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A REMOTE INTEGRATED INTERVENTION FOR HCV CURE AND SMOKING CESSATION AMONG SMOKERS LIVING WITH HEPATITIS C: A PILOT STUDY

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Introduction. Despite the availability of highly effective direct-acting antiviral (DAA) medications with cure rates >95%, if left untreated, mortality rates in people living with Hepatitis C virus (HCV) remain very high and surpass other infectious diseases, including HIV. Cigarette smoking has emerged as a leading cause of mortality among people with HCV. This pilot study assessed the feasibility and preliminary efficacy of an integrated smoking cessation intervention designed to treat HCV and aid smoking cessation concurrently among people living with HCV.

Methods. Current smokers living with HCV received a 12-week intervention delivered via phone. The integrated intervention consisted of weekly 30-min sessions involving: 1) medication; 2) medication adherence support for both HCV treatment (velpatasvir+sofosbuvir) and nicotine replacement therapy (chiantix); 3) psychoeducation about both HCV and smoking; and 4) counseling.

Results. Among 52 eligible participants, 21 (40.4%) met the inclusion criteria, and 10 were enrolled in the pilot study. The sample was 70% male, 38.4 years old on average, and all had a high school education or the equivalent. Most (70%) participants had a history of injection drug use and were receiving buprenorphine. The majority (90%) of participants started DAAs to treat HCV and 60% had an undetectable viral load at the end of treatment. Most participants (70%) started pharmacotherapy for smoking cessation and decreased the number of cigarettes smoked per day on average from 12.6 at baseline to 8.4 at the end of treatment.

Conclusions. The remotely delivered integrated intervention for HCV and smoking resulted in a decline on both HCV viral load and the number of cigarettes smoked per day. Future research warrants a confirmatory study with large sample size to test the effectiveness of the intervention in a real-world setting. Addressing both smoking and HCV can produce tremendous health benefits among people living with HCV.

Social Determinants of Health and HbA1c Control in Patients with Type 2 Diabetes Mellitus

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Purpose statement – Implement a Social Determinants of Health (SDOH) survey into the rooming process of a large, academic family medicine clinic in order to identify healthcare barriers, counsel patients on resources pertaining to those barriers, and measure the impact on diabetes management.

Introduction - A Plan Do Study Act (PDSA) cycle was conducted as the first part of a year-long quality improvement project carried out by the third year medical students at the University of South Carolina School of Medicine. The aim of the project was to efficiently implement a SDOH survey into the workflow at the Prisma Health Family Medicine Center and measure the association between social determinants of health (SDOH) scores and diabetes management, with the overarching goal of addressing patients with negative SDOH and improving to 60% of the patients at FMC with well-controlled diabetes. At the Prisma Health Family Medicine Center (FMC), 58.27% of diabetic patients have their disease well controlled with an A1c < 9.0%. While diabetes is a complex disease that is impacted by biologic and behavioral factors, it is also influenced by the social and physical environments of patients. Traditionally, clinicians have focused on intervening with the biologic and behavioral factors. However, many are starting to recognize the effect that SDOH have on disease course and outcomes for patients. Currently, there is no standardized process at FMC to screen patients for SDOH.

Methods – A SDOH questionnaire was implemented into the rooming process for patients diagnosed with type II diabetes mellitus at the Prisma Health Family Medicine Center. Since there were multiple ways to access the questionnaire in the electronic medical record, the medical students also analyzed the best methods to administer the survey. Patient information and diabetes outcomes (HbA1c) were recorded in a password-protected Excel file. A linear regression was used to evaluate the correlation between SDOH scores and HbA1c levels.

Results – Over the course of 5 weeks, medical students screened 22 patients in clinic for SDOH. Financial strain was the most prevalent positive screen among participants (77.3%), followed by stress (54.5%) and food insecurity (45.5%). Housing (22.7%) and transportation (18.2%) received fewer positive screens. Overall, higher scores on the SDOH survey were correlated with an increased HbA1c, indicating poor glucose control. When individual factors were compared to HbA1c levels, higher levels of financial strain and stress were correlated to higher HbA1c measurements. On average, the SDOH questionnaire took 107 seconds to administer.

Conclusion – Poor social determinants of health are an important factor involved in diabetic outcomes. The quality improvement project is ongoing to continue to screen patients for SDOH and to implement this screening into the FMC workflow. Next steps will be to develop tools for counseling in referral on positive responses to SDOH screenings. Future study will examine whether intervention in the form of counseling on available resources to improve social determinants of health can help improve diabetic outcomes.

Actively Working-from-Home but Without the Active: Perception Versus Reality of Work-from-Home Physical Activity

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Purpose statement: When the World Health Organization (WHO) declared COVID-19 a global pandemic on March 11, 2020, government lockdowns and social distancing encouraged a push towards a Work-from-Home (WFH) format for many. Studies examining physical activity (PA) during the pandemic found that this led to a decrease in activity for these workers based on either self-reported or objective PA metrics from activity trackers. The purpose of this study was to 1) examine patterns of PA throughout the onset of COVID-19 and WFH and 2) investigate if participants' subjective PA reporting agreed with objective values.

Methods: Objective physical activity data (i.e., daily heart rate, step count, and Metabolic Equivalent [MET]) were recorded via an activity tracker (Fitbit Charge 3, Fitbit, San Francisco, CA) which was worn by 188 office workers over the course of seven months (January-June, December 2020). To see the change in PA throughout the duration of the pandemic, the activity dates were segmented into three WFH timeframes: pre-transition (Jan.10, 2020 – Mar. 11, 2020), transition (Mar. 12, 2020 – Jun. 10, 2020), and post-transition (Dec. 1, 2020 – Dec. 31, 2020). Average daily steps and heart rate were aggregated and were obtained for each WFH timeframe. Subjective PA data were gathered through four iterations of the International Physical Activity Questionnaire (IPAQ) survey, and METs were calculated. Pairwise Wilcoxon tests were conducted in RStudio

Results: It was found that there was no significant difference between timeframes for heart rate. For steps, pairwise comparisons show there was a significance difference between pre-transition and post-transition ($p < 0.01$) and transition and post-transition ($p < 0.05$) timeframes with a decrease in steps throughout transition and post-transition from the beginning of the year. Overall, subjective MET values trended higher than objective MET values.

Conclusion: Although subjective values were higher than objective, the reported decrease in steps indicate that there was a decrease in PA for employees throughout the pandemic. This was expected as many experienced reduced opportunities (e.g., walking around an office) for exercise due to WFH. Furthermore, the difference between objective and subjective PA could be due to a

lapse in memory due to the length of time the PA survey asked the participants to recall or the activity trackers' sensitivity in detecting activities. Still, both metrics are important as the reality and perception of information are key to understanding PA in individuals. As modes of WFH seems likely to continue into the foreseeable future, it is important for employers to understand how much reduced PA employees experience during WFH so interventions can be made to ensure employees maintain a healthy and productive lifestyle.

A gap in care: children transferred to the regional burn center

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Purpose: Regionalization aims to improve healthcare by designating specialty centers for a specific region. Burn centers are regional centers with specialized resources that receive patients from outside hospitals. We hypothesize that regionalization and factors associated (distance) with burn centers play a role in patients' treatment and outcomes based on race, socioeconomic status, insurance, and follow-ups. Children with burns who cannot fully utilize the advantages of a regional burn center may benefit from continued care at a local center. We reviewed these cases with an aim of identifying socioeconomic disparities and barriers to care among this patient population.

Methods: A list of burn patients was collected from our trauma registry. Criteria for inclusion included patients ages 0 to 18 years who presented to the Prisma Health Upstate Emergency Department from February 2016 through December 2020 who were diagnosed with partial or full thickness burns. Two patients were excluded who died of anoxic brain injury soon after arrival to the emergency department. Eighty-one total patients met inclusion criteria. Data was retrospectively collected via chart reviews in the EMR.

Results: Of the 81 patients in this cohort, 54 (67%) were transferred to the regional burn center from our facility. Of those transferred, 66.7% were white and 27.8% were black; 20.4% were Hispanic. Of those not transferred, 70.1% were white and 29.6% were black; 22.2% were Hispanic. 77.7% of patients transferred had public insurance compared to 70.1% of patients not transferred. Secondary analysis showed 31 (57.4%) children were transferred without evaluation by social work at our institution. This included two patients with non-accidental trauma and 15 (27.7%) with documented current or previous involvement of Child Protective Services (CPS). In comparison with patients not transferred, 93% were seen by social work and 25.9% had documented current or prior CPS cases. Of the 31 transferred patients without social work evaluation, 22 (67%) had incomplete or missing notes in the EMR from the burn center. 32% of patients received local follow-up.

Conclusion: Non-accidental trauma and social concerns are common amongst children presenting with burn injuries. These children should be thoroughly

evaluated by social work upon presentation. Our findings demonstrated a large gap in care and follow-up amongst a particularly high-risk and vulnerable population. Children transferred to the regional burn center were largely missed by social work, and had little to no documented follow-ups in our EMR to show whether these concerns had been addressed.

Subcutaneous administration of alginate- α -CGRP microcapsules protect against pressure-overload induced heart failure in a murine model

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Purpose Statement: Congestive heart failure (CHF) is one of the major factors of illness and death among humans worldwide. In the USA, CHF contributes to ~397800 deaths in the year 2018. Although there are several classes of heart failure drugs available, more effective therapeutic modalities are needed to treat and prevent CHF. Studies conducted by us and other research groups established a cardioprotective role of a 37-amino acid regulatory neuropeptide, named α -calcitonin gene-related peptide (α -CGRP), in a variety of cardiovascular diseases, including heart failure, hypertension, and myocardial infarction. The short half-life of the peptide in circulation ($t_{1/2}$ = ~5.5 min in the human plasma) makes α -CGRP challenging to use in therapy. The goal of the present study was to develop an effective α -CGRP delivery system to increase the peptide's bioavailability. We utilized an FDA-approved alginate biomaterial as a drug carrier and developed and tested α -CGRP encapsulated alginate microcapsules as a novel drug delivery system in a mouse model of heart failure.

Methods: Alginate- α -CGRP microcapsules of 200 μ m diameter were prepared by an electrospray method and *in vitro* assays were performed to test the cytotoxicity of prepared microcapsules. A bolus subcutaneous injection of alginate- α -CGRP microcapsules (containing α -CGRP doses 6, 10, and 20 mg/kg per mouse) was given to male C57BL6 mice and blood pressure was recorded by a tail-cuff method using the Hatteras Blood Pressure Analysis System. The efficacy of these microcapsules was tested in the transverse aortic constriction (TAC) pressure-overload mouse model of heart failure. Male nine-week-old C57BL6 mice were divided into four groups (i)- sham, (ii)- sham-alginate-CGRP, (iii)- TAC-only, and (iv)- TAC-alginate-CGRP. After 2 or 15 days post-TAC, alginate- α -CGRP microcapsules (containing α -CGRP dose of 6 mg/kg per mouse) were administered subcutaneously on alternate days, until day 28. Echocardiography was performed every 7th day to measure cardiac function using Vevo3100 Imaging System. After 28 days of microcapsules delivery, mice were euthanized and hearts were used for histology and biochemical analyses.

Results: Our cell viability assays demonstrated that incubation of alginate- α -CGRP microcapsules for seven days did not affect the viability of cardiac cell lines tested-

mouse HL1 cells and rat H9C2 cells. Subcutaneous administration of alginate microcapsules containing α -CGRP doses of 6, 10, and 20 mg/kg/mouse lowered blood pressure up to 18 h, 3 days, and 7 days, respectively, in mice, indicating that α -CGRP releasing from the microcapsules remained bioactive. Echocardiography studies demonstrated that the TAC procedure significantly decreased cardiac function (fractional shortening and ejection fraction), however alginate- α -CGRP microcapsules delivery (either 2 days or 15 days post-TAC) preserved these cardiac parameters to sham-mice. Histology and biochemical data showed that TAC-induced pressure-overload markedly increased cardiac hypertrophy, heart weight, and left ventricular fibrosis, oxidative stress, and cell death (determined by cleaved caspase-3). Administration of alginate- α -CGRP microcapsules in the TAC-mice significantly reduced left ventricular hypertrophy, fibrosis, oxidative stress, and apoptotic cell death to levels comparable to sham mice.

Conclusion: Our results showed that alginate- α -CGRP microcapsules were non-toxic to cardiac cells, and the encapsulation of α -CGRP in an alginate polymer improved the bioavailability of the peptide in circulation. Administration of alginate- α -CGRP microcapsules improved cardiac functions and protected hearts against pressure-induced heart failure. Thus, the developed alginate- α -CGRP microcapsule can be an effective modality to treat patients with failing heart.

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Investigating the Effects of Type II Heat-Labile Enterotoxins on Human Respiratory Immune Responses

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Purpose Statement: Heat-Labile Enterotoxins (HLTs) are bacterial secreted proteins with unique immune properties. Type II HLTs are produced by certain strains of *E. coli* and have been found to act as mucosal and systemic adjuvants. The goal of this study is to determine the potential of three Type II HLTs, LT-IIa, LT-IIb, and LT-IIc, to function as adjuvants to boost respiratory specific immune responses.

Methods: The human lung epithelial cell line, A549, was exposed to HLTs in the presence or absence of lipopolysaccharide (LPS), a known immunostimulant. The impact of enterotoxin exposure on cell structure and viability was measured by flow cytometry. Changes to immune gene expression were observed via quantitative reverse transcriptase polymerase chain reaction (qRT-PCR) to detect mRNA or enzyme linked immunosorbent assay (ELISA) to measure cytokine secretion.

Results: The addition of HLTs resulted in no significant changes to cell complexity or viability with or without LPS. Analysis of mRNA expression found that the immune response triggered by HLTs significantly differed from that induced by LPS. Secretion of IL-1 β was decreased in the presence of HLTs and modulation of IL-6 secretion was also observed.

Conclusion: Based on these results, we can conclude that Type II HLTs, can drive an altered immune response, on both an mRNA and protein level, without significant cellular cytotoxicity. Further study is needed to determine the mechanisms by which the HLTs may modulate immune signaling in the respiratory tract, particularly in the presence of other immune adjuvants. This study demonstrates that HLTs trigger immune responses that differ from standard adjuvants which may have therapeutic potential in treatments for targeted delivery to the respiratory tract.

Increasing self-efficacy through deliberate practice for nurses who care for patients with non-dialysis arteriovenous (AV) fistulas for intravenous (IV) access

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Background – There are greater than 100 patients in the Upstate of South Carolina with non-dialysis AV fistulas who at any time may present to the hospital. These patients often need an IV access using these fistulas. Our Upstate system currently has seventy-five nurses trained to access these special AV fistulas. Despite education and training received, some nurses continue to lack confidence in their own ability and self-awareness to perform this skill when the time arises. Thus, some patients continue to encounter difficulties when they come to the hospital. Deliberate practice (DP) is deliberately repeating a clinical skill with the goal of mastering. In DP, learners receive feedback from an expert to guide their performance. It has been reported that an additional 15 to 60 minutes of practice is necessary to master advanced clinical skills. No reports of time spent in DP has been reported in the literature.

Category Selection – Developing and Supporting the Healthcare Workforce

Purpose statement – This study investigates the usefulness of 10-minute DP in augmenting learning self-efficacy of registered nurses when accessing non-dialysis AV fistulas for IV access.

Methods - This is a deliberate practice intervention--a descriptive pre/post design study utilizing a comparison of approximately 40 nurses self-reported level of learning self-efficacy. This study compares the learning self-efficacy of registered nurses at the current level of education using/accessing non-dialysis AV fistulas with the measurement of the same nurses' learning self-efficacy after providing additional deliberate practice. The inclusion criteria will be Prisma-employed, registered nurses who have been trained to access non-dialysis AV fistulas. Exclusion criteria will be any nurse without the non-dialysis AV fistula training, travel nurses, nurse interns, and nurses who are on orientation. The additional deliberate practice involves a 10-minute video-recorded training session by an expert consisting of learning objectives on identifying the correct vessel and positioning the IV needle for access. The Learning Self-Efficacy scale (L-SES) is a reliable and valid twelve-question survey computed on a Likert scale from disagree (1) to agree (5). Score ranges from 12-60. Low scores reflect low self-efficacy, and

high scores reflect high self-efficacy. Study results will be analyzed using descriptive statistical analyses of frequencies for the demographic questions. The L-SES responses are summed and averaged to yield an overall value. The pre-test total score will be compared to the post-test total score using a paired t-test, the Wilcoxon Signed-Rank. (LSES) and demographics will be used utilizing the REDCAP system. Confidentiality will be maintained through the REDCAP system. No personal identifiers will be collected.

Results – Results will include a summary table of responses to demographic questions (number of years in nursing, number of non-dialysis arteriovenous AV fistulas accessed in the past year) and aggregate mean paired t-test scores of the pre and posttests of the same individuals.

Conclusion/Clinical Implications – The self-efficacy of registered nurses working with these patients is expected to improve with 10-minute deliberate practice guided by an expert. This project anticipates reducing the number of nurses who felt insecure or unaware, and continued to stick the patient “looking for” a peripheral IV site thus improving quality of care delivered. Video will be linked to institutional procedure and provides access across Prisma Health institutions.

Outcomes of Subsequent Abdominal Operations after an Initial Ventral Hernia Repair

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Introduction There are several potential planes for mesh placement when performing a ventral hernia repair (VHR), and this choice can affect the outcomes of subsequent abdominal operations (SAO). Previous studies show that intraperitoneal mesh (IPOM) placed during a VHR leads to longer operative times in a SAO as well as increased risk of enterotomy, surgical site infection/ occurrence (SSI/SSO), and a greater amount of adhesions to mesh. We evaluated a large cohort of SAO after prior VHR to compare outcomes.

Methods A retrospective chart review was performed in Epic within Prisma Health/ Greenville Memorial Hospital of patients with VHR between 2005 and 2020. For these with reoperations, indication for surgery, adhesions, operative time, and complications were collected. Data will be presented using mean values with standard deviation.

Results We identified 405 patients with an SAO after VHR. For mesh placed retro-muscularly, 42.7 % of SAOs were due to hernia recurrence or wound complication. The rate of enterotomy was 0.6 %, and a high category of difficulty score in lysis of adhesions to mesh was 3.2 %. In comparison to mesh placed IPOM, 57.4 % underwent SAO due to hernia recurrence or wound complication. The instance of enterotomy was 2.8 %, and high grade lysis of adhesions occurred in 8.3 % of reoperations. Upon further data review we plan to compare the whole group of mesh placement in different planes of the abdomen to the IPOM group.

Conclusion From preliminary results, our data will support prior literature that mesh placed in a location other than IPOM will result in better outcomes for the patient when it comes to a SAO.

Physical Activity and Disease Severity in Patients with Rheumatoid Arthritis: Understanding the Clinical Value of a mHealth Wearable Device

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Background – Rheumatoid arthritis (RA) is a chronic disease characterized by vacillating, debilitating pain and inflammation in the hands, knees, hips, and other joints. Physical activity is safe and highly recommended for patients with RA; however, a sedentary lifestyle is common, because patients worry about doing too much exercise and exacerbating the joint pain and stiffness resulting from their disease. Wearable devices could help patients monitor their level of physical activity, but little evidence currently exists demonstrating the devices' clinical value in assisting patients and medical professionals setting reasonable goals for physical activity in the context of their disease severity.

Purpose statement – As a first step towards demonstrating the clinical value of wearable devices, this study's purpose was to identify correlations between self-reported disease severity and physical activity as measured by wearable devices among patients with Rheumatoid Arthritis (RA).

Methods – Patients with RA were recruited from a convenience sample with a prospective, cross-sectional study design. Participants wore a MotionWatch 8 to collect measures of physical activity using actigraphy (i.e. wrist movement). They also completed a 15-item validated questionnaire on disease severity (RAPID-3). Actigraphy measures of inactive, sedentary, and moderate activity were averaged over 6 nights and correlated to disease severity through Pearson correlations.

Results – Correlations show significant, directly proportional relationships between disease severity and inactive, sedentary, and moderate activity measures. There were inverse proportional relationships between disease severity and physical

activity time.

Conclusion – Our findings suggest that wearable devices identify relationships between disease severity and physical activity. Therefore, actigraphy may have valuable clinical application in promoting a level of physical activity that is reflective of the patient's disease severity. Future work is needed to determine how to meaningfully integrate and display actigraphy measures within a mobile application for RA to facilitate discussions between the patient and medical professional about reasonable goals for patients' level of physical activity.

Waist-Height Ratio (WHR) may predict loss of nocturnal dip on Ambulatory Blood Pressure Monitoring(ABPM)

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Introduction

30% of obese children have associated hypertension (HTN)—a risk factor for cardiovascular disease (CVD). Loss of nocturnal dip on ABPM is associated with CVD in adults. Abdominal obesity (visceral fat) is associated with cardiovascular risk. Sagittal abdominal diameter (SAD) and waist-height ratio (WHR) are measures of visceral fat. There is no data about SAD/WHR and HTN in overweight/obese children.

Methods

Children between ages 4-18 referred to Pediatric Nephrology due to elevated blood pressure were recruited. We measured WHR as defined in the NHANES manual. SAD was measured with Kahn caliper (Seritex). Demographic and anthropometric measures were obtained along with office BP. ABPM findings were recorded if available. Statistical analysis: Pearson's correlation coefficient was calculated with $p < 0.05$ as significant. Spearman's Rho was calculated where applicable. Linear regression coefficients were calculated for BMI, SAD, and WHR compared to office SBP.

Results

20 individuals participated in this pilot study. At the time of this report, 5 had completed ABPM. 75% were male. The average age was 13.1 yrs (6-17). 80% had BMI $> 95^{\text{th}}$ percentile. SAD and WHR were not correlated to office BP ($P=0.338$, $P=0.539$). WHR was negatively correlated to nocturnal dip (significant at $p=0.034$). See Figures.

Conclusion

SAD/WHR may be better predictors of office BP and ABPM dip than BMI. However, a larger cohort should be studied to determine the value of these anthropometric measures in pediatrics. Pediatricians must pay attention to visceral fat measures,

not just BMI when counseling families about the risk of CVD/HTN with obesity.

Factors associated with patients undergoing surgery for localized pancreatic adenocarcinoma

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Purpose: This study was designed to identify the number of patients with pancreatic adenocarcinoma in the years 2001 to 2017 and analyze whether the rate for surgical interventions has changed compared to previous years. For those who did not undergo surgical intervention, our study aimed to identify factors that may be associated with a nonoperative treatment course.

Methods: Using the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) database, we identified a cohort of patients between 2001 to 2017 with a diagnosis of localized pancreatic adenocarcinoma who had a known surgical status. Cases of surgical versus nonsurgical interventions were charted against year of diagnosis. Statistical analysis of patient and tumor factors was performed to identify possible associations that may have influenced choosing nonoperative management.

Results: Of the 7018 patients identified with an early-stage pancreatic adenocarcinoma diagnosis, 1174 (16.7%) underwent surgical intervention. Of the 5844 (83.3%) nonoperative patients, 4483 (76.7%) were not recommended for resection. The remaining patients either refused the operation, had contraindications, or died prior to undergoing intervention. Patients who were less likely to have a surgical intervention included those with characteristics of age greater than 70 years ($p < 0.0001$, O.R. 0.37, CI: 0.26 - 0.53), black race ($p < 0.001$, O.R. 0.61, CI: 0.47-0.79), and tumors > 20 mm ($p < 0.0001$, O.R. 0.24, CI: 0.19-0.30). Population density of reporting city was not a significant factor, but those with income $> \$70,000$ /year were more likely to undergo surgery (O.R. 1.42, CI 1.03-1.95). From 2011- 2017, patients diagnosed in this time period had decreased odds of receiving a surgical intervention compared to 2001 to 2005 ($p < 0.0001$, O.R. 0.43).

Conclusion: Surgical resection still remains the only curative method for pancreatic adenocarcinoma. However, despite a growing number of medical centers specializing in these oncological operations, the frequency of cancer directed surgery for patients with localized pancreatic adenocarcinoma has not significantly increased over the past several years. The choice of an appropriate surgical candidate for pancreatic resection remains highly individualized to each patient and his or her operative surgeon, and this may be a barrier to improving the trend.

Another explanation could be attributed to a more frequent use of neoadjuvant therapy which can delay scheduling surgery. This study emphasized the current frequency of surgical intervention and highlights an opportunity to re-examine the current surgical practice and candidate selection.

Prevent Cancer - Greenville: Identifying and Influencing Cancer Risk

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Purpose:

The Prevent Cancer - Greenville research study is entering year four of enrollment and to date has accrued approximately 700 participants. Dual objectives include a participant educational focus based on individual risks as well as a long-term research objective of correlation of lifestyle and environmental influences on an individual's molecular constitution and for those affected, the development of a cancer. Our team has begun preliminary data interrogation to assess participant response to a personalized cancer risk stratification and specific recommendations.

Methods:

Volunteer participants are accrued through open enrollment and by referrals from content experts in the following specialties: Medical and Surgical oncology, Gastroenterology, Urology, Gynecology, Dermatology, Otolaryngology, and cancer genetics. Open enrollment is promoted through Prisma News, social media, posters and flyers, news articles in community journals, speaking to community groups and study listing on the National Institute of Health clinical trials.gov website. Participants must be 18 years or greater to enroll. Risk stratification is compiled utilizing a non-invasive body composition analysis with attention towards cancer susceptibility parameters and an extensive survey of lifestyle, family history, and environmental factors. The immediate deliverable for this free study is a personalized risk stratification analysis with specific recommendations for health maintenance and potential referrals and navigation to address areas of enhanced cancer risk. This annual analysis assesses the execution and outcomes of specific evidenced based recommendations and allows updating the underlying inventory of lifestyle, environmental and body composition parameters.

Results:

Our team analyzed participant execution of specific health practice recommendations from year 1 to year 2 of enrollment. Early findings are compiled as a measure of the influence of health-related education. 333 participants have currently completed a year 1 and year 2 visit. 251 participants met

recommendations for colon cancer screening during year 1, and 15 were past due for screening at that time. Of those 15 past due participants, 8 (53.33%) were screened for colon cancer before their year 2 visit. 250 participants met recommendations for cervical cancer screening during year 1, and 5 were past due for screening at that time. Of those 5 participants, 1 (20%) was screened for cervical cancer before their year 2 visit. 201 participants met recommendations for breast cancer screening during year 1, and 15 were past due for screening at that time. Of those 15 past due participants, 12 (80%) were screened for breast cancer before their year 2 visit. Overall, 21 out of the 35 (60%) past due screenings were completed before year 2.

Conclusion:

These findings reflect a trend toward participant compliance with cancer prevention recommendations. Education concerning the influence of lifestyle on cancer incidence can support the paradigm shift needed to change behaviors and curb oncologic related morbidity and mortality. The sequential annual visits will allow future molecular mapping and support strategies for early identification of malignancy and prevention of clinical disease through targeted interventions.

Error Occurrence in Death Certification: A Single Health System Based Review

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Purpose Statement: The purpose of death certification extends beyond functioning as a legal document. The cause-of-death (COD) statement affects epidemiology, funding research, public health policies and initiatives, and ultimately impacts the prevention of disease processes; however, the frequency of inconsistencies and errors remain high. The goal of this project was to evaluate the frequency of error types in the COD reporting.

Methods: We completed a retrospective sampling of death certificates (DC) in a single institution between 1/1/2019 and 12/31/2019 to evaluate the frequency of errors in the COD reporting. Cases were excluded if final DCs could not be obtained, or the decedent's medical record contained limited past medical history. COD reporting errors were categorized as minor and major. Minor errors did not affect the interpretation of COD, while major errors did affect the interpretation of COD. Major errors included, but were not limited to, non-specific COD, omitted significant conditions, and inaccurate underlying sequence of events.

Results: Overall, 124 DCs were examined and stratified by type of error: 10 (8.1%) contained minor errors only, 22 (17.7%) contained major errors only, and 92 (74.2%) contained both major and minor errors. However, when evaluating the specific class of error between groups, all classes of errors were significantly different. Class IA (multiple COD on a single entry), IB (typographic errors) and IC (omitted intervals) were only identified on the death certificates that had both major and minor errors, $p = 0.03, 0.001, 0.0005$ respectively.

Conclusion: The widespread distribution of major errors indicates a need to educate physicians on death certification to accurately specify COD. Based on our findings, we initiated an educational initiative to address and mitigate errors in completing the COD statement on DCs.

Rationale, Design, and Methodology of a Randomized Pilot Trial of an Integrated Intervention Combining Computerized Behavioral Therapy and Recovery Coaching for People with Opioid Use Disorder: The OVERCOME Study

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Purpose Statement: The goal of this study is to understand the effectiveness of a combined intervention of a computer-based training for cognitive behavioral therapy (CBT4CBT) and recovery coaching services for reducing substance use and increasing buprenorphine adherence in patients diagnosed with opioid use disorder (OUD). The purpose of this abstract is to describe the rationale, design, and methodology of the trial. Background: OUD has led to a staggering death toll in terms of drug-related overdoses. Despite the demonstrated benefits and effectiveness of buprenorphine, retention is suboptimal and patients typically present with high rates of ongoing polysubstance use during treatment. A pilot trial provided preliminary support for the efficacy of CBT4CBT as an add-on to buprenorphine in reducing substance use and increasing retention rates. Recovery coaching services provided by individuals with substance use experience and successful recovery have shown to positively influence recovery outcomes for people with OUD by increasing buprenorphine initiation and reducing opioid use. **Methods:** The OVERCOME study is a randomized clinical trial (RCT) aiming to test an integrated intervention combining CBT4CBT and Recovery coaching relative to treatment-as-usual (TAU) among individuals with OUD on buprenorphine (N=50). The primary outcome measure is the proportion of saliva toxicology screens positive for all drugs tested during the first 8 weeks of the study. Secondary outcomes include the proportion of positive toxicology screens for all drugs and opioids at 1- and 3- month follow-up and adherence to buprenorphine at 3- month follow-up. **Results:** We describe the rationale, design, and methodology of the OVERCOME Study. **Conclusion:** This trial will provide evidence of the effectiveness of an integrated intervention combining CBT4CBT and recovery coaching for reducing substance use and increasing buprenorphine adherence and have the potential to reduce mortality among people with OUD.

Physical Activity Engagement and Health-Protective Behaviors in College Students during The COVID-19 Pandemic

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Background: The COVID-19 pandemic has potential long-lasting effects on college-aged student's health and well-being. Regular physical activity participation and practicing COVID-related health-protective behaviors (e.g., get COVID tests, avoid large gatherings) are recommended during the pandemic to reduce risks for severe illness from COVID-19. It is unclear whether these two types of health-protective behaviors are linked among college students and whether there were gender differences in this association. This study aims to evaluate (1) the association between college student's weekly physical activity levels and their COVID-related health-protective behaviors, and (2) the gender differences in these health behaviors.

Methods: An ongoing online survey was distributed to a sample of college-aged students through Qualtrics (a mobile-based survey application) between 2020 August and 2021 October. The survey assessed student's frequency and duration of weekly exercise and moderate-to-vigorous physical activity, perceptions of COVID testing, and COVID-related health-protective behaviors using validated items. Descriptive statistics, bivariate correlations, and multiple regression models were conducted to answer the research questions using SPSS v27.

Results: A total of 816 college students (23.7% male) studying in South Carolina responded to the survey within the one-year period after the COVID pandemic. The preliminary results showed that students who exercise for at least three times per week are more likely to search for new information to improve their health ($p < .01$), while they were less likely to avoid large social gatherings ($p < .05$) and less likely to change their social life since the pandemic ($p < .01$). For students who visited a gym/fitness center more days a week prior to the pandemic were less willing to get a COVID-19 test ($p < .05$). There was no significant association between minutes of weekly moderate-to-vigorous physical activity and COVID-19 perceptions and health behaviors. Compared to men, women had less frequent gym visits, more positive perceptions about COVID testing (e.g., testing is important; can save lives), and were more likely to get a COVID test ($p < .05$).

Conclusion: Overall, our findings suggested that there may be an inverse association between student's exercise frequency and COVID-19 protective

behaviors. Compared to less active students, those who exercise more often may perceive less severity with COVID infection and consider themselves to be less susceptible to COVID. Thus, they tend not to change their social behavior, which is considered valuable during college life. This hypothesis should be further tested to inform intervention strategies to promote compliance of health-protective behaviors and recommendations to avoid the spreading of COVID-19. More educational resources and information should also be delivered to men students as they value less of the importance of COVID-19 health-protective behaviors. Our findings have the potential to inform policy makers in university settings to managing, preventing, and responding to COVID-19 on campus.

Let's Talk About Sleep: Correlations of Self-Reported Sleep, Actigraphy, and Disease Activity in Patients with Rheumatoid Arthritis

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Purpose Statement: Poor sleep is a common complaint among patients with rheumatoid arthritis (RA), but few actively discuss the problem with their rheumatologist. Challenges include the lack of standardized sleep measures within clinical care, and conflicting evidence as to their relationship with disease activity. The purpose of this study was to identify correlations between sleep measures assessed through self-report and actigraphy (i.e. wrist movement) with disease activity for patients with RA.

Methods: In a prospective, cross-sectional study, participants diagnosed with RA were recruited through convenience sampling. Consenting participants were asked to self-report sleep quality (Pittsburgh Sleep Quality Index (PSQI)), disease activity (Routine Assessment of Patient Index Data 3 (RAPID-3)), and demographics. Participants' sleep quality was also measured using actigraphy which monitors wrist movement by wearing a watch. Actigraphy measures of sleep efficiency, latency, and fragmentation were averaged over the 6 nights. Actigraphy measures were correlated to the PSQI and RAPID-3 through Spearman correlations.

Results: The sample was mostly Caucasian women with an average age of 55 years, generally reflective of the population with RA. The results demonstrated low correlations between actigraphy measures (average sleep efficiency, latency, the fragmentation index) and self-reported measures of sleep ($r = 0.1221, 0.1019, -0.4452$; $p = 0.66, 0.72, 0.10$) as well as with disease activity ($r = 0.0915, 0.3573, -0.1274$; $p = 0.75, 0.19, 0.65$). Focusing on sleep latency and PSQI, because the correlation was low, there is little to no relationship between self-reported sleep quality and amount of time it takes to fall asleep. Similarly, between sleep latency and RAPID-3 scores, the correlation was slightly higher, however it seems as though there is little to no relationship between disease activity and amount of time taken to fall asleep.

Conclusion: Actigraphy may be a useful tool in facilitating patient-rheumatologist communication; however, further research is needed to demonstrate its ability to clinically identify sleep disorders requiring referral.

Glycomic Profiling of Breast Cancer Patient Samples

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Background - Cells are covered with heterogenous sugar structures called glycans. These glycan structures are alternatively expressed in cancer, and specific structures can be used as indicators of cancer development and progression.

Purpose statement – The goal of this study is the creation of generalizable glycomic profiles and signatures based on neoplastic tissue glycan expression that correlate with various tumor attributes such as tumor stage and level of differentiation.

Methods – Our study analyzes of 40 serum samples, 40 cancer tissue biopsies and 40 biopsies of adjacent non-tumor tissue in breast cancer patients. All of the above samples were obtained from the Prisma Health Cancer Institute Biorepository. Ten volunteers provided healthy control serum samples. The samples were examined by the Emory Comprehensive Glycomics Core using mass spectroscopy to determine the presence, type, and amount of over 300 unique glycan structures. Bioinformatic analysis will be used to develop comprehensive glycomic profiles and glycan signatures based on various tumor attributes.

Results – In the serum samples, six glycan compositions (H5N4F2, H5N5S1, H5N5F1, H6N5S3, H5N4F1S2, H5N3S1) had unique presence among different cancer stages and three (H3N5F1, H4N5F1, H6N5S3) had significant concentration changes between stages, marking them as possible indicators of breast cancer stage progression. The spectroscopic analysis of breast tissue biopsy samples is currently ongoing.

Conclusion – In addition to providing greater understanding of tumor glycobiology, the data gathered from this study will be used to further enrich the Prisma Health Cancer Institute's patient database. Comparing serum and tumor glycan profiles to those of healthy sera and tissue controls will allow for a more comprehensive understanding of the aberrant expression of glycan structures in breast cancer. The collected information has the potential for more accurate diagnoses and personalized treatments. Prospective uses of differential glycomic profiles could allow oncologists and their patients a more nuanced understanding of the tumor and its characteristics.

Integration of Molecular Data into Cancer Patient Database

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Background - The incidence of cancer is predicted to be 26.4 million in 2030, and the number of cancer deaths will be 17 million globally. Strategies to enable enhanced secondary prevention of cancer are profoundly needed, as seen by far worse prognosis of a cancer patient the later the cancer is found. Precision medicine, the idea behind tailoring every treatment to the individual, has proven to be a more advanced method of treating complex diseases such as cancer. Nuanced treatments are needed, as cancer itself is multifactorial with influences such as a patient's clinical data, demographic information, lifestyle factors, co-morbidities, molecular data, and course of disease. To tailor an individualized treatment to the patient, such multifactorial data must be consolidated in an easy-to-use, easy-to-analyze fashion for providers to effectively use.

Purpose statement – To address this, we have built a database accumulating genetic mutations in cancer-critical genes, protein markers including galectins, glycomic profiles, and patient lifestyle and demographic factors.

Methods – The data was acquired from breast cancer patients, ten from each stage 1-4, and ten healthy patients. The glycan, galectin, and mutation data was from serum samples from each patient and was obtained from Prisma Health Cancer Institute Biorepository and the Emory Comprehensive Glycomics Core. The data acquired contained that of five galectin structures, over 300 glycan structures, and the presence or absence of fifty cancer-critical genes. The data was stored using Microsoft SQL server and is fed into an interactive web application using RStudio.

Results – Our interactive database allows providers to amalgamate cohorts from these groups to find correlations between different data types with the possibility of, for example, describing a “stage signature” based upon a combination of glycan signatures, galectin serum levels, genetic mutations, and lifestyle choices to create among our patient population.

Conclusion – Our project, demonstrates, to the best of our knowledge, the first time such an interactive database has been made. We believe this utility, such as

the ability to analyze of patterns (signatures) across stages in our database, will provide an opportunity for increased diagnostic and prognostic power.

Breaking Down Barriers: Creating a Virtual Hospice and Palliative Care Didactic Series

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*Background

The COVID-19 pandemic has significantly changed multiple aspects of the provision of high-quality Hospice and Palliative Care (HAPC) education. Social Distancing, physical space constraints, and demands on providers have limited the availability of didactic activities in small HAPC training programs. Prior to the pandemic, our fellowship had five in person speakers from outside institutions over a two-year period. Now, meeting via video conferencing technologies has become a normal activity, minimizing the barriers to expanding didactic activities beyond the walls of a single institution.

*Aim Statement

To increase access to diverse perspectives in HAPC education during the COVID-19 era by creating a free, virtual, open-access program that supplements HAPC education. The target participants are trainees, practicing providers, and members of the interdisciplinary Palliative Medicine team.

*Methods

After recognizing the need for expansion of didactics, the authors used social media to request lecturers from different programs and created a sustainable bi-monthly didactic series. Within hours, the first six months of lecture spots were filled. Interested providers were instructed to register for the didactics email list. In addition, participants were requested to complete an optional demographic survey. CME and ABIM (American Board of Internal Medicine) MOC (maintenance of certification) credits were approved for participants as an educational series through Prisma Health and the University of South Carolina School of Medicine.

*Results

The HAPC Virtual Didactic Program had 22 registrants by the end of the first didactic session in August of 2020. In July of 2021, this number had grown to 240 with an average viewership of 30. Lecturers have joined from across the globe to

speak on a variety of HAPC topics, ranging from a physician, from the Pacific Northwest, discussing Palliative Care in Surgical and Trauma ICUs to a Death Doula, and their role, in New Zealand. We have had 20 speakers from outside our organization in the last year, broadening the perspectives of our trainees. Ten other fellowship programs have incorporated this lecture series into their regularly scheduled educational programming as well.

*Conclusions and Implications

The HAPC Virtual Didactics lecture series has reached providers across the globe and supplemented the educational opportunities for HAPC Fellows at several programs. Because of this reach, we have experienced growth within our own fellowship program. We expanded access to high-quality lectures by removing physical barriers, thus promoting diversity, equity, and inclusion. In the future, our goal is to further establish a robust interdisciplinary didactic series by incorporating speakers across the many specialties in HAPC.

Are wound complications increased with mesh plating of patella fractures?

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Purpose statement: The purpose of this study was to evaluate the efficacy of mesh plating as a means for treating patella fractures including the incidence of post-operative complications.

Introduction: Patella fractures constitute a relatively small number of all adult fractures while frequently requiring surgery when displaced to restore the integrity of the extensor mechanism. More traditional methods of fracture fixation have centered on tension-band constructs. Difficulty achieving and maintaining reduction in more comminuted fracture patterns led to the advent of newer methods of fixation, including the use of anterior-based mesh plating. The aim of our study was to evaluate the efficacy of mesh plating as a means for treating patella fractures including the incidence of post-operative complications.

Methods: Patients from one health system treated with surgical fixation for a patella fracture from 2015-2021 were identified through retrospective chart review. Fracture classification means of internal fixation, and incidence of postoperative complications were all recorded.

Results: Of the 157 patients meeting inclusion criteria, 16 underwent fixation with mesh plating, 15 underwent fixation with non-mesh plating and 126 patients underwent fixation by other means. There were no differences in fracture healing, revision fixation or stiffness. Wound dehiscence was identified in 4 out of 16 mesh plates, 1 out of 16 non-mesh plates, and 5 out of 121 with other fixation ($p=0.01$). Infection was identified in 4 out of 16 mesh plates, 0 out of 16 non-mesh plates, and 9 out of 121 with other fixation ($p=0.049$). Permanent hardware removal was required in 5 out of 16 mesh plates, 3 out of 15 non-mesh plates, and 11 out of 117 with other fixation ($p=0.016$).

Conclusion: While mesh plating remains an acceptable method of fixation for comminuted patella fractures, careful consideration should be given to the possibility of wound complications. Additional research is needed to further investigate complications of patellar mesh plating.

Misidentification of small bowel NET via ⁶⁸Ga-Dotatate PET/CT: a case report

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Purpose Statement: The purpose of this case report is to convey the first case of the misidentification of a neuroendocrine tumor found in a patient's small bowel mesentery using ⁶⁸Ga-Dotatate PET/CT. **Background:** Neuroendocrine tumors (NET) have had a 6.4 fold increased incidence rate between 1973 and 2012 with most found in the lungs, GI tract, rectum, and pancreas. The use of ⁶⁸Ga-Dotatate PET/CT to specifically identify NET has promoted early diagnosis with 83%-100% sensitivity depending on the anatomic region. **Method:** Here, we present a 68 year old male with a suspected small bowel obstruction which by CT was identified as a mass with enlarged mesenteric nodes. ⁶⁸Ga-Dotatate PET/CT showed avidity in both the mass and the nodes, suggestive of NET. Upon surgical resection, the mass was not consistent with NET texture and the intra-operative frozen section revealed pancreatic necrotic fat. Analysis to rule out an inflammatory process for IgG4-related disease was negative. Surgical resection was difficult and unnecessary; therefore, subsequently aborted. **Results:** A comprehensive literature review revealed 11 rare reported misidentifications of lesions by ⁶⁸Ga-Dotatate. The most frequent misidentification occurred in older patients with a past history of NET and the most frequent ⁶⁸Ga-Dotatate avid tissues were noted in lymph nodes, pancreas, and prostate. Our case is the only reported misidentification of a necrotic lesion. **Conclusion:** Even with the ⁶⁸Ga-Dotatate PET/CT imaging modality's high sensitivity and specificity, the presented case begs the question of how much can practitioners rely solely on ⁶⁸Ga-Dotatate PET/CT without subjectively evaluating patients based on criteria such as age, past medical history, and comorbidities. Exercising caution, in turn, will result in less unneeded treatment and invasive procedures that present with their own risks.

