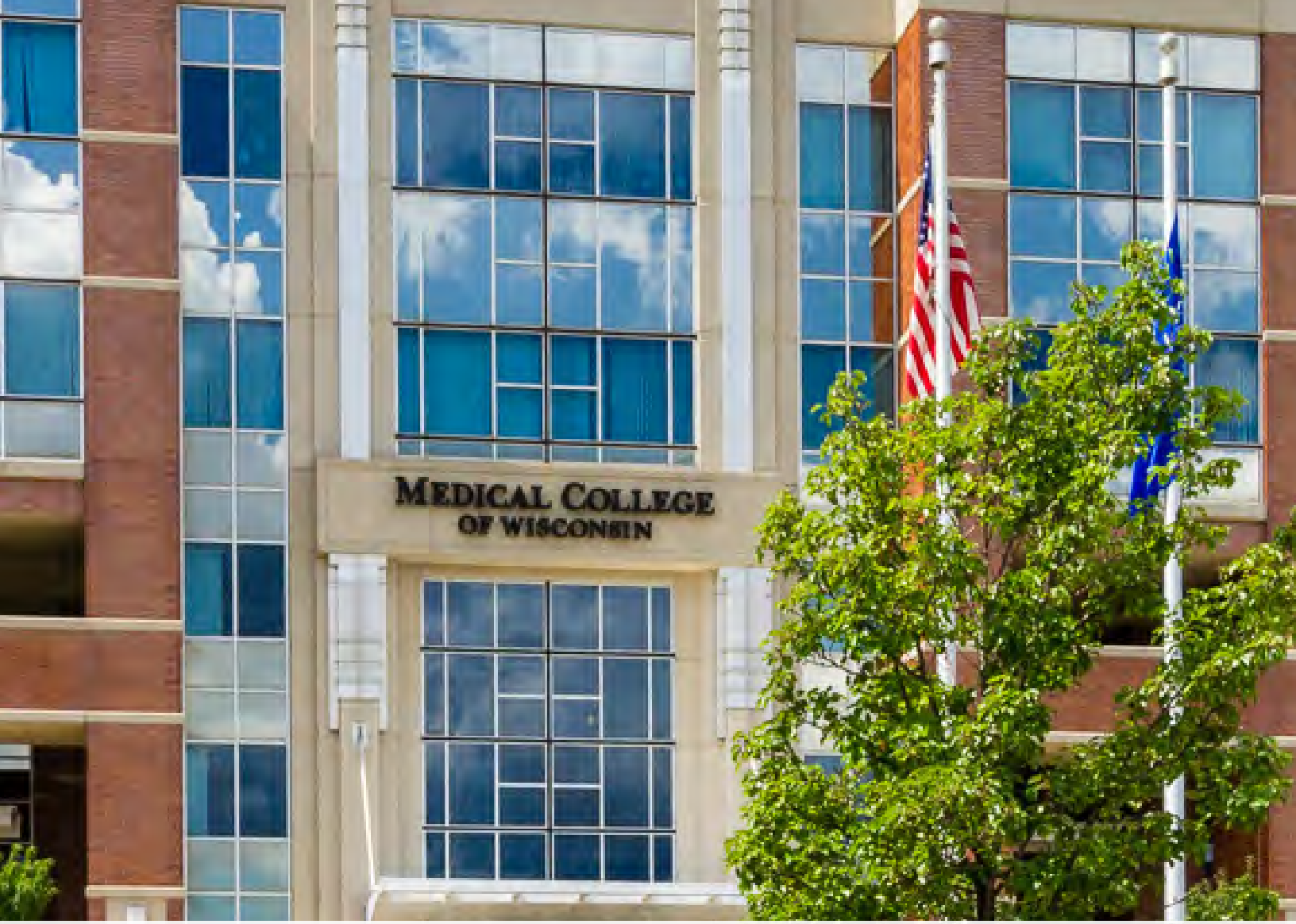
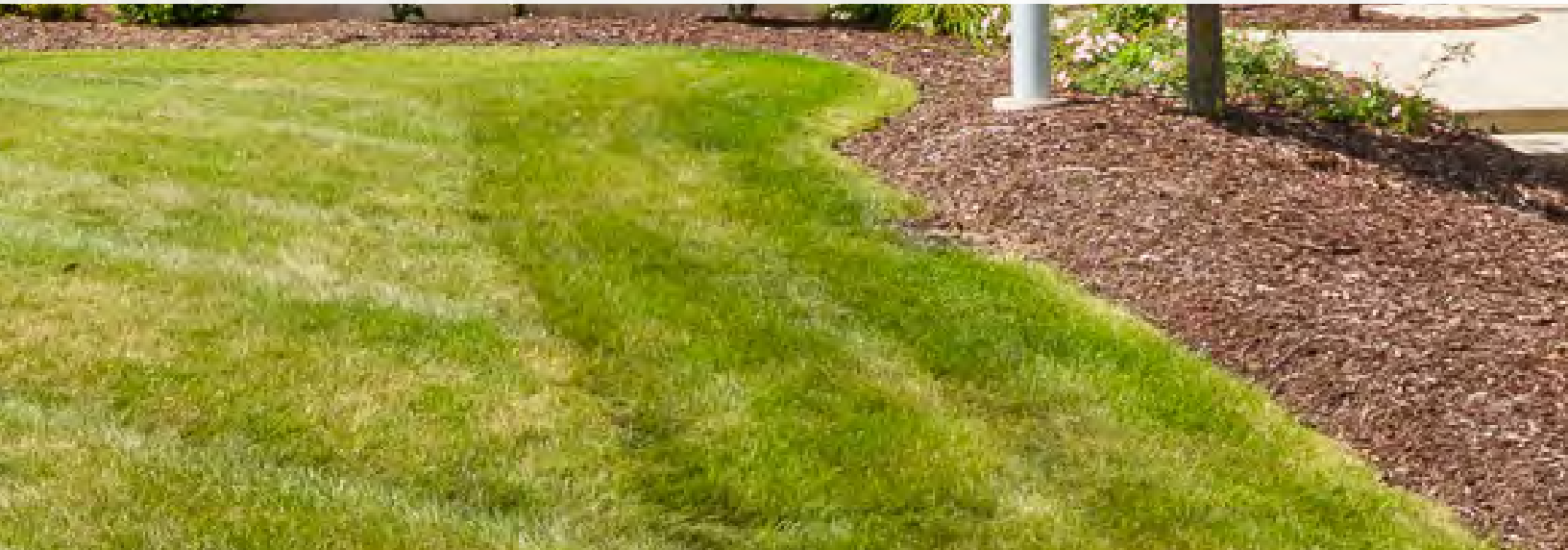



MCW
Milwaukee

# SCHOLARLY PROJECTS
## CLASS OF 2023



## Dean for Scholarly Activities: David Brousseau, MD, MS

## School of Medicine Scholarly Pathway Directors

| | |
|---|---|
| Bioethics & Medical Humanities | Cynthiane Morgenweck, MD, MA<br>Ashley Pavlic, MD<br>Arthur Derse, MD, JD |
| Clinical & Translational Research | Joseph Carroll, PhD<br>Jennifer Knight, MD, MS |
| Clinician Educator | Joseph Budovec, MD |
| Global Health | Kirsten Beyer, PhD, MPH<br>Megan Schultz, MD |
| Health Systems Management & Policy | John Meurer, MD, MBA<br>Mark Lodes, MD |
| Molecular & Cellular Research | Joseph Carroll, PhD<br>Alison Kriegel, PhD |
| Quality Improvement & Patient Safety | Catherine Ferguson, MD |
| Urban & Community Health | Rebecca Bernstein, MD, MS<br>Linda Meurer, MD, MPH |

### Scholarly Pathway Staff Team

Meaghan Hayes, MEd
Sarah Leineweber
Rachel Sommer, MS

Scholarly Pathways are a required component of the M1 and M2 year of the Discovery Curriculum. Students select an area of concentration through which they enrich and individualize their medical training, while exploring an area of interest. Students can apply to participate during M3 year, of which 48 Class of 2023 students were accepted to participate.

Each Pathway course features a structured curriculum with monthly learning sessions (core), and an experiential component (noncore) that follows an Individual Learning Plan (ILP) guided by a faculty advisor.

Students must complete a faculty-mentored Scholarly Project which meets *Glassick Criteria for Scholarship* by the end of M3 year regardless of M3 Pathway participation. Current M3s and their Scholarly Projects are featured here.

## Agbeh, Abiye — Quality Improvement and Patient Safety

***The Rounds Efficiency Index: A novel physics-based construct for patient- and family-centered rounds***

**Authors:** Tuomela K, Agbeh A, Bauer S, et al.
**Project Mentor:** Michael Weisgerber, MD
**Mentor's Department:** Pediatrics

BACKGROUND: Patient-and family-centered rounds (PFCR) are integral to pediatric practice leading to improved outcomes, family satisfaction, and holistic care. Rounding efficiently is one goal that can be challenging for individuals and programs. In physics, efficiency is the ratio of work output to work input. We sought to evaluate PFCR efficiency by establishing a novel construct rooted in physics.
OBJECTIVES: 1) Establish baseline work output for three areas of clinical work (CW), educational effectiveness (EE), and family experience (FE) 2) Establish baseline work input for round length (RL) 3) Calculate the rounds efficiency index (REI) construct as a measure efficiency for PFCR.
METHODS: Data was collected on four components of rounds efficiency on five inpatient acute care teams at Children's Wisconsin. CW was evaluated as the percent of daily orders placed on rounds. Clinical order entry was abstracted from the electronic health record with a 10-point CW rating system during an initial baseline study period. EE was assessed on a 1 to 10 scale via survey for students and residents while FE was rated from 1 to 10 by families during post-rounds interviews. RL was recorded in minutes per patient. A subsequent intensive study period analyzed four 2-week increments. The REI (reported as %) was calculated as a ratio of work output/work input using aggregate mean/median ratings for CW, EE, FE, and RL.
RESULTS: Baseline data included 809 orders, 28 EE ratings, 21 FE ratings, and RL mean of 11.4 minutes per patient. During the intensive study period, the median REI for block 13 (end of academic year) of 64% was significantly higher than block 1 (start of next academic year) at 54.4% (p=0.015) using the Kruskal-Wallis test.
CONCLUSION: The REI is an innovative construct that measures PFCR efficiency utilizing CW, EE, FE, and RL. By measuring efficiency, it is possible to accurately target interventions while improving patient care and education to families and trainees.

## Aiken, Matthew — Poster 1 — Bioethics & Medical Humanities

***Fast Facts and Concepts: Compassion Fatigue and Compassion Satisfaction***

**Authors:** Aiken M, Foutz R.
**Project Mentor:** Cynthia Morgenweck, MD and Renee Foutz, MD
**Mentor's Department:** Emergency Medicine and Hospice and Palliative Medicine

Compassion Fatigue (CF) is a stress disorder that can develop when caring for others who are suffering. Often referred to as "the cost of caring," it can manifest as emotional exhaustion after attending to persons who are experiencing physical and/or emotional pain. In contrast, Compassion Satisfaction (CS) is the emotional fulfillment that is associated with caring professions. When CF becomes out of balance with CS, it can have negative consequences on personal well-being, and potentially lead to decreased quality of care with poor patient outcomes. This Fast Fact will focus on defining both CF and CS, as well as discussing methods for management and prevention of CF.

## Ali, BS, Syed — Poster 5 — Clinician Educator

***Does the Surgical Clerkship Meet the Knowledge and Skills Needs of Practicing Primary Care Providers?***

**Authors:** Ali SO, Kastenmeier A, Lewis BD.
**Project Mentor:** Brian Lewis, MD
**Mentor's Department:** Surgery

INTRODUCTION: A substantial number of medical students enter primary care (PC) specialties (22%). Medical school wide curriculum changes have occurred at MCW, most recently 10 years ago. We have completed an evaluation of our updated surgical clerkship with the needs of PC practitioners in mind. We surveyed recent MCW graduates practicing PC in Wisconsin asking questions about their experiences regarding the surgical clerkship curriculum at MCW.
METHODS: A survey was e-mailed to 129 recent MCW graduates practicing PC in Wisconsin. Included in this group were internal medicine, family medicine, Ob/Gyn, and pediatrics. Two follow-up reminder emails were sent to all non-respondents. Respondents rated the overall importance of 10 core curricular areas; general surgery, orthopedics, plastics, transplant, vascular, cardiothoracic, pediatric surgery, otolaryngology, neurosurgery, and urology. Respondents also rated the importance of exposure to 24 core surgical diagnoses covered in the surgery clerkship and were asked to self identify important office procedures to their daily practices.
RESULTS: A total of 31 PC physicians responded to the survey (24%). The highest-ranked curricular areas were general surgery, pediatric surgery, and orthopedic surgery. The 5 highest ranked core diagnoses were abdominal pain, morbid obesity, gastrointestinal bleeding, small bowel/appendix disorders, and gastroesophageal reflux disease (GERD). The 3 most common office procedures important to PC physicians were suturing, dressing/wound management, and wound debridement.
CONCLUSIONS: Our survey confirmed the importance of core surgical knowledge to PC physicians. The survey results may inform changes to include additional exposure general surgery, pediatric and orthopedic surgery during the core clerkship. Survey results also suggest that more exposure to certain basic office-based procedures may benefit those students eventually entering PC.

## Allen, Sara — Poster 53 — Urban & Community Health

***Impact Evaluation of Patient-Centered, Community-Engaged Health Modules for Homeless Pregnant Women***

**Authors:** Nelipovich S, Kotagiri N, Afreen E, Craft MA, Allen S, Davitt C, Ruffalo L, Diehr S.
**Project Mentor:** Sabina Diehr, MD
**Mentor's Department:** Family and Community Medicine
**Community Partner:** Milwaukee Women's Center

PURPOSE: Pregnant women who experience homelessness are at a greater risk for poor birth outcomes than the general population. This pilot study describes results of a service-learning program informed by previously identified unmet perinatal health needs. In this mutually beneficial, patient-centered service-learning program, medical students partnered with homeless women currently residing in a shelter in Milwaukee, WI.
METHODS: Medical students in the Health Advocacy in Pregnancy & Infancy (HAPI) project, under faculty supervision, developed and taught six service-learning modules: healthy cooking, mental health, perinatal nutrition, infant care/safety, breastfeeding, and contraception to shelter residents. Implemented between 2018-2021, the modules were hosted in-person and via electronic videoconferences. We gathered qualitative data on participants' perceived impact of the modules and used grounded theory analysis to examine written comments and verbal feedback.
RESULTS: A total of 141 participants attended 42 learning sessions. Participants included pregnant and postpartum mothers, and women interested in learning about pregnancy-related health. Qualitative analysis revealed three universal themes across all sessions that related to the impact of the sessions on participants. Emergent themes represented in all session modules included 'Knowledge', 'Intention to Change', and 'Empowerment.'
CONCLUSIONS: Our community-engaged health education partnership program between homeless pregnant women and medical students focused on perinatal health. This well-received, effective strategy cultivated new knowledge, empowering participants to not only change their own behaviors, but to teach and support others. This study demonstrates the ability of using community-based teaching sessions to enhance participants' understanding of pregnancy and postpartum health and empower others to implement changes.

## Alluri, Nitesh — Health Systems Management & Policy

***Associations Between Breast Infections and Future Core Needle Biopsy Rates***

**Authors:** Alluri NV, Patten CR.
**Project Mentor:** Caitlin R. Patten, MD, FACS
**Mentor's Department:** Surgery

Patients who are diagnosed with mastitis and breast abscesses will sometimes require an additional future core needle biopsy after the initial infection has resolved. Our retrospective study attempted to gauge the proportion of patients who received such a biopsy and the proportion of biopsies which showed malignant tissue. After the data was collected, cumulative incidence curves were generated to characterize the time to biopsy and a gray's test was performed on those curves to assess for a difference between abscess and mastitis group. Kaplan-Meier survival plots were generated to assess the time to last follow-up or death and a Logrank test was done to assess for a difference between abscess and mastitis groups. 91.7% of our patient sample did not receive a CNB and 92.6% of the CNBs which were performed did not show malignant tissue. 68% of the CNBs were performed on the same side of the breast as in the initial diagnosis. The time to biopsy at 125 months after initial diagnosis is much higher at 20.1% and 60.7% for abscess and mastitis respectively when looking at just the time the patient has an infection. Our study has indicated that when patients present with an abscess or mastitis, they are unlikely to receive a core needle biopsy in the future and the few who do are unlikely to show malignant pathology. Additionally, among the patients who will not need a CNB in the future, the majority will have their last follow-up related to the breast infection within 10 months of their initial presentation.

## Almazan, MS, Krystal — Poster H3 — Quality Improvement and Patient Safety

***Challenging implicit bias among medical students during the pre-clinical years: an interactive experience***

**Authors:** Almazan K, Avila EJ, Lockhart MN.
**Project Mentor:** Malika Siker, MD
**Mentor's Department:** Radiation Oncology

BACKGROUND: Implicit bias exists inherently within healthcare leading to poor health outcomes, especially for historically underrepresented patients. Previous research documents the complexity of bias and the importance of detection and mitigation of implicit bias among practitioners to improve health outcomes. Although the literature demonstrates either identification of implicit bias among medical students or implementing training to reduce bias for physicians, these studies have not illustrated the impact of implicit bias training during the pre-clinical years.
METHODS: Voluntarily recruited medical students from the Medical College of Wisconsin Milwaukee and Central campuses participated in virtual interactive small groups sessions surrounding diverse patient clinical vignettes. Participants filled out pre and post surveys consisting of Likert scale and free text questions.
RESULTS: Responses indicate that 85% of medical students agree or strongly agree that it is important to receive training on implicit bias during their medical education, 84% of participants agree or strongly agree that it would be valuable to have formal integration of implicit bias sessions in the medical school curriculum, 78% of medical students do not feel well prepared for caring for patients of different backgrounds. Lastly, the post-survey average for the statement "unconscious bias has a significant impact on patient/can affect many levels of health care" was higher than the pre-survey average yielding statistical significance ($p=0.027$).
CONCLUSIONS: Findings from our study exhibit the significance of initiating implicit bias training for medical students during the pre-clinical years to reduce bias throughout their academic and professional careers to provide equitable care for vulnerable patient populations.

## Amoabin, BS, Afua — Clinician Educator

***Effects of Community Engagement on Implicit Bias in Healthcare Workers***

**Authors:** Amoabin A, Pinar B, Bence CM, Siddiqui SM.
**Project Mentor:** Chelsea Willie, MD and Sabina Siddiqui, MD
**Mentor's Department:** Anesthesiology and Surgery
**Community Partner:** Maruf Center for Youth Innovation

BACKGROUND Multiple studies, including the Institutes of Medicine 2003 report, have shown that racial and ethnic minorities experience lower quality of care (are less likely to receive routine care and experience higher rates of morbidity/mortality when care is provided) than their white counterparts. Further research suggests that implicit (unconscious) bias amongst healthcare professionals contributes to health disparities. We sought to evaluate the effects of community engagement on implicit bias in healthcare providers and gauge the feasibility of conducting this research in a healthcare setting.
METHODS Subjects were identified based on their participation in a community youth trauma outreach program, and included medical students, general surgery residents, and hospital staff. All subjects were directed to an anonymous web survey at Harvard University's Project Implicit web server. De-identified data was self-submitted to a protected REDCap database. Data collection period was three weeks following the community engagement program.
RESULTS We were unable to distinguish a difference in implicit bias based on community engagement based on our survey respondents. Our data did reveal an increase in bias scored on the Implicit Association Test towards Arab-Muslims populations (IAT Score 5.7) as compared to Black/African Americans (IAT Score 4.4). This may suggest an increased need for targeted community engagement within the Arab-Muslim population.
CONCLUSION Our data showed that implicit bias screening in healthcare workers is feasible, and that bias in our volunteer cohort was overall low. However, our study is limited by small sample size and selection bias in our cohort of volunteer respondents. Overall, more studies and interventions are needed to determine the effects of increased community engagement on implicit bias in healthcare providers in medical literature.

## An, Johanna — Clinical & Translational Research

***Aortic Valvuloplasty & Valvotomy: An Institutional Review of Outcomes***

**Authors:** An JM, Johnson W, Creighton SE, Mitchell ME.
**Project Mentor:** Michael Mitchell, MD
**Mentor's Department:** Surgery

One of the most common forms of Left Ventricle Outflow Tract Obstruction (LVOTO) is valvar aortic stenosis (AS); obstruction can occur at valvar, sub-valvar, and supra-valvar levels. Patients with congenital valvar AS often have progressive obstruction and are at substantial risk for numerous complications including infectious endocarditis, heart failure and sudden death. Treatment for AS varies, in that it depends on age and the degree of obstruction. Prostaglandins may be used early on in managing the critically ill newborn, yet in older patients, percutaneous balloon valvuloplasty may be utilized. Surgical options for valvar AS include simple repair (valvotomy, commissurotomy, and thinning of leaflet), complex repair (valvuloplasty, leaflet extension, suture on valve leaflets, or procedures done on 2 levels of heart), and valve replacement (either mechanical or bio-prosthetic valve, or with a pulmonary autograft such as in the Ross procedure). While collecting data, one patient was patho-physiologically significant because the case was one of the first cases in which an infant of a diabetic mother not only had biventricular hypertrophy, but also critical congenital valvular AS. The initial concern was determining whether the primary pathophysiology was the biventricular hypertrophy or congenital AS. The AS seemed to be benefiting the systemic circulation and preventing complete LVOTO. While determining which primary procedure to undergo, patient developed an unexpected cardiorespiratory arrest and underwent an aortic valvotomy and left ventricle myectomy. Post-operation, infant successfully recovered with dramatically improved hypertrophy. Thus, even in diabetic caused hypertrophy, if there's a comorbidity of critical congenital AS in neonates, treatment for AS is priority and will help in treating both pathologies.

## Anderson, Danyon — Clinical & Translational Research

***How the Brain is Functionally Connected During Cigarette Relapse***

**Authors:** Anderson D, McKenzie P, Gill H, Li N, Trinh D, Liu H, Engelmann J.
**Project Mentor:** Jeffrey Engelmann, PhD
**Mentor's Department:** Psychiatry and Behavioral Medicine

INTRODUCTION: With recent advances in functional connectivity analysis, functional magnetic resonance imaging (fMRI) studies offer the ability to better neural functional connectivity during relapse. This study is the first to explore functional connectivity with smoking being immediately possible.
METHOD: Participants (n=50) abstained from smoking for 24 hours. These abstinent smokers underwent a brain fMRI while viewing a series of smoking-related and neutral photos. Halfway through the images, the participants smoked a cigarette in the MRI scanner using a MRI compatible device. Psychophysiological Interaction (PPI) analysis was performed to analyze functional connectivity. This analysis correlated neural activity to map which regions of the brain fired together.
RESULTS: During cigarette relapse, there were Smoking Possible x Cue Type interactions in functional connectivity between the anterior cingulate cortex and superior medial gyrus in the post-smoke block, the nucleus accumbens and the right superior orbital gyrus in the pre-smoke block, and the caudate and left middle temporal gyrus, bilateral superior temporal gyrus, right inferior temporal gyrus, left inferior parietal lobe, and cerebellum in the pre-smoke block ($p<.005$, volume > 756 mm^3). Prior to smoking, these brain regions were more functionally connected while viewing neutral pictures. After smoking, these brain regions were more functionally connected while viewing cigarette-related pictures.
CONCLUSION: During pre-smoking blocks, the possibility of smoking altered traditional cue reactivity. In the post-smoking block, traditional cue-reactivity was seen. Being presented with an opportunity to smoke seems to dysregulate neural reward systems, the function of which is restored by smoking.

## Ansari, Moiz — Poster 54 — Urban & Community Health

***Health beliefs and barriers to healthcare of Rohingya refugees.***

**Authors:** Haider S, Maheen A, Ansari M, Stolley M.
**Project Mentor:** Melinda Stolley, PhD
**Mentor's Department:** Medicine

Recently, over 1,000 Rohingya families have been resettled to Milwaukee, Wisconsin from areas where they faced trauma and health disparities. To better understand their health beliefs and barriers to healthcare, we conducted a qualitative study with ten community health workers and stakeholders serving the Milwaukee Rohingya community. Interviews were transcribed, coded, and analyzed to identify the following themes: which included: 1) health is defined as being able to meet basic needs of the family/community; 2) prior and existing mistrust and fear of systems of authority impact healthcare seeking behavior; 3) past trauma negatively impacts physical and mental health; 4) religion and spirituality influence beliefs about illness, recovery, and wellbeing; 5) linguistic, cultural, and educational barriers impact access, quality of care and understanding of disease. These results begin to address the significant gap in our knowledge of the health beliefs and needs of the local Rohingya community and underscore the need for tailored interventions.

## Attlassy, Nabil — Poster 6 — Clinician Educator

***Primary Malignant Melanoma of the Gastroesophageal Junction treated with Immunotherapy: a case report***

**Authors:** Attlassy N, Patnaik R, Agbeh A, McCarthy J.
**Project Mentor:** James McCarthy, MD
**Mentor's Department:** Medicine

Introduction: Primary Malignant Esophageal Melanoma (PMME) constitutes 0.1% -0.5% of all primary malignant esophageal neoplasms. Melanocytes are present within the squamous epithelium of the esophagus in the stratum basale with melanocytosis rare within the esophagus. PMME is aggressive and has a poor survival rate. Resection surgery is usually first-line treatment for localized PMME but recurrence rates remain high. Tumor-specific immunotherapy has shown promising results. We report a case of PMME with metastasis to the liver treated with immunotherapy.
Case Presentation: A 66-year-old female with 2 months of progressive dysphagia and 3 episodes of hematemesis. Endoscopic examination showed a hypervascular distal esophageal mass. Biopsy was positive for S-100, SOX-10, HMB-45 and showed mitotic figures with scattered pigment, consistent with melanoma. The patient was scheduled for esophagectomy initially, but instead pursued immunotherapy after liver metastasis was diagnosed during MRI. Immunotherapy consisted of 8 cycles of pembrolizumab followed by 4 months nivolumab and ipilimumab. The patient remains in remission three years after completing immunotherapy.
Discussion/Conclusion: Our patient was diagnosed with PMME with metastasis to the liver, a presentation that typically has a poor prognosis. Despite this, remission was achieved with immunotherapy without surgical intervention. Only a small number of cases of PMME treated with immunotherapy have been reported, one showcasing tumor stabilization following several cycles of therapy with eventual metastasis, while our patient had a stable response to treatment. Further exploration of management with immunotherapy should be conducted as it represents an alternative treatment for patients in lieu of surgical management.

## Awadh, BS, Sami — Poster 33 — Health Systems Management & Policy

***Reasons For Late Referrals For Testicular Maldescent: Results From An Integrated Pediatric Health System***

**Authors:** Awadh OA, Tran J, Schwake C, Ellison J.
**Project Mentor:** Jonathan S. Ellison, MD
**Mentor's Department:** Urology

Introduction: American Urological Association guidelines in 2014 highlighted the importance of early referral and avoidance of ultrasonography in evaluating undescended testicles (UDT). Recent data suggest opportunities for improvement in both categories. We investigated the context of care at well-child checks within an integrated primary and specialty care pediatric health system that may influence timely referral.
Methods: Primary care referrals within our health system to urology for UDT in 2019. Three referral categories were defined: testicular ascent (prior normal WCCs), prior abnormal WCCs, or new patient to primary care. Descriptive and comparative analyses across groups were performed.
Results: 93 referrals were included, with a median age at initial pediatric urology visit of 52.0 months and IQR of 85. 75% (21/28) of patients in the abnormal prior WCC group required surgical intervention compared to 35% (18/51) and 57% (8/14) for the ascent and new CMG groups (p=0.003).Conclusion: Although testicular ascent contributes to most cases of older UDT referrals, children with abnormal prior WCCs required orchiopexy at higher rates and constituted a sizable proportion of delayed referrals. Our findings suggest that passive dissemination of AUA guidelines alone is insufficient to optimize referral practices. Future quality improvement initiatives should target integrative collaboration with local PCPs and be attentive to modifiable referral delays.

## Balfour, Marie — Bioethics & Medical Humanities

***Empowering Primary Care Family Networks Toward Nutrition Behavior Change***

**Authors:** Balfour M, Johnston B.
**Project Mentor:** Bryan Johnston, MD
**Mentor's Department:** Family and Community Medicine
**Community Partner**: St. Marcus Lutheran School and Milwaukee Academy of Science

Background: Initiatives in the Milwaukee community through the Food Doctors nutrition education project have shown increases in baseline nutritional knowledge for third grade students after three targeted in-class nutrition lessons and a desire among students to share newfound nutritional knowledge with family members. The objective of this study is to bring Food Doctors curriculum into family networks to improve nutritional knowledge and empower families toward nutrition behavior change by distributing online nutrition education and conducting family interviews.
Methods: Interactive virtual family nutritional education sessions were provided to families at the All Saints Family Medicine Clinic, St. Marcus Lutheran School, and Milwaukee Academy of Science. After the sessions, phone interviews were conducted with participating families to assess nutritional behaviors and perceptions on their diet.
Results: Virtual lessons were presented live, recorded, and distributed to over 4500 individuals. Throughout the interviews, five main themes emerged: perceptions of "healthy" eating among different age groups, family member influence on "healthy" diet, roles of extended family in nutrition, family communication around food, and factors that influence healthy eating in families. Numerous patients specifically noted their nutritional advice from extended family members involved connection through recipe sharing.
Conclusions: Family nutritional decisions involved a multitude of factors and were highly dependent on participants' role within their family. All interviewed family members expressed personalized challenges integrating family dietary preferences with healthy eating guidelines received from sources including their doctor, other family members, or Internet research. This highlights the need for additional specialized nutrition resources for family networks.

## Baraboo, Karna — Urban & Community Health

***Beyond Resource Referral: Reframing Food Insecurity as a Vital Sign in SDOH Addressment***

**Authors:** Baraboo K, Ruffalo L.
**Project Mentor:** Leslie Ruffalo, PhD
**Mentor's Department:** Family and Community Medicine

Food insecurity has an established connection with an increased risk of chronic disease and difficulty accessing necessary healthcare; serving as one of the steepest barriers to health care for Americans. Our research highlights the complexity of addressing food insecurity within healthcare at a clinician, clinic, and health system level. This project was aimed at addressing how various healthcare professionals perceive the effects of food insecurity and other social determinants of health on patient health, how these issues are addressed by the healthcare system, and the effectiveness of current interventions. The goal of this project was to identify health care systems strategies to better address social determinants of health factors for patients. Through thematic analysis of 12 semi-structured interviews, we identified 16 themes with 125 subcodes for a total of 141 codes. The 12 interview participants identified as attending physicians, nurses, dieticians, psychologists, and outpatient clinic social workers. The specialties represented include family medicine, internal medicine, pediatric endocrinology, emergency medicine, and urology. These codes were then analyzed using a grounded theory approach using a cloud-based software program called Dedoose to create a model to investigate the core phenomenon of "Patient Awareness, Addressment and/or follow up on Food Insecurity". We divided our 16 themes into five main categories: casual conditions, contextual conditions, intervening conditions, strategies, and consequences. Thematic analysis identified potential investment strategies for the health care system in longitudinal education in SDOH, follow up systems for health care providers, and within local community organizations to create infrastructure for closed loop communication.

## Bednarke, Kate — Health Systems Management & Policy

***Neighborhood Greenspace and Children's Respiratory Function***

**Authors:** Bednarke KS, Campbell JT, Schultz AA, Malecki KMC, Beyer KM.
**Project Mentor:** Kirsten M. Beyer, PhD, MPH, MS
**Mentor's Department:** Institute for Health and Equity

INTRODUCTION: Neighborhood greenspace (grass, trees, and vegetation) is associated with numerous health benefits, but there remains a lack of understanding of its effects on children's respiratory health. We investigated if greenspace improves children's lung function and/or mitigates effects of air pollution.
METHODS: A total of 343 children (ages 6-17) from the Survey of Health of Wisconsin (SHOW) database were included in this study. This analysis utilized logistic and linear multivariate survey regression to examine the effects of neighborhood greenspace on children's lung function. Measurements of FEV1, FVC, and FEV1/ FVC, as well as the odds of these measures reaching normal thresholds were utilized. Neighborhood greenspace was analyzed both as total quantity and subdivided into tertiles.
RESULTS: With increased total neighborhood greenspace and specifically in the third tertile of greespace, ln(FVC) decreased [-5.93 CI 95% -10.58 - -1.29, P = 0.016] and [-240.69 CI 95% -481.02 - 0.35, P = 0.050] respectively; however, the odds of reaching normal FVC or FEV1 levels were unchanged. The odds of children reaching normal FEV1/ FVC increased with greenspace in the 2nd [2.26 CI 95% 1.15 - 4.48, P = 0.022] and 3rd [2.65 CI 95% 1.45 - 4.87, P = 0.004] tertiles. Agriculture respiratory hazards also appeared to interact with greenspace and demonstrated both increased and decreased lung function that varied by model, likely indicating underlying confounders.
CONCLUSION: These findings suggest slight decreases in children's lung function (FVC) occur with increased neighborhood greenspace, though not necessarily at a clinically significant level. No association between greenspace and obstructive airway conditions (FEV1) was observed. Findings remain somewhat inconclusive about the effect of environmental greenspace in children's neighborhoods serving as a preventive pediatric health intervention.

## Beinhoff, Paul — Health Systems Management & Policy

***Second-Generation Jak2 Inhibitors for Advanced Prostate Cancer: Are We Ready for Clinical Development?***

**Authors:** Beinhoff P, Sabharwal L, Udhane V, Maranto C, LaViolette PS, Jacobsohn KM, Tsai S, Iczkowski KA, Wang L, Hall WA, Dehm SM, Kilari D, Nevalainen MT.
**Project Mentor:** Marja Nevalainen, MD, PhD
**Mentor's Department:** Pathology

Androgen deprivation therapy (ADT) for metastatic and high-risk prostate cancer (PC) inhibits growth pathways driven by the androgen receptor (AR). Over time, ADT leads to the emergence of lethal castrate-resistant PC (CRPC), which is consistently caused by an acquired ability of tumors to re-activate AR. This has led to the development of second-generation anti-androgens that more effectively antagonize AR, such as enzalutamide (ENZ). However, the resistance of CRPC to ENZ develops rapidly. Studies utilizing preclinical models of PC have established that inhibition of the Jak2-Stat5 signaling leads to extensive PC cell apoptosis and decreased tumor growth. In large clinical cohorts, Jak2-Stat5 activity predicts PC progression and recurrence. Recently, Jak2-Stat5 signaling was demonstrated to induce ENZ-resistant PC growth in preclinical PC models, further emphasizing the importance of Jak2-Stat5 for therapeutic targeting for advanced PC. The discovery of the Jak2V617F somatic mutation in myeloproliferative disorders triggered the rapid development of Jak1/2-specific inhibitors for a variety of myeloproliferative and auto-immune disorders as well as hematological malignancies. Here, we review Jak2 inhibitors targeting the mutated Jak2V617F vs. wild type (WT)-Jak2 that are currently in the development pipeline. Among these 35 compounds with documented Jak2 inhibitory activity, those with potency against WT-Jak2 hold strong potential for advanced PC therapy.

## Bellile, Kathryn — Bioethics & Medical Humanities

***Flecainide use in pediatric patients***

**Authors:** Bellile KG, Morton C, Hunker N, Singh A, Kovach J.
**Project Mentor:** Joshua Kovach, MD
**Mentor's Department:** Pediatrics

BACKGROUND: Previous studies have suggested flecainide is associated with increased morbidity and mortality in patients with structural heart disease, leading to hesitance in prescribing flecainide to patients with congenital heart disease (CHD). Additionally, there is limited recent pediatric data on the use of flecainide in the immediate post-operative period after CHD surgery. We reviewed the Herma Heart Center's experience with flecainide in post-operative CHD patients and those with structurally normal hearts to better characterize its efficacy and safety.
METHODS: We reviewed the charts of children treated with flecainide; 32 following CHD surgery and 24 for primary arrhythmia management. Data evaluated included CHD diagnosis, surgical history, antiarrhythmic treatment, ECG changes, arrhythmia recurrence, and adverse events.
RESULTS: Of the 57 patients in our study, 51 (89.5%) were successfully and safely treated with flecainide. Treatment success was comparable between the CHD group and non-CHD groups (88% vs 92%; p=0.65).
The average effective dosage for the combined group was approximately 91 ï,± 25.7 mg/m2 , with the CHD group requiring a lower dose (75.2 ï,± 16.0 mg/m2) than the non-CHD group (108.5 ï,± 22.2 mg/m2) (p=<0.01). The average change in QRS duration from baseline to therapeutic dosing was 21 ms ï,± 15.7 ms, with CHD patients having a greater change (25.3 ï,± 17.7 ms) compared to non-CHD patients (15.1 ï,± 13.1ms; p=0.026). CHD patients were five times as likely to require a dosage decrease for QRS/QT prolongation compared to non-CHD patients, in which there were no adverse events or arrhythmic complications (18% vs 9%; p= 0.18).
CONCLUSIONS: Flecainide is an effective and safe option for arrhythmia treatment in CHD patients with appropriate monitoring. A 30% lower average dose of flecainide was prescribed to CHD patients. Adverse events are rare.

