Controversy exists regarding accurate prognosis and treatment to optimize outcomes.

Methods: Following IRB approval, all patients with SNC diagnosed/treated at a single institution between 8/1/2015 6/1/2022 were retrospectively evaluated; typical demographic and clinicopathologic data were collected to include radiologic presentation, histology, treatments and outcomes.

Results: Overall, 82 patients with SBC were identified. Average age was 58; 59% having a family history of breast cancer. 73% had bilateral and 27% had ipsilateral SBC. Surgery was completed on 98% of patients (80 of 82. Post-surgery histology per tumor showed 37% IDC, 92% ER+, 85% PR+, and 86% HER-. 88% had diagnostic mammograms, 77% had MRIs, and 88% had ultrasound. To date, 17% of patients developed metastasis. 89% (73) of patients are alive and 11% (9) are deceased.

Conclusion: Since the etiology of SBC remains uncertain, increased imaging is sought to improve prognosis of SBC. This study shows patients most often having primarily IDC, ER+, and HER2- tumors due to early detection of both MRI and ultrasound with biopsy. Most patients have not developed metastasis, a lower rate compared to previous literature. Considering this, mammographic screenings should be administered more frequently to detect and prevent metastasis.

Summer Research Scholar funded by UofSC SOMG and the Sargent Foundation

School of Medicine Greenville

Isabelle Robinson

The Impact of COVID on Medical Education: Evaluation of Immunology Module Performance in In-Person vs Virtual Course Presentation

Isabelle L. Robinson, Penny S. Edwards, Renee J. Chosed, Jennifer T. Grier

UofSC SOMG, Department of Biomedical Sciences

Background: In March of 2020, education across the world transitioned to virtual delivery and medical education was not immune. The quality of online education at all levels of learning has been questioned by parents, students, and instructors alike, however comparisons of student performance between in-person and virtual delivery of the same medical course have not been fully investigated.

Purpose: This research aimed to explore the efficacy of virtual medical education during the COVID-19 pandemic by comparing the 2019 and 2020 Immunology course offered at the University of South Carolina School of Medicine Greenville.

Methods: The project compared course material provided between the two years, as well as compared overall course performance and performance by objective as outlined in course presentations. Deidentified student data from 61 final exam questions that did not differ between the two years will be analyzed to assess student performance in the course by topic, delivery method and resources. Prism GraphPad 9 will be used for statistical analysis.

Results: In addition to changes in content delivery, formative Canvas quizzes were generated in 2020 to replace lecture review questions and the total number of Clinical cases decreased. The student performance results have not been processed in their entirety.

Conclusions: Once results have been obtained, the hope is to draw conclusions on whether virtual education during the COVID-19 pandemic affected final Immunology exam outcomes and identify successful strategies for student learning. Overall, this study may have implications for students educated during COVID and for medical education as a whole.

Summer Research Scholar funded by UofSC SOMG and the Sargent Foundation

School of Medicine Greenville

Stephan Robinson

Neutrophil NFkB Response to Aspergillus Fumigatus in Zebrafish Models

Stephan L Robinson, Emily E Rosowski
Clemson University, Eukaryotic Pathogens Innovation Center

My time at Clemson's EPIC MEnTOR Program has mainly involved researching the primary cell or immune cell(s) responsible for acting when NFkB is released in response to a fungal infection. Aspergillus Fumigatus is a fungus with a cell wall that consists of a beta-glucan polymer that is recognized by Dectin-1 receptors on host immune cells and epithelial cells. Zymosan is a large glucan particle with repeating glucose units that will be injected into the hindbrains of zebrafish to mimic infection by A. Fumigatus. The focus of my research is to investigate the relationship of NFkB downstream signals and its impact on neutrophils in host zebrafish models (in response to A. Fumigatus infections). A double cross of irf8 +/- heterogenous zebrafish will be used to select for irf8 -/- offspring, which will expressively lack macrophages. There will be a NFkB::GFP transgenic irf8 +/- zebrafish line, and a lyz::BFP transgenic irf8+/- line. These transgenic lines will produce offspring that can be fluorescently visualized with a green (NFkB::GFP) signal, and a blue (lyz::BFP) signal. Once the offspring are screened, the irf8 +/- and irf8 -/- zebrafish larva will be injected with zymosan. The infected larva will then be visualized on a Zeiss Spinning Disk Confocal Microscope where an 18hr timelapse of the NFkB (GFP), neutrophils (lyz::BFP), and zymosan host-pathogen interaction will be captured. I will analyze the images, collect data, and genotype (via PCR) the zebrafish to validate the data.