Pressure injury prevention in the medical-surgical ICU: Capturing a multimodal approach

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Background – Pressure injuries cause substantial health burdens for patients in Intensive Care Unit (ICU). Critically ill patients in the ICU are significantly at higher risk for developing a pressure injury while hospitalized. The effects of pressure injuries can be detrimental to patient recovery and cost of care. The Greenville Memorial Hospital medical-surgical ICU has adopted the following evidence-based pressure injury prevention interventions: Use a maximum of 2 linen layers, pressure dispersing foam dressings, transfer aids to reduce friction, enhanced skin assessment strategies, digital pressure mapping system, pressure relieving overlay specialty mattresses, and turn clocks. This study predicts to capture the commitment from ICU nurses toward pressure injury prevention.

Purpose statement – To document the multimodal, unit-tailored medical and nursing interventions in rooms where pressure injury prevention care is in place. In addition to documenting the visible medical interventions in place, observation will be made of the pressure injury prevention strategies.

Methods – This descriptive study of observed medical interventions and pressure injury prevention strategies. Medical-Surgical ICU unit at Prisma Health Greenville Memorial Hospital was included. An observational method will be used. The principal investigator will complete a checklist documenting which medical interventions (e.g., supplemental nutrition, vasopressors, sedation, ventilator) and which pressure injury prevention strategies (e.g., posted turn clock, specialized mattresses, pressure mapping sensor, pressures dispersing dressings, and repositioning) are being utilized. Inclusion criteria include: (1) Occupied rooms where pressure injury prevention strategies are occurring; (2) room location is in the medical surgical ICU at Prisma Health Greenville Memorial Hospital (GMH) in Greenville, South Carolina. Exclusion criteria include (1) No report of pressure injury strategies occurring in the room (2) Room is not located in the medical surgical ICU unit. Data will be collected from the medical-surgical ICU at Greenville Memorial Hospital three days a week during the day shift in the period between November 1, 2021, and January 31, 2022. Study results will be analyzed using descriptive statistical analyses of frequencies for the interventions and strategies.

Results – Results will be analyzed using descriptive statistical analysis of frequencies of interventions and strategies.

Conclusion/Clinical Implications – This study provides a detailed assessment of the multimodal, unit-tailored evidence-based medical interventions and pressure injury prevention strategies intended to decrease prevalence of pressure injuries in ICU. This study design utilizes the intentions of "Catching People Doing Something Right," which has long been recognized as a way of building a positive workplace morale. The results of this study will be used as a motivator intended to positively affect clinical nurses in endeavors to prevent prevalence of pressure injuries in the ICU. A collateral positive outcome of this study includes greater provider awareness of the prevalence of pressure injuries in ICU and the evidence-based prevention methods utilized.

Identifying Protein Biomarkers and Calcium Content in Femoral Endarterectomy Patients

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Introduction: Peripheral arterial disease (PAD) involves a pathological narrowing of the arteries supplying blood to the upper and lower extremities. PAD severity ranges from intermittent claudication to chronic limb-threatening ischemia (CLTI) and is one of the overall leading factors for nontraumatic limb amputation¹. Generally, PAD patients experience reductions in ambulatory ability, daily functional capacity, and quality of life¹. To assess PAD severity, exercise tests are typically used, that consist of a six-minute walk with functional decline indicated by slower walking velocity, greater resting frequency, and shortened total distance traveled². Additionally, patients with PAD can have a 60% reduction in treadmill performance, and those with claudication have a similar functional reduction as patients with severe congestive heart failure. Femoral endarterectomy (FEA) is a common surgical intervention for PAD, which involves removing a stenotic plaque from the femoral artery³. As with all surgical interventions, each patient responds differently. Post-FEA limb salvage rates are approximately 94% after 10 years, and 85% after 15 years⁴. At roughly 1 per 10,000 people, the state of South Carolina, in particular the Midlands, has one of the highest rates of lower limb amputation in the country¹. Therefore, diagnosing PAD early, noninvasively, quickly, quantitatively, and inexpensively is very important. This project investigates the feasibility of using a panel of protein biomarkers to accomplish this goal.

Purpose Statement: To correlate plasma biomarker proteins found in PAD patients undergoing femoral endarterectomy with calcification quantification.

Methods: Five proteins were identified from preliminary data using antibody array-based proteomics. These proteins, myostatin, osteoprotegerin (OPG), osteocalcin, follistatin-related gene (FLRG), and Fetuin A, were quantified using sandwich enzyme-linked immunosorbent assays (ELISAs) in plasma obtained from 25 FEA patients and 6 male controls. Lower extremity calcification was quantified *in vivo* using 16-bit CT scans without contrast. Principal component analysis (PCA), a technique that reduces the number of dimensions of the data set yet keeps the statistical information intact, was used to analyze the relationship between biomarkers and calcium volume⁵. PCA identified trends in groupings of data and important proteins.

Results: The average plasma concentration of FLRG was lower in the controls (5.95 ± 2.84 ng/mL) than the FEA patients (15.03 ± 12.78 ng/mL; $p=0.004$). Osteocalcin was also lower in the controls (2.5 ± 0.19 ng/mL) than the FEA patients (23.0 ± 21.48 ng/mL; $p<0.001$). Myostatin, on the other hand, was higher in controls (4.46 ± 0.98 mg/mL) than in FEA patients (3.00 ± 1.90 mg/mL; $p=0.18$). Fetuin A was also higher in controls (1.60 ± 0.40 mg/mL) than FEA patients (0.55 ± 0.39 mg/mL; $p=0.011$). OPG was found to be lower in controls (0.041 ± 0.003 ng/mL) than FEA patients (0.051 ± 0.008 ng/mL; $p<0.001$). Calcium volume scoring ($n=12$) was performed in a blinded fashion by two observers with high inter-observer correlation ($R^2=0.993$). Linear regression was performed to identify potential correlations between concentration of each individual protein and calcium volumes. The first principal component ($\lambda=2.09$) was positively correlated to increased osteocalcin and decreased myostatin and negatively correlated to increased FLRG and decreased Fetuin A.

Conclusions: OPG, FLRG, and osteocalcin concentrations were significantly elevated in patients while Fetuin A and myostatin concentrations were significantly reduced. The results of the principal component analysis show that for FEA patients there is a correlation with increased osteocalcin, decreased myostatin, decreased FLRG, and increased Fetuin A. Plasma OPG concentration was found to have a positive correlation with calcium volume ($R^2=0.58$). This biomarker data has the potential for improved diagnostic testing and identification of individuals with developing PAD via simple bloodwork analysis. In future work, patient demographic and clinical data will also be included in the principal component analysis to determine which variables are most relevant.

Literature Cited

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Clinical Factors Associated with rtPA Inclusion in Ischemic Stroke Patients with and without Heart Failure

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Purpose Statement: It is estimated that approximately 10-24% of acute ischemic stroke (AIS) patients have comorbid heart failure (HF). However, it is currently unknown if certain clinical risk factors associated with recombinant tissue plasminogen activator (rtPA) thrombolytic therapy differ based on HF diagnosis. The purpose of this study is to determine the clinical factors associated with rtPA inclusion in AIS patients with and without heart failure.

Methods: Retrospective data for baseline clinical and demographic data from January 2010 to January 2016 in a regional stroke center were analyzed. Of the 5,469 patients identified with AIS, 590 presented with heart failure while 4,879 did not. Odds ratios and 95% confidence intervals were used to determine which clinical factors were associated with rtPA inclusion.

Results: Adjusted multivariate analysis demonstrated that within the AIS population, those without HF who received rtPA were more likely to be associated with Hispanic ethnicity (OR = 0.464, 95% CI, 0.247-0.87, P= 0.017), coronary artery stenosis (OR = 0.55, 95% CI, 0.366-0.83, P= 0.004), previous stroke (OR = 0.745, 95% CI, 0.609-0.91, P= 0.004), previous TIA (OR = 1.447, 95% CI, 1.094-1.91, P= 0.010), total cholesterol (OR = 1.487, 95% CI, 1.175-1.88, P= 0.001), Lipids (OR = 0.998, 95% CI, 0.996-1, P=0.038), serum creatinine (OR = 0.899, 95% CI, 0.854-0.95, P<0.001), INR (OR = 0.825, 95% CI, 0.73-0.93, P= 0.002), heart rate (OR = 0.13, 95% CI, 0.071-0.24, P<0.001), and direct admission (OR = 2.87, 95% CI, 2.432-3.39, P<0.001). AIS patients with HF who received rtPA were more likely to be associated with increasing age (OR = 0.982, 95% CI, 0.966-1, P= 0.020), coronary artery disease (OR = 0.618, 95% CI, 0.391-0.98, P= 0.004), INR (OR = 0.326, 95% CI, 0.129-0.82, P= 0.018), and ambulatory improvement (OR = 1.69, 95% CI, 1.058-2.7, P= 0.028).

Conclusion: The results of this study demonstrate that within the AIS population, there are certain clinical risk factors that influence the likelihood of receiving rtPA in patients with and without HF. These findings provide further insight into AIS and HF and suggest the need for further research into the role the identified factors play in influencing clinical outcome.

Genotype-Phenotype Correlations in Phelan-McDermid Syndrome

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Phelan-McDermid Syndrome (PMS) is a genetic disorder characterized by 22q13.3 deletions that can include up to 150 genes or pathogenic SHANK3 variants. General symptoms of the disorder include neonatal hypotonia, developmental delay, and autistic presentation, however other complications can arise contingent upon the span of genetic information lost in an individual. In some patients, kidney development is stunted, or completely absent, while those with fully developed kidneys may be at risk for developing cysts or other malformations. It is not yet known what genes in the 22q13.3 region contribute to the nephrological phenotypes present in PMS. This research aims to elucidate the genotype-phenotype correlation by investigating four candidate genes found in 22q13.3: MAPK8IP2, ARSA, WNT7B, and CELSR1. Because zebrafish share orthologs with 70% of human genes, including the genes to be studied (Mapk8ip2, Arsa, Wnt7bb, and Celsr1b), and have transparent embryos conducive to live imaging, they will be used to observe pronephros development in lines of knockout specimens. While more rudimentary than the human kidney, the zebrafish pronephros does contain glomeruli and tubules that function in a similar capacity to those of humans. To clearly visualize the pronephros, a stable line of transgenic zebrafish Tg(wt1b:EGFP) will be crossed with knockout lines to produce a model that fluoresces throughout its glomeruli and tubules. Confocal microscopy will then be used to render a three-dimensional image of the pronephros for detailed evaluation of its size and structure in comparison to a set of control transgenic fish. The goal of this study is to identify candidate genes that may contribute to the kidney phenotypes in PMS and future treatment targets for those affected by PMS and develop a method that can be used to research genes beyond the investigation of this disorder.

Pilot Study of Insulin-like Growth Factor 1 on Differing Metabolic Responders with Phelan-McDermid Syndrome: Preliminary Results

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Background: Phelan-McDermid Syndrome (PMS) is a rare genetic neurodevelopmental disorder with variable clinical manifestations. These features can include intellectual disability, autism, developmental delays, and seizures. PMS can be caused by deletions within the 22q13 region or pathogenic variants of the *SH3 and multiple ankyrin repeat domains 3 (SHANK3)* gene, which plays an important role in the development, function, and maintenance of excitatory synapses. While there are currently no approved treatments for PMS, one potential therapy is insulin-like growth factor-1 (IGF-1). IGF-1 is a protein that supports the development of mature synapses and regulates cellular function via several regulatory pathways. IGF-1 has been used to promote growth in children with short stature due to IGF-1 deficiency or growth hormone (GH) deficiency, but only for a limited amount of time. Animal models of PMS have shown the rescue of neurological and behavioral functions following treatment with IGF-1. We aim to explore the impact of IGF-1 treatment on the metabolic response to a large panel of metabolites and effectors to determine if IGF-1 can rescue the abnormal metabolic pathways present in individuals with PMS.

Methods: Previous experiments employing the Biolog Phenotype Mammalian Microarrays (PM-Ms) assessed the metabolic profile of lymphoblastoid cell lines (LCLs) from individuals with PMS: results from these experiments were analyzed to identify five subjects who were high metabolizers of IGF-1 and five that were low metabolizers. The Biolog data for those ten people were evaluated across all eight PM-M Biolog plates to determine which plates had the greatest differences when compared to a group of 50 controls.

Results: Ten abnormal metabolic responders were identified from a PMS cohort of 54 individuals. Five controls were randomly selected from a cohort of 50 people. Four Biolog PM-M plates were identified as plates of interest with the effectors being carbon energy sources, hormones, growth factors and cytokines (PM-M1, and PM-M6 to M8). The LCLs of these ten subjects with PMS showing abnormal metabolic response to IGF-1 will be utilized in our pilot study aimed at addressing the efficacy of IGF-1 treatment with the potential to identify ideal candidates for the treatment.

Conclusion: The 15 selected LCLs will be used to determine the effect IGF-1 has on the differing metabolic profile of the high, low, and average responders.

Serendipitous Science: Discovery and Characterization of a possible *E. histolytica* Protein Involved in Regulating Virulence.

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Purpose: The goal of this study is to characterize the function of a previously unknown protein encoded by the gene, EHI_056700. This protein possibly regulates facets of virulence in *Entamoeba histolytica*. *E. histolytica* is a food and waterborne parasite that exhibits a 2-stage life cycle that includes the infectious amoeba and environmentally stable cyst. A profound human pathogen, *E. histolytica* causes as many as 50 million cases of amoebiasis annually. Despite such prevalence, little is known about the parasite's divergent genome. Of note, one-third of putative genes encode proteins that are unique to *Entamoeba*, warranting further investigation. However, due to the difficulty of inducing cyst formation of *E. histolytica in vitro*, many laboratory studies are conducted with a related reptilian pathogen, *E. invadens*, which readily forms cysts *in vitro*. This lab has previously characterized a hypothetical protein that is a homolog to EHI_056700 in *E. invadens* known as EIN_059080.

Methods: To isolate the gene, *E. histolytica* genomic DNA was purified and used as a PCR template with gene-specific primers that also added BglII and XhoI restriction enzyme sites to the ends. The PCR-amplified gene was subcloned into a Trigger plasmid, which facilitates reduced expression of genes by RNA-interference (RNAi) and confers resistance to the antibiotic, G418. DNA sequencing was used to confirm the correctness of the gene in the Trigger plasmid. *E. histolytica* cells were transfected with the Trigger plasmid using the reagent, Lipofectamine 3000 (Thermo Fisher). Transfected cells were selected by adding G418 to the medium.

Results: Characterization studies of EHI_056700's gene product are ongoing, however, our lab's previous studies in the reptilian homolog, EIN_059080, revealed a significant difference in encystation phenotype at 48 and 72 hours versus control ($p=0.0214$, $p=0.0039$ respectfully) as well as a difference in phagocytosis ($p=0.0290$).

Conclusion: Discovery that EIN_059080's gene product is involved in regulating phagocytosis is very exciting, as this pathway is poorly understood in protozoa and could yield a therapeutic target pending characterization of EHI_056700. Furthermore, the encystation phenotype is interesting in that knockdown of EIN_059080 results in cell lines that are resistant to stage conversion, persisting as

the environmentally fragile amoeba. From a public health standpoint, this could be used as a water-treatment target in nations where this pathogen is endemic. Future studies will include confirming gene knockdown of expression by RT-PCR and characterizing virulence functions in the transfected cells.

A Comparative Analysis on Fertility Success Among Physician Specialties

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Purpose: Physicians are exposed to a variety of psychological and physical occupational hazards. Emergency Physicians serve as the initial contact for the most critically ill and injured. Adding to these stressors are 24-hour staffing demands of the Emergency Department (ED) with varying shift times and durations. This increases not only the physical demands of the occupation but also the psychological stressors. Prior research has recognized both physical and psychological stressors on women's fertility. Physician specialties traditionally have differing time pressures, compassion fatigue, and occupational culture that may also affect fertility. Yet, little is known how the stressful ED environment influences fertility. The present study explores the history of fertility success among physicians and examined if the prevalence of infertility differs between specialties.

Methods: Between December 2019 to April 2020, all female physicians at a large health care system in South Carolina were contacted through email with an invitation to participate in this voluntary study. The introductory email assured confidentiality and anonymity of responses. The Qualtrics epoch-based questionnaire assessed all attempts to conceive from medical school to the present date and included questions examining fertility experiences and pregnancy outcomes. Additional demographic data was obtained from human resources. The questionnaire used branch logic to gather details about attempts to get pregnant and the outcome of the pregnancy (e.g. live birth, miscarriage).

Results: 354 female physicians responded to the invitation (42% response rate). Participants who reported that they had never tried to get pregnant were excluded, N= 262; 34 (13%) were EM and 232 (87%) from other specialties. The 262 respondents reported a total of 524 pregnancy attempts ($M = 2$). Further analyses were conducted at the level of the attempt. Overall, physicians were successful in getting pregnant for 445 of all attempts (84%). EM physicians were less likely to get pregnant (73%) than physicians from other specialties (87%), [$\chi^2(1) = 9.99$, $p = .002$] and took longer to get pregnant ($M = 5.34$ months, $SD = 5.51$) than other physicians ($M = 3.90$ months, $SD = 4.64$), [$F(1, 441) = 4.07$, $p < .05$]. EM physicians also tried at an older age to get pregnant ($M = 33.19$, $SD = 3.31$) compared to other physicians, ($M = 31.68$, $SD = 3.45$), [$F(1, 521) = 11.62$, $p < .01$]. However, age at the pregnancy attempt was not associated with likelihood of pregnancy success. For the 445 successful pregnancy attempts, 92 (21%) experienced difficulties with their pregnancy (e.g. ovulatory dysfunction). No significant difference existed in reporting of pregnancy difficulties between

physicians. Generalized linear modeling revealed that after controlling for history of infertility and age of attempt, being an EM physician was still a predictor of a reduced likelihood of a pregnancy attempt being successful, Wald $\chi^2 (1) = 12.02$, $p = .001$.

Conclusion: At this large academic health center, EM female physicians were significantly less likely to get pregnant and took longer to get pregnant than physicians from other specialties. Further inquiry into the reasons for this finding and extension beyond a single health care system are needed to better understand the role of workplace stressors on physician fertility.

Stroke Severity Factors in patients with Acute Ischemic Stroke and Heart Failure Stratifying by Age

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Purpose Statement: The goal of this study is to investigate the clinical risk factors associated with acute ischemic stroke (AIS) severity in heart failure (HF) patients between ages 65 to 75 versus greater than 75 years old using the National Institutes of Health Stroke Scale (NIHSS) as a measure for stroke severity.

Methods: This study uses retrospective analysis of AIS patients who were previously diagnosed with HF. Data was collected from a regional stroke center from January 2010 to June 2016. Multivariate logistic regression identified the factors associated with stroke severity, with a NIHSS score ≤ 7 indicating low severity and a score > 7 indicating high severity. These results were stratified by patient ages of 65-75 versus greater than 75 years old.

Results: A total of 429 patients were between 65 to 75 and greater than 75 years old who presented with AIS, and had a previous diagnosis of HF. The AIS-HF population contained 131 patients that were 65-75 years old and 298 that were > 75 years old. In the AIS-HF population, patients between 65-75 years old who presented with a previous stroke (OR = 2.297, 95% CI, 1.171-9.852, P = 0.024), peripheral vascular disease (PVD) (OR = 6.784, 95% CI, 1.242-37.065, P = 0.027), increased heart rate (OR = 1.035, 95% CI, 1.008-1.063, P = 0.012), and increase systolic blood pressure (OR = 1.023, 95% CI, 1.005-1.041, P = 0.012) were associated with a higher stroke severity (NIHSS > 7). In the AIS-HF population, patients between > 75 years old who presented with a smoking history (OR = 0.105, 95% CI, 0.018-0.614, P = 0.012) and had a direct admission (OR = 0.355, 95% CI, 0.137-0.920, P = 0.033) were associated with a lower stroke severity (NIHSS ≤ 7).

Conclusion: The data revealed a variety of components that may affect Stroke Severity in AIS patients with HF with distinct age groups based on previous age stratification studies. AIS-HF patients between 65-75 years old who presented with a previous stroke, peripheral vascular disease, increased heart rate, and an increased systolic blood pressure were significantly associated with higher stroke severity (NIHSS > 7). The > 75 years old age range who had lower stroke severity (NIHSS ≤ 7) were significantly associated with patients having a smoking history and being directly admitted. Identifying more concrete clinical and demographic

associations may aid in the identification, improved utilization of the NIHSS score in conjunction with clinical judgement, and evidence-based management of patients who suffer from AIS.

Impact of Time on Patient's Lived Perinatal Loss Experience

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Purpose Statement: The purpose of this study is to examine the impact of time spent with baby on the patient's lived perinatal loss experience. With the objective being to understand and describe the mother's loss experience in relation to time with baby including expectations of care, opportunity to participate in care (co-creation of mementoes), and emotional support provided.

Methods: Participants are consented following delivery after their 2-hour postpartum recovery and after being given the opportunity to review the study introductory letter. Participants must be 18 years of age and have been given the opportunity to spend time with their baby. As participants consent to participate in the study, each is assigned a designated identification number.

Data collection includes retrospectively gathering of data from participants regarding the phenomenon of having experienced the loss of a baby (miscarriage, stillbirths, and neonatal deaths). Demographic data is collected while the patient is in the hospital and then interviews take place at 3 and 6 weeks postpartum.

Using a phenomenological approach, the interview includes a primary question followed by probing questions, as necessary and appropriate. It is anticipated that the 10-15 patients interviewed will vary in their demographic characteristics and length of time spent with the deceased baby. Interview questions were derived from the literature, personal clinical experience, and from discussion among the study team members who are members of the Nursing Shared Governance Research council. This instrument was designed for in-depth interviewing and consists of open-ended sentences to allow the participants to describe their experience from their perspective.

Interviews are audio taped and transcribed verbatim. Each researcher reviews their transcription for accuracy and makes correction as needed. The researcher shares a summary of the participants responses from the first interview with the participant at the time of the second interview. This allows the researcher the opportunity to assure understanding of the meaning of the participants response and time for further elaboration of their response if needed. After two interviews have been transcribed and reviewed, the research team reviews the data as a group. During each meeting, the research team reflects on the meaning units discovered. Meaning units will be synthesized into a description of the perception of the impact of time of

the patients lived perinatal loss experience.

Results: Eight participants from Prisma Health Baptist have been consented for the study with three withdrawing before their initial scheduled interview date. Of the five participants four have completed both of their interviews. Four of the five participants chose to spend time with their baby. Of the four that choose to spend time with their baby one of the mothers had significant concerns regarding the appearance of her baby who was of an early gestation and felt she had not been given any anticipatory guidance regarding the baby's darkened skin color and gelatinous appearance. Other preliminary findings include the identifying of themes surrounding incongruency related to expectations of care at the hospital and of the lack of support of the participant's providers office for the bereavement experience.

Conclusion/Implications: The preliminary results reflect the need for nursing as well as other health care providers to provide women experiencing a loss more anticipatory guidance. All but one of the participants that spent time with their baby described some very meaningful moments with their baby and spoke to capturing some of those moments with photography or with the inclusion of significant others or partners. The study is ongoing, and data continues to be analyzed with intent to submit as a multi-site study at other Prisma Health Midlands facilities.

Non-alcoholic steatohepatitis (NASH) Elastography versus Liver Biopsy

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Non-alcoholic steatohepatitis (NASH) is increasing in incidence alongside obesity and diabetes. Untreated NASH leads to cirrhosis, which emphasizes the importance of early diagnosis and continual monitoring of patients at high risk of disease progression. Historically, diagnosis has relied on liver biopsy; however, elastography is a noninvasive means of identifying NASH characteristics. A single institution retrospective correlation of biopsies and elastography between 3/1/16 and 5/1/21 on patients with NASH was completed. Those on NASH studies and those with incomplete records were excluded. Typical demographic and clinicopathologic data were collected to include imaging and histology findings. Overall, 25 patients were included in the study. Of these patients, 88% were white, and 60% were female. The average age of our cohort was 56.6 (35-73). Mean BMI was 31.80 (24.06-42.20), and 60% of patients were obese. Moreover, 96% of patients were overweight, and none were underweight, while 72% had diabetes. A comparison of proportions was performed to evaluate the efficacy of biopsy versus elastography for fibrosis and cirrhosis. There was a statistically significant difference between the categories of elastography and histology in agreement versus those opposed for both fibrosis and cirrhosis, suggesting that they have similar capabilities in recognizing later stages of NASH. However, regarding elastography, none of the imaging definitively noted steatosis or inflammation. For histologic analysis, steatosis was identified in 88% of specimens, and inflammation was apparent in 92% of specimens. These data reveal that histology more readily confirmed early defining features of NASH, while elastography posed difficulty differentiating fibrosis and biologic confounders, supporting histology as the gold standard for initial NASH diagnosis.

Improving health outcomes through community collaborations to address food access and food insecurity in a large healthcare system: protocol for a pilot study

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Purpose statement: Food insecurity is linked to several adverse health outcomes and increased health care use and costs. Patients with diabetes and hypertension are two groups whose health outcomes are adversely affected by food insecurity. Although healthcare systems can address food needs of patients and connect them to community-based and other local resources, it is challenging to ensure not only universal screening but also how to successfully connect patients with food insecurity resources. Clinical-community collaborations are essential, but patients also need the capabilities to access available resources. This study aims to pilot and evaluate a food insecurity screening and resource navigation program for patient with diabetes and/or hypertension. This pilot has been implemented in family and internal medicine practices in South Carolina's largest health system, Prisma Health. We examine whether screening for food insecurity and providing access to a resource navigator to assist patients with diabetes and/or hypertension who are food insecure will result in changes in patient quality of life, food insecurity and short-term clinical outcomes, resource use, and costs.

Methods: Patients seen at study sites are screened for food insecurity as part of social determinants of health screening (SDOH) at Prisma Health. Those individuals who are 18 years or older, food insecure, have diabetes, hypertension or both and seen at the study practices are eligible for this study. Patients who consent to research participation receive support from a resource navigator to assist with meeting food insecurity needs for 12 months following the date of study entry. Study sites are one family medicine practice (urban) and two internal medicine practices (one rural and one urban) in the Upstate region of South Carolina. Participating practices were chosen for geographic variability and high representation of patients with diabetes and hypertension based on absolute volume and percentage of patients.

This study utilizes a matched observational design and a mix of primary and secondary data. It uses the following data sources; quality of life survey, claims and electronic medical record (EMR) data, which includes SDOH screening data. Study enrollment started on July 13, 2021 with an expected end date of December

31, 2022.

Primary data collection occurs at baseline, 6 months and 12 months. We administer the Hunger Vital Sign (the gold standard two question format for food insecurity) and the Euroqol-5D5L data (EQ-5D-5L) to assess patient quality of life at each interval. Quality of life and food insecurity data will be analyzed before and after the intervention for statistical significance using t-tests and repeated measures ANOVA.

Secondary analysis uses claims and EMR data. Research study participants will be matched using propensity score methods based on gender, age, race/ethnicity, payer and comorbidity diagnoses to patients who have not been receiving care at the study sites. Analysis will examine differences in short term clinical outcomes (BMI, HbA1C, and blood pressure levels), resource use (emergency department visits, number of admissions, and inpatient days) and cost of care across the matched and treated groups. Short term clinical outcomes will be examined using OLS regression. Resource use and cost outcome work will test a number of specifications to include negative binomial and two-stage hurdle models to account for the distribution of zeros in the outcome variables.

Results: A pilot study on the impacts of screening for SDOH and using a resource navigator to facilitate access to food insecurity needs has been developed and is ongoing. 2 practices have begun recruiting patients with 1 in the process of onboarding. As of September 3, 2021, 27 patients have qualified for the study based on inclusion criteria. 13 have consented for research participation.

Conclusion: Findings will help establish whether screening for food insecurity and referral to a resource navigator improves quality of life and health outcomes for at-risk, food insecure patients. The study will provide evidence about the effectiveness of a food insecurity intervention to be used by healthcare systems to improve health outcomes and potentially reduce resource utilization and healthcare spending. Findings from this study will provide useful information to guide how clinical-community collaboration models can be integrated in healthcare systems to address at-risk patients' food needs.

An outdoor urban mindful walking program for cognitive and physical health in older adults at risk for dementia

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Purpose statement: A six-week urban outdoor mindful walking program is being conducted for older adults at risk for dementia. The goal of the project is to determine if the mindful walking intervention would help improve or maintain cognition for adults.

Background: Community-based physical and social programming may assist in the prevention of cognitive decline. There are few wellness programs for older adults that can be implemented in outdoor urban settings. Mindful walking has been found to sustain older adults' mental health and speed of cognitive processing. The goal of this project is to determine the efficacy of an outdoor, multi-session mindful walking program with brief social interactions on daily cognitive function in older adults.

Methods: Community-based older adults (Mean Age=70.88; SD=9.40) with dementia risk factors were recruited to participate in a twice weekly 30-minute mindful walking program at an urban walking trail in Columbia, South Carolina. Staff (i.e., trained university students) led the walking sessions. Participants were told to focus on their breath, their steps, mentally scan their body for sensations and focus on the present moment. Participants completed 12 sessions over six-weeks after baseline measurement (online surveys, physical fitness tests, and cognitive tests). Participants wrote their observations on a clipboard after each session and discussed their observations with another participant or staff. Participants also completed multiple short ambulatory measures of cognitive function using a study smartphone. Post testing was conducted for comparison with baseline measures.

Results: Data collection is on-going. The first six participants on average maintained or improved cognitive test performance (MoCA Time1=25, Time2=26.38 and Trail Making Test (Part B; Time1=92.62seconds and Time2=92.63 seconds). Participants also spent less time on the Timed Up and Go Test (a physical fitness measure, Time1=9.77 seconds and Time2=9.24 seconds).

Feedback on participant experience was positive. Preliminary results from ambulatory cognitive measures suggested that participants had faster mental processing speed from pre-to-post mindful walking (Pre-walk =2035 ms; Post-walk =1801 ms on the symbol search test).

Conclusion: Preliminary data suggests that older adults with risk factors for dementia could benefit from a community based mindful walking program. Mindful walking is a feasible strategy that generates beneficial effects on older adults' cognitive function and well-being in their day-to-day lives.

Stroke Severity in the Telestroke Network – Is Age a Major or Minor Factor?

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Background:

Age is the single most important risk factor for stroke, and most strokes occur in people >65 years of age, while adults ≥75 years' experience more hospitalization stays and higher mortality linked to stroke. In this study, we aim to investigate risk factors that contribute to the severity of acute ischemic stroke (AIS) among >65 and <75 and ≥75 age categories treated in the telestroke network. The particular NeuroDirect telestroke system in this experiment uses video and teleradiological evaluations of brain scans to provide a bidirectional prognosis of stroke severity.

Methods:

Retrospective clinical and demographic data from the stroke registry of Prisma Health from 2010-2016 for AIS patients >65 and <75 and ≥75 was analyzed. The National Institute of Health Stroke Scale (NIHSS) was used to stratify stroke severity classifying results as either improving neurologic outcomes (score ≤7) or worsening (score >7). Multivariate logistic regression models predicted clinical factors and demographics that most closely associated with worsening or improving neurological outcomes.

Results:

Adjusted multivariate analysis showed that AIS population of patients >65 and <75 experiencing heart failure (OR = 4.398, 95% CI, 3.912 – 494.613, P = 0.002) and elevated HDL levels (OR = 1.066, 95% CI, 1.009 – 1.126, P = 0.024) trended towards worsening neurologic outcomes while patients experiencing obesity (OR = 0.177, 95% CI, 0.041 – 0.760, P = 0.020) exhibited improving neurologic outcomes. For the patients ≥75, direct admission (OR = 0.270, 95% CI, 0.085 – 0.856, P = 0.026) was associated with improvement of patients treated in the telestroke network.

Conclusion:

Heart failure and elevated HDL levels were significantly associated with scores >7 on the NIHSS scale and hence worsening neurologic outcomes among AIS patients >65 and <75 . Obese patients and individuals ≥ 75 years who were directly admitted were most likely to exhibit lower NIHSS scores (≤ 7) and improving neurological outcomes. Amid various risk factors, data supports that age is a major factor in assessing stroke risk.

Keywords: stroke, risk factors, telestroke, univariate, multivariate

Maternal Breastfeeding Self-efficacy and Surgical Release of Infant's Tethered Oral Tissues

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Background- It has been noted that regardless of feeding choice, feeding difficulties are reported in 25-44% with infants with tethered oral tissues (TOT). The effects of these ties can have a great impact on whether mothers are able to continue breastfeeding at the breast or stop providing breastmilk and switch to exclusive formula. Breastfeeding "failure" is 4 to 5 times more likely among less confident women. Between October 21, 2019 and October 12, 2020, Prisma Health Upstate Lactation Outpatient Services (PHULOS) saw 317 babies for an outpatient evaluation related to breastfeeding. Of those, it is estimated 75% were recognized to have some degree of TOT. There are variable perceptions among pediatricians and International Board Certified Lactation Consultant (IBCLC) feeding specialists regarding TOT, and whether this is indeed a contributor to early weaning and decreased breastfeeding duration. The lack of documented evidence and the noted inconsistency between views of healthcare professionals on the need and/or efficacy of a frenotomy results in inconsistent breastfeeding management of these infants.

Purpose statement - To report on the effect on maternal self-efficacy before and after surgical release of infants' tethered tissues.

Methods - Study is a descriptive, prospective correlational study that includes assessing 60 mothers of infants with TOT before and after infants have undergone a surgical release intervention. During a patient visit, mothers of infants aged 0-12 months with TOT scheduled for a release are offered the opportunity to participate in the study by a IBCLC feeding specialist who explains the study guided by the institutional review board approved consent. Exclusion criteria: (1) Mothers of infants aged 0-12 months without TOT who visit the PHULOS; (2) Mothers of infants aged 0-12 months with TOT who have elected to not schedule a surgical release. Instrument to assess maternal self-efficacy in breastfeeding is the Breastfeeding Self-Efficacy Scale—Short Form (BSES-SF), a 14 item Likert scale with reported Cronbach's alpha coefficient of .96. The BSES-SF identifies mothers at risk of prematurely discontinuing breast feeding. A demographic instrument will capture data about the type of tethering, date of surgical intervention, household income, age, race, education of the mother, smoker, parity #, childbirth preparation classes for the current pregnancy, type of delivery, hours discharged home, working outside the home, and length of time on maternity leave. Study results will be analyzed using descriptive statistical analyses of frequencies for the demographic questions. The BSES-SF responses are summed and averaged to yield

an overall value. The pre-infant surgical release total score will be compared to the post-infant surgical release total score using a paired t-test, the Wilcoxon Signed-Rank. (BSES-SF) and demographics will be collected utilizing the REDCAP data collection system. Confidentiality will be maintained through the protected and approved REDCAP cloud storage. No personal identifiers will be collected.

Results – Results will include a summary table of responses to demographic questions, aggregate mean paired t-test scores of the pre-and post-surgical release periods, and correlations between assessment scores and demographic variables.

Clinical implications/Conclusion-- Findings will be shared with Medical and Nursing committees in health system in Appalachia SC, to support practice changes related to the treatment of infants with tethering in mothers desiring the breast-feeding experience.

Prisma Health Upstate Medication Safety Task Force: Collaboration Leads to Improvements

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Purpose/Background: The goal of this quality improvement project was to identify, evaluate, and execute improvements in selected medication safety priority areas and spread lessons learned and the approach throughout the organization. In the Spring of 2020, serious safety events triggered a deeper analysis of medication safety. A multidisciplinary Medication Safety Task Force was developed to improve collaboration and communication across all disciplines and to identify the priority areas. The team identified three to five specific priority areas in each discipline.

Methods/Processes: Three different areas were chosen to pilot the nursing improvements. Multiple clinical nurse champions from each unit volunteered to assist with the project. Feedback was obtained via both paper and digital surveys. Providers were also provided a medication safety survey with a Computerized Physician Order Entry (CPOE) and verbal order focus. The feedback helped identify many barriers and inefficiencies in medication safety processes for which solutions were identified and interventions provided. These interventions included the development and dissemination of education, the identification and repair of broken barcodes and pump integration issues, the provision of motivation rewards for achieving desired barcode medication administration (BCMA) rates and numbers of event reports submitted, and the prevention of nuisance CPOE alerts. Data from the electronic medical record were analyzed daily, weekly, and/or monthly in various priority areas for opportunities to improve processes, and additional suggestions, education, and support was provided to staff, as needed, with a "how can we help" focus.

Results: The project reduced overall verbal order rates from 7.3% to 3.3% in the critical care pilot unit and had an overall statistically significant reduction in Greenville Memorial Hospital from 4.2% to 3.3% ($p < 0.001$). Pump integration rates improved from 79.4% to 87.3% market wide ($p < 0.001$). Barcode scanning rates improved on average from 94.7% to 97.4% in the pilot areas. Safety event reporting increased when education and motivational rewards were provided. Staff perceptions of unit safety demonstrated several significant improvements from the pre- and post-surveys in the pilot areas ($p < 0.05$). Greenville Memorial Medical Center experienced statistically significant improvement in dispenses from Omnicell

($p < 0.001$). As of February 2021, overall medication alerts per 100 orders decreased by 21%. Provider alert overrides decreased by 1.7%. Pharmacist alert overrides decreased by 3.1%. There were also significant reductions in the warnings per 100 orders for duplicate therapies ($p = 0.002$), lactation ($p < 0.001$), and pregnancy ($p < 0.001$).

Conclusion and Next Steps: The project has been spread to eleven units and has had 44 clinical nurse unit-based champions. The team is in the process of developing a system-wide medication safety committee to further expand the reaches of this work. By promoting strong interdisciplinary collaboration, medication safety can be improved in the setting of a disciplined approach to the improvement work, involvement of direct care providers, and strong leadership support.

Can We Use Twin Sheep as a Model for Singleton Human Pregnancies? Comparison of Hemodynamic Values of Singleton Vs. Twin Pregnancies in a Meat Producing Flock

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Background: Nutrient and oxygen supply to the fetus depends on proper uterine and placental blood flow which can be assessed by Doppler ultrasonography. In the ewe, Doppler ultrasonography during pregnancy has been used in singleton pregnancies as sheep models of human disease. However, most of our meat and wool producing sheep herds are selected to produce twin or triplets, and many singletons born from mature ewes are larger than the average newborn size for the herd.

Purpose: This trial was designed to obtain and compare the hemodynamic values of singleton vs. twin pregnancies in a meat producing flock.

Methods: Mature Suffolk ewes from the Clemson Research Flock were examined by transabdominal ultrasound at 50 d post breeding to confirm pregnancy and estimate fetal number. Ewes carrying singleton (n = 9) and twin (n = 9) pregnancies were selected. Doppler ultrasonography was performed at 60, 90, and 120 (± 3) days post-breeding. Umbilical artery, fetal aorta, and maternal femoral artery blood-flow velocities and vessel diameter were measured. Blood flow velocities were used to calculate resistance index (RI). Vessel diameter and RI were analyzed as repeated measures over time, with an autoregressive covariance structure (Proc Mixed, SAS).

Results: For umbilical artery RI, fetal aorta RI, and fetal aorta diameter, there was no significant ($p > 0.05$) effect of fetal number; there was significant ($p < 0.0001$) effect of time; and there was no interaction. Umbilical artery RI: $0.84 \pm 0.01a$; $0.64 \pm 0.01b$; $0.55 \pm 0.01c$, LSM \pm SE for days 60, 90, and 120 respectively; fetal aorta RI: $0.79 \pm 0.02a$; $0.66 \pm 0.02b$; $0.61 \pm 0.02c$ for days 60, 90, and 120 respectively; fetal aorta diameter: $0.22 \pm 0.02a$; $0.35 \pm 0.02b$; $0.62 \pm 0.02c$ cm for days 60, 90, and 120 respectively. For maternal femoral artery RI, there was no significant ($p > 0.05$) effect of fetal number, time, or interaction. Maternal femoral artery diameter had a significant ($p < 0.005$) effect of time; and there was no interaction: $0.55 \pm 0.01a$; $0.51 \pm 0.01b$; $0.50 \pm 0.01b$ cm, LSM \pm SE for days 60,

90, and 120 respectively.

Conclusion: These preliminary results indicate that there are no major differences in the measured hemodynamic values between singleton and twin pregnancies in mature Suffolk ewes.

Use of Antibiotic Irrigation to Reduce Incidence of Intra-abdominal Abscess Formation and Wound Infection in Pediatric Perforated Appendicitis

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Purpose Statement: To determine the efficacy of intra-operative antibiotic irrigation in the prevention of intra-abdominal abscess (IAA) and post-operative wound infection following a laparoscopic appendectomy in pediatric patients with perforated appendicitis as compared to suction alone. We hypothesize that intra-operative antibiotic irrigation will decrease the incidence of IAA and post-operative wound infection.

Methods: All patients 18-years-old and younger who were taken to the operating room for acute appendicitis with suspected perforation were asked to voluntarily participate in a randomized prospective study before operation. Those who did not wish to participate were treated at the preference of the attending surgeon and were not included in the study. After resection of the appendix patients were randomized into one of two groups: 1) suction of reactive/purulent fluid alone or 2) antibiotic irrigation with suction. Patient follow-up included post-operative course and duration of antibiotics, length of stay, development of intra-abdominal abscess with the need for treatment via repeat surgery or radiologic guided drainage, readmission rate, and follow-up phone questionnaire 30-days after surgery.

Results: Over the first eighteen months we have enrolled 75 out of the planned 200 patients deemed necessary to power the study. Based upon preliminary data, we have noted the following trends. Children with antibiotic irrigation had a decreased need for post-discharge antibiotics (60% v. 91.4%), a lower hospital re-admission rate (7.5% v. 14.3%), decreased need for drainage of abdominal abscess and decreased time for a return to previous activities. In addition, children in the antibiotic group may have increased incisional wound infections.

Conclusion: Our preliminary findings demonstrate decreased intraabdominal abscess formation and a possible increase in post-op wound infections. This data justifies the continuation of the project and continual recruitment until we reach the necessary 200 participants to determine the statistical significance of our current findings.

Enhancing Prediction of Cardiac Events for Critically Ill Patients Prescribed QTc-prolonging Medications using Cure Model

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Purpose Statement: Early identification of critically ill patients at a higher risk of developing cardiac events secondary to QTc prolongation may provide a timely window for clinicians to reevaluate their treatment plan. Currently, the major assessment tool called Tisdale's risk score has been developed for cardiac critical care patients, however its positive predictive value is low for moderate risk patients (55%), and it's not routinely used. There is a strong need of improving the assessment tool using different analytic frameworks. The objective of this proposed study is to improve the ability of predicting likelihood of cardiac events for patients prescribed QTc-prolonging medications.

Methods: This is a retrospective cohort study. The cohort is adult patients admitted to the CCU at Prisma Health Heart Hospital between January 1, 2018, and December 31, 2019 with at least one cardiovascular diagnosis and 12-lead EKG. The risk scores [range: 0 – 21] depicted in Tisdale et al., 2013 ¹ were calculated based on the first 5 ECGs. All potential risk factors ¹ were collected. The outcome was defined as incidence of cardiac events (QTc>500ms or a QTc interval increase of ≥ 60 ms from the baseline, ventricular tachycardias, and cardiac arrest) during their CCU stay. The factors associated with developing cardiac events will be modelled and reported.

Results: So far, 1043 patients with baseline QTc ≤ 500 were collected. The average age was 64 years old with 54% males. The average QTc at baseline was 428 [range: 311, 500]. 34% of patients had history of acute myocardial infarction, 25% had heart failure with reduced ejection fraction (HFrEF), 99% of them had no history of drug induced TdP and 4.4% had prior episode of sudden cardiac death. The average of the highest risk score among the calculated 5 risk scores was 4.6 [range: 0, 16]. 109 (10%) patients had ventricular tachycardias, 189 (18%) patients had QTc prolongation (> 500 ms or QTc increase of 60ms from the baseline), 94 (9%) patients had cardiac arrest, and 124 (12%) of patients died. A total of 315 (30%) patients developed cardiac events. The number of cardiac events that occurred was significantly associated with the highest risk score ($p < .0001$).