## Bickford, David — Poster 55 — Urban & Community Health

***Clinical characteristics and ED, but not brain structure and amyloid measures correlate with SI in LLD***

**Authors:** Bickford D, Goveas JS, Nelson JC, Mackin RS.
**Project Mentor:** Joseph S Goveas, MD
**Mentor's Department:**

Objectives: Suicide ideation (SI) is common in Late-Life Psychiatry and Behavioral Medicine Depression (LLD), and characteristics associated with SI in LLD may be helpful to understand underlying mechanisms and guide appropriate treatment interventions. This study explored the clinical, cognitive, structural brain imaging and beta-amyloid correlates of SI in LLD.
Methods: 118 older non-demented adults with LLD from the Alzheimer's Disease Neuroimaging Initiative (ADNI) Depression Project completed psychiatric and cognitive assessments, including the Geriatric Suicide Ideation Scale (GSIS), structural MRI (to measure cortical thickness and subcortical volume), and PET beta-amyloid scans. A GSIS cutoff of ≥ 69 separated LLD participants into high SI (n=65; 55%) and low SI (n=53) groups. Analysis of covariance was used to compare clinical, cognitive, structural MRI, and beta-amyloid measures between LLD participants with high and low SI.
Results: Relative to those with low SI, the high SI LLD participants endorsed longer lifetime duration ($p = .02$) and current depressive episode duration ($p < .01$), endorsed greater worry ($p = .04$), perceived stress ($p < .001$), generalized anxiety ($p = .05$), and had longer depression treatment exposure ($p = .05$). High SI participants also showed worse performance on executive functioning measures (WAIS Digit Span, $p = .05$; Trail Making Test-B, $p = .02$). The high and low groups did not differ on measures of cortical thickness, subcortical volume abnormalities, and beta-amyloid burden ($p > .05$).
Conclusions: In LLD, extended depression history, more significant anxiety and worry, and executive dysfunction were associated with higher SI, but cortical atrophy and amyloid burden were not. The modifiability of the associated symptoms suggests possible venues to intervene, alleviate SI and improve LLD outcomes.

## Bierer, MMP, Doug | Poster 56 | Urban & Community Health

***Case of Nocardia farcinica - diagnosis to treatment***

**Authors:** Bierer DW, Jethwa TE, Jha P.
**Project Mentor:** Trisha Jethwa, MD and Pinky Jha, MD
**Mentor's Department:** Medicine

60y M presented to an outside hospital after being found unconscious and shaking in a presumed seizure. PMH significant for autoimmune hepatitis and esophageal varices, taking prednisone 30mg daily and azathioprine 50mg daily for past 3 months, and a melanoma removed in 2002.
Head CT showed low attenuation area with mass effect in R posterior temporal-occipital region. MRI confirmed 2 small-moderate peripherally enhancing lesions within R temporal and temporal-occipital region concerning for intracranial abscesses or amelanotic metastases. CT Chest showed 3 R lower lobe pleural nodules concerning for metastases. Biopsy and culture grew gram positive branching beaded rods. Nocardia farcinica was confirmed by MALDI-TOF. Treatment was with IV TMP/SMX 5mg/kg q8h and linezolid 600mg PO BID. TMP/SMX was discontinued after 12 days d/t severe nausea and vomiting, hypoglycemia and increased creatine. Linezolid was discontinued after 19 days due to thrombocytopenia. Treatment was bridged with imipenem/cilastatin 1000mg IV q8h until susceptibilities indicated moxifloxacin 400mg daily for 2 weeks and tedizolid 200mg PO daily for 1 week. Oral step down therapy for up to a year was considered. Prednisone was decreased from 30 to 15 mg and at 6 weeks after initial encounter, patient is doing well and repeat CT showed resolution of swelling and abscess at the site of drainage.
- Nocardia infections are difficult to distinguish on physical examination alone, CNS imaging and culture remain critical for prompt identification and treatment.
- Nocardia farcinica can be treated with a variety of antimicrobials based on susceptibility testing and patient tolerance.

## Bixler, BS, Rebecca | Quality Improvement and Patient Safety

***Verbal Order Practices During Trauma Resuscitations in the Emergency Department***

**Authors:** Bixler R, Jacobson N, Chinn M, et al.
**Project Mentor:** Nancy Jacobson, MD
**Mentor's Department:** Emergency Medicine

INTRODUCTION Resuscitation of critically injured patients requires effective communication. Poor communication is the leading cause of sentinel events. Closed-loop communication reduces error during trauma resuscitations. Studies show few verbal orders are audible. Verbal orders during trauma resuscitations have not been studied for completeness.
OBJECTIVE This project aims to assess whether verbal orders for medications and blood products during trauma resuscitations were audible, were complete, and utilized closed-loop communication.
METHODS This was an observational assessment of a convenience sample of verbal orders given for medications and blood during the resuscitation of trauma patients at our level 1 trauma, academic emergency department. Medication orders were assessed for the inclusion of name, dose, and route. Blood orders were assessed for the inclusion of product and type. Orders were recorded as audible or inaudible. Closed-loop communication was recorded as present or absent. Orders were complete if all component parts were present. Descriptive statistics were used to analyze data.
RESULTS There were 186 verbal orders enrolled. 88.7% (n=165) were for medications, 11.3% (n=21) were for blood. For medication verbal orders, 77.9% (n=127) were audible, 73.6% (n=120) included the name, 62.0% (n=101) included the dose, 17.8% (n=29) included the route, and 73.5% (n=111) utilized closed-loop communication. 14.1% (n=23) of medication verbal orders were complete. For blood verbal orders, 76.2% (n=16) were audible, 14.3% (n=3) included the blood product, 33.3% (n=7) included the blood type, and 61.9% (n=13) utilized closed-loop communication. 0% (n=0) blood verbal orders were complete.
CONCLUSION Audible, complete verbal orders and closed-loop communication were underutilized during trauma resuscitations. As such, there is opportunity for improvement and subsequent evaluation in the ED and other clinical environments where verbal ordering is necessary.

## Bodnar, Catherine | Poster 42 | Quality Improvement and Patient Safety

***The value of second opinions in hematopathology: An analysis of quality and patient safety***

**Authors:** Bodnar CA, Kroft SH, Harrington AM.
**Project Mentor:** Alexandra M. Harrington, MD
**Mentor's Department:** Pathology

Pathology 2nd opinions in cancer diagnosis are common at academic centers and may lead to altered diagnoses &/or patient management. Prior studies quantified 2nd opinion diagnostic changes for general pathology and subspecialties but did not investigate patient safety or specimen quality. The objective of this study was to [1] determine diagnostic error in 2nd opinion hematopathology material from regional laboratories and [2] ascertain suboptimal specimen impact on diagnosis and patient safety.
All 2nd opinion hematopathology consultations at an academic institution were reviewed for a 1-year period. Discordant cases were examined with chart and pathology report review and scored for [1] altered diagnosis &/or clinical management; [2] patient harm; [3] specimen/stain quality. VizientÂ© Harm Score and internally developed quality & diagnostic scores were used.
877 consultations were reviewed. 33 (3.7%) had discordant diagnoses in 17 bone marrows and 16 tissues across 14 myeloid and 19 lymphoid diagnoses. 45% of discordant cases underwent consensus diagnosis. On internal review, 9 went from benign to malignant, 5 from atypical to malignant, and 8 changed subclassification. Of discordant cases, 12 had a change in diagnosis but not management. 6 changed in diagnosis and management, of which 3 had time delays with a revised diagnosis reached after therapy commencement. Most reports mentioned no quality issues (N=23; 70%). 10 had quality issues affecting interpretation, including 4 (12%) requesting new biopsy, 3 (9.1%) with poor stain quality, and 2 inadequate lymphoma staging/grading specimens. 2/3 discordant cases had negligible harm scores; 11 (33%) had harm scores signifying further treatment/procedures.
A minority of hematopathology 2nd opinions at our institution have discordant diagnoses from original interpretations, though 1/2 upgraded to malignant diagnoses and 1/3 resulted in further treatment/procedures, highlighting the value of the 2nd opinion process.

## Bor, Daniel | Quality Improvement and Patient Safety

***Understanding Medication Reconciliation Breakdowns***

**Authors:** Bor DS, Moeller J, Spahr CD.
**Project Mentor:** Christopher Spahr, MD
**Mentor's Department:** Pediatrics

INTRODUCTION: Medication reconciliation (MR) is the process of creating a unified medication list between all stakeholders involved in the administration of medicine both within the healthcare system and at home. This study aims to understand where possible breakdowns occur in the medication education (ME) process at discharge.
STUDY METHODS: 47 patient charts were reviewed: including 24 charts of patients who did not pass a medication audit and 23 charts of patients who did.
Additionally, to understand if a CHW policy that required acetaminophen and ibuprofen to be present on the AVS was being implemented, 144 charts without both ibuprofen and acetaminophen on the after-visit summary were examined.
RESULTS: The average amount of medications for a failed audit was 7.2 while the average meds for a passed audit was 6.1 (5.6 outlier adjusted). We also found a prevalence of the at-home dose of Decadron within the ED that was a consistent culprit in failed audits.
Regarding acetaminophen and ibuprofen, 52% of the absences occurred in Dental and ENT and most were connected to a few providers within a service.
CONCLUSIONS: This study found that while CW overall is proficient with its MR and ME program, opportunities still exist for improvement. These are creating a unified method of teaching about medications, understanding if any risk factors predispose a patient for failing ME, and considering whether certain teaching workflows function correctly.

## Bourgeois, Shay | Poster 43 | Quality Improvement and Patient Safety

***Effects of the COVID-19 pandemic on readmissions and complications after tonsillectomy.***

**Authors:** Bourgeois S, McCormick ME, Sulman CG.
**Project Mentor:** Michael E. McCormick, MD
**Mentor's Department:** Otolaryngology

INTRODUCTION: Tonsillectomy is a common surgery but does have complications. Our goal is to understand the impact of the COVID-19 pandemic on tonsillectomy surgery including rates of post-op complications and readmissions to the hospital.
METHODS: Retrospective chart review of 852 pediatric patients who underwent tonsillectomy in March-June in 2019 and 2020.
RESULTS: The COVID-19 pandemic reduced the number of tonsillectomies performed from 566 in 2019 to 286 in 2020 (in study months). The mean patient age was 6.43 years (SD=3.54) in 2019 and 6.70 years (SD=3.82) in 2020. The percentage of patients who underwent tonsillectomy and had a diagnosis of obstructive sleep apnea (OSA) was 18.73% in 2019 and 21.68% in 2020 (p=0.31). Of those with OSA, the percentage diagnosed as moderate or severe OSA was 55.66% in 2019 and 56.45% in 2020 (p=0.92). A higher percentage of tonsillectomies were performed at the main hospital in 2020 compared to 2019 (90.56% vs. 87.63%) as opposed to an outside location, however this difference was not significant (p=0.20). The post-op readmission rate was 3.18% in 2019 and 3.50% in 2020 (p=0.81). The rate of post-op hemorrhage was 3.36% in 2019 and 2.80% in 2020 (p=0.66). More patient families communicated with the healthcare team via MyChart (an online patient portal) in 2020 than in 2019 (5.24% vs. 1.77%, p=0.0045).
CONCLUSION: The largest impact the COVID-19 pandemic had on tonsillectomy surgeries in 2020 was the reduced number of surgeries performed. Although the patients that underwent tonsillectomy in 2020 were perceived to be more ill or in need of surgery, there was not a statistically significant increase in the severity of OSA, the percent of post-op bleeds or readmissions, or the percentage of tonsillectomies completed at the main hospital. Notably, the way in which patient families communicated with the care team was different between the groups, with more families communicating electronically via MyChart in the 2020 cohort.

## Buchman, Bryanna | Quality Improvement and Patient Safety

***Improving Documentation of Neonatal Resuscitation in High-Risk Deliveries***

**Authors:** Buchman B, Gupta R, Cabacungan E.
**Project Mentor:** Ruby Gupta, MD
**Mentor's Department:** Pediatrics

BACKGROUND Neonatal resuscitation is a time-sensitive emergency procedure, and real-time documentation of events is crucial to understanding events' chronology. Current literature shows poor neonatal resuscitation documentation. We describe key areas of neonatal resuscitation documentation before and during the COVID-19 pandemic and the effect of performing targeted interventions to improve documentation completeness.
METHODS Baseline data (Epoch 1) was collected by dividing deliveries into four groups: pre-COVID-19, during COVID-19, dayshift, and nightshift. We collected the number of providers present and documentation of gestational age and airway interventions usage [positive pressure ventilation (PPV) and continuous positive airway pressure (CPAP)]. After monthly education (first PDSA cycle), second round of data collection (Epoch 2) was performed.
RESULTS During Epoch 1, 381 resuscitation forms were reviewed. The average number of providers present during delivery decreased by one during COVID-19; the mean CPAP documentation decreased by 22% during the dayshift and decreased by 3% during nightshift; the mean documentation of PPV decreased during the dayshift by 13% but stayed the same during nightshift from pre-COVID-19 to COVID-19.
During Epoch 2, a review of 212 forms showed that despite education, there was no significant improvement noted in the documentation of PPV and CPAP; however, there was an improvement in the documentation of gestational age.
CONCLUSION A decrease in delivery attendants during COVID-19 negatively affected the documentation, and education intervention did not show improvement.
We speculate that a better method of documentation like electronic form or video recording may be necessary to improve the completeness and quality of documentation.

## Buss, Radek | Poster H5 | Quality Improvement and Patient Safety

***Same-day discharge after appendectomy for uncomplicated appendicitis in children.***

**Authors:** Buss R, Bodnar CA, Somers KK, et al.
**Project Mentor:** Kyle Van Arendonk, MD, PhD
**Mentor's Department:** Surgery

Background
Utilization of same-day discharge (SDD) after appendectomy for uncomplicated appendicitis (UA) was closely examined to explore potential barriers to greater use of SDD.
Methods
Children (≤18 years) who underwent appendectomy for UA between 2015-2019 at a tertiary care children's hospital were reviewed. Associations with SDD were evaluated using multivariable regression models.
Results
Among 973 children, SDD was less frequently utilized after appendectomy performed between 12pm-5pm (aOR 0.14, p<0.001) and after 5pm (aOR 0.01, p<0.001) compared to before 12pm. SDD utilization was also less frequent in those from lower resource neighborhoods (adjusted odds ratio [aOR] 0.90 per decile increase in Area Deprivation Index, p=0.04), females (aOR 0.53, p=0.005), and patients residing 30-60 minutes away (aOR 0.56, p=0.04) compared to <30 minutes away.
Conclusions
SDD utilization was primarily impacted by operative timing and socioeconomic and travel factors, focuses for quality improvement efforts to further increase utilization of SDD.

## Calzada, Stephanie | Quality Improvement and Patient Safety

***Review of Contract Growing Initiative***

**Authors:** Rodriguez A, Calzada S, Ruffalo L.
**Project Mentor:** Leslie Ruffalo, PhD
**Mentor's Department:** Family and Community Medicine
**Community Partner:** Feeding America Eastern Wisconsin

Farm Link, a Feeding America Eastern Wisconsin program, is using contract farming to work with local farms to meet the food needs of low and very low food secure households in the 35 counties of Eastern Wisconsin. Contract growing is a preharvest agreement between farmers and buyers, in which buyers set guidelines for the product being harvested and collect the product at the end of the season. This helps connect small farmers to a larger market and is used by Farm Link, to consistently provide low food secure households with fresh food. Farm Link purchases food from local farms that goes directly to food banks which will then distribute it to low food secure households with the goal to sustainably meet the food needs of the communities in Eastern Wisconsin. In 2021 alone, Farm Link provided the community with an estimated 250,000 pounds of fresh fruits and vegetables, more than double that of 2019. Farm Link's contract growing initiative was assessed through two surveys, a year apart to provide the stakeholders involved improvement strategies and increase the program's efficacy and contribution to the communities it serves. Overall, the stakeholders involved with Farm Link are satisfied with the partnership and their involvement with the program, but there are ways to improve the distribution, awareness and client education about the produce provided. Our recommendations are to continue shaping the program to improve community needs and stakeholder satisfaction.

## Campbell, MS, Jonelle | Global Health

***Associations among Green Space, Air Pollution and Sleep Duration in Children in Living in Wisconsin.***

**Authors:** Campbell JT, Bednarke K, Beyer K, et. al.
**Project Mentor:** Kirsten Beyer, PhD, MPH, MS
**Mentor's Department:** Institute for Health and Equity
**Community Partner:** Survey of the Health of Wisconsin (SHOW)

INTRODUCTION: Sleep plays an important role in child health and is affected by neighborhood physical and social environments. Neighborhood green space and air pollution have received little attention in relation to sleep among children. This study examined relationships between both neighborhood green space and air pollution (PM2.5, O3) and sleep duration in children.
METHODS: Survey data was obtained from the Survey of the Health of Wisconsin (SHOW) database (n=482) and linked to air pollution data from EJSCREEN (2014-2016) and landcover data from the Wisconsin Department of Natural Resources (2010-2014). Participants included Wisconsin residents ages 3-17. Survey regression analysis was used to examine the relationship between green space (percent forested or grassland areas, in three equal interval categories), PM2.5, and O3 and the outcomes of healthy weekday and weekend sleep duration, as defined by the National Sleep Foundation, controlling for covariates.
RESULTS: There is a small but significant relationship between percent green space as a continuous predictor and healthy weekday sleep duration (OR 1.011 [1.00, 1.02]) but not weekend sleep duration (OR 1.005 [0.99, 1.02]) in adjusted models. Fully adjusted models showed no statistically significant relationship between O3 or Pm2.5 and weekday/weekend sleep duration.
CONCLUSIONS: Neighborhood green space may be associated with healthier weekday sleep duration in children and is one neighborhood level intervention that may be useful in ensuring that children meet daily sleep recommendations.

## Cardwell, Maxwell | Clinical & Translational Research

***Systematic Review of Sacroiliac Joint Motion and the Effect of Screw Fixation***

**Authors:** Cardwell MC, Meinerz CM, Martin JM, Beck CJ, Wang M, Schmeling GJ.
**Project Mentor:** Mei Wang, PhD
**Mentor's Department:** Orthopaedic Surgery

Background: Pelvic injuries that disrupt the sacroiliac joints often require surgical intervention to restore stability. Quantitative characterization of sacroiliac motion in response to physiologic loading provides important metrics of adequate fixation in the evaluation of newly emerged fixation techniques. The objective of this study was to systematically review and evaluate biomechanical evidence on the motion of the sacroiliac joint in its normal, destabilized, and stabilized states.
Methods: We searched the PubMed database for studies available until June 2020 using keywords: sacroiliac, biomechanic*, and fixation. Publications of any in vivo or in vitro biomechanical study that included measurements of the range of motion at the sacroiliac joint were considered.
Findings: We identified and screened 176 total records, and 13 articles of them met inclusion criteria and were used in this review. The average sacroiliac joint range of motion of the intact pelvis was 1.88° in flexion/extension, 0.85° in lateral bending, 1.26° in axial rotation. Of the 13 studies, four reported sacroiliac motion from a destabilized state, while seven reported the motion after stabilization. A forest plot of the stabilized data set in flexion/extension showed that while the heterogeneity was poor, the weighted effect size of the changes from the intact state to the stabilized state was 0.0%.
Conclusion: Quantitative evidence on sacroiliac joint motion relating to pelvic injuries or fixation is limited. Our results indicate that the pooled intact range of motion from the literature may serve as a viable reference to quantify the effectiveness of new stabilization techniques.

## Carter, Frances | Poster 57 | Urban & Community Health

***Pregnancy outcomes after bariatric surgery as a function of socioeconomic status***

**Authors:** Carter FA, Cruz M, De La Pena R.
**Project Mentor:** Meredith Cruz, MD, MPH, MBA
**Mentor's Department:** Obstetrics and Gynecology

Background
Women of reproductive age have historically accounted for a large proportion of bariatric surgery patients, but there is insufficient evidence to inform evidence-based recommendations for pregnancy after bariatric surgery. There has also been minimal research conducted on socioeconomic differences in pregnancy outcomes after bariatric surgery, although it is known that low socioeconomic status (SES) is associated with worse outcomes after surgery. The goal of this study was to explore differences in pregnancy outcomes after bariatric surgery based on socioeconomic status.
Methods & Results
This is a retrospective cohort study conducted at a single center. Women with a singleton pregnancy who conceived after their bariatric procedure (n=85) and matched controls (n=109) were included in the study. Patients were then stratified into 2 SES categories for analysis based on their zip codes. Low SES women with a history of bariatric surgery notably had increased rates of need for transfusion postpartum (11.7%), neonatal demise (2.9%), and preterm delivery (17.6%) compared to high SES women with a history of bariatric surgery (3.9%, 0%, & 11.8%, respectively) and all women with no history of bariatric surgery (low SES: 6.3%, 1.6%, & 12.7% and high SES: 6.5%, 0%, & 8.7%) ($p>0.05$).
Conclusion
Women from low-income neighborhoods who underwent bariatric surgery had increased rates of postpartum bleeding complications, preterm delivery, and neonatal demise than their higher income peers and all women who did not undergo bariatric surgery. Although these findings were not statistically significant, they may be clinically significant and should be further investigated.

## Cherian, Shannon | Poster 23 | Global Health

***Autism spectrum disorder and idioms of distress in India and the United States***

**Authors:** Cherian S.
**Project Mentor:** Samantha Wilson, PhD
**Mentor's Department:** Pediatrics

Autism Spectrum Disorders (ASD) are lifelong neurodevelopmental disorders found worldwide that affect how one is able to function in society. The diagnosis is made based on core traits found in the DSM or ICD. However, certain traits vary by culture, likely because what is considered a "deficit" varies by culture. This paper aims to explore the similarities and differences in how Western cultures, specifically the United States, define autism in comparison to India. It also examines the connection between autistic traits in these cultures and idioms of distress.
A literature review was conducted through PubMed, Cochrane Library, and Google Scholar that revealed over 1,000 results. Then criteria including publication in the last 20 years, free full text, and publication in English were used to narrow the results. Finally, titles and abstracts were reviewed to choose the papers most relevant to the current topic.
Overall, the study showed that there are core traits that remain diagnostic for autism in both the United States and India. However, there are other traits that have poor predictive value in India indicating a difference in cultural values and idioms of distress. The paper further demonstrates the need for culturally sensitive screening tools and increasing research on varying expressions of autism.

## Collar, Nicholas | Quality Improvement and Patient Safety

***Protocolized screening effectively identifies myocardial recovery following LVAD implantation.***

**Authors:** Smith NJ, Collar N, Duvvuri P, Miles B, Wu R, Szabo A, Gaglianello N, Joyce LD, Joyce DL.
**Project Mentor:** David Joyce, MD, MBA
**Mentor's Department:** Surgery

Background: Myocardial recovery following left ventricular assist device (LVAD) implantation has been of interest in transplant candidates with non-ischemic cardiomyopathy but is rare. Evidence suggests that a combination of left ventricular unloading and pharmacologic reverse remodeling is beneficial. Recovery in non-transplant candidates (i.e., destination therapy [DT]) patients is believed to be even rarer.
Methods: All DT LVADs between January 1, 2017 and November 23, 2020 were reviewed. All patients were subjected to an institutional protocol consisting of combined pharmacologic remodeling and mechanical unloading with proactive screening for recovery. The primary outcome of interest was the cumulative incidence of myocardial recovery. Baseline characteristics and operative outcomes were compared between recovered and non-recovered DT patients using non-parametric tests to identify predictive factors.
Results: A total of 49 patients received DT LVADs. Nine patients were identified as myocardial recovery candidates using the protocol screening criteria. Overall, 11 patients underwent formal confirmatory testing for recovery, of which 10 were deemed recovered and underwent LVAD explant, defunctionalization, or transplantation. 37.5% of patients that had a concomitant coronary artery bypass during LVAD implantation achieved recovery. An equal proportion of ischemic and non-ischemic cardiomyopathy patients achieved recovery. The cumulative incidence of myocardial recovery was 25.1% at 36 months. No factors were identified as being predictive of recovery.
Conclusion: Myocardial recovery in DT LVAD patients can be achieved at a higher rate than previously reported. Revascularization at the time of LVAD is safe and may be beneficial. LVAD therapy may not be the final destination in these patients.

## Conley, William | Molecular & Cellular Research

***Elucidating the Genetic Etiology of a Familial Case of Congenital Arteriopathy***

**Authors:** Conley W, Thareja S, Tomita-Mitchell A, et al.
**Project Mentor:** Aoy Tomita-Mitchell, PhD
**Mentor's Department:** Sugery

Background: Supravalvular aortic stenosis (SVAS) is a congenital heart defect commonly seen together with peripheral pulmonary arterial stenosis (PPAS). SVAS and PPAS can co-occur in syndromic and non-syndromic familial or sporadic forms. Current research suggests variants of the elastin protein (ELN) may be a potential cause of this arteriopathy, but the true genetic etiology remains unknown. This study investigates potential variants that may give a genetic explanation to a multigenerational family with 6 out of 11 members affected by a non-syndromic arteriopathy consisting of SVAS and PPAS.

Methods: A family pedigree was created using information provided by the family and medical chart review. Exome sequencing was performed on four affected and one unaffected family member. We filtered gene variants based on allele frequency < 0.2%, scaled CADD score > 25, and the presence or absence of disease. Candidate variants were identified and confirmed through Sanger sequencing in the remaining family members.

Results: Exome analysis yielded a candidate list of four damaging coding variants: SNIP1, SLC9A4, BSCL2, and TINGAL1. Further Sanger sequencing revealed SLC9A4, a sodium-hydrogen exchanger, as the only variant to segregate with each affected family member. Pathogenic ELN variants were not found in affected members.

Conclusion: Our study reports a variant, other than ELN, that segregates with disease and may explain this family's combined arteriopathy. However, since limited research exists, further work is needed to determine how the SLC9A4 variant may lead to SVAS and PPAS.

## Cotchett, MA, Kelly | Poster 44 | Quality Improvement and Patient Safety

***Depression and Psychological Distress in Breast Cancer Patients***

**Authors:** Cotchett KR, Kelly AH, Szabo A, Wallace L, Chaudhary LN.
**Project Mentor:** Lubna Chaudhary, MD, MS
**Mentor's Department:** Medicine

INTRODUCTION: Patients with breast cancer are at increased risk for depression and suicide compared to the general population and patients with other types of cancer. The aim of the present study was to identify variables associated with changes in self-reported distress and depression.
METHODS: We performed a retrospective chart review of breast cancer patients seen at Froedtert & MCW Breast Clinic between 2019 and 2020. Univariate and multivariate analysis of demographic and clinical variables was performed in relation to PHQ and distress scores.
RESULTS: Data from 197 patients was analyzed. Patients with a history of depression scored significantly higher on distress screening (p=0.004) versus patients without psychiatric history. Patients under 50 years old reported higher levels of distress than patients over 70 (p=0.031). Self-reported distress declined significantly with increased time from initial diagnosis (p=0.043; p=0.006 at 2 years). Distress was significantly higher prior to initiation of radiation versus during and immediately following therapy (p=0.028). A history of depression, younger age, passage of time, and temporal relationship to radiation treatment were not associated with significant differences in self-reported depression (p=0.5; p=0.059; p=0.5; p=0.7). Distress and depression screening scores were not significantly impacted by surgery or chemotherapy (p=0.5; p=0.11).
CONCLUSION: Subpopulations who reported significantly higher levels of distress included individuals under 50 years old and those with a history of depression. Distress exhibited a greater downtrend than depression following initiation of oncologic intervention. The results of this study indicate that breast cancer patients are susceptible to significant fluctuations in psychological distress. In contrast, clinically relevant depression screening scores were less frequent and less subject to deviation.

## Cowley, MS, Norah | Quality Improvement and Patient Safety

***Assessment of MRI and US screening for tethered cord syndrome in patients diagnosed with EA/TEF***

**Authors:** Cowley N, Maheshwari M, Lerner D, Lew S, Lal D, Knezevich M, Lingongo M, Gourlay D.
**Project Mentor:** David Gourlay, MD
**Mentor's Department:** Pediatric Surgery

Background: Infants with EA/TEF undergo screening for tethered cord syndrome (TCS) via US/MRI. Existing literature lacks data to guide optimal timing of screening and MRI is often delayed until 3-6 months of age, when it is frequently forgotten. Detethering surgery has a high rate of success in patients with TCS and is often performed prophylactically due to potential irreversible deficits. This study aims to improve screening procedure for infants with EA/TEF.
Materials and Methods: A retrospective chart review was done of all EA/TEF patients treated over six years (n=79). The study examined how often each imaging modality was performed and identified a TCS lesion, as well as age of screening/surgical intervention.
Results: Screening for TCS was done with MRI 58% of the time and US 15% of the time. However, 38% of patients did not undergo any screening. Out of the patients with TCS on MRI (n=19, 41.3%), 73.7% had neurosurgery. Of patients who underwent US (n=12), 9 patients also had MRI later: 2 reported TCS lesions and subsequently had neurosurgery. Surgical infection rates and complications were 0/14.
Conclusions: MRI demonstrated a higher rate of detecting TCS lesions than US, and patients with TCS frequently had detethering. Patients with >=3 VACTERL or vertebral anomalies had a higher incidence of TCS on MRI. Patients with vertebral anomalies reported false negative ultrasounds in 2 cases, suggesting the potential superiority of MRI screening in this subgroup. A third of children did not undergo any imaging and this will require a process improvement.

## Cox, Ronald | Poster 34 | Health Systems Management & Policy

***Short term safety of COVID-19 vaccines in patients with solid tumors receiving systemic therapy***

**Authors:** Cox RE, Parish MA, McKenna EJ, Oxencis C, Thapa B, Chakrabarti S.

**Project Mentor:** Sakti Chakrabarti, MD

**Mentor's Department:** Medicine

BACKGROUND There are currently three COVID-19 vaccines approved by the United States Food and Drug Administration to prevent coronavirus infection. However, robust data are unavailable on the adverse events of the vaccines in patients with solid tumor malignancies undergoing systemic therapies.
AIM To evaluate the safety of COVID-19 vaccines in patients with solid tumors undergoing systemic therapies.
METHODS The study included patients with solid tumors treated in a tertiary care center who received COVID-19 vaccination between January 1, 2021 and August 15, 2021 while undergoing systemic therapy. Electronic medical records were accessed to collect information on patient characteristics, systemic therapies, type of vaccine received, and adverse events associated with vaccine administration.
RESULTS The analysis included 210 patients; the median age was 70 years, and 51% of patients were female. The most common chemotherapy, immunotherapy, and targeted therapy administered were taxane-based regimens 14.2% (30/210), anti-programmed death 1 (PD-1) agents 22.8% (48/210), and antiangiogenic agents 7.1% (15/210), respectively. Patients received the following vaccines: 2 doses of BNT162b2 by Pfizer 52% (110/210), 2 doses of mRNA-1273 by Moderna 42% (89/210), and 1 dose of JNJ-78436735 by Johnson & Johnson 5% (11/210). At least 1 adverse event (AE) attributable to the vaccine was observed in 37 patients 17.6% (37/210). The total number of AEs attributable to vaccines was 62: fifty-three grade 1 and nine grade 2. The most frequent grade 1 AEs included fatigue 17% (9/53), fever 15% (8/53) ,and injection site reaction 13.2% (7/53). The most frequent grade 2 AEs were fatigue 33.3% (3/9) and generalized weakness 22.2% (2/9).
CONCLUSION This study demonstrates that the adverse events associated with COVID-19 vaccination are mild and infrequent in patients with solid tumors receiving systemic therapies.

## Craig, Taylor | Health Systems Management & Policy

***B12 & Methylene Blue in the Treatment of Vasoplegic Syndrome in Liver Transplant and CV Surgery Patients***

**Authors:** Craig T, Tawil J.

**Project Mentor:** Justin Tawil MD

**Mentor's Department:** Pediatrics

BACKGROUND AND PRELIMINARY DATA: Vasoplegia is a syndrome characterized by pathologic low systemic vascular resistance, high cardiac index, and normal volume status. Vasopressors do not always restore adequate organ perfusion. A retrospective chart review evaluating the efficacy of methylene blue and hydroxocobalamin as adjuncts may provide crucial knowledge on treatment of intraoperative vasoplegic syndrome.
HYPOTHESIS: B12 and MB will reduce norepinephrine equivalent (NEE) doses of vasopressors following administration.
SPECIFIC AIMS: To describe the efficacy of hydroxocobalamin and methylene blue in treating vasoplegic syndrome as measured by a decrease in NEE compared to baseline.
METHODS PROPOSED: I2B2 screening was used to identify patients having liver transplant or cardiac surgery between 1/1/2016 and 6/30/2018 and exposure to the study drugs. Variables collected: CVP, SVR, SBP/DBP, and amount of administered vasopressors at -30,-15,0,15, 0,15,30,60,90,120,150,180,210,and 240 minute intervals after study drug administration.
EXPECTED OUTCOMES: To determine the efficacy of methylene blue and hydroxycobalamin in treating intraoperative vasoplegic syndrome and decreasing vasopressor requirement.
RESULTS: No statistically significant differences were noted in NEE dosing following administration.
CONCLUSIONS: Our study did not find a reduction in NEE following administration of MB or B12.
NEXT STEPS: BP and SVR should be collected and trended alongside NEE. Additionally, a prospective study where data collection and the BP relative to drug administration can be assured to be accurate.

## Dang, MPH, Madeline | PODIUM | Clinical & Translational Research

***Barriers and facilitators to HIV pre-exposure prophylaxis (PrEP) among transgender populations in the US***

**Authors:** Dang MC, Scheim AI, Teti M, Quinn KG, Zarwell M, Petroll AE, Horvath KJ, John SA.
**Project Mentor:** Steven John, PhD, MPH
**Mentor's Department:** Psychiatry and Behavioral Medicine

HIV pre-exposure prophylaxis (PrEP) is highly effective at preventing HIV; however, PrEP use among transgender individuals remains low. We conducted a systematic review to identify barriers and facilitators to PrEP uptake, adherence, and persistence among transgender individuals in the U.S. We conducted a literature search in PubMed and CINAHL databases in March 2021 and followed PRISMA guidelines. Studies were eligible if they were published in a peer-reviewed journal and reported interest, uptake, adherence, and/or persistence of PrEP use among transgender individuals. Articles that did not disaggregate results for transgender participants were excluded. Data from included articles were coded using content analysis and narratively synthesized using a framework matrix. We screened 254 unique articles published after U.S. Food and Drug Administration approval of PrEP, and 33 articles were included in the review. Five themes were identified in the literature including: (1) PrEP concentrations were lower among individuals taking feminizing hormones, but the difference did not appear clinically significant; (2) concerns regarding interactions between gender-affirming hormone therapy and PrEP remains a large barrier; (3) PrEP initiation may facilitate increased self-advocacy and self-acceptance; (4) lack of trust in medical institutions impacts PrEP uptake; and (5) social networks have a significant influence on PrEP knowledge, interest, and adherence. Additional research is needed involving transgender men and nonbinary persons, and efforts to improve PrEP persistence among the transgender community are needed. Training healthcare providers to provide inclusive and affirming care is perhaps one of the strongest areas for intervention to increase PrEP uptake and persistence.

## Daniels, Erica | Quality Improvement and Patient Safety

***Reducing inappropriate oxygen use in hospitalized medicine patients***

**Authors:** Daniels EA, Lamb G.
**Project Mentor:** Geoffrey Lamb, MD
**Mentor's Department:** Medicine

Introduction: Evidence suggests inappropriate initiation and excessive supplementation of oxygen is harmful to patients. To improve oxygen use, we initiated a quality improvement project with the goal to reduce the percentage of inappropriate utilization of oxygen by 50%.
Methods: Nasal cannula oxygen use data for medicine inpatients was abstracted weekly for chart review. A multidisciplinary team developed a guideline for O2 use. Initiation of NC O2 with a baseline SPO2>92% was deemed inappropriate and 3+ consecutive SPO2>96% was defined as over-supplementation. Formal interventions included an oxygen use guideline, updated EPIC order to include an upper SPO2 limit, and magnetic reminder placards. Progress was tracked over time via control charts.
Results: Baseline data revealed 40% of patients were inappropriately placed on oxygen. Of these, 71% started in the ED with continuation on admission. 55% of patients had one instance of excessive supplementation recorded. Only half of all improper uses of oxygen had any charted medical reasoning and only 30% had a corresponding order. Instances of proper oxygen use had orders only 48% of the time. Run charts revealed inappropriate initiation was significantly reduced to 27.1% ($p<0.0001$) and excessive oxygenation decreased significantly to 34.4% ($p<0.0001$) following interventions with no effect on charting or on oxygen ordering.
Conclusions: Our interventions significantly decreased improper oxygen initiation and excessive supplementation with greatest impact following the updated EPIC order. Most cases of oxygen use are initiated in the ED and maintained on admission. A majority of oxygen use continues to have no associated order.