USC School of Medicine Greenville

Student stipend and project funded by the Clemson EPIC MEnTOR Program

Miles Rothstein

School of Medicine Greenville

Effects of Chemotherapy Regimens on Skeletal Muscle Mitochondrial Function in Breast Cancer Patients Measured by Near Infrared Spectroscopy

Miles B Rothstein, Garrett E Smith, Zach Morgan, Frankie Bennet, Sara Biddle, Randy Hutchinson, Jennifer Trilk
UofSC SOMG, Department of Biomedical Sciences

Chemotherapeutic drugs have shown to decrease skeletal muscle mitochondrial function of cancer patients. It has been suggested that this dysfunction plays a role in cachexia, increasing the risk for chemotherapy-associated morbidity and mortality. Traditional methods to measure mitochondrial function have relied on invasive techniques such as muscle biopsy. In this study, we leveraged a non-invasive method called Near-Infrared Spectroscopy (NIRS) using the PortaMon device to measure real-time mitochondrial function of the vastus lateralis muscle during exercise. This is a convergent, mixed-methods, cohort study currently examining 6 non-metastatic breast-cancer patients undergoing standard-of-care chemotherapy regimens. Participants complete an on/off kinetics cycling effort on a stationary ergonometric bike during which NIRS data, VO2/kg, heart rate, and rate of perceived exertion are measured. Patients return for testing within 5 days of subsequent chemotherapy infusions. Additionally, participants complete the Brief Fatigue Index (BFI) and PROMIS Global Health surveys. Preliminary analysis of oxy-Hb content and reoxygenation duration of the vastus lateralis were examined with descriptive statistics. Future NIRS data will be analyzed through one-way ANOVA at a significance level of $\alpha < 0.05$. A decrease in magnitude of the difference of oxy-Hb levels between rest and exercise was observed when comparing average pre-treatment levels to intra-treatment levels. These early outcomes suggest that the PortaMon device provides a valid, non-invasive method of measuring mitochondrial function in patients undergoing chemotherapy. With additional data, the results of this project may provide insight into the relationship between chemotherapy and cachexia, potentially influencing treatment practices to reduce this effect.

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Courtney Rucker

Using Endogenous Myc-tagging to Locate Fatty Acid Metabolism Proteins in *Trypanosoma Brucei*, the causative agent in African trypanosomiasis

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Trypanosoma brucei, an extracellular parasite that leads to the endemic vector-borne disease African trypanosomiasis, readily uptakes the host's nutrients, one of which is lipids. Our lab recently discovered that the fatty acid synthesis and metabolism pathways are potential therapeutic pathways to combat *T. brucei* infection. However, little is known about the mechanism *T. brucei* uses to uptake fatty acids and the exact locations of the fatty acid uptake proteins. Our lab utilizes endogenous myc-tagging to target and investigate five different fatty acid metabolism proteins in this project. These proteins are acyl-CoA synthetase (ACS) 1-4 and plasma membrane fatty acid-binding protein (FABPpm) 1 and 2. The myc-tag on these proteins would allow us to see where the fatty acid metabolism proteins localize in trypanosome cells. The tagged gene inserts will then be incorporated into a bacterial plasmid and used to generate plasmid copies. Upon successful reproduction, the tagged gene of interest would be transfected into *T. brucei*, where the myc-tag is incorporated into the gene of interest via homologous recombination. We have successfully amplified the gene of interest and are currently working on generating plasmid copies with the gene of interest fused with myc-tag. Future work will determine whether the myc-tag is successfully fused with the gene of interest and whether the transfection of the gene construct is successfully performed.

School of Medicine Greenville

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Michael Russell

The Use of a Novel Barrier Skin and Muscle Retractor to Avoid Muscle Injury During Total Shoulder Arthroplasty

Michael J Russell, Stephan G Pill
Prisma Health, Department of Orthopaedic Surgery

Background: The challenge of improving enduring, surgical operations that have seen countless refinements requires the use of novel, unconventional instruments. The Alexis orthopaedic protector is a sturdy, yet flexible sleeve designed to encapsulate the site of operation and shield the surrounding tissues. The chief aim of this research was to assess the level of structural integrity preserved by substituting this instrument in the place of traditional metal retractors during total shoulder arthroplasties (TSA). Our hypothesis is that the use of this innovation will reduce collateral muscular damage.
Methods: To quantify the collateral damage, a 4-point scale assessing the integrity of the deltoid was devised. Then, the ensuing 120 patients were randomized into two populations of 60 patients each. The control group was operated on traditionally, whereas the experimental group was operated on using the instrument. The 3 operating surgical fellows then graded the muscles using the aforementioned scale.
Results: Currently, both populations of patients have received 54 of the anticipated 60 participants and the timeframe for completion remains no more than an additional week away. However, expectations are that the instrument will affirm the hypothesis.
Conclusions: These findings deliver a statistical basis for the original estimation behind this research study: metal retractors are significantly more injurious to the surrounding tissues than the novel Alexis orthopaedic protector. Ultimately, with additional studies/exposure leading to increased prevalence, this instrument can be the next evolution of TSA towards an operation that consistently delivers the highest quality outcome with the lowest incidence of complication.

School of Medicine Greenville

Summer Research Scholar funded by UofSC SOMG and the Sargent Foundation

Nicole Russell

Relationship between PAF and Fc Receptor in Sperm Cell Fertilization Potential

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UofSC SOMG, Department of Biomedical Sciences

Introduction: The Fc receptor (FcR) is a membrane bound receptor that functions in ligand-triggered transmission signals across the plasma membrane which results in altered secretion, exocytosis, and increased intracellular calcium. The FcR on sperm cells has been shown to follow a cyclic pattern of expression that impacts sperm functionality and ultimately fertilization potential. Platelet-activating factor (PAF) is a signaling phospholipid that has been found to have a variety of reproductive roles, including induing capacitation and the acrosome reaction (an exocytosis process) plus enhanced IUI outcomes. PAF functions via a G-protein coupled receptor mediated pathway leading to increased intracellular calcium. The study objective was to determine if PAF effects FcR expression in the sea urchin, a time-honored model for developmental biology studies.