Conclusion: Data collection is still on-going. The methodology for a cure model assumes the study population is a mixture of patients who are non-susceptible and

susceptible to the event of interest. By using cure model framework, the factors associated with being non-susceptible to cardiac events and risk factors associated with time to develop cardiac events can be modelled simultaneously. Descriptive statistics were provided in the interim analysis. Age and history of acute myocardial infarction, HFrEF, or prior episode of sudden cardiac death are highly associated with likelihood of developing cardiac event. Further analysis will be conducted when the data collection process is complete.

Examination of Sex-based Differences and Adolescent Concussion Recovery

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Aim/Purpose: Current literature indicates adolescent concussion outcomes may differ based on sex. More specifically, females often self-report greater number and severity of symptoms following concussion. However, evidence for sex-based differences on more objective measures of brain function remains incomplete. Therefore, the purpose of the present study was to go beyond self-reported symptoms and examine sex-based differences across cognitive, vestibular, and cardioautonomic functioning follow adolescent concussion.

Methods: Sixty-two demographically matched adolescent females (n=31) and males (n=31) were evaluated at a pediatric specialty concussion clinic on average 2- and 4-weeks post-injury. To examine self-reported symptoms, patients completed the Rivermead Post Concussion Symptoms Questionnaire. A parent-reported Behavioral Rating Inventory of Executive Function was also assessed. Objective clinic measures of cognitive (CogState Brain Injury Battery), vestibular (Vestibular Oculomotor Screen-VOMS; Balance Error Scoring System-BESS), and cardioautonomic functioning were collected during each visit. Outcome variables were analyzed via series of 2 (group: female, male) x 2 (time: initial, follow-up visit) repeated measures ANOVAs. Independent samples t-tests with Bonferroni correction were used to determine to source of significant interactions.

Results: On average, adolescent females self-reported a greater number and severity of somatic, affective, and cognitive symptoms across both evaluation timepoints (p 's < 0.05; ηp^2 = 0.07-0.10) when compared to adolescent males. Similarly, parents of female patients reported observing greater levels executive dysfunction across both evaluation timepoints when compared to parents of male patients (p 's < 0.05; ηp^2 = 0.08-0.21). Additionally, females had slower response times on the CogState OneBack Test (p = 0.02; ηp^2 = 0.10). Females also endorsed greater severity of symptoms on all portions of the VOMS exam across both visits (p 's < 0.05; ηp^2 = 0.60-0.12), as well as greater number of errors on BESS firm dual stance (p = 0.02; ηp^2 = 0.08). No differences were found on any measure of cardioautonomic function.

Conclusion: Our findings corroborate prior research indicating adolescent females report greater symptom burden when compared to adolescent males. Beyond self-reported symptoms, our study provides evidence that adolescent females may

exhibit greater cognitive and vestibular dysfunction following concussion when compared to adolescent males. Future research is necessary to determine underlying mechanisms of sex-based differences in adolescent concussion outcomes, including the influence of sociocultural and biological factors.

Lewy Body Dementia Gender Differences: Effect of Demographic and Pharmacological Factors

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Hypothesis: Several studies have investigated gender differences in patients with Lewy Body Dementia (LBD), however, whether the observed differences are associated with demographic and pharmacological factors is not fully understood. The current study tested the hypothesis that specific demographic or pharmacological factors may contribute to the observed gender difference.

Method: A 5-year data collected from a regional registry from 608 LBD patients including 332 men and 276 women were analyzed. Factors associated with men and women patients with LBD were determined using the logistic regression model. Multicollinearity was evaluated using variance inflation factors (VIFs), with values greater than five suggestive of multicollinearity.

Results: The results indicate that Caucasian men (94.3% vs 83.3%) were more likely to present with LBD. In the adjusted analysis, increasing age (OR= 1.042, 95% CI, 1.025- 1.058, P < 0.001) was more likely to be associated with women with LBD, while olanzapine (OR=2.871, 95% CI, 1.902-4.334, P< 0.001), buspirone (OR= 2.388, 95% CI, 1.527-3.735, P< 0.001), escitalopram (OR= 1.444, 95% CI, 1.079-1.932, P=0.014) and tobacco use (OR=1.424, 95% CI, 1.075-1.887, P=0.014) were associated with men with LBD.

Conclusion: More men presented with LBD compared to women. Our findings reveal specific demographic and pharmacological factors that contribute to gender differences among LBD patients.

Falls Predictive Score (FPS) Scale and Patient Falls in Acute Care Patients Experiencing a Fall in the Upstate and Midlands of South Carolina (SC)

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Background – Caregivers must improve the assessment of risk as well as the interventions employed to decrease fall occurrence. Prisma Health implemented a fall risk screening formula for inpatients developed by Epic, the institution's electronic medical records system (EMR). Implementation of the Fall Predictive Scale (FPS) occurred at Prisma Health Upstate in February 2020 and Prisma Health Midlands in February 2021. By using the information entered by nurses (history of fall, mobility score, mobility tools), patient demographics (age, gender), physician orders, and lab results, the system predicts whether the patient is a high, medium, or low fall risk

Purpose statement – This study investigates the accuracy of the fall risk prediction screening tool, the FPS and associated data at the time of the of patient fall.

Methods - This is a descriptive, retrospective study design. Inclusion Criteria are (1) Age equal to or greater than 18 years of age (2) Fall event met the operational definition involuntary, unintentional descent from a sitting or lying position that results in the patient coming to rest on the floor, on or against some other surface (e.g., a counter), on another person, or on an object (e.g., a trash can) (3) acute care inpatient locations (i.e., med/surge, telemetry, intermediate care, mother/baby, intensive care, or a behavioral health unit). Excluded are outpatient, pediatrics, and emergency department. Data on falls will be collected from an anticipated approximately 100 patients who have received care in any acute care, intensive care, or behavioral health unit within the listed twelve acute care Prisma Health institutions across the Upstate and Midlands regions of SC from May 2021 through July 2021 and met Prisma Health's operational definition of fall. Fall events will be assigned to investigators for data collection. Falls were identified during the study period using risk management software required for reporting all hospital adverse events. Data collected from fall event documentation includes the date and time the patient fell, instituted interventions at time of fall, circumstances surrounding the fall, FPS score at time of fall, and whether the patient sustained injury. The FPS scores 24 hours prior to the fall, patient's date and time of admission, age, gender, active diagnoses, mobility score and assigned inpatient unit will be collected through EMR chart reviews. Prisma Health uses a High/Medium/Low falls predictive scale (FPS) format where a score of 0-34 is low

risk, 35-69 is medium risk and a high fall risk score is above 70. Information will be entered into an electronic survey and stored in Prisma Health's REDCap. No identifying information will be collected.

Results – Results will include graphs of descriptive analyses.

Clinical implications/Conclusion – This study contributes to an improved understanding of the fall risk score. As a result of this investigation, nurses will have an increased familiarity with the newly implemented fall risk screening tool. It is important to have confidence in the accuracy of the fall risk screening score that alerts the clinical bedside nurse to implement fall prevention interventions to reduce the chance of a fall.

Promoting Physical Activity via Physical Therapist Following Knee Replacement

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Purpose: To examine the feasibility and acceptability of conducting a cluster randomized trial examining a physical therapist led physical activity intervention for adults after knee replacement within an outpatient physical therapy facility.

Methods: Adults starting outpatient physical therapy following knee replacement were recruited at the first appointment across four physical therapy sites. The four sites were randomized to either start delivering the intervention or control condition. To balance the effects of sites and physical therapists, after enrolling and randomizing half of the target number of participants, the sites initially delivering the intervention changed to control and the control changed to intervention. A washout period was completed during this swap to ensure all enrolled participants completed therapy before the clinic began implementing the other condition. The intervention consisted of standard outpatient physical therapy and physical therapists used goal setting, problem-solving, and motivational interviewing to promote 150 minutes of moderate-intensity physical activity. The control received standard outpatient physical therapy and a brief physical activity coaching session after completing the final assessment. Feasibility and acceptability were determined based on recruitment and retention rates at 12 weeks after surgery. Preliminary outcomes including objectively measured moderate-to-vigorous intensity activity, physical function, and pain were examined between groups from baseline to 12 weeks after surgery. **Results:** Thirty-three percent of candidates screened were randomized (n=45) and retention at 12 weeks after surgery was 91%, with no difference in retention between groups. Moderate intensity physical activity increased (27.9 ± 57.3 [CI: 8.2, 47.6]), self-reported function improved (4.2 ± 4.9 [CI: 2.6, 5.7]), and pain decreased (-3.2 ± 3.4 [CI: -4.3, -2.1]) between baseline and 12 weeks but there were no differences between groups. **Conclusion:** Implementing a minimal, no-additional cost physical activity intervention within standard outpatient physical therapy for adults after knee replacement is feasible, however, it was not sufficient to increase physical activity within 3 months of surgery more than standard physical therapy. Future studies are needed to explore additional low-cost strategies and the optimal time to promote aerobic physical activity after knee replacement within outpatient physical therapy.

The Effect of a Simulated First Night Shift on Affect

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Background and Purpose: Shift work, a common occurrence in many healthcare settings, contributes to work-related stress and chronic sleep deprivation. A first night shift is particularly stressful as it is the beginning night shift in a series of night shifts, typically performed by individuals with a normalized circadian rhythm. The compound effects of stress and sleep deprivation further the negative impact of a first night shift on health, productivity, and emotional reactivity. Affect is one component of emotional reactivity that can also impact health, productivity, and the ability to cope with stress. The purpose of this study was to investigate how a first night shift, under the conditions total sleep deprivation and sustained operations, impact positive and negative affect.

Methods: Ninety English-speaking undergraduate students at Clemson University participated in this study (60 men, 30 women; 22.1 ± 3.0 years). Men had an average age of 21.9 years ($SD=2.6$), and women had an average age of 22.5 years ($SD=3.7$). The PANAS test was used to assess participants' Positive Affect (PA) and Negative Affect (NA) scores by presenting them with twenty emotion-evoking words: 10 positively associated and 10 negatively associated words. Participants were then instructed to answer how they felt 'lately' on a five-point scale from 1 = *not at all* to 5 = *very much*. The test was administered during four testing sessions over the course of the night: 6:30 p.m. to 10:30 p.m., 11:00 p.m. to 3:00 a.m., 3:30 a.m. to 7:30 a.m., and 8:00 a.m. to 12:00 p.m. During each testing session the participants completed a variety of tasks including working memory, cognitive ability, logical reasoning, and reaction time. These varied cognitive tests were used to simulate working at night.

Results: We completed a 2 (affect) * 4 (testing sessions) repeated-measures ANOVA and found that the participants' rating of the positive and negative terms in the PANAS were significantly different across the night ($p<.0001$). In addition, the mean PA significantly decreased ($p<.0001$) across the four testing sessions while the mean NA remained stable. This combination of decreasing PA and stable NA was also reflected in a significant interaction term between affect and testing session ($p<.0001$).

Conclusion: These findings suggest that a simulated first night shift results in a decrease in PA across the night while not affecting NA. Previous research indicates that a lower PA makes it more challenging to cope with stressors. As such, individuals working a first night shift could be more susceptible to the negative health impact of daily stressors partly due to a decrease in PA as well as the stress

of working a night shift. Since PA is linked to health, social skills, and work-related task performance, it is important for organizations that utilize night shifts to consider how to best assist workers to adapt and help prevent performance errors and burnout.

Standardized Evaluation of Foot Disease Progression among Spanish-speaking Patients with Diabetes

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Purpose statement – The purpose of the present study was to implement a Spanish-language foot evaluation to assess the prevalence of foot pathology among Hogar Carlos María Ulloa's (HCMU) patient population with type II diabetes mellitus and to identify each patient's risk of developing more serious foot complications, in order that appropriate preventative measures could be taken to reduce that progression.

Introduction: The frequency of diabetes in Latin America is expected to increase by 38% over next 10 years. The strong association of types 1 and 2 diabetes with end-stage renal disease, retinopathy, and coronary artery disease has long been reported. Although physicians are comfortable addressing these issues, they give less attention to their diabetic patients' feet. American Diabetes Association (ADA) states that a comprehensive foot examination should be conducted at least annually and should assess skin, neurologic, vascular, and biomechanical status, but foot examinations are documented in only 6% to 12% of HMO/private practice settings. A specific barrier to diabetic foot care in Spanish speaking countries is the lack of a standardized evaluation form to record different types of diabetes-related foot pathologies and estimate the risk of foot disease progression.

Methods – A Spanish-language evaluation form was developed to obtain demographic factors, assess the prevalence of diabetic foot disease, and estimate the risk of developing severe foot disease amongst all diabetic patients at HCMU, a state-sponsored nursing home in San Jose, Costa Rica. Foot evaluations were completed by the first author and three licensed HCMU physical therapists. Statistical Analysis Software (SAS) was used to assess the prevalence of foot disease among diabetic patients and estimate the risk of progression to severe foot disease, including foot ulcers and amputation.

Results – Of the 43 patients with type II diabetes mellitus assessed, 61.9% of patients experienced a diminished posterior tibial pulse, while pulse was absent in 16.67% of patients. 66.67% of patients presented with claw or hammer toe deformities, 54.76% experienced hallux valgus deformity, and 30.95% presented with pes cavus or pes equinus deformities. Strikingly, over half 54.76% of patients had developed peripheral neuropathy within their feet. Of the patients examined, 64.29% of patients had a moderate risk of progressing to more severe diabetic foot disease, including ulcers requiring amputation. Two of the patients examined had already developed diabetic foot ulcers, and an additional two patients had already undergone single-foot amputations. On average, the evaluation form took two minutes and fifty three seconds to administer.

Conclusion – Although the incidence of diabetes is increasing throughout the world, diabetes and diabetic foot care play an especially large role in the healthcare management of patients in patients living in Latin American countries. One of the barriers to proper management in these countries is the lower rates of diabetic foot examinations at primary care visits. This study used a Spanish-language evaluation form to both record the results from these examinations and estimate the risk of progression to more severe diabetic foot disease. This evaluation can be adopted in healthcare settings looking to improve screening efficiency and preventative care quality for their Spanish-speaking patients with diabetes.

Experimental and Computational Analysis of Arterial End-to-End Anastomosis

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Purpose Statement- Coronary artery disease is a severe vascular pathology resulting from atherosclerotic plaques that restrict blood flow to the heart. This disease requires nearly 400,000 blood vessels to be replaced each year through coronary artery bypass grafting (CABG). Autologous tissue sources used for this procedure have several complications including compliance mismatching and histological dissimilarities that contribute to premature failure.^{1,2} Acquiring histomechanical data for the graft and target vessels enables the development of computational models to better elucidate and predict the vessel-specific performance of individual grafts.

Methods- Porcine coronary and internal thoracic arteries (ITAs) were acquired from 2-year-old American Yorkshire sows weighing approximately 200 kg from a local abattoir. The left and right internal thoracic arteries (LITA & RITA) were segmented into four distinct regions relative to the distance from the heart (LITA₁/RITA₁=proximal & LITA₄/RITA₄=distal).¹ The coronary vasculature included the proximal and distal left anterior descending artery (PLAD & DLAD), right coronary artery (RCA), and left circumflex artery (LCX). Inflation-extension biaxial mechanical testing was conducted by measuring the axial force and outer diameter at 0-200 mmHg and at three axial stretch ratios. Image thresholding using Movat's Pentachrome stained sections provided elastin and smooth muscle cell (SMC) constituent area fractions, while Picrosirius Red stained sections, visualized through polarized light microscopy, provided collagen area fractions. To simulate the solid and fluid mechanics of an end-to-end anastomosis, computational models of the grafting configurations were generated for all 32 coronary-ITA combinations. Conduit inner-diameters were first matched through a pre-tapering phase using Finite Element Analysis (FEA) which compressed or expanded the ends of the respective vessels to form a continuous lumen. To model reperfusion, the simulated grafts were then subjected to an internal pressure load of 100 mmHg while the first and second principal stresses (σ_1 & σ_2) were analyzed along the length of the anastomotic interface. A Computational Fluid Dynamics (CFD) model was generated from the resultant geometry to simulate steady blood flow through the different graft configurations. The change in centerline fluid velocity (Δv), fluid pressure gradient (p), and wall shear stress (τ_w) were quantified using CFD.³

Results- Biaxial mechanical test data showed that the inner radius, area compliance, and circumferential stress of coronary vessels were significantly lower than that of the middle segments of the ITA. Of these, the axial stress value of the DLAD was notably greater than the other coronary vessels. Image thresholding revealed that the ITA contains significantly more elastin and less SMCs than the coronary arteries while a significant decrease in the area fraction of adventitial collagen was found between the coronary vessels and the ITA. FEA analysis revealed that for the PLAD, RCA, and LCX, the maximum σ_I occurred when anastomosed to the LITA₁ segment but for the DLAD, the maximum occurred when anastomosed to the LITA₄ segment. CFD revealed that the maximum τ_w for PLAD, DLAD, and LCX occurred when anastomosed to LITA₄ while the RCA peak value occurred with RITA₄. For all coronary vessels, the maximum pressure gradient occurred when anastomosed with the smallest vessel (LITA₄), while the minimum change in centerline velocity occurred when anastomosed with RITA₃.

Conclusions- Differences between the amount of the primary load-bearing constituents found within the coronary vasculature and the ITA support the biaxial mechanical data. That is, significant decreases in elastin content found in the coronary vascular wall, compared to the ITA, explains the differences in circumferential stress and area compliance found in these tissues. These experimental analyses confirm that tissues contain divergent material parameters performing uniquely under common loading conditions. In general, end-to-end CABG configurations that included RCA and LCX exhibited higher σ_I & τ_w values than the PLAD and DLAD configurations. Although the choice of coronary target vessel depends on disease location, the selection of graft tissues (i.e., regions of the ITA) to be used are at the surgeon's discretion. Based on normalization of the solid-fluid output metrics using FEA and CFD analysis together, we conclude that the poorest match for the PLAD, DLAD, RCA, and LCX are the LITA₁, LITA₄, LITA₄, and LITA₁, respectively while the best choices are the LITA₂, LITA₂, RITA₃, and LITA₃, respectively. Although our studies were performed using a porcine model as a surrogate for humans, these experimental and computational results suggest optimal graft and target tissue configurations using end-to-end anastomoses. Current and ongoing work seeks to establish a link between these output variables and a mechanistic basis for inflammation and thrombosis that are axiomatic in early graft failures.

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CT Angiography of the Middle Mesenteric Artery Associated with Intestinal Nonrotation

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Purpose: The middle mesenteric artery (MMA) is an exceedingly rare functional variant of mesenteric vasculature that itself has variations of vascular territorial supply. We report an MMA identified incidentally in a female patient with history of hematochezia, hypertension, and coronary artery disease during workup of mesenteric ischemia. In addition to MMA, additional mesenteric variations and intestinal nonrotation were found, which has not yet been reported in literature.

Methods: An MMA was identified on computed tomography angiogram (CTA) following vascular ultrasound of the mesenteric arteries. CTA of the aorta was performed using thin-slice multidetector volume acquisition from the diaphragm to the femoral bifurcation. 100 cc of iohexol 350 was used as a contrast agent. 3D multiplanar images were reconstructed. **Results:** The MMA, with ostium of 7 mm, arose anteriorly from the aorta at L3, 55 mm inferior to the superior mesenteric artery and 31 mm superior to the inferior mesenteric artery. Its vascular supply included distal jejunum, ileum, cecum, ascending colon and proximal transverse colon. No active bleeding or clinically relevant stenosis was identified within its vascular supply. An additional vascular variation included a right hepatic artery that was supplied by the superior mesenteric artery rather than the celiac artery. Intestinal nonrotation was also noted. **Conclusion:** In surgical cases where the MMA is unexpected, its presence poses the possibility of intra-operative complications for abdominal surgeries. Its highly variable anatomy and associations with other abdominal and vascular variations only adds to its potential of causing complications in cases where the anomaly is not accounted for during pre-operative planning. The MMA highlights the importance of imaging in surgical planning, as with its identification surgeons can alter surgical management if necessary and avoid unexpected surgical complications.

A Deeper Understanding between Transforming Growth Factor Beta and its role in Cardiac Fibrosis and Myxoma

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This project aims to uncover the role of transforming growth factor beta-1 and its role in the propagation of cardiac fibrosis and cardiac myxoma (cardiac tumor). Heart failure is one of the leading causes of morbidity and mortality in the United States, affecting nearly 6.5 million individuals annually, and has no known cure. Transforming growth factor beta (TGF β) is a family of multifunctional regulatory proteins, and its expression plays a significant role in the pathogenesis of cardiovascular disease, such as hypertrophy, cardiac fibrosis, cardiac myxoma and heart failure. TGF β exists in three different isoforms (B-1, B-2 and B-3), and although playing various roles biologically, all three have been discovered to activate cardiac fibroblasts and induce cardiac hypertrophy, specifically the Left Atrium and Left Ventricle. In the myocardium, TGF β 1 plays a mediator role between cardiac muscle cells and cardiac fibroblasts, binding to TGF β receptors one and two (TGF β RI and TGF β RII) on the cell's surface, and activating the SMAD2/3 signaling pathway. Upon being transported to the nucleus for genomic alteration, the TGF β R/SMAD complex can turn on genes that activate the fibroblasts in the myocardium, and more importantly, can cause the loss of cardiomyocytes from the myocardium. With excessive collagen accumulation in the extracellular matrix, risk of primary cardiac myxoma is heightened, and the risk of developing heart failure is increased. This project focuses on genotypically transgenic mouse models, with TGF β 1 selectively hyper-activated in adult cardiomyocytes. Through crossing TGF β 1 mice with Myosin Heavy Chain II Cre recombinase (Mer-Cre-Mer) mice, adult double transgenic 'conditional' mice were able to be created and were treated with 5 daily doses of the TGF β -inducible drug, Tamoxifen. This created a perpetually activated form of TGF β 1 in the cardiac muscle cells. The effects of TGF β , explicitly TGF β -1, were able to be observed via histological analysis, echocardiographic methods, immunohistochemical methods, and protein extraction. In summary, it was discovered that: 1) fibrosis is accompanied by progressive loss of cardiac muscle cells in a phenomenon called "replacement fibrosis," and 2) cardiac myxoma formation is stimulated upon TGF β overactivation, with increased fibrosis and hypertrophy.

Metabolic Effect of Marjoram on Healthy and Cancerous Breast Cell Lines

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Background: Cancerous cells have been proven to interact with various natural and artificial substances like polycyclic aromatic hydrocarbons, radon, and cigarette smoke. The cytotoxic effects of natural substances have been explored more frequently in recent years to ensure that healthy, noncancerous cells thrive during and after treatment. Previous studies involving marjoram pill extracts involving ethanol extraction displayed cytotoxic effects with the MCF-7 breast cancer cells and mitogenic effects with the MCF-12A healthy breast tissue cells. It was concluded that the marjoram pill extracts involving ethanol extraction have the most effective outcomes on both MCF-7 breast cells and MCF-12A breast cells. This present study aims to investigate the impact of marjoram on MCF-7 and MCF-12A cells and their metabolic response to a large panel of metabolites and effectors.

Methods: The effects of Soxhlet, Microwave-assisted and Ethanol-incorporated 500 µg/ml of marjoram plant, *Origanum majorana* (dried and pill form), were measured using Biolog Phenotype Mammalian Microarrays (PM-Ms) on MCF-7 and MCF-12A cells. The PM-M system uses a redox dye to measure NADH production via colorimetric chemistry and indicate the capacity of the cells to generate energy in different metabolic environments. Both treated and untreated MCF-7 and MCF-12A cells were plated in triplicates on the PM-M1 to M8 Biolog plates, incubated for 48 hours before 10 µl of Biolog Redox Dye Mix was added to each well, and then incubated for another 24 hours in the Omnilog system. After this final incubation, endpoint absorbance values were measured for each well using a microplate reader.

Results: Our preliminary data revealed statistically significant ($p < 0.05$) differences in the metabolic profiles of MCF-7 and MCF-12A cells. As previously reported, cancer cells showed increased utilization of anaerobic pathways for energy production (Warburg effect), with elevated utilization of energy sources linked to glycolysis rather than the Krebs cycle and mitochondrial respiratory chain. We also noted increased utilization by MCF-7 cells of alternative energy sources, such as nucleotides or methylated carbohydrates, as compared to MCF-12A cells, suggesting compensation for the utilization of less efficient pathways of energy production. Exposure of MCF-7 cells to 500 µg/ml marjoram restored normal NADH levels while little or no effects were detected in MCF-12A cells.

Conclusions: Metabolic profiling of cancer and normal breast cells proved to be an effective approach to investigate known and novel pathogenic mechanisms in cancer and to evaluate the efficacy of candidate therapeutic compounds like marjoram.

Job Satisfaction Among Nurses and Healthcare Quality

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Purpose Statement: The objective of this research study was to assess satisfaction with daily work responsibilities among nurses. For the purposes of this study, we focused on a single question: "On your job, what are the top challenges you face within the work environment?" Previous research on job dissatisfaction among nurses had much smaller sample sizes than our research study. Additionally, many were conducted in other countries or focused on other healthcare settings. Significant works in the literature include a focus on conceptual theory such as the Self Determination Theory. Our research emphasizes the Donabedian Model which puts forth structure, process, and outcome to measure the quality of healthcare organizations. According to the Agency for Healthcare Research and Quality, "Structural measures provide an understanding of a healthcare provider's capacity, systems, and processes to provide high-quality care."

Methods: This study utilized the results of a web-based survey that we developed with the College of Nursing at the University of South Carolina in 2018. The survey was approved by the Institutional Review Board at the University of South Carolina. The Qualtrics software online survey tool was used to email nurses in ambulatory care settings using a commercial mailing list. As a result, we received 435 completed surveys, which reflects a 10.3% completion rate. Surveys that answered the single question of interest were then coded using NVivo software. Descriptive statistics were analyzed using statistical software SAS, version 9.4.

Results: Preliminary results suggest five key areas impact job satisfaction among nurses: (1) Staffing issues related to the nationwide nursing shortage, (2) leadership/ management, (3) supplies, resources, and equipment, (4) caring for patients and the patient load, and (5) the burden of completing administrative tasks. Overall, the survey respondents were women (89%) and non-Hispanic white (89%). Almost 3 in 4 (72%) had a bachelor's degree or greater (master's or doctorate) level of education. The average years of experience in the field of nursing was 21 years. One in four (26%) reported residing in a rural area.

Conclusion: Job satisfaction is a significant predictor of employee performance and as the largest group of healthcare providers, nurses have a direct impact on the quality of healthcare. Further, job satisfaction has been associated with turnover which can be an indicator of organizational effectiveness. This study adds to the growing body of literature surrounding job dissatisfaction among nurses; this area of concern is exacerbated by the ongoing SARS-CoV-2 pandemic and the crisis-level nursing shortage nationwide. Future research should consider oversampling minoritized racial and ethnic nurses and nurses practicing in rural areas. Rural America has been increasingly burdened by the pandemic and nursing shortage. Additional insight into their job satisfaction can lead to improved patient care and increased

retention of nurses.

Expression of deubiquitinating enzymes in blastocoel fluid-conditioned media from IVF-generated embryos is associated with positive implantation outcomes

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PURPOSE: To identify the expression profile of deubiquitinating enzymes (DUBs) in blastocoel fluid-conditioned media from IVF-generated embryos associated with implantation outcomes.

MATERIALS AND METHODS: Blastocoel fluid-conditioned media was collected from day-5 human IVF-generated embryos immediately following trophectoderm biopsy. Media from 25 embryos with known implantation outcomes were analyzed for gene expression levels of selected DUBs (MYSM1, USP22, USP28, and USP34) and an additional 17 samples were also analyzed for USP34 alone. cDNA was synthesized from individual media samples, then Real-Time qPCR was performed to detect expression of the individual DUBs (TaqMan Gene Expression Assays) with GAPDH for normalization of expression in each sample. Aggregate DUB mRNA expression levels were then compared in embryos associated with positive versus negative implantation outcomes via a Welch's t-test. Additionally, DUB activity was assessed in an additional 21 individual blastocoel fluid-conditioned media samples using a fluorescent DUB Activity Assay Kit (Cayman Chemicals) with Tecan Infinite M1000 plate reader.

RESULTS: This analysis revealed expression for the DUBs MYSM1, USP22, USP28 and USP34 was increased in blastocoel fluid-conditioned media from embryos associated with positive implantation outcomes versus negative implantation outcomes ($p < 0.05$). Furthermore, DUB activity was detected in a limited number of blastocoel fluid-conditioned media samples from embryos associated with positive implantation outcomes.

CONCLUSIONS: This study reports that expression of specific DUBs in blastocoel fluid-conditioned media is associated with positive embryo implantation outcomes. In support of this finding, DUB enzymatic activity was also detected in media samples associated with positive implantation status. The source of DUB mRNA and protein detected in the blastocoel fluid likely originates from the cytoplasm of

embryonic cells that underwent apoptosis early in preimplantation development. One potential mechanism for these elevated DUB levels detected in the media may be that the most viable preimplantation embryos exhibit tighter regulatory control thereby increasing apoptosis of cells with upregulated DUBs. These enzymes MYSM-1, USP22, USP 28, and USP34 are known to be pathogenic and upregulated in various types of cancers. Further study is needed to determine the role that DUBs play during preimplantation embryo development and how this could contribute to embryo implantation competence.

IMPACT STATEMENT: This study shows that analysis of DUB expression and activity in blastocoel fluid-conditioned media could be used as a viability parameter when selecting embryos for uterine transfer in IVF patients.

FUNDING: This research was supported by a UofSC Aspire grant and the Sargent Foundation

Examination of Drug Resistant *Acinetobacter baumannii* response to phagocytosis by monocyte-derived macrophages

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Background: *Acinetobacter baumannii* is a nosocomial opportunistic pathogen that is usually associated with mucosal infections such as pneumonia, urinary tract infections or sepsis and less commonly with more severe illnesses such as meningitis, wound infection, and necrotizing fasciitis. Of late, *A. baumannii* has been flagged by the CDC as an urgent threat due to the pandrug- and multidrug resistant properties it has acquired, making it a major concern within the public health community. Due to its emerging status and sparsity of information on the virulence factors, It has been difficult to understand how this bacterium is able to gain a foothold and cause severe infections.

Methods: To this end, extensively drug resistant *A. baumannii* was isolated at two timepoints from a patient over the course of a lethal necrotizing fasciitis infection that led to sepsis. The intra-cellular survival of these two strains was compared with each other, as well as to ATCC 19606 and ATCC 17978, within a macrophage system, complemented with qRT-PCR to investigate virulence factors, Katalse E (KatE), Phospholipase C (PLC), Outer membrane protein A (ompA), and Pilus A (PilA), that could contribute to immune evasion.

Results: The phagocytic assay demonstrated enhanced survival and bacterial growth of NF-ab1 and NFab-2 within macrophages compared to ATCC 19606 and 17978. Examining gene expression, NFab-1 and NFab-2 had much higher expression of the PilA gene compared to ATCC 19606 and 17978, while the other 3 genes didn't show any significant differences between the different strains of bacteria.

Discussion: Taken together, this data demonstrates a need to further investigate these two strains to understand their ability to evade our immune response in hopes of understanding and combating its infection.

Addressing Self-Care Needs and Coping of Sexual Assault Nurse Examiners (SANE)

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Purpose statement: The study purpose was to assess the self-care needs of Sexual Assault Nurse Examiners (SANEs), including compassion satisfaction, burnout, and secondary traumatic stress, and to discuss healthy coping strategies in facilitated virtual individual and/or group sessions.

Methods: Study participants were recruited from a pool of 25 SANEs in a secondary job position in a large, southeastern multi-hospital SANE program. The SANEs are scheduled centrally (on-call) and deployed when a sexual assault victim accesses any of the six emergency departments in a four-county region of the system. Following IRB approval in 2019, study recruitment information was provided at a SANE nurse staff meeting by the nurse researchers and through an introductory email. SANEs were provided an overview of the study, methods, dissemination, consent, and confidentiality. They were assured that participation was voluntary; no individual identifiers would be used (assigned research numbers); and results would be reported as group data. Initial data collection began in December 2019. SANEs signed informed consents; provided demographic information; and completed the online version of the ProQOL Compassion Satisfaction and Compassion Fatigue (ProQOL) Version 5 (Stamm, 2009). The instrument was modified with permission (use of SANE vs helper). Three subscales measure compassion satisfaction (CS), burnout, and secondary traumatic stress (STS). Results were received electronically with scoring information. They were unable to engage in the in-person focus session or coping strategy sessions due to COVID 19 restrictions. In July 2020, an amended proposal was approved by the IRB for virtual in place of in-person facilitated sessions and a waiver of signed informed consent. In August 2020, SANE nurses were recruited by an email invitation with informed consent elements included in an introduction to the study and survey. Demographic information, the ProQOL 5 and narrative responses to five open-ended questions was provided by these SANEs. All had the opportunity to participate in a one-hour individual or group facilitated virtual sessions conducted by a LISW to discuss how they dealt with the stress of being a SANE and to learn effective coping strategies (meditation and Linehan's States of Mind). Participants were offered an individual 15-minute follow-up session. The process was repeated post-session with the demographic and ProQOL survey link distributed electronically in March 2021.

Results: The 2019 cohort had 11 SANEs with the typical respondent having a bachelor's degree, aged 26 years or older, a registered nurse (RN) for 4 or more years, and a SANE for 2 years or less. The 2019 data provides a description of CS, Burnout and STS in these SANEs prior to the pandemic. In the 2019 cohort, all scored moderate (36%) to high (64%) on CS; low (100%) on Burnout; and low (100%) on STS. In the amended study, 9 SANE nurses completed the pre-session ProQOL. The typical respondent had a bachelor's degree, aged 26 years or older, was an RN for 6 or more years, and a SANE for 1 - 2 years or 3 or more years. The pre-session results revealed all SANEs scored moderate (44%) to high (56%) on CS; low (100%) on Burnout; and low (100%) on STS. Nine SANE nurses participated in the facilitated sessions and 8 completed the post-session ProQOL. Post-session results found all SANEs scored moderate (37.5%) to high (62.5%) on CS; low (87.5%) and moderate (12.5%) on Burnout; and low (87.5%) and moderate (12.5%) on STS. Wilcoxon Signed Ranks Test, comparing pre & post-session ProQOL scores for each subscale, found a statistically significant difference for only STS ($Z=-2.113$, $p=0.035$).

Conclusions: Study limitations included a small sample size, self-selected participants in a secondary SANE position, and virtual instead of in-person sessions. The 2019 data provided a description of compassion satisfaction, burnout and secondary traumatic stress in these SANEs prior to the pandemic. An interesting finding was these SANE's scores remained relatively stable, despite the added stress of experiencing a pandemic. While these SANEs were experienced RNs, they were new in their role as a SANEs. Being new SANEs may account for their high CS, low Burnout and STS. Analyses showed a statistically significant increase only in STS from pre- to post-session debriefings, though the change was small and scores remained in the low category. These results may illustrate the positive support the SANE nurses received in the follow-up sessions for coping skills; support of a SANE coordinator; opportunities for advancing SANE education and national certification; secondary job role and in a program with adequate staffing, centralized scheduling to limit the number of on-call shifts; in a SANE program with strong nursing leadership support and a dedicated Medical Director; and a strong relationship with the sexual assault community advocacy centers which provide in-person staff who come to the emergency department and provide follow-up for the sexual assault victims.

Hospital Medication Discharge Instructions: Comprehension and compliance among adults following an acute medical-surgical hospital stay

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Background - Charge nurses report receiving calls from discharged patients asking for clarification regarding medication discharge instructions. An opportunity exists to capture the content of the calls to see if common themes of confusion are occurring in the patient who is discharged for which interventions could be planned in response. In addition, there is a gap in knowledge related to assessing the patients' comprehension and compliance using prescribed medication at discharge. Literature reports of patients' assessments following vascular surgery about discharge instructions demonstrate a level of comprehension at 60 to 78%. In a study of 3699 hospital discharge adults, 27% of patients knew if they had new medications prescribed.

Purpose - To capture the unanswered questions that patients, who are discharged from medical-surgical units, are asking of discharge nurses from those units. To assess patient comprehension and compliance of discharge instructions post medical-surgical hospital stay.

Methods - Study is a prospective, correlative, descriptive study. Two phases of the study will be performed. One phase will be to interview discharge nurses on cardiac telemetry and pulmonary acute care units at Prisma Health Greenville Memorial Hospital to capture the discharge medication questions that are posed by patients after discharge from the hospital. The principal investigator will collect via face-to-face interview, the discharge nurses' reports of the topics addressed by patients' post-discharge phone call questions. Topics will be analyzed using frequencies. The second phase of the study is to assess the patients' medication comprehension and compliance post discharge. Recruitment of 50 patients will occur via flyer placed in the discharge planning materials. Patients interested in participating in the study can utilize the information listed in the flyer to contact the principal investigator or to directly access the survey instruments and consent by using a weblink. Upon registering their interest, the patient will be enrolled in the study using the IRB approved consent as a guide. Study instrument utilized is The Medication Understanding and Use Self-Efficacy Scale (MUSE), a validated and reliable tool with Cronbach reliability of .77. Four of the eight items in the scale are associated with taking medication and four items were associated with learning about medication. Self-reported demographics for participants include age, gender, race/ethnicity, education, marital status, and number of different medications taken

daily. Patient and discharge nurse conversations will be tape-recorded with participant's permission for audit purposes of capturing correct and complete information. Recorded data will be transcribed as soon as is practicable using Redcap survey format and approved cloud storage. Responses are anonymous. No identifying information for study participants will be collected. SPSS is utilized for analysis of descriptive statistics (e.g., frequencies, means) and scores on the MUSE will be summed. An assessment of association of demographic variables with the MUSE scores will be performed using chi-square analysis or Fisher's exact test for categorical covariates and Student's t-test or the Wilcoxon Rank Sum test for continuous covariates.

Results - Results include a frequency table of recalled content of patients' phone calls post discharge, patients' demographic data, summed scores on the MUSE, and correlations.

Clinical implications/Conclusion - It is surmised that a capture of the commonly and oft repeated questions posed to the discharge nurse could result in an intervention to improve the delivery or the wording of the discharge instructions. Improved comprehension and compliance of discharge instructions could result in reducing unnecessary readmissions and potentially bring about a decrease in morbidity and mortality for the patients in the Upstate region of South Carolina, designated Appalachian counties.

Neurophysiological responses to drug cues among buprenorphine-maintained patients: A pilot study

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Purpose Statement: Opioid use disorder (OUD) is a major public health problem in the US. Buprenorphine is a widely-used, effective approach for treating OUD. Research has shown that buprenorphine is useful at producing substantial reductions in risk of overdose, criminal activity, and other risky drug-related behaviors. Unfortunately, the prevalence of polysubstance use among patients on buprenorphine remains high (65%), which is concerning given the deleterious consequences of ongoing drug use. Craving and neurophysiological arousal in response to drug related cues is known to be a precipitant of drug use and relapse. The current study used an innovative approach to investigate whether the exposure to drug-related cues increase craving and induces electroencephalography (EEG) changes among a sample of patients living with OUD on buprenorphine.

Methods: Participants were 10 people with OUD receiving buprenorphine in an office-based maintenance program. All participants completed one 90 min cue reactivity session. Participants were exposed to neutral and drug-related pictures extracted from the International Affective Picture System. Skin conductance level (SCL) and EEG was recorded throughout the session using Nexus-10 psychophysiological monitor with BioTrace+ software. Self-reported craving was measured with a visual analogue scale (VAS; 0-100) before and after the exposure of the control and drug-related pictures.

Results: Analysis of the frontal EEG conducted to assess power of slow (theta, alpha) and fast (high beta, gamma) rhythms in neutral and drug blocks showed higher relative power of gamma (35-45 Hz), along with trends to lower power of theta activity and higher alpha-to-theta ratio in response to drug cues compared to neutral. Participants evidenced increased SCL responses to drug-related relative to neutral cues ($p=0.002$). Also, a significant increase in self-reported craving was observed after the exposure to drug-related cues relative to neutral cues ($p=0.037$).

Conclusion: Craving and neurophysiological responses to drug-related cues are precipitants of relapse in people with OUD and their measures. Our results provide preliminary data that EEG and SCL may serve as a secondary measure of treatment outcomes within outpatient buprenorphine clinics. In addition, these outcomes

could be used for identifying patients at need of more intensive interventions.

Smoking Cessation Adherence after Total Joint Arthroplasty

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Purpose: To evaluate the smoking status and complications postoperatively of a cohort of patients who stopped smoking prior to total hip or knee arthroplasty.

Methods: Patients with a history of smoking cessation within one year prior to undergoing total joint arthroplasty at a single center were included. Patients were surveyed at routine 3-week, 9-week and 1-year post-operative visits. Surveys were anonymous so a patient may have been surveyed at more than one time point. The patient survey included questions on if they quit smoking prior to surgery, if they have smoked since surgery, how many cigarettes they smoke per day, and if they had any complications from surgery. After completion, the anonymous survey was placed in a sealed envelope for the respective surgeon to complete additional questions on the outside of the sealed envelope at the end of the encounter. The surgeon questions collected the physician's perception of the patient's smoking habits as well as information regarding post-operative wound healing and complications.

Results: A total of 100 surveys were collected. Seven surveys were excluded due to incomplete data. At the 3-week post-operative visit, 17 of 33 patients (51.5%) self-reported smoking abstinence. Surgeons correctly suspected 12 of 16 (75%) patients who had returned to smoking and 14 of 17 (82.4%) of those who remained abstinent. Three post-operative infections were reported at the 3-week time point, 2 of which were in patients who self-reported a return to smoking.

At the 9-week post-operative visit, 20 of 43 patients (46.5%) self-reported smoking abstinence. Surgeons correctly suspected 18 of 23 (78.2%) patients who had returned to smoking and 14 of 20 (70%) of patients who remained abstinent. There were 2 wound complications at the 9-week mark, neither of which were in patients who self-reported a return to smoking.

At the 1-year post-operative visit, 9 of 17 patients (52.9%) self-reported smoking abstinence. Surgeons correctly suspected 5 of 8 (62.5%) patients who had returned to smoking and 8 of 9 (88.9%) of those who remained abstinent. There were no patients who required antibiotics or surgical interventions at the 1-year mark.

Conclusions: Despite a lack of required standardized smoking cessation program at our institution, a high percentage of patients reported smoking abstinence at up to one year postoperatively after total joint replacement. Our study reports abstinence rates of 51.5%, 46.5% and 52.9% at the 3-week, 9-week, and 1-year visits, respectively. There is extensive research to demonstrate the increased risk of postoperative complications in patients who smoke. However, there is relatively little research literature that evaluates continued abstinence versus returning to smoking after arthroplasty surgery. A recent study showed only 12.5% of patients remained smoke-free one-year from hip and knee surgery. However, other studies have reported abstinence rates as high as 86% at least early in the postoperative period. Our study also reports that surgeons correctly identified patients who had returned to smoking of 75%, 78.2% and 62.5% at the 3-week, 9-week and 1-year visits, respectively. This provides important data that surgeons can and should continue to discuss smoking cessation even in the postoperative period.

Outcomes Following Adolescent Mid-shaft Clavicle Fractures: A Prospective, Observational Study

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¹Prisma Health

Purpose Statement: To report the radiographic and functional outcomes after clavicle fractures in patients ages 11-17 years old.

Methods: Single center, prospective observational study that screened all patients 11-17 years old with mid-shaft clavicle fractures >100% displaced or >1cm shortened who were enrolled within <21 days of injury between March 2018 and October 2019. Outcomes included fracture shortening, displacement, and union on radiographs, patient reported outcomes with visual analogue scale and QuickDash scores, and clinically measuring strength by microFET and range of motion (ROM) at 1, 3, 6, and 12 month time periods post-injury.