## Desjarlais, Eric — Clinical & Translational Research

***Epidemiologic Investigation of Pentosan Polysulfate Sodium-Associated Retinopathy***

**Authors:** Desjarlais EB, Medic V, Kim JE.
**Project Mentor:** Judy E. Kim, MD
**Mentor's Department:** Ophthalmology and Visual Sciences

Background: Pentosan polysulfate sodium (PPS) is an oral medication for interstitial cystitis (IC). Recent studies have demonstrated an association between PPS use and retinopathy. However, to our knowledge, no studies have investigated or controlled for the potential relationship between IC and retinopathy. The aim of this study was to investigate the incidence and risk of retinopathy in patients with and without IC and PPS use.
Methods: Data for this retrospective cohort study was sourced from the TriNetX database. Adult, female patients with IC were matched to non-IC controls with a 1:4 ratio on age, race, and ethnicity. Index dates for patients with IC and their matched controls were informed by the first recorded IC diagnosis. Patients did not have retinopathy before their index dates. The outcome measure was any one of six retinopathy diagnoses: exudative or nonexudative age-related macular degeneration, drusen, hereditary retinal dystrophy, toxic maculopathy, or unspecified macular degeneration. A Cox proportional hazards models was used to estimate hazard ratios for incident retinopathy while adjusting for age, race, ethnicity, smoking, and medical comorbidities.
Results: The study included 22,060 and 88,240 adult, female patients with and without IC, respectively. Average age was 53.92 (SD 16.22) years. Incidence per 100,000 person-years was 173.88 (95% CI 162.96 - 185.53) for patients without IC, 226.63 (95% CI 198.63 - 258.56) for IC without PPS use, 293.02 (95% CI 234.02 - 366.89) for less than five years of PPS use, and 558.91 (409.97- 761.95) for at least five years of PPS use. Adjusted HRs were 1.31 (95% CI 1.13-1.51) for IC without PPS use, 1.70 (95% CI 1.35-2.15) for less than five years of PPS use, and 3.10 (95% CI 2.26-4.27) for at least five years of PPS use.
Conclusions: The incidence and risk of retinopathy was increased in patients with IC. Prolonged PPS use further increased the incidence and risk of retinopathy.

## Diehl, Cody — Poster 24 — Global Health

***Assessing barriers to healthcare for the LGBTQ+ community in Milwaukee***

**Authors:** Diehl CH, Doll BM.
**Project Mentor:** Juan Trivella, MD
**Mentor's Department:** Medicine

At the forefront of modern-day medicine is patient-centered care (PCC). To effectively provide PCC, physicians must understand the unique challenges faced by their patients. This requires physicians to practice cultural competency. One population that continues to require more culturally competent healthcare providers is the LGBTQ+ community. Previous studies found that this population is more likely to delay care due to cost and non-cost variables. These studies compared healthcare barriers within the LGBTQ+ community as well as against their cis counterpart; however, studies that evaluate the healthcare barriers based on the context of the care are not well established. Our study compared the barriers to healthcare for self-identified members of the Milwaukee LGBTQ+ community in the following populations: members who receive care at an LGBTQ inclusion clinic, members who receive medical care at a non-LGBTQ clinic, and members who are not receiving medical care. Furthermore, we aimed to determine the areas of healthcare most important to the LGBTQ+ community. To do this, we created a validated "Barriers to care scale" that was adapted from previously established studies. This questionnaire was distributed on flyers at the Inclusion Clinic at Froedtert Hospital as well as on a QR code posted to various Milwaukee area LGBTQ+ social media pages. Our study determined the main barriers to healthcare for the LGBTQ+ community in Milwaukee are lack of physicians who are competent in LGBTQ+ centered care and social stigma against the LGBTQ+ community. Additionally, it was found that LGBTQ+ patients would feel more comfortable receiving care from a physician that identifies as LGBTQ+ or wears a symbol representing the LGBTQ+ community. These findings indicate the need for a heightened focus on LGBTQ+ centered care both during medical training and continued throughout medical practice so that providers can deliver equitable patient-centered care.

## Dobbs, MPH, Jared | Poster 58 | Urban & Community Health

***Rural, suburban, and urban access to sterile injection equipment and syringe services programs.***

**Authors:** Dobbs JM, Dickson-Gomez JB.
**Project Mentor:** Julia Dickson-Gomez, PhD
**Mentor's Department:** Institute for Health and Equity

Fatal opioid overdose and communicable disease rates continue to rise among people who inject drugs (PWID). Syringe services programs (SSPs) are an evidence-based harm reduction strategy providing sterile injection equipment, education, and resources to PWID. While access to SSPs has expanded over time, there are still many PWID without adequate access to sterile injection equipment. This study involved the use of in-depth interviews with 57 PWID across rural, suburban, and urban Wisconsin to explore perceptions about the availability and accessibility of sterile injection equipment and SSPs among PWID. Results revealed a gradient of access, where those in urban communities with greater access to SSPs reported fewer barriers than those in suburban and rural communities that lacked access to SSPs. Participants without access to SSPs often relied on nonprescription syringe sales at community pharmacies and secondary syringe exchange within their networks to obtain sterile injection equipment, which presented their own barriers. Participants also went to great lengths to preserve and reuse injection equipment they did have. Recommendations for expanding access to sterile injection equipment for rural and suburban PWID include: (1) Educating pharmacists about the public health benefits of sterile syringe access for PWID; (2) Adjusting state and pharmacy policies to facilitate the sale of nonprescription syringes without barriers meant to discourage PWID; (3) Establishing more SSPs in rural and suburban communities, which can be accomplished through standalone programs or integration into existing clinics and programs; and (4) Training PWID that attend SSPs and are engaged in secondary syringe exchange to share harm reduction education with other PWID in their social and drug using networks.

## Doll, Brittany | Poster 24 | Global Health

***Assessing barriers to healthcare for the LGBTQ+ community in Milwaukee***

**Authors:** Doll BM, Diehl CH.
**Project Mentor:** Juan Trivella, MD
**Mentor's Department:** Medicine

At the forefront of modern-day medicine is patient-centered care (PCC). To effectively provide PCC, physicians must understand the unique challenges faced by their patients. This requires physicians to practice cultural competency. One population that continues to require more culturally competent healthcare providers is the LGBTQ+ community. Previous studies found that this population is more likely to delay care due to cost and non-cost variables. These studies compared healthcare barriers within the LGBTQ+ community as well as against their cis counterpart; however, studies that evaluate the healthcare barriers based on the context of the care are not well established. Our study compared the barriers to healthcare for self-identified members of the Milwaukee LGBTQ+ community in the following populations: members who receive care at an LGBTQ inclusion clinic, members who receive medical care at a non-LGBTQ clinic, and members who are not receiving medical care. Furthermore, we aimed to determine the areas of healthcare most important to the LGBTQ+ community. To do this, we created a validated "Barriers to care scale" that was adapted from previously established studies. This questionnaire was distributed on flyers at the Inclusion Clinic at Froedtert Hospital as well as on a QR code posted to various Milwaukee area LGBTQ+ social media pages. Our study determined the main barriers to healthcare for the LGBTQ+ community in Milwaukee are lack of physicians who are competent in LGBTQ+ centered care and social stigma against the LGBTQ+ community. Additionally, it was found that LGBTQ+ patients would feel more comfortable receiving care from a physician that identifies as LGBTQ+ or wears a symbol representing the LGBTQ+ community. These findings indicate the need for a heightened focus on LGBTQ+ centered care both during medical training and continued throughout medical practice so that providers can deliver equitable patient-centered care.

## Dorantes, Ricardo — Quality Improvement and Patient Safety

***Calcium Chloride Requirement and Postreperfusion Rebound During Massive Transfusion in Liver Transplants***

**Authors:** Dorantes RP, Boettcher BT, Woehlck HJ.
**Project Mentor:** Harvey J. Woehlck, MD
**Mentor's Department:** Anesthesiology

Objective: The administration of citrated blood products during massive transfusion requires calcium salt administration to prevent citrate toxicity and to maintain ionized calcium values. The literature does not provide adequate guidance for the amount of calcium required during massive transfusions during liver transplantation. This study was conducted to provide guidance on calcium salt replacement during massive transfusion in liver transplant patients with a focus on the phase of transplantation where citrate metabolism was minimal.
Design: Observational retrospective chart review
Setting: Academic single institution study of hospitalized patients
Participants: 132 patients after liver transplantation
Interventions: We observed documented measurements of ionized calcium and observed the ratio of calcium salts to citrated bank blood products in patients undergoing liver transplantation with complete data sets. We observed the effect of continuous venovenous hemofiltration on the distribution of ionized calcium values.
Measurements and Main Results: Pre-reperfusion, an average of 1.09g CaCl2/L of citrated blood was administered to maintain ionized calcium in the normal range. Post-reperfusion, less CaCl2 was administered and a rebound of ionized calcium occurred. Pre-reperfusion, continuous venovenous hemofiltration reduced the number of ionized calcium values outside 2 SD, meaning fewer values were critically low.
Conclusions: With massive transfusions up to 67 liters (approximately 13 blood volumes) 1.09g CaCl2/L citrated blood maintained ionized calcium in the normal range in the absence of citrate metabolism. This ratio may have value in empiric treatment when ionized calcium measurements are unavailable and massive transfusion rates exceed metabolic capacity.

## Dumitrescu, Calin — Global Health

***Age Effect on Change of Lymphocytes and Immunoglobulins During Treatment with Ocrelizumab or Rituximab***

**Authors:** Dumitrescu C, Salter A, Maynard M, Obeidat A.
**Project Mentor:** Ahmed Obeidat, MD, PhD
**Mentor's Department:** Neurology

Background: Depleting B cells is a known therapeutic strategy for Multiple Sclerosis (MS) and related disorders. Ocrelizumab (OCR) is a humanized IgG1 monoclonal antibody (mAb) that targets CD20 on the surface of B cells. Rituximab (RTX) is a chimeric IgG1 anti-CD20 mAb that is used in the treatment of MS, Neuromyelitis Optica Spectrum Disorders (NMOSDs) and Myelin Oligodendrocyte Glycoprotein Antibody Disease (MOGAD). Both drugs can reduce circulating immunoglobulins (Ig) and increase the risk of infections. Growing evidence suggests that they also exert an indirect effect on circulating T cells. The interaction between age, sex and alterations of circulating Ig or T cells over time while on treatment is unknown.
Objectives: To characterize pre- and post-B-cell-depletion cell counts, serum Ig levels over time and correlate these immune markers with age, sex and number of infections.
Methods: Data from patients' 18-75 years old receiving OCR or RTX for MS, NMOSD or MOGAD between 07/01/18 and 06/20/20 and had laboratory values over 5 years were included. Statistical analysis was performed using a repeated measures linear mixed model.
Results: A total of 157 charts were screened and 95 met inclusion criteria. Mean (SD) for age was 45.8 (12.9), 66% were females, 72.2% had MS and 63.9% were on OCR. While on treatment, we observed a significant inverse interaction between age and drop in total lymphocyte, CD4, CD8 and CD3 absolute counts. This interaction with age wasn't observed for the drop in Ig. Lower IgG and IgA were associated with a higher frequency of reported infections. There was no significant interaction with sex and no difference in trends specific to treatment.
Conclusions: Older patients receiving OCR or RTX are more likely to experience a drop in circulating T cells. The effect of age was not observed with Ig decline. This suggests a differential interaction between age and adaptive vs humoral immunity in patients receiving OCR or RTX.

## Dyke, Sarah — Health Systems Management & Policy

***Establishing contouring protocols for local OARs for MRI-guided RT of adenocarcinoma of the prostate.***

**Authors:** Dyke SE, Paulson E, Lawton CAF, Bedi M, Straza M, Li XA, Omari E, Chen X, Knechtges P, Hall WA.
**Project Mentor:** William Hall, MD
**Mentor's Department:** Radiation Oncology

Purpose
Establish guidelines for contouring the urethra, penile bulb (PB), corpus cavernosum (CC), corpus spongiosum (CS), and the neurovascular bundle (NVB) for the purpose of consistent definition of regional organs at risk (OAR) for MRI-guided radiation treatment (RT) using a 1.5 Tesla MRI equipped linear accelerator (MR-Linac).
Methods and Materials
Patients undergoing RT for prostate cancer on a 1.5 Tesla MRI Linac were enrolled in a prospective clinical trial (NCT04075305). Daily MR images from 10 patients were collected and the urethra, PB, CC, CS, and the NVB were contoured in MIM (MIM Software Inc, Beachwood, OH). Detailed contouring guidelines for identifying each structure were generated and presented to a diagnostic radiologist and four board certified radiation oncologists to test their reproducibility. Recommendations include using T2-weighted images and specific window levels for each structure. In order to show concordance between reference and observer contours, mean Hausdorff distances (HD) (mean distance between contours) and Jaccard coefficients (JC) (contouring area overlap) were obtained.
Results
The mean HD for the CC was 0.2 ±0.06, and the mean JC was 0.54±0.11. The mean HD for the CS was 0.29±0.22, and the mean JC was 0.47±0.15. The mean HD for the PB was 0.17±0.08, and the mean JC was 0.58±0.12. The mean HD for the NVB was 0.32±0.18, and the mean JC was 0.32±0.10. The mean HD for the urethra was 0.19±0.11, and the mean JC was 0.25±0.13.
Conclusions
Contouring guidelines were designed for the urethra, PB, CC, CS, and NVB using images from 1.5 Tesla MR-Linac. These OARs are challenging to contour and agreement across observers was modest/poor; additional methods to improve inter-observer variability are needed. Consistent contouring of these OARs is important for prospective evaluation of dosimetric criteria and clinical outcomes related to their exposure, including erectile and urinary function.

## Engstrand, Erica — Poster 35 — Health Systems Management & Policy

***Gender disparities in general surgery resident sub-specialization***

**Authors:** Wilson D, Engstrand EK, Schoel L, et al.
**Project Mentor:** Sophie Dream, MD
**Mentor's Department:** Surgery

Purpose: There are an increasing number of women entering medical school and general surgery residency. Despite this, there remains an underrepresentation of women in some surgical specialties. The purpose of this study is to examine gender differences in fellowship subspecialization of recent general surgery graduates.
Methods: Graduating residents from general surgery residencies from 2016-2020 were identified. Referring to each residency's graduating resident website, we noted whether or not listed alumni were reported to have entered a fellowship. If applicants were listed as having completed a fellowship, the fellowship was noted along with each applicant's expressed gender. Differences across groups were analyzed using SPSS.
Results: The majority (82.4%) of graduates pursued a fellowship after residency training. Men were more likely to enter fellowships in Cardiothoracic Surgery, Plastic and Reconstructive Surgery, Vascular Surgery, and practice than women. Women were more likely to enter fellowships in Breast Surgery, Acute Care Surgery/Trauma Surgery, Pediatric Surgery, and Endocrine Surgery than men.
Conclusions: The majority of general surgery residency graduates pursue fellowship training. Gender disparities continue for a minority of subspecialties for both men and women.

## Fastner, Suzanne | Bioethics & Medical Humanities

***Evaluating Skin Cancer Risk Factors and Outcomes in Transplant Recipients***

**Authors:** Fastner S, Katz K, Kasprzak J.
**Project Mentor:** Julia Kasprzak, MD
**Mentor's Department:** Dermatology

The need for immunosuppression after solid organ transplant significantly increases the risk for the development of skin cancer in solid organ transplant recipients (SOTRs). Many factors have been postulated to place patients at higher risk of developing a cutaneous malignancy following solid organ transplantation. The relative importance of each of these factors, however, remains to be clearly elucidated. The aims of this project are to create a registry of SOTRs who are followed prospectively in the department of dermatology to better characterize skin cancer in this population. Additionally, we aim to collect retrospective data regarding immunosuppressive regimen, chemoprevention for skin cancer, time since transplant, type of transplant, skin type, gender, history of skin cancer, and amount of prior sun exposure in patients who have received organ transplants to determine how these variables are associated with skin cancer in SOTRs. We hypothesize that the patient population of SOTRs seen in the Department of Dermatology at the Medical College of Wisconsin (MCW) has an increased incidence of cutaneous squamous cell carcinoma (cSCC) compared to basal cell carcinoma (BCC). This hypothesis was reflected in the preliminary registry data for the 39 SOTRs from MCW enrolled in the registry, with higher rates of cSCC than BCC reported in this population. Going forward, a growing registry of SOTRs at MCW will provide datapoints useful for future studies.

## Feller, Christina | Quality Improvement and Patient Safety

***Improving the quality of care in neurosurgery: a spinal surgery case review over three years***

**Authors:** Feller CN, Bodenbach EM, Kolinski JM, Sinson GP.
**Project Mentor:** Grant P. Sinson, MD
**Mentor's Department:** Neurosurgery

Introduction: Despite the known importance of accurate clinical documentation as a companion to quality care, this is not often prioritized in practice. Accurate clinical documentation is essential for accurate coding and thus, accurate hospital and physician quality ranking, medical center profiling, and revenue captured.
Methods: A single-center retrospective chart review took place over three years for patients undergoing spinal surgery. Based on Vizient's diagnosis related group (DRG) model, each patient chart was analyzed for omitted ICD-10 diagnoses and/or procedure codes missed by coders or not documented by physicians that code for expected length of stay (eLOS). Analysis between old eLOS and new eLOS with the addition of the originally missed variables was completed.
Results: Across the three years, the average eLOS including missed variables was significantly larger than the original eLOS ($p < 0.001$). This result was consistent went analyzing each year independently. Of 192 charts reviewed, 89.5% had at least one new variable contributing to eLOS, with an average of 2.60 (0, 12) new variables found per chart. The average increase in eLOS after recalculation with missed variables was 2.869 days (-0.160, 35.129).
Conclusions: This study demonstrates the consistent room for opportunity to increase accuracy in clinical documentation across three years. Inaccurate documentation misrepresents the quality of patient care provided and the complexity of their cases, negatively affecting hospital and physician quality ranking, medical center profiling, and revenue captured.

## Fields, MLS(ASCP), British | PODIUM | Urban & Community Health

***Mitigating Implicit Bias in Clerkship Evaluations***

**Authors:** Fields BL, Perez A, Saudek K, et al.
**Project Mentor:** Kris Saudek, MD
**Mentor's Department:** Pediatrics

There are significant differences in the narrative language chosen to evaluate students who are underrepresented in medicine (URM). URM students are more likely to be described using personal attributes which impacts Medical Student Performance Evaluation, AOA membership, and overall career trajectory. Addressing this disparity requires that we mitigate implicit biases.
We developed a curriculum for all evaluators in pediatrics at our institution to enhance writing biased-free clerkship narratives. To test this, we created student narratives for pre-/post-curriculum surveys flipping URM versus non-URM status between the surveys. Participants were then assigned a clerkship grade to each narrative. A repeated-measures analysis of variance (ANOVA) was conducted with time (pre/post) as the within-subject repeating factor, and URM as the between-subject factor.
We had a 7% completion rate (14/200). The ANOVA revealed a significant interaction ($p<0.05$) between URM status and time, with URM students scoring significantly higher (M=3.2) at the pre-assessment than non-URM students (M=2.4). No differences existed at post-assessment between the two groups (URM M=2.6 vs. non-URM M= 2.6). Evaluation of the entire curriculum was uniformly positive, indicating the curriculum prepared them to write bias-free evaluations.
We found that differences in faculty assigned grades pre-/post-curriculum between URM and non-URM students were not significant post-curriculum. Although our findings counter our hypothesis, one possibility is that participants were aware of their biases. Differences in the pre-curriculum may reflect a lack of faculty development writing narratives that the curriculum addressed and may represent a methodological flaw that could be rectified with a retrospective pre/post analysis.

## Flitcroft, Madelyn | Poster 45 | Quality Improvement and Patient Safety

***Where You Go Matters: Hospital Variation in Treatment Outcomes for High-Risk Hepatocellular Carcinoma***

**Authors:** Kothari AN, Flitcroft MA.
**Project Mentor:** Anai Kothari, MD, MS
**Mentor's Department:** Surgery

Introduction: Survival for patients with hepatocellular carcinoma (HCC) can be influenced by factors related to the hospital where they receive treatment, including volume and facility type. The objective of this study was to determine the impact of treating facility on long-term survival in patients with high-risk HCC.
Methods: The National Cancer Database was used to identify patients with high-risk HCC (non-metastatic T4 or N1 disease) between 2004 and 2015. Relative contribution of variances between treating facilities was measured using multi-level gamma shared-frailty models and random forest survival analyses were used to predict expected median survival time.
Results: Total of 8,864 patients at 1,112 hospitals met our inclusion criteria. Median survival of the cohort was 5.2 months (1.8 - 14.0) with an up to 29-fold variation in survival between treating facilities (gamma = 0.335, P<.001). Patient clinical, socioeconomic, tumor, and treatment factors explained only 7% of this variability. Hospitals were stratified by predicted median survival and the top 10% were classified as high performers (Figure). Observed median survival at high performance hospitals was 10.2 months compared to 4.2 months at low performing hospitals (aHR=0.32, 0.28 - 0.36). Characteristics associated with classification as a high performing hospital included: increasing HCC case and surgical volume, increasing number of available treatment modalities, academic affiliation, and increasing use of surgery (all P<.001).
Discussion: Survival for patients with high-risk HCC varies substantially across treating facilities and this variability is incompletely explained by patient factors alone. Ensuring this patient population has access to care at high performing centers is a potential strategy to improve long-term survival.

## Ford, Connor — Quality Improvement and Patient Safety

***Relationships among treatment expectancy and positive outlook and spinal cord stimulation success.***

**Authors:** Ford CJ.
**Project Mentor:** Rebecca Anderson, PhD and Sarah Trost, PhD
**Mentor's Department:** Anesthesiology

INTRODUCTION: Spinal cord stimulation (SCS) is a pain management treatment for chronic pain. Past studies have shown that psychological evaluation tools can be used as predictors of SCS outcomes. Finding factors with strong predictive value is significant as predictive capacity may result in adding psychiatric medication and consulting along with SCS treatment. This study will attempt to determine whether such tools are predictors in whether an SCS trial is successful or not, focusing on positive outlook (PO) and treatment expectancy (TE).
HYPOTHESIS: Patients who record higher PO and TE scores prior to an SCS trial will experience a higher rate of trial success than those with lower scores.
AIMS: To compare PO and TE between subjects with successful and unsuccessful SCS trials.
METHODS: Retrospective chart review will be conducted on patients with SCS trials and whether they decided to move forward with a permanent implant or not. Patient score values for PO and TE and whether or not the patient underwent a successful trial will be collected. The population of patients will be split into those with successful trials and those with unsuccessful trials. The data will be analyzed with two-sample T tests to compare the groups to determine if either variable plays a significant role in SCS trial success.
RESULTS: The mean PO scores for successful and unsuccessful trials were 25.1 and 25.7 respectively. The mean TE scores were 26.0 and 24.3 respectively. Both PO and TE scores had no significant impact on whether a trial was successful or not ($p = 0.34$, $p = 0.068$ respectively).
CONCLUSION: The results showed that PO are TE scores do not significantly impact the success of an SCS trial. While statistically insignificant, patients with successful SCS trials had a higher mean TE score and had a slightly lower mean PO score. Ultimately, the results suggest that patient scores for PO and TE should not influence the decision to move forward with SCS trials.

## Foster, Parker — PODIUM — Molecular & Cellular Research

***Pericentriolar Material-1 (PCM1) Localization influences Cardiomyocyte Proliferative Potential***

**Authors:** Foster P, Paddock S, Patterson M.
**Project Mentor:** Michaela Patterson, Ph.D.
**Mentor's Department:** Cell Biology, Neurobiology and Anatomy

Background: Stimulating cardiomyocyte proliferation to promote regeneration is an attractive strategy for heart disease. Evidence suggests mononuclear diploid cardiomyocytes (MDCM) may be competent to proliferate and drive regeneration. Previous work has shown cellular localization of the centrosome-associated protein pericentriolar material-1 (PCM1) can influence whether a cardiomyocyte can re-enter the cell cycle or maintain a post-mitotic state.
Methods: Utilizing single-cell suspension, MDCM were analyzed for localization of PCM1. Afterwards, PCM1 gene expression was knocked down via siRNA to assess its contribution to cardiomyocyte proliferation.
Results: We determined 8.5% of cardiomyocytes in A/J murine ventricles were MDCM (i.e. 2N). PCM1 localized to three distinct phenotypes: non-perinuclear, perinuclear, and mixed. 32.1% of MDCMs revealed non-perinuclear localization, significantly more than 4N ($p = 0.002$) or ≥8N ($p = 0.001$) cardiomyocytes. Polyploid groups significantly expressed a perinuclear phenotype. When PCM1 expression was knocked down, Ki67 staining frequency was significantly reduced ($p = 0.016$) compared to controls. EdU incorporation was less prevalent in the knockdown group ($p = 0.069$), while pH3 was not significantly different ($p = 0.374$).
Significance: We report an association between PCM1 localization and suspected regenerative-competent MDCMs. Specifically, a perinuclear state was significantly associated with polyploidy, whereas MDCMs disproportionately adopted a non-perinuclear phenotype. This suggests the non-perinuclear configuration is important for cardiomyocyte proliferative potential. Further, reduced PCM1 expression significantly reduces Ki67 staining frequency, suggesting PCM1 has an active role in cell cycling. Together, this suggest perinuclear localization influences the transition from proliferation-capable to senescence rather than merely being a marker of the switch.

## Gableman, Angela — Quality Improvement and Patient Safety

***Aneurysm Size Index as a Novel Method to Predict AAA Rupture and Guide Elective Repair***

**Authors:** Gableman AG, Olowofela A, Rolon S, Mansukhani NA.
**Project Mentor:** Neel Mansukhani, MD
**Mentor's Department:** Surgery

OBJECTIVES Abdominal aortic aneurysm (AAA) maximum diameter (AD) threshold is currently used to identify patients at highest risk for rupture and guide elective repair. The maximum AD threshold was developed using a sample of almost all males, and it is estimated that 10-20% of aneurysms rupture at 5cm or less, often in women and patients of smaller size. In this study, we propose a novel method to guide elective repair that indexes maximum AAA diameter to the external iliac artery diameter.
METHODS Single center retrospective cohort study. Patients were divided into 3 groups based on aortic aneurysm status (surveillance, elective repair, and ruptured). TeraRecon software was used to obtain centerline diameter measurements. ASI was calculated as the maximum aortic diameter divided by the average external iliac artery diameter. ASI was compared between groups and between males and females.
RESULTS 126 patients (50% female) were included with 42 patients per group. ASI for surveillance (5.27±1.70), elective repair (7.39±1.69), and rupture (9.70±2.91) groups were significantly different ($p<0.001$). AD was significantly different for men vs women in the elective repair group (6.26±1.22 vs 5.43±0.64) at $p<0.05$ and the rupture group (9.21±2.04 vs 6.84±1.48) at $p<0.01$, while ASI was not significantly different in either group (elective repair [7.11±1.88, p=0.276], rupture [7.68±1.47, p=0.304]). Linear regression analysis of ASI vs AD for men and women showed that slope was not significantly different between sexes for any of the 3 groups (surveillance [p=0.2822], elective [p=0.1206], and rupture [p=0.2158]).
CONCLUSIONS ASI is correlated to surveillance, elective, and repair groups. ASI normalizes differences seen between maximum AD of men and women. ASI is a promising alternative to AD in use for determining if a patient with an AAA should undergo elective repair. An appropriate threshold for comparison to AD in rupture prediction has yet to be established.

## Gibson, Evan — Poster 46 — Quality Improvement and Patient Safety

***Readmission Reduction via Froedtert's Emergency Department by Social Determinant of Health Identification***

**Authors:** Gibson E, Sonnenberg T, Johnshoy H.
**Project Mentor:** Taylor Sonnenberg, MD, MSGH
**Mentor's Department:** Emergency Medicine

Social Determinants of Health (SHD) are the conditions in which people are born, grow, live, work, and age. These demographics are often overlooked when evaluating a patient, even though they often influence patient health in unseen ways. Hospital systems aim to eliminate patient readmissions within 30 days of their previous discharge. Quick readmissions can negatively impact patients' health. Knowing how SDH impact patients' health can be a key indicator of reasons why readmission under 30 days occurs and can shed light on which SDH may not be adequately supported outside of a hospital setting. Patients that were readmitted for less than 24 hours through Froedtert's Emergency Department within 30 days of their last Froedtert discharge were identified from July 2019 to November 2020. Patients were recorded in an excel spreadsheet. Commonly held SDH for identified patients were recorded. SDH's were then organized into figures and analyzed for significance. If a single SDH did not have a 25% prevalence in its respective category it was considered to be non-significant. Recorded data shows that patients with previous or current smoking, EtOH, or illicit drug usage are readmitted at higher rates than other SDH's. Government-assisted insurance was often associated with readmission. Home zip code, religion, PCP, and BMI did not impact readmission rates. Education and employment status were seldom recorded. Standard demographics (age, sex, gender, race) are not enough to identify at-risk populations.

## Gill, Harpreet — Clinical & Translational Research

***Impact of vasoactive medication on enteral nutrition in PARDS***

**Authors:** Gill HS, Yan K, Rajapreyar P, Powell M, Mikhailov TM.
**Project Mentor:** Theresa Mikhailov, MD, PhD
**Mentor's Department:** Pediatrics

Pediatric Acute Respiratory Distress Syndrome (PARDS) remains a major concern for critically ill children. It is both a significant cause of morbidity and mortality. Early enteral nutrition (EEN) has been shown to reduce mortality, length of stay, and hospital charges in critically ill children. EEN in children with PARDS has not been a major standard of care due to reluctance to initiate nutrition and findings that suggest children experience longer time on mechanical ventilation following EEN. Vasoactive-Ionotropic Scores (VIS) are a method of quantifying cardiovascular support. The maximum score during the 48-hour period was found to be predictive of both length of stay and morbidity when comparing high VIS to low VIS. In this study, we look to establish guidelines or thresholds for VIS and the individual vasoactive agents it represents with regards to EEN.
We hypothesized that subjects who receive EEN will have a lower maximum VIS than those who did not in the first 48 hours following diagnosis.
We completed retrospective chart review of PARDS admission between July 1, 2014 and October 31, 2019. 151 subjects met our inclusion criteria and a total of 1954 unique VIS scores were obtained.
Among critically ill children with PARDS, we found that subjects who received EEN had a lower maximum VIS in the first 48 hours than subjects who did not receive EEN. Also, the most potent vasoconstrictor, vasopressin, was used less in subjects who received EEN than in those who did not. Furthermore, we found that were was is overlap between the maximum dose received in the EEN group and the Median dose received in the non-EEN group. This group represents individuals who could be initiated on EEN. These difference suggest that more aggressive nutritional strategies could be implemented and that the threshold of vasoactive medication that is prohibitory to feeding has not been reached.

## Gmehlin, BA, Cameron — Global Health

***SARS-CoV-2 and Wisconsin Nursing Homes: Temporal Dynamics During the COVID-19 Pandemic***

**Authors:** Gmehlin CG, Rivera F, Ramos-Castaneda JA, Pezzin LE, Ehn D, Duthie EH, Munoz-Price LS.
**Project Mentor:** Silvia Munoz-Price, MD, PhD
**Mentor's Department:** Medicine

Objectives: Evidence suggests that quality, location, and staffing levels may be associated with COVID-19 incidence in nursing homes. However, it is unknown if these relationships remain constant over time. We describe incidence rates of COVID-19 across Wisconsin nursing homes while examining factors associated with their trajectory.
Methods: Publicly available data from June 1, 2020, to October 31, 2020, were obtained. These included facility size, staffing, 5-star Medicare rating score, and components. Nursing home characteristics were compared using Pearson chi-square and Kruskal-Wallis tests. Multiple linear regressions were used to evaluate the effect of rurality on COVID-19.
Results: There were a total of 2459 COVID-19 cases across 246 Wisconsin nursing homes. Number of beds ($P < .001$), average count of residents per day ($P < .001$), and governmental ownership ($P = .014$) were associated with a higher number of COVID-19 cases. Temporal analysis showed that the highest incidence rates of COVID19 were observed in October 2020 (30.33 cases per 10,000 nursing home occupied-bed days). Urban nursing homes experienced higher incidence rates until September 2020; then incidence rates among rural nursing homes surged. In the first half of the study period, nursing homes with lower-quality scores (1-3 stars) had higher COVID-19 incidence rates. However, since August 2020, incidence was highest among nursing homes with higher-quality scores (4 or 5 stars). Multivariate analysis indicated that over time rural location was associated with increased incidence of COVID-19 ($\hat{I}^2 = 0.05$, $P = .03$).
Conclusions: Higher COVID-19 incidence rates were first observed in large, urban nursing homes with low-quality rating. By October 2020, the disease had spread to rural and smaller nursing homes and those with higher-quality ratings, suggesting that community transmission of SARS-CoV-2 may have propelled its spread.

## Gobrial, Monica — Clinical & Translational Research

***Effect of Weight Promoting Medications in a Real-Life Outpatient Setting***

**Authors:** Gobrial MS, Morselli LL, Garacci Z, Dawson AZ, Kidambi S.
**Project Mentor:** Srividya Kidambi, MD, MS
**Mentor's Department:** Medicine

Background: Obesity prevalence has increased significantly in the past 50 years. We examined the effect of certain classes of medications on weight in the general population over a multi-year period.
Methods: Electronic medical records were used to extract data (2012-2019) to identify individuals aged 18-70 years, with weight recorded within 3 months prior to starting an obesogenic medication, and with at least one weight recorded per consecutive follow-up year. Among these, persons prescribed and continued on a medication associated with weight gain were identified (cases). Patients with no obesogenic medication prescription throughout the follow-up years served as controls.
Results: 12,642 individuals were identified, of which 9008 were started on an obesogenic medication. The remaining (n=3634) were controls. Baseline and subsequent weights of cases were 87±23 kg (BL), 87 ± 23 kg (year1, n= 9008), 89 ± 23 kg (year2, n= 2322), 91 ± 24 kg (year3, n= 1064), 91 ± 25 kg (year4, n= 637). Baseline and subsequent weights of controls were 80±20 kg (BL), 80±20 (n=3634), 80±20 (n=1202), 79±19 (n=574), and 79±20 (n=327). Weight increases in cases during each year were statistically significant compared to controls after controlling for baseline weight ($p<0.0001$). Multivariate analysis of specific medication classes showed statistically significant weight increase in psychotropic medications ($p<.0001$), glucocorticoid hormones ($p<.0001$), cardiovascular medications ($p=0.003$) and hypoglycemic agents ($p=.005$).
Conclusion: In this multiyear follow-up study, several medication classes resulted in sustained weight gain. Temporal associations of medications with weight gain should be monitored and alternatives that are weight-neutral should be considered.

## Goldsher, Jay — Poster 59 — Urban & Community Health

***Medical Student Reflections on The Food Doctors Community-Engaged Nutrition Education Program***

**Authors:** Cory M, Johnston B, Schreiner J, Balfour M, Goldsher J, Villarreal E, Pazdera M, Nelson D.
**Project Mentor:** Bryan Johnston MD
**Mentor's Department:** Family and Community Medicine

The Food Doctors (TFD) is a community-engaged medical student-led nutrition education program. This study sought to assess the impact of service-learning and research in TFD on past and present program leaders and volunteers. Likert-scale questions were utilized to assess degree of impact of the program on student perspectives and skills. Individual reflections on personal and professional development through TFD were also captured. Over 86% of the participants (N=14) reported that TFD was very or extremely impactful in four aspects, including their views of service-learning and teaching skills. Common themes from the reflections were noted, and the authors discuss how the unique opportunities provided to students in TFD yield significant learning outcomes. The authors also offer suggestions to student leaders and those interested in enhancing service-learning at their institutions for how to develop a program that will prepare medical students to become community-engaged physicians who deliver patient-centered care.

## Gomez, Jose | Poster 12 | Clinical & Translational Research

***Predictive Factors Associated with Higher Tick and Lyme Disease Awareness in Summer Camp Staff***

**Authors:** Gomez J, Coburn J.
**Project Mentor:** Jenifer Coburn, PhD
**Mentor's Department:** Medicine

Objective: There is an increased risk of contracting tick-borne disease in summer camp environments. The purpose of this study was to determine factors associated with high tick and Lyme disease (LD) awareness among summer camp staff.

Methods: An online survey was distributed to staff at a single summer camp site. Data abstracted was based on previous existing questionnaires and responses were formatted to a Likert scale. Sociodemographic characteristics such as age, gender, education level, country of residence, and years working at camp were collected and analyzed. Responses were analyzed using Chi- Square, Mann-Whitney U-test, and logistic regression as appropriate.
Results: Overall, 79 questionnaires were received. Fifty (63%) U.S. and twenty-nine (37%) international staff completed the survey. International staff represented 6 different countries, while U.S. respondents represented 20 different states with 6 coming from high LD incidence states. Factors associated with a high awareness and familiarity of ticks and LD include having lived in areas where ticks and LD are common ($p<0.0001$), having heard of tick-borne disease ($p< 0.05$), and number of years working at a camp ($p<0.05$).
Conclusions: Summer camp staff may work in tick endemic areas and may be at high risk of acquiring tick-borne disease. Living in high tick and LD prevalence areas, having heard of tick-borne diseases, and years working at camp are factors associated with higher awareness and familiarity. Screening criteria in camp practice can help identify staff who would benefit from additional training and therefore mitigate the burden of tick-borne diseases and healthcare costs.