Methods and Materials: Sperm cells were harvested from gravid sea urchins following the injection of 0.5M KCl. Sperm cells were exposed to PAF (10-7M) for 15 minutes. PAF-exposed sperm cells were measured for FcR activity utilizing a specific FcR assay (Arex Life Sciences) per manufacturer's instructions. A control group (no PAF treatment) followed the same FcR assay procedure. Samples were measured for Fc receptor expression quantity via spectrometry (NanoDrop, ThermoFisher Scientific) at various time points.

Results: There was a significant ($P<0.01$) difference in FcR expression levels and cycling patterns between the PAF (6,452.14 RFU) group and the control (3,113.77 RFU) group.

Discussion: Our results indicate that PAF has a positive effect on FcR expression quantity and cycling patterns which may correlate to increased fertilization potential and pregnancy outcomes.

School of Medicine Greenville

Summer Research Scholar funded by UofSC SOMG and the Sargent Foundation

Kyle Russi

Urothelial Cancer Case Report

Kyle E. Russi, Adam D. Brockway, Ainsley R. Hartman, Avery C. Phelps, Emma R. Webb, Ryan P. Werntz

Prisma Health, Department of Surgery

We report a case of a 58 year old male with a history of low grade upper tract urothelial cancer. Initially a laparoscopic nephrectomy with total ureterectomy was preformed and negative margins were noted. 9 months post-op tumors reappeared, believed to be due to tumor spillage. The challenging decision was made to proceed with a surgical intervention versus a systemic therapy because tumor spillage is a local problem. After 2 more surgeries and at the time of writing this case report our patient has not had any more reseeding of the urothelial carcinoma and is currently in remission.

Student stipend provided by the Prisma Health Department of Surgery

School of Medicine Greenville

Madison Ryan

The Role of IFI44 in Post-Viral Inflammation

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Following infection with an RNA virus an endogenous intracellular immune response is triggered, leading to expression of hundreds of genes and setting the stage for innate and adaptive immune responses. Interferon stimulated genes encode for a subset of proteins that are upregulated in viral infection. However, the function of many of these genes, including Interferon-alpha-inducible-protein 44 (IFI44), remains unclear. IFI44 is upregulated in viral infections like SARS-CoV-2 and respiratory syncytial virus (RSV), as well as the autoimmune disease systemic lupus erythematosus. With its increased expression in both viral infection and autoimmune disease, understanding of the mechanistic nature of IFI44 in these inflammatory processes could prove helpful diagnostically and in development of immunotherapies. The goal of this study is to assess the effect of IFI44 on gene and protein expression of inflammatory cytokines such as IL-1,6, 8, interferon gamma, and tumor necrosis factor alpha. To start, we determined that IFI44 expression peaks in wild-type A549 human alveolar epithelial cells at 8 hours after treatment. Next, IFI44 knockout (KO) A549 cells were generated via CRISPR-Cas9, to compare inflammatory cytokine expression in response to viral stimulation in the presence or absence of IFI44. Preliminary results confirmed the IFI44 knockouts by sanger sequencing, and ongoing work will assess cytokine expression in IFI44 KO cells compared to wild type cells after viral stimulation to determine the impact of IFI44 on inflammatory immune responses. These findings can then indicate targets for future therapies as well as serve as biological markers of disease.

School of Medicine Greenville

Summer Research Scholar funded by UofSC SOMG and the Sargent Foundation

Alia Sadek

School of Medicine Greenville

Identifying Mechanisms of Resistance in Novel Necrotizing Fasciitis *Acinetobacter baumannii* Isolates

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Background: Acinetobacter baumannii is one of the world's most multi-drug resistant (MDR) pathogens. Traditionally responsible for causing nosocomial pneumonia and bacteremia, novel strains of A. baumannii have been increasingly isolated from fatal cases of necrotizing fasciitis (NF; i.e. flesh-eating disease) over the past decade. These MDR NF A. baumannii (NFAb) strains display an enhanced virulence uncharacteristic of type strains, and evade the host immune system via unknown mechanisms. This study aims to elucidate (1) how NFAb isolates enter human-derived THP-1 macrophages and (2) what virulence factors propagate their resistance in the host immune cell niche.

Methods: To identify the mechanism of host cell entry, a subset of macrophages were pre-treated with Cytochalasin D, an inhibitor of phagocytosis. Novel NFAb isolates from a fatal case of NF were cultured then incubated with macrophages in-vitro. After, macrophages were treated with colistin to kill remaining extracellular bacteria and lysed to collect intracellular bacteria. Samples were then processed for quantification of colony forming units. To identify virulence factors involved in the infection process, extracellular, intracellular, and cell-free bacterial samples were collected for total RNA sequencing.

Results: Similar to type strains, NFAb isolates must be engulfed to enter THP-1 macrophages. However, both isolates displayed greater intracellular entry and survival under normal conditions. As such, we hypothesize NFAb isolates possess atypical expression profiles before and after uptake to maximize intracellular infection.

Conclusion: Our study will identify virulence factors unique to MDR A. baumannii strains that facilitate intracellular survival and provide potential targets for novel therapeutics.