Results: 26 patients treated non operatively were enrolled in the study, with average age of 13.7 on presentation. 15 (58%) of patients were male, 24 (92%) of patients were right hand dominant, and 13 (50%) of patients injured their right clavicle. At six months, 19/19 patients (100%) were radiographically healed, with 3 (15%) malunions (>1cm shortened or >10 degrees angulated). At one year, the average injured clavicle length was 93% of the non injured clavicle length on X-ray. By 3 months, strength of the injured side returned to baseline (compared to contralateral side) in forward flexion (95.2%, $p=0.24$), abduction (97.3%, $p=0.06$) and external rotation (102%, $p=0.32$). At 3 months, range of motion returned to baseline (compared to contralateral side) in forward flexion (100%), abduction (99.3%, $p=0.16$) and external rotation (98.5%, $p=0.16$). QuickDash returned to baseline by 6 months.

Conclusions: Adolescent patients treated non operatively after mid-shaft clavicle fractures had equal ROM and strength compared to non injured side by 3 months. PROM with QuickDash returned to baseline by 6 months. There was a 100% union rate at 1 year, and 15% nonunion rate. Based on this study, we feel adolescent patients and families should be reassured that nonoperative treatment provides acceptable outcomes in mid-shaft clavicle fractures and adult criteria for surgical fixation should not necessarily be applied to adolescent patients.

Mesh Reinforcement of the Visceral Sac Following Partial Pelvic Resection

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Purpose: To review outcomes and procedures performed in patients undergoing hemipelvectomy with or without mesh reinforcement of the visceral sac.

Significance:

Hemipelvectomy for resection of pelvis neoplasm is a needed procedure with high complications rates and significant deleterious functional outcomes. Reconstruction following hemipelvectomy of the soft tissue structures of the pelvis have been shown to improve outcomes post-operatively. We believe that the use of mesh reconstruction can not only decrease the rate of post-operative visceral herniation but may also improve patient functional outcomes by providing containment to the remaining limb.

Methods:

All patients who underwent partial pelvic resection with mesh reinforcement of the visceral sac at Greenville Health System between January 1, 2010 and May 1, 2021 were retrospectively reviewed. Data collection will include patient characteristics, operative details, complications, including surgical site infection (SSI) and surgical site occurrence (SSO), and physical outcomes (function).

Results:

Six patients were identified as having a hemipelvectomy for the treatment of pelvic oncologic disease. Of the six patients four also underwent reconstruction and reinforcement of the surgical site with mesh products. Of the four patients receiving mesh reconstruction there was one intraoperative complication with injury to an ileal conduit, requiring urologic repair. In addition, two of the four mesh recipients required readmission to the hospital within thirty days of discharge. In total, two of the four patients in the mesh group did have post operative wound complication. Both patients experienced breakdown and infection of their perineal wounds, requiring surgical debridements. Of note, in both cases of post-operative wound complication no mesh device required removal. Both patients were being treated for high grade urologic and gynecologic malignancies. Within the patients receiving mesh reconstruction only two of the four patients were alive at follow up. Time to

death following surgery was six and fifteen months for the respective patients. The mesh recipients who were alive at time of data collection had at least two years follow up. There was no occurrence of post-operative herniation in any of the patients receiving mesh at time of last follow up. Patients receiving mesh had overall good self-reported functional capacity. None of mesh recipients required a wheelchair for ambulation. They were all ambulatory at follow up with the use of an assisted device including a cane, crutches, or walker.

Conclusion:

Hemipelvectomy for the resection of pelvic oncologic disease is a difficult procedure with high complication rates. In recent years the use of mesh to reconstruct and reinforce the surgical site has gained traction to avoid post-operative herniation and improve post-operative residual limb function. Our study population did have a relatively high post-operative surgical site complication rate, which has been a known risk of this procedure. However, there was no cases of reported post-operative hernia formation and even in the two cases of post-operative wound infection no mesh product required removal. The functional outcomes in the mesh reconstructed patients were overall encouraging. All of the patients receiving mesh were ambulatory with the use of assisted device at the end of study. Overall, we feel that this series of patients demonstrate the benefits of using mesh in reconstruction of pelvic soft tissues to avoid post-operative herniation and maintain patient function. We believe that the use of mesh in the reconstruction of the visceral sac following hemipelvectomy provides a good solution to prevent post operative herniation and also provides containment for the residual limb providing satisfactory post operative function.

Meningioma grade and discrepancy in outcomes following surgical resection

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Meningiomas account for approximately one-third of all primary central nervous system tumors, with an estimated 29,000 new cases in the United States annually. Increasing grade (I-III) has an understood correlation with worsening prognosis. While there are a variety of treatments, surgical resection is often considered the gold standard for treatment in symptomatic individuals. A retrospective evaluation of surgically resected meningiomas at a single institution between 1/1/2007 and 12/31/2016 was completed. Patients without complete records and those with spinal meningiomas were excluded. Typical demographic and clinicopathologic data were collected to include treatments, recurrences, outcomes and five-year follow up. The cohort was stratified by grade and preoperative and postoperative symptoms were evaluated. There were 178 patients: 135 grade I (76%), 36 grade II (20%), and 7 grade III (4%). The most common symptoms across all grades were headache, seizure, gait disturbance and limb weakness. Grade I patients experienced statistically significant symptom improvement postoperatively across the board. Headaches decreased 25% ($p < 0.0001$), seizures 17.6% ($p = 0.0002$), gait disturbances 10% ($p = .03$), and limb weakness 17% ($p = 0.0019$). Interestingly, Grade II participants had increasing symptoms post operatively: seizure (13%), gait disturbances (7%), limb weakness (4%) except for improved headaches (18%). Grade III patients experienced symptom improvement in headaches (15%), seizures (29%) and limb weakness (43%) but saw no change in gait disturbances (29%). These data suggest that, regarding symptoms, careful consideration for surgical resection of all grades, but specifically grade II lesions, may be warranted and other treatment options for this cohort may optimize patient outcomes.

Higher Complication Rate with Excessive Glenoid Lateralization Following Reverse Shoulder Arthroplasty with a Humeral Onlay Design

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Purpose Statement: The primary purpose of this study is to determine the optimal amount of glenosphere lateralization for patients undergoing reverse shoulder arthroplasty (RSA) with a humeral onlay design. Specifically, we aim to retrospectively analyze postoperative functional and patient reported outcomes between two different degrees of glenosphere lateralization (2mm vs. 6mm offset), while utilizing the same technique and surgeon.

Introduction

Glenosphere lateralization in reverse total shoulder arthroplasty (RSA) can reduce scapular notching, improve tension of the remaining rotator cuff musculature, improve deltoid wrapping effect, and reduce the impingement free arc of motion. However, too much lateralization may increase tension on the brachial plexus and strain the acromion or deltoid leading to detrimental effects. The purpose of this study was to evaluate the risks and benefits of two different amounts of lateralization (2mm versus 6mm) from one surgeon using the same surgical technique and the same implant system.

Methods

This was a retrospective cohort evaluating post-operative outcomes for patients after RSA (Stryker ReUnion, Mahwah, NJ) by a single surgeon. Data gathering was completed through chart review, contacting patients, and reviewing radiographs. Forty patients, with an average age of 69.6 years, underwent RSA with a +2mm offset (n=16) or +6mm offset (n=24) glenosphere. The same humeral onlay humeral component was used after an anatomic neck cut. Patient reported outcomes (PENN, ASES, and SANE) were collected pre- and post-operatively with an average follow-up of 33 months. Pre-operative, short-term and long-term forward flexion and external rotation measures were recorded from same site physical therapy records. Post-operative complications were recorded.

Results

Both groups displayed similar baseline characteristics. Post-operative orthopedic complications in the +2mm offset group were 3 out of 16 (18.8%) versus 8 out of 24 (33.3%) in the +6mm offset group ($p=0.31$). The eleven complications included significant pain/functional limitation (3), radicular symptoms (2), acromial fracture (1), greater tuberosity fracture (1), infection (3), and implant loosening (1). No statistically significant differences were found in post-operative patient-reported outcomes or flexion and external rotation range of motion measures.

Conclusion

A higher complication rate was seen using the +6 lateralized glenosphere compared to the +2 lateralized glenosphere when controlling all other factors in a humeral onlay RSA design. The amount of glenosphere lateralization did not have significant impact on post-operative functional range of motion or patient reported outcomes.

Single Shot Interscalene Regional Anesthesia Provides Noninferior Analgesia And Decreased Complications Compared With an Indwelling Catheter For Arthroscopic and Reconstructive Shoulder Surgery

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Background: There is an abundance of literature comparing the efficacy, safety, and complication rates of regional anesthesia in shoulder surgery. Few studies have investigated how regional anesthesia affects outcomes, particularly when block-related complications occur. To our knowledge, no studies have compared functional outcome measures between single shot and continuous catheter interscalene nerve blocks following shoulder surgery. The purpose of this study was to compare analgesia efficacy, complication rates, and patient reported outcome measures (PROMs) between single shot and continuous catheters in patients undergoing arthroscopic or reconstructive shoulder surgery.

Methods: Consecutive patients (n=1888) who underwent shoulder arthroplasty or arthroscopic shoulder surgery and had regional anesthesia were included. Patients had either an interscalene single shot block (SSB) or interscalene peripheral nerve block catheter (ISC). The decision for SSB or ISC was selected based on patient risk factors and surgeon preference. Patients received phone calls on postoperative days one, two, and seven to assess for pain levels (NRS), complications, and overall satisfaction.

Results: One hundred and sixty patients received SSB, and 1728 patients received ISC. The postoperative NRS at one, two, and seven days were also similar. There were 9 complications (5.6%) in the SSB group and 340 complications (19.7%) in the ISC group. Ten patients in the ISC group required Emergency Department (ED) visits secondary to block complications compared to no ED visits in the SSB group.

Conclusion: In 1888 consecutive patients undergoing shoulder surgery, no clinically significant differences were found in pain relief between SSB and ISC. Patients who received ISC had significantly more complications and ED visits compared to patients who received SSB. The benefits may not outweigh the risks of ISC versus SSB in common shoulder procedures.

Creating a Multidisciplinary Clinical Educational Module (MCEM) in the Hospital Setting

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Background – Prisma Health is the largest not-for-profit healthcare system in South Carolina, treating 1.4 million unique patients in 2020. Now stronger and more supported than ever, our 30,000+ team members work across 21 counties to help transform the healthcare experience for our patients and their families. Workforce development education is a vital component of how the organization supports and develops its clinical team members. In 2019, a new innovative multidisciplinary clinical education model (MCEM) was introduced that is centralized in its development and implementation to ensure continuous improvement to the quality-of-care. It is reported in the literature that training and simulations were most effective when they incorporated the healthcare delivery team. The MCEM occurred step by step in strategic response to overcoming organizational process barriers over a period of months. Clinical resource materials, focused on acute care nursing, were expanded to other members of the health care delivery team (e.g., allied health, supportive roles, and those outside of acute care). At the two-year timeframe, an evaluation of the MCEM will direct the next step in development and reorganization of the innovative MCEM. The new model created new synergies as well as standardized how we educate and train our team members. Because this change is innovative, with few examples reported in the literature, there is no quantitative measure that could comprehensively assess the barriers and facilitators experienced by the educators.

Purpose statement – to investigate the perceptions of the barriers and facilitators experienced by the MCEM educators, some of whom were involved before, during, and after reorganization. These captured perceptions can inform the administrators as directions are set for the next phase of development and reorganization of the MCEM.

Methods – This is a qualitative design study that follows the four phases of grounded theory (Code/Concept/Category/Theme). Volunteers will be solicited from the 72 Prisma Health educators who perform the MCEM daily. A flyer will be circulated in an email sent to all the educators to explain the study project time frame, and to provide contact information to the qualitative investigator. The qualitative investigator, a member of this research study, is educated in qualitative methods at the Ph.D. level. This investigator is not an employee of the institution where the MCEM is performed. *Code*. The transcripts will be entered into NVivo and coded using this qualitative software. *Concept*. Key words from the interviewee's

transcript (answers to the 3 guided questions) will be placed on a diagram that can be grouped into key concepts. The concepts will explain the content that is repeated from one study participant to another. *Category*. The concepts will be aligned by categories to assist in summarizing or synthesizing the interviewee's feedback. *Theme*. The synthesis of the concepts will be reported as themes. The number of persons involved depends upon the information that is repeated from one interviewee to another. When repetition of concepts, categories, and themes occurs without other ideas put forward the qualitative investigator will propose to the other investigators that saturation has been achieved discontinuing additional recruitment. A group of 4 to 5 of the co-investigators will begin to review and analyze the output of the software. When the investigator group is satisfied that the analysis accurately conveys the data that was analyzed, the thematic findings will be presented to a focus group of the participants to see if the analysis appears to be interpreted with close alignment to their feedback provided.

Results – The synthesis of the concepts, aligned by categories, will be reported as themes.

Clinical implications/Conclusion – Utilization of educator viewpoints has proven itself to be valuable forecasting valuable clinical implications derived from this study. In the past two years, the educators have identified variations in practice using the MCEM to facilitate standardization into one system-wide set of processes; identified redundancies in the previous clinical education materials and renovated them. Educators proposed a reduction of 75+ required annual courses to 24, with estimated time-savings estimated at over \$4.8M in cost avoidance.

CenteringPregnancy – Depression Diagnosis Among Prenatal Women

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Objectives: To assess differences in depression diagnosis rates between women assigned to CenteringPregnancy group prenatal care (GPNC) compared to those receiving traditional individual-based prenatal care (IPNC). With a structured intervention such as group care, we hypothesize that women in GPNC with depression would have higher rates of diagnosis due to increased time providers spend with patients.

Design: Secondary analysis of the CRADLE study, a randomized control trial of GPNC. Patients were allocated 1:1 to either GPNC or IPNC prior to 24 weeks gestational age and stratified by self-reported race/ethnicity. Patients completed comprehensive psychosocial surveys at study enrollment, including Center for Epidemiological Studies Depression Scale (CES-D). Comprehensive review of the medical record were also completed. A positive screening was defined as a CES-D survey score of ≥ 16 . Categorical variables were analyzed using chi-squared analysis and logistic regression was used to evaluate the association between prenatal care model and rates of depression

Results: 1,918 women were enrolled, 1,094 in IPNC and 824 in GPNC. CES-D positive screens were similar between IPNC (n=274, 45.1%) and GPNC (n=306, 42.3%), $P=0.26$, OR 0.89 [IRQ 0.73 – 1.09]). **There was also no difference in rates of clinically diagnosed depression between IPNC (n=70, 25.6%) and GPNC (n=462, 21.1%), $p=0.40$.**

Conclusion: There is no difference in depression diagnosis rates between GPNC and IPNC care. However, a significant number of women, regardless of care group, are not being captured in their medical record as having depression.

Do pregnant women perceive being counseled on nutrition by their healthcare provider?

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BACKGROUND: The American Academy of Nutrition and Dietetics identifies a balanced diet and appropriate weight gain as two important components of a healthy pregnancy. Pregnant women were found to have “high levels of motivation and confidence in their ability to achieve a healthy diet and understand dietary recommendations,” but “poor adherence to guidelines” (8). This study’s purpose was to determine if pregnant women are receiving nutrition recommendations from their healthcare providers.

METHODS: We conducted an anonymous, voluntary survey using online software for women who are at least 35 weeks pregnant, or have recently given birth. Each participant was invited to participate in a 27-item survey using REDCap (Research Electronic Data Capture) software via email. Discrete variables were analyzed using Chi-square or Fisher’s exact test. Analyses are carried out using R statistical software. Differences were considered statistically significant at $p < 0.05$.

RESULTS: Of 201 women surveyed, 100 (49.8%) perceived receiving nutrition counseling during pregnancy, and 101 (50.2%) did not recall receiving nutrition counseling. There was a statistically significant difference in women reporting receiving preconception nutrition counseling across age, race, education and income level. Forty one (41%) women reported feeling “very dissatisfied” about their provider’s advice and 36 (36%) reported feeling “satisfied.”

CONCLUSION: These findings suggest that that social determinants of health may likely contribute to the preconception and pregnancy counseling women receive. Women who are pregnant or trying to conceive may benefit from healthcare providers providing more targeted nutrition counseling across all demographics.

Differences in Sex-Based Outcomes of Calcific Aortic Valve Disease

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Introduction & Purpose: Calcific Aortic Valve Disease (CAVD) is a progressive heart disease that affects 25% of people older than 65 and 50% of people older than 85. These rates are expected to increase in the United States due to higher levels of obesity and diabetes, as well as an aging population. CAVD is the leading cause of valve replacement surgery. Annual healthcare costs for these valve replacements are currently estimated to be approximately 2 billion dollars. There are currently no medications approved by the FDA to treat CAVD.

CAVD ranges from aortic valve sclerosis to aortic valve stenosis. It is characterized by intense calcification and compromised valve function. Male sex is a major risk factor of calcific aortic stenosis (AS). Tissue samples collected from patients suffering from CAVD have shown elevated levels of the cytokine, TGFB1. Previous studies done by Dr. Azhar's lab using transgenic (tg) mice that have upregulated levels of activated TGFB1 in their valve interstitial cells (VIC) showed that CAVD was induced in both sexes. However, males progressed to calcific AS at a higher rate by 2 years of age. Additionally, this difference was not seen before puberty. Previous research has shown that exogenous estrogen has anti-sclerotic capabilities.

The goal of this project is to understand the underlying molecular mechanisms that drive the sex-based differences in CAVD outcome.

Methods: One group of 2-month-old, Tgfb1tg female mice will receive ovariectomies (OVX), while the other group will receive a sham surgery. For 3 months, they will be on a high fat diet to expedite the onset of CAVD. During this 3-month period, they will undergo microCT scans and echocardiography, so that calcification progression and heart function can be tracked and monitored. There will also be a control group of older females (at least 1-year old) that will not receive any surgeries, and that was never on a high fat diet. They will also undergo microCT and echocardiography. After three weeks, the mice will be euthanized. Their heart tissue will be collected for histological studies, such as Alizarin red and von Kossa staining.

Results/Conclusion: The preliminary study included 2 OVX mice, 2 sham surgery mice, and 4 older, control female mice. Importantly, MicroCT scans showed no calcification in the older, control females. There was some calcification in the sham

surgery females. Interestingly, one of the OVX mice showed no clear calcification, while the other showed intense calcification. Preliminary data indicates that the protective capabilities of estrogen are reduced when paired with a high fat diet. While one of the OVX mice did not develop visible calcification, the other one developed intense calcification, and the sham surgery mice developed some visible calcification. Further research is clearly required. Research aimed at finding a non-invasive treatment for CAVD is monumental. Current surgical treatments for CAVD are simultaneously expensive and risky. The protection of females from the disease shows that there is a way to significantly decrease the incidence of it. The key is to ascertain what underlying molecular mechanisms lead to this phenomenon.

Biophysical characterization of the AT-rich interacting domain-containing protein 1A (ARID1A)

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The AT-rich interacting domain-containing protein 1A (ARID1A) is frequently mutated in a broad spectrum of cancers. In terms of function, ARID1A facilitates target-specific binding of SWI/SNF complexes to chromatin, thereby altering the accessibility of chromatin to a variety of nuclear factors. In a concurrent clinical trial lead by Dr. Jeffery Edenfield at PRISMA Health, the team identified two missense ARID1A mutations. Therefore, this project aims to study the mechanisms in which these missense mutations become pathogenic. To accomplish our goal, we seek to elucidate the biophysical properties of ARID1A and the impact of the identified missense mutations on the biophysical properties. We propose to combine experimental and computational approaches to study the various domains of ARID1A. Our preliminary results show that ARID1A contains large regions of high propensity of structural disorder. Specifically, the wild-type sequence of the n-terminal disorder region has a propensity to form condensates via a mechanism known as liquid-liquid phase separation. Moreover, we have purified the DNA binding domain of ARID1A for studying its DNA binding interactions. Our results could inform the impact of missense mutations on the structure and dynamics of ARID1A and lead to novel drug design.

Carotid Artery Calcifications in Patients 30-60: important indicator for radiologists to report?

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Purpose Statement: Internal carotid artery calcification (ICAC) is part of the atherosclerotic process occurring in vessels throughout the body, putting individuals at greater risk for cardiovascular disease (CVD) and stroke. The prolific utilization of head CT scans, as well as the visualization of the intracranial internal carotid artery, makes them ideal for screening for ICAC. As head CTs visualize carotid arteries, we sought to evaluate the utilization of these scans in evaluation of ICAC in younger patients.

Methods: Non-contrast head CTs were evaluated for patients aged 30-59 stratified by decade at a single institution (6/16/20-6/7/21) for the presence of ICAC. Clinicopathologic data and CT scan results were analyzed blinded to one another. Radiologist's reports were also analyzed for mention of carotid artery calcification.

Results: Overall, 125 head CT scans were analyzed with patients aged 30-39 (n=40), 40-49 (n=34), and 50-59 (n=51). Stratification revealed increasing calcification with age (25% 30-39; 38% 40-49; 76% 50-59); unilateral calcifications were more common in the younger decade (n=6, 60%) and bilateral calcifications were more common in the older decades (n=33, 63%). For the 50-59 stratification, calcifications were associated with diabetes (28%), hyperlipidemia (28%), hypercholesterolemia (21%), kidney disease (33%), CVD (15%), COPD (18%), and previous stroke (15%). While 49.6% of patients in the study showed calcification, only 4.8% of cases were mentioned in the radiology report.

Conclusion: Due to the connection between ICAC and CVD and stroke, and the apparent worsening of calcification with age, it would be important for radiologists to comment on the status of ICAC in head CT scans in patients aged 30-59 and appropriately document in the impressions section of the report to facilitate clinician follow-up and intervention.

Complications after reverse shoulder arthroplasty lessening over time: A Retrospective Review of Complications

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Background- Reverse shoulder arthroplasty (RSA) has gained popularity for its expanded indications, such as rotator cuff arthropathy, irreparable rotator cuff tear, proximal humerus fracture, arthritis with glenoid deformity, and failed hemiarthroplasty or anatomic total shoulder arthroplasty. Despite concerns about reported high complication rates, the complication rates may be less than originally reported. The goal of this study was to compare types and rates of complications after RSA over time at a single tertiary referral center. Our hypothesis was that the types and rates of complications have shown a statistically significant reduction over time.

Materials and Methods- Two six-year consecutive series of patients who underwent RSA were included. The first group consisted of 183 shoulders with RSA performed between 2003 and 2008. The second group consisted of 355 shoulders with RSA performed between 2009 and 2014. Patient demographics, preoperative diagnosis, and post-operative data, such as range of motion and patient reported outcome measures were collected at the minimum two-year follow up.

Results- In the first group, there were 30 complications in 183 shoulders (16%). Infection (5%), instability (3%), and mechanical component failure (3%) were the most common complications. In the second group, 12 complications occurred in 355 shoulders (3.4%). Instability (1%) and infection (1%) were the most common complications.

Conclusion- A significant reduction in complication rate was found over time. Infection and instability remain the most common complications, while implant failure seems to be lessening.

Feasibility, functionality, and design of open source 3-D printed pediatric prosthetics

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Purpose

Every year it is estimated by the CDC that one in every 1900 babies are born with a limb reduction deficit in the United States, and still more children present to emergency rooms each year needing limb amputations. Pediatric prosthetics are vital for the livelihood of the child, necessary for proper functional development considering the psychosocial and emotional impact that limb handicaps can have on proper growth. Conventional options for prostheses through biomedical companies can be inaccessible due to high cost, timely production, as well as constant re-sizing as the child grows resulting in the need for multiple prostheses over time. In an attempt to create more accessible prosthetic options, open-source 3D printed designs through websites such as E-Nable, have become available for anyone with 3D printing access. However, these devices lack the functionality of high-cost prosthetics with limited capabilities. 3D printed myoelectric arms offer higher functionality and while maintaining cost effectiveness, but their designs require a higher degree of technical skill thereby offering limited access when compared to simpler designs.

Methods

We are attempting to manufacture a design of the El Medallo myoelectric arm available on the E-Nable website. By comparing it with simpler, wrist-actuated models that have already been 3D printed and assembled, we will be able to assess feasibility through the assembly, functionality, using testing metrics for use, and design of the overall success of the model.

Results

We expect to produce the results of functionality testing based on the following metrics: ability to grasp small, medium, and large objects, ease of use, comfort, and cosmetics in comparison with wrist-actuated designs. Our product will be the prototype for future arms including a compiled instruction list, parts list, printing files, and codes.

Conclusions

With the success of this project we will be able to assess feasibility of design, compare functionality to movement-actuated models, and increase accessibility by simplifying and organizing instructional materials for future production of these arms.

Implementation of the HIV Pre-exposure Prophylaxis Continuum of Care among Individuals Receiving Medication for Opioid Use Disorder

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Purpose Statement: The spread of human immunodeficiency virus (HIV) is often associated with the rise in injection drug use. Pre-exposure prophylaxis (PrEP) is an effective way of reducing the risk of acquiring HIV among people who inject drugs (PWID). Although the U.S. Department of Health and Human Services recommends PrEP be offered to PWID alongside other harm-reduction services, no research has reported the progression of the PrEP Care Continuum among populations receiving medication for opioid use disorder (MOUD). The objective of the current study was to assess PrEP eligibility criteria and implementation of the PrEP Care Continuum among individuals receiving MOUD.

Methods: HIV-negative MOUD participants enrolled in the Prisma Health Recovery Clinic were screened at the Internal Medicine Clinic for PrEP eligibility by assessing injection drug use and sexual risk factors. Each participant provided a detailed history of medical conditions, sexual activity, and sexual/substance-use risk-behaviors, and was assessed using a tool that utilized the males who have sex with males (MSM) Risk Index, and the Assessment of the Risk of Contracting HIV for Injection Drug Users (ARCH-IDU) Risk Index.

Results: Of the 140 screened recovery program participants, we found 83 were eligible for PrEP. The majority were eligible based on their ARCH-IDU score, 18.1% were eligible based on sexual risk factors, and 9.6% were eligible due to both their ARCH-IDU score and sexual risk factors. None met criteria based on HIRI-MSM score. Although interest in PrEP was fairly high at 18.1%, only 6 (7.2%) ultimately received a PrEP prescription. Of the two individuals who picked up a PrEP prescription, neither were adherent nor retained in PrEP care at 3 months. The proportion of individuals at each point of the PrEP cascade in the current study are much lower than those shown in other populations.

Conclusion: This is the first study to illustrate the progression of the PrEP Care Continuum amongst individuals receiving MOUD. Implementation of the PrEP Care Continuum during MOUD may present challenges not often experienced by populations traditionally featured in PrEP care cascades. These findings emphasize the necessity of developing effective interventions to increase PrEP interest, uptake, and adherence among individuals receiving MOUD. Future research should identify barriers along the PrEP Care Continuum unique to those receiving MOUD.

Hippocampal insulin resistance is a causative factor for depressive illness

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Purpose Statement: Insulin is classically regarded as a peptide hormone that plays a key role in metabolism, and peripheral insulin resistance is a known feature of metabolic disorders such as obesity and type 2 diabetes. However, insulin also serves several functions within the central nervous system, and central insulin resistance has been linked to cognitive deficits and neuropsychiatric diseases such as depression. To distinguish between peripheral and central insulin resistance, we developed an animal model using a lentiviral vector containing a selective insulin receptor antisense sequence (LV-IRAS). We previously demonstrated that injection of this vector into the hippocampus, a brain region known for its role in learning and memory, impairs synaptic transmission and hippocampal-dependent learning and memory in the absence of peripheral insulin resistance. In view of the increased risk for the development of neuropsychiatric disorders in patients with insulin resistance, the current study examined depressive- and anxiety-like behaviors, as well as hippocampal structural plasticity in rats with hippocampal-specific insulin resistance.

Methods: For the behavioral analyses, adult male Sprague-Dawley rats received bilateral hippocampal injections of the LV-IRAS construct to induce hippocampal-specific insulin resistance or a control lentiviral vector (LV-Con). To study the neuronal morphology, a separate cohort of rats received an intrahippocampal injection of the LV-Con construct in one hemisphere and an intrahippocampal injection of the LV-IRAS construct into the contralateral hemisphere, allowing each rat to serve as its own control for the morphological analyses. Anhedonia was evaluated using the sucrose preference test, behavioral despair was evaluated in the forced swim test (FST), and anxiety-like behavior was assessed in the elevated plus maze (EPM). Since decreases in hippocampal volumes and dendritic architecture are observed in metabolic disorders, morphological analysis of hippocampal neurons was performed using Golgi-Cox impregnation. Rat brains were processed for a modification of the Golgi-Cox technique followed by three-dimensional analysis of dendritic morphology.

Results: In agreement with our previous studies, we observed that LV-IRAS injection selectively downregulated hippocampal insulin receptor (IR) expression and insulin-stimulated IR phosphorylation without affecting peripheral insulin sensitivity. In the FST, rats that received the hippocampal LV-IRAS injections exhibited significant increases in immobility and decreased latency to float. In the test for anhedonia, total fluid intake and sucrose preference did not differ in LV-Con compared to LV-IRAS rats. In the EPM, open arm time was significantly reduced in the LV-IRAS rats. Overall, these results indicate that rats with hippocampal insulin resistance exhibit behavioral despair in the FST and anxiety-like behaviors in the EPM in the absence of anhedonic responses. Morphologically, the downregulation of the IR in the hippocampus provoked atrophy of the basal dendrites of CA3 pyramidal neurons and dentate gyrus granule neurons.

Conclusion: By using a viral vector to specifically downregulate IR expression in the hippocampus, we were able to disentangle central effects of insulin resistance from the many peripheral complications of metabolic disorders. In addition, we were able to distinguish neurobiological correlates of despair and anxiety from those that may underlie anhedonia. Our results demonstrate that hippocampal insulin resistance induces hippocampal structural changes often observed in patients with comorbid obesity and depressive illness. These hippocampal structural deficits are accompanied by behavioral despair and anxiety-like behaviors, identifying hippocampal insulin resistance as a key causative factor in depressive illness. As depression is a complex disorder, impacted by a variety of neurochemical and structural alterations across multiple brain regions, the specificity of the effects of hippocampal insulin resistance on learning-based behavioral tasks provides valuable insight into the underlying molecular causes of the depressive phenotype. Additionally, it is probable that strategies to enhance brain insulin signaling represent a potential therapy for the restoration of neuroplasticity in patients with metabolic disorders like obesity and type 2 diabetes.

Aromatherapy, a Blend of Peppermint, Lavender, Ginger, and Spearmint-- Effect on the Comfort of Postoperative Patients undergoing Gallbladder Surgery in Greer, SC

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Background - Studies have shown that aromatherapy is effective in reducing postoperative and post discharge nausea and vomiting. Aromatherapy is not a medication and has reported clinical implications for patient comfort after gallbladder surgery. Specifically, ginger essential oil has demonstrated effectiveness in alleviating post-operative nausea and vomiting. A study at Prisma Health Midlands, emergency department waiting room at Parkridge Medical Center, demonstrated the use of aromatherapy in easing discomfort of prospective patients who are waiting to be taken back for treatment. This study, the first phase of a longer study where physiologic variables would be investigated in addition to patient perceived satisfaction, seeks to make observations in Greer SC about the effect on the comfort of postoperative patients. The perioperative staff, medical and nursing leaders at Greer Memorial Hospital received information from a national conference about the topic of using blended aromatherapy (peppermint, lavender, ginger, and spearmint) and the passive diffusion of a one-inch disk clipped to the patient gown or nasal cannula. Both patients and physicians are interested in exploring non-medicinal remedies to ease patient symptoms of discomfort following surgery.

Purpose statement – To observe the effect that aromatherapy has on the perception of staff easing patient discomfort during postoperative care for outpatients experiencing gallbladder surgery.

Methods – Study is a prospective, quasi-experimental comparative design using a convenience sample to assess the benefits of using aromatherapy in enhancing the

patient's perception of staff easing their discomfort postoperatively following gallbladder surgery. Once patients, from Dr. Dersch and Mittelstaedt's practice, have arrived for gallbladder surgery, recruitment will occur using a posted flyer that will be set up as a large tent card on the reception desk such that the patient can read it as they are waiting for the receptionist to process their arrival paperwork. The PI or co-investigators on call for that day will come immediately to the perioperative patient reception desk to explain the study privately and confidentially to interested patients. Inclusion criteria include adults having regularly scheduled gall bladder surgeries. Exclusions include urgent procedures, patients with pregnancies and/or respiratory illnesses. An estimated 50 patients, after giving consent, will receive a one-inch disc with blended aromatherapy clipped to their gown or nasal cannula in the recovery area as an enhancement in addition to the standard of care comfort measures. Results are tabulated anonymously by a contract service National Research Corporation (NRC) from one question from the NRC Health Survey about staff easing patient discomfort during their recovery period. Comparisons will be made from two time periods, before and after initiating the aromatherapy one-inch disc intervention. Data will be analyzed using the NRC Health Survey question, "Did the staff do everything they could to help you with your discomfort?". Scores will range from a 4 "Yes, definitely"; a 3, "yes, mostly"; a 2 "yes, somewhat"; a 1 "no"; 0 "N/A". Analysis of the scores will be made using T tests. Descriptive data (age, gender, marital status, and race) will be analyzed using frequencies, central tendency, variation, and position.

Results – Results will include aggregate data for the NRC Health Survey question and corresponding demographics for patients of Drs. Dersch and Mittelstaedt's practice receiving gall bladder surgery during a six-month period. It is hypothesized that a target sample of 40% of patients volunteering for the opportunity to receive aromatherapy in months 4, 5 and 6, may not bring about significant change in scores because the data for the period when patients are using aromatherapy is diluted (40% of 120 patients). The collection of data is valuable as the first phase of a longer study and will serve as a baseline perspective.

Clinical implications/Conclusion – A possible identification of a non-pharmacological intervention to help alleviate patients discomfort following Cholecystectomy (Gallbladder) surgery at Prisma Health Greer Memorial Hospital.

The Impact of Midlands Healthy Start Program on Perinatal Outcomes: A Quasi-Experimental Design

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Purpose: Over the past 30 years, the federal Healthy Start program has been implemented in over 34 states. Healthy Start's overall objective is to improve the health of mothers and children before, during, and beyond pregnancy by reducing infant mortality rates, increasing access to early prenatal care, and removing barriers to healthcare access. The Midlands Healthy Start (MHS) has been serving residents living in the Midlands region of South Carolina since 1998. Yet the impact of MHS program has never been rigorously evaluated. The goal of this project was to evaluate the impact of the MHS program on maternal and infant health outcomes, prenatal care, and public services utilization.

Methods: This retrospective cohort study used birth certificates data for all MHS participants and non-MHS controls who gave a live birth in Lexington and Sumter counties between April 2010 and April 2019. Propensity score matching technique was used to match MHS participants to non-MHS controls at a ratio of 1:2. Matching eliminated any prior imbalances in MHS and non-MHS groups with respect to covariates including maternal age, education, race/ethnicity, parity, prepregnancy body mass index (BMI, categorical), smoking status before pregnancy, Medicaid insurance, and a composite score of adverse pregnancy histories or chronic diseases. Conditional logistic regression was employed to generate odds ratios (OR) and 95% confidence intervals (CI) for matched observations. A total of 2,137 MHS participants and 4,274 non-MHS controls remained in the final matched analyses.

Results: MHS participants were 25.3 years old (± 5.6) on average and racially diverse (58.6% non-Hispanic African Americans, 33.4% non-Hispanic White, 6.6% Hispanics, 1.4% others). Over half had a high school education or less (55.4%) and were parous (53.5%). Their mean prepregnancy BMI was 29.1 kg/m² (± 8.3). Over three quarters were Medicaid recipients (75.9%). Over a quarter reported at least one adverse pregnancy history or chronic disease (25.5%). After propensity score matching, the non-MHS controls had similar distributions of all covariates. Compared to non-MHS controls, MHS participants had 15% lower odds of delivering low birth weight babies (95% CI: 0.71, 1.00), but higher odds of participating in WIC program (OR: 1.77, 95% CI: 1.56-2.02) and initiating breastfeeding at the hospital (OR=1.28, 95% CI: 1.15-1.43). Compared to non-MHS controls, MHS

participants had higher odds of gaining weight above the Institute of Medicine (IOM)'s recommended total weight gain during pregnancy (OR: 1.10, 95% CI: 1.01-1.21) but lower odds of gaining weight below the IOM recommendations (OR: 0.89, 95% CI: 0.80-1.00). There were no significant differences between MHS and non-MHS women in other perinatal outcomes including preterm births, infant mortality, diabetes in pregnancy, hypertension in pregnancy, cesarean deliveries, and adequacy of prenatal care.

Conclusions: This study demonstrates that a Federal Healthy Start project contributed to a significant improvement in low birth weight, breastfeeding initiation, and WIC program participation. However, Healthy Start participants were more likely to gain excessive weight during pregnancy and may benefit from greater education in this area.

Extra-cranial malignancies in patients with Pituitary Adenomas

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Purpose: Pituitary adenomas (PA) generally present with a mixed array of symptoms. However, PAs are also associated with endocrine disorders such as multiple endocrine neoplasia types 1 and 4 as well as Carney syndrome. Recently, there has been debate regarding a relationship between PAs and secondary malignancies. There are few studies that approach this question from multiple angles by comparing endocrine sources, demographics, risk factors, and their association with secondary malignancies in PA patients. Herein we describe an investigation into this potential relationship through this multifaceted approach.

Methods: We performed a retrospective study at our institution where data on demographics, clinicopathologic, radiologic, treatment and outcome were collected on all PA patients. Our cohort was compared to the SEER database of cancer incidence and the expected probabilities of secondary malignancies in our cohort were calculated and compared to the actual incidences observed.

Results: Results indicated our patient cohort with secondary malignancies was significantly higher than expected. Race was the only significant parameter linked to secondary malignancies, with African American people having higher rates of secondary malignancies than white people ($p=0.04$).

Conclusion: These data indicate a compelling association between PA and non-cranial malignancies suggesting an underlying cause apparently independent of recognized risk factors and endocrine related complications of PA, but significantly associated with race. This information combined with future genetic investigations of patients with PA and secondary malignancies could help further improve diagnostic and treatment options.

Vectors of Spread Insight into Pre-Operative Pituitary Adenoma Characteristics

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Background: The goal of surgical intervention for pituitary adenomas (PA) is complete gross total resection as determined by post-operative imaging. This imaging is typically performed 3 months post-operatively, which allows post-surgical changes to resolve for better residual tumor visualization, but subsequently delays adjuvant treatment if necessary. Vectors of spread, defined here as the direction upon which the PA tumor itself extends using anatomic markers as descriptors, have been correlated to be the only significant factor for reoperation, readmission, or death. Current studies have not performed a comprehensive investigation into the potential relationship between PA size, detailed location (i.e. vectors of spread) and success of surgical excision. Such relationships could prove useful by predicting which patients are most likely to need adjuvant post-surgical management.

Materials and Methods: Pre- and post-operative MRI volumes of pituitary adenomas resections were evaluated for achievement of gross total resection. The different types of vectors of spread were documented and their prevalence was noted. Relationships between vectors were also assessed and correlated to determine whether certain vectors are likely to be present together. These included: cavernous sinus, planum, dorsum sella, suprasellar and juxtasellar.

Results: The most common pre-operative vector extensions were suprasellar and cavernous sinus, with 66.7% and 58.0% of patients demonstrating these tumor extensions, respectively. Pre-operative dorsum sella and suprasellar extensions were associated ($p < 0.01$); suprasellar also correlated with juxtasellar ($p < 0.01$) and cavernous sinus ($p < 0.01$) extensions. Juxtasellar and cavernous sinus vectors correlated with each other ($p < 0.01$) and suprasellar ($p < 0.01$) extensions. Post-operative residual tumor was frequent in cavernous sinus extensions (62.5%). Concomitant juxtasellar ($p < 0.05$) and cavernous sinus ($p < 0.01$) extensions were associated with residual tumor, as was cavernous sinus extension with suprasellar residual ($p < 0.03$). While the dorsum sella ($p < 0.01$), suprasellar ($p < 0.01$), juxtasellar ($p < 0.01$) and cavernous sinus ($p < 0.05$) vectors were larger pre-operatively, only the cavernous sinus ($p < 0.01$) was significantly decreased by resection. However, multiple vectors (suprasellar ($p < 0.01$), juxtasellar ($p < 0.01$) and cavernous sinus ($p < 0.01$)) correlated to a statistically decreased likelihood of

achieving gross total resection.

Conclusion: Certain vectors appear to correlate with each other, offering unique insight in PA growth patterns, as tumors do not appear to grow along the path of least resistance. Additionally, specific vectors (suprasellar, cavernous sinus, and juxtasellar) correlated with increased resection difficulty, though not decreased probability of achieving GTR. Most notably, cavernous sinus extension coupled with suprasellar and /or juxtasellar extension statistically increased the likelihood of residual tumor. With this information, surgeons would be better informed regarding which specific tumor characteristics represent significant increases in resection difficulty. Additionally, these relationships may help clinicians accelerate post-surgical patient management, avoiding the 3-month post-operative MRI delay by predicting the ability to achieve GTR and even help predict symptomatology in patients that choose a non-surgical approach.

Combining Tumor-Treating Fields and Radiation Therapy to Combat Breast Cancer Metastases

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Purpose Statement – Current radiation treatment regimens for triple-negative breast cancer (TNBC) therapy use high-energy radiation with potentially life-threatening toxicities in order to eradicate large deposits of metastatic breast cancer cells. With the goal of minimizing these potentially life-threatening toxicities, lower-energy tumor-treating electric fields (TTFields) in conjunction with low-dose ionizing radiation have been investigated as a method of therapy for triple-negative breast cancer.

Background - Tumor-treating fields represent a very narrow range of oscillating electric fields (OEF), as TTFields are defined with an upper limit of electric field intensity of 2 V/cm.¹ The delivery of oscillating electric fields continuously at this low intensity and intermediate frequency range (100-300 kHz) has been demonstrated over the last one to two decades to prove a promising new treatment of cancer.² Cells exposed to OEF during mitosis have been demonstrated to undergo normal progression up until the transition from metaphase to anaphase, after which they exhibit uncontrolled membrane blebbing that coincides with metaphase exit. After metaphase exit, aberrant nuclear architecture and signs of cellular stress were observed, including decreased cellular proliferation, followed by apoptosis.³

Methods - We have designed, built, and tested our own device capable of delivering OEFs over a much broader range of electric field intensities. Our device also allows us to test an unlimited number of combinations of alternating current waveforms rather than being restricted to a single frequency or a constant peak voltage. For delivering OEFs to cells, *in vitro* breast cancer samples were subjected to OEFs for 24 hours in three wells of a cell plate while the other three wells contain samples that were left untreated, and microscope images were taken every 24 hours for 2 days. Additionally, fractionated treatments of ionizing radiation (IR) of 3 Gy were delivered once every 24 hours for 3 days to both the control group and the group that received TTField treatment.

Results - Initial testing used OEFs of 3.75 V/cm field strength delivered at a frequency of 150 kHz with modulated amplitude. Currents were delivered to each electrode with a 1-minute commutation time and virtually instantaneous delay (< 1μs) between commutations. After 24 hours of OEF treatment, the three wells of treated samples were destroyed, while the three wells of untreated samples

contained living and healthy breast cancer cells with no signs of apoptosis. Further testing investigated the effects of OEF on healthy epithelial cells, as well as the effect of OEF and fractionated ionizing radiation.

Epithelial and breast cancer cells that received both TTField therapy and ionizing radiation therapy experienced greatly reduced proliferation compared to cells that received only TTField treatment, only ionizing radiation treatment, and no treatment. After 72 hours of TTField treatment and two doses of 3 Gy ionizing radiation at 24 and 48 hours of treatment, breast cancer cells showed a 2.7% increase in the number of viable cells, while epithelial cells showed a 48% increase in the number of viable cells. Cells that received only IR treatment or only TTField treatment did not show noticeable changes in morphology and were much more confluent.