## Griggs, Jasmin | Quality Improvement and Patient Safety

***Breast Cancer Experiences of African American Women in Southeastern Wisconsin***

**Authors:** Beyer K.
**Project Mentor:** Kirsten Beyer, PhD, MPH, MS
**Mentor's Department:** Institute for Health & Equity

Since the mid-2000s, breast cancer mortality rates have been higher for African American women, compared to non-Hispanic White women, in Milwaukee, WI. A multitude of factors relating to African American women's interactions with the health care system, including inadequate breast cancer screening and suboptimal patient-provider relationships, potentially contribute to this disparity. In addition, the tendency to take on a "superwoman" or "strong Black woman" (SBW) role in their family and larger community is thought to hinder breast cancer survivorship. To further determine how these factors might impact African American women, 30 African American women who had completed breast cancer treatment and lived in the Milwaukee Metropolitan Statistical Area were interviewed about their experiences of being diagnosed with and treated for breast cancer. These interviews revealed that screening mammography or self-initiated interactions with health care providers were the main initial paths that led the women to be diagnosed with breast cancer. Also, most women were satisfied with the care teams that they had while they underwent cancer treatment. Lastly, the women often played outsized roles in their families, in terms of being a significant source of support for multiple family members; however, many women still prioritized their health, with some consciously choosing not to play the SBW role. These findings indicate that the aforementioned factors might not universally hinder African American breast cancer patients.

## Halama, Sam | Poster 47 | Quality Improvement and Patient Safety

***Developing a concussion education curriculum for ED providers.***

**Authors:** Halama SR, Elftmann A, Ferguson CC, Thomas DG.
**Project Mentor:** Danny Thomas, MD, MPH
**Mentor's Department:** Pediatrics

Background: Children commonly present to the ED for assessment of concussion, making knowledge of best practices in assessing and managing concussion essential in the skillset of an ED clinician. As part of a QI project to improve effectiveness of care received by concussion patients, we created a provider education curriculum called Concussion University. We proposed that this curriculum would increase provider knowledge and thereby use of concussion best practices leading to improved care for concussion patients.
Methods: Participants included ED providers at Children's Wisconsin. From previous survey data and project leader's expertise, five lessons on concussion assessment and management were developed. The curriculum was piloted to a few ED providers as part of a PDSA cycle. After adjustments, all ED providers received the materials and were asked to complete a follow up survey.
Results: All four respondents on the initial pilot found the curriculum to be helpful and agreed that this made them feel more like a concussion expert. Concerns regarding time to complete and technology were noted. Preliminary results from eleven respondents to the final survey showed most respondents did not use any of the materials with time as a commonly cited completion barrier.
Discussion: Preliminary results suggest that an education curriculum may not be an effective strategy to improve provider use of concussion best practices on a wider scale; therefore, future directions should focus on other improvement strategies or improving provider engagement. The project was limited significantly by low survey response rates.

## Hansen-Cole, Zachary | Molecular & Cellular Research

***Effect of Cellular Senescence, Changing Cell Populations in End Neuromas on Targeted Muscle Reinnervation***

**Authors:** Cole ZT, Cole K, Khosla A, Roth E, Hoben G.
**Project Mentor:** Gwendolyn Hoben, MD, PhD
**Mentor's Department:** Plastic and Reconstructive Surgery

Introduction: Targeted muscle reinnervation (TMR) is a surgical intervention found to prevent neuromatous and phantom limb pain in acute amputees; however, there is reduced efficacy in chronic amputees. TMR performed 3 weeks after nerve injury in a rodent model of neuropathic pain results in rapid, complete reduction of pain behaviors while TMR performed after 12 weeks demonstrates continued pain behaviors. Organized reinnervation is critical to stop spontaneous afferent activity that results in pain. We hypothesize that there is reduced axonal regeneration and Schwann cell presence in TMR coaptations performed 12 weeks following amputation.
Materials & Methods: Unilateral spared nerve injury (SNI) was performed on Sprague-Dawley rats by ligating the common peroneal and tibial nerves. Behavioral testing with standard measures (acetone sensitivity, pin test, von Frey, and soft brush) was performed to confirm a pain phenotype. At 3 weeks and 12 weeks post-SNI, the tibial and common peroneal nerve neuromas were collected as zone-of-injury specimens (ZoIs). Cell population counts in samples were performed using N-200 (neurofilament, axons) and S100 (Schwann Cell) immunohistochemical staining. Mean fluorescence at proximal and distal points in the zone of injury specimens was measured using ImageJ, with values given as a percentage of the positive control's mean fluorescence.
Results: ImageJ analysis shows reduced mean NF-200 and S-100 fluorescence in distal segments of the nerve at both 3 and 12 weeks, with higher overall mean fluorescence in the 3-week group for both NF-200 and S-100.
Conclusions: Reduced NF-200, S-100 fluorescence in the distal nerve at both time points indicates a gradual reduction of viable axons with concomitant reductions in Schwann cells at both time points. The greater density of axons and Schwann cells at 3-weeks indicates a microenvironment more conducive to regeneration that may support the analgesic effect of TMR.

## Hennes, Leah — Quality Improvement and Patient Safety

***Influenza Vaccination Program in a Pediatric Emergency Department: Who Declined the Vaccine in the ED?***

**Authors:** Hennes L, Baumer-Mouradian S.
**Project Mentor:** Shannon Baumer-Mouradian, MD
**Mentor's Department:** Pediatrics

BACKGROUND: From 2010-2020, yearly influenza hospitalization estimates for patients <5 years old ranged from 7,000-26,000. Minority patients are affected by influenza more than White/Caucasian children. Our pediatric ED developed an influenza vaccination initiative to vaccinate patients in the ED.
METHODS: Patients aged 6 months-18 years with an Emergency Severity Index of 2-5 that presented to the pediatric ED during either of the recorded influenza seasons were screened for their flu shot status. If not vaccinated, they were offered the vaccine in the ED. If they declined, they could offer a comment for their decision. Patients with comments indicating follow-up in the community were followed for vaccination status at end of season and their demographics were recorded. Rates of follow-up visits to the ED or urgent care (UC) and hospital admissions related to influenza and influenza-like illnesses were compared between patients vaccinated in the ED and those that declined.
RESULTS: 58% of patients that commented they would receive vaccine in the community were vaccinated. Most of the vaccinated patients were White/Caucasian (44%) while the majority not vaccinated were Black/African American (47%). Patients that were vaccinated in the community consisted of 44% on commercial insurance and 56% on public or government insurance. Most patients not vaccinated in the community were on public or government insurance (73%) compared to commercial (25%). Variation between those vaccinated in the ED or not for ED or UC visits and those who were hospitalized was negligible.
DISCUSSION: The pediatric ED is a good place to offer the flu shot to patients that may use the ED as their primary source of care. Further education can be provided to encourage patients to receive the vaccine while in the ED instead of waiting to receive it in the community. Further improvements in our vaccination process should increase our sample size to further analyze our vaccination efforts.

## Hernandez, Matthew — Poster 25 — Global Health

***Physical activity levels following concussion related retirement from contact sports:a prospective cohort***

**Authors:** El-Sayed A, Walter KD, Hernandez MA, et al.
**Project Mentor:** Kevin Walter, MD
**Mentor's Department:** Orthopaedic Surgery

Background: Organized contact sports are one of many ways children and adolescents can stay active, however these activities carry a known risk of concussion injuries. Occasionally, physicians may recommend that some of these athletes retire from contact sports due to concussion complications.
Purpose: The aim of this study was to examine athlete compliance with physician recommendations to retire from contact sports in the setting of concussion complications, and to assess subsequent level of non-contact physical activity post-retirement.
Methods: We identified athletes who received a physician retirement recommendation between years 2013 to 2019. Participants were between the ages of 10-22 at the time of the retirement. All patients answered an 8-question telephone survey which collected information regarding compliance with cessation of contact sports and volume of non-contact aerobic and resistance activity in the first year following retirement (short term), as well as their current volume of aerobic and resistance activity (long term). Mean average time to follow up was 5.39 years.
Results: Overall, we found that most patients comply with retirement recommendations with only 12.5% of patients returning to play contact sports against medical advice. In the short term, non-compliant patients had a mean of 5.8 hours per week aerobic vs 2.53 hours in the compliant group (p=0.042), and mean of 4 hours resistance vs 1.53 hours resistance in the compliant group (p=0.042). In the long term, non-compliant patients had a mean of 4 hours resistance vs 1.75 hours in the compliant group (p=0.034).
Conclusion: The vast majority of patients do comply with physician recommended retirement from contact sports due to concussion complications. After adjustment for vocational exercise, retiring athletes from contact sports appears to result in significantly lower volumes of aerobic and resistance activity in the short term, and lower resistance activity volume in the long term.

## Hii, Michael — Global Health

***Respiratory disease, racial disparities, and residential proximity to coal power plants in Wisconsin, USA***

**Authors:** Hii M, Beyer K, Namin S, Malecki K, Schultz A, Rublee C.
**Project Mentor:** Caitlin Rublee, MD, MPH and Kristen Beyer, PhD, MPH, MS
**Mentor's Department:** Emergency Medicine and Epidemiology and Social Sciences

Background: Burning fossil fuels, including coal, is the primary source of greenhouse gas emissions driving anthropogenic climate change and its associated health harms. Coal-fired power plants (CFPP) supply 23% of electricity nationally and 42% for Wisconsin, contributing to air pollution and associated respiratory diseases, cancers, cardiovascular, and neurologic disorders, especially for vulnerable populations. Authors seek to quantify residential distance from CFPP, pulmonary function of Wisconsin residents, and demographics.
Methods: Data from 2,327 adults aged 21-74 years was obtained from the Survey of the Health of Wisconsin database from 2008-2013. Pulmonary function was measured by expiratory volume in one second (FEV1) and forced vital capacity (FVC) as a ratio of FEV1/FVC. An average of at least three FEV1/FVC readings <80% was considered abnormal.
Findings: Adults living near one of 11 CFPP may have worse pulmonary function. The odds ratio of FEV1/FVC values below 80% for those living ≤35km of a CFPP was 1.24 (95% CI: 0.90-1.70) when compared to those living >35km from CFPP. While Black individuals made up 4.8% of the total sample population, they accounted for 13.3% of individuals living ≤35km of CFPP. Similarly, Hispanic populations accounted for 4.8% of those living ≤35km of CFPP while making up 2.8% of the sample population.
Interpretation: Significant disparities were found in residential proximity to Wisconsin CFPP for Black and Hispanic populations with trends that support worse pulmonary function when living ≤35km from plants. When linked with socioeconomic and racial/ethnic factors, closing down CFPP becomes a necessity to reduce disparities and address environmental injustices.

## Hodge, Allen — Poster 60 — Urban & Community Health

***Exploring Health Behaviors and Feasibility of a Lifestyle Intervention for Patients with Multiple Myeloma***

**Authors:** Hodge A, Sheean P, O'Connor P, et al.
**Project Mentor:** Melinda Stolley, PhD
**Mentor's Department:** Medicine

Purpose: Multiple Myeloma (MM) is the second most common hematologic malignancy in the U.S., with higher rates observed in older adults and African Americans (AA). Survivors experience fatigue, bone pain, and reduced functioning. The high incidence of obesity among MM survivors may be partly responsible. These factors highlight the value of developing lifestyle interventions to meet the needs of this diverse group. This study aims to inform the development of a lifestyle program tailored to the MM community.
Methods: MM survivors who were ≥100 days post autologous stem cell transplant (ASCT) with a BMI ≥20 kg/m2 were recruited from two university hospitals, with the goal of obtaining sufficient representation of AA participants. They completed dietary, physical activity, and quality of life (QOL) questionnaires and a qualitative interview.
Results: 72 MM survivors participated (65% white, 35% black). Participants were 62.5±15.8 years of age. 50% were classified as obese and 65% were insufficiently active. Participants reported diets high in added sugars and saturated fats. QOL measures indicated clinically significant challenges in physical and sexual function. Most (87%) were interested in a lifestyle program. Predominant themes regarding survivors' desires for a lifestyle program included social support, guided exercise, meal preparation support, and disease management information.
Conclusion: This study demonstrates the need for and interest in lifestyle change support among a racially diverse sample of MM survivors. Interventions that are group-based, target knowledge gaps, social connections, accountability, and provide structured framework with professional instruction will best address the needs of this survivor population.

## Hoffmann, Brianna | Poster 13 | Clinical & Translational Research

***Neuropsychological Correlates of Acute Grief in Bereaved Older Adults***

**Authors:** Hoffmann BM, Blair NP, McAuliffe TL, Larson E, Claesges S, Reynolds CF, Goveas JS.
**Project Mentor:** Joseph S. Goveas
**Mentor's Department:** Psychiatry & Behavioral Health

BACKGROUND: The death of a loved one is a traumatic experience in one's life. The grieving process requires extensive cognitive processing to facilitate successful adaptation and to restore purpose and meaning in life without the deceased. Impairments in specific cognitive domains may interfere with this adaptive process, potentially contributing to prolonged grief disorder (PGD) development. This project aimed to explore in bereaved older adults during the first-year post-loss the (1) neuropsychological profile differences between high and low grief, relative to nonbereaved comparison participants, and (2) relationship between grief severity and multidomain cognitive measures.
METHODS: Bereaved older adults (n=94) completed clinical and multidomain cognitive assessments within 13 months post-loss. Grief symptom severity was measured using the Inventory of Complicated Grief (high grief [HG]: ICG score>30 (n=45) and low grief [LG]: ICG score<30 (n=49). A nonbereaved comparison group (n=47) also completed similar assessments. Using generalized estimating equations, the (1) differences in cognitive measures between the three groups, and (2) associations between grief severity and cognitive measures in the grief group were explored.
RESULTS: Global cognitive and processing speed measures showed significant differences among groups ($p<0.05$). After controlling for depressive symptom severity, the HG group showed lower processing speed, semantic memory, and executive function scores, relative to LG and comparison groups ($p<0.05$). Higher grief severity correlated with lower global cognition and semantic memory scores in grievers ($p<0.05$).
CONCLUSION: Higher grief symptoms during the initial months post-loss correlated with lower multiple cognitive domain performance, suggesting compromised cognitive function, which may contribute to PGD development.

## Holle, Tammi | Quality Improvement and Patient Safety

***Reliability & repeatability of foveal cone density and spacing measurements in retinitis pigmentosa.***

**Authors:** Holle TJ, Cava JA, Grieshop J, et al.
**Project Mentor:** Joseph Carroll, PhD
**Mentor's Department:** Ophthalmology and Visual Sciences

Purpose: To assess the reliability and repeatability of cone metrics obtained from adaptive optics scanning light ophthalmoscopy (AOSLO) images of individuals with retinitis pigmentosa (RP). A second purpose was to assess the efficacy of a standardized training for novice graders.
Methods: Ten graders used a semi-automated algorithm to identify cones in 90 foveal, confocal images from 21 individuals with syndromic or non-syndromic RP. Grading was repeated three times in a masked fashion. Six of the graders had no prior experience counting cones and underwent a standardized training prior to data collection. Cone density and spacing metrics were generated and analyzed to estimate intra-grader reliability and repeatability. Variance due to trial and image were estimated using a variance components model. Repeatability was calculated for each grader using an intraclass correlation coefficient (ICC).
Results: The reliability and repeatability of cone density was 96.7% and 98.6%, respectively. The reliability and repeatability of cell spacing was 95.2% and 97.9%, respectively. Novice graders achieved an average repeatability of 99.1%, and experienced graders achieved an average repeatability of 99.2%.
Conclusions: The results of this study indicate that cone mosaic metrics are reliable and repeatable on confocal images near the fovea. Furthermore, the standardized training used in this study was successful to help novice graders achieve a repeatability similar to that of experienced graders.

## Honan, BA, Natalie | Poster H1 | Bioethics & Medical Humanities

***Graphic medicine to create community-centered health education resources.***

**Authors:** Honan N.
**Project Mentor:** Teresa Patitucci, PhD
**Mentor's Department:** Cell Biology, Neurobiology & Anatomy

Graphic medicine is an effective way to create health education resources that are facilitative rather than instructive, inclusive of all identities, and a physical source of evidence-based medical information. We are obligated to share scientific truths with all members of our community, and teaching about science, especially as it pertains to one's own body, can be empowering and fascinating.

The dangers of misinformation, as well as the advantages of promoting health literacy have been exemplified in the pandemic. In my zine, Give the Shot a Shot, my intention was to incorporate text, comics, art, and diagrams to provide multiple points of access to understand the benefits of vaccination against COVID-19. While this systemic concern will not be solved by graphic medicine alone, zines serve as a creative approach suitable to different learning styles; engaging readers visually with illustration, emotionally with storytelling, or in critical thinking with reflection prompts..

Furthermore, health education is a two way street. Just as physicians counsel their patients, we have much to learn from our patients and the communities they belong to. In my zines, What is Naloxone? and Sex Ed for Real Life, I rely on interviews with experts from the community who work outside of the medical field, as well as open forums to survey folks on their personal learning goals. Zines can involve many different voices in a single work and thus have the potential to bridge the barrier between an individual in the exam room and the environment in which they live.

## Jarrett, MPH, Jamal | Poster 36 | Health Systems Management & Policy

***Thoughts and Perspectives on Artificial Intelligence in Response to COVID-19 in Underserved Communities***

**Authors:** Jarrett JA, Zimmer M, Franco Z.
**Project Mentor:** Zeno Franco, PhD
**Mentor's Department:** Family and Community Medicine

The COVID-19 pandemic has affected many people, although communities of color have been disproportionately affected. Focus groups were conducted with members of underserved communities in Southeastern Wisconsin about their thoughts on the potential artificial intelligence could have on healthcare and future pandemics. The communities that the project focused on were African American, Hispanic, Southeast Asian and Native populations. Racial disparities and a history of mistrust of the health system and federal government from these communities make these voices important and unique. The themes that were extracted from each communities' focus groups varied. Yet, there were similar themes such as each community wanting representation in the making of these innovations as well as key parts of their culture interwoven into the algorithm and keeping a human aspect in the technology.

## Johnson, Peter

**Clinical & Translational Research**

***The Burden of NAS, Opioid Use and Covid-19 in Wisconsin***

**Authors:** Johnson PW, Cabacungan E, Yan K, Dasgupta M, Broad J, Kemp ME, Ryan KS.
**Project Mentor:** Kelsey Ryan, MD
**Mentor's Department:** Pediatrics

OBJECTIVE Neonatal Abstinence Syndrome (NAS) affects newborns who are prenatally exposed to substances, classically opioids. Wisconsin (WI) experienced overlapping epidemics of opioid use and COVID-19 after March 2020, but impact on incidence and distribution of NAS is unknown.
DESIGN Retrospective cohort analysis examined deidentified WI Department of Health Services (DHS) birth certificate, death certificate, hospital discharge and COVID-19 diagnosis records spanning Jan 1, 2019 to Dec 31, 2021. Jan 2019-Mar 2020 was considered prior to onset of COVID-19 (PRE); Apr 2020-Dec 2021 was considered post onset of COVID-19 (POST). DHS Regions by County guidelines defined 5 WI regions. Deaths were considered associated with opioids or COVID-19 if these diagnoses were primary or underlying cause. Incidence rates PRE vs POST were compared using unpaired T tests. P values <0.05 were considered statistically significant. Case counts of <5 were suppressed for confidentiality.
RESULTS 190,072 infants were born Jan 2019-Dec 2021, of which 1,126 infants were diagnosed with NAS Jan 2019-Sep 2021. Statewide average monthly rate of NAS/1000 live births did not significantly change PRE vs POST (6.7/1000 vs 6.3/1000, p<0.64; Fig 1A). The Southeast (SE) region had both the highest absolute numbers of births and of NAS cases, but the North region detected the highest average monthly rate of NAS/1000 live births both PRE and POST. The NAS rate in the SE region significantly decreased PRE vs POST (8.1/1000 to 6.4/1000 births, p<0.01) (Fig 1B). Statewide deaths in females 15-44 years significantly increased PRE vs POST (p<0.0002). In females 15-44 years, opioid-associated deaths were more frequent than COVID-19-associated deaths, although this difference diminished over time (Fig 2).
DISCUSSION The burden of opioid use, COVID-19 and NAS varied regionally and changed over time during the study period. Further study is needed to understand how these overlapping epidemics interact in WI.

## Judkins, Jarrett

**Quality Improvement and Patient Safety**

***Evaluation of the role for STAT head CT scans in critically ill children.***

**Authors:** Balakrishnan B, Judkins J, Scanlon M, et al.
**Project Mentor:** Mathew Scanlon, MD Binod Balakrishnan
**Mentor's Department:** Pediatrics

Computed Tomography (CT) imaging of the brain is commonly used to assess patients for intracranial pathology. Among patients in the pediatric Intensive care unit (PICU), head CTs are commonly used to evaluate existing or worsening neurologic changes. However, there are associated drawbacks of potentially delaying therapy after sudden clinical changes, exposure to radiation that is potentially detrimental to their developing brains and increasing healthcare costs. Previous research conducted in pediatric emergency departments have concluded that the majority of CTs ordered were not justified but a similar study does not exist evaluating the findings of stat head CTs in the PICU and whether they impact therapy changes.
We hypothesize that the majority of STAT head CTs performed in the PICU will not be associated with an emergent change of therapy.
This is retrospective review and descriptive analysis of medical records of PICU patients who received STAT head CTs. Data collected will include relevant demographics, clinical indications for STAT head CT, head CT findings, and interventions performed, if any, in response to these findings. Patients will be categorized based on diagnoses such as seizures, TBI, anoxic brain injury, ECMO, and patients increased risk of intracranial hemorrhage (such as critically ill hem/onc patients). A standardized list of relevant clinical changes that might lead to an emergent CT such as change in mental status, seizures, and focal neurologic findings will also be created. The findings of the head CTs will be categorized as new findings, no change, and worsening of known problem. Interventions that are performed within 2 hours of the head CT were considered to be in response to the CT findings. Descriptive statistics will be used to describe the study cohort.

## Kahn, Elise — Health Systems Management & Policy

***Patient and provider perspectives on geriatric weight management***

**Authors:** Kahn E, Ruffalo L.
**Project Mentor:** Leslie Ruffalo, PhD, MS
**Mentor's Department:** Family and Community Medicine

BACKGROUND: Obesity levels and the number of people over the age of 65 are increasing in the US. While obesity is associated with high mortality conditions such as cardiovascular disease and diabetes; certain factors can complicate weight management in the elderly. We aimed to explore the perspectives of patients and providers regarding factors that influence weight management. In doing so, we will identify areas to improve upon within our healthcare system to better support this population.
METHODS: Subjects consisted of two subsets: patients over the age of 60, and providers caring for this population. Guided interviews were audio recorded, transcribed, and analyzed using principles of open-coding and grounded theory to identify themes. Axial coding was completed to illustrate relationships between themes. This study was approved by the MCW Institutional Review Board.
RESULTS: 14 patient interviews and 13 provider interviews were conducted. Common themes expressed by both patient and provider participants included: functional capacity, financial barriers, and difficulty breaking lifelong habits.
CONCLUSIONS: While patients emphasized their motivation to lose weight in the context of increasing health concerns, several systemic and personal barriers exist to achieving weight loss. Avenues for overcoming barriers include advocacy, further research into the benefits of weight loss in an elderly population, utilizing community resources, and using a multidisciplinary approach.

## Karabetsos, Konstantinos — Clinical & Translational Research

***Maximal aortic diameter at Zone 3 predicts negative remodeling in patients with initial Type A Dissection***

**Authors:** Karabetsos KC, Rossi PJ.
**Project Mentor:** Peter J. Rossi, MD, FACS
**Mentor's Department:** Surgery

Introduction
Acute Type A Aortic Dissection (ATAAD) is a surgical emergency which carries significant mortality. Patients who survive initial ATAAD repair require lifelong imaging surveillance due to the risk of long-term negative remodeling of the at-risk aorta, which leads to aneurysm formation and rupture. Our goal was to determine whether the maximal aortic diameter (MAD) in any combination of aortic zones at initial ATAAD presentation can predict negative remodeling.
Methods
Initial and follow-up computed tomographic (CT) angiography images of initial ATAAD presenting to our institution from 2015-2020 were reconstructed using centerline technique with Aquarius iNtuition (ver.4.4.13.P7) and sorted into 3 groups based on subsequent remodeling (positive, stable, negative). Patients were excluded based on complications leading to death within 30 days of hospitalization or lack of follow-up contrast CT availability. After univariate analysis ruled out non-contributory zones, complete and Akaike Inclusion Criterion (AIC)-guided 'best-fit' models were used to determine whether any combination of zones may contribute to remodeling.
Results
Of 98 patients who presented with true initial ATAAD, 63 met inclusion criteria. Of those excluded, 21/98 (21.4%) died within a month of initial hospitalization. Initial large diameter at zone 3 was independently associated with negative remodeling after multivariate analyses of all zones (OR=0.80,0.64-1.00,p=0.048) and according to an AIC-adjusted model (OR=0.83, 0.70-1.00, p=0.039).
Conclusions
For every 1-mm increase in the diameter of the proximal descending thoracic aorta at initial ATAAD presentation, patients were 1.2x as likely to remodel negatively. Further studies are required to determine the threshold aortic diameter at which early intervention is indicated after ATAAD repair to prevent subsequent negative remodeling and eventual aortic rupture.

## Kassels, MBE, Austin — Health Systems Management & Policy

***Impact of Ankle Fractures on Gait in Long-Term Recovery***

**Authors:** Kassels A, Schmeling G, Fritz J, Baynard T.
**Project Mentor:** Gregory Schmeling, MD, FAAOS, FACS
**Mentor's Department:** Orthopaedic Surgery

INTRODUCTION: A recently published study reported an annual ankle fracture incidence of approximately 169 per 100,000 people, making them one of the most frequent lower extremity fractures. Rehabilitation helps with long-term mobility and functionality. This study evaluated long-term function following surgical repair of ankle fractures by correlating patient-reported outcomes (PRO) data with age and gender.
HYPOTHESIS: The team hypothesized that participants' age at the time of fracture will positively correlate with the degree of current ankle pain in affected ankles reported through American Orthopaedic Foot & Ankle Society (AOFAS) questions scores and that females will display a stronger positive correlation than men.
STUDY METHODS: Charts of patients who had ankle fracture surgery at least two years ago were pre-screened based on fracture type were reviewed for eligibility. If eligible, SF-36 and the PRO portion of the AOFAS hindfoot survey were collected. Pearson's correlation tests were used for analysis. Student's t-test was used to compare self-reported pain scores in both males and females.
RESULTS: A correlation coefficient (r) of 0.12 (n=38) with a p-value of 0.46 between all of the participants' age and their degree of current ankle pain was found. Males (n=13) demonstrated a correlation coefficient (r) of 0.44 with a p-value of 0.13. Females (n=25) demonstrated a correlation coefficient (r) of 0.03 with a p-value of 0.87. The mean pain scores for males and females were calculated, and utilizing these mean values, it was determined that there was a significant difference (p-value = 0.004) between the variances of the two samples. The p-value for the two-tailed t-test was 0.029909.
CONCLUSIONS: Based off the results of the study, it was concluded that age had no statistically significant impact on long-term outcomes. Gender had a statistically significant impact on long-term outcomes, with females demonstrating higher reported pain scores than males.

## Kellis, Julia — Poster 61 — Urban & Community Health

***Description of blood lead level testing and follow-up among Milwaukee children receiving case management***

**Authors:** Kellis JE, Nelson DA, Miller TL, Hamelin KL, Balza JS.
**Project Mentor:** David Nelson, PhD, MS
**Mentor's Department:** Family and Community Medicine
**Community Partner:** City of Milwaukee Health Department

INTRODUCTION: The city of Milwaukee has many children who are at especially high risk of lead poisoning. Until lead can be completely mitigated, we must rely on secondary prevention such as blood lead level (BLL) testing in order to protect our children. Unfortunately, there are many gaps in the system that lead to children being lost to follow-up.
OBJECTIVE: This study aims to describe the current testing situation in Milwaukee among children who have had at least one elevated test, with a focus on children who were lost to follow-up after one elevated test.
METHODS: We analyzed data provided by the Milwaukee Health Department that included information on all children who were referred for case management between 2018-2020. Specific data points utilized include dates and results of BLL tests and demographics of each child including age, sex, and race.
RESULTS: We found that after an initially elevated test, children's lead levels decrease on average by 12.3%. Also, 9.3% of children did not receive any follow-up testing after their first elevated test.
CONCLUSION: Though there is an average improvement in BLLs after referral to case management, there are obvious gaps. Many children never receive any follow-up, even though they are theoretically among the group who should receive more intense follow-up via case management. This implies that the follow-up situation among the greater population may be even more dire. Future research should focus on the reasons behind these gaps and ways to ensure that all children receive the care they deserve.

## Kelly, MS, Adam — Quality Improvement and Patient Safety

***Appendiceal Incidentalomas: prevalence, radiographic characteristics, management, and outcomes.***

**Authors:** Kelly AH, O'Connor S, Kane D, Huang CC, Mogal H.
**Project Mentor:** Harveshp Mogal, MD, MS
**Mentor's Department:** Surgery

Intro: Radiographically detected incidental appendiceal abnormalities, herein termed Appendiceal Incidentalomas (AIs), are an ill-defined entity with unknown prevalence of neoplasm. This study aims to describe prevalence, radiographic characteristics, and outcomes of patients diagnosed with AIs.
Methods: EHRs for patients at a single institution undergoing abdominopelvic CT/MRI from 2000-2020 for non-appendix-related complaints with mention of appendix abnormality in the radiology report were reviewed. Suggested diagnosis at index imaging was recorded. Outcomes were compared between operative and non-operative patients.
Results: Of 5197 records, 484 were identified as AIs (9% of screened patients). Neoplasms were suggested radiographically in 16% (n=79), 59% (47/79) of which were resected. 32 were pathologically confirmed as neoplasms yielding a diagnostic accuracy of 68%. In comparison to non-operative patients, operative AIs had higher mean diameter (22.7 ±13.0 mm vs 17.8 ±7.7 mm; p = 0.04), higher colonoscopy rate (51% vs 22%; p = 0.01), and lower age at diagnosis (55.8 ±15.6 years vs 67.2 ±16.0 years; p = 0.003). 26% had minor (grade I/II) and 4% had major (grade III-V) Clavien-Dindo postoperative complications. With a median follow up of 28.3 months, 94% of patients were alive without disease and 6% died of other causes. The 32 non-operative suggested neoplastic AIs had a median follow up of 20.9 months; 59% are alive with a stable abnormal appendix, 13% had no appendix abnormality at last follow up, and 28% died of other causes.
Conclusion: Neoplastic AIs are an uncommon finding and are radiographically diagnosed with relatively high accuracy. Larger appendiceal diameter and younger age predict operative intervention. While surgery is associated with favorable outcomes and minimal risk of postoperative complications, observation of suspected neoplastic AIs may be a safe alternative in select patients undergoing longitudinal follow-up.

## Kerschner, Abigail — Urban & Community Health

***Impact of a cancer health education curriculum among Milwaukee public high school students***

**Authors:** Kerschner A, Jensik K, Berg D, Visotcky A, Banerjee A, Stolley M.
**Project Mentor:** Melinda Stolley, PhD
**Mentor's Department:** Medicine
**Community Partner:** Milwaukee High School of the Arts

Background: In Milwaukee and nationwide, cancer incidence, late-stage diagnosis, and mortality are notably higher among some racial/ethnic populations. Cancer education has the potential to impact cancer burden and reduce cancer disparities. In particular, the addition of a service-learning component to academic curriculums has been shown to improve student learning as well as positively impact the surrounding community.
Methods: This study implemented a Cancer Health Education Curriculum (CHEC) at a Milwaukee public high school with the goal of addressing cancer knowledge, fear and fatalism beliefs, and risk behaviors. The curriculum included interactive learning sessions and a service-learning final project. Five-hundred twenty-one students also completed pre- and post-surveys assessing cancer knowledge, fear and fatalism, risk behaviors, cancer-related communication and a qualitative question asking what they hoped to gain (pre) or did gain (post) from the course.
Results: Results indicate: 1) a significant improvement in cancer knowledge ($p < 0.0001$), 2) a decrease in cancer fear and fatalism ($p<0.0001$), 3) an increase in fruit consumption ($p<0.0001$), 4) a decrease in screen time ($p = 0.0004$), and 5) an increase in how often students spoke with their family about cancer ($p<0.0001$). Qualitative data reflect important gains such as increased interest in sharing their knowledge about cancer with their community.
Conclusions: Providing cancer education and leveraging a service-learning requirement led to notable changes in high school students' cancer knowledge, fear and fatalism, and risk behaviors. Students also communicated more with family/friends about cancer. Such efforts could have broader implications for student, family, and community cancer burden.

## Khan, Zan — Clinical & Translational Research

***Tonic, burst, and burst-cycle spinal cord stimulation lead to differential brain activation patterns***

**Authors:** Saber M, Schwabe D, Park H, et al.

**Project Mentor:** Christopher Pawela, PhD and Quinn Hogan, MD

**Mentor's Department:** Anesthesiology

OBJECTIVE The objective of this preclinical study was to examine brain responses to noxious stimulation in the presence and absence of different modes of spinal cord stimulation (SCS) using blood-oxygen-level-dependent functional magnetic resonance imaging (BOLD-fMRI).
MATERIALS AND METHODS Sprague-Dawley rats were randomized on basis of SCS mode delivered which included tonic stimulation (n = 27), burst stimulation (n = 30), and burst-cycle stimulation (n = 29). The control (sham) group (n = 28) received no SCS. The experimental protocol for fMRI acquisition consisted of an initial noxious stimulation phase, a treatment phase wherein SCS was turned on concurrently with noxious stimulation, and a residual effect phase wherein the noxious stimulation alone was turned on. The responses were statistically analyzed through paired t-test and results were presented as z-scores for the quantitative analysis of the fMRI data.
RESULTS The tonic, burst, and burst-cycle SCS treatment attenuated BOLD responses in the caudate putamen (CPu), insula (In), and secondary somatosensory cortex (S2). There was little to no corresponding change in sham control in these three regions. The burst and burst-cycle SCS demonstrated greater attenuation of BOLD signals in CPu, In, and S2 compared to tonic stimulation.
CONCLUSION The fMRI study using a rat model demonstrated the potential of different SCS modes to act on pain-matrix-related regions of the brain in response to noxious stimulation. The burst and burst-cycle SCS exhibited greater brain activity reduction in response to noxious hindlimb stimulation in the caudate putamen, insula, and secondary somatosensory cortex compared to tonic stimulation.

## Kiamanesh, Cyrus — Clinical & Translational Research

***New opioid persistence in veterans following major and minor surgery***

**Authors:** Kiamanesh C, Fuller M, Lu M, Nordin E, Ma J, Dugan S, Cummings C, Sherman K, Ebert TJ.

**Project Mentor:** Thomas Ebert, MD, PhD

**Mentor's Department:** Anesthesiology

Objective: To determine the prevalence of opioid persistence after surgery and its relationship to age in a veteran population.
Design: Retrospective medical record review.
Setting: Clement J. Zablocki VA Medical Center, a tertiary care hospital.
Patients: 1,257 veterans who had not filled an opioid prescription within the 30 days prior to the procedure and had undergone a surgical procedure over a 1-year period ending in 2018. Roughly half of patients had a major surgical procedure, the remaining had minor procedures. Age groups included 181 (14.4%) younger than 45 years, 444 (35.3%) between 45-64 years, and 632 (50.3%) older than 64 years.
Interventions: none
Main Outcome Measures: The incidence and risk factors for persistent opioid use beyond 90 days following surgery. The relationship of age to opioid persistence.
Results: The incidence of opioid persistence following major (3.3%) and minor (3.4%) procedures were similar. The incidence in patients younger than 45 years (3.3%), between 45-64 years (4.3%), and 65 years and older (2.2%) was also determined to be similar. Patient factors associated with an increased risk for persistent opioid use include cancer (odds ratio [OR], 2.13; 95% CI, 1.11-4.09), mental health disorders (OR, 2.32; 95% CI, 1.17-4.60), and substance use disorders (OR, 2.09; 95% CI, 1.09-4.00).
Conclusions: New persistent opioid use following surgery was not related to procedure type or age. Patient health conditions including cancer, mental health disorders, and substance use disorders were associated more frequently with opioid persistence.