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Gary Sayre

Diverticulitis Recurrence: A Comparison of Robotic vs Open and Laparoscopic Sigmoidectomy

Gary Sayre, Mya Beasley, Bryce Humpert, Kalie Goodman, Patrick Culumovic

Prisma Health, Department of Surgery

Objectives: Recurrence of diverticular disease after sigmoid resection has been shown to be as high as 15%. Patients who experience recurrent diverticular attacks often have only one choice in definitive treatment options: surgery. However, there has been no investigation comparing the rates of disease recurrence following the three major routes of surgical intervention. We aimed to look at the recurrence of diverticular disease after elective robotic sigmoidectomy compared to laparoscopic and open.

Methods: This is a retrospective review using EPIC data based on CPT/ICD 10 codes of patient encounters. A database of n=629 patients was assembled. The data was collected and managed using REDCap software. For patients to be considered for this study they had to have a history of diverticulitis and as a result undergone an elective sigmoidectomy.

Results: Data is still under collection. Early trends suggest there is an increased risk of recurrence after robotic sigmoidectomy, however statistical analysis has not yet been performed.

Conclusion: Preliminary results suggest that there is a higher risk of diverticulitis recurrence following robotic sigmoidectomy. These findings need to be considered when discussing the potential benefits and drawbacks of robotic, laparoscopic, and open surgery routes. This will allow surgeons to better counsel patients and as well as enable patients to make a more informed decision regarding their elective sigmoidectomy.

School of Medicine Greenville

Student stipend provided by the Prisma Health Department of Surgery

Erica Schumann

Resolution of anemia following paraesophageal hernia repair

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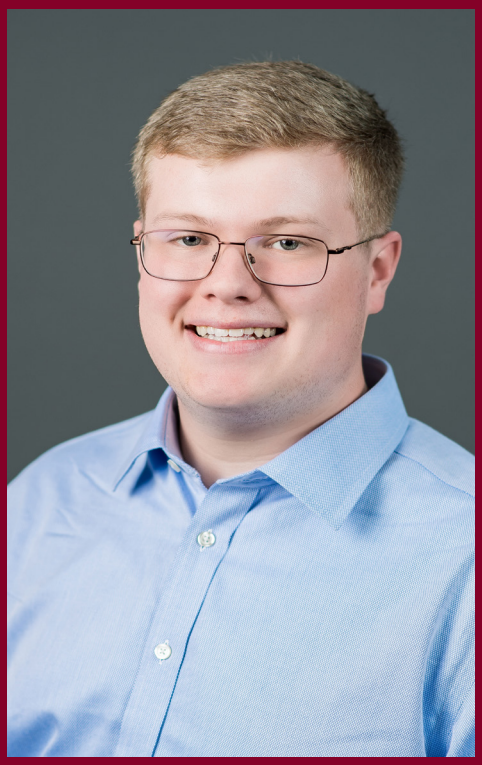
Paraesophageal hernias have been associated with chronic blood loss leading to iron deficiency anemia. While this connection has been well documented with numerous studies and large sample sizes, the resolution of anemia following surgical repair has not. This study aims to evaluate the hemoglobin levels of anemic patients undergoing paraoesophageal hernia repair pre- and post-operation. Chart review was conducted on 1,293 patients to look for the presence of ulcers, Cameron's lesions, and pre-operative anemia. Of the patients with a positive finding for one of those criteria, hemoglobin levels were compared both prior to surgery and at a series of intervals following discharge up to 24 months following surgery. This research is still in progress and results have not been analyzed at this point. These results will help to clarify whether or not paraesophageal hernia repair leads to resolution of iron deficiency anemia and if this should be an indication for the surgery.

School of Medicine Greenville

Student stipend provided by the Prisma Health Department of Surgery



Jonah Shealy

Analysis of Patient Galectin Profiles by Breast Cancer Subtypes and Patient Characteristics

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UofSC SOMG, Department of Biomedical Sciences

Galectins are sugar-binding proteins found in the human body both extracellularly and intracellularly. They have been commonly correlated with development and progression of cancer, and galectin inhibitors have been successfully used as cancer therapy. However, important details about galectins' expression in specific subtypes of cancer represent a knowledge gap. The goal of this study is to compare the concentrations of galectins -1, -3, and -7 in breast cancer patient samples by molecular and histological subtype, receptor expression, as well as other tumor attributes and patient characteristics. We used Enzyme-linked Immunosorbent Assay (ELISA) technology to establish the concentration of each galectin in 100 breast cancer patient serum samples. Our preliminary results show that patients with invasive lobular carcinoma, the second most common histological subtype of breast cancer, have significantly higher serum concentrations of galectin-3 compared to patients with invasive ductal carcinoma, the most common histological subtype of breast cancer. Other results for galectin-3 include lower concentrations in patients who underwent chemotherapy versus those who did not and higher concentrations in patients who currently smoked compared to those who never smoked. The findings of this project will provide information for the design of more accurate breast cancer diagnostics and new therapeutic approaches.