Conclusion - Tumor-treating fields prove to be an effective treatment for triple-negative breast cancer, especially when paired with fractionated ionizing radiation. While we observed that TTField treatment sensitized the effect of radiation treatments on TNBC we did not observe sensitization when the combined treatment was delivered to a normal breast epithelial cell line. Future experimentation should be conducted *in vivo* with a re-designed device to create a better understanding of conjunctive TTField and IR treatment for implementation in clinical trials.

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Protecting our healthcare heroes: Using latent JD-R profiles to predict burnout in emergency medicine clinicians during the COVID-19 pandemic

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Purpose Statement – Burnout has been a very concerning and prevalent issue among clinicians, especially those in emergency medicine. With the emergence of COVID-19, however, burnout became an even greater concern due to the extreme stressors faced by clinicians working during the pandemic. Preliminary research noted that frontline clinicians experienced elevated rates of depression, anxiety, and fatigue, making them susceptible to burnout, and thus, there was a need to better understand the complexities of those types of burnout antecedents. The purpose of this study was to examine what combinations of job demands and job resources make emergency medicine clinicians susceptible to burnout with an overarching goal of helping Emergency Department (ED) leadership identify how to best support their clinicians during COVID-19. To help accomplish this goal, the following research questions were posed: “What combinations of job demands and job resources make emergency medicine clinicians more or less susceptible to burnout during COVID-19?” and “Which of the proposed profiles predict burnout of emergency medicine clinicians during the COVID-19 pandemic?”

Methods – The data for this study were collected from two iterations of a larger, ongoing survey of emergency medicine clinicians working at a health system in the southeastern United States. To collect data, a brief online survey sent out each month via email gathered information on employee well-being, burnout, stressors, resources, and requested support during the COVID-19 pandemic. The survey was sent out to attending physicians, resident physicians, APCs, and RNs. This study used Latent Profile Analysis (LPA) to examine what combinations of job demands and job resources make emergency medicine clinicians more or less susceptible to burnout and which profiles—if any—are predictive of emergency medicine clinician burnout during COVID-19. Four latent profile indicators were used: COVID-19-related job demands, general job demands, internal job resources (person-centered), and external job resources (organization-centered). The July 2020 iteration (i.e., Survey 1) was used for the LPA due to the high response rate. Burnout scores from the August 2020 iteration (i.e., Survey 2) were used to test if any of the profiles were predictive of future burnout scores (i.e., July profiles predicting August 2020 burnout scores) by using the BCH method.

Results – Results revealed five unique Job Demands-Resources profiles: Meaningful Work-Low Job Demands (moderate general and COVID-19-related job demands, moderate external job resources, and high internal job resources), Autopilot (moderate general job demands, low COVID-19-related job demands, and low internal and external job resources), Burnout Risk (high general and COVID-19-related job demands, very low internal job resources, and moderate external job resources), Sufficient Resources, and Meaningful Work-High Job Demands (high general and COVID-19-related demands, moderate external job resources, and high internal job resources). Using mean burnout scores and the BCH method, patterns of job demands and resources arose that revealed what JD-R combinations may lead to clinicians being more or less susceptible to burnout. Overall, the latent profiles differed on burnout scores, which indicates that the profiles could be used to predict clinician burnout. From the analyses, it can be gathered that the Burnout Risk, Autopilot, and MW-HJD profiles are more susceptible to burnout. The two patterns of job demand and job resource combinations that make EM clinicians more susceptible to burnout are as follows: low to moderate levels of job resources that cannot make up for the negative impacts that result from high levels of COVID-19-related and general job demands; low levels of COVID-19 related job demands, internal job resources, and external job resources and a moderate level of general job demands. The key combination of job demands and job resources that make EM clinicians less susceptible to burnout during COVID-19 is a moderate level of job demands paired with high levels of both internal and external job resources.

Conclusion – The findings of this thesis are important to the clinical realm because they can help inform both preventative and reactive burnout interventions. Using the 5-profile solution, hospital leadership could identify individuals who are at a high risk of burnout before they actually burn out. Additionally, the profiles could be used to create personalized intervention strategies. Based on the profile of an individual who is either at risk of burnout or already burning out, a personalized intervention strategy could be put in place to realign their ratio of job demands and job resources.

Hemoconcentration and non-specific gastrointestinal discharge diagnoses as markers to identify potential angiotensin converting enzyme inhibitor induced visceral angioedema

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Purpose Statement: Visceral angioedema is a rarely diagnosed side effect of angiotensin converting enzyme inhibitors (ACEI's). Due to the lack of diagnostic criteria, patients with ACEI-induced visceral angioedema (AIVA) typically suffer years of repeated gastrointestinal (GI) symptoms without an etiology for their symptoms. Identifying patients with a high potential for this side effect would likely lead to more diagnoses and reduce the duration of patients' GI symptoms. Hemoconcentration has been described with AIVA case reports and is thought to be secondary to third spacing of fluid into the bowel wall. This study attempted to determine if a high hemoglobin (Hgb) level, coupled with current and prior non-specific GI discharge diagnoses could identify potential AIVA patients.

Methods: Our 641-bed hospital is a Level 1 Trauma center, regional referral center and community teaching hospital. All adult patients who presented to our emergency department (ED) patients in the calendar year 2016 had their electronic health records (EHR, Cerner) queried to identify those patients who an initial Hgb level that was abnormally high, defined as >15.7 g/dL for females and >17.5 g/dL for males. In those patients with an abnormally high Hgb, a retrospective chart reviewed was conducted for additional variables: presence or absence of GI symptoms (defined as vomiting, diarrhea or abdominal pain) in the ED; use of ACEIs; and discharge diagnosis if there were any GI symptoms. The GI discharge diagnosis was considered specific if confirmed by laboratory results, CT imaging or specific clinical diagnoses. Diagnoses were considered non-specific if terms such as gastroenteritis, vomiting, diarrhea or abdominal pain were used without a specific etiology. In patients with a GI discharge diagnosis on the target visit date, additional chart review was conducted to determine if there were any prior GI discharge diagnoses within 12 months, or any future GI discharge diagnoses for the 12 months following the target visit date. These prior and future GI discharge diagnoses were also evaluated to determine if they were specific or non-specific.

Results: 77,717 ED patients were seen in the 2016 calendar year, with 540 identified by the database query as having an abnormally high Hgb level. 182/540 patients had both high Hgb and GI symptoms. Of these 182 patients, 52 were on an ACEI and 130 were not. Non-specific GI diagnoses were seen in 30/52 (58%) on ACEI's and 43/130 (33%) not on ACEI's. 29/182 patients had non-specific GI

diagnoses on both the target date and within the prior 12 months. Of these, 16/52 (31%) were on ACEI's and 13/130 (10%) were not on ACEI's. Patients with high Hgb and GI symptoms were more likely to have recurrent non-specific GI diagnoses if they were on ACEI's (OR 3.96; 95% CI 1.62, 9.9, $p=0.0026$, Fisher exact test). The 16 patients on ACEI's with non-specific GI diagnoses on both the target date and prior date approximated the 18 patients admitted for oropharyngeal angioedema in our hospital that year. ACEI use and non-specific GI discharge diagnosis on the target and prior ED visits appeared to predict future ED visits for non-specific GI discharge diagnoses, but the confidence intervals (OR 3.5, 95% CI 0.73, 16.8, $p=0.11$) were not robust enough due to the small number of patients.

Conclusions: Although non-specific GI diagnoses can be seen in patients not on ACEI's, our study showed that recurrent non-specific GI diagnoses are much more common in patients with a high Hgb and taking ACEI's. Without any other etiology to account for their recurrent symptoms, unrecognized AIVA may be the cause of these non-specific GI diagnoses in those on ACEI's and high Hgb. These patients may benefit from stopping their ACEI to see if this stops future GI symptoms, thereby reducing medical costs and the need for further diagnostic workups. AIVA may be as frequent as ACEI-induced oropharyngeal angioedema, but will require further study.

WeLCKME Study Outcomes: Adherence to exercise recommendations for children enrolled in a clinical weight loss study

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Purpose Statement: The Weight Loss Changing Kidney MicroRNA Expression (WeLCKME) study recruited participants from 2020-2021 as they lost weight to see the change in kidney exosomal microRNA expression in urine. Since microRNA expression can be influenced by diet and exercise, we tracked these factors for a period of three months per participant. This pilot study gave us an opportunity to analyze behaviors and barriers to change.

Methods: Children attending a large urban pediatric clinic were recruited to the study if they met the following inclusion criteria: 4-18 years old, BMI>85th percentile, no known kidney/gastrointestinal diseases, no diabetes/hypertension at baseline. Families were required to attend two study visits three months apart. At the first visit, they were given a Fitbit Charge-2 to track activity and asked to complete a ASA-24 dietary recall. Wearing the tracker was incentivized with monetary rewards. They also filled out two questionnaires on random days each week about diet and sleep/activity. Data were collected via RedCap and Qualtrics and analyzed using Excel software. Fitbit data was analyzed using SPSS version 27.

Results: Out of the 419 children that were screened; 200 met study criteria, 80 attended clinics, 60 agreed to talk to recruiter, 37 agreed to participate, and 14 completed both visits. Only 3.3% of all screened families were able to participate successfully. 92% subjects provided both urine samples per protocol. Average age was 10.6 years, 53% were male. 21% identified as Hispanic and 50% identified as Black. Qualitatively, we identified multiple barriers to participation including socioeconomic barriers (transportation, parental job restrictions), racial barriers centered around mistrust of the healthcare system and language barriers which made effectively communicating the nature of the study difficult. These factors, along with COVID restrictions, lead to significant impediments that cause low yield recruitment even with a large population of potential recruits. Zip code data showed our participants had to travel a range of 2-46 miles for a visit. We collected at least 3 days of valid physical activity data for 100% of participants, with an average of 30 days of valid Fitbit wear per person. Participants completed an average of 11 (SD = 4.5) day level dietary surveys. Only 46% of participants completed the ASA-

24.

Conclusion: Several systemic barriers exist to prevent effective recruitment of families raising overweight/obese children into clinical studies/trials. However, Fitbit data indicates that this method is feasible for remote tracking of physical activity and diet. Study design should incorporate solutions to these issues to conduct effective and equitable research.

The Fate of Orthopaedic Surgery Applicants from Medical Schools Without an Orthopaedic Surgery Residency

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Purpose statement: The purpose of this study was to provide an analysis and assessment of students from medical schools without a home Orthopaedic Surgery Residency program when applying for a residency position in Orthopaedic Surgery.

Introduction: Orthopaedic Surgery consistently remains one of the most competitive specialties to match into for residency. The purpose of this study was to provide the first ever analysis and assessment of students from medical schools without a home orthopaedic surgery residency program when applying for a residency position in orthopaedic surgery. The study also aimed to provide comparisons between medical students with and without an orthopaedic surgery residency home program when assessing some of the most important factors in the orthopaedic surgery residency match; USMLE Step 1 and Step 2CK scores, member of Alpha Omega Alpha (AOA), number and quality of letters of recommendations, performance in medical school clinical rotations, and number of research publications and presentations.

Methods: A survey was created and sent to graduates from the following four medical schools without affiliated home orthopaedic surgery residency programs that successfully matched into orthopaedic surgery residency programs over the past four years: Mercer University School of Medicine, Macon, GA; Herbert Wertheim College of Medicine at Florida International University, Miami, FL; Eastern Virginia Medical School, Norfolk, VA and The Brody School of Medicine at East Carolina University, Greenville, NC.

Results: Nineteen total responses were recorded. 63% (12/19) were elected to the Alpha Omega Alpha (AOA) Honor Society. 21% (4/19) participated in the Couples Match. 63% (12/19) received Honors in their General Surgery clinical rotation, 47% (9/19) received Honors in their Internal Medicine clinic rotation, and 53% (10/19) received Honors in their OB/GYN clinical rotation. The average USMLE Step 1 and Step 2 CK exam scores were 250 and 257, respectively. The average number of away rotations completed was 2.68. The average number of letters of recommendation from an Orthopaedic Surgeons and non-Orthopaedic Surgeons were 2.84 and 0.57, respectively. The average number of programs applied to was 82.5 and the average number of interviews obtained was 14.6. 53% (10/19) matched at a program where they had performed an away sub-internship rotation.

The average number of research publications in Orthopaedic Surgery and total publications overall at time of application were 2.58 and 4, respectively. The average number of research presentations in Orthopaedic Surgery and total research presentations at time of application were 10.89 and 14.89, respectively.

Conclusion: Orthopaedic surgery remains one of the most difficult specialties for medical students to match into, with only 80.22% of applicants who applied successfully matched in 2020. A study has never been published evaluating how students from medical schools without an affiliated orthopaedic surgery residency fare in the match process. This novel study showed that students from medical schools without a home orthopaedic surgery residency program scored higher on both USMLE Step 1 and Step 2 CK, had a higher percentage of AOA members, and completed a higher number of research publications and presentations in both orthopaedic and non-orthopaedic fields. These students were more likely to request a letter of recommendation from a non-orthopaedic physician and performed more sub-internship away rotations compared to the overall average matched orthopaedic surgery student applicant. They are also faced with the challenges of lack of available mentorship, access to research opportunities, and exposure to musculoskeletal pathology in the clinic and operative settings. While orthopaedic surgery continues to remain one of the

most difficult specialties to match into, students applying from medical schools without a home orthopaedic surgery residency are presented with these unique challenges and must perform at a high level across multiple aspects of their residency application to successfully match.

Impact Analysis of Visual Literacy Training on Medical Decision Making in Telehealth

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Purpose Statement

The recent increased use of telemedicine during COVID-19 has significantly changed the landscape of patient physician visits and we know little about its effects on communication. Visits conducted via telemedicine removes the in-person nature of an office visit and places greater demands on the physician to connect with the patient using the limited information delivered through a 2-dimensional audio-visual format. We hypothesize that addressing the process of observation itself, by underscoring the subjective and imperfect act of looking, can impact medical decision making. Specifically, we aim to cultivate visual literacy skills (e.g., observation, analysis, communication), through the close study of artwork, in physicians in training.

Aim 1: Develop and implement an interactive visual literacy workshop, incorporated into the Family Medicine Residency orientation. The current project builds upon a pilot seminar, taught in September 2019, targeting specific visual literacy skills and incorporating reflective writing to connect the outcomes to specific health-related scenarios.

Aim 2: Create two standardized patient encounters to test a trainee's interpersonal skills, the quality of their history taking and physical exam using a virtual platform, their clinical reasoning skills.

Aim 3: Develop a Visual Literacy assessment metric that would measure increased visual literacy skills in standardized, recorded remote scenarios. Creating recorded telehealth assessment scenarios and measurement tools would reduce obstacles to protocol assessment and help optimize lesson planning and future execution.

Methods

This IRB approved project studied 18 interns from the 3 Family Medicine Residency Program at Prisma Health Upstate-Greenville, Oconee and Greer, supported by a Prisma Health-Furman Seed grant rewarded on April 2020. The experimental group (one half of the interns) participated in a 90-minute visual literacy training session lead by Dr. Archino. Subsequently, both experimental and control groups completed a standardized virtual patient encounter at the Greenville Simulation Center in the University of South Carolina School of Medicine Greenville, designed by Dr. Shen-Wagner to reflect a real-world telehealth visit, with a standardized patient and background. The control group (the other half) underwent the same visual literacy training after their standardized patient assessment on the same day.

Results

These telehealth encounters were recorded, and we are currently in the process of grading and scoring using rubrics to measure for the number of observations made by the resident physician in the history and physical to quantify the quality and scope of the observations made, and document the use of objective, concrete language. Residents are being scored on the demonstration of interpersonal skills (Perceived by the standardized patient), the number of differentials considered, and their ability to arrive at the correct diagnosis. We also developed a Visual Literacy scale that measures communication attitudes, mindfulness, bias awareness and empathy. This is a compilation from existing models which are extremely lengthy; part of the resources for the seed grant will be used towards researching if a smaller number of questions can be as sensitive and specific compared to the questions set as a whole, allowing us to produce a more compact scale that would provide reliable results. Both groups will complete this assessment immediately following the patient encounter.

Conclusion

Limited Studies of visual literacy in current literature suggest that focused training can increase observational skills. We hope to demonstrate similar effects amongst physicians in training and in the context of telehealth. We hope that by performing this study, in the future we will be more equipped to foster and train our physicians

to improve their observational skills, sharpen their medical decision making, avoid diagnostic cognitive errors such as anchoring and premature closure, and ultimately take better care of our patients.

Medical students' perspectives on the decline of classroom attendance

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Background/Objectives

Attendance in medical school lectures has declined as many students are opting for more control in their educational schedule. However, students' average performance on both institutional and national examinations does not decline due to lack of classroom attendance. This study investigates the reason behind the decline in classroom attendance from the perspective of medical students and determines what resources are utilized outside the classroom.

Methods

A survey was sent to M1 and M2 students to indicate their class attendance, and to select the resources they utilized outside of the classroom. The frequency percentage of responses were recorded for both classes. The percentage change from attending classes from the M1 to M2 years, and for the resources utilized outside the classroom were analyzed using Chi-square.

Results

The response rate to the survey was 72%. The results showed a decline in attendance from 44% to 27.3% as students progressed from M1 to M2, with a concordant rise in non-attendance from 56% to 72.7%. There was also a significant change in resources utilized by the two different classes (P ranged from 0.049 - <0.001) except for utilization of flashcards ($P=0.896$). The most notable difference was the use of question banks by M2 students who reported 94.8% use verses 31.1% use for M1 students. The second largest change came from utilization of outside lectures by the M2 students who reported 94.8% utilization compared to only 59.5% utilization by M1 students, a difference of 35.3%. There was also a significant change from the M1 to M2 classes in both one-on-one encounter with faculty, and one-on-one peer tutoring utilization, decreasing 27.3% and 14.7%

respectively. Additionally, small group tutoring use decreased from 44.6% to 15.6% utilization from the M1 to M2 classes. The only resource that had no significant change was the use of flashcards, both classes reported around 76% utilization.

Conclusion

M2 students limit their class attendance due to demand on time and content coverage. There is a significant rise in question bank and outside lectures utilization for content review. The increase in utilization of these two resources along with the decrease in classroom attendance and use of one-on-one or small group interaction all indicated that the students are pressured for time and energy. With continued usage of easily accessible online resources that focus heavily on USMLE Step 1 examination materials, the decline in attendance is likely to remain as the majority of student's time remains focused on study practices outside of the classroom.

MOMs in Control Midlands: A novel model of care to remove treatment barriers for women with diabetes in pregnancy

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Moms in Control Midlands: A novel model of care to remove treatment barriers for women with diabetes in pregnancy

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Purpose Statement: Diabetes in pregnancy increases the risk of perinatal complications for mother and baby. Women with gestational diabetes (GDM) are 10 times more likely to develop type 2 diabetes (T2DM) later in life. Fetal exposure to maternal diabetes also leads to increased risk of childhood obesity, diabetes, and metabolic syndrome. Treatment of diabetes has been shown to improve outcomes, but often requires specialized care in addition to the primary OB. However, women often face significant barriers in obtaining early and adequate prenatal care and accessing specialty care can be even more challenging in resource-poor areas where shortages of maternal fetal medicine specialists, endocrinologists, and diabetes educators exist. The aim of our collaborative care model is to improve pregnancy and delivery outcomes, as well as the long-term health of families in SC.

Methods: In June 2020, Prisma Health Midlands and CDKC formed a partnership based in Sumter, SC to create a team-based, patient-centered model of care. The **Moms in Control** (MOMs) team includes an endocrinologist, maternal fetal medicine (MFM) specialist, dietitian, diabetes educator, and nurse navigator. Following a program introduction, community OB providers began referring patients with any diabetes diagnosis. Patients attend class, participate in treatment planning, and have the option for telehealth visits as needed. They are provided a 10-day continuous glucose monitor (CGM) to guide treatment and inform self-management. Those eligible for diabetes technology are assisted in obtaining the equipment and trained on its use in clinic. Measures to evaluate effectiveness include monthly hemoglobin A1Cs to assess glycemic control, rates of delivery complications, number of women utilizing diabetes technology, follow-up rates, and level of patient satisfaction.

Results: *MOMs* has cared for 114 patients (T1DM n=10, T2DM n=19, GDM n=91) since September 2020. Among 6 delivered T1DM patients, average A1C decreased from 7.65% in the first trimester to 5.9% in the third trimester, and among 8 delivered T2DM patients, average A1C decreased from 8.2% to 5.5%. Using a five-point Likert scale to assess patient satisfaction (1=very dissatisfied, 5=very satisfied), among 44 postpartum patients surveyed the mean level of satisfaction with our care model was 4.84. Additional benefits identified include fewer appointments, fewer missed appointments, access to MFM ultrasounds, individualized patient support between appointments, and timely data access to help guide the management plan across specialties.

Conclusion: A team-based care model that optimizes the use of telehealth and diabetes technology, while emphasizing education and engagement, can effectively deliver specialized, patient-centered care and has the potential to positively impact the health of women, children, and families for generations to come. Future research is needed to measure the impact on maternal and fetal outcomes. Expansion of services to telehealth will further improve access to specialized care in rural areas.

Funding: MOMs in Control Midlands is supported by Diabetes Free SC, an initiative of Blue Cross Blue Shield South Carolina and BCBS Foundation.

Improving clinical capacity by addressing social determinants of health: clinician perceptions of the impact of a South Carolina medical-legal partnership

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Purpose statement

The overall goal of this project is to understand how the Upstate Medical-Legal Partnership (MLP) impacts clinicians. The project aims to describe clinician perception of their role in screening for and discussing social determinants of health needs with their patients, describe clinician perception of a Medical-Legal Partnership's ability to increase provider capacity to treat patient social determinants of health needs and reduce clinician stress, and discuss how MLPs can drive systems-level change in the identification of and treatment of patient social determinants of health.

Methods

The current MLP is a collaborative between a large local health system, legal aid office, and a higher education institution in South Carolina. In 2020, 532 geriatric or pediatric providers were given a 16-question online survey using a 5-point Likert scale (1=Strongly Disagree, 5=Strongly Agree) that assessed clinician perception of: their role in addressing SDOH needs, the MLP's impact on their clinical practice, and the MLP's ability to address SDOH needs. Chi-square and t-tests were used to determine differences between referring and non-referring providers. Descriptive statistics were used to summarize findings of referring provider's perceptions of the MLP.

Results

Respondents (n=171) included Physicians/Residents, Advanced Practice Providers, and other provider types. About half (50.9%) had referred to the MLP. Providers that reported SDOH screenings were part of their role ($t=3.29$, $p<.001$) and who were comfortable discussing patient SDOH needs ($t=3.69$, $p<.001$) were more likely to make referrals. Referring providers indicated MLP services: improved their overall capacity to serve patients (92.9% strongly agreed/agreed) and improved

their capacity to address patient SDOH needs (77.02% strongly agreed/agreed). Geriatric providers ($t=1.977$, $p<.026$) were more likely to report that the MLP reduced clinician stress than pediatric providers.

Conclusion

MLPs have the potential to reduce clinician stress and burn-out by improving overall clinical capacity and capacity to address patient SDOH needs. Additionally, MLPs can influence how SDOH needs are treated at the system level. Challenges noted by referring clinicians included limitations on serving non-resident citizens and income restrictions. Integrating education into the medical curriculum on how SDOH needs impact patient health and the healthcare systems role in identifying and addressing SDOH needs, could improve healthcare delivery at the system level and encourage the implementation of novel SDOH interventions including MLPs.

The Development and Testing of “Is Lung Cancer Screening for You,” A Computer-Based Decision Aid

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Purpose: Cancer screening-related decisions require patients to evaluate complex medical information in short time frames, often with health care providers they do not know well. Providers play an essential role in facilitating shared decision making. To reduce lung cancer mortality, national guidelines recommend individuals at high risk receive a low dose computed tomography screening annually. To increase the likelihood of screening, shared decision-promoting decision interventions are needed. The goal of this study was to investigate the feasibility, acceptability, usability, and preliminary effectiveness of a computer-based decision-aid (DA).

Methods: A brief, clinic-based DA was developed using Janis and Mann’s conflict theory of decision making and findings from statewide and national primary care provider surveys. Participants used a previously tested decision-aid “Is Lung Cancer Screening for You?” that was adapted to an electronic format for use during a clinic visit. The DA was disseminated on a 12-inch touch-screen tablet computer. The Feasibility of Intervention Measure, Acceptability of the Intervention Measure, and the System Usability Scale were used to collect self-reported feasibility, acceptability, and usability data. Data related to decisional conflict, screening intent and actual screening completion were also collected. Provider training included an in-person overview of the study protocol and a short (10-minute) video demonstrating the use of the DA and documentation exemplars to facilitate coding and reimbursement. A project coordinator was present to observe patient’s and healthcare provider’s interactions during their appointment to assess the fidelity of shared decision-making discussions.

Results: Thirty-three participants were recruited through academic primary care and pulmonary clinics in Columbia, SC. Recruitment was impacted by several barriers including the COVID-19 pandemic. All participants were current smokers or former smokers who quit smoking less than 15 years ago. The majority were female (63%, n = 21), and most often reported their race as African American (55%, n = 18). Mean age was 66.50 (±9.50) years. The DA was feasible, acceptable for use in a clinic setting, and easy to use for participants. The DA also led to low decisional conflict among participants. Prior to conversations with providers, 31 participants (94%) had an intention to be screened within 6 months, while 2 participants were neutral. Following conversations with their provider, all respondents (n=29) had high intentions to be screened within 6-months. Actual screening rates were relatively high (75.8%, n = 25). Of those not screened (24.2

%, n = 8), the majority (87.5%, n = 7) were not referred for screening immediately, two were sent letters later but were lost to follow up and one was ineligible. One patient was diagnosed with stage 4, non-small cell lung cancer. Eleven different providers (a pulmonologist, primary care physician and residents) participated. Using the electronic DA, shared decision-making discussions between a provider and patients averaged 5.95 min.

Conclusion: Strong evidence exists that patients exposed to DAs feel more knowledgeable, better informed, more certain about their own values and engaged in a more active role in decision making about their health choices. Our finding suggest that computer-based decision aids are feasible for promoting shared lung cancer screening decisions. A more robust study is warranted to measure the added value of a computer-based version versus a paper-based aid of this DA.

A Qualitative Analysis: Developing an Understanding of Job Demands and Organizational Resources Needed by Attending Physicians, Advanced Practice Clinicians, and Registered Nurses during COVID-19

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Purpose statement – Despite nurses representing the largest percentage of healthcare workers in the industry (Torpey, 2018), there is little research to the authors' knowledge on the organizational resources and support that can best assist registered nurses during times of crises (French et al., 2002; Liu et al., 2018). It is essential to begin bridging this gap during COVID-19, as prior research has demonstrated that various medical specialties suffer from burnout at different rates due to different job demands and resources (West et al., 2018). As such, our research seeks to longitudinally examine qualitative responses from attending physicians, Advanced Practice Clinicians (physician assistants and nurse practitioners), and registered nurses to develop recommendations on how hospital leadership can best assist each role during times of crisis. More specifically, our research seeks to (1) understand the job demands that attending physicians, Advanced Practice Clinicians (APCs) and registered nurses (RNs) are experiencing during the COVID-19 pandemic, (2) examine whether there are specific job demands faced by only attendings, APCs or RNs and what these role specific job demands are, and (3) understand the specific organizational resources that attendings, APCs and RNs need inside the workplace to combat increased job demands and whether they differ on needed resources.

Methods – Emergency Department clinicians currently employed at a hospital system located within the southeastern United States were invited to participate in this study. The hospital system is comprised of six hospitals and their associated urgent care facilities. To recruit participants, an email was sent to the Emergency Department clinicians on Tuesday with a reminder email sent on Thursday or when a lag in responses was noticed by the lead researcher. The survey was open for 4 days to provide clinicians with enough time to complete the survey despite their busy work schedules. Attending physicians were invited to participate throughout the entire study, while registered nurses were invited during the 9th wave (July 2020) of data collection. The first survey was distributed in March 2020, as COVID-19 began to impact the southeastern United States. Hospital leadership and the research team decided to survey clinicians weekly for the first six weeks and then met to reevaluate the frequency of the survey. After April 2020, leadership and

researchers decided to switch to monthly data collection in response to the stabilization of patient numbers and to reduce participant fatigue. Monthly data collection began in May 2020 and is still ongoing. While data collection is ongoing, this poster presentation will only include data from March 2020-June 2021 or Round 1-20 of data collection.

The qualitative portion of the survey utilized an adaptive survey technique to allow researchers to better understand and respond to the rapidly changing clinical environment during COVID-19. To accomplish this, each month the research team met with hospital leadership to discuss necessary survey changes. These decisions were informed both by previous waves of data collection and leadership's technical expertise of the clinical work environment. While an extensive list of questions is outside of the scope of this abstract, topics for questions typically include personal concerns, coping strategies, support needed from leadership, and work-related concerns (e.g., scheduling, staffing, medication shortages, and supply shortages).

Results – The research team utilized an iterative process to develop a coding scheme of job demands and organizational resources. Preliminary results show that attending physicians, APCs and registered nurses share many job demands such as staffing shortages, bed holds, and high patient volume and acuity. Preliminary data analysis has revealed that while they share many job demands, they also have unique job demands that may require specific organizational resources. Data analysis will be completed prior to the conference. In addition, we will provide recommendations based on (1) the final results, (2) the in-depth literature review, and (3) further conversations with subject matter experts.

Conclusion – This research will begin to bridge the gap in the hospitals industries understanding of how to best assist various roles during times of crisis. It is important to understand and begin explicating both the similar job demands and associated organizational resources that each role requires, as well as those that are unique to various roles. It is our hope that this research can assist hospitals in supporting attending physicians, APCs and RNs and ensure that their organizational supports are being used in the most economical and impactful way.

A Comparison of H. Pylori Detection Methods

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Background: *Helicobacter pylori* (*H. pylori*) infects over 50% of the world's population and can lead to gastric cancer if left untreated. An estimated 26,000 gastric cancer cases will occur in the United States in 2021 with 40% of cases becoming the primary cause of death. Invasive and non-invasive techniques are used to diagnose *H. pylori* infection, however, there is controversy regarding what technique should be considered the "gold standard" for diagnosis.

Objective: To evaluate the efficacy of *H. pylori* invasive detection methods: stained biopsy and Rapid Urease test [RUT])

Methods: 200 patients (100 *H. pylori* + and 100 *H. pylori* -) from a single institution that underwent gastric biopsies were retrospectively evaluated for *H. pylori* status. Demographics and clinicopathologic data were collected including diagnostic tests performed, treatment, and outcomes.

Results: When histology was identified as positive, RUT was also positive (92.5%), likewise, when histology was negative, RUT was negative (93.9%, Table 3). Disparate results occurred in 7% of samples with n=2 (6.1%) of histology positive when RUT was negative and n=3 (7.5%) histology negative but the RUT test was positive ($p < 0.001$). Of those that were *H. pylori* positive, 60% had a post-treatment test completed. Gastric cancer developed in 3 patients (1.5%), all of which were *H. pylori* positive.

Conclusions: This study found that histology and RU testing yield similar results, therefore, there is no efficacious reason to run both tests. Since histology has a greater sensitivity (>95%), it should be considered the "gold standard" as the literature suggests.ion--remove this text

The Effect on Illness Perception on Diabetes Control

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Purpose: Identify the association between illness perception and diabetes control, as measured by hemoglobin A1c.

Methods: This study will survey 20-30 patients with uncontrolled diabetes in the Internal Medicine Clinic using the Revised Illness Perception Questionnaire.

Inclusion criteria is HbA1c > 7%.

Results: in progress

Conclusion: in progress

This study seeks to identify the association between illness perception and diabetes control, as measured by hemoglobin A1c (HbA1c). Current literature suggests favorable illness perceptions have been associated with better health outcomes, while unfavorable illness perceptions have been associated with worse outcomes. The Revised Illness Perception Questionnaire (IPQ-R) assesses a patient's positive and negative beliefs about their illness by scoring eight dimensions—identity, timeline (acute/chronic), consequences, personal control, treatment control, coherence, cyclical, and emotional representations. It is hypothesized that more negative beliefs regarding a patient's diabetes will correlate with a higher HbA1c, while more positive beliefs regarding a patient's diabetes will correlate with a lower HbA1c.

This study will use the IPQ-R to survey 20-30 patients with uncontrolled diabetes in the Prisma Health Internal Medicine Clinic. Inclusion criteria is HbA1c > 7%. Results will be both quantitative and qualitative in nature, allowing for future discussions on how targeted interventions, including behavioral, educational, and psychosocial components, may help patients improve their glycemic control.

Current results from 20 patient surveys demonstrates no correlation between the eight dimensions of illness perception and diabetes control. The strongest relationship ($r^2=0.27$) was found to be the timeline cyclical dimension with

questions such as, "My diabetes is very unpredictable" and "The symptoms of my diabetes changes a great deal from day-to-day." The weakest relationship ($r^2=0.0$) was found to be the personal control dimension with questions such as, "The course of my diabetes depends on me" and "I have the power to influence my diabetes." Across the 20 patients, poor diet, lack of exercise, and family inheritance were cited as the most common causes of diabetes. Many patients expressed that fear of starting insulin was a strong motivator for improving their diabetes control.

While the study remains in progress, this preliminary data offers valuable insight into patient perspectives. The lack of correlation between illness perception and diabetes control could be attributed to the fact that patients who routinely attend medical appointments are possibly more proactive about their health. Patient recognition of poor diet and lack of exercise as causes of diabetes highlights the success of health education. It also suggests that, when possible, each medical visit is an opportunity to further patient understanding. Targeted interventions could include helping patients understand why their symptoms change a great deal from day-to-day, creating patient-specific meal plans and exercises, and encouraging reminders that the patient is the agent of their own success.

Weaknesses of this study include a small patient population taken only from the Prisma Health Internal Medicine Clinic and surveys conducted in-person. It is possible patients felt more inclined to respond positively about their diabetes during the interview, as opposed to reading and responding privately. Despite this, the in-person model created a forum in which patients not only had prompts for discussing their diabetes but also had a dedicated time to reflect on their disease. With this in mind, using direct questions such as "Do you have any questions about your symptoms?" or "Do you have any questions about how you can influence your diabetes?" (versus, "Do you have any other questions?") can potentially strengthen the patient-provider diabetes dialogue. These direct questions also create an opportunity to ask the patient about their emotional responses such as, "Does the diabetes worry you?" or "Does the diabetes make you angry?" These questions can build patient-provider trust and provide insight into additional aspects of diabetes control.

Development of a Capillary-Channeled Polymer Fiber Film-based Lateral Flow Immunoassay for SARS-CoV-2

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Purpose Statement: The COVID-19 pandemic has emphasized the need for the development of accurate and practical diagnostic approaches for non-invasive disease detection. Our current work focuses on the development of a rapid, sensitive, saliva-based lateral flow immunoassay (LFIA) for SARS-CoV-2 using hydrophobic interaction chromatography (HIC) on a capillary-channeled polymer (C-CP) fiber film stationary phase.

Methods: Human embryonic kidney (HEK293) cells were used to produce fluorescent SARS-CoV-2 pseudoparticles using lentivector constructs (System BioSciences, Palo Alto, CA). A HIC solvent system was employed to isolate SARS-CoV-2 pseudoparticles from the HEK293 cellular milieu via a polyester (PET) C-CP fiber film. The Hitachi SU9000 scanning/transmission electron (STEM) and HT7830 transmission electron (TEM) microscopes were used to assess the size and integrity of the viral pseudoparticles on and off the fiber film. Antibodies to the SARS-CoV-2 spike (M122, M130) and nucleocapsid proteins (ACROBiosystems, Newark, DE) were conjugated to 40 nm gold nanoparticles for colorimetric pseudoparticle detection. The Abcam (Cambridge, United Kingdom) Universal LFIA Kit was used to develop the detection pad of the LFIA. After isolation, the SARS-CoV-2 pseudoparticles were placed on the LFIA detection membrane and allowed to wick across for up to 10 minutes until a colorimetric response was observed. The LFIA detection pad was imaged using a Leica Thunder Imaging System (Wetzlar, Germany). The colorimetric control and test responses of the detection pad were compared by assessing the obtained micrographs using ImageJ.

Results: STEM imaging confirmed the capture of the virus pseudoparticles on the PET C-CP film surface and the elution of the particles using the HIC method. TEM micrographs allowed the pseudoparticles to be visualized before and after isolation by the HIC C-CP method, and the characteristic size (approximately 100 nm) and membraneous morphology were observed. The virus particles were successfully detected via the LFIA, using gold nanoparticle-conjugated antibodies to SARS-CoV-2 spike proteins. The pseudoparticles were able to be detected using 50 – 150 $\mu\text{g mL}^{-1}$ concentrations of the detection antibodies.

Conclusion: This work demonstrates that the PET C-CP films are able to concentrate virus pseudoparticles from bulk cellular milieu and can be paired to an antibody-based LFIA to detect SARS-CoV-2 spike proteins in less than 10 minutes. Future developments of this novel C-CP film LFIA approach will allow for the introduction of a practical, rapid, cost-effective method for SARS-CoV-2 detection on a clinically fit platform, with the potential to be tailored to many other diseases.

Female Sexual Dysfunction in Patients with Abnormal Uterine Bleeding

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Purpose statement – Abnormal uterine bleeding (AUB) is defined as menstrual flow that is outside of normal frequency, volume, and/or duration. AUB is the cause of 70% of all gynecologic consults and 1/3 of all outpatient gynecologic visits. Female Sexual Dysfunction (FSD) is a widespread problem among women and significantly impacts their quality of life. Some causes of FSD have been identified, and several of them are also associated with AUB. There are currently no published correlations between AUB and FSD, but there is a suspected correlation between the two. Many women are hesitant to discuss FSD during a gynecologic visit. This study will use the Female Sexual Function Index-6 (FSFI-6) questionnaire, with the goal to determine if patients with a diagnosis of AUB are more likely to also struggle with a higher incidence and/or more severe sexual dysfunction than patients without abnormal uterine bleeding. This could help guide counseling and the discussion of benefits to the treatment of AUB.

Methods – This was a cross-sectional survey study. All subjects were approached by a study coordinator during their gynecologic visit at the OBGYN Center and eligibility was verified and written consent obtained. Consented participants then completed an FSFI-6.

- Inclusion criteria: premenopausal female, age 18-55, sexually active
- Exclusion criteria: age less than 18, post-menopausal females, history of hysterectomy, pathology diagnosis of endometriosis, diagnosis of irritable bowel syndrome, diagnosis of pelvic floor dysfunction, history of pelvic adhesive disease or pelvic inflammatory disease, documented history of sexual abuse
- Group 1 (Case): patients with a formal diagnosis of AUB
- Group 2: (Control): patients without a diagnosis of AUB

A chart review was then performed for each patient to identify a diagnosis of AUB, as well as any possible co-occurring conditions that could contribute to FSD. A student t-test was used to identify the possible statistical differences between the two groups of participants.

Results –A total of 145 participants were enrolled in the study, 20 were excluded due to having variables that were exclusion criteria. Finally, 86 women were enrolled in the control group and 39 women were enrolled in the AUB group. The two groups differed significantly with regard to age between case and control participants (mean age of 27.88 ± 6.42 vs 34.48 ± 8.81 , respectively). However, there were no statistically significant differences among the groups in terms of ethnicity, parity, or marital status. There was no statistically significant difference in the number of women with or without AUB that also suffered from FSD. Women without a diagnosis of AUB had an overall higher FSFI score (20.58 ± 3.09 vs 16.36 ± 8.06), as well as higher dysfunction in sexual arousal (3.186 ± 1.38 vs 2.667 ± 1.66), lubrication during intercourse (3.57 ± 1.72 vs 2.744 ± 1.99), sexual satisfaction (3.767 ± 1.15 vs 2.59 ± 1.93), pain with intercourse 3.512 ± 1.68 vs 2.59 ± 1.93).

Conclusion – Overall these results suggest that abnormal uterine bleeding may not be a risk factor for increased sexual dysfunction. Women with AUB had a lower incidence of FSD and lower severity of sexual dysfunction overall. The age discrepancy between the two groups may explain the lack of statistically significant findings as women with abnormal uterine bleeding were significantly younger than the control participants. These questions are important for providers to consider to continue to treat our patients holistically and address issues of importance to their quality of life, even if that is not why they are initially presenting to the healthcare system.

Silicon Material Characterization for Use in Custom-Fit Diabetic Foot Orthotics

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Introduction: Diabetes is a rising epidemic in the US with an estimated 34 million people currently afflicted.¹ About 25% of all diabetics will experience a foot ulcer within their lifetime and, in the worst-case scenario, the ulceration could lead to amputation.² Custom-fit diabetic foot orthotics are often prescribed to help redistribute/offload plantar pressure.³ This study aims to begin the characterization of select silicone/urethane materials for potential use in custom-fit orthotics.

Materials and Methods: Uni-axial tensile material characterization of five different silicone/urethane products (Eco Flex OO-50, Dragon Skin 10, Mold Star 30, Vyta Flex 60, Reo Flex 60, Smooth-Sil 960, (Smooth-on, Inc., Macungie PA)) was conducted according to ASTM D412. Five samples (n=5) of each material were produced according to dimensions outlined in the ASTM standard, and markers were placed on each end of the gauge length to help calculate strain. Each sample was then tested to fracture using an Instron (Instron, Norwood, MA). Each trial was video recorded for digital strain analysis using the MATLAB DLTdv8 dot tracking application (University of North Carolina, Chapel Hill, NC). The data was used to calculate and plot stress strain curves for each material. The processed data was then used to calculate material properties such as elastic modulus, ultimate tensile strength, etc.

Results: See figure 1 and table 1.

Discussion and Conclusions: The materials Vyta Flex and Smooth Sil were the highest performing materials in terms of average ultimate tensile strength and average elastic modulus, respectively. This may indicate that those materials could be used as a base/structural material within an orthotic. The fracture strength of each material was not reported because it was equal to the ultimate tensile strength for each material. The data collected in this study will be used in conjunction with further material characterization testing including hardness, stiffness, and fatigue analysis to choose the materials best suited for use within a custom-fit foot orthotic. Once suitable materials are selected, future work will include pressure distribution analysis to determine how effectively various material combinations offload regions of high pressure.

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An Objective Assessment of Fatigue in Emergency Physicians Over Time

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Purpose Statement: Fatigue is a state of physical and mental exhaustion that leads people to feel tired, exhausted, or drained of energy. It can be caused by lack of sleep, timing of sleep, poor sleep quality, fragmented sleep and/or disruption of a person's 'internal clock'. Shift-workers are highly vulnerable to fatigue and fatigue-related risks, and this is especially true of Emergency Physicians (EPs). Shift scheduling (shift hours, frequency/length of breaks, time of day of shift, and number of hours off between shifts) can affect levels of fatigue in EPs. When EPs are fatigued, they experience decrements in cognitive performance, resulting in increased risk of error. One night of sleep deprivation decreases cognitive performance by 30%, but performance deficits are observed in as little as 16 hours of awake time. After 24 hours awake, an individual's cognitive performance can be just as impaired as if their blood alcohol content (BAC) was 0.1%. This study was designed to assess the current state of fatigue in EPs at Prisma Health using objective measures. Specifically, sleep metrics and shift scheduling were used to determine fatigue risk in the Emergency Department (ED) at Prisma Health.

Methods: Seventeen Emergency Physicians (EPs) from Prisma Health, 10 females, wore wrist activity monitors called ReadiBands™ for a minimum of two months. The Readiband is a non-invasive, objective actigraphy measure that communicates with a phone application to quantify sleep metrics (quality, quantity, frequency, and fragmentation) and predict future fatigue. Future fatigue is predicted by both the sleep metrics and individual circadian rhythms. Participants did not have access to the phone application during the first month. After 1 month of wearing the Readiband, participants were able to access their sleep metrics and see their future predicted fatigue. While ReadiBands™ provide fatigue scores for every hour of every day while the band is worn, only data collected during EP shifts were analyzed.