## Kieffer, Hannah — Clinical & Translational Research

***The impact of documentation on treatment guideline misuse in neonatal hypoxic-ischemic encephalopathy***

**Authors:** Kieffer H, Cabacungan E, Carlton K, Adams S, Cohen S.
**Project Mentor:** Susan Cohen, MD
**Mentor's Department:** Pediatrics

INTRODUCTION: Therapeutic hypothermia (TH) is the only neuroprotective strategy available to treat hypoxic-ischemic encephalopathy (HIE). Our team previously conducted a QI project to implement an electronic medical record smartphrase (EMR-SP) to outline the specific TH eligibility guidelines. We hypothesize that increased use of the EMR-SP will lead to improved diagnostic accuracy in the classification of HIE severity and will consequently decrease TH guideline misuse and subsequent medical complications
METHODS: We performed a retrospective cohort study on term neonates diagnosed with HIE and treated with TH at Children's Wisconsin between 01/18 and 06/20. EMR-SP use per attending and case was collected. HIE severity classification was assigned using the guidelines outlined in the PRIME study. Medical complications associated with TH were also collected. Descriptive analysis of EMR-SP use, misuse frequency, and complication rate was performed. Fisher exact test was used for categorical variables, significance was set at $p<0.05$
RESULTS: Eleven out of 22 patients (50%) had documentation including the EMR-SP, with 6 of 22 (27%) identified as TH guideline misuse cases. Lack of EMR-SP was significantly associated with TH guideline misuse, $p = 0.012$. Eligibility factors not met in the 6 TH guideline misuse cases included prematurity (33%) and diagnosis of mild HIE (67%). When there was TH guideline misuse, the median (25th-75th %ile) total number of medical complications documented was 3 (3-4) versus 2 (2-3) for when there was no TH guideline misuse, $p = 0.065$. Except for hypoglycemia, there was no difference in the type of medical complications documented between cases with and without TH guideline misuse
CONCLUSIONS: Our study identified practice variation in the use of the EMR-SP despite its utility in facilitating clinical decision-making and documentation. This practice variation contributed to TH guideline misuse and may have led to increased medical complications

## Kiernan, Sophia — Poster 3 — Bioethics & Medical Humanities

***"If you build It…will they come?": Teaching empathy in medical education***

**Authors:** Kiernan SL, Owen JR.
**Project Mentor:** Julie R Owen, MD, MBA
**Mentor's Department:** Psychiatry

Empathy is considered an essential skill for doctors, and a highly desired trait for patients when choosing a physician. Empathetic physicians have been shown in studies to have better clinical outcomes and improved diagnostic accuracy. However, studies have also shown that empathy decreases throughout the course of medical education, and that training does more to lower innate empathy than enhance it. So how do we instill this necessary skill into future physicians effectively, while also ensuring students understand the importance of spending their limited training time on improving their "soft skills?"
This project investigates how empathy has been taught effectively in outside medical schools through a robust curriculum review of several successful programs. A needs assessment was also conducted among MCW students to determine what programming the current student body would find valuable. A combination of the curriculum review and needs assessment were synthesized to develop suggestions for expanded course work at MCW, including [1] emphasizing and defining empathy, [2] creating an on-going dialogue, [3] amplifying clinician examples, and [4] involving patients outside of clinical settings.

## Kohn, Sarah C. | Poster 48 | Quality Improvement and Patient Safety

***A Multi-site study using DSC-MRI perfusion imaging in untreated brain mets using a consensus protocol.***

**Authors:** Kohn S, Kong M, Phung D, et al.
**Project Mentor:** Kathleen Schmainda, PhD
**Mentor's Department:** Biophysics

PURPOSE: Determine standardized rCBV (sRCBV) in untreated brain metastases in comparison to glioblastoma and normal appearing brain, using the DSC-MRI national consensus acquisition protocol.
MATERIALS/METHODS: Patients from three sites (MCW, Mayo Clinic-Arizona, Keck School of Medicine of USC) with untreated enhancing brain metastases on MRI were considered for inclusion in this retrospective study. MRIs performed at 1.5T or 3T included post-contrast T1w(T1+C) images obtained after administration of GBCA (0.1 mmol/kg), which serves as a preload for the DSC-MRI data collection, consistent with the consensus recommendation(1,2). A 2nd GBCA dose (0.1 mmol/kg) was administered 40-60sec after the collection of baseline GRE-EPI images using recommended settings (FA=60o, TE/TR=30ms/1100-1250ms) for 120s. Data was post-processed with IB Rad Tech (Imaging Biometrics LLC, ElmGrove, WI), for delineation of T1+C ROIs, and standardized (calibrated) rCBV (sRCBV)(4) that do not require normalization. Mean sRCBV for metastases, using dT1 or T1+C ROIs, and normal appearing white matter (NAWM) were determined and compared to untreated glioblastoma (GBM) from a previous study(5). Pairwise comparisons performed using Mann-Whitney nonparametric test with $p<0.05$ considered significant.
RESULTS: N=47 patients with primary histologies of lung (n=23); breast (n=6); skin (melanoma and squamous cell carcinoma) (n=7); gastrointestinal (GI: n=3) and genitourinary (GU: n=8) cancers were included in comparison to GBM (n=31). Example images are shown (Fig. 1). The mean sRCBV of all metastases (1.83+/-1.09) were significantly lower ($p=0.0013$) than mean sRCBV for GBM (2.67+/-1.34) with both statistically greater ($p<0.0001$) than NAWM (0.71+/-0.16) (Fig. 2a). The sRCBV from histologically-distinct metastases are shown (Fig. 2b) with each being statistically greater than NAWM ($p<0.0001$).
CONCLUSION: sRCBV for untreated brain metastases are significantly higher than normal appearing brain.

## Kotsonis, Thomas | Poster 15 | Clinical & Translational Research

***High Frequency Heart Rate Variability Reflects Reduced Autonomic Nervous System Flexibility After mTBI***

**Authors:** TA Kotsonis, Nelson L.
**Project Mentor:** Lindsay Nelson, PhD
**Mentor's Department:** Neurosurgery

Mild traumatic brain injuries (mTBIs) are a growing public health concern. However, the mechanisms underlying the pathophysiology and the variation in presenting symptoms of mTBI are not well understood. Prior studies have found acute changes in high frequency heart rate variability (HF-HRV) following an mTBI, indicating the autonomic nervous system may play a role in the pathophysiology of mTBI. We measured changes in heart rate (HR) and Respiratory Sinus Arrhythmia (RSA) in 38 persons with mTBI from a single emergency department and 24 healthy community controls. Participants were examined twice 3 weeks apart (1-week and 1-month after mTBI) using the Paced Auditory Serial Addition Test (PASAT). Linear mixed effects modelling examining Group (mTBI, control), Visit (1-week, 1-month), and Event (pre-task baseline, easy task, hard task, post-task recovery) effects found a significant Group by Visit by Event interaction ($p=0.002$) for mean HR explained by a 2-way Group by Event interaction present at 1-week ($p=0.023$) but not at 1-month ($p=0.774$), reflecting slower changes in HR for the mTBI group during the PASAT tasks. In addition, there was a significant Group by Event ($p=0.019$) interaction for RSA, showing reduced parasympathetic nervous system withdrawal in the mTBI group during the PASAT tasks. These results demonstrate decreased autonomic nervous system flexibility in response to cognitive stress following mTBI and indicates a possible role of the parasympathetic nervous system in the pathophysiology of mTBI and its symptoms, such as activity-induced symptom exacerbation commonly reported by persons with acute mTBI.

## Krier, Cassandre | Health Systems Management & Policy

***The Effect of COVID-19 on the Medical School Experience, Specialty Selection, and Career Choice***

**Authors:** Krier CR, Quinn K, Kaljo K, Farkas AH, Ellinas EH.
**Project Mentor:** Libby Ellinas, MD, MS
**Mentor's Department:** Center for the Advancement of Women in Science and Medicine

Objective: While COVID-19 had a profound impact on healthcare, its effects on medical students are less clear. This study explored the effects of COVID-19 safety measures on medical students' specialty selection and career choices. It further considers the potential differential effects of COVID by gender.
Design: Between June and November 2020 at a Midwestern medical university, medical students with an anticipated graduation in 2021 through 2023 participated in virtual focus group sessions, which explored students' transition to remote learning during COVID-19, perception of gender bias within medical education, and personal and professional goals. Nine focus groups were held, with two to six students per session (n = 22). Focus groups were video recorded, transcribed verbatim, and data were deidentified. Transcripts were coded and analyzed using consensual qualitative analysis to identify themes.
Results: Our analysis captured 3 themes: (1) Impact of Institutional Decision-Making due to COVID-19, (2) Impact of Unstructured Time on Professional and Personal Decision Making, and (3) Impact of Societal Pressures, Gender Bias, and Mentorship on Career Planning.
Conclusions: COVID-19 disrupted important learning opportunities for medical students. Mentorship and shadowing are critical in helping students make career and specialty decisions, particularly for women. The loss of these opportunities may have lasting career impacts for all students.

## Krueger, Emily | Global Health

***A Study Looking at the Teaching of Peripheral Arterial Disease to Medical Personnel in Nepal***

**Authors:** Krueger E, Karmacharya R, Klinger D.
**Project Mentor:** Dean Klinger, MD
**Mentor's Department:** Surgery
**Community Partners:** Dhulikhel Hospital and Kathmandu University Hospital, Dhulikhel, Nepal

The purpose of this study is to quantify a gap in medical education curriculum in Nepal as it pertains to medical trainees that have a lack of exposure to peripheral arterial disease (PAD) in a clinical setting as well as improve lecture quality on PAD. A survey was sent out to 615 medical trainees in Nepal with a survey completion rate of 44%. The results indicate that both medical students and intern doctors feel most confident in their ability to diagnose PAD and comfortable ordering a work up for PAD when their education includes both a dedicated lecture and care of a patient. The self-reported ability to diagnose PAD increased in medical students from 21.9% in the lecture only group to 44.4% in the group who had both lecture and cared for a patient. The current curriculum at the University of Kathmandu Medical School only allows two hours in the medical school to cover all vascular topics and is taught with a traditional PowerPoint method. To improve this area of curriculum, we recommend increasing the allotted time for lectures as well as demonstrate on live patients the evaluation for PAD.

## Kurkowski, Sarah | Poster 49 | Quality Improvement and Patient Safety

***Early physical therapy intervention of spondylolisthesis/spondylolysis diagnosis in pediatric population***

**Authors:** Kurkowski S, Liu X-C, Selthafner M, Snetselaar J, Walter K, Fehr S, Hong K.
**Project Mentor:** Xue-Cheng Liu, MD, PhD
**Mentor's Department:** Orthopedic Surgery

In pediatric athletes diagnosed with spondylolysis or spondylolisthesis, it is common to start with conservative treatment, such as physical therapy. It is usually opted to not start the young athletes in physical therapy until they are pain-free. Overall conservative/nonoperative treatment (including sports cessation, bracing, and physical therapy together) and bracing correlation to return to sport have been extensively analyzed. However, it has yet to be determined if earlier physical therapy intervention is effective and safe for conservative treatment of adolescent athletes with spondylolysis or spondylolisthesis within the first month of diagnosis. The retrospective study described here analyzes physical therapy intervention within the first month after diagnosis; this study fills the gap in the literature described.

## Lamberton, Charles | Poster 16 | Clinical & Translational Research

***Successful microsurgical breast reconstruction in patients with primary hypercoagulable disorders.***

**Authors:** Zarb R, Lamberton CS, Berry V, et al.
**Project Mentor:** John LoGiudice, MD
**Mentor's Department:** Plastic and Reconstructive Surgery

Background: Primary hypercoagulable disorders pose a significant challenge for microsurgeons. When performing autologous breast reconstruction in patients with primary hypercoagulability, the regimen at our institution has evolved to include pre-operative chemoprophylaxis and extended low molecular weight heparin (LMWH) upon discharge.

Methods: A retrospective review identified 15 patients (25 flaps) with known primary hypercoagulability who underwent microsurgical breast reconstruction from 2010 through 2020. 577 patients (924 flaps) without primary hypercoagulability who underwent microsurgical breast reconstruction were also evaluated. Demographics, co-morbidities, peri-operative anticoagulation regimen, flap complications, and post-operative VTE were collected.

Results: Fifteen patients with primary hypercoagulability were identified, including heterozygous factor V Leiden mutation (n=12), protein S deficiency (n=1), prothrombin mutation (n=1), and primary antiphospholipid syndrome (n=1). 80% (n=12) of those with primary hypercoagulability received pre-induction chemoprophylaxis, and 87% (n=13) were discharged with an extended course of LMWH. There was no post-operative VTE or mortality in this cohort, and no statistically significant difference in operative hematoma (6.67% vs. 4.16%, $p = 0.48$) or transfusion requirement (0% vs. 5.72%, $p = 0.7$) compared to the non-hypercoagulable group. The rate of flap loss was 4% in the primary hypercoagulable group, compared to 2% and 1.03% in the prior VTE group and normal (no prior VTE, no primary hypercoagulability) group, respectively ($p = 0.49$).

Conclusion: Microsurgical breast reconstruction in women with primary hypercoagulability disorders is feasible with acceptable risk of flap loss but likely poor salvage potential. Post-operative thromboprophylaxis with extended LMWH in this population appears to be a safe regimen.

## LaRue, MS.Ed, MS, Chase Walker Poster 7 Clinician Educator

***Creating A Low-Stakes Environment for Teaching Growth and Feedback: The Teaching Test Kitchen***

**Authors:** LaRue CW, Chou EY.
**Project Mentor:** Erica Chou, MD
**Mentor's Department:** Pediatrics

In response to the COVID-19 Pandemic, medical schools across the world transitioned from largely in-person teaching to online formats and the need for a space to practice new teaching practices appeared. Research currently exists showing educational experiences for teachers and learners improves with practice, reflection and revision of methods - it is largely undocumented in Undergraduate and Graduate Medical Education.

At the Medical College of Wisconsin, a group recognizing this need created the Teaching Test Kitchen. The Test Kitchen created a system for educators to pilot instructional activities with learners from their target audience providing immediate feedback. The first programs included digital meeting spaces, screen sharing, and audience response systems and evolved into pilots of OSCE's, small group instruction, and problem-based learning activities.

Our research examines the increase in confidence of teachers before and after utilizing the Teaching Test Kitchen for piloting their events, whether they viewed the types, quality, and value of feedback as beneficial, and if they felt their pilot helped improve their role as an educator. For the "testers" who trial the teacher's activities, the program investigates the value they feel in taking part in educational improvement, curricular design, and if they felt they were able to provide effective feedback to the teacher.

As student needs, teaching environments, and the field of medicine continue to change a growing need for opportunities to trial teaching pedagogies for effectiveness and fit to students learning increases. The recent shift to digital learning highlighted the need for flexibility and training in educators within undergraduate medical education and the large pool of feedback that can be obtained from current medical students.

## Li, Nathan Poster 8 Clinician Educator

***Gatekeeper Training Programs: Are they Working for College and University Students?***

**Authors:** Li N, Kusch J, Davis C, Barry C.
**Project Mentor:** Jennifer Kusch, PhD, MS, MPH
**Mentor's Department:** Academic Affairs

Objective: Suicide is the second most frequent cause of death in undergraduate and graduate students. Although gatekeeper training programs are often used to provide student support, their effectiveness remains unclear. This report reviews the impact of gatekeeper trainings on enhancing mental health support for students and discusses potential areas of training improvement.
Methods: A rapid literature review was conducted in Ovid MEDLINE in the spring of 2020 using terms related to gatekeeper training and reviewed by two independent reviewers for relevance. 1082 manuscripts were identified, and 14 records were selected for review.
Results: Gatekeeper trainings were not correlated with any significant improvements in gatekeeper behaviors or skills. Additionally, there were inconsistent levels of knowledge retention 3 months post-training.
Conclusions: Gatekeeper trainings may not be achieving their objectives. Changes in training content and delivery should be explored to improve mental health support to the student population.

## Li, MS, Lin — Clinical & Translational Research

***The Effect of Psychosocial Factors on Post-Operative Outcomes of Bariatric Surgery***

**Authors:** Li L, Lak K, Feuerborn M, Barry C.
**Project Mentor:** Kathleen Lak, MD
**Mentor's Department:** Surgery

INTRODUCTION: Various mental health disorders are seen amongst patients seeking bariatric surgery, with nearly 40% of patients meeting criteria for psychiatric diagnoses such as major depression, anxiety, and eating disorders. In this study, we evaluate the effect of mental health disorders on short-term post-op outcomes and complications of bariatric surgery.
METHODS: Patients who underwent bariatric surgery at a single academic institution between January 2014 to June 2018 were retrospectively reviewed. Data was gathered from 575 patients, and 469 patients were included in this study. Mental health data was collected from pre-op psychological evaluations and categorized by severity Outcomes analyzed include post-operative length of stay, 30-day readmissions, and post-op weight loss and complications. All statistical analyses were carried out using SPSS. Statistical analysis methods included t-tests and regression analyses.
RESULTS: Patients with mental health disorders had higher length of stays. A higher rate of 30-day complications was seen in patients under current psychiatric care ($p<0.001$) and those with a history of anxiety ($p=0.012$) or PTSD ($p=0.001$) than patients in control group. Severity of mental health disorders was not found to have any significant association with 30-day complications, or excess weight loss after surgery.
CONCLUSION: Our study results suggest there may be a relationship between anxiety and PTSD, and 30-day post-op complications. However, our hypothesis that mental health disorders affects post-op weight loss and complications, was not well-substantiated.

## Liles, Jonathan — Global Health

***Institutional Review of Complex Tracheal Reconstructions Performed on Cardiopulmonary Bypass in Children***

**Authors:** Mitchell ME, Liles JT, Kuhn E, et al.
**Project Mentor:** Michael Mitchell, MD
**Mentor's Department:** Surgery

Background: Tracheal reconstruction using cardiopulmonary bypass has proven essential in the treatment of congenital tracheal anomalies. Although slide tracheoplasty has gained prominence in recent years, simple slide tracheoplasty is often not adequate to address more complex conditions such as long segment tracheal stenosis, tracheal duplication, "Christmas tree trachea" and complete tracheal agenesis. In this study we analyze our methods and results while comparing them to other institutions.
Methods: In our retrospective review of tracheal reconstruction on cardiopulmonary bypass between 2004 and 2019 we analyzed 36 procedures in 33 patients. Slide tracheoplasty was used in the majority of cases with alternate methods being utilized for more complex anatomies.
Results: Median follow up was 4.2 years. We found significant decrease in the mean level of respiratory support and clinical respiratory status required at discharge and last live follow up, compared to pre-operatively. Freedom from CPAP/BiPAP or greater support was 70% at last follow up out to 13 years.
Conclusions: This data shows immediate improvements in the respiratory needs and status of patients following surgery that do not diminish over time. Aggressive operative reconstruction of radical tracheal abnormalities may be warranted. More research is needed to investigate optimal materials and techniques.

## Liu, Hefei — Clinical & Translational Research

***Demographic, Clinical, and Biochemical Predictors of Pica in a Large Cohort of Blood Donors***

**Authors:** Liu H, Page G, Burns R, Mast AE.
**Project Mentor:** Alan E. Mast, MD, PhD
**Mentor's Department:** Cell Biology, Neurobiology and Anatomy

Background: Pica is characterized as repeatedly eating or chewing a nonnutritious substance including, but not limited to ice, clay and dirt, starch, raw pasta, chalk, coal, paint, or paper. Pica symptoms can be intense and addiction-like and disrupt quality of life. It is strongly linked to iron deficiency. Since substantial iron loss occurs during blood donation, blood donors may be susceptible to development of pica behaviors.
Methods: We investigated demographic, clinical, hematological, and biochemical factors associated with pica using univariable and multivariable logistic regression analysis in a cohort of 11,418 racially diverse blood donors. Pica was defined by questionnaire responses as consuming at least 8 oz of ice daily and/or consumption of non-ice substances regardless of the amount and frequency.
Results: Pica was present in 2.2% of the donors. The sensitivity and specificity of pica in iron-deficient donors were 36% and 82%, respectively. Lower ferritin ($p = .001$), non-Asian race ($p < .001$), higher red cell distribution width ($p < .001$), younger age, and restless legs syndrome ($p = .008$) were independently associated with pica. Female sex is associated with iron deficiency but was not an independent predictor of pica suggesting that iron deficient males and females were equally susceptible to the development of pica behaviors. Donors with normal ferritin levels also reported pica, reinforcing the role of non-iron related factors in its presentation.
Conclusions: We have identified demographic, clinical, and biochemical predictors of pica that help identify those most at risk for developing pica behaviors, and thereby assist in its clinical diagnosis and treatment.

## Lockhart, Morgan — Poster H3 — Clinician Educator

***Challenging Implicit Bias Among Medical Students During the Pre-Clinical Years: An Interactive Experience***

**Authors:** Almazan K, Avila, EJ, Lockhart MN.
**Project Mentor:** Tavinder Ark, PhD
**Mentor's Department:** Robert D. and Patricia E. Kern Institute for the Transformation of Medical Education

BACKGROUND: Implicit bias exists inherently within healthcare leading to poor health outcomes, especially for historically underrepresented patients. Previous research documents the complexity of bias and the importance of detection and mitigation of implicit bias among practitioners to improve health outcomes. Although the literature demonstrates either identification of implicit bias among medical students or implementing training to reduce bias for physicians, these studies have not illustrated the impact of implicit bias training during the pre-clinical years.
METHODS: Voluntarily recruited medical students from the Medical College of Wisconsin Milwaukee and Central campuses participated in virtual interactive small groups sessions surrounding diverse patient clinical vignettes. Participants filled out pre and post surveys consisting of Likert scale and free text questions.
RESULTS: Responses indicate that 85% of medical students agree or strongly agree that it is important to receive training on implicit bias during their medical education, 84% of participants agree or strongly agree that it would be valuable to have formal integration of implicit bias sessions in the medical school curriculum, 78% of medical students do not feel well prepared for caring for patients of different backgrounds. Lastly, the post-survey average for the statement "unconscious bias has a significant impact on patient/can affect many levels of health care" was higher than the pre-survey average yielding statistical significance ($p=0.027$).
CONCLUSIONS: Findings from our study exhibit the significance of initiating implicit bias training for medical students during the pre-clinical years to reduce bias throughout their academic and professional careers to provide equitable care for vulnerable patient populations.

## Lokkesmoe, Ryan | Poster 37 | Health Systems Management & Policy

***Disseminated Blastomycosis in the Absence of Respiratory Involvment***

**Authors:** Lokkesmoe RK, Jha P, McKee DP, Dishman AF, Feemster J.
**Project Mentor:** Pinky Jha, MD, MPH
**Mentor's Department:** Medicine

Blastomycosis is a rare pyogranulomatous infection most commonly involving the lungs and sometimes involving the skin. Other manifestations are much less common. Diagnosis relies on biopsy, histopathology, and culture of suspicious lesions. In this case a healthy 42-year-old male from Wisconsin presented to the emergency room with a chief complaint of two weeks of knee pain without clear mechanism of injury. Upon further examination he was found to have lesions on his abdomen which he had first noticed over three years prior and had been treated with antibiotics as cellulitis for nearly 18 months. Biopsy of these lesions was consistent with blastomycosis infection and further work-up and examination was notable for brain and laryngeal lesions. Intense anti-fungal treatment was immediately initiated with notable improvement in this patient's symptoms. This case highlights the importance of a thorough physical exam and consideration of rare infections in cases without clear answers, and it provides a unique example of blastomycosis infection involving brain, laryngeal, skin, and knee lesions without pulmonary involvement.

## Lu, Marvin | Poster 17 | Clinical & Translational Research

***Anesthesia time by treatment course in children with subglottic stenosis.***

**Authors:** Lu MS, Massman LJ, Doerfer KW, Robey TC.
**Project Mentor:** Thomas C. Robey, MD
**Mentor's Department:** Otolaryngology

Background
Children with subglottic stenosis (SGS) often require early life surgery with general anesthesia. Animal model studies have found that early anesthesia exposure can lead to lasting cognitive impairment. For pediatric SGS, Laryngotracheal reconstruction (LTR) and endoscopic balloon dilation (EBD) are two common procedures used for treatment though it remains unknown if there is a difference in anesthesia exposure from selecting one over the other.
Methods
A single institution retrospective study was conducted on children who were treated surgically for SGS between November 2014 through August 2020. Only patients who had undergone LTR, EBD, or both were included. Only patients who had completed their treatment course, which we defined as not having any airway procedure for a 12-month period, were included. All procedures important to the overall management of SGS, including surveillance procedures, were included. Our primary outcome was to compare the cumulative anesthesia time among the treatment courses.
Results
31 patients met inclusion criteria. Mean age at first procedure was 3.1 ± 5.4 years. Children who had an LTR (n=13) had 17.1 ± 7.9 hours of anesthesia associated with their treatment course. Of these 13, those who never underwent EBD (n=2) had 10.6 and 10.7 hours of anesthesia. Children treated with EBD alone (n=18) had 6.2 ± 3.0 hours of anesthesia during their treatment course. Those who had an LTR had a longer treatment course (3.1 ± 1.6 vs 1.3 ± 1.5 years). After adjusting for anesthesia time associated with surveillance procedures, each LTR and EBD was associated with an additional seven and one hour(s) of anesthesia, respectively.
Conclusion
Pediatric patients successfully treated for SGS with EBD underwent fewer number of procedures, endured less time under anesthesia, and had a shorter treatment course compared to patients treated with LTR. Patients with higher grade stenosis were more likely to be treated with LTR.

## Luo, BSE, Thomas | Health Systems Management & Policy

***Using Machine Learning to predict seizure onset zones in focal epilepsy from interictal ECoG features.***

**Authors:** Luo TY, Raghavan M.
**Project Mentor:** Manoj Raghavan MD, PhD
**Mentor's Department:** Neurology

Introduction: Localization of the epileptic seizure onset zone (SOZ) prior to epilepsy surgery often requires electrocorticographic (ECoG) recordings of seizures using intracranial electrodes. While seizure (ictal) recordings are the clinical gold standard to identify surgical targets, several interictal ECoG features may represent biomarkers of the epileptogenic cortex. We hypothesize machine learning applied to a set of channel-level ECoG features could identify signals originating from the SOZ.
Methods: Interictal ECoG data and corresponding SOZ determinations established from clinical evaluations were retrieved for 10 patients (N=807). The following ECoG features were extracted using MATLAB scripts: epileptic spike-rates and mean-amplitudes; high frequency oscillation (HFO)-rates and mean-amplitudes; power spectral density in six frequency bands; node-strength and eigenvector centrality (EC) based on cross-channel signal-envelope correlations in four bands; node-strength and eigenvector centrality based on phase-locking values (PLV) for the same four bands. The known SOZ classification of 75% of channels comprised the training data, while the generalizability was evaluated on the remaining 25% of channels.
Results: Several algorithms including k-nearest neighbor, decision trees, shallow neural network, and support vector machine (SVM) were trained on the ECoG feature data. An SVM using a Gaussian kernel showed the highest AUROC of 0.93 and captured ~90% of channels from the SOZ with a false positive rate of ~17% using 15 features including envelope-correlation node-strength and EC, PLV node-strength and EC, and power spectral density.
Conclusion: Accurate interictal SOZ prediction could allow localization of surgical targets from brief intraoperative ECoG recordings, eliminating the need for multiday invasive recordings.

## Lyon, Danielle | Quality Improvement and Patient Safety

***Pilot study on the use of surgical video based on OSATS for simulated pediatric bronchoscopy***

**Authors:** Lyon DR, Trott KD, Shay SG, Pierce DC, Schneider JG, Robey TR, Chun RH.
**Project Mentor:** Robert Chun, MD
**Mentor's Department:** Pediatric Otolaryngology

INTRODUCTION: Surgical residency programs must assess technical skills of trainees using both validated and feasible objective measures. OSATS is a survey consisting of a global rating scale and procedure task-specific checklist scores with previously demonstrated validity across multiple specialties. Simulation-based training for pediatric bronchoscopy (PB) with didactic teaching and demonstration has been demonstrated as an effective and reproducible method to teach the complex psychomotor task of airway foreign body retrieval. This study aims to investigate if incorporation of a surgical video improves knowledge and simulation skills.
STUDY METHODS: Pediatric surgery trainees (PST) and otorhinolaryngology (ORL) residents were recruited to participate in this study. All trainees were assessed at an annual PB simulation course. Most of the subjects received the training video prior to simulation (psV) while three did not. All subjects were given surveys before and after the PB to assess their knowledge. Trainees performed PB simulations and were graded by an attending surgeon based on the OSATS scale.
RESULTS: 5 PST (average PGY 6), and 4 ORL residents (average PGY 2) participated in the PB simulation and OSATS evaluation. 3 PST and 3 ORL residents reviewed the video prior to sim (psV). Overall, PST and ORL trainees scored 4.06 and 3.956 on OSATS, respectively. The psV-ORL residents (N=3) scored an average of 0.177 points higher on their OSATS than the ORL who had not viewed the video (N=1). The psV-PST subjects (N=3) scored an average of 0.695 points less than PST subjects who had not seen the video (N=2). Knowledge survey scores increased by 0.12 on the pre-survey and 0.833 on the post-survey in subjects with video access.
CONCLUSIONS: Watching a surgical video OSATS prior to simulation may be beneficial to surgical trainees in regards to skill acquisition. Incorporation of a surgical video may increase knowledge of the procedure for all trainees.

## Madhusudhana, Sharadhi | Poster 26 | Global Health

***Valve-Sparing Aortic Root Reconstruction in Children and Adults: A Dual-Center Experience***

**Authors:** Thangappan K, Madhusudhana S, Robinson L, Zafar F, Hill G, Ginde S, Earing MG, Tweddell JS, Mitchell ME.

**Project Mentor:** Michael Mitchell, MD

**Mentor's Department:** Surgery

Objective: The purpose of this study is to review a dual-institution experience with valve-sparing aortic root reconstruction (VSARR).

Methods: Patients who underwent VSARR from 2003 to 2019 at two institutions with congenital cardiac surgery programs were included in the current study.

Results: From 2003-2019, 70 patients underwent VSARR at our two institutions. Median age at surgery was 21years (IQR 15-33 years). Indications for VSARR included aortic root dilation (n=68) and aortic dissection (n=2). Loeys-Dietz syndrome was present in 12(17%), Marfan Syndrome in 27(39%), and bicuspid aortic valve in 18(26%). Concomitant procedures included replacement of ascending aorta (n=6) and replacement of aortic arch (n=2). Median length of stay was 5 days (interquartile range(IQR)=4-7 days). Cardiac complications requiring reoperation occurred in 10 patients, with the most common complications being aortic aneurysm/dissection (n=3) and coronary button aneurysm/stenosis (n=2). No patients required aortic valve replacement after VSARR. There were no in-hospital deaths post-operatively. At a median follow up of 3.2years (IQR=1.6-7.6 years), 69 of 70(99%) patients remained alive. Bicuspid aortic valves(BAV) were associated with development of significant aortic regurgitation(>mild) post-operatively, with >90% of tricuspid aortic valves remaining free of significant aortic regurgitation at 4 years.

Conclusions: VSARR is a reliable and reproducible technique that achieves acceptable short and intermediate term outcomes. No patients experienced in-hospital mortality and 99% remain alive at a median 3 years. The majority of patients (>80%) in our series free from greater than mild regurgitation post-operatively but the presence of BAV was associated with increased likelihood of significant aortic regurgitation.

## Maguire, Jesse | Health Systems Management & Policy

***The Impact of Frailty on Outcomes Following Laparoscopic Repair of 'Giant' Paraesophageal Hernias***

**Authors:** Maguire JD, Gould JC.

**Project Mentor:** Jon C. Gould, MD, MBA

**Mentor's Department:** Surgery

Background: Frailty is a measure of physiologic reserve and has been demonstrated to correlate with surgical outcomes in the elderly. Paraesophageal hernias tend to increase in size with age, and patients who present with obstructive symptoms related to the presence of giant paraesophageal hernias (> 50% of stomach in the chest) are typically older than 65. We hypothesized that frailty correlates with 30-day complications, length of stay, and discharge destination.

Methods: Patients older than 65 to undergo primary repair of a giant paraesophageal hernia at a single academic medical center were included. Frailty was assessed prior to surgery using the modified Frailty Index (mFI), an 11-item instrument that counts clinical deficits known to be associated with frailty. Patients with a score ≥ 3 out of 11 were considered frail. Linear regression analysis and chi-square/Fisher exact tests were used to determine the relationship between frailty and the hypothesized outcomes.

Results: Of the 107 patients included in the study, there were 22 (20.6%) patients with a mFI = 0; 38 (35.5%) a score of 1; 29 (27.1%) a score of 2; and 18 patients (16.8%) with a score of > 3. Frail patients were significantly more likely to experience complications (df=1, x2=4.2, p=0.04). Relative to mFI scores of 0, 1, 2, > 3, outcomes of interest were as follows; Major complications: 0%, 2.7%, 17.2%, 11.1% (p=0.21, r2=0.61); any grade complication: 9.1%, 36.84%, 41.38%, 55.6% (p=0.04, r2=0.91); discharge destination other than home: 0%, 0%, 10.3%, 16.7% (p=0.05, r2=0.90); length of stay: 1.7 d, 2.4 d, 3.6 d, 3.2 d (p=0.001, r2=0.09).

Conclusion: Frailty, as assessed by the mFI, was correlated with complications and length of stay following laparoscopic repair of giant PEH. The correlation with frailty approached significance for discharge destination and was not correlated with major complications. A small portion of our study population was considered frail which may limit our findings.

## Mahoney, Matthew | Poster H4 | Health Systems Management & Policy

***Pilot Implementation of Entrustable Professional Activities in United States Anesthesiology Training***

**Authors:** Maniker R, Mahoney M, Chen F, Fromer I.
**Project Mentor:** Christina Spofford, MD PhD
**Mentor's Department:** Anesthesiology

Background: Entrustable Professional Activities (EPAs) represent a practical yet informative framework to document trainee milestones and provide just-in-time feedback. A set of EPAs for US anesthesiology programs was recently developed and published but has yet to be formally implemented or tested.
Methods: A three-month trial of EPA implementation via a mobile app was completed at seven anesthesiology residency training programs. Trainee and faculty satisfaction with EPA usage was assessed via a survey prior to and immediately following the trial. The number of individual assessments was counted and compared to the quantity of trainee assessments in the three-month period immediately prior to the trail. EPA results were also tabulated.
Results: In general, both trainees and supervising physicians were satisfied with use of the EPAs. Average trainee metrics of timeliness, quality, and amount of feedback improved from before to after the trial while the frequency of receiving feedback, and faculty dominating the feedback conversation did not improve. Use of the EPA APP resulted in a larger quantity of feedback submissions as compared to previous feedback formats. Scores in all EPAs had a positive correlation with level of training.
Conclusions: EPAs may be a valuable feedback tool for anesthesia trainees leading to data-driven feedback assessments.

## Mann, Ramneet | Poster 62 | Urban & Community Health

***Community Engagement, Mentorship, Interacting with Intended Populations, and Cultural Understanding***

**Authors:** Mann R.
**Project Mentor:** David Nelson, PhD
**Mentor's Department:** Family and Community Medicine
**Community Partner:** StreetLife Communities, Inc.

BACKGROUND: Individuals experiencing homelessness are incredibly marginalized and often encounter many barriers to healthcare. Literature reveals better healthcare outcomes for homeless populations who are treated by physicians that create an environment with an exchange of respect and understanding in regards to various backgrounds and socioeconomic issues. This phenomenon is also known as cultural understanding. Without actively implementing strategies to improve cultural understanding, biasing, stereotyping, and prejudices are contributing to disparities in healthcare. The next step is to investigate how medical trainees can develop cultural understanding to better support patients from a variety of settings.
PURPOSE: To investigate how the three factors of community engagement, mentorship, and interactions with intended populations can contribute to the phenomenon of cultural understanding amongst medical trainees.
METHODS: The study population consisted of Medical Students at MCW who have volunteered with StreetLife Communities Inc. Interviews were conducted, and were audio-recorded and transcribed verbatim. Transcripts were analyzed using open coding techniques and grounded theory.
RESULTS: Major themes identified included healthcare access, social support, connectivity, challenging societal stigmas, empathy, resilience, humanity, humility, systemic and policy barriers, communication, recognition of individuality and uniqueness, holistic view of individuals, tailoring to specific needs and situations, and advocacy.
CONCLUSIONS: Results of this study are critical in highlighting that community engagement, mentorship, and interactions with intended populations influence the development of cultural understanding by many interconnected processes. These findings will foster future projects to further assess development of cultural understanding and how this can be applied in clinical settings.

## Marfowaa, Gifty — Global Health

***Examining the relationship between wealth and diabetes across six countries.***

**Authors:** Marfowaa GD, Campbell JA, Nagavally S, Dawson AZ, Walker RJ, Egede LE.
**Project Mentor:** Kirsten Beyer, PhD, MPH, MS
**Mentor's Department:** Institute for Health and Equity

Increase in diabetes prevalence is evident across low, middle, and high-income countries. Attainment of wealth across countries may be an important factor associated with incidence and prevalence of diabetes. While previous research has explored the association between wealth and diabetes in higher income countries, additional work is needed to understand how the relationship between wealth and diabetes varies across nations. The purpose of this study is to examine the association between wealth and diabetes across 6 countries.
Using data from the Study on Global Ageing and Adult Health (SAGE), Wave 1 individual data files were pooled and analyzed from China, Ghana, India, Mexico, Russia, and South Africa.
Across each country, approximately 6% reported diabetes in China, 3.5% in Ghana, 4.9% in India, 18% in Mexico, 8% in Russia, and 9% in South Africa. In the unadjusted logistic model of income quintile and odds of diabetes, income quintile was significantly associated with higher odds of diabetes across China, Ghana, India, Mexico, and South Africa. After adjusting for social cohesion, age, gender, marital status, education, area of residence, and work status, most countries saw a 2-fold increase in diabetes odds between the highest quintile and the reference group: in China (OR 2.16; CI 1.62; 2.93), Ghana (OR 2.26; CI 1.28; 4.13), India (OR 2.45; CI 1.60; 3.86), Mexico (OR 2.00; CI 1.14; 3.60), and South Africa (OR 4.57; CI 2.25; 10.32). In Russia, there was no significant relationship between income quintile and diabetes odds.
Using income quintiles as a measure of wealth, this study shows that wealth is significantly related to increased odds of diabetes across China, Ghana, India, Mexico, and South Africa, while controlling for sample characteristics. Future work should examine the longitudinal relationship between wealth and diabetes across countries.