School of Medicine Greenville

Summer Research Scholar funded by UofSC SOMG and the Sargent Foundation

George Skenteris

School of Medicine Greenville

Effectiveness of cholangioscopy guided biopsy versus ERCP guided brushings in diagnosing malignant biliary strictures

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Stella Self, David P Schammel, Wesley B Jones, Mike Devane, Christine Schammel
Pathology Associates, Prisma Health

Background: Evaluation of lesions of the biliary tract are essential to diagnose given the notoriously dismal outcomes of cholangiocarcinoma. Historically, these diagnoses were made using brush biopsies obtained under Endoscopic Retrograde Cholangiopancreatography (ERCP). To increase the efficacy of biliary biopsies, SpyGlass™ Discover cholangioscopy guided biopsy has been developed, providing greater tissue yield and direct visualization of the biliary epithelium. We evaluated the diagnostic accuracy of ERCP guided brushings and SpyGlass™ Discover guided biopsies at a single institution.
Methods: Following IRB approval, all diagnostic biliary biopsies utilizing both ERCP guided brushings and/or SpyGlass™ Discover between 8/2015 and 6/2022 were retrospectively evaluated. Typical demographic and clinicopathologic data were collected. Fischer's t-tests and Chi-square analyses were completed as appropriate ($p<0.05$).
Results: Overall 46 patients with an average age of 61 years were included in this study; 59% of the patients were female and 41% were male. 87% of patients had at least one SpyGlass™ Discover guided biopsy and one ERCP guided brushing and 13% of patients had at least one SpyGlass™ Discover guided biopsy alone. SpyGlass™ Discover correctly identified 82% of malignancies while brushings identified only 47% of malignancies.
Conclusions: SpyGlass™ Discover guided biopsies are more efficacious than ERCP guided brushings. Therefore, SpyGlass™ Discover alone should be considered as the standard for diagnosing biliary lesions at our institution. The classification of visual characteristics of biliary lesions should be investigated in the future as the high-resolution image generated by SpyGlass™ Discover can allow for detailed visual observation of strictures and potentially aid in diagnosis.

Summer Research Scholar funded by UofSC SOMG and the Sargent Foundation

Garrett Smith

School of Medicine Greenville

Effects of Chemotherapy Regimens on Skeletal Muscle Mitochondrial Function in Breast Cancer and Gynecological Cancer Patients Measured by NIRS

Garrett E Smith, Miles Rothstein, Zach Morgan, Sara Biddel, Frankie Bennett, Randy Hutchison, Jennifer Trilk
UofSC SOMG, Department of Biomedical Sciences

Background: Cancer patients undergoing chemotherapy can experience treatment related oxidative stress which leads to skeletal muscle mitochondrial dysfunction, reduced cardiorespiratory fitness, and ultimately, cachexia. These risk factors leading to cachexia have increased morbidity and mortality rates among the cancer patient population. Near infrared spectroscopy (NIRS) allows for the measurement of mitochondrial dysfunction and provides a non-invasive alternative for chemotherapy patients.
Purpose: To assess the effects of various chemotherapy regimens on skeletal muscle mitochondrial function during exercise throughout treatment in breast cancer and gynecological cancer patients, using near infrared spectroscopy.
Methods: Non-metastatic breast cancer and gynecologic cancer patients will be recruited prior to the initiation of chemotherapy regimens. Changes in oxygenated and deoxygenated hemoglobin of the vastus lateralis muscle will be measured utilizing the NIRS PortaMon device to assess mitochondrial function. Within five days prior to every infusion during their chemotherapy regimen, participants will perform moderately intense exercise on a stationary ergonometric bike. Data will be analyzed by one-way ANOVA to detect differences in mitochondrial oxidative capacity between chemotherapy regimens. An average oxyhemoglobin (tau) at rest will be obtained to assess the patient's oxyhemoglobin recovery time. Between treatment differences will be considered statistically significant at < 0.05.
Results/Discussion: Across breast cancer chemotherapy regimens, an increased average tau (in seconds) for patient's oxyhemoglobin levels to recover to baseline after moderately intense exercise has been observed thus far. Through a non-invasive test, the NIRS device has shown a promising approach for oncologists to determine the effects of differing chemotherapy regimens on mitochondrial function.

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Madison Stanley

School of Medicine Greenville

Comparison of Demographic and Pharmacological Characteristics of Vascular Dementia, Alzheimer's Disease, and Mixed Vascular and Alzheimer's Disease stratified by Gender

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Background: Gender differences among patients with vascular dementia (VaD), Alzheimer's disease (AD), and mixed vascular dementia and Alzheimer's disease (VDAD) is controversial in current literature. This study examined the gender differences among patients with VaD, AD, and VDAD using demographic and pharmacologic factors from a retrospective data registry.
Methods: Dementia data was collected from Prisma Health-Upstate from 2016 to 2021 for 6,039 VaD patients, 9,290 AD patients, and 412 VDAD patients. A logistic regression model was performed of the demographic and pharmacological characteristics of the patients with VaD, AD, and VDAD to determine factors associated with gender differences.
Results: The statistical analysis showed AD patients had the highest rates of acetylcholinesterase inhibitor (CAI) use (63.3% vs. 45.7% vs. 50.0%) while VDAD patients had the highest rates of selective serotonin reuptake inhibitor (SSRI) use (41.5% vs. 38.8% vs. 33.0%) when compared to other dementia types. Older age in VaD patients was more associated with females (OR = 1.023, 95% CI, 1.017-1.029, $p<0.001$) and black race in AD (OR = 1.454, 95% CI, 1.257-1.682, $p<0.001$) and VaD (OR = 1.747, 95% CI, 1.486-2.053, $p<0.001$) patients was more associated with females compared to male patients. Female VaD patients were less likely to be using CAIs (42.3% vs. 49.9%) and SSRIs (37.5% vs. 40.3%) than male patients, while female AD patients were more likely to be using SSRIs compared to males (35.6% vs. 27.3%).
Conclusion: Our study revealed there are gender differences and similarities in the demographic and pharmacological factors of AD, VaD, and VDAD. Future studies can be conducted investigating each of these factors to improve treatment of AD, VaD, and VDAD.