Results: Throughout the 3083 on-shift hours in which we obtained fatigue data, descriptive analysis revealed that EPs have concerning levels of sleep quality ($M = 7.71/10$, $SD = 1.84/10$), sleep quantity ($M = 6.77$ hrs, $SD = 1.66$ hrs), and sleep efficiency ($M = 87.26$, $SD = 9.00$). Participants spent 725 hours (23.52%) in the fatigue red zone (fatigue score < 80, equivalent to BAC = .08). In addition, results indicate that shift type (day, evening, night) is significantly associated with fatigue score. Specifically, night shifts were associated with higher fatigue scores. Upon examining the actual start time of the shifts, the later the start time the higher the

fatigue scores. Furthermore, multi-level modeling (MLM) revealed that this association remained when controlling for individual differences in average fatigue scores. However, shift type did not impact many of the sleep metrics. Further analyses will demonstrate the role of sleep and shift on fatigue risk.

Conclusion: Fatigue is an issue for many EPs in the ED at Prisma Health, but the factors influencing fatigue are varied. More research is needed to determine effective countermeasures to help combat fatigue and decrease fatigue risk.

Embolization and Acute Right Ventricular Shock due to Cardiac Calcified Amorphous Tumor in a Patient with Anti-Phospholipid Antibodies

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Purpose Statement: This report describes the case of a patient who presented to Prisma Health with a cardiac calcified amorphous tumor (CAT), an exceedingly rare, non-neoplastic intracardiac tumor, complicated by previously unknown anti-phospholipid syndrome leading to acute right ventricular shock and cor pulmonale. Our goal is that, in writing this case report, the pathophysiology of this disease process may be further understood and the unique aspects of our case may enhance management and improve outcomes for these patients.

Introduction: Cardiac CATs often present similarly to other intracardiac tumors, such as cardiac myxomas, and thus are often confused as such, requiring biopsy for definitive diagnosis which shows calcified nodules in an amorphous background. Pathophysiologic mechanisms of formation are poorly understood; leading hypotheses include disturbances in calcium and phosphorous, favoring formation of the CAT, and that hypercoagulable states may create a nidus off which the CAT forms, with current literature slightly favoring the former. Presenting symptoms most frequently include dyspnea and syncope per a recent systematic review with common comorbidities including cardiac valvular disease, end-stage renal disease, diabetes mellitus, and coronary artery disease.

Methods: Current literature was systematically reviewed for articles on cardiac CATs in the English language and the patient's medical record was methodically analyzed for complete and accurate report of the presentation and management.

Case: This report describes the case of a 45-year-old female with pertinent past medical history of hyperlipidemia, stage 3 chronic kidney disease, and COVID-19 five months prior who presented with right-sided chest pain and pleurisy. Initial work-up included computed tomography (CT) which was concerning for chronic pulmonary emboli in multiple lobes bilaterally and a filling defect in the right atrium. Echocardiography showed right ventricle and right atrial pressure overload, as well as a large, fixed, echogenic mass in, and possibly invading, the right atrial wall. She was briefly discharged for outpatient management before returning and was readmitted with concern for cardiogenic shock. The patient continued to deteriorate and was transferred to the cardiovascular intensive care unit. On day nine the mass was resected and histopathology was consistent with cardiac CAT.

The patient experienced some complications, including complete heart block requiring biventricular pacemaker and persistent thrombocytopenia, which revealed underlying anti-phospholipid syndrome. The patient continued to improve and was discharged on day 22.

Results: This patient's concomitant diagnosis of anti-phospholipid syndrome distinguishes our case from the literature as it provides insight into the pathophysiology of the formation of cardiac CATs and the management of associated tumor thromboemboli and cor pulmonale. **Conclusion:** This case demonstrates the importance of reporting instances of rare disease processes in order to provide additional data points from which to derive their pathophysiologic mechanisms, best course of treatment, and potential long-term effects that may be caused. While current literature favors the electrolyte hypothesis to explain formation, this patient's anti-phospholipid syndrome provides a valuable data point for a hypercoagulable state hypothesis. In addition, this patient's unique comorbidities and hospital course provide invaluable insight for management of future patients with cardiac CATs and considerations to be made which can improve their management and outcomes.

Managing Abstinence in Newborns 2.0: Expansion Hospital Perspectives at Baseline

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Purpose Statement: The MAiN Expansion project aims to transform the traditional care model for Neonatal Abstinence Syndrome (NAS) through implementation of new treatment protocols in hospitals throughout South Carolina (SC).

Implementation of the current expansion project is vital to identifying and reducing barriers to successful program implementation. **Background:** The Managing

Abstinence in Newborns (MAiN) model is a multidisciplinary, coordinated approach to care for opioid-dependent mothers and their newborns. MAiN provides treatment within the first forty-eight hours of life, rooming in with mothers, and medication weaning to reduce NAS severity and complications requiring NICU care. MAiN Expansion is a partnership between Prisma Health, Clemson University, and the South Carolina Department of Health and Human Services to partner with ten SC hospitals to implement the MAiN model at their facilities. Partnering hospitals receive continuing education credits as part of the implementation training, as well as financial incentives and the potential for future cost savings with NAS-related care. **Methods:** Because MAiN was initially developed to treat NAS infants at

Greenville Memorial, now Prisma Upstate, identifying barriers to implementation and adaption of the MAiN treatment model is vital to improving buy-in from participating hospitals. Key informant interviews were conducted with hospital staff at five SC hospitals as part of the implementation process to measure knowledge and attitudes regarding the MAiN model, as well as benefits and barriers of incorporating MAiN into nursery practices. Hospital culture concerning the adaption of new programs was also measured, and the staff was asked to identify key champions for implementing the MAiN model at their hospitals. Interviews lasted between fifteen and thirty minutes with staff members. After interviews were conducted, verbatim transcripts were coded, and data analysis was conducted using thematic analysis. Important themes regarding dissemination and implementation were identified. **Results:** Baseline interviews provided evaluators with important insights into the challenges of implementing MAiN at hospitals with varying levels of resources. Limited support is available for women with substance use disorders (SUD), particularly during pregnancy, and inadequate or inaccurate information is driving SUD rates. A lack of quality prenatal care for women with SUDs also exists. Although nursery staff are open to the MAiN treatment models, some staff members felt that community-based obstetric and pediatric providers were hesitant about the medication and weaning protocols for infants with NAS. At the hospital administration level, standardization and adaption to the MAiN model were critical to ensuring staff buy-in; however, proper communication between administration and leadership with staff was identified as a major barrier in staff buy-in to MAiN

early in the implementation process. Education regarding NAS and treatment models was lacking, particularly among clinical care providers outside the immediate nursery staff and could be associated with a lack of SUD-informed treatment care, particularly with case management after infants have been discharged. Nursing staff identified an overall lack of education regarding NAS treatment as a major concern among nursing staff. However, they also identified an interest in incorporating an evidence-based standard of care into their treatment of NAS infants at all levels. Several staff members felt that integration of this model could improve communication regarding NAS treatment between medical and nursing staff and create a team approach to managing NAS infants in the nursery. Nursing staff were eager to improve their knowledge regarding NAS to be better equipped in educating and counseling mothers with SUD. Nursing staff were interested in the potential reduction in staff needs for NAS infants who were rooming in and the potential for improved maternal involvement in care. Identified champions of MAiN implementation varied between hospitals, indicating the importance of identifying specific staff members before and during the implementation process to ensure a smooth transition to this model of care.

Conclusion: Baseline evaluation of the MAiN Expansion program's implementation has identified several key facilitators and barriers and emphasizes the importance of early and sustained communication and partnership with staff members to ensure successful implementation of a new model of care. Addressing these facilitators and barriers will be vital to ensuring improvement in care for infants with NAS and continued buy-in from health care professionals to improve outcomes for infants throughout South Carolina.

Effectiveness of peer recovery support services on stages of the opioid use disorder treatment cascade: A systematic review

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Background- Despite a significant number of individuals reporting a substance use disorder (SUD), very few ultimately receive any associated specialty care. In order to bolster the infrastructure available to link individuals to SUD treatment, peer recovery support services (PRSS) have been increasingly incorporated during the recovery process, yet little is known about their effect on clinical outcomes of individuals who misuse opioids.

Purpose Statement- To systematically synthesize existing literature reporting the effectiveness of PRSS interventions on stages of the OUD treatment cascade.

Methods A search conducted on five databases (MEDLINE/PubMed, EMBASE, PsycINFO, the Cumulative Index to Nursing and Allied Health Literature (CINAHL), and the Cochrane Database of Systematic Reviews) identified studies from database inception to January 26th, 2021, that evaluated the effects of PRSS on PRSS engagement, medication for OUD (MOUD) initiation, MOUD retention, opioid and non-opioid misuse, and remission. Characteristics of PRSS interventions, study design, and clinical outcomes were extracted. Methodological quality was assessed with the quality assessment tool for quantitative studies by the Effective Public Health Practice Project.

Results Of 123 titles, 22 were subjected to full-text review and 12 ultimately met inclusion criteria. Only two studies were randomized control trials, half of the studies compared the outcomes of PRSS participants to those of a counterfactual group. Most PRSS were unstandardized and broadly described, involving linkage to treatment (91.7%) or follow-up support (91.7%). MOUD initiation was reported the most often (66.7%), followed by PRSS engagement (33.3%) and opioid use (25.0%). No studies reported findings for MOUD retention or remission. Findings for available outcomes were inconsistent and difficult to compare due to the heterogeneity of PRSS interventions and methodological limitations.

Conclusion: Effectiveness of PRSS interventions on stages of the OUD treatment cascade are inconclusive. Additional research is necessary before supporting the implementation of PRSS in the OUD recovery process on a broad scale.

Demographic and Pharmacological Factors Among Men and Women Patients With Parkinson's Disease With Dementia (PDD) and Lewy Body Dementia (LBD)

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Purpose Statement: Gender differences in dementia patients have been investigated extensively, however, demographic, risk, and pharmacological factors associated with gender differences in dementia patients associated with Lewy Body Dementia (LBD) and Parkinson's disease with dementia (PDD) is not fully understood. We tested the hypothesis that specific factors may contribute to the observed gender differences in LBD and PDD patients.

Method: A 5-year retrospective data analytical study was conducted using 4526 men and 3676 women collected from a regional hospital database. We performed logistic regression analysis to determine factors associated with gender differences in LBD and PDD patients. Multicollinearity and significant interactions between independent variables in the model were examined using variance inflation factors, while a Cox & Snell classification was applied to check the model fitness.

Results: In the adjusted analysis, African-American men (AAM) (OR=0.249, 95% CI, 0.088-0.703, P=0.009) were more likely to present with PDD, while women with an increasing age (OR=1.042, 95% CI, 1.025-1.058, P<0.002) were more likely to present with LBD. Escitalopram was associated with LBD in men (OR=1.444, 95% CI, 1.079-1.932, P=0.014) and PDD in women (OR=0.651, 95% CI, 0.468-0.906, P=0.011).

Conclusion: Our findings revealed gender differences in LBD and PDD. More men presented with PDD based on race, while women presented with LBD more based on age.

Impact of self-reported dietary caffeine and sodium consumption on blood pressures in adolescents with hypertension

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Purpose of study

Excessive intake of caffeine and of sodium, is known to influence blood pressures (BP). Adolescents are high consumers of processed foods in our country. Virtual learning and disruption of normal schedules has contributed to increased consumption of energy drinks and salty snacks. Sodium/Caffeine reduction continues to be an effective strategy to lower BP. Effects on reduction in BP are demonstrable only in rigorous behavioral modification programs and effects may not be long lasting. Incorporating a self-report on caffeine and sodium consumption as part of history taking may be impactful and cost-effective.

Methods

A retrospective chart analysis was conducted for adolescents ages 12-19 years referred to a hypertension clinic for elevated BP during a 12-week period in 2019 and 2020. A new EMR template was implemented in 2020 that asked adolescents to report their caffeine and sodium consumption as High, Average or Low/None. Demographic data including age, sex, BMI, office BP, ABPM data when available, follow up BP after DASH diet education and visit with dietician and/or DASH diet counseling given by provider was documented. Statistical analysis was done using Chi-square test of significance for blood pressures with p value set at <0.05.

Results

We reviewed 32 patients in 2020 and 19 patients in 2019. In the 2019 cohort, the gender distribution was 52% male Vs. 84% in 2020. DASH diet education increased from 75% to 93% and dietitian visits increased from 10% to 29% after the implementation of the template. However, there was no significant change in systolic BP at the second visit. In fact, BP went up at second visit in 2020 cohort (p -value .020116. The result is significant at $p < .05$). In 2020, 100% of respondents with normal BMI reported high sodium consumption, while only 80% of those with obese category BMI reported high sodium in diet. Home blood pressure monitoring decreased from 44% in 2019 to 25% in 2020. White Coat Hypertension was

diagnosed more often in the group receiving diet education.

Conclusions

Using an EMR Template to remind physicians to discuss sodium and caffeine consumption with adolescents at their clinic visits can lead to greater access to dietary counseling. Self-reporting of dietary habits is the first step of awareness and self-management of hypertension. While sustained change in behavior takes intense programs, simple steps like this can increase DASH diet awareness. We were unable to show a decrease in systolic BP in this small cohort but more adolescents received dietary education after instituting a self-report template. There were more diagnoses of WCH in group receiving dietary counseling, but office BP was not significantly improved. A larger cohort may be needed. There were more referrals for BP in 2020 and the impact of the Pandemic on stress, food insecurity and access may have influenced results. Intensive interventions are more expensive and difficult to sustain. Screening for caffeine and sodium consumption during the adolescent health maintenance visit may prove more cost effective in the long run.

Urban and Rural Disparities in Smoking and Lung Cancer Screening Accessibility in South Carolina

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Purpose: Large randomized controlled trials have confirmed the benefits of lung cancer screening (LCS) with low-dose computed tomography (CT) scan in reducing lung cancer mortality. In 2015, the Centers for Medicare and Medicaid Services started coverage of LCS for eligible beneficiaries. Since then, LCS has been widely accepted and many population-based programs have been launched. Given the disproportionate smoking and lung cancer mortality burden in urban and rural areas, it is important to understand whether urban and rural residents have equal access to the LCS programs across the state. This study aimed to investigate the access to LCS by rurality, smoking prevalence, lung cancer mortality, and socioeconomic factors at county level in SC.

Methods: A list of LCS sites were identified from the American College of Radiology. We defined access to LCS as <30 minutes driving time from the centroid of the census block group to the nearest LCS site. At a county level, the access of each census block group was weighted by the proportion of population aged 55-80 years in the county. County level rurality was measured by Rural-Urban Continuum Codes (RUCC), where 1-3 indicated metropolitan area (urban county) and RUCC 4-9 indicated non-metropolitan area (rural county). County level smoking prevalence was extracted from County Health Rankings. Lung cancer mortality rates among people aged 60 to 80 years were abstracted from the United States Cancer Statistics, 2014-2018. Data on other county level socioeconomic factors, including income, education, and the prevalence of minority population, were obtained from Census 2010. We employed ArcGIS to geocode the LCS sites. We used Students' t-test and Pearson correlation to examine the relationship between access to LCS and rurality, smoking, lung cancer mortality, and socioeconomic factors.

Results: South Carolina has 46 (26 urban and 20 rural) counties. As of August 2021, 72 population-based LCS sites have been established, including 63 sites

located in 18 urban counties and 9 sites in 9 rural counties. The driving time from the centroid of census block group to the nearest LCS site ranged from less than 5 minutes to 60 minutes, with an average of 13.7 minutes. Overall, 74.9% of the residents aged 55 to 80 in South Carolina had access to LCS. About 85.4% of residents in urban county vs. 61.3% of residents in rural county had access to LCS sites ($P = 0.004$). Access to LCS sites were significantly associated with higher median income ($P = 0.0007$), higher education ($P = 0.005$), and a higher proportion of minority population ($P = 0.008$), with counties with worse socioeconomic status having lower access to LCS. Access to LCS was not significantly associated with smoking or with lung cancer mortality at a county level.

Conclusions: In South Carolina, residents in the rural counties and counties with lower socioeconomic status had less access to LCS. Counties with higher smoking and lung cancer mortality burden did not have more access to LCS. Targeted efforts are needed to remove geographic disparities in access to LCS and to develop services in communities with a higher burden of smoking and lung cancer mortality.

Rate and Predictors of Lung Cancer Screening Utilization at Prisma Health

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Purpose: Lung cancer causes most cancer deaths in South Carolina and the United States. Lung cancer screening (LCS) with low-dose Computed Tomography (CT) scan has been proven to reduce lung cancer mortality in high-risk populations. In 2014, the Centers for Medicare and Medicaid Service (CMS) started coverage of LCS to eligible individuals. Following this policy, Prisma Health–Upstate launched a LCS program. This study aimed to examine the rate and predictors of LCS utilization in Prisma Health–Upstate-eligible patient populations.

Methods: Data on patients meeting LCS eligibility criteria (aged 55-80 years, current smokers or former smokers who quit smoking within the past 15 years, smoking ≥ 30 pack years) in 2019 were extracted from the Prisma Health electronic medical record system (EPIC system). Only South Carolina residents were included. The outcome was lung cancer screening utilization (yes vs. no). Potential predictors included: age (55-64, 65-80), sex (male, female), race (white, black, other), marital status (married or living with a partner, single or divorced or widowed or other), insurance (private, Medicare or Medicaid, self-pay), zip code level median income ($< \$40,000$, $\$40,000$ – $\$60,000$, $> \$60,000$), zip code level urbanicity (metropolitan area, non-metropolitan area), travel time from the centroid of zip code area to the nearest screening site (< 15 minutes, ≥ 15 minutes), smoking status (current smoker, former smoker), body mass index (underweight, normal weight, overweight, obesity), chronic pulmonary disease (COPD) (yes, no), and Charlson Comorbidity Index (CCI) (0, 1, 2, ≥ 3). Chi-square test, univariate and multivariable logistic regression were employed in the analysis.

Results: A total of 7,115 patients eligible for LCS were included in the analysis. About half of patients were 65-80 years old, male, married or living with a partner, current smokers, had COPD, or CCI ≥ 3 . The majority of the patients were white, insured by Medicare or Medicaid, living in a metropolitan area, or had < 15 minutes of driving time to the nearest LCS site. Among all LCS eligible patients, 1,462 (20.55%) received LCS. Compared to patients who did not receive LCS, those who received screening were more likely to be older, female, married or living with partner, covered with Medicare or Medicaid, former smokers, have COPD, or live in a metropolitan area or an area with income $> \$60,000$ or < 15 minutes of driving time to the nearest LCS site. After adjusting for covariates, significant predictors of

receiving LCS included: aged 65-80 (adjusted odds ratio [aOR]: 1.24 [0.73-1.42]), female (1.17 [1.03-1.32]), with race of black or African American (1.50 [1.25-1.78]), married or living with partner (1.23 [1.10- 1.40]), living in a metropolitan area (3.10 [2.50- 3.83]), with <15 minutes of travel time to a LCS site (1.42 [1.19-1.70]), with COPD (2.40 [2.04- 2.73]), and without comorbidity (1.38 [1.10-1.73]).

Conclusions: About 20% of eligible patients received LCS. Targeted interventions are needed to improve LCS utilization in the Prisma Health–Upstate patient population.

Increasing Conversations about End-of-Life (EOL) Planning for Culturally, Racially and Ethnically Diverse (CRED) Older Adults in Appalachia, SC in a Period of Heightened COVID Prevention Strategies

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Background – Culturally, racially, and ethically (CRED) older adults are the fastest growing populations in the US. They experience critical disparities in end-of-life (EOL) planning, resulting in higher rates of intensive treatments and increased financial/emotional burdens. Inclusion of many CRED populations is lacking regarding EOL care planning. Interventional trials in EOL planning are rare and often focus on general/mainstream populations. Older age, chronic disease, a regular source of care, lack of awareness is associated with not having an advanced directive. A CRED sensitive EOL plan may facilitate patient-centered decisions about desired medical interventions avoid extensive—and expensive—measures to sustain life in the face of death and improve the quality of EOL care. The volume of EOL conversations performed in the primary care offices is low. There is a gap in the literature about the barriers and facilitators of these conversations.

Purpose statement – to investigate the barriers and facilitators in increasing EOL conversations from the perspective of the providers and to assess EOL planning attitudes of the elders. Our study inadvertently captured a unique perspective of providers who had available to them the scheduling solely of virtual conversations between provider and patients--a response necessitated by COVID prevention strategies.

Methods - Study design is prospective and descriptive with two arms: one arm quantitatively assesses 186 CRED patient participants' attitudes about EOL conversations using established measures and the other arm qualitatively assesses the provider perspective of engaging in EOL conversations. Two validated instruments evaluate patient participants' attitudes: "Attitude Toward Advance Decision Making" and "Health Care System Distrust Scale". CRED patient participant attitudes will be evaluated using descriptive statistics upon completion of the study.

Inclusion criteria are adult patients 50 years or older who can complete a survey in English. An evaluation team met quarterly to evaluate the barriers and the facilitators identified by the advanced practice providers. Six advanced practice provider participants evaluated EOL conversations by completing open-ended qualitative questions with each patient encounter. This arm of the study uses a qualitative design that follows the four phases of grounded theory (Code/Concept/Category/Theme). *Code*. The transcripts will be entered into NVivo and coded by using this qualitative software. *Concept*. Key words from the provider perspective (answers to the 5 guided and open-ended questions) will be placed on a diagram that can be grouped into key concepts. The concepts will explain the content that is repeated from one study participant to another. *Category*. The concepts will be aligned by categories to assist in summarizing or synthesizing the interviewee's feedback. *Theme*. The synthesis of the concepts will be reported as themes. In a group of 4 to 5, co-investigators will review and analyze the output of the software. Thematic findings will be presented to the advanced practice provider participants to see if the analysis appears to be in close alignment to their feedback provided.

Results –In October 2021, a six-month qualitative synthesis of providers' perspective of engaging in solely virtual EOL conversations will be available for dissemination.

Clinical implications/Conclusion – The value driven goal to increase EOL conversations is central to the mission of Prisma Health. Findings will inform the EOL process. Adaptation, testing and fabrication of a toolkit of support materials to execution of an EOL plan developed to implement the research study will add to the provider knowledge of CRED EOL conversations in Appalachian SC and expand the number of providers engaged.

The Beat Goes On: Emergency Nurses' Song of Resilience

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Purpose Statement: Since the beginning of the COVID-19 Pandemic, emergency nurses have been on the frontlines. Not only are emergency nurses caring for patients with physical symptoms, nurses are also confronting anxiety, depression, stress, and uncertainty in patients, peers, and themselves. Even as they care for patients seeking their help, they are dealing with their own struggles as members of the larger community. Broadly, the purpose of this study was to yield generalizable knowledge about the resiliency of nurses during crisis.

Methods: Researchers conducted direct observations with live environmental music therapy, focus groups, and essays with ten emergency room nurses. Data was collected from these methods. Direct observations included emergency nurses as they interacted, communicated, and cared for patients. Researchers completed reflective journal entries during observations. These entries were analyzed along with the focus group transcription and essays, using Paul Ricoeur's (1976) hermeneutic interpretive circle. This resulted in an Excel spreadsheet where the text was divided, re-divided, aligned, and re-aligned via a dialectal and iterative process. This process led to the emergence of patterns, subthemes, and main themes which eventually resulted in elements of emergency nurses' resiliency.

Results: Ricoeur's (1976) analysis included critical interpretation and discussion against the backdrop of music theory—specifically the work of Christine Steven's and her Hoop of Harmony Model. Five interconnected elements for resiliency emerged from the data: harmony, melody, rhythm, silence/rest, and beingness.

Harmony was the successful combining of the internal and external world, and was supported or hindered by factors outside of the individual nurse. That was, harmony developed or ebbed and flowed in response to the organization's communication, allocation of resources, and information bombardment from the external world. At the core, harmony was sense-making.

Melody spoke to pleasant succession, and rose up from socialization. Melody was derived from shared stories and experiences, as well as emotional and social engagement among emergency room team members. When emergency nurses faced challenges, they used laughter, humor, and offloading to colleagues as essential coping strategies. These activities proved an essential component of

resiliency.

Rhythm surfaced from acquired experience, systematic arrangement of policies and procedures, and the comfort of consistent routine. Rhythm came into existence with practice, adaptive anticipation, time awareness, and knowing what to expect. Beginnings proved hard, but experience contributed to flexibility and practice, when the standard processes and procedures were absent or incomplete.

Silence/Rest was reflection, and emerged from breaks, respite, self-talk, and reflective practices. Emergency nurses demonstrated that clear and insightful thinking often happened after silence/rest.

These four elements were interconnected and created a sense of beingness, summarized best by "I am an ER nurse" or "We are ER nurses", as these sentiments were used by most all participants. This fifth element of music and life is where the sense of resiliency for emergency room nurses was derived. All five elements hindered or nourished emergency room nurses' experiences of resiliency.

The purpose for this study was to provide generalizable knowledge about the resiliency of emergency nurses during crisis, with hopes of revealing crucial knowledge on how to support resiliency. Analysis showed that resiliency tools and processes correlate with the elements of music. Results suggest that harmony, melody, rhythm, silence/rest, and beingness can be supported or hindered by the organization and the leaders that lead them.

Conclusion: Direct benefit surfaced when team members had the opportunity to support and reflect on their own resiliency during a pandemic. Sensed experience was conveyed throughout the nurses' participation in live environmental music therapy sessions, direct observations, focus groups, and essays. Each nurses' concern centered on personal and team survival. Resiliency surfaced to be musical, at times harmonious and at others ill-sounding.

Findings contribute to the understanding of resiliency, by drawing out emergency nurses' perspectives and highlighting five elements of resiliency displayed by emergency nurses'. The researchers found an association between the journey towards resilience and music theory. By using the elements of music as an interpretive lens, we were able to offer an introductory look into the lived experiences of emergency nurses as they struggle to find their resiliency during a time of crisis.

Recommendations for moving forward is to strengthen the five elements of resiliency and remove hinderances by way of communication, allocation of resources, and understanding the need for practical tools that emphasize practice, reflection , and recovery time at individual and group levels. Analysis and consistent attention to the the elements of resiliency surfaced here may influence leaders, and assist them be more creative and intentional in their support of emergency nurses' resiliency.

PERSPECTIVES AND BELIEFS OF LATINX CAREGIVERS OF PERSONS WITH ALZHIEMER'S DISEASE IN UPSTATE SOUTH CAROLINA

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Introduction- The number of Americans over the age of 65 continues to grow each year. Increasing age is recognized as a risk factor for the development of Alzheimer's dementia and related disorders (ADRD), a disease that affects an individual's memory, cognition, and behaviors. According to the Alzheimer's Association, it is projected that by 2050, the number of Americans living with Alzheimer's dementia will more than double, disproportionately affecting African American and Latinx Americans. Latinx Americans with dementia are more likely to have a delayed diagnosis and seek care later than Non-Hispanic White Americans, relying on informal caregivers. Use of informal caregivers increases the caregivers' risk of physical, psychological, and financial burdens. Cultural values and beliefs influence caregiving in a complex and multidimensional way. The purpose of this study was to examine the perspectives, beliefs, needs, and perceived barriers to care for Latinx caregivers in Upstate South Carolina.

Methods- Recruitment of eleven informal Latinx caregivers occurred through community partnerships to participate in semi-structured phone interviews and planned focus groups. However, this was modified secondary to pandemic restrictions. Phone interviews were initially conducted in Spanish. Data was first transcribed in Spanish and translated to English by an independent provider. A phenomenological approach guided the qualitative data analysis using a deductive approach following interview questions, and an inductive approach to identify emergent themes.

Results- Preliminary analysis of 6 out of 19 questions for 11 completed interviews revealed key themes. For instance, regarding the question on factors that influence caregiver's experience, participants identified patient related and caregiver related factors. The current health and emotional status of the patient was identified as a patient-related factor. Regarding caregiver-related factors, family ties and conflicts; knowledge/awareness of the disease; and, the capability, disposition, and feelings

of the caregiver were reported. Further analysis of the data is currently in progress.

Discussion- The themes identified will elucidate the experiences of Latinx caregivers in this study. The results should ideally support healthcare providers gain a better understanding of the perspectives, beliefs, needs, and perceived barriers faced by Latinx caregivers in the Upstate South Carolina community. Findings should also promote more effective communication between healthcare providers and ADRD patients and support informal caregivers in a more comprehensive way in order to reduce barriers to care.

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Polycystic Disease of the Pancreas: a case report and comprehensive review of the literature

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Purpose Statement: The goal of this case report with comprehensive review of the literature is to provide an algorithm to guide diagnosis of isolated polycystic disease of the pancreas (IPDP) in order to limit unnecessary invasive procedures completed due to lack of diagnostic certainty or ability to rule out differential diagnoses of greater concern.

Introduction: IPDP is a rare condition with few reported cases in the literature. It refers to multiple dysontogenetic, or congenital, cysts spanning the pancreas excluding those with inherited autosomal cystic diseases of abdominal organs, cystic fibrosis, and Von Hippel Lindau disease with or without involvement of cysts in other organs. These cystic lesions prove difficult to distinguish from those of neoplastic nature, including but not limited to intraductal papillary mucinous neoplasms, mucinous cystic neoplasms, and serous cystic neoplasms, potentially leading to unnecessary treatment.

Methods: Case report and comprehensive literature review of all reported cases of IPDP and articles related to the disease.

Results: We report an incidental finding of polycystic pancreas in a 73-year-old male upon computed topography (CT) for diverticulitis without any pancreas-related symptoms. This is the oldest known patient to be diagnosed, as all other patients are between ages 13-62 with 64% being female. CT identified pancreatic parenchymal calcifications in the head of the pancreas with mild accessory pancreatic ductal dilation. Small cystic lesions appearing as pseudocysts vs cystic neoplasms were noted with additional cystic lesions present in the liver and kidneys that proved too small to characterize. Esophagogastroduodenoscopy (EGD) was performed for lesion characterization which showed greater than six cystic lesions spanning the pancreas and a probable neoplasm. Patient opted for observation for 1 year, when he then presented to his primary physician with recurrent abdominal pain. Further evaluation with MRI identified cholestatic wall thickening and pericholecystic fluid in addition to multiple enlarged pancreatic cystic parenchyma lesions without communication with pancreatic duct. Repeat EGD with endoscopic ultrasound (EUS) showed multiple cysts with thin septations and lobulated appearance without solid masses; doppler showed no indication of malignancy. Fine

needle aspiration (FNA) provided an elevated carcinoembryonic antigen (CEA) and amylase, contradicting each other in terms of malignancy suspicion. Although findings decreased suspicion for neoplastic origin, surgical resection was recommended for rule-out. Final pathologic diagnosis was IPDP without malignancy and patient remained asymptomatic at 1 year follow-up.

IPDP is a very rare entity, as only fourteen cases have ever been reported in the literature. Until now, there has been no proposed diagnostic algorithm for the differentiation of these lesions from those of malignant quality, leading to unnecessary invasive procedures and their extensive associated risks. Per literature review, imaging is the most consistent means by which to identify IPDP, with all but one case reporting identification of multiple pancreatic cysts. Other imaging findings, such as presence/absence of vascularization, septation, calcification, ductal dilatation, and indications of pancreatitis can assist in the definitive identification of IPDP. Most imaging of IPDP reports cystic lesions throughout the entirety of the pancreas, dominating the pancreatic parenchyma without inflammation and hemorrhage, ruling out pancreatitis. Magnetic resonance imaging (MRI)/magnetic resonance cholangiopancreatography (MRCP) is useful in visualizing pancreatic cyst communication with the pancreatic duct and vascularization of lesion, although only mentioned in one case report. EUS with FNA of cystic fluid has been reported as helpful in determining CEA, amylase, and CA19-9 (tumor marker) levels for further characterization of malignancy risk; in addition, a core needle biopsy during EUS was discussed in six case reports with IPDP having cuboidal to flat epithelium. Independent of treatment, surgical resection or observation, the outcomes of all case reports were unremarkable. While none of these diagnostic methods have been shown to be effective in identifying this disease in the past independently, the goal is that together they will provide greater diagnostic potential in order to prevent unnecessary surgery and the risks that its extensive nature entails.

Conclusion: A thorough evaluation of the literature was completed and a diagnostic algorithm to diagnose IPDP was created to assist in appropriate evaluation of these benign lesions to reduce the morbidity associated with unnecessary surgeries prompted by diagnostic uncertainty and the possibility of pre-malignant lesions.

Splenic Artery Embolization: A Non-Invasive Intervention for Blunt Splenic Injury

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Purpose Statement

While treatment for blunt splenic injury (BSI) has historically been splenectomy, treatment has shifted toward non-operative management (NOM) to prevent consequences of an immunocompromised, asplenic state which elevates risk of life-threatening infection; however, NOM has failure rates as high as 34%. Splenic artery embolization (SAE) achieves hemostasis in BSI treatment via placement of embolic material within the proximal splenic artery (proximal SAE) or within the distal splenic artery (distal SAE) or both (combined SAE) improving success rates to 86-100%. Currently, it is unclear whether there are optimal embolization criteria for candidate selection, location, or material. Our goal was to investigate this at a single institution.

Materials, Methods, and Procedures

A retrospective evaluation of all patients managed with SAE between 3/1/2016 and 12/31/2020 at a single institution was completed (n=91). Data were stratified by vascular injury type, BSI grade, location and material. Patients for whom complete records were not available were excluded. It was also noted independently if the patient's splenic injury was associated with vascular injury: active extravasation/bleeding, pseudoaneurysm, AV Fistula, or a combination. Additionally, embolization site, technique, success of embolization, abscess formation, and overall outcomes were collected and evaluated.

Results

There was no difference in initial presentation when considering hemodynamic stability in ED ($p=0.3418$), or FAST abdominal results ($p=0.7896$). Presence of vascular injury ($p=0.4388$) and vascular injury type ($p=0.093$) were not different when stratifying by grade of injury. Overall, 78% of SAE were proximal, 4.4% distal and 17.6% combined. Stratification by location revealed significant differences in material usages: amplatzer plug was primarily used for proximal SAE (46.5%; $n=33$); however, coil (38%; $n=27$) and amplatzer plug and coil can and were used

proximally (7%; $n=5$, $p<0.001$). For vascular injury type, number of minor complications was significantly different between groups ($p<0.05$); there were no differences in major complications. Most patients had high grade injuries ($n=77$; Grade III/IV/V) and thus required significantly more intervention ($p=0.01$); however, major and minor complications were not significantly different between groups.

Conclusion

Overall, SAE proved a 100% technical success, 94.5% primary clinical success, with a major complication rate of 6.6%; only 2.2% of patients had complications requiring splenectomy. SAE, regardless of location/material, appears to be an optimal non-surgical intervention for all grades of BSI. This study highlights the safety of SAE for patients regardless of clinical status.

The Advanced Life Support in Obstetrics Program Increases Incoming Resident Confidence in Managing Obstetric Emergencies and when Provided for Residents of Multiple Specialties Fosters Teamwork and Inter Specialty Collaboration.

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¹Prisma Health Upstate

Purpose statement - The Advanced Life Support in Obstetrics (ALSO) program is an intensive one-day evidenced-based and hands-on course provided by the American Association of Family Practitioners (AAFP) with the purpose of developing the skills to confidently manage obstetric emergencies for all members of the obstetric team. In large tertiary care teaching hospitals, it is common for multiple residency specialties to rotate on labor and delivery services during training in the intern year including obstetrics and gynecology (OBGYN), emergency medicine (EM) and family medicine (FM) residents. In 2021 the ALSO course was provided to a mixed group of incoming OBGYN, EM, and FM interns at Prisma Health–Upstate. The purpose of this study was to assess the impact of delivering the ALSO course to incoming resident physicians of varying specialties in terms of building confidence and skill for managing obstetrical emergencies during their intern year.

Methods - Course participants were asked to complete anonymous voluntary pre- and post-course questionnaires that assessed quantitative resident confidence in managing obstetrical emergencies on a scale of 1 to 5 (1 being not confident at all, 5 being very confident), specifically in regard to vaginal breech delivery, vacuum assisted delivery, delivery complicated by shoulder dystocia, and postpartum hemorrhage (PPH). The participants were also surveyed regarding their qualitative prior experiences and assessment following completion of the ALSO course.

Results - 33 resident interns from Prisma Health–Upstate completed the ALSO course as a combined group in July 2021. 23 resident interns (3 OBGYN, 7 EM, and 13 FM) completed both pre- and post-course questionnaires. Prior to completion of the ALSO course, few residents had received hands-on experience with management of obstetric emergencies. Only 6 residents had prior hands-on practice with vaginal breech deliveries, 4 had experience with vacuum assisted deliveries, 7 had experience practicing shoulder dystocia deliveries, and 4 had practice managing PPH. Upon completion of this course, quantitative confidence was found to increase in all 4 specific obstetric emergencies. On average, confidence with vaginal breech delivery increased from 2.2 to 4.6, vacuum assisted

delivery confidence increased from 2 to 4.5, shoulder dystocia delivery confidence increased from 2.3 to 4.6, and management of PPH increase from 2 to 4.5. Residents unanimously found the ALSO course beneficial to their training at the beginning of residency, and all stated they would recommend this training be provided at the beginning of the intern year. All residents found it beneficial to complete ALSO training with interns from multiple specialties, most commonly referencing to the importance of shared perspectives, fostering a teamwork mentality, and promoting collaborative relationships between specialties.

Conclusion - The ALSO course is an effective tool for interns from multiple medical specialties to acquire hands-on experience with complicated deliveries and to gain confidence in managing obstetric emergencies. The course, provided to a mixed group of family medicine, emergency medicine, and obstetrics and gynecology residents also fosters shared perspectives, promotes teamwork, and encourages collaborative inter specialty relationships, especially at the onset of residency.

Pan-cancer review and analysis on tumor microenvironment

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Purpose Statement: In recent years there has been a tremendous advance that allows a comprehensive and systemic investigation of genetic and epigenetics of cancer with the help of cutting-edge techniques. Recent studies show that the tumor existing can interact with the surrounding tumor microenvironment (TME) leading to different effects. The tumor can interact with the microenvironment by releasing extracellular signals, which can promote tumor angiogenesis and induce peripheral immunity tolerance. The immune cells in the microenvironment can also affect the growth and evolution of cancerous cells, which contributes to tumor heterogeneity. Genomic studies have reshaped the understanding of the complexity of the genomes across multiple tumor types. In this study, we performed a comprehensive review of the interactions between genetic and epigenetic TME-gene interactions. The tumor microenvironment gene-specific expression profiling of immune cells can be obtained by single-cell RNA sequencing, showing microenvironment-specific changes and patient-to-patient variation in cells. To understand and identify the comprehensive immune-genomic character of different regulatory genes, we also performed an association analysis of survival and TME immune cell composition across cancer types in this study.

Methods: A series of systematic reviews were conducted on the findings of TME-associated genomic features. We analyzed bulk transcriptomic data from TCGA and single-cell transcriptomic datasets from multiple reported studies. Six cancer types were studied, including breast invasive carcinoma (BRCA, n=1097), liver hepatocellular carcinoma (LIHC, n=377), lung adenocarcinoma (LUAD, n=522), head, and neck squamous cell carcinoma (HNSC, n=528), acute myeloid leukemia (LAML, n=200), skin cutaneous melanoma (SKCM, n=470). The composition of TME immune cells (T cells, B cells, NK cells, Monocytes, Macrophages, DCs, Mast cells), including were inferred by deconvolution. Survival analyses on TME immune cell composition were performed by the Cox Proportional-Hazards Model, adjusted for age, sex, and race.

Results: The pan-cancer study on tumor microenvironment across different tumor types over the period and found changes in different factors including multiple cellular and genomic alterations in the extracellular matrix, mitochondria, protein metabolism, pathways, and secretion concerning the TME that can help detect the mutation of genes as well as the cellular pathways. In survival analysis, DC, Macrophage and T cell compositions showed negative hazard effects in BRCA, while they showed positive hazard effects in LUAD, HNSC, and LAML cancers. This

indicates TME immune cells play different roles in different cancers, which may be related to the dual function of the immune system as a “double-edged sword” to target tumor cells and, on the other hand, promote tumor development.

Conclusion: It is essential as well as critical to understand the immune system and its interaction with the tumor microenvironment not only in tumor-specific but also cross-cancer types. In our study, heterogeneity was found among cancers in the survival association of TME immune cell composition. Pan-cancer helps in understanding the landscape pattern of mechanism and interaction between solid tumors and the infiltrating immune cells keeping the level, timing, and location of the mutation across different cancer types into consideration. While TME is recognized as key-contributing factors for studying cancer progression and drug resistance to cancer treatment as there is a strong association between immune cell composition and survival in cancers.

MECHANISMS AND THERAPY OF MEDIAL ARTERIAL CALCIFICATION

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Introduction/Background. Medial arterial calcification (MAC) is a type of vascular calcification that occurs in the medial part of arteries and mostly associated with aging, diabetes, and chronic kidney disease. It is due to a phenotypic change of vascular smooth muscle cells (VSMCs) from their contractile phenotype to synthetic osteoblast-like cells in response to disease conditions. During this differentiation they lose expression of smooth muscle-specific proteins such as α SMA, SM22 α and express high level of osteo-/chondrogenic transcription factors/proteins such as RUNX2, SOX9, osteopontin, osteocalcin, alkaline phosphatase and BMP-2. Surgery (endarterectomy) is the major treatment for MAC.

Hypothesis/Goal of Study: To produce *Myh11-CreER^{T2};mT/mG* mice by crossbreeding double fluorescent reporter and inducible VSMC promoter-Cre recombinase strains to study fate of VSMCs in calcified areas and their vicinity before and after removal of mineral deposit and repair of broken elastin fibers by ethylene diamine tetra acetic acid (EDTA) nanoparticle (EDTA-NP) treatment.

Methods: Male mice with tamoxifen inducible VSMC-specific *Myh11-CreER^{T2}Cre* recombinase and tdTomato/GFP double reporter transgenes were injected 100 μ L of tamoxifen for 5 consecutive days to activate Cre recombinase. Then the mice were fed high phosphate adenine diet for 12 weeks. Control mice were fed regular chow. The progress of aortic calcification in live mice in longitudinal study and isolated aorta was done by micro-computed tomography (micro-CT). After completion of the diet and presence of aortic calcification was evaluated, mice in the adenine diet group were treated with 10mg/Kg of EDTA-NP injections twice a week for 8 weeks. The change in calcium deposits in aortic walls was monitored by micro-CT scanning once a week throughout the treatment.

Results: Micro-CT imaging showed that calcification started after 8 weeks of adenine diet. Wholemound micro-CT imaging showed extensive calcification in both thoracic and abdominal aorta. Both Alizarin red and von Kossa staining of aortic sections showed calcification of aortic media only in the adenine diet group. Alcian blue staining showed deposition of proteoglycans in the calcified areas and their surrounding indicating change in the extracellular matrix during the calcification process. Fluorescent and confocal microscopic investigations showed that tamoxifen induced expression of membrane eGFP was exclusively in *Myh11-CreER^{T2} Cre* positive (eGFP+) VSMCs, all other cells (non-VSMC) expressed membrane

tdTomato (tdTomato+). Histological, immunofluorescence, and molecular analyses showed increased expression of osteo/chondrogenic markers in aortas of adenine diet mice than normal controls. Significant elevation of serum alkaline phosphatase is seen in adenine diet mice indicating active calcification. Our preliminary data indicates a gradual decrease of calcium deposits in mice that were treated with EDTA-NP. Importantly, eGFP+ VSMC and tdTomato+ non-VSMC repopulated the decalcified tissue in the medial wall of aorta. More experiments will be done to further investigate and confirm the treatment outcome at the tissue and cellular level and identify the source of non-VSMC that repopulate the decalcified area of the aorta after chelation therapy.