## Martinez, Martin — Poster 63 — Urban & Community Health

***Prevalence and impact of comorbid diabetes and depression on quality of life in three Sub-Saharan African***

**Authors:** Dawson AZ, Wang D, Martinez M, et al.
**Project Mentor:** Aprill Z. Dawson, PhD, MPH & Leonard E. Egede, MD, MS
**Mentor's Department:** Medicine

Objective: As the health profile of sub-Saharan Africa shifts from communicable to non-communicable disease, there is an urgent need to understand comorbid chronic conditions and the impact on quality of life (QoL). This study examined the prevalence of diabetes and depression across Namibia, South Africa, and Swaziland and the impact on QoL.
Methods: Data from the World Health Organization World Health Survey (2002 - 2004) was used. The outcome, QoL, included 8 domains of physical and mental functioning. The primary independent variable included four categories: neither diabetes nor depression, diabetes only, depression only, and diabetes and depression. Linear regression models were used and stratified by country.
Results: Prevalence of diabetes was 9.6%, 6.1%, and 3.2% in South Africa, Swaziland, and Namibia, respectively. Prevalence of depression was 60.4%, 40.2%, and 37.6% in Swaziland, South Africa, and Namibia, respectively. In fully adjusted models, compared to those not having diabetes or depression, those with depression had significantly lower QoL (Namibia b-12.83; $p<0.001$; South Africa b-14.41; $p<0.001$; Swaziland b-15.23; $p<0.001$), and those with comorbid diabetes and depression also had significantly lower QoL (Namibia b-11.69 $p<0.001$; South Africa b-16.22 $p<0.001$; Swaziland b-21.05 $p<0.001$).
Conclusions: These findings provide new knowledge on the impact of comorbid diabetes and depression in three sub-Saharan Africa countries and the impact on QoL. There remains an urgent need to identify factors contributing to chronic disease prevalence and associated conditions such as depression in sub-Saharan Africa as the region faces the dual burden of communicable and noncommunicable diseases.

## Martinez-Ortiz, Enrique — Poster H2 — Clinical & Translational Research

***Primary Breast Neuroendocrine Tumors: A National Cancer Database Analysis***

**Authors:** Martinez EO, Jorns JM, Kong AL, Kijak J, Lee W, Huang C, Cortina CS.
**Project Mentor:** Chandler S. Cortina, MD, MS
**Mentor's Department:** Surgery

Background: Primary breast neuroendocrine tumors (BNETs) represent <1% of breast cancers. Diagnosing BNETs can be challenging, and limited clinical data currently exists in the literature. We aimed to describe primary BNET characteristics, treatment modalities, and survival outcomes through the National Cancer Database (NCDB).
Methods: A retrospective cohort analysis was performed using the NCDB from 2004-2017. BNET cases were compared to patients with invasive ductal carcinoma (IDC). A matched IDC cohort was created by matching patient age, race, and disease stage. Kaplan Meier analysis was performed, and hazard ratios (HR) were calculated through the bootstrap sampling method.
Results: A total of 1,389 BNET and 1,967,401 IDC cases were identified. When compared to IDC patients, BNET patients were older, had more comorbidities ($p<0.01$), and were more often male (2.1% vs 1.0%, $p<0.01$). There were no differences in race between the BNET and IDC patients. BNETs were larger, higher grade, and more frequently hormone receptor negative ($p<0.01$). Compared to IDC patients, BNET patients presented at later disease stage ($p<0.001$), were treated with surgery and radiotherapy less frequently ($p<0.01$), and received systemic treatment more frequently (53.5% vs 40%, $p<0.01$). BNET patients had increased mortality compared to the matched IDC cohort: stage 1 HR 1.8, stage 2 HR 2.0, stage 3 HR 1.8, and stage 4 HR 1.5 ($p<0.001$ for all).
Conclusion: Patients with BNETs tend to present at higher clinical stages, are more frequently hormone receptor negative, and have inferior overall survival compared to patients with IDC. Future studies are needed to elucidate optimal and multidisciplinary oncologic treatment strategies for this rare and aggressive breast cancer subtype to maximize patient outcomes.

## Marting, Spenser — Urban & Community Health

***Responding to Trauma: Culturally Effective, Trauma-Informed Strategies for Urban Middle and High Schools***

**Authors:** Marting ST, Hasan C, Dilley L, Meurer JR.
**Project Mentor:** John R. Meurer, MD, MBA
**Mentor's Department:** Institute for Health and Equity
**Community Partner:** Milwaukee Succeeds

Trauma and adverse childhood experiences (ACEs) disrupt the academic success of students, especially for urban K12 students from low-income backgrounds. Trauma-informed educational supports, however, can be protective against these experiences and promote student success. To this end, we conducted a systematic literature review to identify culturally responsive, evidenced-based strategies to address trauma and optimize student learning in low-income urban middle and high school students. The literature review yielded 433 unique papers, of which there were 20 that met the review's eligibility criteria. None of the 20 studies evaluated the impact of trauma-informed care on academic outcomes or learning loss but rather demonstrated benefits for student behavior and their psychological symptoms. These studies also provided suggestions for how families, educators, and educational leaders can effectively engage in trauma-informed practices. Ultimately, the implications of this review indicate that when given appropriate supports, educators and families can help care for students with a traumatic experience. School leaders should also contribute by creating trauma-sensitive systems and school cultures. Moreover, there must be more investment in trauma-informed school programs as a public good.

## Massman, Logan — Clinical & Translational Research

***O-GlcNAcylation is essential for rapid Pomc expression & cell proliferation in corticotropic tumor cells.***

**Authors:** Massman LJ, Pereckas M, Zwagerman NT, Oliver-Van Stichelen S.
**Project Mentor:** Stéphanie Olivier-Van Stichelen, PhD and Nathan T Zwagerman, MD
**Mentor's Department:** Biochemistry and Neurosurgery

Pituitary adenomas have a staggering 16.7% lifetime prevalence and can be devastating in many patients because of profound endocrine and neurologic dysfunction. To date, no clear genomic or epigenomic markers correlate with their onset or severity. Herein, we investigate the impact of the O-GlcNAc posttranslational modification in their etiology. Found in more than 7000 human proteins to date, O-GlcNAcylation dynamically regulates proteins in critical signaling pathways, and its deregulation is involved in cancer progression and endocrine diseases such as diabetes. In this study, we demonstrated that O-GlcNAc enzymes were upregulated, particularly in aggressive adrenocorticotropin (ACTH)-secreting tumors, suggesting a role for O-GlcNAcylation in pituitary adenoma etiology. In addition to the demonstration that O-GlcNAcylation was essential for their proliferation, we showed that the endocrine function of pituitary adenoma is also dependent on O-GlcNAcylation. In corticotropic tumors, hypersecretion of the proopiomelanocortin (POMC)-derived hormone ACTH leads to Cushing disease, materialized by severe endocrine disruption and increased mortality. We demonstrated that Pomc messenger RNA is stabilized in an O-GlcNAc-dependent manner in response to corticotrophin-releasing hormone (CRH). By affecting Pomc mRNA splicing and stability, O-GlcNAcylation contributes to this new mechanism of fast hormonal response in corticotropes. Thus, this study stresses the essential role of O-GlcNAcylation in ACTH-secreting adenomas' pathophysiology, including cellular proliferation and hypersecretion.

## Maxey, Jauntea — Poster 64 — Urban & Community Health

***Perinatal Autopsy of Neu-Laxova Syndrome: A case report***

**Authors:** Parsons LN, Jain PV, Lawlor M, Maxey JM.
**Project Mentor:** Lauren Parsons, MD
**Mentor's Department:** Pathology

Neu-Laxova Syndrome (NLS) is a rare lethal disorder with autosomal recessive inheritance and is characterized by multiple congenital anomalies. Our case of NLS presented with severe intrauterine growth restriction (IUGR), abnormal facial features, severe central nervous system malformations, skeletal muscle contractures, and the hallmark signs of NLS: ichthyotic skin and excessive subcutaneous tissue with edema. A final diagnosis of NLS was made on postmortem studies including gross and microscopic findings and genetic analysis. The clinical characteristics of NLS described in this case are supported by serial fetal ultrasounds, a postmortem neonatal exam, and radiographs. This rare developmental disorder is characterized by heterogeneity with ectodermal defects. It can be diagnosed by fetal ultrasound in the second trimester. It is postulated to be caused by loss of function mutations in PHGDH, PSAT1, and PSPH genes, which are responsible for de novo L-serine synthesis; and can be seen in both consanguineous and non-consanguineous relationships.

## McKenzie, Corey — Urban & Community Health

***A Look at the Subvastus Approach vs. Medial Parapatellar Approach to Primary Total Knee Arthroplasty***

**Authors:** McKenzie CS, Wooldridge A, Scheidt KB, Kukushliev VV, Hershey M, Knight B.
**Project Mentor:** Adam Wooldridge, M.D., PhD, Karl B. Scheidt, M.D.
**Mentor's Department:** Orthopaedic Surgery

Background: Many Veterans receive a Total Knee Arthroplasty (TKA) because of osteoarthritis. We asked whether the Subvastus approach (SV) or Medial Parapatellar Approach (MPP) produced better outcomes? We compared the quantity of opioids used post-op, length of hospital stay (LOS), whether there were 30-day readmissions or 30-day emergency room visits, and any major surgical complications.
Methods: We performed a retrospective chart review to discover patients that received a TKA from 2017 to 2020. We collected data on 393 total patients. Demographic information (sex, age, BMI, ASA status, medical comorbidities, opioid naÃ¯ve status) was also collected. Univariable comparisons were performed using Chi Square/Fisher's Exact Test or One-Way ANOVA as appropriate. Because 10% of the sample received a subvastus approach, effect sizes were computed as a secondary analysis. Primary analyses were conducted using SAS 9.4 14.3; effect sizes were computed using G*Power.
Results: There were no statistical differences in opioid use between MPP and SV approaches, defined as $p<0.05$. There is a trend toward SV needing less opioid. There were more emergency room visits among those with SV approach (22% vs 12%, p=0.04), and there was no difference in hospital readmissions (combined total of 7, p=0.13). Notable complications for SV approach included deep vein thrombosis and surgical site infection that required incision/drainage, while the MPP approach included 2 cases of quadriceps tendon rupture.
Conclusions: Our study concluded that the variables we compared showed no differences between the approach's outcomes. Future studies should include prospective comparison with greater portions of SV approach.

## Mead-Davies, William — Urban & Community Health

***Characterizing Food Insecurity in an Urban Geriatric Primary Care Population***

**Authors:** Mead-Davies W, Johnston B.
**Project Mentor:** Bryan Johnston, MD
**Mentor's Department:** Family and Community Medicine

INTRODUCTION: Food insecurity is a problem that affects millions of people in the United States. Food insecurity is associated with health problems such as diabetes, obesity, and cardiovascular disease. Older adults are at an increased risk for food insecurity due to physical mobility limitations. This vulnerable population uses various community food resources as well as other sources of support to help alleviate the burdens of food insecurity.
STUDY METHODS: A list of community food resources was compiled along with instructions for how to access the resources, which were distributed to patiets ages 65 and older. Patients were then screened for food insecurity. Phone interviews were conducted to learn more about patient experiences with food, food insecurity, and community resources.
RESULTS: Of the 33 patients screened, 20 (60.6%) screened positive for food insecurity. In interviews, common themes emerged. Patients cited mobility limitations, financial constraints, health problems, and a lack of nearby supermarkets as barriers to food security. The COVID-19 pandemic has also affected how and when the patients obtain food. In addition to resources such as food pantries and the Commodity Supplemental Food Program, many patients utilize other resources such as farmer's markets to access affordable fresh produce. Lastly, patients emphasized their reliance on family members for transportation, financial assistance, or food delivery.
CONCLUSIONS: There is a substantial amount of food insecurity in the study population. While community food resources are being used by many patients to supplement their nutrition, many elderly patients still struggle to become food secure. Family support systems, neighborhood grocery stores, and farmer's markets provide additional support for these patients. This study also highlights the need for community food resources to consider the physical limitations of this population, with food delivery being an option to improve access.

## Mehdi, Maahum — Health Systems Management & Policy

***Prognostic outcomes of signet ring cell carcinoma of the breast***

**Authors:** Mehdi M, Kong AL, Frebault J, Huang S, Huang CC, Cortina CS.
**Project Mentor:** Amanda L. Kong, MD, MS and Chandler S. Cortina, MD
**Mentor's Department:** Surgery

Background: Signet ring cell breast carcinoma (SRCBC) is a rare variant of invasive lobular carcinoma and there are no large series characterizing its long-term prognosis.
Materials and Methods: The NCDB was queried from 2004-2016 to identify SRCBC patients. Patients were excluded if they had non-invasive tumors, multiple malignancies, or incomplete treatment data. Univariate analysis was performed utilizing chi-squared tests and Fischer's Exact tests. Kaplan-Meier models were used for survival analysis.
Results: 324 patients met inclusion criteria. Patients were mostly White (75.3%), ≥50 years of age (88.2%), female (98.5%), and healthy (82.7%). 34.5% had Stage IV disease and 78.1% had ER+ tumors. 63.9% received surgery: 47.8% had lumpectomy and 52.2% underwent mastectomy. Radiation therapy was used in 40.7% and 50% received chemotherapy. Lower stage patients had higher rates of locoregional therapy ($p<0.001$) while higher stage patients received systemic chemotherapy at higher rates ($p<0.001$). Significant differences in overall survival were seen at 5 and 10 years based on stage ($p<0.001$). Overall survival based on ER status revealed no significant survival difference at 5 or 10 years ($p=0.079$). ER+ patients who received endocrine therapy (ET) did not have a survival benefit compared to ER+ who did not receive ET ($p=0.35$). Patients who underwent surgery had improved overall survival compared to those that did not ($p<0.001$), but there was no survival difference based upon type of breast operation ($p=0.35$).
Conclusion: SRCBC frequently presents at an advanced stage. ER+ status did not demonstrate a survival benefit and neither did treatment with ET for ER+ patients.

## Melby, Drew — PODIUM — Global Health

***The Current State of Pediatric Procedural Sedation in Africa***

**Authors:** Melby D, Benett S, Nganzeu C, Evans F, Gray R, Niescierenko M, Schultz M.
**Project Mentor:** Megan Schultz, MD, MA
**Mentor's Department:** Pediatrics

CONTENT: This study aims to analyze current clinical practices regarding pediatric procedural sedation in Africa. The overall study includes a mixed methods approach: a qualitative component involving interviews with African key informants (Phase I), followed by a quantitative component based on a large, multinational survey of African medical providers (Phase II). This abstract describes the completion of Phase I of this study, which was conducted over 18 months via both in-person interviews and through online audio communication platforms (e.g. Zoom, Skype, FaceTime).
SPECIFIC AIMS: Conduct key informant interviews of African medical providers regarding their clinical experiences performing pediatric procedural sedation in order to better understand pediatric sedation practices, identify opportunities for education, and help fill gaps in the provision of safe sedation services for children in African countries.
STUDY METHODS: This study uses mixed-methods analysis assessing African medical providers' clinical practice of performing procedural sedation.
RESULTS: 38 interviews were conducted with African providers of pediatric procedural sedation from 18 different countries. These interviews were recorded, translated as necessary, and then transcribed. Providers interviewed practiced within one of 7 different specialty areas: Anesthesia (12), Surgery (6), Pediatrics (5), Critical Care (5), Non-MD Anesthetists (5), Emergency Medicine (4), General Practitioner (1). Additionally, providers interviewed worked within all 5 major regions of Africa: East (12), West (11), North (6), South (6), Central (3). Interviews were conducted in both English (37) and French (1).
NEXT STEPS: Describe the training, comfort level, clinical practice and needs of African medical providers regarding pediatric procedural sedation, and characterize the available training opportunities, protocols and guidelines on pediatric procedural sedation for medical providers in Africa.

## Miklja, Zachary

**Clinical & Translational Research**

***Everolimus improves the efficacy of dasatinib in PDGFRα-driven glioma***

**Authors:** Miklja Z, Yadav VN, Cartaxo RT, Siada R, Thomas CC, Cummings JR, Mullan B, Stallard S, Paul A, Bruzek AK, Wierzbicki K, Yang T, Garcia T, Wolfe I, Leonard M, et al.

**Project Mentor:** David Gutterman, MD

**Mentor's Department:** Medicine

Pediatric and adult high-grade gliomas (HGGs) frequently harbor PDGFRA alterations. We hypothesized that cotreatment with everolimus may improve the efficacy of dasatinib in PDGFRα-driven glioma through combinatorial synergism and increased tumor accumulation of dasatinib. We performed dose-response, synergism, P-glycoprotein inhibition, and pharmacokinetic studies in in vitro and in vivo human and mouse models of HGG. Six patients with recurrent PDGFRα-driven glioma were treated with dasatinib and everolimus. We found that dasatinib effectively inhibited the proliferation of mouse and human primary HGG cells with a variety of PDGFRA alterations. Dasatinib exhibited synergy with everolimus in the treatment of HGG cells at low nanomolar concentrations of both agents, with a reduction in mTOR signaling that persisted after dasatinib treatment alone. Prolonged exposure to everolimus significantly improved the CNS retention of dasatinib and extended the survival of PPK tumor-bearing mice (mutant TP53, mutant PDGFRA, H3K27M). Six pediatric patients with glioma tolerated this combination without significant adverse events, and 4 patients with recurrent disease (n = 4) had a median overall survival of 8.5 months. Our results show that the efficacy of dasatinib treatment of PDGFRα-driven HGG was enhanced with everolimus and suggest a promising route for improving targeted therapy for this patient population.

## Minutella, Caitlyn

**Global Health**

***A qualitative analysis of substance use and HIV treatment in Uganda***

**Authors:** Minutella C, Dickson-Gomez J.

**Project Mentor:** Julia Dickson-Gomez, PhD

**Mentor's Department:** Institute for Health and Equity

BACKGROUND: Efforts to end the worldwide HIV epidemic have placed emphasis on ensuring people living with HIV (PLWH) are aware they are HIV-positive, are adherent to antiretroviral therapy (ART), and have undetectable viral loads. While the incidence of HIV in Uganda has steadily declined over the past decade, people who use alcohol and drugs (PWUAD) remain an important target population. When it comes to HIV risk, progression, and spread, PWUAD have historically had lower rates of viral suppression and ART adherence and are more likely to transmit HIV to others.
METHODS: In this study, 30 PLWH in Kampala, Uganda who use alcohol and drugs were interviewed and asked open-ended questions about their HIV diagnosis and substance use. Topics included HIV-related healthcare, substance use, stigma and discrimination, ART adherence, and various social factors. Interviews were then transcribed, translated, and coded for key themes using qualitative analysis software.
RESULTS: ART adherence was negatively influenced by a multitude of factors. For one, substance use played a large role in ART non-adherence. On the other hand, some PLWH developed routines or "tricks" to not forget ART doses despite their substance use. An alarming number of participants were not provided with addiction treatment resources after discussing their substance use disorder (SUD) with a provider. Many participants would skip ART doses after being told by providers that dangerous drug-drug interactions existed between ART and alcohol or drugs. Experiences with HIV- or SUD-related discrimination, whether from healthcare providers or the community, negatively influenced ART adherence, as well.
CONCLUSIONS: This study revealed an urgent need for an increase in provider awareness of both the current HIV treatment guidelines and SUD treatment options in order to successfully reduce the HIV incidence in not only Uganda, but sub-Saharan Africa and other low-to-middle-income countries.

## Moore, Samantha — Clinical & Translational Research

***Examining visual attention networks using a novel face discrimination paradigm***

**Authors:** Moore SM, Shah-Basak PP, Greenberg AS.
**Project Mentor:** Priyanka Shah-Basak, PhD
**Mentor's Department:** Neurology

INTRODUCTION: Visual attention is largely subserved by alerting, orienting, and executive control networks. Mounting evidence suggests the three domains are anatomically and functionally distinct, yet few studies have attempted to systematically manipulate a single network independently of the other two. Our objectives were to (1) develop and validate a novel attentional paradigm to selectively probe either the filtering (i.e., executive control) or alerting subnetwork and (2) examine the effects of specific task demands on behavioral performance in healthy adults.
METHODS: We created a face discrimination paradigm in which task difficulty, distracter salience, and cue-to-target interval were parametrically manipulated in an orthogonal manner. Two versions of the task were developed: in the filtering task, the contrast level (brightness) of distracters flanking a target was altered; in the alerting task, the timing of target presentation to a known location was varied. Experiments were built using Testable (https://www.testable.org) to allow for virtual data collection. Primary outcome measures were reaction time (RT) and accuracy (% correct).
RESULTS: Twenty-seven participants met inclusion criteria. Individuals were overall slower to respond and less accurate during the hard trials, particularly with high distracter salience (for filtering) or short cue-target timing (for alerting). There were differential performance profiles related to salience level and cue-target interval, but the interactions between these variables with task difficulty were not statistically significant.
CONCLUSION: Our findings suggest that our attentional paradigm can successfully capture parametric changes in performance of a single network. Pairing these cognitive tasks with targeted brain stimulation can potentially enhance attentional functions in healthy adults and may ultimately be a promising new tool for neuromodulation therapies in clinical populations.

## Moua, Keng — Poster 65 — Urban & Community Health

***Intervening at the Intersection of Hmong, Type 2 Diabetes, and Social Determinants of Health***

**Authors:** Thao MS, Moua K, Nguyen A, Tongpalad F, Lor K.
**Project Mentor:** Kajua Lor, PharmD, BCACP and Mai See Thao, PhD
**Mentor's Department:** School of Pharmacy Administration and Family and Community Medicine
**Community Partners:** United Hmong of Wisconsin Outreach and Hmong Wisconsin Chamber of Commerce

Hmong in Wisconsin have an alarming prevalence of Type 2 Diabetes compared to non-Hispanic whites. Research examining Type 2 Diabetes within the Hmong community has primarily focused on cultural perceptions and practices of treating the disease. Studies examining diabetes within other populations have shown strong associations between Social Determinants of Health (SDOH) and diabetes outcomes. This is the first study of its kind to examine the association of SDOH and diabetes outcomes within the Hmong community. A mixed-methods design was utilized. Participants completed a survey and participated in a focus group. Key informant interviews were also conducted. A total of 22 participants completed the survey. Survey results examined health and health care experiences, self-management of diabetes, and the impacts of COVID-19. A total of 10 focus groups were held virtually. Focus groups were separated by genders with 4 male groups and 6 female groups. Emerging themes from the focus groups include: financial burden of diabetes management, health care access and quality, neighborhood, economic stability, and family/community context. Key informant interviews were conducted with 2 physicians, 1 interpreter, 1 diabetes education specialist, 1 physician assistant, and 2 community leaders. This study found that the Hmong continue to experience challenges in managing Type 2 Diabetes and emphasized the need for culturally-tailored approaches to education on Type 2 Diabetes with the Hmong community. These approaches include utilizing storytelling and emphasizing social supports.

## Mueller, Brett | Poster 18 | Clinical & Translational Research

***Pain Management Patient Education Intervention in the Emergency Department***

**Authors:** Mueller B, Zosel A, Jacobson N.
**Project Mentor:** Nancy Jacobson, MD and Amy Zosel, MD, MSCS
**Mentor's Department:** Emergency Medicine
**Community Partner:** Wisconsin Medical Society Foundation

INTRODUCTION: Over 40% of Emergency Department (ED) visits include a painful complaint and ED providers prescribe 4.7% of immediate release opioid prescriptions. Non-opioid analgesics provide similar relief with fewer side effects. However, public education is necessary to correct misperceptions about the perceived superiority of opioids. Multimedia education modalities providing patient education on non-opioid analgesic options reduce musculoskeletal pain, improve functionality, and decrease additional opioid prescriptions from another provider after ED discharge. Froedtert hospital ED patients self-report an interest in watching a video to learn about their health while in the ED. Multimedia utilization additionally overcomes classic barriers to patient education in the ED.
METHODS: This is a single blind randomized clinical trial of adult patients who presented and discharged from the ED with a painful condition. Subjects took a baseline test of knowledge and confidence questionnaire. Subjects were randomized to an intervention video on pain management or a control video after which they repeated these assessments. Patient knowledge was assessed using McNemar's Statistic, The T test evaluated differences in pain and satisfaction scores.
RESULTS: Preliminary results (n=12) demonstrate an increase of nearly 25% in correctly answered questions regarding pain management post-video administration in the treatment group (64% to 88%) compared to relatively stable scores (48% to 43%) in the control group. Patients that viewed the intervention video also reported an increase in satisfaction with pain control in the ED and ability to use pain management techniques at home.
CONCLUSIONS: Multimedia education modalities appear to be effective for pain management education in the ED and increasing patient satisfaction with pain control and home pain management. A larger sample size is necessary to fully evaluate the efficacy of this intervention.

## Muench, Jared | Poster 50 | Quality Improvement and Patient Safety

***Quantitative and qualitative evaluation of Clinical Human Anatomy ultrasound education***

**Authors:** Muench JR, Schellpfeffer MA.
**Project Mentor:** Michael Schellpfeffer, MD, MS
**Mentor's Department:** Cell Biology, Neurobiology & Anatomy

Ultrasound's proven use as a procedural guide and diagnostic tool has led to its utilization across nearly all medical specialties. In fact, many herald an age of ultrasound as the "new stethoscope", where all clinicians will require a foundation in ultrasound use and image interpretation. Given ultrasonography's clinical relevance, U.S. medical schools are seeking to integrate hands-on ultrasound training into their curricula. This has been accomplished to varying degrees and via various methods, often differing in aspects like stage of implementation, course length, and staffing. At the Medical College of Wisconsin, first-year students have the opportunity to engage in ultrasound education through the Clinical Human Anatomy lab. The aim of this project was to identify strengths and areas for improvement in MCW's ultrasound education when considering both student feedback and documented efforts among other medical schools. A 10-question survey was distributed to first-year students after completion of gross anatomy, which subjectively gauged mastery of ultrasound performance (e.g., physical principles, ultrasound probes and modes, clinical applications), as well as student excitement and perceived value of the ultrasound sessions. Descriptive statistics were performed to quantitatively assess the current state of MCW's ultrasound education program. Through thematic analysis, common themes in qualitative student feedback were organized, coded, and associated with higher or lower student excitement and perceived value. Clinical relevance/utility was consistently identified as the single most influential factor. Ultimately, through a combination of survey findings and literature review, recommendations were proposed to enhance MCW's ultrasound education program to better prepare its student-doctors.

## Murray, Molly — Urban & Community Health

***Retrospective Analysis of Post-Tracheostomy Complications***

**Authors:** Murray M, Shen C, Massey B, Stadler M, Zenga J.
**Project Mentor:** Joseph Zenga, MD
**Mentor's Department:** Otolaryngology

Objective: To elucidate patient, disease, and surgical factors that are significantly associated with 90-day tracheostomy complications, readmissions, and mortality.
Study Design: Retrospective case series with chart review.
Setting: A single academic tertiary care center between 2011-2018.
Methods: Patients who underwent tracheostomy by any technique for any indication were included. Demographic, disease, and operative details were examined. Multivariable analysis was performed to determine factors associated with 90-day complications, 90-day readmissions, and overall mortality.
Results: 697 patients were included. 75% of patients had severe comorbidity (ACE-27 score of 3).1 Patients were intubated for 12 days prior to tracheostomy placement on average. The primary indication was ventilator dependence due to critical illness (85%). 74% were performed open and 26% percutaneous. 10% of patients had a tracheostomy-related complication within 90 days. Complications occurred at a median of post-operative day 11, and hemorrhage was most common (n=35). 14 patients required immediate return to the operating room, and 3 patients died of their complication, all within 3 days of tracheostomy placement. 40% of patients undergoing tracheostomy died within 30 days. In multivariable analysis, only a documented difficult tracheostomy placement was significantly associated with a 90-day complication.
Conclusions: While complications after tracheostomy are infrequent, they are often severe. A heightened level of preparedness to immediately manage accidental tracheostomy decannulation or hemorrhage is required for patients with a difficult tracheostomy placement. 30-day mortality is high, which reinforces the need for multi-disciplinary evaluation, including palliative care, to determine appropriate candidacy for tracheostomy.

## Musacchio, Sophia — Clinical & Translational Research

***Salivary cortisol dynamics after mild traumatic brain injury***

**Authors:** Musacchio SG, Kallenbach MD, Huber DL, Raff H, Johnson BD, Leddy J, McCrea MA, Meier TB, Nelson LD.
**Project Mentor:** Lindsay Nelson, PhD
**Mentor's Department:** Neurosurgery

Objective: To assess mild traumatic brain (mTBI)-related alterations in baseline (resting) salivary cortisol and cortisol reactivity to cognitive and exercise stressors, which are frequently encountered during mTBI rehabilitation and recovery.
Participants: Thirty-seven individuals with mTBI and 24 HCs. All patients with mTBI were enrolled at 7 ± 3 days post-injury, met the American Congress of Rehabilitation Medicine's (ACRM) definition of mTBI, and had no acute intracranial findings on clinical neuroimaging (if performed).
Design: Prospective cohort study. All participants provided saliva samples 10 times during each of two visits spaced 3 weeks apart (1-week and 1-month post-injury for the mTBI group). Each visit included baseline saliva sampling and sampling to evaluate reactivity to a cognitive stressor (Paced Auditory Serial Addition Test) and physical stressor (Buffalo Concussion Treadmill Test [BCTT]).
Main Outcome Measure: Natural log-transformed salivary cortisol measured by enzyme immunoassay. Cortisol was predicted using a linear mixed effects models by group (mTBI, HC), visit (1-week, 1 month), and saliva sample.
Results: Mean salivary cortisol was higher in the mTBI group (1.67 nmol/L [95% CI 1.42-1.72]) compared to controls (1.30 nmol/L [1.12-1.47]), without an mTBI x Time interaction. At one week, the mTBI group had greater cortisol reactivity in response to the BCTT.
Conclusion: Higher cortisol in individuals with mTBI at 1 week and 1-month post-injury extend previous findings into the subacute recovery period. Furthermore, the mTBI group demonstrated a greater cortisol response to mild-to-moderate aerobic exercise (BCTT) at 1-week post-injury. Given the increasing role of exercise in mTBI rehabilitation, further research is warranted to replicate these findings and identify the clinical implications, if any, of enhanced HPA axis responses to exercise in civilians with recent mTBI.

## Nelson, Jacob — Clinical & Translational Research

***Factors Associated with Follow-up Visits in Appendicular Fracture Emergency Department Patients***

**Authors:** Nelson JP, Lenhart RL, Neilson JC.
**Project Mentor:** John C. Neilson, MD
**Mentor's Department:** Orthopaedic Surgery

Numerous studies have reviewed clinical and cost implications for the increasing amount of outpatient orthopedic visits and surgeries, linking outpatient growth to factors such as expanding insurance coverage to ambulatory surgery centers, cost-saving benefits, and fewer scheduling delays. However, there is little research on what factors go into whether a patient will return for an outpatient follow-up after an initial diagnosis in a hospital's emergency department. To evaluate this, a single-institution, retrospective study was performed on a cohort of Froedtert Memorial Lutheran Hospital emergency department patients who were diagnosed with an appendicular fracture. It was hypothesized that insurance type would be the most influential factor in a patient's return to Froedtert for outpatient follow-up. 1768 deidentified appendicular fracture patients were queried via CTSI's TriNetX and HonestBroker tools. Multivariable logistic regression was used to test ten predictor variables that were deemed potentially impactful on a patient's decision. Overall, our results showed that 52.1% of outpatient appointments were kept and insurance coverage, fracture type, older patient age, residency, marital status, and employment status were all significantly associated with patient return. Leg (69.63%), humerus (68.1%), and ankle (62.82%) fractures had the highest compliance for return while femur (35.94%), wrist (39.58%), and hand (43.37%) had the least. Future studies will aim to use prospective studies and surveys to improve predictive power of these models and assess causality.

## Newton, Sydney — PODIUM — Quality Improvement and Patient Safety

***Evaluation of a high-risk clinical guideline through implementation of usability evaluation***

**Authors:** Newton SA, Yale SC, Gosbee JW, Scanlon MC.
**Project Mentor:** Matthew Scanlon, MD
**Mentor's Department:** Pediatrics

Clinical guidelines are systematically created documents that present the latest evidence to aid providers in decision making, though adherence to guidelines is historically low. One medical condition that often relies on clinical guidelines for management is diabetic ketoacidosis, which is a medical emergency for patients with type 1 diabetes mellitus and has high rates of morbidity and mortality, especially in children due to the risk of cerebral edema. Treatment of diabetic ketoacidosis is challenging, making it a strong candidate for standard clinical guideline use. This paper describes the use of heuristic evaluation of a clinical guideline for the treatment of diabetic ketoacidosis. After an hour of instruction from an expert in human factors engineering and heuristic analysis, two novices to usability testing applied a heuristic tool to the guideline of interest, which ultimately revealed numerous usability issues in the domains of metaphor, organization, typology and layout. When compared to Nielsen's principles of heuristics, a well-documented tool in analyzing interface design, the findings identified multiple sources of potential error. Additionally, this paper demonstrates that novices to usability testing can perform effective heuristic evaluation with limited training and the use of a heuristic tool. The findings will guide redesign of the studied guideline as well as prompt more readily accessible usability testing of other high-risk and high-volume clinical guidelines.

## Nguyen, Minh-Tran Cecilia | Poster H6 | Urban & Community Health

***Evaluating Barriers to Opioid Use Disorder Treatment: From the Patients' Perspectives***

**Authors:** Nguyen MTC, Kubiak G, Dixit N, Young SA, Hayes JR.
**Project Mentor:** John R. Hayes, DO
**Mentor's Department:** Family and Community Medicine

OBJECTIVES: Medically Assisted Treatment (MAT) provides an effective treatment for opioid use disorder (OUD); however, it remains underutilized. Stigma around substance use disorders, healthcare worker lack of knowledge, and lack of treatment providers persist. Our study aims to elucidate barriers to accessing MAT in Milwaukee, Wisconsin. We hypothesize that stigma negatively impacts patient motivation to seek treatment.
METHODS: We conducted semi-structured interviews with patients receiving MAT at Ascension Columbia St. Mary's Family Health Center in Milwaukee, Wisconsin. Interviews were audio-recorded, transcribed, and analyzed using rapid qualitative analysis. Participants completed a Likert scale survey to evaluate for self and treatment-related stigma. The stigma scales were developed and evaluated for internal consistency and validation in prior studies.
RESULTS: Interviews with 30 participants showed that OUD frequently began with chronic pain, pain prescriptions, and/or social influences. Motivation to seek treatment appeared self-driven and/or for loved ones. Most participants had no concerns with treatment, though some had fears of treatment denial. Transportation was a common barrier and many had experiences with incarceration. Results of the stigma scales suggest lower self and treatment-related stigma than hypothesized, though structural issues such as transportation remain a barrier.
CONCLUSIONS: Offering MAT at more family practice clinics and connecting patients with transportation early in care would help alleviate the issue of few MAT clinics and the low proportion of physicians with Buprenorphine Waivers. Family physicians can build on patient motivation through motivational interviewing and family-centered care. Future studies may further explore effects of structural inadequacies on MAT access.

## Nordin, BA, Emily | Clinical & Translational Research

***The effects of education initiatives and anesthetic gas monitoring on OR greenhouse gas emissions***

**Authors:** Nordin EJ, Dugan SM, Ebert TJ, et al.
**Project Mentor:** Thomas J. Ebert, MD, PhD
**Mentor's Department:** Anesthesiology

Introduction: Volatile anesthetics have a markedly higher global warming potential than carbon dioxide (desflurane>isoflurane>sevoflurane). Providing anesthesia with a lower fresh gas flow (FGF) will lower the amount of waste anesthetic gas (WAG) emitted into the atmosphere. This project evaluated the success of providing anesthesia residents at the Zablocki VA with weekly education and electronic feedback on the environmental impact of their own practice.
Methods: Resident FGF use during the maintenance phase, case duration, and volatile anesthetic choice were extracted from the electronic record for thirteen 4-week rotations during the 2020-2021 academic year. For the 2-week education period, residents were sent an email each week with general strategies to reduce their WAGs (e.g., use an environmentally-friendly FGF ≤1 LPM), along with their own FGF data (compared to that of their peers) and environmental impact data. In the 2-week post-education period, they were again sent their own FGF and environmental impact data to evaluate the effectiveness of the educational intervention. Statistical analysis was performed using ANOVA.

Results: 39 residents were present for the entire 4-week rotation and 29 (74%) reduced their mean FGF per case by at least 0.10 LPM, between the education and post-education period. Overall, the 39 residents reduced their mean FGF per case between these two periods from 1.64 LPM to 1.39 LPM (P = .007). This reduction in FGF resulted in a decrease in mean emissions generated from WAGs (14% decrease per sevoflurane case).
Conclusion: Resident education and electronic feedback can successfully change anesthesia practice to the benefit of the environmentâ"€at least in the short term, as evidenced by a reduction in FGF and emissions from WAGs. Of note, most residents evaluated did not achieve the environmental standard of ≤1 LPM for mean FGF per case, suggesting that further education and feedback may be necessary.