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Ryan Stepp

Targeting Cryptococcus Caritine Biosynthesis: Meldonium (mildronate) inhibitor

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Clemson University, EPIC MEnTOR Program

Cryptococcus neoformans is a neglected fungal pathogen that affects nearly 220,000 people each year. It has been found that Cryptococcal meningitis prevalence overlaps with HIV prevalence where ~15% of all HIV-related deaths are due to cryptococcal meningitis. Of these cases, most are focused on sub-Saharan Africa where there is a high incidence of HIV. The current treatment for Cryptococcosis is Amphotericin B, 5-Fluorocytosine, and Fluconazole. However, these drugs are expensive for the average sub-Saharan African. Therefore, a cost effect drug needs to be created. Acetate has proven to be an important source of carbon during *C. neoformans* infections and allows for a way to inhibit growth through inhibition of its utilization. Our thought is focused on inhibition of the pathway for synthesis of carnitine, which transports acetyl CoA and fatty acids into the mitochondria. Meldonium (mildronate) has shown to inhibit the human gamma-butyrobetaine (GBB) hydroxylase, a key enzyme in the carnitine synthesis pathway, to treat angina, heart attack, heart failure, and other ischemic injuries. Our current research focuses on this inhibitor and its effect on the growth of Cryptococcus in an acetate and glucose rich environments. We have found that Meldonium shows inhibition on Cryptococcus growth in acetate at concentrations above 0.06 M. This is the first step towards creating a new drug in that the Cryptococcus enzyme shares little identity to the human enzyme, this will allow the development of meldonium derivatives that may be more effective against Cryptococcus.

School of Medicine Greenville

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Brooke Taylor

School of Medicine Greenville

The Effect of a Topical Cannabidiol on Pruritus

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Dermatology and Laser Center of the Carolinas

Background/Rationale: Treatments with cannabinoids (CBs) are becoming increasingly popular due to their anti-inflammatory effects. The role of cutaneous CB signaling in the complex cutaneous intercellular communication network make it a promising treatment option for pruritus. The assumption of this research is that the regular use of Canno Cream®, a CBD nano-cream, will decrease pruritus in patients with various dermatologic conditions.
Objectives: The primary objective is to determine if high potency cannabidiol nano-cream can decrease itch in patients with dermatologic conditions that cause itch.
Methods: The case series will assess patients with conditions that cause itch who are provided with Canno Cream®, a high potency cannabidiol nano-cream. Participants will be 12 adult patient who have dermatologic conditions causing pruritus. The patients will fill out a survey every day for 7 consecutive days rating their itch on a scale of 0 (no itch)-10 (worst itch imaginable). The scale use is called the worst-itch numerical rating scale (WI-NRS). The data from this survey will be collected and analyzed to determine the effect Canno Cream® has on pruritus.
Results: Research is still in progress.
Conclusion: Research is still in progress.

Michelle Troup

Trying to stay awake: Medical student exhaustion and fatigue on 12 hr EMT shifts

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Burnout poses a risk to health systems by decreasing quality of care and longevity of physicians in the workforce. It has been shown that burnout is not a phenomena only impacting established physicians, but also occurs during undergraduate medical education, steadily increasing across the four years. As components of burnout such as emotional exhaustion and cynicism have been shown to increase with increased sleepiness, medical students experiencing burnout may be at risk of increased sleepiness after a 12 hour EMT shift. From 2019-2021, 73 medical students were surveyed using the Maslach Burnout Inventory (MBI) at baseline and Stanford Sleepiness Scale pre and post a 12 hour EMT shift. Analysis investigated relationships between baseline burnout scores and changes seen in perceived sleepiness.

No significant differences for individual factors of burnout were present for race or gender; however, higher depersonalization scores on MBI at baseline were associated with increased perception at the end of the 12 hour shift regardless of baseline perceived sleepiness. Resiliency to clinical stressors, such as a 12-hour shift, is vital for both short-term success in the undergraduate medical education environment as well as longevity in a career in medicine. This study seeks to better understand the fatigue and burnout experienced by students.

School of Medicine Greenville

Summer Research Scholar funded by UofSC SOMG and the Sargent Foundation

Kayla Vaillant

School of Medicine Greenville

Analysis of Ubiquitin Ligase Expression in Mosaic IVF-Embryos to Predict Embryo Viability

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UofSC SOMG, Department of Biomedical Sciences

IVF contributes to 4 million births annually according to the CDC. PGT-A is a sequencing tool that utilizes 3-6 trophectoderm cells to determine the ploidy status of each IVF-embryo. Questions remain whether PGT-A provides a usable metric for women under age 35 with a good live-birth prognosis. Mosaics complicate IVF-embryo analysis as there is debate whether these embryos should be transferred. The goal of this study is to determine specific gene expression detected in blastocyst fluid that can aid in predicting the successful implantation and subsequent live birth of a mosaic embryo.