Conclusions: High phosphate adenine diet causes chronic kidney disease like condition that result in medial arterial calcification. A gradual decrease of calcium deposit followed by regeneration of new and healthy tissue in the medial wall indicated that EDTA-Nanoparticles are promising non-surgical approach of reversing or treating medial arterial calcification.

No increased risk of infection when type I open distal radius fractures are surgically treated >24 hours post-injury: a comparison study

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Purpose

The purpose of this study is to determine how the time to surgical debridement and fixation affects infection and complication rate in type I open distal radius fractures by comparing patients treated within 24 hours to those treated >24 hours post-injury.

Methods

A retrospective review identified a cohort of patients who sustained a type I open distal radius fracture treated surgically at a large tertiary hospital system from 2010-2020. Patients were stratified into groups based on time to surgical intervention. An additional sub-group analysis was performed on patients with an isolated type I open distal radius fracture and whether they were treated as an inpatient or outpatient. The primary outcome measure was infection rate. Secondary outcome measures were complications, reoperations and readmissions related to the open distal radius fracture. Sixty-two patients were included. Thirty-eight patients underwent surgery ≤24 hours post-injury at an average of 14 hours (range, 3-23). Twenty-four patients underwent surgery >24 hours post-injury at an average of 72 hours (range, 25-242).

Results

There was a total of 9 complications in 8 patients (14.5%). The overall infection rate was 1.6% with one deep infection occurring the group treated ≤24 hours post-injury and no infections in group treated >24 hours post-injury. There was a total of 7 reoperations (11.3%) and one readmission (1.6%). No significant differences were found between groups in any outcome measure. Of the 27 patients with an isolated type I open distal radius fracture, 16 (59%) were treated as an inpatient. Fourteen (88%) of which were admitted solely for their open fracture, while only 2 (12%) were admitted for observation by another service due to traumatic mechanism. There was no significant difference between isolated fractures treated

as an inpatient or as an outpatient in any outcome measure.

Conclusion

The current study found no differences in rate of infection, complication or readmission when type I open distal radius fractures were treated \leq 24 hours or >24 hours post-injury. Outpatient treatment for isolated fractures did not negatively affect patient care, and inpatient admission for these injuries may add significant cost and undue strain to both the patient and healthcare system. We suggest that type I open distal radius fractures could be safely treated surgically as an outpatient >24 hours post-injury without increased risk of infection.

A Systematic Review of Breast Cancer Applications for Functionality in Identifying Patient Preferences to Support Therapeutic Decisions

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Purpose Statement: Women with metastatic breast cancer (MBC), a type of cancer for which there is currently no cure, now have access to different therapeutic treatment options, that can both prolong life and reduce symptoms of the disease. However, not all therapies exhibit the same risk/benefit profile (e.g., incidence and tolerance of toxicities and side effects). Therefore, it is imperative to understand the preferences of women with MBC to ensure that treatment selection aligns with individual preferences for therapeutic profile. mHealth technology (e.g., mobile applications) may facilitate preference-based decisions, but product evaluations of current applications' functionality in aiding decision making are not readily available. This study's objective was to evaluate the ability of current breast cancer mobile applications to support patients in the identification and communication of treatment preferences.

Methods: Investigators executed a systematic search of United States Apple and Google Play stores from June to July 2021 to identify all mobile applications patients may download to inform breast cancer treatment decisions. Social cognitive theory (SCT) was applied to evaluate existing applications' functionality for supporting in treatment decisions through identification of goals and preferences. Apps were included if they were in English. Apps were excluded if they were: not free, non-functional after download, not intended for use in the US, not specifically for breast cancer, for provider/academic use only, for the purposes of education, prevention, social support, awareness, or fundraising only.

Results: Of the 303 apps, initially screened, 295 applications were excluded. 8 apps were evaluated based on support of knowledge, perceived self-efficacy, outcome expectations, goal formation, socio-structural factors and self-regulation. Based on these constructs of the social cognitive theory, none of the 8 apps

included functionality that supports identification of patient goals and preferences.

Conclusions: There is a lack of mHealth technology that helps patients with breast cancer identify and articulate treatment preferences. Subsequent application development may require input from patients, clinicians, and caregivers to support patient-centered care with the use of mHealth technology in the clinical setting.

Clinical Risk Factors Associated with Gender Differences in Patients with Alzheimer's Disease with Mild Cognitive Impairment

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Purpose

The role that specific clinical factors play in contributing to gender differences in Alzheimer's patients with mild cognitive impairment (MCI) is not yet fully understood. In this study, we tested the hypothesis that pharmacological, demographic and risk factors may contribute to gender difference in Alzheimer's patients with MCI.

Methods

Data collected for 5 years was analyzed using a retrospective data analytical approach on 33,064 Alzheimer patients, including 13,569 men and 19,495 women that presented with MCI. Receiver operating characteristic (ROC) curve analysis and multivariate regression models were used to identify specific factors that contribute to gender differences in MCI patients.

Results

Our records indicate that women that presented with MCI were more likely to be taking Buspirone (OR=0.767, 95% CI, 0.683-0.861, P<0.001) while men within this population were more likely to be taking Galantamine (OR=0.559, 95% CI, 0.382-0.818, P<0.001). ETOH use was associated with MCI in both men (OR=0.696, 95% CI, 0.638-0.760, P<0.001) and women with Alzheimer's Dementia (OR=0.484, 95% CI, 0.442-0.529, P<0.001).

Conclusion

Our findings reveal gender differences in men and women that presented with MCI. Management strategies should consider identified factors to provide better care for Alzheimer patients with MCI.

Identification and predictive assessment of exosomal small-RNA biomarkers in ovarian cancer utilizing liquid-biopsy derived and tissue-specific data

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Purpose Statement

Ovarian cancer (OC) is an aggressive gynecological cancer that is currently the 5th most lethal cancer for women. High mortality rates are attributable to the vague pathogenesis and unspecific symptomology in the early stages of the disease. The development of a liquid biopsy for routine OC screening could help identify the disease at an earlier stage, making treatments more likely to be effective and increasing survival rates. Exosomes, small (~100nm) extracellular vesicles present in body fluids, have been shown to contain cancer-progression, onset, and recurrence related factors, and are a good candidate for use in liquid biopsies. However, to date, only limited exosomal data is available for OC patients. Here, we explore the use of new integrated bioinformatics methodologies for use in small dataset analytics and their application in identifying potential exosomal miRNA OC biomarkers present in cervical mucus from a small patient study.

Methods

Cervical mucus samples were obtained from 42 gynecological surgery patients and processed to retrieve exosomes. The exosomal miRNA content was assessed via RNA sequencing. The resulting exosomal miRNA transcriptomes were explored using integrated bioinformatics methodologies to assess expression differences between exosomes from OC patients and non-OC patients for the identification of potential small RNA OC biomarkers. Several methods including univariate (Differential Expression Analysis) and multivariate approaches (Random Forest; Support Vector Machines and Variance at the observational level-Nearest shrunken centroids (voom-NSC)) were used to identify potential miRNA markers of OC. In addition to these methods, we employed an information-theory based feature selection method, mRMR (minimum redundancy and maximum relevance). The resulting potential OC biomarker panel(s) were validated via logistic regression using two independent datasets derived from publicly available data contained in the Gene-Expression Omnibus-GEO (tissue derived, GSE533289) and the serum derived (GSE106817) databases. In addition, we performed several functional

validation methods using bioinformatics approaches and finally compared the predictive performances between the different univariate and multivariate methods for the small patient study samples.

Results

We demonstrated that an identified 15-member panel of miRs was able to distinguish between OC and benign samples with an area under the curve (AUC) of 0.95 in a small dataset. The panel included exosomal miR-142-3p, hsa-miR-1246 and hsa-miR-182-5p, which were found to be potential candidates for OC biomarkers. The panel also contained 9 miRs previously implicated in OC tumorigenesis.

Conclusion

We examined the capability of exosomal miRNAs to predict OC status in tissue/serum data and a small patient dataset. Although our study is categorized as 'small data', we made use of 5 different approaches to obtain a consensus approach on which miRs can be considered robust and promising in decoding OC cancer status. This new bioinformatics approach represents a promising methodology for the discovery of biomarkers from small datasets, and the identified OC biomarker panel could have important implications for early OC screening and diagnostics.

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A Rapid-Cycle Survey Response to Emergency Medicine Clinicians' Well-Being during a Pandemic

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Purpose Statement – The purpose of the current study was to determine if a rapid-cycle survey could effectively identify emergency medicine (EM) clinicians' immediate concerns and assess well-being and burnout throughout the COVID-19 pandemic by using a blend of science and practice.

Introduction – The COVID-19 pandemic increased the potential for more severe increases in emotional, mental, and physical stressors for healthcare professionals, especially in frontline settings (e.g., emergency departments). EM clinicians have the resource of coworker support to combat stressors, which is associated with high levels of positive work outcomes (Beehr et al., 2000; Ducharme & Martin, 2000; Sloan, 2012; Wolff et al., 2018). Accordingly, we utilized a mixed methods approach to examine EM clinicians' levels of burnout, coworker support, and needed leadership support during the COVID-19 pandemic, allowing for analyses of the impact of COVID-19 on emergency department dynamics and processes at team and multiteam levels.

Methods

Participants – The sample included 394 EM clinicians (nurses, attending physicians, advanced practice clinicians, residents). Response rates remained between 33% and 40% each wave.

Procedure – EM clinicians received an email to voluntarily participate in each brief online survey, followed by reminder emails. EM clinicians were assured of confidentiality and provided consent prior to completing each survey. To ensure confidentiality, individual-level data were not provided to the organization, rather, only group-level data were shared. The data for the current longitudinal study are part of a larger ongoing project. The current study included ten waves of data. The first six waves were administered in 1-week increments, the seventh wave was administered 2 weeks later, and waves eight - ten were administered in 4-week increments. Increment lengths were dependent on the current state of the COVID-19 pandemic and EM clinicians' needs.

Assessment – The current study implemented a mixed methods approach in which indices of employee, team, and organizational functioning were examined throughout the COVID-19 pandemic through closed- and open-ended questions with web-based surveys. The current study utilized open-ended questions, which allowed for qualitative data collection. Specifically, EM clinicians were asked to detail their: 1) work-related concerns (e.g., staffing and scheduling, medication and supply shortages); 2) personal concerns (e.g., finances); 3) coping strategies (e.g., coworker support); 4) support needed from EM leadership; and 5) recognitions for team members, including positive feedback and shoutouts.

Results – Across all surveys, reported coworker support ranged from 32% - 90% (M = 62%), increasing from Survey 1 to Survey 10. Thus, as the COVID-19 pandemic progressed, EM clinicians found coworker support to be increasingly beneficial as a resource and started supporting each other more. Further, the open-ended responses in which EM clinicians had the opportunity to provide additional thoughts and feedback, including positive comments and shoutouts to their coworkers, consisted of positive feedback regarding the EM department. Of these responses, 82% of responses consisted of specific shoutouts to one(+) coworker. An example is, "Shoutout to [Coworker], [Coworker], and [Coworker] for always having great attitudes, being a pleasure to work with, and doing whatever they can to help move patients throughout the department." EM clinicians received an email from the research team containing the specific shoutouts that they received to help foster coworker support. EM leadership and clinicians explained how important, helpful, and beneficial it was to receive these emails and see the accomplishments of those they manage. Coworker support has been necessary and beneficial for EM clinicians working through the COVID-19 pandemic, not only benefiting each other, but the patients and community as well.

Conclusion – A rapid-cycle survey blending science and practice does effectively identify EM clinicians' needs during a pandemic; specifically by allowing the research team and leadership to implement specific strategies in response and in anticipation of EM clinicians' needs, concerns, and well-being.

TigerSaliva: a SARS-CoV-2 RT-qPCR Diagnostic System

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Purpose Statement - The emergence of the recent COVID-19 global health crisis introduced key challenges for epidemiological research and clinical testing. Characterized by high infectivity rate and moderate mortality rate, the COVID-19 pandemic necessitated accurate and efficient diagnostic testing of the highest degree. While traditional nucleic acid testing methods were sufficient, complications from supply chain pressure and substantial cost warranted the development of novel testing strategies. Consequently, we developed the TigerSaliva multiplex RT-qPCR diagnostic assay at Clemson University. With approximately 5,000 daily tests administered, and reaching 94.6% of tests reported within 9 hours, our rapid turnaround time allowed for frequent testing and more accurate surveillance of local outbreaks. This provided students, faculty, and staff a safe and timely return to campus.

Background - SARS-CoV-2, a novel coronavirus, emerged in late 2019 and rapidly spread throughout global populations. Public health recommendations encouraged wide-scale population screening to isolate cases and reduce transmission rates. Furthermore, models of population surveillance revealed that increasing testing frequency and decreasing turnaround time had a substantial effect on reducing transmission. Saliva-based RT-qPCR testing is comparable in sensitivity and sensitivity to that of nasopharyngeal swabs. In this study, we developed the TigerSaliva multiplex RT-qPCR diagnostic assay alongside a novel automation strategy to facilitate frequent, accurate, and efficient testing for COVID-19 in a university setting.

Methods - Individuals self-collected personal saliva specimens which were subsequently heat-treated for 30 minutes at 95°C to extract viral RNA. Mastermix plates were prepared in advance with RT-qPCR reagents. We programmed and utilized open-source liquid handling robots to load specimens into duplicate wells of 384 well PCR plates. Loaded plates were run on a thermocycler with a touchdown PCR protocol. Amplification data was processed to determine patient results; positive results were reported if both $N1\ Cq \leq 33$. Paired nasopharyngeal swabs were also administered for initial participants (n=827), and we evaluated test result agreement. We also compared the efficiency and accuracy of singleplex and multiplex PCR systems. After validation, we implemented our clinical automation system at scale. Results were reported to patients through a secure online platform

through which we analyzed turnaround time of 369,604 tests performed over a seven-month period.

Results - Initial validation of TigerSaliva tests against paired nasopharyngeal RT-qPCR tests showed 99.6% test result accuracy, thereby validating our protocols. The multiplex system decreased time per sample by 39.4%, so we utilized multiplex to increase efficiency. As testing volume increased to approximately 5,000 daily tests, 95% of tests were reported within 9 hours and >99% of tests were reported within 24 hours. The university population positivity rate was approximately 75% lower than that of the surrounding community, likely related to increased testing frequency facilitated by short turnaround times.

Conclusion - TigerSaliva is a novel approach to clinical lab automation that substantially reduced turnaround time for SARS-CoV-2 testing. This allowed for frequent testing of the university population, particularly high-contact individuals such as athletes and residential students. Increasing frequency of testing allowed for early detection of outbreak clusters.

High grade phyllodes tumor with osteosarcomatous differentiation: case report and review of the literature.

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Background:

Phyllodes tumors (PTs) are rare fibroepithelial malignancies of the breast and account for less than 1% of malignant breast tumors. PTs are usually solitary tumors but can be associated with other malignancies of the breast. In particular, malignant differentiation arising from the epithelial component such as chondrosarcomas, osteosarcomas and liposarcomas, can be seen in association with the stromal component of a PT. Osteosarcomatous differentiation of a malignant phyllodes tumor is rare, accounting for 1.3% of phyllodes tumors in the breast.

Purpose:

Differentiation of this rare breast tumor from other similar presentations including fibroadenomas, metaplastic carcinomas, and primary breast sarcomas, is of vital importance to the clinicians due to the differences in treatment and prognosis.

Methods:

We present a case of rare high-grade phyllodes tumor with osteosarcomatous differentiation and a comprehensive review of this phenomenon in the literature. A retrospective, comprehensive literature search was completed for all phyllodes tumors with osteosarcomatous differentiation reported in the literature including course of the disease to include initial presentation, diagnosis, metastasis, and mortality to exclude cases that were not available in English or those which the institution could not obtain. Information from the cases reported here and from the literature was used to define characteristics of these rare tumors to better differentiate from other malignancies.

Results:

A total of 28 cases reported high grade phyllodes tumors with osteosarcomatous differentiation, ranging from 1958 to 2021. The average age of the patient was

54.7 years old, and all patients were female. Of the 28 cases, 32% reported calcifications on imaging. Mitotic indices were reported in 12 cases, eight of which demonstrated 10/10 HPF or higher. Metastasis occurred in 43% of cases most commonly, in the lung. Death was reported in eight cases resulting in an average time till death of 19 months.

Conclusion:

In this case, the combination of a new mass and unusual calcifications radiologically prompted more suspicion for a rarer pathology. Biopsy is more definitive. Distinction from other pathologies can be achieved with histopathological suspicion in combination with stains and clinical course. No trend was found to conclude that either chemotherapy or radiotherapy significantly resulted in less mortality. By examining trends observed in other cases of this rare type, diagnosis can be more clearly made by noting common presentations, nonspecific changes in imaging, and unambiguous histopathologic features that distinguish osteosarcomatous PTs from other pathologies.

Minimally Invasive Dorsal Cheilectomy and Hallux Metatarsal Phalangeal Joint Arthroscopy for the Treatment of Hallux Rigidus

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Background: Hallux rigidus (HR) is a common source of forefoot pain and disability. For those who fail nonoperative treatment, minimally invasive dorsal cheilectomy (MIDC) is an increasingly popular alternative to the open approach with early positive results. Early failures may be due to loose bone debris from the MIDC as well as other intra-articular pathology that cannot be addressed with MIDC alone. Metatarsophalangeal (MTP) arthroscopy can be used in addition to MIDC to assess the joint after MIDC and address any intra-articular pathology while still maintaining the benefits of minimally invasive surgery. We report our clinical outcomes following MIDC combined with MTP arthroscopy. **Methods:** From November 2017 to July 2020, a retrospective analysis of all MIDC cheilectomies with MTP arthroscopy performed by the 2 senior authors was done. Wound complications, infections, revision rates, need for future surgery, conversion to fusion rates, pre- and postoperative range of motion, visual analog scale (VAS) scores, time to return to normal shoe, intraoperative arthroscopic findings, and operative time were collected. Follow-up average was 16.5 months (range 3-33 months). **Results:** A total of 20 patients were included with an average follow-up of 16.5 months. The average VAS score improved from 7.05 preoperatively to 0.75 postoperatively ($P < .05$). Average range of motion in dorsiflexion increased from 32 to 48 degrees ($P < .05$) and plantarflexion increased from 15 to 19 degrees plantarflexion ($P < .05$). All patients were weightbearing as tolerated immediately after surgery in a postoperative shoe and transitioned to a regular shoe at average of 2.1 weeks. We had no wound infections, wound complications, revision surgeries, tendon injuries or nerve damage. One patient required conversion to a fusion 3 years after the index procedure. Average tourniquet time was 30.39 minutes (range 17-60 minutes) and total average operating room time was 59.7 minutes (range 40-87 minutes). On arthroscopic evaluation of the MTP joint after MIDC, 100% of patients had bone debris, 100% had synovitis, 10% had loose bodies, and 30% had large cartilage flaps within the joint. **Conclusion:** MIDC and first MTP joint arthroscopy for treatment of hallux rigidus provide improved pain relief with minimal complications while still maintaining the benefits touted for minimally invasive operative procedures. Additionally, we have shown a high rate of intra-articular debris along with intra-articular pathology such as synovitis, loose chondral flaps, and loose bodies that exist after MIDC. This combined procedure has the potential for improving patient outcomes and may minimize risk of future revision surgeries compared with MIDC alone.

Impact of follow up blood cultures on outcomes of patients with gram-negative bloodstream infections

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Purpose statement: Importance of follow up blood cultures (FUBC) for *Staphylococcus aureus* bloodstream infections (BSI) is well known, but the role of FUBC in gram-negative BSI remains controversial. This retrospective cohort study examined the association between obtaining FUBC and mortality in patients with gram-negative BSI.

Methods: Adults with first episodes of community-onset monomicrobial BSI due to gram-negative bacilli hospitalized at Prisma Health-Midlands hospitals in Columbia, South Carolina, USA from January 1, 2010 to June 30, 2015 were identified. Patients who died or were discharged from hospital within 72 hours of collection of index blood culture were excluded to minimize impact of survival and selection biases on results, respectively. FUBC were defined as repeat blood cultures obtained between 24 and 96 hours from initial positive blood culture. Cox proportional hazards regression model was used to examine association between obtaining FUBC and 28-day all-cause mortality.

Results: Among 766 patients with gram-negative BSI, 219 (28.6%) had FUBC obtained and 15 of 219 (6.8%) FUBC were persistently positive. Overall, median age was 67 years, 57% were women, 457 (60%) had urinary source of infection, and 426 (56%) had BSI due to *Escherichia coli*. Mortality was significantly lower in patients who had FUBC obtained than in those who did not have FUBC (6.3% vs. 11.7%, log-rank $p = 0.03$). Obtaining FUBC was independently associated with reduced mortality (hazards ratio [HR] 0.49, 95%CI: 0.25-0.90) after adjustments for age (HR 1.35 per decade, 95% CI: 1.13-1.61), cancer (HR 5.90, 95% CI: 3.53-9.84), Pitt bacteremia score (HR 1.38 per point, 95% CI: 1.26-1.50), and inappropriate empirical antimicrobial therapy (HR 2.37, 95% CI: 1.17-4.39).

Conclusion: Obtaining FUBC was associated with improved survival in hospitalized patients with gram-negative BSI. These observations are consistent with the results of recent publications from Italy and North Carolina supporting utilization of FUBC in the management of gram-negative BSI.

Hydrops fetalis—trends in associated diagnoses and mortality from 1997–2018

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OBJECTIVES: To describe and evaluate trends in the etiology and mortality risk in neonates admitted for neonatal intensive care with hydrops fetalis. **STUDY DESIGN:** A retrospective review of de-identified patient data in the Pediatrix Clinical Data Warehouse from 1997 to 2018.

RESULTS: We identified 2144 infants diagnosed with hydrops fetalis. The most common diagnoses were congenital heart disease (n = 325, 15.2%), genetic diagnoses (n = 269, 12.5%) and cardiac arrhythmia (n = 176, 8.2%). Of 2144 neonates, 988 (46%) survived to hospital discharge and 775 (36%) died prior to discharge. Mortality rate was highly variable across diagnoses, ranging from 90% in infants with congenital diaphragmatic hernia to 0% in infants with atrial flutter. Over the study period, more infants were diagnosed with trisomies and fewer with twin-to-twin transfusion. Mortality decreased by 5% from 1997–2007 to 2008–2018.

CONCLUSIONS: The risk of death among neonates with hydrops fetalis is highly dependent on the underlying cause, with increasing risk of mortality at lower gestational ages

Joining Together: Multidisciplinary Science and Teamwork Applied to Improving Emergency Clinician Well-Being During the COVID-19 Pandemic

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Purpose Statement

Emergency department clinicians face unique challenges in the workplace. The high-stakes, high-stress nature of emergency medicine is associated with greater rates of burnout and reduced well-being among clinicians and has been the subject of increased research for the past several years. However, the onset and continued duration of the COVID-19 pandemic has introduced a novel set of stressors unseen by clinicians in the modern medical era. These stressors exacerbate existing concerns surrounding burnout and compromise well-being among emergency clinicians, as frontline workers, who are especially at risk for harmful psychological, psychosocial, and physical consequences related to workplace stressors. To understand the effects that the pandemic inflicts on emergency department clinicians both at and outside of work related to burnout and well-being, an innovative rapid-cycle survey was designed and administered to emergency department clinicians at a large healthcare organization in the Southeastern United States beginning in March 2020. The present research presents over 18 months' worth of data in the context of emergency clinician well-being during the COVID-19 pandemic, including variations and challenges related to workplace and personal concerns, environmental challenges, local and national changes, and meaningfulness and purpose related to work.

Importantly, the importance of the collaboration between Clemson University and Prisma Health to implement and sustain these survey efforts is paramount. The research team that has dedicated time and effort to this survey, including its distribution, modification, and translation has fostered and enhanced important ties between Prisma Health and its research partners at Clemson University. The unprecedented nature of the COVID-19 pandemic spurred action on behalf of this research team, and the ongoing initiatives provided by this interdisciplinary team exemplify science-based research, multidisciplinary teamwork, and adaptation.

Methods

The survey launched in March 2020 and is ongoing. Participants included emergency medicine physicians, advanced practice clinicians, emergency medicine residents, and emergency medicine nurses. To date (as of submission in September 2021), we have 22 waves of data (and will have a minimum of 23 waves upon presentation), comprising quantitative and qualitative measures centered around workplace stressors, challenges, well-being, and burnout. Specific survey measures and longitudinal trends will be presented and have been analyzed by role and location. Items were adapted to suit ongoing and evolving needs as extracted from survey responses. This rapid-cycle methodology and flexible survey design was intentionally applied to provide data to support ongoing initiatives and status reports amidst often rapid clinical changes as a result of the pandemic.

Results

The results of twenty-three waves of survey data provide insight into the impacts of COVID-19 on emergency department clinicians. Averages across role depict changes in well-being, burnout, sleep quality, and meaningfulness at work over eighteen months, from March 2020 to September 2021. Qualitative comments were coded and categorized into broad themes, the most frequent of which included communication concerns, occupational concerns (i.e., job security, financial stability), medication and supply shortages, and need for organizational support.

Conclusion

This research provides a comprehensive depiction of the demands, stressors, and coping strategies that emergency clinicians have reported since Spring 2020, as well as how those phenomena have evolved over the course of the pandemic. This data is currently providing insight into immediate support needs for clinicians and will continue to serve as a foundation for lessons learned and future research on the impact that the COVID-19 pandemic is inflicting on frontline healthcare workers.

Reduction of Sars-CoV-2 Oral Viral Load with Prophylactic Mouth Rinse

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Purpose statement: The purpose of this study was to test the effectiveness of prophylactic mouth rinses in reducing the amount of virus particles, specifically SARS-CoV-2 in the oral cavity. With the onset of the COVID-19 pandemic, the practice of using a preprocedural rinse to reduce oral viral load has been used widely across the globe in anesthesia, otolaryngology, dentistry, and other healthcare specialties working in the oro-pharynx, but there was little to no data to support these practices. We hypothesized that at least one of chlorhexidine, hydrogen peroxide, povidone iodide mouthwash, or alcohol-based mouthwash will temporarily reduce the amount of viable SARS-CoV-2 present in the oral cavity. This research will guide dental and medical providers on best practices to be performed prior to dental and medical procedures involving the oral cavity. Our study had 1 **Specific aim: Test the efficacy of prophylactic mouth rinses on reducing oral levels of SARS-CoV-2.** Our study was designed to demonstrate if prophylactic mouth rinses are effective in reducing oral SARS-CoV-2, and if so which ones are most effective and for how long they reduce viral loads. This may serve as evidence to practitioners who look to mitigate risk of transmission during aerosolizing oral procedures in healthcare.

Methods: Patients that tested positive for Sars-CoV-2 through Augusta University diagnostic services were recruited for the study and were assigned one of 5 pre-procedural rinses. These rinses included either 0.2% Chlorhexidine gluconate, 1.5% hydrogen peroxide, 1% povidone iodine mouthwash, alcohol-based mouthwash (Listerine) or control-water. Patients were consented remotely, and test kits were delivered to the residence of the subject, where testing was performed remotely over video conference. Participants were instructed not to eat or drink 1 hour prior to or any time during the study. Each subject expectorated approximately 2ml of saliva into a collection vial in order to obtain the baseline viral load. The subject was then instructed to rinse for 2 minutes with 5mL of the rinse they were assigned and to expectorate and discard the waste. Subsequently, the subject provided three more samples of saliva for viral load quantification at time points 0 hours (following intervention), 1 hours, and 2 hours to determine the effectiveness and substantivity of each rinse at reducing oral viral load. Samples were collected and Viral RNA was extracted using Perkin Elmer FDA EUA Kit. Extracts were then analyzed using reverse transcriptase real-time polymerase chain reaction (RT-PCR) to quantify levels of viral RNA detectable in each sample using fluorescent labeling and

recording Ct values.

Results: We found that each rinse had different effects in the action and duration of action in reducing oral viral load of Sars-CoV-2. We were able to recruit a total of 25 qualifying subjects, reducing the statistical clarity of our study, but found statistically significant reduction in oral viral load following each mouthrinse as compared to water. However, we found strong qualitative differences between our pre-procedural rinses. The most significant n-fold change from the internal control, or reduction in oral viral load, was seen in Listerine mouthwash at time points 0 hour and 1 hour, while Chlorhexidine mouthwash demonstrated an appreciable reduction and the longest lasting effect at 2 hours. Against our expectations, both hydrogen peroxide and povidone iodide had little to no effect at any time point.

Conclusion: We found that an alcohol-based mouthrinse (Listerine) had the most appreciable impact in reducing oral viral load while chlorhexidine demonstrated the best substantivity. Although both hydrogen peroxide and povidone iodide are being widely used to mitigate spread of COVID-19 and both have been proven effective in-vitro, our data indicates that they are clinically ineffective for reducing oral viral load. We recommend that practitioners utilize pre-procedural rinses on all patients during the pandemic regardless of COVID-19 status and, depending on the length of the procedure, use alcohol-based Listerine or Chlorhexidine Gluconate to reduce potential oral viral load.

De-Novo Innervation of a Transplant Organ

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Purpose statement: - At present, damage to nervous tissue is difficult to treat, often irreversible, and furthermore nerve growth to new sites is very limited. I hypothesize that teeth have a special capability to induce nerves and that we can isolate tissues and factors that could be used in a clinical setting to completely regenerate nerves. My present goal is to establish this concept in a laboratory model and discover those dental-borne tissues and molecular candidates that recruit nerves. My long-term goal is to develop a therapeutic approach to induce nerve growth to damaged and transplanted organs. I have realized a unique clinical finding from multiple published studies wherein de-novo sensation has arisen in transplant organs of juvenile patients. In clinical studies where developing third molar teeth have been transplanted to donor sites, the teeth have continued to grow but more astoundingly have gained the ability for nociception in response to cold stimuli. This finding implies that developing teeth transplanted to a bony defect induce de-novo nerve growth at the recipient site. In this working study I utilize the rat model to demonstrate de-novo nerve growth by transplanting whole teeth to iatrogenic bony-defects and performing histological and biochemical analysis. Demonstrating innervation in transplanted teeth of post-natal rats would indicate that dental tissues are indeed capable of nerve growth in a transplanted organ. Acquisition of such data would greatly enhance our understanding of nerve induction and deliver a laboratory model of postnatal nerve growth.

Methods: Post-natal rats (Sprague-Dawley) aged 28-30 days were anesthetized and intact tooth germs with fully developed crowns undergoing root development were isolated. A bony defect was then created in the ipsilateral anterior tibia and the extracted tooth was transplanted to the defect. The wound was closed and hemostasis established. Littermates underwent the same surgery and sequential sacrifice was performed on a weekly basis to describe the histological changes that occurred following the transplantation surgery. Additional processing included Hematoxylin and Eosin staining, and fluorescent immunohistochemistry was performed for nerve specific markers including anti-acetylated tubulin III antibodies. Additional methods in process include transcriptional analysis through single cell sequencing of teeth that are growing and mature to help realize nerve inductive candidates.

Results: Survival rates for the animals following the procedure was high with more deaths associated with anesthesia than the procedure, and furthermore upon sacrifice most animals exhibited teeth integrated into the leg with various configurations. This included high levels of inflammation at 6-8 weeks post-surgery

with evidence of boney turnover and resorption, and evidence of vascularization beyond these stages. Early immunohistochemistry indicates evidence of innervation of transplanted teeth in line with the hypothesis that teeth have nerve inductive capacity postnatally. Figure 1 is an image of a H&E staining of a tooth at 10X (A) and 20X (C) showing the interface of a tooth transplanted into tibia at 28dpf and sacrificed 7 weeks after transplantation. Indirect Immunohistochemical staining was performed for nerve marker acetylated tubulin at 10X (B) and 20X (D), demonstrating the presence of nerve fibers at this interface in red. Figure 2 is an image of a rat tooth transplanted autologously at 28dpf and sacrificed for histology 14 weeks post-transplantation. Histology reveals a tooth well integrated into the tibia and a significant reduction in inflammation and bony remodeling, with dental specific enamel and dentin present in the leg.

Conclusion: Teeth transplanted autologously to tibia can integrate into the leg, survive as independent organs with their own blood supply, and early histology indicates innervation of the transplanted tooth. I will next perform transcriptomic analysis to identify candidate signaling factors for nerve induction. From this part of the study I will identify molecular candidates to test for their capability of nerve induction. The combined results of these studies will be the establishment of a nerve growth model with identification of dental tissue layers and specific molecular candidates that can eventually be used in regenerative medicine. These data are applicable to patients' needing re-innervation of eye, spine, extremity, teeth and many other organs. The implications are far-reaching and may lead to novel nerve regeneration therapeutics.

Validation of the Rapid Arterial occlusion Evaluation (RACE) Scale in Upstate South Carolina

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Purpose Statement: The purpose of this study was to determine if the RACE scale is a valid pre-hospital stroke screening tool for identifying LVOs in patient's triaged to a high-volume comprehensive stroke center in South Carolina.

Methods: A Health Insurance Portability and Accountability Act (HIPAA) compliant messaging system (Telmediq) was used to collect all stroke alerts that presented to Prisma Health Greenville Memorial Hospital between January 1st, 2020-March 31st, 2020. Patient demographics, RACE scale, NIHSS, imaging to confirm LVO presence and site, and discharge diagnosis were collected using the electronic medical record (EMR) and Telmediq. The sensitivity and specificity for LVO detection was calculated for RACE scores $\geq 1-9$. The correlation between NIHSS at admission and RACE scale by EMS personnel was subsequently determined.

Results: The following results are based on a preliminary analysis of the data. Data abstraction is ongoing, and the sample size will increase as more data is collected. A RACE score of ≥ 4 had a sensitivity of 0.82 and a specificity of 0.47. A score of ≥ 5 had a sensitivity of 0.71 and a specificity of 0.65. There is a significant correlation between the RACE scale assessed in the field vs NIHSS assessed by a neurologist at admission ($r=0.60$, $p<.0001$).

Conclusion: The preliminary results of this study re-validate the RACE scale as a useful pre-hospital tool capable of detecting large vessel occlusions in patient suffering from an acute ischemic stroke. Furthermore, our results indicate that previous conclusions regarding the RACE scale are applicable to EMS utilizing this tool in the Prisma Health-Upstate region. Future studies involving a greater sample size of South Carolina patients should be used to see if the findings in our data are replicable in larger cohorts.

Gender Difference in Alzheimer Dementia Patients using Pharmacological and Clinical Factors

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Purpose Statement: Alzheimer dementia (AD) has been reported in both men and women. However, the factors contributing to gender differences are not fully understood. We tested the hypothesis that pharmacological, demographic, and risk factors contribute to gender difference in AD.

Methods: A retrospective analytical approach was used to analyze data from 12,632 AD patients, comprising 4,584 men and 8,048 women. Univariate and multivariate analyses determined the factors contributing to the gender difference in AD patients.

Results: About 36% of AD patients were men, and 64% were women. Citalopram (OR=1.187, 95% CI, 1.044 – 1.350, $P=0.009$) was associated with men, while escitalopram (OR=1.213, 95% CI, 1.119 – 1.315, $P<0.001$) was associated with women. In both men and women, increasing age (OR=1.075, 95% CI, 1.071 – 1.079, $P<0.001$ /OR=1.096, 95% CI, 1.093 – 1.100, $P<0.001$), tobacco use (OR=1.150, 95% CI, 1.054 – 1.254, $P=0.002$ /OR=1.150, 95% CI, 1.073 – 1.233, $P<0.001$), and black patients (OR=2.380, 95% CI, 2.120 – 2.674, $P<0.001$ /OR=1.395, 95% CI, 1.268 – 1.535, $P<0.001$) were associated with AD.

Conclusion: Our findings reveal similarities and differences in factors associated with both men and women AD patients, suggesting the

development of management strategies for the care of AD.

Influential Factors for Meningioma Recurrence

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Each year there are approximately 29,000 meningioma diagnoses. Factors are known to contribute to meningioma formation; however less is known regarding factors that contribute to recurrences. An evaluation of all meningiomas surgically resected and/or treated at a single institution between 1/1/2006 – 12/31/2016 was completed. Patients who had spinal meningiomas and those for whom complete records were unavailable were excluded. Typical demographic and clinicopathologic data were collected to include numbers of recurrences, treatments, and overall outcomes.

Overall, 30 recurrences were noted in the cohort with a mean age of 55 (range 15-82); 57% were female (n=17) and 43% male (n=13) and 60% were White (n=18) and 40% Black (n=12).

For grades, 26.7% of individuals had grade I, 50% grade II, 6.7% grade III, and 16.7% were not documented. The mitotic rate for the cohort was 6.2 per 10HpF (range 0-26) and 28.6% had a low Ki-67 (0-5), 42.9% were 6-10, 14.3% 11-15 and 14.3% had a high index (16-20). When comparing those with recurrences to those without, none of the demographics were significantly different except for race (p=0.0175). Regarding grade, recurrences were typically grades II and III (56.7%) compared to no recurrences (17.4%; p<0.0001). Likewise, the mitotic rate (recurrence 6.2; no recurrence: 2.12; p=0.0019) and Ki-67 (p=0.033) were significantly different between groups. Regarding surgical resection, gross total resection was significantly lower in those with recurrences (p=0.0037).

It appears that the profile for individuals with recurrences is dependent on histological markers. Expansion upon this could be useful assigning a "recurrence risk score".

Classifying and quantifying communication ability and genetic contributions in Phelan-McDermid Syndrome

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Purpose statement Persons with Phelan-McDermid Syndrome (PMS) present with a broad range of disabilities, including speech and language impairments in almost all cases. These speech and language deficits are highly variable (Sarasua et al., 2011) and little research has been completed to thoroughly analyze functional communication abilities. The purpose of this study is threefold. The first is to describe the language and communication profile of school-aged individuals with PMS using a combination of standardized measures and semi-formal assessment methods such as direct observation and language sampling. A second objective is to identify the genetic contributions to the language and communication profile in PMS. We will correlate the language phenotype of 20 people with PMS using their diagnostic test results to investigate the association with deletion size or the presence of a SHANK3 pathogenic variant. In a demonstration sample of three to four individuals, we will correlate the language and genetic profiles using DNA sequencing to investigate additional genetic variants that may affect language. A final objective of this study is to determine the feasibility of remote administration of assessments and data collection for research purposes. This is an especially important study feature that will support increased accessibility to research participation in studies for vulnerable patient populations in light of the COVID-19 pandemic.

Methods Recruitment of participants will be conducted in collaboration with the Phelan-McDermid Syndrome Foundation (PMSF). Recruitment will close when 20 subjects have confirmed and provided consent to participate. Subjects will participate in all research activities remotely using a video-conferencing platform and mail-in standardized questionnaires. Caregivers will first be asked to independently complete the Vineland Adaptive Behavior Rating Scales-Caregiver Form (Sparrow et al. 2016), the Children's Communication Checklist-2 (Bishop, 2006), and the Social Responsiveness Scale (Constantino, 2012). Caregivers will also independently collect a saliva sample from the subject. Direct evaluations will be conducted (remotely) across one to three sessions based on family needs. A speech-language pathologist (SLP) will observe a ten-minute subject-caregiver interaction to collect a language sample and identify specific nonverbal expressive/receptive and pragmatic communicative functions, followed by formal standardized assessment using the Peabody Picture Vocabulary Test-5th

Edition (Dunn, 2018) and the Functional Communication Profile Revised (Kleiman, 2003). The team will collectively analyze and correlate the phenotypic communication and genomic data.

Results This study is undergoing IRB approval and data collection has not yet begun. We plan to have preliminary data for the Health Sciences Center Research Showcase.

Conclusion This research study aims to generate valuable information on language development in individuals with PMS that will be beneficial to families, caregivers, physicians, rehab team members, and researchers. The results of this pilot study may also help shape a future study on a larger scale and improve and increase remote data collection opportunities. We also hope the information learned from this study will provide future benefits to other children diagnosed with PMS and speech/language disorders.

Support: This pilot study is supported by a seed grant from Prisma Health

Examining the Relationship between Anxiety and Cognitive Functioning in Individuals Receiving Medication for Opioid Use Disorder

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Purpose: Individuals with opioid use disorder (OUD) display problems with certain cognitive functions, including increased impulsivity and heightened reward sensitivity. Moreover, individuals with OUD experience high rates of mental health comorbidities. One of the most prevalent mental health comorbidities is anxiety: approximately 60% of individuals with OUD also have a comorbid anxiety disorder (Conway et al., 2006). However, research examining cognitive processes and the relationship between anxiety and cognitive functioning in individuals receiving medication for OUD, such as buprenorphine, is not well understood. The purpose of this ongoing research is twofold. First, we seek to characterize cognitive functioning in attention and inhibitory control in individuals receiving medication for OUD compared to healthy controls. Second, we seek to investigate whether there are differences in the relationship between anxiety and these cognitive functions between individuals receiving medication for OUD and healthy controls.

Methods: Participants in the study included 12 individuals receiving medication for OUD and 14 healthy controls. All participants completed the identical procedure: the Stroop Test to assess attention; the Continuous Performance Task (CPT) which assesses inhibitory control; the GAD-7 questionnaire to assess anxiety symptoms; the PHQ-9 questionnaire to assess depressive symptoms; the EQ-5D to gauge self-reported health, and demographic information. During the Stroop Test and Continuous Performance Task, participants level of physiological arousal was measured using Galvanic skin response and heart rate measures.

Results: Independent samples t-test results demonstrated that individuals receiving medication for OUD had higher levels of anxiety ($p < .001$) and depression ($p = .001$), reported poorer health ($p = .002$), and made more errors on the Stroop Test compared to healthy controls. To investigate the relationship between anxiety and cognitive functioning between individuals receiving medication for OUD and controls, separate regression analyses were conducted for the Stroop and Continuous Performance Task outcome measures. Results demonstrated a significant interaction between groups (OUD vs. Control) and anxiety levels on error rates in the Continuous Performance Task ($p < .05$). Follow-up analyses by group revealed that higher anxiety levels were associated with greater commission errors

among individuals receiving medication for OUD ($r = .59, p = .04$), but not among healthy controls ($r = -.19, p = .59$).

Conclusion: The findings of this ongoing study suggest that individuals receiving medication for OUD exhibit greater anxiety and depressive symptoms and attentional biases than healthy controls. Moreover, greater levels of anxiety symptoms are associated with deficits in inhibitory control among those receiving medication for OUD. Because inhibitory control reflects the ability to stop oneself from executing an action, deficits in this cognitive function have important implications for regulation of opioid-related cravings and preventing relapse. Based on the observed relationship between anxiety and inhibitory control deficits, we speculate that increased anxiety levels may impact cravings in individuals receiving medication for OUD, and thus, anxiety management may be key for recovery in this population.

Transportation vulnerability and impacts on clinical care among HIV patients: Qualitative findings from a randomized clinical trial of a concierge ride-sharing intervention

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Background: People living with HIV (PLHIV) in the Southern United States (US) face unique challenges to care engagement. In the South, PLHIV are less likely to receive timely HIV care, more likely to fall out of care, and, subsequently, have death rates that are three times higher than individuals from non-Southern states. The Southern US is also characterized by high rates of poverty, limited public transportation, and inadequate infrastructures that further amplify health inequities. Addressing underlying barriers to care—including transportation-related barriers—is critical to reduce current disparities. This study aimed to identify transportation related barriers to care and explore the implementation of an innovative concierge ridesharing service for PLHIV who are 're-engaging' in care and/or in care but not virally suppressed.

Methods: A randomized clinical trial to test an innovative concierge ride-sharing program was implemented at the University of South Carolina (USC) School of Medicine and Prisma Health—USC Medical Group Ryan White center in Columbia, South Carolina. The goal of the program was to improve care engagement among PLHIV. During the implementation phase, semi-structured interviews were completed with 20 PLHIV who self-reported experiencing transportation vulnerabilities. A deductive and inductive approach with two trained coders was employed to identify themes related to transportation barriers and to gather patient input on the implementation of the concierge ride-sharing intervention.