## Novotny, Julia — Health Systems Management & Policy

***Risk factors for intradialytic cerebral hypoperfusion***

**Authors:** Wolfgram DF, Novotny J, Goodman M, Visotcky A, Laud P, Barnes J.
**Project Mentor:** Dawn Wolfgram, MD
**Mentor's Department:** Medicine

Introduction: Hemodialysis (HD) patients have significant burden of cerebral ischemic pathology possibly due to cerebral hypoperfusion secondary to blood pressure (BP) fluctuations during HD. We evaluated changes in cerebral perfusion and measured an index of cerebral autoregulation (CA index) during HD to identify potential risk factors for intradialytic cerebral perfusion decline and impaired CA.
Methods: In this cross-sectional study, we included HD patients age 50 years or older receiving HD. We measured cerebral perfusion during HD, using cerebral oximetry, and calculated the correlation between cerebral perfusion and BP during HD as an index of CA. We measured the association between potential risk factors for intradialytic decline in cerebral perfusion and CA index.
Findings: Our analysis included 32 participants and 118 HD sessions. The mean SD decline in cerebral oxygen saturation during HD was 6.5% 2.9%. Greater drop in systolic BP (SBP) during HD was associated with decline in cerebral oxygen saturation, p=0.02. Having diabetes and >20 mmHg drop in SBP during HD were associated with increased (worse) CA index with an increase of 0.24 95%CI [0.06, 0.41] for diabetes and increase of 0.43 95%CI [0.27, 0.56] for a >20 mmHg drop in SBP during HD.
Discussion: Cerebral perfusion can decline during HD and is associated with changes in systemic BP. This may be due to impaired cerebral autoregulation. Risk factors for worse CA index include diabetes and >20 mmHg drop in SBP. This study highlights the risk of intradialytic decline in cerebral perfusion and impaired cerebral autoregulation in HD patients.

## Nuhn, Sasha — PODIUM — Bioethics & Medical Humanities

***Enhancing Advance Care Planning Education: An Interactive Student-Led Workshop for First Year Medical Students***

**Authors:** Nuhn SE, Foutz R.
**Project Mentor:** Renee Foutz, MD
**Mentor's Department:** Medicine

Objective:
Research shows that advance care planning (ACP) interventions increase the likelihood that the delivered care aligns with the patient's goals of care. Barriers to effective ACP are often physician-related and include lack of experience with advance directives, uncertainty about the legal details of advance directives and insufficient training in communication about ACP.
Methods:
First year medical students in the CHECK UP Program at the Medical College of Wisconsin participated in a 2-hour ACP workshop that included case-based and small group discussions and tangible materials with the opportunity for students to think about and fill out their own advance directive. Participants were asked to fill out pre- and post-workshop surveys that assessed their knowledge and confidence with regards to ACP and their impression of the session.
Results:
Forty-six students completed the ACP confidence survey and workshop evaluation. Self-reported confidence with ACP material significantly improved, and the majority of participants felt the workshop was helpful in supplementing their medical education (93%) and the tangible tools provided improved their understanding of ACP (91%).
Conclusions:
Students responded positively to the student led and developed ACP workshop. The use of tangible materials allowed students to actively engage with the material and become more confident with ACP topics. Engaging medical students in conversations about the importance of ACP and providing them with tangible materials to become more familiar with ACP documents early in their education may offer a meaningful way to improve their comfort when engaging in ACP conversations with future patients.

## Nwaelugo, Nnenna — Clinical & Translational Research

***The evolution of general surgery resident operative case experience in the era of robotic surgery.***

**Authors:** Nwaelugo NS, Goldblatt MI, Gould JC, Higgins RM.
**Project Mentor:** Rana Higgins, MD
**Mentor's Department:** Surgery

INTRODUCTION Robotic-assisted general surgery procedures continue to increase in frequency, requiring more residency programs to establish training curricula for general surgery residents. Therefore, there is concern regarding the impact of newer technologic platforms on the operative case distribution of general surgery residents, specifically the influence on laparoscopic and open surgery. The objective of this study was to analyze the impact of a growing robotic operative case volume and established robotic surgery training curriculum on the general surgery resident operative case experience.
METHODS ACGME operative case logs of residents from 2014 to 2020 were analysed to determine resident participation in open, laparoscopic and robotic cases for three years prior to and three years after the institution of the robotic training curriculum at MCW. Case categories included were alimentary tract, abdomen, endocrine, thoracic, pediatric and trauma. Analyses were performed of overall cases, as well as participation by case type, post-graduate year (PGY) level, resident role and institution type using a one-way analysis of variance (ANOVA).
RESULTS Overall, operative case logs from 77 general surgery residents were analyzed. The residents participated in a total of 34,757 cases, with 59.3% being open, 39.6% laparoscopic and 1.1% robotic. Between 2014 and 2020, there was no significant change in the residents' number of open or laparoscopic cases. However, there was a significant increase in the number of robotic cases, from 0.3% of overall cases in 2014-15 to 3.7% in 2019-20 (p=0.01). The operative case categories with significant increases in robotic cases were foregut, intestinal and hernia.
CONCLUSION This study highlights the effectiveness of a standardized robotic surgery training curriculum in increasing general surgery resident participation in robotic cases without detrimental effects on participation in open and laparoscopic cases.

## Nylen, Emily — Global Health

***How social media influences health topics including attitudes of new mothers toward vaccines.***

**Authors:** Nylen E, Sanchez J, Telega G.
**Project Mentor:** Grzegorz Telega, MD
**Mentor's Department:** Pediatrics

INTRODUCTION: Social media can be a tool to spread awareness about important public health issues since it is widely accessible. A public health topic that could benefit from using social media to combat misinformation is vaccines. The topic of attitudes toward vaccines has gained more interest as it has become more common for people to question whether they should vaccinate their children on the recommended schedule or at all. Many countries have seen decreased vaccination coverage which highlights the need for more research.
METHODS: A literature search was conducted using PubMed and American Academy of Pediatrics databases. The articles used were written between 2011-2020, with most having been written within the last three years. Topics investigated included past use of social media in public health interventions, which sources the public uses for vaccine information, vaccine misinformation, and past studies about attitudes toward vaccinations.
RESULTS: A literature review was written using 31 unique articles. Eight studies examined which sources the global public uses most for information about vaccines. Of these, four studies showed the media as the top source for information, three studies illustrated the internet, and one study listed healthcare professionals as the main source. Themes emerged around the top beliefs regarding vaccine misinformation including that vaccines are linked to autism, they contain unsafe toxic chemicals, and the vaccine schedule is too aggressive.
CONCLUSIONS: The literature relating to public health initiatives such as sexually transmitted disease prevention, smoking cessation, and exercise have shown that the use of social media may cause behavioral changes leading to health intervention. Based off these findings it is plausible that social media can be used as a tool to correct misinformation about vaccines and address vaccine hesitancy.

## Padilla, Nathan | Poster 27 | Global Health

***Profibrotic Circuits of Collagen-specific HSP47+Myofibroblasts and CD163+Macrophages in deceased Hearts***

**Authors:** Puzyrenko A, Hunt B, Jacobs ER, Padilla N, Devine A, Adjadeh M, Lai S, Dai Q, Rubenstein J, North P, Simpson P, Willoughby R, O'Meara C, Flynn M, Lough J, Ibrahim E, Sun Y, Felix J, Ross G, Rui H, Benjamin IJ.
**Project Mentor:** Ivor J. Benjamin, MD
**Mentor's Department:** Medicine

Fibrosis is an essential adaptive response after tissue injury but excess production causes organ failure, which accounts for one third of all deaths worldwide1. A proteostatic network comprised of stress-inducible molecular chaperones, including heat shock proteins (HSPs) and glucose-related proteins (GRPs), is required in fibrogenic responses to facilitate protein biosynthesis, folding and degradation (i.e., proteostasis). Chaperones maintain critically balanced proteostasis within intracellular sites such as the endoplasmic reticulum (ER) where HSP47 regulates synthesis, folding and secretion of procollagen. We have previously demonstrated that lung tissue exhibited increased GRP78, a SARS-CoV-2 co-receptor, in pneumocytes and macrophages (CD68+ cells) in COVID-19 autopsy patients2. Because the long-term sequalae of SARS-CoV-2 infections including increased risks of acute myocardial infarction and heart failure are presently unknown, we examined postmortem myocardial tissues of COVID-19 decedents to characterize the molecular signatures of profibrotic events underlying adverse cardiovascular outcomes such as sudden cardiac death caused by arrhythmias1, 3.

## Panther, Elizabeth | Quality Improvement and Patient Safety

***Incidence of adverse pregnancy outcomes based on the degree of short interpregnancy interval.***

**Authors:** Panther E, Amherdt S, Macbeth M, McNellis B, Pan A, Palatnik A.
**Project Mentor:** Anna Palatnik, MD
**Mentor's Department:** Obstetrics and Gynecology

Objective: To compare adverse pregnancy outcomes between patients with and without short interpregnancy intervals, stratified by the degree of short interpregnancy intervals (IPI).
Study Design: This was a retrospective cohort study of patients with two singleton pregnancies between 2015 and 2018 at a single academic center. The primary outcome was incidence of preterm birth (PTB), which was compared between patients with <6 months, <12 months, <18 months and ≥18 months IPIs. Secondary outcomes included hypertensive disorders of pregnancy, low birth weight, gestational diabetes and presence of congenital anomaly. Maternal demographic and clinical factors were collected to compare between the four groups. Bivariate and multivariate analyses were done to examine the independent role of the degree of short IPI and each outcome.
Results: In unadjusted analysis, patients with IPI <6 months had the highest rate of PTB at 15.0%. Patients with IPI <6 months and >12 and <18 months had higher rate of congenital anomalies compared to ≥18 months. In multivariate analysis, IPI <6 months was associated with higher odds of PTB and IPI >12 and <18 months was associated with higher odds of congenital anomalies. The odds of gestational diabetes were lower with IPI 6-12 months compared to ≥18 months. Patients with IPI <6 months were more likely to be non-Hispanic Black, have higher pre-pregnancy BMI, be single, have public insurance, and have smoked during pregnancy. Older age, higher pre-pregnancy BMI, and Hispanic ethnicity were associated with lower odds of all short IPI. In contrast, public insurance was associated with higher odds of IPI<6 months.
Conclusion: Patients with IPI<6 months had higher odds of PTB while IPI >12 and <18 months had higher odds of congenital anomalies compared to control group. Older age, Hispanic ethnicity and higher pre-pregnancy BMI were associated with lower odds of IPI, while public insurance was associa

## Park, Nahee — Global Health

***Impact of BMI in predicting Atrial Fibrillation Trends and Recovery***

**Authors:** Park N, Choi B.
**Project Mentor:** Byung-IL Choi, MD
**Mentor's Department:** Medicine

This study identified if there is a maximum threshold to the obesity paradox in which increased BMI no longer provides better Atrial fibrillation (AF) prognosis, and identified variables that predict successful AF recovery.
AIMS/METHODS: Whether patients are better able to maintain normal sinus rhythm (NSR) after cardioversion, defined as successful rhythm control (SRC), will be compared to differences in BMI; 100 patients with AF was divided into 6 different BMI groups. Incidence of AF recovery post procedures was determined in each BMI category.
RESULTS/DISCUSSIONS: Patients with successful rhythm control (SRC) had higher instances with severe LA enlargement compared to patients with failed rhythm control (P=.023). Patients with SRC had larger BMI (33.60 kg/m2) compared to patients with failed rhythm control (FRC) (28.76 kg/m2) (P=.049), which supports the obesity paradox. However, the obesity paradox presents with limitations as Group 6 exhibited worsening SRC. A regression equation predicted that the variables gender, height, and LVPWd were important in predicting the occurrence of SRC. This equation was 77% accurate in predicting SRC and 82% accurate in predicting FRC.
The obesity paradox phenomenon has been long observed in providing better cardiovascular prognosis in obese patients. While our studies show that patients with SRC had higher BMI (P=0.49), a further investigation measuring atrial size and SRC with individual BMI groups reveals the limitation of the Obesity Paradox. While not statistically significant, our data shows trends suggest that the largest BMI group (>40 kg/m2) shows poor SRC. Therefore, there seems to be a maximum threshold to the "obesity paradox" since increasing BMI no longer yields favorable outcomes. Overall, this study was important in providing a better understanding on the impacts of BMI in predicting AF trends and recovery.

## Patek, Victoria — Poster 28 — Global Health

***Auto-Segmentation Software for Mapping FLAIR White Matter Hyperintensities in Former Collegiate Athletes***

**Authors:** Patek VC, Klein AP, Meier TB, et al.
**Project Mentor:** Benjamin Brett, PhD
**Mentor's Department:** Neurosurgery

PURPOSE: White matter hyperintensities (WMH) on MRI scans reflect white matter pathologies and correlate with a proxy for repetitive head impact exposure (RHI) in former contact sport athletes. We investigated the relationship of RHI and concussion history with WMH volume using two automated segmentation software in former athletes at early midlife.
METHODS: Former collegiate football players (n = 53; mean age = 37.9 ± 1.5 years) underwent brain MRI, completed an advanced metric of RHI (head impact exposure estimate; HIEE), and reported concussion history (0-1, 2-4, 5-7, ≥8). T2-FLAIR images were processed and total WMH volume was segmented using Sequence Adaptive Multimodal Segmentation (SAMSEG) and the Lesion Segmentation Toolbox (LST; at probability thresholds of 0, 0.5, 0.8). Spearman's Rho (ρ) correlations examined WMH volume across software and thresholds. Negative binomial mixed effect models with site of MRI acquisition as a random effect examined associations between RHI and concussion history with WMH volume.
RESULTS: WMH volume between SAMSEG and LST at probability thresholds of 0 (ρ =.08, p=0.55), 0.5 (ρ =.17, p=0.22), and 0.8 (ρ =.21, p=0.12) showed small, non-significant correlations. Visual inspection revealed discrepancies in segmentation and low detection of smaller lesions. Total WMH volume was not significantly associated with RHI (SAMSEG unstandardized beta[standard error]=-.0004[.0005], p=.42; LST0.5=-.0004[.0004], p=.28) or concussion history (SAMSEG=-.212[.202], p=.30; LST0.5=-.155[.1500], p=.31).
CONCLUSION: Associations between RHI and concussion history with WMH volume were not observed in former collegiate football players at early midlife. The lack of association may reflect an absence of pathology at this point in the lifespan, variability between auto-segmentation software, or insufficient detection of smaller lesions. Manual tracing of WMH may more accurately assess the relationship between RHI and concussion history with WMH volume.

## Patel, Mit | Poster 19 | Clinical & Translational Research

***Demographic differences in the treatment of unilateral vocal fold paralysis***

**Authors:** Patel MA, Bock JM, Blumin JH, et. al.
**Project Mentor:** Jonathan M. Bock, MD, Joel H. Blumin, MD, and David R. Friedland, MD, PhD
**Mentor's Department:** Otolaryngology

OBJECTIVE: To determine the impact of patient demographics and social determinants of health on treatment pathways for unilateral vocal fold paralysis (UVFP) at a tertiary laryngology clinic.
STUDY DESIGN: Retrospective medical record review
METHODS: Patient demographics (age, gender, race, ethnicity, and insurance status) were extracted for adults diagnosed with UVFP between 2009-2019. Odds ratios for the associations between sociodemographic factors and UVFP treatment pathways were determined by chi-square analyses.
RESULTS: A total of 1490 UVFP diagnoses were identified during the study period with the majority being female (58%), White (85%), non-Hispanic (97%), and publicly insured (54%). Five treatment pathways were identified: observation, injection laryngoplasty, voice therapy, laryngeal framework surgery/thyroplasty, and reinnervation surgery. There were 538 patients who underwent observation, 512 injection laryngoplasty, 366 voice therapy, 136 thyroplasty, and 26 laryngeal reinnervation surgery. Males were more likely to undergo injection laryngoplasty than females (OR 1.32; CI 1.08, 1.61), whereas females were more likely to undergo voice therapy (OR 1.39; CI 1.09, 1.76). Patients with public insurance (OR 1.48; CI 1.03, 2.14) and Hispanics (OR 2.60; CI 1.18, 5.72) were more likely to undergo thyroplasty. Patients who underwent reinnervation surgery were younger than those in other treatment pathways (median: 39.1 years vs 50.7-56.1 years).
CONCLUSIONS: Gender, ethnicity, and insurance status were significantly associated with specific UVFP treatment pathways. Patients with public insurance were more likely to undergo surgical intervention than voice therapy. This data overall supports differences in care pathway utilization for UVFP based on social determinants of health.

## Patnaik, BS, Rohan | Health Systems Management & Policy

***A reflection and discussion exercise on racial justice and equity***

**Authors:** Patnaik R, Attlassy N, Davids S, Fletcher K.
**Project Mentor:** Kathlyn Fletcher
**Mentor's Department:** Medicine

Background: Residents have valuable perspectives about the diversity and equity in medical training, yet many graduate medical education curricula lack dedicated activities focused on such issues.
Objectives: Our innovation aimed to use individual reflection and a group discussion to begin a discussion in our residency program about equity and injustice through the lens of the Black Lives Matter movement.

Methods: In July 2020, we sent a survey with reflection prompts to all the post-graduate year (PGY) 2 and above internal medicine residents. In the discussion session (during required academic time), we presented 10 of the residents' responses to the reflection prompts. After each response was read aloud, the residents had an open discussion. We used a constructivist lens and thematic analysis to analyze the responses to the reflection prompts.
Results: We received responses from 24 (33%) residents. We identified ten codes that fell into four themes. The most commonly identified codes included Anger or frustration towards events, Self reflection on privilege, Increased awareness and discussion of racism in daily life, and Life was minimally impacted/homeostasis. The four overarching themes were 1) Awareness, 2) Motivation for change, 3) Emotional response and 4) Self reflection.
Conclusions: Using a format of reflection and sharing anonymous responses was an inexpensive and effective method for to begin a discussion about equity and injustice in medicine. Knowing the themes that arose from our residents may allow other programs to be prepared to moderate discussions should they implement similar interventions.

## Perez, MSBS, Adriana — PODIUM — Clinician Educator

***Mitigating implicit bias in clerkship evaluations***

**Authors:** Perez A, Fields B, Ark T, et al.
**Project Mentor:** Kris Harlander Saudek, MD
**Mentor's Department:** Pediatrics

There are significant differences in the narrative language chosen to evaluate students who are underrepresented in medicine (URM). URM students are more likely to be described using personal attributes which impacts Medical Student Performance Evaluation, AOA membership, and overall career trajectory. Addressing this disparity requires that we mitigate implicit biases.
We developed a curriculum for all evaluators in pediatrics at our institution to enhance writing biased-free clerkship narratives. To test this, we created student narratives for pre-/post-curriculum surveys flipping URM versus non-URM status between the surveys. Participants were then assigned a clerkship grade to each narrative. A repeated-measures analysis of variance (ANOVA) was conducted with time (pre/post) as the within-subject repeating factor, and URM as the between-subject factor.
We had a 7% completion rate (14/200). The ANOVA revealed a significant interaction ($p<0.05$) between URM status and time, with URM students scoring significantly higher (M=3.2) at the pre-assessment than non-URM students (M=2.4). No differences existed at post-assessment between the two groups (URM M=2.6 vs. non-URM M= 2.6). Evaluation of the entire curriculum was uniformly positive, indicating the curriculum prepared them to write bias-free evaluations.
We found that differences in faculty assigned grades pre-/post-curriculum between URM and non-URM students were not significant post-curriculum. Although our findings counter our hypothesis, one possibility is that participants were aware of their biases. Differences in the pre-curriculum may reflect a lack of faculty development writing narratives that the curriculum addressed and may represent a methodological flaw that could be rectified with a retrospective pre/post analysis.

## Peterson, Eileen — Poster 66 — Urban & Community Health

***The impact of a fast-track questionnaire in pediatric Paradoxical Vocal Fold Motion Disorder (PVFMD)***

**Authors:** Harvey E, Peterson E, Fee R, Espahbodi M, Beste D, Robey T.
**Project Mentor:** Thomas C. Robey, MD
**Mentor's Department:** Otolaryngology

Objective: PVFMD is a frequent cause of dyspnea in the healthy adolescent population. When PVFMD is suspected, the current standard of care includes referral to an otolaryngologist (ENT) prior to beginning laryngeal control therapy (LCT) with a speech language pathologist (SLP). We hypothesize that a "fast-track" screening questionnaire will improve time to treatment as well as decrease patient billing charges.
Study Design: Retrospective and prospective cohorts.
Setting: Tertiary care children's hospital.
Methods: Two hundred fifty-eight patients (group 1) who received traditional referral and were evaluated by ENT and SLP in pediatric voice clinic with a diagnosis of PVFMD between 11/2013 and 11/2017 were identified and compared with 66 patients (group 2) from 10/2018 to 11/2019 who were prospectively studied and placed into a 'fast-tracked' subgroup for LCT without preceding ENT evaluation if they scored an 8/10 or higher on a designed screening questionnaire. Descriptive and comparative statistical analyses were completed.
Results: Female gender (group 1: 81%, group 2: 83%, $p=0.73$) and median age (group 1:14y IQR4, group 2:14y IQR3, $p=0.83$) were similar. The median duration from symptom onset to SLP referral was significantly shorter for group 2. (group 1: 12 months, IQR18; group 2 8.5 months IQR 8, $p=0.02$). Time from referral to SLP visit was shorter for group 2 at 3 weeks (IQR 3) compared to group 1 at 4 weeks (IQR 3.5) ($p<0.01$). Over half of the patients in both groups did not require additional LCT sessions with the SLP after their initial visit. The typical minimum patient charge for group 1 patients was estimated at $5123 versus $1649 for group 2, yielding an average savings of over $3000 per patient.
Conclusion: Using a fast-track screening questionnaire for pediatric PVFMD patients significantly helps decrease the time to treatment as well as patient charges without altering the response rate of LCT.

## Porwal, Mokshal — Clinical & Translational Research

***MedCDI: A technology-based documentation and quality improvement initiative in neurosurgery***

**Authors:** Porwal MH, Feller CN, Kumar D, Kolinski J, Sinson GP.
**Project Mentor:** Grant Sinson, MD and Julie Kolinski, MD
**Mentor's Department:** Neurosurgery and Medicine

Background: Clinical documentation of patient care alters coding accuracy of Medicare Severity Diagnosis Related Groups Diagnosis Related Groups (MS-DRGs), expected mortality, and expected length of stay (LOS) which impacts quality metrics. We aimed to determine if neurosurgical quality metrics could be improved by facilitating accurate documentation through an informational mobile application and video.
Material and methods: Vizient software was used to analyze MS-DRGs and expected LOS for sample of patients requiring surgery for spinal pathology, brain tumors, and subarachnoid hemorrhage (SAH) between January 2019 to August 2021. Chart reviews were conducted to discover variables missed by documenting provider and/or coder.
Results: Review of 114 spinal surgery, 20 brain tumor, and 53 SAH patients revealed at least one additional variable impacting LOS in 43% of spine, 75% of brain tumor, and 92% of SAH patients, with an average of 1 (1.25), 2 (1.75), and 3 (2.89) new variables respectively. Recalculated expected LOS increased by an average of 0.86 days for spine, 3.08 for brain tumor, and 6.46 for SAH cases. A Progressive Web Application (PWA) was created to facilitate documentation improvement, accessible through most devices.
Conclusion: Efforts to accurately document patient care can improve quality metrics such as expected LOS, mortality, and cost estimates. To our knowledge, this represents the first initiative to utilize the proven powers of mobile phones in healthcare towards the novel application of specifically improving neurosurgical quality metrics.

## Powers, Ryan — Poster 10 — Clinician Educator

***Disparities in utilization of outpatient surgical clinic among children requiring surgical care***

**Authors:** Powers RJ, Mokdad AA, Pezzin LE, Nattinger AB, Oldham KT, Van Arendonk KJ.
**Project Mentor:** Kyle J. Van Arendonk, MD, PhD
**Mentor's Department:** Surgery

Background. The purpose of this study was to quantify disparities in the utilization of outpatient pediatric surgical care and to examine the extent to which neighborhood-level socioeconomic disadvantage is associated with access to care among children.
Methods. Clinic "no-shows" were examined among children scheduled from 2017-2019 at seven pediatric surgery clinics associated with a tertiary care children's hospital. The association between Area Deprivation Index (ADI), a neighborhood-level measure of socioeconomic disadvantage, and other patient factors with clinic no-shows was examined using multivariable logistic regression models. Difficulties in accessing post-operative care in particular were explored in a subgroup analysis of post-operative (within 90 days) clinic visits after appendectomy or inguinal/umbilical hernia repairs.
Results. Among 10,162 patients, 16% had at least one no-show for a clinic appointment. ADI (most deprived decile adjusted odds ratio [aOR] 3.17, 95% confidence interval [CI] 2.20-4.58, p<0.001), black race (aOR 3.30, 95% CI 2.70-4.00, p<0.001), and public insurance (aOR 2.75, 95% CI 2.38-3.31, p<0.001) were associated with having at least one no-show. Similar associations were identified among 2,543 children scheduled for post-operative clinic visits after undergoing appendectomy or inguinal/umbilical hernia repair, among whom 20% were a no-show.
Conclusions. Race, insurance type, and neighborhood-level socioeconomic disadvantage are associated with disparities in utilization of outpatient pediatric surgical care. Challenges accessing routine outpatient care among disadvantaged children may be one mechanism through which disparate outcomes result among children requiring surgical care.

## Quamme, Megan | Poster 52 | Quality Improvement and Patient Safety

***Verbal de-escalation training for medical students***

**Authors:** Quamme MK, Scanlon MC.
**Project Mentor:** Matthew Scanlon, MD
**Mentor's Department:** Pediatrics

Violence in the health care field has long been a problem among health care professionals, and medical students are no exception. Most medical schools do not offer de-escalation training, and most health system employers don't have training or any policies about managing aggressive behaviors. A group of researchers worked with medical college faculty and resources to develop a one-hour verbal de-escalation training for students, and delivered the class to fourth year students. During and after class, surveys were distributed for students for reflection and to assess the efficacy of the class. There were 162 recorded responses to the survey (of 192 students in the class of 2020). Overall, 82% of respondents thought that the course was at least somewhat of a good use of their time, and 97% of respondents felt that they would be successful in their attempts to de-escalate a patient after participating in the class. Students reported learning about de-escalation tools that will be useful to them, and they reported learning that violence and the use of restraints are preventable with verbal de-escalation. Although most students reported increased confidence in handling these situations after participating in the course, it is unclear whether the topics in this course are easily applied to real-life situations; a limitation of the data collected. Although a one-hour course is a strong step in teaching students about de-escalation, the skills within are learned skills that take practice. More formal teaching should be done before exposure to the clinical environment and throughout clinical careers.

## Racicot, Hannah | Global Health

***Mental Health Interventions and Access in Post-Genocide Rwanda: A Scoping Review***

**Authors:** Racicot HR, Tostrud L, Twizerimana O, Cassidy LD.
**Project Mentor:** Laura D. Cassidy, MS, PhD
**Mentor's Department:** Institute for Health & Equity
**Community Partners:** Kigali Genocide Memorial and Aegis Trust, Kigali, Rwanda

Background:
The 1994 genocide in Rwanda not only left behind over one million murdered individuals but also prevalent mental disorders and trauma in the Rwandan population. No review has been undertaken that evaluates mental healthcare access and effective interventions. We conducted this review to address this gap and provide a landscape assessment for mental health needs that will inform capacity building interventions and policy.
Methods:
A search strategy was developed for three peer-reviewed literature databases. Twenty-two intervention studies were reviewed for themes since they varied in design, intervention, and outcomes, and five articles studying access were categorized according to Penchansky and Thomas' health care access framework.
Results:
Twenty-seven articles were included. Major barriers to accessing care included lack of available resources, awareness, accessibility, various help-seeking behaviors, and prevalent stigma. The intervention findings suggest group-based interventions have significant impact on sense of connection and improved mental health symptoms, and results from individual interventions indicate the significant positive effect of exposure therapies on post-traumatic stress disorder (PTSD) symptoms.
Conclusion:
Although culturally appropriate interventions have been studied that can effectively decrease mental health symptoms, many Rwandans suffering from mental illness still cannot access care; therefore, mental healthcare funding, training, and access must be increased to decrease barriers and improve quality of life.

## Rasmussen, Luke — Clinician Educator

***Analysis of Patient-Reported Outcomes After Surgical Treatment of Isolated Ankle Fractures***

**Authors:** Rasmussen LJ, Fritz JM, Kassels AC, Baynard T, Harris GF, Bartynski ZA, Schmeling GJ.
**Project Mentor:** Gregory J. Schmeling, MD
**Mentor's Department:** Orthopaedic Surgery

INTRODUCTION: Ankle fractures are a very common injury. A better understanding of long-term outcomes following surgical treatment can allow surgeons to best educate and manage expectations of patients.
HYPOTHESIS: Surgical repair of an ankle fracture has no long-term effects on quality of life.
SPECIFIC AIMS: The present study seeks to assess function at least 24 months after surgery using patient-reported outcomes. Self-reported ankle function will be evaluated using the American Orthopaedic Foot and Ankle Society Ankle/Hindfoot Scale (AOFAS), and the 36 item Short-Form Health Survey (SF-36).
STUDY METHODS: Screening was conducted on 771 patients who underwent surgical repair of a fractured ankle at least two years ago. Eligible participants were contacted via mail, and 32 patients completed the SF-36 and AOFAS survey. Total AOFAS score, SF-36 score, and scores from the individual SF-36 subsections were compared using two-tailed T-tests and linear regression.
RESULTS: The average AOFAS score among all participants was a 46.5 out of a possible 60. The average SF-36 score was 80.35 out of a possible 100. There was no trend in linear regression analysis of outcomes against patient age at time of injury, days from closed fracture to surgical repair, or time from surgical repair to the start of data collection.
CONCLUSION: The absence of a correlation between patient-reported outcomes and the participants' ages at the time of their injury suggests all patients can have equivalent outcomes. The lack association between outcomes and the number of days from injury to surgical repair indicates that surgical repair of a closed ankle fracture is not emergent and delaying repair does not affect outcomes. A lack of linear trend for outcomes versus the number of days from surgical repair to the beginning of data collection supports that after two years patients have reached their new baseline.

## Renta, Vincent — Global Health

***Correlates of Prediabetes in Sub-Saharan Africa: Need for Targeted Action***

**Authors:** Walker RJ, Thorgerson AM, Yan A, Williams JS, et al.
**Project Mentor:** Leonard Egede, MD, MS and Rebekah Walker, PhD
**Mentor's Department:** Medicine

Background: Understanding the prevalence and correlates of prediabetes could provide information to identify the target for diabetes prevention. The aim of this study was to investigate the prevalence of prediabetes in Namibia and South Africa and determine sociodemographic correlates of disease using population data.
Methods: Demographic and Health Survey for emerging (Namibia) and established (South Africa) economies in Sub-Saharan Africa collected laboratory data that allowed determination of prediabetes status. Prediabetes was defined as not being diagnosed with diabetes and having a blood sugar measurement of 100-125 mg/dL in Namibia (n=2,534) or an HbA1c measurement of 5.7-6.4% (n=4,964). Logistic models were run for each country separately, with prediabetes as the outcome and a series of sociodemographic variables (age, gender, urban/rural residence, number of children, employment status, wealth index, education level, and ethnicity (in South Africa) or religion (in Namibia)) entered as variables to investigate the independent relationship of each.
Results: Weighted prevalence of prediabetes was 18.7% in Namibia, and 70.1% in South Africa. Rural residence was independently associated with higher odds of prediabetes in Namibia (1.47, 95%CI 1.05, 2.06), while both younger age (0.98, 95%CI 0.97, 0.99) and urban residence (0.80, 95%CI 0.66, 0.99) were independently associated with odds of prediabetes in South Africa.
Conclusions: Prevalence of prediabetes is higher than regional estimates in both Namibia and South Africa, and correlates of prediabetes differ between the two countries. Aggressive interventions including population level education and awareness programs, and individual level education and lifestyle interventions that account for country specific contextual factors are urgently needed to prevent progression to diabetes.

## Repp, Kathryn | Poster 4 | Bioethics & Medical Humanities

***Examining the Ethical Implications of Neurotechnologies as Treatment for Obsessive-Compulsive Disorder***

**Authors:** Repp KE, Jotterand F.
**Project Mentor:** Fabrice Jotterand, PhD, MA
**Mentor's Department:** Institute for Health and Equity

Background: Deep brain stimulation (DBS) and transcranial magnetic stimulation (TMS) are recent neurotechnological developments that are being considered as treatment for obsessive-compulsive disorder (OCD). However, it is unclear if it is in a patient's best interest to undergo this treatment given emerging data on adverse effects and limited data on long-term effectiveness.
Methods: A literature search was performed using the PubMed database and included two individual searches, one to identify the adverse effects of DBS and/or TMS and another to identify ethical issues associated with their use. The review yielded 222 articles, 10 of which met the inclusion and exclusion criteria. No articles focused on TMS met the criteria.
Results: Studies reported 3 types of adverse effects: surgical-related, short-term, and long-term. The majority of the studies concluded that most adverse effects were transient or reversible, with a largely positive treatment outcome. However, there were no studies following patients for longer than 5 years and were also inconsistencies in results, as many studies used different anatomical stimulation targets. Ethical topics discussed included concerns related to beneficence, non-maleficence, patient autonomy, and study validity.
Conclusion: Based on the adverse effects as well as many ethical concerns, it is apparent that further research must be done before this treatment can be implemented safely and effectively in the clinical setting. However, for those patients with severely debilitating, treatment-resistant OCD who have the capacity to fully consent to the procedure and are willing to continue despite the risks, DBS appears to be a promising treatment option.

## Rodriguez, Alejandra | Poster 67 | Urban & Community Health

***Review of Contract Growing Initiative***

**Authors:** Rodriguez A, Calzada S.
**Project Mentor:** Leslie Ruffalo, PhD
**Mentor's Department:** Family and Community Medicine
**Community Partner:** Feeding America Eastern Wisconsin

Farm Link, a Feeding America Eastern Wisconsin program, is using contract farming to work with local farms to meet the food needs of low and very low food secure households in the 35 counties of Eastern Wisconsin. Contract growing is a preharvest agreement between farmers and buyers, in which buyers set guidelines for the product being harvested and collect the product at the end of the season. This helps connect small farmers to a larger market and is used by Farm Link, to consistently provide low food secure households with fresh food. Farm Link purchases food from local farms that goes directly to food banks which will then distribute it to low food secure households with the goal to sustainably meet the food needs of the communities in Eastern Wisconsin. In 2021 alone, Farm Link provided the community with an estimated 250,000 pounds of fresh fruits and vegetables, more than double that of 2019. Farm Link's contract growing initiative was assessed through two surveys, a year apart to provide the stakeholders involved improvement strategies and increase the program's efficacy and contribution to the communities it serves. Overall, the stakeholders involved with Farm Link are satisfied with the partnership and their involvement with the program, but there are ways to improve the distribution, awareness and client education about the produce provided. Our recommendations are to continue shaping the program to improve community needs and stakeholder satisfaction.

## Rossman, Andrea | Poster 20 | Clinical & Translational Research

***Evaluation of texture features from micro-computed tomography of osteogenesis imperfecta bone specimens***

**Authors:** Rossman AH, Radmanovic K, Harris GF, Smith PA, Fritz JM.
**Project Mentor:** Jessica M. Fritz, PhD
**Mentor's Department:** Orthopaedic Surgery

Introduction: Osteogenesis imperfecta (OI) is a genetic disorder primarily resulting in defective collagen type I which is necessary for proper bone formation. This disorder often leads to weakened bones and frequent fractures. Better characterization of OI bone properties could improve fracture mitigation, and activity and rehabilitation prescriptions. Bone texture has been captured using volumetric bone mineral density (vBMD) and porosity, but the use of higher order texture statistics has not been investigated. We hypothesize that second order texture features (contrast, correlation, energy and homogeneity) derived from micro-computed tomography (CT) images will have higher correlation to mechanical properties than previously used porosity and vBMD values.
Methods: Cortical bone samples from children with OI were machined into 23 miniature beams cut in transverse and longitudinal directions. The beams were imaged via micro-CT at a resolution of 10 Âµm and then underwent three-point bending flexural testing to failure. Porosity and vBMD were calculated using SCANCO software. Each beam's modulus of elasticity (E) was calculated from its flexural testing results. A custom MATLAB algorithm automatically selected regions of interest (ROIs) from each micro-CT bone scan and calculated second order texture statistics (contrast, correlation, energy and homogeneity). The Pearson's Correlation Coefficients were calculated to compare the six imaging variables to E.
Results: Contrast, the second order texture feature, had a higher correlation coefficient than porosity and vBMD for the transverse beams. However, the E of the longitudinal beams was most highly correlated to porosity and vBMD.
Conclusion: Contrast showed a stronger correlation to E than vBMD and porosity for the transverse beams. This demonstrates potential evidence to use contrast in estimations of mechanical properties from clinical imaging to inform patient-specific predictive models for fracture risk in OI.