Blastocoel fluid-conditioned media was collected from day-5 IVF-embryos at the time of PGT-A biopsy. An RNAseq dataset obtained from blastocoel fluid with known implantation outcomes was used to select genes for analysis. RNA was purified and cDNA synthesized from 28 samples representing euploid, aneuploid, and mosaic IVF-embryos. Gene expression of SHARPIN, CUL2, BCL2L12, and DRAP1 were assessed using RT-qPCR.

Preliminary RT-qPCR analysis of 28 samples indicates that CUL2, SHARPIN, BCL2L12, and DRAP1 appear to have increased expression in euploids.

Expression of selected genes from the ubiquitin-proteasome family as well as specific transcription factors were analyzed in 28 blastocoel fluid samples. CUL2 and SHARPIN are ubiquitin ligases involved in adding ubiquitin to target proteins flagging them for degradation. Aneuploid or mosaic IVF-embryos may have a lower expression of these ligases therefore cannot remove unnecessary proteins. Identifying genes associated with euploid IVF-embryos may allow embryologists to prioritize certain mosaic embryos for transfer in patients who don’t have any euploid embryos.

Summer Research Scholar funded by UofSC SOMG and the Sargent Foundation

Quentell Wagener

The Use of Smartphone Technology to Supervise Exercise Therapy in Patients with Peripheral Artery Disease

Quentell E. Wagener, Sagar Gandhi

Prisma Health, Department of Surgery

Claudication, discomfort in the lower extremity secondary to occlusion of arteries, is one of the many symptoms of peripheral arterial disease (PAD). Typically, claudication limits one's mobility and overall quality of life. Standard treatment involves stent placement however, exercise has been recognized as an effective tool for pain management and increasing walking distance. This study aims to determine the efficacy of monitoring patients' walking distance via smartphone usage as a means of supervised exercise therapy. We hypothesize that the use of smartphone "walking apps" will improve walking distances as well as claudication symptoms. ~50 participants with PAD and symptoms of claudication will complete questionnaires regarding smartphone usage, quality of life, medical history, and baseline walking distance. Participants will be contacted at 3 months and again at 6 months to assess walking distances and repeat the quality-of-life questionnaires. This study has consented and obtained data from ~36 participants. Average steps increased from 2700 ± 2472 to 3077 ± 2601 in 6 months (p-value=0.595) while responses on quality of life increased from 13 (10, 18) to 16 (12, 20) in 6 months (p-value=0.103). Although not statistically significant, monitoring patients walking distance via smartphone "walking apps", can improve symptoms of claudication and quality of life.

School of Medicine Greenville

Summer Research Scholar funded by UofSC SOMG and the Sargent Foundation

Malorie Webb

Through the Fog: Using Social Media to Evaluate Patient Engagement with Long COVID Patient Experts

Malorie Webb, Erin Walker, Nabil Natafgi, Ann Blair Kennedy
UofSC SOMG, Department of Biomedical Sciences

Patient-centered and -engaged research is essential to conduct thorough, relevant, and socially-conscious research. Additionally, an engaged patient is more likely to stay committed to the project, lowering rates of attrition. However, finding ways to keep patients engaged throughout the life of a project has been debated within the patient engagement literature. The Patient Engagement Studio (PES) is training a group of patients experiencing long-COVID symptoms to work with research teams as Patient Experts. This project investigated a new strategy for encouraging patient engagement through the social media platform Slack, which allows patients and administrators to interact outside of scheduled meetings. To encourage engagement, researchers created postings and prompts in each of the Slack channels, as well as an email newsletter to reach patients who did not use Slack regularly. Additional feedback sessions allowed identification of barriers and facilitators that affected the use of Slack. At the conclusion of this project, the PES will analyze engagement by tracking prompted vs. free postings, number and type of responses, and interaction between members. We expect the community-building activities (e.g. group Spotify playlist, PhotoVoice) will have the most engagement, while postings such as news articles will yield less. It is important to create an engaged community where Patient Experts can safely share their experiences and feedback, resulting in well-rounded research. This is especially important for this particular set of patients because they are living with symptoms such as brain-fog and fatigue, which makes it uniquely difficult to work on a team and stay engaged.

School of Medicine Greenville

Summer Research Scholar funded by UofSC SOMG and the Sargent Foundation

Ashlyn White

Development of a standardized scoring system to predict who does not need to be transferred to a children's hospital for appendicitis evaluation

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Acute appendicitis is a common cause of pediatric surgery. Many patients initially present to community hospitals with abdominal pain and require transfer to a children's hospital for definitive diagnosis. Literature suggests that transferred patients do not have more advanced disease or higher complication rates; however, they undergo more diagnostic testing and incur higher costs of care. Numerous scoring systems have been developed to predict appendicitis, but none are designed to predict which patients can avoid transfer and negative scores do not necessarily preclude the need for transfer. Our goal was to devise a scoring system to determine which patients did not require urgent transfer. A retrospective review was performed of all pediatric patients, ages 5 to 17 years old, transferred to our hospital for an appendicitis workup from January 2020 through March 2022. A total of 527 records were identified. Statistical analysis is underway to devise a clinical score to predict which patients do not need to be transferred to a children's hospital for an appendicitis evaluation. Results are still ongoing. Our goal will be to finalize a scoring system devised by evaluating key lab and radiologic values to determine their predictive value of appendicitis transfer, which will then be tested in a prospective fashion.