Results: Participants identified transportation-related barriers including lack of access to reliable, safe, and affordable public transportation; lack of access to personal transportation; and HIV-related and poverty-related stigma. These barriers were described as negatively affecting participants' engagement in HIV care and as worsening self-perceived physical and mental health. Participants described the concierge ride-sharing intervention as a reliable, safe, convenient, and acceptable means of overcoming these challenges. Participants also indicated that flexible healthcare policies, as well as emotional support and tangible assistance from family and friends, were useful in overcoming care-related barriers.

Conclusions: Addressing social determinants of health—including transportation-related barriers—is critical to improve access to HIV care, increase retention in care, and ensure that all PLHIV achieve and maintain viral suppression. This study provides support for ridesharing programs and offers suggestions for their implementation in other areas in the Southern US that are disproportionately burdened by HIV.

Identifying Factors Related to Treatment Choice for Proximal Humerus Fracture

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Purpose Statement: The objective of this work was to evaluate the patient characteristics that are associated with initial surgical treatment for proximal humerus fractures (PHF). We limit our evaluation to patient demographic, clinical and lifestyle characteristics that are routinely captured and stored in the EHR system.

Introduction: Proximal humerus fractures (PHF), the third most common fracture in the elderly, remain a difficult injury to treat. Historically, treatment for nondisplaced or minimally displaced fractures favored conservative management whereas more complex, multi-part, displaced fractures were treated surgically to avoid malunion and ensure optimal range of motion and outcomes for patients. However, recent clinical trial evidence challenges whether displaced fractures need to be treated surgically. Surgical treatment exposes elderly patients to higher costs, risk of complications, and increased risk of mortality, but in some instances may achieve superior outcomes for patients. The goal of the project was to evaluate patient-specific factors that were related to the initial decision of surgical treatment for PHF.

Methods: Our sample included all adult patients diagnosed with an index PHF (ICD-10 diagnosis code S42.XXX) between January 1, 2016 and December 31, 2018. For that group we performed a medical chart review, in which two independent reviewers extracted over 75 data elements identified a priori as potentially being relevant to treatment choice for PHF. Analyses included descriptive statistics and bivariate analyses to determine which characteristics were significantly associated with surgical treatment within 60 days of the index fracture visit.

Results: The final sample yielded 984 eligible patients, of which 79.8% were treated conservatively and 20.1% were treated with initial surgery. The sample was primarily female (75.6%), with an average age of 66.6 ± 15.8 years. Falls were the most common mechanism of injury (90.7%) and most patients were treated by non-trauma orthopedic specialists (68.5%) at Prisma Health. Patients receiving initial surgical treatment were significantly younger (Mean= 62.53 ± 15.99 , p-value <0.0001), a greater proportion lived at home (98.33%, p-value=0.0019),

were involved in community activities (52.53%, p-value=0.0015), were highly active (87.31%, p-value=0.0004), and had a concurrent fracture elsewhere in the body (20.71%, p-value<0.0001). Patients receiving surgery had greater amounts of displacement in their fractures and had a higher proportion of 4-part fractures (24.24%, p-value=0.0017), compared to patients treated conservatively. Having diabetes (p-value=0.0255), dementia (p-value=0.0006), osteoarthritis (p-value=0.0408) or a history of falls was associated with lower rates of surgical intervention (p-value=0.0006).

Conclusion: Our findings provide better understanding as to what patient characteristics, beyond just clinical fracture characteristics, are relevant when making treatment decisions for PHF.

Impact of Melatonin on Blood Pressures in children undergoing Ambulatory Blood Pressure Monitoring (ABPM)

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Purpose Statement: Ambulatory blood pressure monitoring (ABPM) has become the standard of care for diagnosing pediatric hypertension. In adults, non-dipping (systolic blood pressure decline <10% during sleep) is associated with increased cardiovascular morbidity and mortality, and obstructive sleep apnea (OSA) is associated with nocturnal hypertension and non-dipping. In children, obesity influences non-dipping status, but little is known about the effects of other factors such as melatonin use, medications, and OSA. The aim of this research is to analyze the impact of melatonin in children undergoing ABPM and to describe its associations with BMI percentiles, BP, nocturnal hypertension, and non-dipping.

Methods: We conducted a retrospective chart analysis of patients ages 4-21 years who underwent ABPM study using SpaceLabs 90217® between January 2018-June 2019 at a pediatric hypertension clinic. Children with known cardiac disease, kidney disease, or on dialysis were excluded. 377 records were evaluated. We conducted subgroup analysis for melatonin use in 300 children not taking anti-hypertensives. All analyses were performed with R statistical software.

Results: BMI was not associated with increased prevalence of non-dipping. Higher BMI was associated with lower daytime and nocturnal BP. Melatonin use was more prevalent in the >95% BMI category. There was no difference in the prevalence of melatonin use between dippers and non-dippers. ADHD medication use was more prevalent in dippers than non-dippers. However, these numbers were not statistically significant in this small cohort. As expected, OSA was more prevalent in obese children, but no association was found with non-dipping status.

Conclusion: Melatonin use was more prevalent at higher BMI. Because non-prescription usage is increasing, true prevalence may be underestimated. We were unable to demonstrate a clear impact of melatonin on children's BP despite the documented impact in adults, warranting further research in the pediatric population. Clinicians must be diligent about documenting non-prescription usage of sleep aids like melatonin as they may carry significant side effects and impact the diagnosis of pediatric hypertension and sleep apnea.

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

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Background: Cancer patients undergoing chemotherapy are known to develop skeletal muscle mitochondrial dysfunction and subsequent cachexia due to massive treatment related oxidative stress, increasing the risk of chemotherapy-related morbidity and mortality. The timeline is unknown as to when this dysfunction starts to occur and is traditionally measured via invasive muscle biopsy. This adds additional burden to the patient and makes tracking of cachexia throughout treatment difficult.

Purpose: To assess the effects of differing chemotherapy regimens on skeletal muscle mitochondrial function throughout treatment in breast cancer (BC) patients using near infrared spectroscopy (NIRS).

Methods: Non-metastatic BC patients will be recruited prior to the initiation of chemotherapy treatment involving taxanes and/or anthracyclines. Mitochondrial function of the vastus lateralis muscle will be measured during activation, noninvasively, by assessing changes in oxygenated and deoxygenated hemoglobin using a NIRS PortaMon device. Within 5 days prior to every infusion, participants will perform moderately intense exercise on a stationary ergonomic bike while wearing the PortaMon device. Data collected in real-time by the NIRS will be analyzed using a one-way ANOVA to detect differences in mitochondrial oxidative capacity between different chemotherapy regimens as well as between treatment time points within each individual regimen. Between treatment differences will be considered statistically significant at a < 0.05 .

Results: Throughout chemotherapy treatment, it is anticipated that the time constant (Tc) it takes the vastus lateralis muscle to reoxygenate will increase indicating skeletal muscle mitochondrial dysfunction. It is also anticipated that there will be between treatment differences in mitochondrial oxidative capacity.

Discussion: The results of this project will further provide insight into how different chemotherapy regimens impact mitochondria at a cellular level, potentially further informing oncology practice regarding the costs and benefits of a chemotherapy regimen. This is a novel way to noninvasively assess mitochondrial function during

treatment in a cancer population, which has not yet been previously studied.

Effect of measuring office blood pressures by automated averaging method on diagnosis of hypertension with ambulatory blood pressure monitoring (ABPM)

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Background: Diagnosing pediatric hypertension requires blood pressure measurements consistently >90th percentile both in the office setting and via ambulatory blood pressure monitoring (ABPM). Blood pressure guidelines are often difficult to follow in a busy clinic and, if done incorrectly, may lead to falsely elevated blood pressures. This, in turn, may lead to unnecessary workup, referrals, intervention, and patient stress. Since diagnosing hypertension depends on accurate office blood pressure measurements, it is important for all general practitioners to determine an efficient and accurate way to measure blood pressure for all children in clinic.

Purpose: The purpose of this study is to determine if change in practice from single oscillometric reading to an automated average of three blood pressure readings by oscillometric device leads to more normal office blood pressures, as evidenced by fewer red flags for elevated blood pressure and fewer diagnoses of white coat hypertension.

Methods :

- Compared two similar time periods in 2019 and 2020. In 2019, single-measurement BPs were obtained with Dinamap^R. In 2020, three office BPs were averaged with Welch Allyn^R Conne vital signs monitor.
- Counted all red flags for high BP (set in the EMR for >95th percentile until 7/1/2020 when transitioned to >90th percentile) during these two time periods compared to total BP measurements.
- Reviewed all the ambulatory blood pressure monitoring studies conducted during these two timeframes, noting the physician's diagnosis and interpretation of ABPM.

- Compared ABPM diagnosis from the two time periods and determined if there was a statistically significant reduction in white coat HTN diagnosis. All analysis done using Excel software.

Results:

Change in practice led to a 13% reduction in the red flagged office blood pressure readings between the two time periods. Change in practice did not have a statistically significant effect on type of blood pressure diagnosis (p value 0.70). Both white coat hypertension and ambulatory hypertension were diagnosed more often in 2020 than in 2019 . There were similar age and sex distribution between cohorts.

Conclusion: Switching to an averaging oscillometric device for office BP led to fewer red flags for elevated BP. A confounding factor exists as the EMR's red flag for elevated BP was changed from >95thpercentile to >90thpercentile 7/1/2020 which affected the last month of the 2020 time period, however there were similar red flag BP measurements in July 2019 compared to July 2020. ABPM diagnosis was not significantly altered by transition to averaging oscillometric device.

Averaging BP at check in for office visits may be efficacious for workflow. If office BP is lowered by repeat measurements, use of an automated averaging system should have led to fewer diagnoses of white coat HTN and more normal BP. Confounding factors include pandemic-related anxiety and loss of schedules leading to more referrals made for ABPM, potentially explaining the increase in white coat HTN diagnoses. Extending the study over several years may show benefit for accurate BP diagnosis as well as workflow efficiency.

Correlation between dietary recall and 24-hour urine sodium in children with kidney stones

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Purpose of study

Nephrolithiasis in children is increasing partly due to higher consumption of sodium. There is little correlation between current tools for sodium intake assessment and the gold standard which is 24-hour urine collection for sodium. We need clinical tools to better assess salt intake in children. The purpose of this study was to compare the 24-hour urine data to self-reported daily sodium intake using a newly available online Sodium Calculator (BigLife).

Methods

We conducted a pilot study involved 6 pediatric patients with nephrolithiasis, age ranging from 11 to 17 years old. For each patient, a 24-hour urine sample was collected and analyzed for electrolytes and compounds (Litholink). The BigLife Sodium calculator was administered over the phone to the patients within a month of urine collection. Statistical significance was set at $p < 0.05$.

Results

For patients who enrolled (4 male and 2 female), the average sodium intake was 4867 mg which is more than the recommended amount based on age and sex (avg 204% more). Reported intake correlated better to calculated Na/K ratio in urine ($R = 0.97$, $p < 0.05$). Urine sodium excretion was higher in subjects who reported higher than 100% RDA intake of sodium. Two thirds of patients had hypocitraturia. One sixth had hypercalciuria.

Conclusion

Using the BigLife Sodium calculator may help screen patients at higher risk for nephrolithiasis. It seems likely that the dietary questionnaire correlates better with Urine Na/K ratio. Based on the small sample size, a valid conclusion cannot be drawn. A larger sample size is needed to accurately delineate the relationship between self-reported sodium intake based on a simple online questionnaire and risk of kidney stones.

ASSESSMENT OF A PATIENT-TAILORED OPIOID DISCHARGE PRESCRIBING GUIDELINE ON EPISODE OPIOID UTILIZATION, PAIN MANAGEMENT, AND PATIENT-REPORTED OUTCOMES

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Introduction

Patients recovering from painful surgical procedures commonly receive opioids during the inpatient and post-operative periods to help manage pain and initiate the recovery process. However, opioids are commonly prescribed in excess of what is necessary to adequately manage postoperative pain, increasing the likelihood of chronic opioid use, pill diversion, and misuse. Common approaches to mitigate this risk adopt a “one-size-fits-all” prescribing approach that only seeks to lower prescribing dosages, potentially leaving patients susceptible to unmanaged pain. Alternatively, Hill et al. proposes a discharge opioid prescribing guideline based on patient opioid consumption within 24 hours prior to discharge. This strategy accounts for individual patient characteristics that affect postoperative opioid needs, providing a patient-tailored approach to discharge prescribing. Little is known about how implementation of this novel discharge prescribing guideline affects patient outcomes.

Purpose statement

We sought to assess the impact of a patient-tailored opioid prescribing guideline on opioid utilization, pain management and patient-reported outcomes in a population of patients receiving ventral hernia surgery.

Methods

A patient-tailored opioid-prescribing guideline was implemented in March of 2018 for patients undergoing inpatient ventral hernia surgery in a large, multi-county healthcare system. We retrospectively assessed opioid utilization, pain management and patient-reported outcomes among patients who did (n=42) and did not receive guideline-based prescribing (n=121) between March 2018 and December 2019. Patient-reported outcomes, operative details, and patient characteristics were extracted from Abdominal Core Health Quality Collaborative (ACHQC) registry data and length-of-stay and prescription information was

extracted from the electronic health record system at the health care institution. All opioid dosages were converted to median milligram morphine equivalents (MME) for analysis.

Results

The MME prescribed at discharge was lower for patients receiving guideline-based care (median=65 (IQR=50-75)) than for those not receiving guideline-based care (median=100 (IQR=60-150)). After adjusting for patient characteristics, the odds of receiving a subsequent opioid prescription after discharge did not significantly differ between patient groups ($p=0.43$). PROMIS pain scores and HerQLes quality-of-life scores also did not differ between patients receiving guideline-based care (Mean PROMIS: 57.3; Mean HerQLes: 53.1) versus those that did not (Mean PROMIS: 56.7; Mean HerQLes: 46.6).

Conclusion

Implementation of a patient-tailored opioid prescribing guideline reduces discharge opioid dosages without increasing subsequent opioid prescriptions after discharge. In addition, we found no differences in pain control or quality-of-life scores after discharge, indicating the amount of opioids prescribed under the guideline were sufficient for patients.

The Effect of Decreasing Glomerular Filtration Rate in Patients Undergoing Peripheral Vascular Intervention

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Purpose: End stage renal disease (ESRD) is a life-threatening condition that is a result of the progression of Chronic Kidney Disease (CKD). Patients with peripheral vascular disease (PVD) are disproportionately impacted by ESRD. Additionally, critical limb-threatening ischemia (CLI) is increased in prevalence in patients with ESRD when compared to the general population. Despite these associations, no quantification of renal function with clinical outcomes in CLI patients undergoing peripheral vascular intervention (PVI) has been performed. Our project sought to explore this relationship in order to guide future treatment strategies for patients with CKD and ESRD undergoing PVI.

Methods: A retrospective chart review was performed on 267 patients who underwent PVI at Prisma Health Richland between January 2014 and May 2019. The preoperative glomerular filtration rates (GFR) of these patients were collected, and a one year follow-up was performed via chart review. Patients were excluded if preoperative vascular lab studies were not completed, or if one year follow-up was not obtained. Hazard ratios for the mortality and retreatment rates with respect to preoperative GFR values were calculated using a Cox regression analysis.

Results: A total of 267 patients were examined. The average GFR was 64.4 mL/min with a standard deviation of 34.0 mL/min. Of this population, 18.1% of patients experienced death within one year. Additionally, 20.0% of patients needed endovascular retreatment within one year. Patients with a GFR <30 mL/min had the highest mortality and retreatment rates at 45.9% and 40.5%, respectively. As GFR increased, mortality and retreatment rates tended to decrease in our patient population. A hazard ratio for mortality and retreatment rates was calculated with values of 0.968 and 0.987, respectively, indicating a 3.2% reduced risk of mortality and a 1.3% reduction in retreatment per unit of GFR.

Conclusion: Lower GFR led to poorer outcomes in patients who underwent PVI. Because GFR is an indicator of renal function, it can be concluded that those with more progressive CKD or ESRD had poorer outcomes than patients with a higher GFR. The higher retreatment and mortality rate seen in this population leads to increased burden on hospital systems and decreases the overall quality of care provided. Our findings point to the existence of an underlying biochemical pathway

that has yet to be elucidated connecting decreased GFR with a worsened atherosclerotic response. Management strategies for CLI patients who undergo PVI should include consideration of renal function and progression of the patient's renal disease.

Attitudes Toward Syringe Exchange Programs in a Rural Appalachian Community

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Purpose statement – To evaluate attitudes concerning syringe exchange programs (SEPs) in a rural Appalachian community as part of a larger effort to implement evidence-based harm reduction strategies and improve health outcomes related to opioid use disorder.

Background – For persons who inject drugs (PWID), provision of sterile syringes through syringe exchange programs (SEPs) has repeatedly been shown to reduce disease incidence and associated negative health outcomes, especially when coupled with other harm reduction interventions. Compared to PWID that never engage with an SEP, those who regularly engage are more than 5 times as likely to enter SUD treatment and more than 3 times as likely to report discontinuing injection drug use. Despite the well-documented efficacy of SEPs and consistent evidence that they do not increase drug use or improper disposal of syringes, only 33 states presently have laws explicitly authorizing such programs. Despite recent positive trends in the expansion of SEPs, syringe exchange coverage in the United States remains inadequate, a deficiency especially prominent in the rural South. Residents of Appalachia are 47% more likely to die of a drug overdose than those living elsewhere in the United States. Oconee County, an entirely rural Appalachian county, follows this trend. The drug overdose death rate in Oconee County is 37.5 deaths per 100,000, a rate significantly higher than the state average of 22.7 deaths per 100,000. The various barriers to greater SEP penetrance can largely be traced back to stigma towards persons who use drugs. Stigma has been recognized as the largest hurdle to overcoming legal and policy barriers and is a substantial contributor to the current lack of funding for SEPs. In response to the local opioid epidemic, Oconee County Opioid Response Taskforce (OCORT) was convened in January 2019.

Methods – A 24-item OCORT Community Attitudes Survey was conducted between mid-March and mid-April of 2019. The survey was disseminated via online methods. Survey items were grouped into the following content categories: substance use disorder (SUD) knowledge, stigma towards individuals with OUD, naloxone administration and availability, and infectious disease and harm-reduction

services.

Results – 361 individuals responded. Overall, 49.3% of respondents indicated support for syringe exchange. Individuals who support syringe exchange are more likely to: agree that opioid use disorder is a real illness ($p < 0.0001$); agree that anyone can become addicted to pain medications ($p = 0.01$); agree that medication assisted treatment is effective ($p < 0.0001$); agree that individuals with OUD have the same right to a job ($p < 0.0001$); be willing to administer naloxone to a stranger ($p < 0.0001$); support HIV and HCV screening ($p < 0.0001$), condom distribution ($p < 0.0001$), and medication for opioid use disorder ($p < 0.0001$). They are less likely to believe that harm reduction services encourage drug use ($p < 0.0001$).

Conclusion – Strong positive correlations exist between support for SEPs, understanding of the neurobiological basis of OUD and support for other harm reduction strategies in this survey of a rural Appalachian community. Markers of stigma towards individuals with OUD are negatively correlated with support for SEPs. Given the recognized significance of community support in the establishment and operation of SEPs and the known lack of SEP coverage in rural communities, this study suggests that efforts to improve recognition of OUD as a chronic illness and reduce stigma towards those with OUD might be expected to improve rural community acceptance of SSPs and hasten the evolution and acceptance of evidence-based public health policy. Future research should focus on finding effective methods of increasing community support through stigma reduction.

Ciliated Hepatic Foregut Cyst: case series and review of the literature

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Introduction: A ciliated hepatic foregut cyst (CHFC) is a rare and benign cyst of the liver, derived from the embryonic foregut epithelium. While typically asymptomatic, it may present with signs of biliary obstruction and abdominal pain. Imaging findings are nonspecific, with varying degrees of density on computed tomography (CT) and intensity on magnetic resonance imaging (MRI). Definitive diagnosis requires biopsy demonstrating ciliated pseudostratified columnar epithelium surrounded by a subepithelial connective tissue layer, smooth muscle layer, and an outer fibrous capsule. While usually benign, malignant transformation to squamous cell carcinoma (SCC) has been noted, particularly for large lesions, which portends a poor prognosis.

Purpose Statement: We present a case of a ciliated hepatic foregut cyst and a comprehensive review of all case reports of CHFCs in English literature. Based on the results of the review and the case, we aim to understand CHFC through imaging and biopsy, understand the malignant potential of CHFC, and understand the treatment and diagnostic paradigm for optimal patient care.

Methods: An extensive search of English literature was conducted using keywords "ciliated hepatic foregut cyst", and all reported cases were recorded. Radiologic findings, diagnostic method, pathological findings, and presence of malignancy were recorded from each of the cases, in addition to basic information such as age, gender, size, location, and symptoms.

The electronic medical record of a patient with CHFC was reviewed in Epic Systems, and patient information including age, gender, presentation, radiologic findings, pathologic findings, diagnostic method, and treatment was recorded.

Results: A 75-year-old male, diagnosed with adenocarcinoma of the lung suggestive of pancreaticobiliary origin, underwent an abdominal and pelvic CT to identify the primary lesion. The CT revealed an indeterminate hypoattenuating lesion in segment 4b of the liver. Additionally, intrahepatic ductal dilation was noted in segment 5, prompting concern for an intrahepatic cholangiocarcinoma. A CT-guided core biopsy revealed benign hepatocellular parenchyma without atypical change. However, cholangiocarcinoma was still a concern. A robotic partial hepatectomy was completed and histology revealed a CHFC. To date, the patient continues to be treated for the lung adenocarcinoma of unknown primary.

66 cases of CHFC were reported in English literature. The review showed variability in the imaging features of CHFCs. CHFCs were always hypoechoic on ultrasound (30/32, 94%). On CT they are almost always hypodense (33/37, 89%) and never demonstrated enhancement. CHFC had high variability on T1 MRI with 63% hyperintense (10/16), 19% hypointense (3/16), 19% isointense (3/16). T2 MRI predominately demonstrated a hyperintense lesion (22/23, 96%). Excisional biopsy was the most common method of diagnosis. Fine needle aspiration resulted in a diagnosis in 62% (8/13) of cases. Core biopsy was diagnostic in 2 out of 2 cases. Squamous metaplasia and/or malignant transformation into SCC was not uncommon (10/66, 15%), with SCC in 9% (6/66). The size of the cysts in squamous metaplasia and SCC (median 9 cm, IQR 5.25) was significantly larger than non-metaplastic cysts (median 3 cm, IQR 4; $p < .001$). Malignant transformation was associated with a poor prognosis. Outcomes were reported in 5 cases; 4 (80%) had recurrence of disease or metastasis, and 2 (40%) died within 9 months of diagnosis.

Conclusion: Diagnostic and treatment algorithm was created, and resection is recommended if CHFC is highly suspected or diagnosed with FNA or core biopsy due to the risk of SCC.

The Use of Patient Specific 3D Printed Anatomical Models in Pre-Operative Planning and Patient Engagement to Improve Hip Arthroscopy Outcomes

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Introduction: Femoroacetabular impingement (FAI) of the hip is a condition where the head of the femur and the acetabulum contact each other during movement, causing pain. Hip preservation surgery, usually arthroscopic, has become the major means of treatment for symptomatic FAI.

Purpose Statement: The purpose of this project is to improve the outcome of femoroacetabular impingement resection procedures by developing a process to produce patient specific 3D models that can be used by surgeons to develop a pre-operative plan. The 3D printed model will better help the surgeon understand the mechanical problem, show areas of planned resection, and allow for simulated dynamic motion of the hip model. Further, the model can help the patient understand the pathology, need and outcomes related to surgery by aiding with education about FAI with the surgeon demonstrating the exact model of the patient's hip during an pre-operative educational session.

Methods: To create the 3D model, a de-identified CT scan of a patient with FAI will be uploaded into a 3D modeling generator. The femur and pelvis model will be separated and 3D printed. The surgeon will assess the benefits and challenges of using the 3D printed model in pre-operative planning. A patient understanding survey will also be implemented as a part of the pre-operative planning using the 3D printed models.

Results: We hypothesize that the 3D printed model will better help the surgeon understand the pathologic anatomy and mechanical problem, show areas of planned resection and allow for simulated dynamic motion of the hip model. This benefit should also be demonstrated on the patient education surveys after the surgeon uses the 3D model to educate during the pre-operative visit.

Conclusion: Therefore, we expect to find a difference between pre-operative planning using 2D imaging and 3D imaging, showing that the model would be more useful in resection than traditional 2D estimates. Finally an additional benefit of patient understanding should be demonstrated from statistical analysis of the patient education surveys comparing knowledge of FAI pre-model and post-model

use for patient education.

DEVELOPMENT OF A LENGTH-ACTUATED TRANSFEMORAL PROSTHESIS BASED ON DYNAMIC LEG LENGTH MODELING

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INTRODUCTION: The goal of post-therapy ambulation for unilateral transfemoral amputees is to restore proper gait biomechanics and functional symmetry between the prosthetic limb and the intact limb. Most current prostheses induce asymmetrical loading and kinematics that lead to increased muscle activity and metabolic energy expenditure, and an increased incidence of falling due to poor balance, toe clearance and knee buckling. There is a need to explore novel prosthetic designs, such as a length-actuated prosthesis, that can achieve functional symmetry with direct control over leg length and the resulting biomechanics.

METHODS: A custom model was developed where the three critical measurements of hip joint center to heel (HJC-HEEL), hip joint center to ankle joint center (HJC-AJC), and hip joint center to forefoot/toe (HJC-FF) were calculated. This computation incorporated anthropometric limb segment measurements and dynamic joint angles for the hip, knee, and ankle with the development of trigonometric equations for each leg length. The computational model was validated against an experimental motion capture study of dynamic leg length (DLL). This waveform was adjusted for a SideKicksTM prosthetic foot and then the critical lengths for HJC-HEEL, and HJC-FF were transitioned to HJC-AJC measurements because the length-actuated prosthesis will act along the HJC-AJC line. This waveform is the basis for linear leg length changes programmed into the motor of the prosthesis and achieved with the ball screw movement. A force sensor on the heel of the prosthesis was implemented to track the gait cycle time and initiate appropriate leg length changes. A single able-bodied subject has tested the prosthesis for safety, and correct actions/reactions during treadmill walking. An upcoming study will fit amputees with this prosthesis and use motion capture and electromyography to determine if their biomechanics are more symmetrical than standard prostheses.

RESULTS: The mathematical model yielded an accuracy of 98.65% for HJC-HEEL, 99.4% for HJC-AJC, and 98.60% for HJC-FF when compared to experimental data from Khamis et al. (Figure 1). Our computational model averaged less than 1.4% (0.47-in) error with the experimental DLL measures from the literature, which clinically validates this model for determining leg length symmetry. This model has

been applied to the leg length waveform for the length-actuated prosthesis and the combination of a ClearPath® NEMA 23 servo motor and (0.2-in lead) ball screw was able to achieve the proper speed and torque for the waveform with applied body weight. Testing of an able-bodied subject on the prosthesis showed safe movements and sensor actuation (Figure 2).

CONCLUSIONS: This prosthesis is the only one being developed to replace the flexion and extension of a knee joint with dynamic linear motion (patent: US10898350). A length-actuated prosthesis may be able to increase the biomechanical symmetry between the prosthesis and intact leg. With direct control over leg length, toe clearance and push-off forces can be optimized with the hypothesis that this will result in decreased muscle recruitment and energy expenditure. A more symmetrical gait may also help minimize the long-term effects amputees often face such as chronic pain in the low back, hip, and knee.

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Evaluation of the 2016 Grading System of Post-operative Pancreatic Fistulas: A Single Institution Review of Definition Relevancy

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Purpose: Biochemical leaks (BLs) and post-operative pancreatic fistulas (POPFs), Grade B and Grade C, are a complication of pancreatic resections- distal pancreatectomies and pancreaticoduodenectomies- resulting in significant morbidity and potential mortality (1.23%). In 2016, the International Study Group on Pancreatic Surgery (ISGPS) changed the POPF diagnostic and grading criteria for POPFs. The 2016 POPF definition requires a drain fluid amylase level >3 times the serum amylase necessitating a clinically relevant alteration in treatment, which ultimately determines the POPF grade (B or C). In light of these updated guidelines, we evaluated the utility of the new POPF diagnostic and grading criteria to stratify patients in a single institution.

Methods: A retrospective evaluation of pancreatic resection patients from a single institution between 3/1/2016 and 5/1/2021 was completed. Typical demographic and clinicopathologic data were collected to include POPF indicators. Patients for whom complete records were unavailable were excluded.

Results: Overall, 156 patients were included in the study (69% no POPF; 11% biochemical; 16% Grade B; 4% Grade C). No significant differences were noted for demographic variables except for BMI ($p=0.0115$) which portended worse outcomes. Diagnosis of pancreatic adenocarcinoma or chronic pancreatitis were significantly associated with poorer outcomes ($p=0.0011$, 0.0187 , respectively). Post-op nutritional support demonstrated a significant increase in the use of TPN for Grade B and C ($p=0.0045$). Additionally, LOS ($p<0.00131$) correlated with grade of POPF: Grade B 14.2 days, Grade C 22.7 days.

Patients in the Grade B POPF category specifically were diagnosed by any of the following treatments/combination: antibiotic management (56%), somatostatin analogues (36%), persistent drainage for >3 weeks (64%), or additional drain placement (32%). Grade B POPF patients who only had persistent drainage for >3 weeks had an average length of stay of 6.8 days, which is shorter than all patients

who underwent PD or DP (10.5). Grade B POPF patients who received TPN had a mean length of stay of 22.75 days.

Conclusion: These data demonstrate that poorer outcomes are associated with increasing grade of POPF, necessitating early diagnosis and management. Standardization in post-op lab draws for the assessment of POPF may help identify not only BLs, but potentially mitigate POPFs, providing an opportunity to decrease advanced nutritional support (TPN) and LOS, thus optimizing patient outcomes post-pancreatic resection.

Moreover, in evaluating Grade B POPFs specifically, it is apparent that the current grading system is exceedingly broad and does not stratify patients meaningfully. It is crucial to further investigate Grade B POPFs, create more useful subcategories, and implement these subcategories to better assess clinical outcomes.

Evaluating Time to Discharge after Closed Reduction and Percutaneous Pinning of Uncomplicated Type III Supracondylar Humerus Fractures: A Single Center Retrospective Review

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Purpose statement: The purpose of this retrospective study was to review complications following closed reduction, percutaneous pinning of isolated, uncomplicated type III supracondylar fractures to evaluate if patients may be discharged safely the day of surgery.

Methods: A retrospective chart and radiographic review was performed of patients with uncomplicated Gartland type III supracondylar humerus fractures who underwent closed reduction and percutaneous pinning over a 4 year period. We specifically reviewed admission time to the emergency department, time of surgery, length of surgery, time to discharge, post-operative complications, readmission rate, and office follow up visits.

Results: A total of 110 patients were included. Of the included patients, 19 patients were discharged in less than 6 hours, 45 patients between 6 and 12 hours, and 46 patients greater than 12 hours. A total of 61 patients were discharge on the same business day as surgery, 49 were discharged on the next day. There was a total of 11 post-operative complications. Patients discharged in less than 6 hours from surgery, there were no post-operative complications. Patients discharged between 6 and 12 hours post operatively, only one patient returned to the office earlier than scheduled.

Conclusions: The results of our retrospective review of uncomplicated Gartland type III supracondylar humerus fractures suggests that patients may safely be discharged within the 12 hour post-operative period with no increased risk of complication. This is contingent upon the patient having a stable neurovascular examination, the patient's pain being controlled, and the patient's caregiver comfort level. This can result in decreased medical cost, family stress, and burden to the hospital system. Time to discharge should still be evaluated on a case by case basis after evaluating medical and social barriers.

Previvor and High-Risk Breast Cancer Patients' Opinions on a Specialized Management Clinic

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Approximately 5-10% of cancers are thought to be hereditary, caused by pathogenic variants in genes associated with inherited cancer syndromes. *Previvors*, individuals who have a higher predisposition to cancer due to genetic or other risk factors, have reported difficulties adhering to recommended medical management and have increased feelings of uncertainty and isolation compared to an average risk population. The specific healthcare and psychological needs of previvors have led to the development of a specialized management clinic in some healthcare systems. This study compared the experiences of previvors who had access to a specialized management clinic ($n = 19$) with those who did not ($n = 7$) from one hospital system, in order to better understand the unique needs of previvors. This study utilized a mixed methods design including an online survey ($n = 26$) and semi-structured phone interview ($n = 6$) of individuals who were mutation positive in a hereditary breast cancer risk gene or had a Tyrer-Cuzick or other risk model score of 20% or greater. Overall, previvors with access to a specialized management expressed a reduction in stress level ($n = 5$) as a result of the services that this clinic provided. The clinic provides an expedited ($n = 2$) and simplified ($n = 5$) clinical process in regards to obtaining the necessary and unique medical care required for previvors. Previvors also felt supported by this clinic through the provision of information needed to make informed decisions regarding their medical care ($n = 8$). Previvors who did not have access to a specialty clinic described challenges with finding information about their risk ($n = 4$), receiving care from general practitioners ($n = 3$), and having questions unanswered by healthcare providers ($n = 6$), supporting previous literature stating that previvors found interactions with their healthcare providers overwhelming. All participants without access to a management clinic were interested in attending a specialized previvor clinic and specifically desired a team of specialists familiar with genetics, a forum to ask questions, and a clinic that would ensure their care meets the current recommendations. This study adds support to the need for specialized management clinics designed with previvors' needs in mind in order to provide these patients with the most appropriate care in a simplified and less stressful manner.

Identifying Sites Of Lysine Acetylation Which Regulate SDH Activity In Cardiac I/R

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Purpose Statement: Rapid reperfusion of ischemic tissue is the primary treatment for patients suffering a myocardial infarction, but reperfusion can cause tissue damage by increasing reactive oxygen species levels. It has previously been shown that during ischemia the citric acid cycle intermediate succinate builds up and upon reperfusion succinate dehydrogenase (SDH) rapidly converts succinate to fumarate generating a burst of reactive oxygen species (ROS). Acetylation of lysine residues appears to be the main regulator of SDH activity and preliminary findings have shown a specific lysine corresponding to K480 on mouse succinate dehydrogenase A (SDHA) as a target for mitochondrial histone deacetylase 1 (HDAC1) deacetylation. It appears that deacetylation of the lysine residue on the SDH enzyme via HDAC1 results in increased enzyme activity. To determine if K480 acetylation/deacetylation plays a role in SDH activity we used CRISPR/Cas9 to generate K480R and K480Q mutants to determine differences in SDHA activity levels between the two mutant lines. We hypothesize that the lysine to glutamine mutation will mimic the acetylated lysine residue and therefore have a lower level of SDH activity when compared to wildtype while the arginine mutant will prevent acetylation and have a slightly higher level of SDH activity.

Methods: Preliminary data has shown that Rat K472 is hyperacetylated during ischemia-reperfusion when treated with an HDAC1 inhibitor rendering the enzyme inactive. This specific lysine residue was identified using mass spectrometry from samples of Rat hearts that were subjected to 30min ischemia and 60min reperfusion and treated with an HDAC1 Inhibitor. Rat K472 corresponds to Mouse K480 and it was previously shown in isolated mitochondria that K480R mutation has WT SDH activity, while the K480Q mutation has decreased SDHA activity when overexpressed in HEK293 cells. To determine if the same holds true for live mice we used CRISPR/CAS9 to generate SDHA K480Q and K480R mice. Hearts from K480Q, K480R, and WT mice were harvested, and the left ventricle was isolated to use with abcam's Succinate Dehydrogenase Activity Assay Kit. To clarify that the SDHA protein was present in our samples we used a western blot analysis with an SDHA antibody.

Results: K480 appears to be the location of deacetylation by HDAC1 and a K480Q mutation in isolated mitochondria from HEK293 cells shows decreased SDHA activity when compared to K480R and WT. CRISPR/CAS9 was successfully used to

generate K480Q and K480R mutant mice with no discernable phenotype changes. SDHA is a Krebs's cycle enzyme that is also part of the complex II electron transport system that plays a role in generating ROS post-reperfusion and it is activated by deacetylation of lysine residues via HDAC1. SDHA activity of cardiac tissue in the K480Q and K480R mice showed no significant difference when compared to WT, but the trend suggests K480R has the least amount of SDHA activity.

Conclusions: The goal of this study was to generate mutant mouse lines that would allow for the testing of a mitochondrial-specific HDAC1 inhibitor (MitoDac). Unfortunately, unlike our overexpression studies in HEK293 cells, we did not see a difference in SDH activity in the K480Q and K480R mice. It is possible that either another lysine regulates activity or more than one lysine. It is also possible that in living mice mechanisms of SDH regulation exist other than K480 acetylation. There may also be other physiological compensations altering SDHA activity in living mice that we did not observe in isolated mutant cell lines. Further research is needed to understand SDHA's regulation in order to identify a potential approach to limiting free radical damage during cardiac reperfusion post-myocardial infarction.

Physician Perceptions of Fatigue in an Academic Emergency Department

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Purpose Statement: Research has shown that shift workers experience relatively poor sleep and increased fatigue, and that these effects are associated with adverse impacts on the workers themselves as well as their work quality (e.g., safety incidents, decreased performance). While considerable research has been performed on fatigue, including on risk management and intervention strategies, little research has been conducted in the field of Emergency Medicine, especially with emergency physicians (EPs). Given this dearth of knowledge on EP fatigue, a qualitative study with EPs was conducted, with the goal of gaining insight into emergency physician perceptions of fatigue at work.

Study Design/Methods: Fifteen semi-structured, virtual interviews, along with 2 focus groups (total $N = 20$) were conducted with EPs from the department of Emergency Medicine at Prisma Health-Upstate. Interviews lasted approximately 30 minutes each (ranging from 15 to 60 minutes) and included 9 questions. The interviewer asked additional follow-up questions as needed throughout each interview, and some of the interviews ended without getting through all 9. Interviews were transcribed by a paid, third-party service, and then the data were analyzed using qualitative analysis software (atlas.ti 9). The analysis followed Grounded Theory framework and Consensual Qualitative Research guidelines. Specifically, the data were open coded, using team consensus to develop a codebook that described themes as they emerged in the data. Then, we used axial and selective coding techniques to tie the emergent themes to theoretical frameworks from the fatigue, stress, and medical literatures.

Results/Findings: Four areas emerged with a strong thematic presence in the interviews that are pertinent to this study: sources of fatigue, consequences of fatigue, the inevitability of fatigue in emergency medicine, and prevention and mitigation strategies of fatigue. The number of interviews in which each theme was discussed is included in parentheses out of 17 total interviews/focus groups. We found that some of the EPs' experiences with the sources and consequences of fatigue were consistent with other types of shift workers, but they also reported unique fatigue perceptions. EPs indicated experiencing a variety of specific work- and home-related sources of fatigue, including shift scheduling and unpredictability (14/17), sleep issues (10/17), work overload (9/17). Participants also reported a variety of consequences of fatigue at work, including impacts on attitude (6/17), cognition (5/17), general work performance (8/17), professionalism (9/17), and

collegiality (4/17). Interestingly, in addition to discussing sources and consequences of fatigue, participants discussed the inevitability of fatigue in emergency medicine due to traumatic and emotionally taxing work experiences, work unpredictability, and the 24/7 shift work nature of the job. Indeed, discussion of the nature of emergency medicine and inevitability of fatigue in this type of work were some of the most prolific themes to emerge from the data (12/17). Finally, participants shared prevention and mitigation strategies (16/17) that they implement that in their judgment have been effective against fatigue. These strategies involved diet- (9/17), exercise- (10/17), and sleep- (10/17) related habits, as well as strategies to implement while at work (9/17), such as throttling the pace at which they take-on new patients/tasks.

Conclusions: EPs experience fatigue, with potentially serious consequences at both work and home. Additionally, this study suggests that EPs might incorporate this inevitability of fatigue at work into their identity as emergency physicians. One theory from the psychology literature that helps explain this phenomenon is the theory of Learned Helplessness. Learned Helplessness states that individuals who perceive an inability to control a situation ultimately relinquish efforts to change it. Learned helplessness has been shown to be associated with a host of negative outcomes, including depression. More research is needed to test potential interventions to reduce fatigue and limit the sense of learned helplessness, such as education and increased control over scheduling and other aspects of emergency medicine work.

Cardiac Amyloidosis and Transcatheter Aortic Valve Replacement

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Background: Cardiac amyloidosis (CA) is the deposition of insoluble abnormally folded proteins, light chain or transthyretin, causing a restrictive cardiomyopathy. CA can be associated with aortic stenosis (AS), leading to a reduced quality of life, heart failure, and death. The prevalence of CA within all AS patients is approximately 8%, with a higher prevalence of 16% in an older cohort (> 74 years). AS patients with concomitant CA had significantly higher (56%) 1-year all-cause mortality than patients with isolated AS (20%). Advances in diagnostics that no longer require a cardiac biopsy and the recent emergence of effective treatments make CA a vital condition to identify to achieve optimal patient outcomes. Aortic valve replacement is a treatment option for CA patients to address symptomatic AS, which can be done noninvasively with a transcatheter aortic valve replacement (TAVR). TAVR has become more frequently used to treat AS in recent years; the number of TAVR procedures have increased 338% from 2012 to 2016. TAVR is often used as the replacement technique, but outcomes for CA patients following TAVR have not been well documented.

Purpose statement: This study prospectively evaluates the presence of CA in patients undergoing TAVR at a single regional medical center. It aims to improve understanding of CA in the TAVR patient population by identifying common patient characteristics and co-morbidities of patients undergoing TAVR found to have CA.

Methods: Patients undergoing TAVR at our medical center underwent a bone nuclear scintigraphy scan to assess for the presence of transthyretin cardiac amyloidosis (ATTR). The patients were then grouped according to the results of the nuclear medicine scan into patients positive, equivocal, and negative for ATTR. In this study, patient characteristics and co-morbidities preselected based on past research were documented for all TAVR patients and compared between each of the patient groups.

Results: A total of 139 TAVR patients have their nuclear scintigraphy amyloid scans completed to date since February 2020. Of these patients, 6 were positive for ATTR (4.32%), 13 had equivocal scans (9.35%), and 120 had negative scans (86.33%). Patients with nuclear scintigraphy scans positive for ATTR had an average age of 84 years, which is higher than patients with equivocal scans (79 years) and negative scans (75 years). The ATTR group was 66.67% male, equivocal was 61.54% male, and negative was 52.50% male. Of the co-morbidities assessed, the ATTR group had higher rates of heart failure, heart failure with reduced ejection fraction, complete heart block, chronic kidney disease, and cataracts than the equivocal and negative groups. The ATTR and equivocal groups had higher prevalence of atrial fibrillation and pacemaker implantation than the negative group. The rates of heart failure with preserved ejection fraction were comparable between groups 33.33%, 38.46%, and 39.17% for ATTR, equivocal, and negative groups respectively. The rates of diabetes mellitus and arthroplasty were lower in the ATTR group than negative and equivocal groups.

Conclusion: These findings confirm that ATTR is present within the general population of patients with severe symptomatic aortic stenosis undergoing TAVR. Advanced age, heart failure, complete heart block, chronic kidney disease, and cataracts are more common in ATTR patients in this TAVR patient population. These findings benefit patient care by identifying characteristics and co-morbidities that in combination raise clinical suspicion for transthyretin cardiac amyloidosis, facilitating earlier diagnosis. Further work is planned to identify echocardiogram and electrocardiogram findings typical of ATTR that can then be combined with the characteristics indicated in this study to better identify ATTR patients. Delineating ways to identify ATTR earlier in disease course will be beneficial to patient outcomes by leading to earlier treatment to minimize further progression of the disease.