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No Child Left Behind: Evaluating Disparities in Pediatric Pharmacodynamic Data

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Introduction: Pediatric pharmacodynamics describes how drugs affect a child during development. Although adult pharmacodynamic data are readily available, few studies have compared how age and dosing impacts the activity of drugs in children. The current study was designed to explore how variations in dosing may impact pediatric pharmacodynamics.
Methods: Over 60 articles were evaluated, and pediatric data were obtained for four classes of drugs, which included antibiotics, analgesics, anti-inflammatory, and chemotherapy medications. Demographic, dosing, adverse effects, safety, and efficacy data were extracted from each publication. Standard adult data were obtained from pubchem.gov and reference.medscape.com. The data was evaluated to compare standard adult dosing data to pediatric data and changes in pharmacodynamics were determined.
Results: An extensive literature search was conducted to obtain pediatric data. Research suggests that pharmacodynamic data is often available for children in the age range of 4-14 years. Anti-inflammatory and analgesic medications showed similar dosing between pediatrics and adults compared to antibiotics and anti-cancer drugs. Although the pediatric data for most drugs demonstrated that the doses studied resulted in an effective treatment response when compared to the equivalent adult dose, the pharmacodynamics of some drugs differed with age.
Conclusion: Pediatric pharmacodynamic data gaps were often observed in younger (<4 years) and older (>14 years) children. Research regarding adult pharmacodynamics and drug dosing are generally more comprehensive when compared to children. In conclusion, pediatric pharmacodynamics greatly informs proper drug dosing and efficacy, opening the door for greater improvements in future treatments.

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The Influence of Language and Place of Birth on Use and Method of Contraception Among Reproductive Age Hispanic Women in the United States

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Background: Hispanic reproductive age women have the second highest fertility rate in the United States in conjunction with higher rates of adolescent and unintended pregnancies. However, little is known about contraceptive choices within this population. Therefore, our study aims to assess the role of birthplace and language preference on contraceptive use.
Methods: Using the 2017-2019 National Survey of Family Growth, we identified a nationally representative sample of Hispanic women (age 15-49). We compared the risk difference in contraceptive use between Hispanic immigrant Spanish speaking women to other Hispanic immigrant and non-immigrant English-speaking women. We also assessed methods of contraceptives in three categories: permanent, long-acting reversible contraception (LARC), and other less effective methods.
Results: Among the 1,664 Hispanic women, immigrant Spanish speaking women were 7.7% (95% CI 0.02- 15.3) less likely to use contraceptives than non-immigrant English speaking women. Immigrant Spanish speaking women were 17.7% (95% CI 0.4-35.0) and 19.0% (95% CI 9.0- 30.0) more likely than immigrant and non-immigrant English speaking women respectively to have permanent forms of contraception. Immigrant Spanish speaking women were 14.6% (95% CI 5.5- 23.7) less likely to use lower efficacy methods then non-immigrant English speaking women.
Conclusion: Our findings suggest immigrant Spanish speaking women have lower rates of contraceptive use with higher rates of permanent and lower rates of low efficacy contraception use. These findings suggest the potential need for more targeted reproductive and contraceptive education within Hispanic populations.

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Wenxin Yang

Papillary Meningioma: a single institution case series and comprehensive review of the literature

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Meningiomas are the most common primary central nervous system tumor. Papillary meningiomas (PM) are considered a more aggressive subtype, encompassing <1% of all meningiomas characterized by the presence of >50% papillary features, bone/brain invasion, and increased mitotic figures. Due to its rarity, there is a lack of standardized guidelines for definitive diagnosis, characterization, and optimal treatment. Here, we evaluate two cases at a single institution and provide a comprehensive literature review to evaluate these metrics.

Our two cases were found in older (mean 71) symptomatic males; literature reports younger (mean 33.2) symptomatic patients with a male/female ratio of 0.84. Our patients CT/MRI demonstrated a maximum average tumor diameter of 8.00cm versus published reports of 4.97cm. Our patients underwent both surgical resection and adjuvant radiotherapy 100% of the time, with 50% survival, while literature reports use of both 26.8% of the time (n=23) with 56.3% survival (range 2 days after surgery to 14 years). Analysis of the literature shows that commonly used terms for histopathological diagnosis includes “papillary,” “angioblastic,” and “whorls.”

The rarity of PM has hampered the development of a widely applicable diagnostic algorithm. The parameters within the literature can lead to downgraded diagnoses, which could be a contributing factor of our institution’s increased age and tumor size. Although our cases detailed highly aggressive meningiomas, neither obtained a definitive WHO grade III diagnosis due to current criteria. Here, we propose more stringent morphological guidelines, consensus on immunohistochemical markers, and increased use of tumor genotyping to appropriately classify these lesions.

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