## David, Roznovjak | Poster 29 | Global Health

***Perceptions Toward Breast/Cervical Cancer Development and Screening in Transgender and Nonbinanry Persons***

**Authors:** Roznovjak D, Petroll A, Lakatos A, Narayan R, Cortina CS.
**Project Mentor:** Chandler S Cortina MD, MS and Andrew Petroll MD, MS
**Mentor's Department:** Surgery and Medicine

Approximately 1.4 million adult Americans identify as transgender (TG) or non-binary (NB) and with continued social acceptance, this population is increasing. However, cancer risk is unclear, and screening and treatment guidelines are lacking. We sought to assess TG and NB perceptions towards breast and cervical cancer screening, risk of cancer development, and thoughts towards gender-affirming hormone therapy in the setting of a hormone-receptor positive breast cancer. Of the 59 responses: 24% were TG women, 41% TG men, 20% NB, and 15% identified as other (i.e., agender, genderqueer, etc). 63% were assigned female sex at birth (59% of whom had chest masculinization surgery), 36% were assigned male sex at birth, and one individual was intersex at birth. The majority reported they were not familiar with breast (69%) or cervical (58%) cancer screening recommendations as it applied to them. 41% of respondents reported either being somewhat concerned or concerned regarding breast cancer development. In patients assigned female sex at birth, 52% reported concern about cervical cancer. In totality, 86% of respondents were currently using or had previously used gender-affirming hormone therapy, and of these, 39% reported they would not stop therapy in the event they developed a hormone-receptor positive breast cancer. In patients age >40 (n=13), 62% had a mammogram (MMG) in the past 10 years. In patients who currently had a cervix, 59% reported having a pap smear in the past 5 years. When all respondents were presented with information regarding screening MMG and automated breast ultrasonography (ABUS), 73% reported they would prefer ABUS over MMG for breast cancer screening. This survey indicates an overall lack of knowledge when it comes to breast and cervical screening, an overall heightened sense of concern for developing cancer, a reluctance by a significant amount of people to give up hormone therapy, and a much greater need for explanation of screening guidelines.

***Heterotopic Ossification in Cervical Disc Arthroplasty: A Finite Element Model Analysis.***

**Authors:** Rybakowicz RL, Purushothaman Y, Sharma H, Jabaseelen D, Baisden J, Yoganandan N.
**Project Mentor:** Jamie Baisden, MD
**Mentor's Department:** Neurosurgery

Introduction: The treatment of spondylotic radiculopathy and/or myelopathy unresponsive to conservative measures is complex with both anterior, posterior, and combined approaches depending on the severity and the number of levels involved. Anterior Cervical Discectomy and Fusion (ACDF) has been the gold standard for anterior approaches however, it is known that ACDF results in decreased range of motion (ROM), potentially leading to adjacent segment disease (ASD) and revisional surgeries. Cervical Disc Arthroplasty (CDA) was created to forgo these sequelae by preserving cervical kinematics. However, CDA is not without its own faults. Heterotopic ossification (HO) is a known common complication of CDA. HO can reduce ROM and lead to bony ankylosis of the joint, negating the benefits of the procedure. Using a finite element model (FEM), HO can be predicted with the end goal of creating a clinical model for various artificial discs.
Objective: To use FEM to predict the effects of HO development on ROM and its time course in a commonly used CDA implant.
Methods: A FEM from C2-T1 using a CDA (metal on polymer design) was placed at the C5-C6 level, HO formation was predicted by applying 75N follower loads and 2 NM moments at the superior C2 vertebra. Flexion and extension were simulated: ROM, potential HO regions and volumes, and time course for HO development determined.
Results: Flexion at the C5-C6 level was shown to be 6.414mm3, 9.731mm3, and 1.214mm3 while extension was shown to be 4.483mm3, 4.589mm3, and 1.103mm3 for the intact segment, CDA without and with HO formation, respectively. At 20 months HO progression volume was 591mm3 for flexion and 647mm3 for extension.
Conclusions: HO can be predicted using a FEM analysis for various artificial cervical discs. This could influence which type of CDA would be recommended for different demographics. By minimizing HO formation and maintaining ROM, subsequent surgeries can be avoided improving overall patient outcomes.

## Saleh, Hadi Omar | Poster 38 | Health Systems Management & Policy

***Vaccine Hesitancy and Risk Communication - Qualitative Assessment of Fight COVID MKE Risk Assessment Tool***

**Authors:** Saleh HO, Titi M, Keval A, Meurer J.
**Project Mentor:** John Meurer, MD, MBA
**Mentor's Department:** Pediatrics

Motivation: Vaccine-hesitancy towards COVID-19 inoculation appears to be a worldwide phenomenon and varies based on demographic factors including sex, age, race, and ethnicity.
Problem statement: Data from the Kaiser Family Foundation has shown differences between vaccination rates among Asian, Hispanic, White, and Black people. As of April 2022, these rates have stabilized at 85%, 65%, 63%, and 57%, respectively. To ameliorate vaccine-hesitation, the 'Fight COVID MKE Risk Assessment Tool' (https://fightcovidmilwaukee.org/individual-risk-estimator) was created to communicate individual risk of death from COVID.
Approach: The aim of our study was to qualitatively assess the value of the risk-tool based on feedback from community focus groups. Study participants included adults, fluent in English/Spanish and able to provide informed consent. Transcripts were generated from each focus group discussion and a thematic analysis was performed using MAXQDA.
Results: From 07/13/21 to 10/19/21, 69 participants enrolled. Ages ranged from 20-77 years, 65% were female, 35% were White, 30% Hispanic, and 26% African-American. Overall, 6 different themes were identified: "tool accessibility", "simplifying information", "explaining comorbidities", "confusing tool-criteria", "applying findings to day-to-day living", and "refusal to use tool". Feedback varied based on race, age, and vaccination-status. Emphasis on specific themes varied based on the demographics of participants. Among high-risk participants, 'Whites >65-years' emphasized "simplifying information", whereas 'African-Americans 40-65' focused on "applying findings to day-to-day living".
Conclusions: Feedback was used to incorporate additional charts and graphs to the risk-tool. The variability in responses allowed us to tailor risk-tool improvement and enhance risk communication across multiple demographic groups in MKE.

## Salem, Edward | Clinical & Translational Research

***Comparative Effectiveness of Alternative Bridging Therapies for Subtherapeutic INR in Patients with LVADs***

**Authors:** Chung GS, Salem E, Sippola E, Shore S, Baumann Kreuziger LM, Barnes GD.
**Project Mentor:** Lisa Baumann Kreuziger, MD
**Mentor's Department:** Medicine

BACKGROUND Patients with left ventricular assist devices (LVAD) use warfarin to prevent life-threatening thromboembolic complications. Warfarin's anticoagulant effects are notoriously variable, requiring the use of temporary "bridging" anticoagulation when subtherapeutic. Comparative effectiveness data between hospitalization for unfractionated heparin (UFH) and outpatient management with low-molecular-weight heparin (LMWH) are lacking.
AIMS To compare 30-day rates of bleeding and thrombotic events between patients bridged with LMWH vs UFH for subtherapeutic INR occurring in the outpatient setting.
METHODS We conducted a retrospective cohort study of patients aged 18 years and older with LVAD implantation between January 1, 2014 and December 31, 2018 from two academic medical centers. Data were collected for each unintended subtherapeutic international normalized ratio (INR) episode occurring in the ambulatory setting for which either UFH or LMWH was used. Patients were followed for 30 days after UFH or LMWH was discontinued, assessing for bleeding and/or thromboembolic events. The composite outcome was major bleeding or thromboembolism.
RESULTS Data were collected from 269 patients and 1438 bridging episodes. The 30-day rate of major bleeding or thromboembolism was lower for patients receiving LMWH as compared to UFH (11/1169 [0.9%] vs. 8/195 [4.1%], adjusted OR: 0.31; 95% CI: 0.11-0.87; p=0.026).
CONCLUSION Outpatient LMWH bridging was associated with a lower risk of major adverse events for LVAD patients with subtherapeutic INR, compared to intravenous UFH therapy. If confirmed in prospective analyses, use of LMWH bridging as compared to hospital admission for UFH bridging is a potentially safer and lower-cost management strategy for this high-risk population.

## Saravanan, Vishmayaa | Poster 30 | Global Health

***Factors associated with gestational hypertension or preeclampsia in women with gestational diabetes***

**Authors:** Saravanan V, Harrison RK, Pavlik LB, Cruz MO, Palatnik A.
**Project Mentor:** Anna Palatnik, MD
**Mentor's Department:** Obstetrics and Gynecology

Objective: To identify factors associated with the development of gestational hypertension (gHTN) or preeclampsia (preE) in women with gestational diabetes mellitus (GDM).
Study design: This is a retrospective case-control study of women with non-anomalous singleton gestations who delivered at a single academic center from 2011 to 2019 and were diagnosed with GDM. Cases were defined as women with GDM and a diagnosis of gHTN or preE. Controls were defined as women with GDM without the diagnosis of gHTN or preE. Maternal demographics, pregnancy characteristics, and GDM diagnosis and management information was collected. Univariable comparisons of patients' characteristics were conducted using chi-square for categorical data and student t-test for continuous measures. Multivariable logistic regression with backward selection was performed to determine which factors had an independent association with a diagnosis of gestational hypertension or preeclampsia in women with GDM.
Results: A total of 937 women were included, 131 of whom (14.0%) women developed gHTN or preE. In univariable analysis women with gHTN or preE had higher early pregnancy body mass index (BMI) (35.0 ± 7.7 vs. 31.8 ± 8.1 kg/m2, p<0.001) and were more likely to have chronic hypertension (27.8% vs. 2.7%, p<0.001) . In multivariable logistic regression, higher early pregnancy BMI, maternal mood disorder, and chronic hypertension were significantly associated with higher rates of gHTN or preE in women with GDM (aOR 1.03, 95% CI 1.00-1.06, aOR 2.02, 95% CI 1.21-3.39, and aOR 11.36, 95% CI 5.87-22.00).
Conclusion: Women with GDM were more likely to develop gHTN or preE if they had a history of chronic hypertension, diagnosis of mood disorder, or a higher early pregnancy BMI.

## Saterbak, Audun | Clinical & Translational Research

***Clinical impact of surgical technique and prosthesis design in reverse shoulder arthroplasty.***

**Authors:** Saterbak AK, Mehta S, Grindel SI.
**Project Mentor:** Steven Grindel, MD
**Mentor's Department:** Orthopaedic Surgery

The practice of reverse shoulder arthroplasty (RSA) is an important procedure for management of glenohumeral arthritis because of the ability to improve the mechanical advantage of the deltoid. Two commonly discussed disadvantages of this procedure are the occurrence of scapular notching, where the cup of the prosthesis erodes into the scapula over time, and decreased range of motion (ROM). Although advancements to surgical technique and implant design are emerging, the clinical impact of these changes is not well understood. This retrospective study investigates the effect BMI, RSA prosthesis design, and operative technique have on forward flexion (FF) and internal rotation (IR) through 2 years of follow-up in our population of 306 patients (Age range 47-94, Mean 72.2).
Variables investigated include glenosphere size, glenosphere lateralization, humeral retroversion, repair of the subscapularis, and inferior glenosphere overhang. Data was analyzed using linear mixed models to isolate variables and control for pre-operative ROM. In our population, no significant differences were observed regarding BMI, glenosphere lateralization, or humeral retroversion. IR was significantly improved with the use of smaller glenospheres (P=0.0497). FF was observed to significantly improve with greater glenosphere overhangs (P=0.0124) and with intra-operative repair of the subscapularis tendon (P=0.0338). While potential mechanisms for the findings regarding smaller glenospheres and subscapularis repair are still unclear, greater glenosphere overhangs agreed with prior cadaveric and biomechanical studies. The proposed mechanism of this improvement was by allowing greater prosthesis ROM prior to contact with the scapula. Further investigation is needed to understand potential mechanisms and assess if these results translate clinically to patient outcomes, which can be better inferred from standardized orthopedic function scores.

## Scheidt, Abigail — Clinical & Translational Research

***Near-infrared autofluorescence imaging: method assessment and clinical application to albinism.***

**Authors:** Scheidt A, Heitkotter H, Wynne N, Woertz E, Carroll J.
**Project Mentor:** Joseph Carroll, PhD
**Mentor's Department:** Ophthalmology and Visual Sciences

Monitoring changes in retinal melanin with non-invasive imaging techniques is essential for understanding ocular pathologies that directly influence retinal melanin, such as albinism. Near-infrared autofluorescence is a non-invasive imaging tool that holds promise for use in clinical and research settings for imaging retinal melanin. In this study, replication and repeatability of a quantitative method of analysis of near-infrared autofluorescence images was done, as well as application of the method for comparison of pariticpants with normal ocular health and participants with albinism. In this study, near-infrared autofluorescence images were collected and analysed from 17 participants with normal vision and five participants with albinism. Repeat imaging was collected from participants with normal vision one week later, all by the same operator. Methods of quantitative analysis were replicated from a previous study and autofluorescence was measured as gray level values. Gray level value in participants with normal vision were not significantly different between repeat imaging sessions. Intersession repeatability in individuals with normal vision was good ($p>0.05$) Analysis of repeated imaging sessions of participants with normal vision were not significantly different. Gray level values at the fovea were significantly different in participants with normal vision versus participants with albinism. Our results demonstrate a reproducible method of quantitative analysis of near-infrared autofluorescence images. Our results also support the use of near-infrared autofluorescence as a tool to image differences in retinal pigmentation.

## Sehring, Jacqueline — Poster 39 — Health Systems Management & Policy

***Mitochondrial DNA scores of euploid embryos are higher among infertile patients compared to oocyte donors***

**Authors:** Sehring J, Grimm L, Anderson J, Hussain A, Cooper A, Beltsos A, Jeelani R.
**Project Mentor:** Allison Linton, MD
**Mentor's Department:** Obstetrics and Gynecology
**Community Partners:** Kindbody and Vios Fertility Institute

Introduction: Mitochondrial scoring offers a promising new parameter for assessing embryo viability by predicting metabolic health. Previous studies have shown that elevated Mitoscore, indicative of poor embryo quality due to oxidative stress, is linked to lower embryo viability and implantation as well as decreased pregnancy rates, while lower scores of mtDNA have been associated with improved outcomes. Thus, this study sought to compare embryos from infertile patients to those from age-matched oocyte donors to better understand the relevance of mtDNA as a predictor of embryonic health.

Methods: Retrospective chart review at a private fertility clinic. All patients 32yo and younger who underwent in-vitro fertilization (IVF) that resulted in euploid embryos from January 2019 to September 2019 were included. Two groups were assessed: euploid embryos derived from oocyte donors and those derived from the infertile population. Baseline characteristics and IVF cycles were reviewed.

Results: A total of 149 embryos were analyzed. Age, BMI, and AMH were similar ($p>0.05$). 62 embryos were included in the oocyte donor group and 87 embryos were in the infertile group. Number of oocytes retrieved, maturation rate, fertilization rate, and blastocyst rate of the two groups was not significant ($p>0.05$). Yet, the mitochondrial score between the two groups was statistically different in the oocyte donor group with a mean score of 20.21, while the infertile group had a mean score of 23.76 ($p<0.001$).

Conclusion: Our results demonstrate that Mitoscore may provide further information beyond aneuploidy testing and embryo morphology. While the embryos derived from young women are thought to yield the best quality, our results show that an infertile diagnosis does implicate diminished embryonic metabolic health compared to their fertile counterparts. Further investigation is warranted to determine the clinical utility of Mitoscore for improving pregnancy rates among infertile patients.

## Serebin, Molly — Quality Improvement and Patient Safety

***Assessing the impact of time to neurosurgery for preterm infants with post-hemorrhagic hydrocephalus***

**Authors:** Serebin M, Carlton K, Adams S, Foy A, Cabacungan E, Cohen S.
**Project Mentor:** Susan Cohen, MD
**Mentor's Department:** Pediatrics

Introduction: Post-hemorrhagic hydrocephalus (PHH) is a major complication of intraventricular hemorrhage (IVH) in preterm infants and a known contributor to poor neurodevelopmental outcomes. Earlier neurosurgical interventions lead to improved outcomes, yet no consensus guidelines exist for optimal timing of intervention. Investigation of current PHH management practices and outcomes at our institution is needed to inform establishment of local practice guidelines.
Methods: We performed a retrospective cohort study of premature infants born between 1/1/2013 - 12/7/2020 who had grade 3 or 4 IVH and were admitted to the CW NICU. We collected demographics, maternal and delivery risk factors, neonatal comorbidities, neurosurgeries and other NICU care, and neurodevelopmental outcomes measured by Bayley scores at 6-, 12-, 18-, and 24-months corrected gestational age. Infants with neurosurgery at ≤28 days of life (DOL) were in the early intervention group (EI) and infants with neurosurgery at > 28 DOL were in the late intervention group (LI). Statistical analysis was performed using Chi-Square, Fisher Exact test, Student's t-test, and Poisson regression.
Results: The median time to neurosurgery was 24 days in the EI group compared to 36 days in the LI group ($p<0.001$). There were no significant differences in Bayley scores between the two groups. The median NICU length of stay was greater in the LI group (106 vs. 93 days; $p<0.01$). The LI group also required longer invasive mechanical ventilation (46 vs. 23 days; $p<0.001$) and more patients in this group required higher levels of ventilatory support (94.1% vs. 44.4%; $p=0.003$). These results were adjusted for demographics (e.g. gestational age at birth) and neonatal comorbidities.
Conclusions: Time to neurosurgery, measured by DOL, had no impact on neurodevelopmental outcomes. However, delayed neurosurgery was associated with increased length of stay in the NICU and greater utilization of NICU resources.

## Sharma, Shivani — Poster 22 — Clinical & Translational Research

***Assessing at Risk Populations for Poor Birth Outcomes with the ACE Questionnaire.***

**Authors:** Sharma S, Wong A, Pan A, Carter F, Afreen E, Menon S.
**Project Mentor:** Seema Menon, MD
**Mentor's Department:** Obstetrics and Gynecology

Background: Adverse childhood experiences (ACEs) are traumatic events that occur during childhood (≤18yrs). Past studies have indicated an association between ACEs, pregnancy complications (PC), and poor birth outcomes (PBO). The ACE questionnaire assess 10 ACE categories.
Purpose: To determine whether a higher total ACE score on the ACE questionnaire, is associated with a higher incidence of PBOs or PCs and if a particular ACE category is associated a particular birth outcome or PC.
Methods: 57 pregnant women were enrolled in this prospective study from Froedtert Hospital resident OBGYN clinic from Feb 2020 - Jan 2021. ACE questionnaires were administered at enrollment, and outcomes were collected through chart review. Wilcoxon, Kruskal-Wallis and Fischer's exact tests were used for statistical analysis.
Results: N=57 completed the study. The mean age was 25.7 years; racial composition was 14.03% Caucasian, 68.42% African American, 5.26% Hispanic, and 12.28% Other. The sample reported an average of 2.66 ACEs, with 57.9% reporting ≥2ACES. Total ACE score ($p=0.0078$) and ACE category of neglect ($p=0.0014$) were significantly associated with depression.
Conclusion: Of the outcomes assessed, only depression was associated with the total ACE score and the ACE category of neglect. The sample population studied had a low overall incidence of pregnancy complications and poor birth outcomes.

## Silva, Jose | PODIUM | Urban & Community Health

***Social Determinants of Health Screening Follow up***

**Authors:** Silva J, Bauer L.
**Project Mentor:** Lauren M. Bauer, MD
**Mentor's Department:** Family and Community Medicine
**Community Partner**: Sixteenth Street Community Health Centers

Background: There has been a movement to integrate social determinants of health (SDoH) to provide us with a holistic view of the health of our community. Screening patients for social determinants of health provides a deeper understanding of our community's unmet social needs and enables us to connect patients to resources in the community.
Methods: We conducted phone interviews with patients screened through the SDoH screening program in federally qualified health centers in Milwaukee. The purpose of the interviews was to follow up with patients after their initial screening to see if they had connected with the resources that were mailed to them during the initial screening and if they had any barriers in connecting the resources (i.e., technology, language, transportation, etc.).
Results: 97 interviews were conducted; 61 connected with the resource, 26 people did not reach out, and 10 individuals never received the resource material. Of the 61 individuals that connected with the resource, 55 did not have an obstacle in connecting with the resource; 6 individuals said they encountered barriers, including (asking about legal status, the resource not answering, being referred to a third party, charging too much). In total, 54 out of the 61 individuals that connected with the resource did get the help they needed. The overall patient satisfaction was 7.8 out of 10 from 88 respondents.
Conclusion: Building stronger relationships with our community partners and addressing obstacles in access to resources can help address systemic barriers that play a role in our community's health.

## Simske, Natasha | PODIUM | Health Systems Management & Policy

***Anxiety is Linked to Higher Readmission Rates after Emergency General Surgery Hospitalizations***

**Authors:** Simske NS, Geier TJ, Schramm AT, deRoon-Cassini, TA.
**Project Mentor:** Terri A. deRoon-Cassini, PhD, MS
**Mentor's Department:** Surgery

Introduction: Readmission is a critical concern following Emergency General Surgery (EGS) hospitalizations. Although risk factors for readmission have been identified, patients' psychological status is often not assessed. This study evaluated the relationship between depression, anxiety, avoidant coping and subsequent unplanned readmission in an EGS population.
Methods: All EGS patients at a level 1 trauma center were prospectively screened for study eligibility. Enrolled patients completed the following questionnaires during their index hospitalization: the Center for Epidemiologic Studies Depression Scale - Revised (CESD-R), the Beck Anxiety Inventory (BAI), and the Brief COPE, which is reported as use of two coping styles: avoidant coping (e.g. denial, self-blame, venting) and approach coping (e.g. planning, positive reframing, acceptance) on a Likert scale of 1-4, based on frequency of use.
Results: Of the 99 patients recruited, 38.4% reported scores consistent with Major Depressive Disorder (MDD) and 17.2% had severe anxiety. Approach coping strategies (M: 2.87, SD=0.74) were utilized more frequently than avoidant coping (M=1.66, SD=0.53). Thirteen patients (13.1%) had a 90-day readmission. Readmitted patients had longer initial hospital lengths of stay (15 vs 6 days) and higher associated rates of severe anxiety (46% vs 13%), both $p<0.01$. Patients with severe anxiety had higher rates of MDD (82% vs. 29%) and utilized avoidant coping strategies more readily (2.04 vs. 1.58), both $p<0.001$.
Conclusion: Nearly half of patients with severe anxiety had an unplanned readmission within 90 days of initial hospitalization, and avoidant coping mechanisms may be instrumental in this relationship. Developing strategies to target and mitigate anxiety and unsustainable coping mechanisms could help reduce readmission-related morbidity associated with EGS hospitalizations.

## Singhal, Ishan — Clinical & Translational Research

***Documentation improvement in critical care anesthesia: maximizing Vizient quality metrics***

**Authors:** Singhal IC.
**Project Mentor:** Julie Kolinski, MD and Grant Sinson, MD
**Mentor's Department:** Surgery and Neurosurgery

Background: Vizient is a quality collaborative that measures the clinical performance of academic medical centers through quality metrics. In our organization, coders utilize documentation to assign ICD-10 codes that portray a patient's severity of illness. These codes play a large role in Vizient's quality metrics. This process is supported by Clinical Documentation Improvement (CDI) specialists, nurses who are trained to provide queries to providers to clarify documentation so that proper ICD-10 codes can be assigned. When documentation is unclear, we fail to achieve accurate Vizient quality metrics as reflected through metrics like observed to expected (O/E) mortality ratios and case mix index.
Method: We conducted an analysis of Vizient variables in twenty-two CVICU diagnostic related groups (DRGs) that are associated with high expected mortality. A retrospective chart review of query data identified which of these diagnoses were most consistently missed by providers. An intervention was conducted with CDI specialists and providers and a tip sheet was utilized to summarize high yield variables. Post-intervention metrics and query numbers were measured.
Results: Across our twenty-two DRGs, Vizient variables associated with the highest mortality include severe brain conditions, respiratory failure, shock, STEMI, and ECMO on admission day. Between July 2019 and May 2020, 92 queries were reported. The most common were shock, respiratory failure, diagnoses that were present on admission (POA), nutrition, and coagulation defects. The overlap guided our intervention. O/E mortality ratio for the department of critical care anesthesia decreased from 0.407 to 0.391. A decline in query numbers was observed as well.
Conclusion: Our project shows that targeted intervention can improve quality metrics for a department by more accurately portraying patients' severity of illness through documentation

## Skaletski, Claire — Quality Improvement and Patient Safety

***Perceived Value of Support from an Institutional Peer Support Program at an Adult Level 1 Trauma Hospital***

**Authors:** Skaletski C, Klatt T, Pilarski A.
**Project Mentor:** Alicia Pilarski, DO
**Mentor's Department:** Emergency Medicine

Introduction: Healthcare providers may develop second victim syndrome following medical errors or adverse patient outcomes. Second victims commonly experience guilt, anxiety, self-doubt, depression, and other negative emotions. Peer support is the preferred method of support for second victims and has been shown to alleviate these symptoms. Peer support programs in healthcare settings aid caregivers recovering from traumatic events, but little research exists regarding the perceived value of this formal support.
Hypothesis: Based on the preference for peer support demonstrated in previous research, we hypothesized that second victims would find value in receiving trained peer support, and this support would hasten their recovery.
Methods: A 3-point Likert survey was generated to assess perceived value and recovery time after using the SOS Peer Support Program. The survey also assessed barriers to using Peer Support. The survey was administered to physicians, residents, APPs, nurses, technicians, and other staff at Froedtert Hospital and/or MCW.
Results: Nearly 30% of 332 survey respondents reported experiencing at least one type of adverse patient event within the past year. 12.71% received support from the SOS program. Of those who used the program, 69.54% found trained peer support to be very valuable. 68.66% reported faster emotional recovery after using the SOS program. Frequently reported barriers to using the program included unfamiliarity with the program, lack of time, and uncertainty about the program's efficacy.
Conclusion: A majority of those who used the SOS Peer Support Program found it valuable and reported shorter durations of emotional symptoms following an adverse event.

## Smith, Rachel — Quality Improvement and Patient Safety

***The importance of asking about a history of sentinel injuries***

**Authors:** Petska HW, Smith RA, Liegl M, Simpson P, Sheets LK.
**Project Mentor:** Hillary Petska, MD
**Mentor's Department:** Pediatrics

Despite increasing awareness that injuries such as bruises are not expected in pre-cruising infants, most medical providers think and talk about sentinel injuries (SI) as a finding on physical exam and may not inquire about them during the medical history. We hypothesized that if a child protection team (CPT) consistently and sensitively asks about SI in medical evaluations of infants suspected of being physically abused, then the rates of SI will be higher than those detected solely on exam and those currently reported in the literature. A retrospective case-control study of infants <12 months of age with a caregiver present evaluated for physical abuse by the CPT was conducted. An SI screening tool was drafted and revised based on family and provider feedback, which included a script and templated language in the electronic medical record, to improve screening for the 3 most common SI: bruises, oral injuries, and subconjunctival hemorrhages. Results showed that the tool significantly improved screening for SI (4.3% v. 83.6%, p <0.001), and the rate of sentinel injuries in abused infants was higher than currently reported in the literature (37% v. 27.5%, p = 0.0174). SI were also more likely to be detected via history than exam (57.3% v. 42.7%). Consistent screening for SI has the potential to improve early detection and, if urgently and appropriately managed, may prevent escalation of abuse.

## Smurawa, Kia — Poster 40 — Health Systems Management & Policy

***Reducing the duration of high-flow anesthetic gas during induction minimizes carbon footprint***

**Authors:** Smurawa K, Ebert T, Muslu C.
**Project Mentor:** Thomas Ebert, MD
**Mentor's Department:** Anesthesiology

INTRODUCTION: During general anesthesia, unmetabolized anesthetic gas is released into the atmosphere where it contributes to the greenhouse effect and climate change. Although used on a smaller scale than carbon dioxide, anesthetic gases last longer in the atmosphere and are more potent than CO2. Anesthetic gas waste is increased when the flow rate of the carrier gas is high. Reducing the total time in which anesthetic gas is delivered at high flow will reduce gas waste. Reducing waste during induction would be especially impactful since anesthetic gas is often delivered at high flow rates.
METHODS: In the pre-intervention group, anesthesia providers were silently observed during induction to record the length of time from the onset of anesthetic gas use until the flow rate was reduced to ≤2 L/min. In the post-intervention group, anesthesia providers were informed of the study's goals and asked to reduce high-flow anesthetic gas during induction. They were also given a verbal reminder to lower the gas flow if needed.
RESULTS: The average duration of high flow gas decreased by 5 min 19.8 seconds after intervention. The total volume of sevoflurane used per case decreased from 7.40 mL to 3.41 mL after intervention. When converted to CO2 equivalents, the post-intervention group was estimated to save an average of 5,333 gallons of gas per day nationwide.
CONCLUSION: Reducing the total time anesthetic gas is delivered at high flow rates during induction leads to a large decrease in waste and can be accomplished through simple modifications.

## Sommers, Nicholas | Quality Improvement and Patient Safety

***Onset of the COVID-19 pandemic reduced active time in patients with implanted cardiac devices***

**Authors:** Sommers N, Berger M, Rubenstein JC, Roth J, Thompson C, Widlansky ME.
**Project Mentor:** Marcie Berger, MD
**Mentor's Department:** Medicine

Background:
Physical inactivity and sedentary behavior are modifiable risk factors for chronic disease and all-cause mortality that may have been negatively impacted by the COVID-19 shutdowns.
Methods:
Accelerometry data was retrospectively collected from 332 PPM and 244 ICD patients for 6 time points: March 15-May 15, 2020 (pandemic period), January 1-March 14, 2020, October 1-December 31, 2019, March 15-May 15, 2019, January 1-March 14, 2019, and October 1-December 31, 2018. Paired t-tests, with Bonferroni correction, were used to compare time periods.
Results:
Activity significantly decreased during the pandemic period compared to one year prior by an average of 0.53±1.18 hours/day ($P<0.001$) for PPM patients and 0.51±1.2 hours/day ($P<0.001$) for ICD patients. No significant change in activity was observed in the January-March or October-December time periods versus their respective time periods one year prior for PPM or ICD patients. Stratification of subjects by active time (<2 versus ≥2 hours/day) showed patients with <2 hours, particularly those with ICDs, more commonly had activity reductions with the pandemic onset. Univariable analyses of PPM patients, but not ICD patients, generally supported an association between a greater drop in active time at the onset of the pandemic and an increased risk of hospital or ED admission.
Conclusions:
The onset of the pandemic in the United States was associated with a significant drop in PPM and ICD patient active hours that was more pronounced in less active patients and cannot be explained by one year of aging or seasonal variation. If sustained, these populations may experience excess cardiovascular morbidity.

## Sonnen, Aly | Health Systems Management & Policy

***Opportunities for Improvement in Time to Antibiotic Administration for Pediatric Sepsis Patients***

**Authors:** Sonnen A, Thompson N.
**Project Mentor:** Nathan Thompson, MD, PharmD, MS
**Mentor's Department:** Pediatrics

Pediatric sepsis outcomes improve when antibiotics are administered within 60 minutes of initial sepsis recognition. Along with other sepsis-related objectives, Children's Wisconsin has been working to decrease time to antibiotic administration in these patients. As part of that work, this project aims to evaluate opportunities for continued improvement specifically in the Hematology, Oncology, and Transplant unit. Multiple areas for improvement were identified. Antibiotic administration took longer when ordered by the bone marrow transplant service (84 vs 71 mins), when a sepsis specific order set was not used (84 vs 48 mins), and when the antibiotic was ordered at night (91 vs 63 mins). When tracking antibiotic times, time from antibiotic leaving pharmacy to administration took much longer when the 60-minute goal was not met (101 vs 12 mins). In coming years, work should continue to focus on encouraging use of the sepsis specific order set. Antibiotic times were much less when the order set was used, but of 31 orders, only seven used the order set (23%). Future work should also work on evaluating why administration is slower when antibiotics are ordered at night and by the bone marrow transplant service. Finally, focus should be placed on ways to decrease antibiotic administration times at the bedside after the antibiotic has left pharmacy.

## Sookdeo, Madeleine — Quality Improvement and Patient Safety

***Assessment of a point-of-care ultrasound guideline in traumatic cardiac arrest.***

**Authors:** Sookdeo M, Carver T, Treat R, Brandolino A, Bergner C, Phelan MB.
**Project Mentor:** Mary Beth Phelan, MD
**Mentor's Department:** Emergency Medicine

Background: Determination of traumatic cardiac arrest (TCA) by the absence of palpable pulses has poor sensitivity and specificity. A growing body evidence demonstrates point-of-care ultrasound (POCUS) detects cardiac activity in some pulseless TCA patients. Establishing cardiac activity or reversible causes of TCA can identify a patient cohort who may survive TCA. Furthermore, POCUS data may inform whether to escalate or terminate resuscitative efforts. This study aims to identify differences in POCUS utilization after the implementation of a POCUS guideline.
Methods: A retrospective review evaluated pre- and post-guideline implementation interventions and outcomes for TCA patients. Statistical analysis was performed using chi-squared tests and T-tests or Wilcoxon rank-sum, as appropriate.
Results: One-hundred thirty TCA patients were identified (51% after implementation). Prior to guideline implementation, 22 out of 64 TCA patients underwent POCUS (34%) and images were saved in 59% of patients. Post implementation, 48 out of 66 TCA patients underwent POCUS (73%) and images were saved for 35% of these patients. No statistical differences in thoracotomy, disposition, or transfusions were identified. POCUS use (70/130) was associated with a significant increase in blood transfusions (43% vs 15% p = 0.001) but no difference in thoracotomies or ED disposition when compared to those without POCUS.
Conclusions: Implementing a TCA POCUS guideline resulted in increased POCUS use but a lower rate of component adherence. Outcomes such as survival rate, thoracotomy rate, and disposition to the operating room did not change following the guideline implementation, but the use of POCUS was associated with more blood transfusions. POCUS appears to impact medical decision making according to physician documentation, but the retrospective nature of this study limits our conclusions. This study identifies several areas for future evaluation.

## Sow, Mami — Global Health

***The Supported vs Unsupported Ross in Teenagers: the Fate of the Neoaortic Root and LV Function***

**Authors:** Sow M, Ginde S, Bartz P, Cohen S, Gerardin J, Kuhn E, Jaquiss R, Litwin SB, Woods RK, Tweddell JS, Hraska V, Mitchell M.
**Project Mentor:** Michael E. Mitchell, MD
**Mentor's Department:** Surgery

BACKGROUND The supported Ross (SR) is used to mitigate the neoaortic root dilation that has been described with the unsupported Ross (UR). There is limited literature assessing the efficacy of the SR in pediatrics. In this study, outcomes and the fate of the neoaortic root and left ventricle (LV) were compared between UR and SR patients in pediatrics.
METHODS A retrospective review was performed on all patients who underwent the Ross procedure between 1996 and 2019. Structured clinical data was collected and echocardiograms were reviewed. A sub-analysis was conducted on patients aged 10-18 years, that underwent the SR and UR surgery, without a Konno enlargement, to assess for echocardiographic changes.
RESULTS UR patients had significant changes in aortic annulus and aortic sinus diameter during the post-discharge phase, however, SR patients remained stable (p=0.004 and p=0.007 respectively). UR and SR patients experienced significant reduction in LVIDd during their in-patient stay (p<0.001 and p=0.003 respectively). This reduction was stable in SR patients but not in the UR patients (p=0.015), who experienced rebound dilation. Furthermore, UR patients had significant increases in their degree of aortic insufficiency (AI) (p=0.005) on follow up while SR patients were stable.
CONCLUSION Progressive dilation of the neoaortic root seen in UR patients is significantly mitigated with the SR; there is excellent stability in the degree of AI overtime. The SR is safe and effective and may play an increasing role in the management of children with aortic pathology.

## Stark, Katarina 'Kate' | Health Systems Management & Policy

***Demographics and clinical features impacting initial treatment decision making in vestibular schwannoma***

**Authors:** Harvey E, Stark KJ, Friedland DR, et al.
**Project Mentor:** David R Friedland, MD
**Mentor's Department:** Otolaryngology

Objective: To identify demographic and clinical features impacting decision making for vestibular schwannoma treatment.
Methods: Retrospective chart review of patients in a tertiary care academic medical center who were diagnosed with vestibular schwannoma between 2009 and 2019. Initial treatment decisions of 197 patients with vestibular schwannoma were analyzed with respect to socioeconomic factors, tumor size, hearing status, treating surgeon, and final treatment course. Multivariate logistic regression was used to develop a model for predicting treatment pathway.
Results: Among 197 patients, 93 (47%) were initially treated with observation, 60 (30%) with Gamma Knife and 44 (22%) with surgical resection. Age univariately had no statistically significant impact on initial pathway but those undergoing surgery trended toward a younger demographic (49.1y (sur) vs 57.2y (obs) vs 59.0y (GK)). Males were more likely to elect observation than females (p=0.04). Patients opting for observation were more likely to have a lower Koos classification (p<0.001) and better tumor-ear hearing (p=0.03). Only 34.4% of patients living outside the local geographic region elected observation compared with 53.0% living locally (p=0.055). Interestingly, surgeon correlated with initial treatment (p=0.03) but did not maintain significance when adjusting for hearing level or tumor size. A multiple linear regression model found age, maximum tumor diameter, and Koos class to predict initial treatment (p<0.0001, r2=0.42).
Conclusions: Treatment pathway decision making for vestibular schwannoma is impacted by demographic factors such as age, sex, and geographic proximity to the medical center. Clinical features including hearing level and tumor size also impacted treatment decision making

## Stevens-Haas, MBS, Claire | Clinician Educator

***Internal medicine resident reflections on early COVID-19 experience***

**Authors:** Stevens-Haas C, Fletcher K, Muntz M, Lyons A.
**Project Mentor:** Kathlyn Fletcher, MD
**Mentor's Department:** Medicine

INTRODUCTION: The impact of medical education on mental health has been well-documented, with some research indicating that signs of burnout are highest among resident physicians. Times of crisis can be significant stressors, and reflection during crisis has been used to nurture the development of personality traits which best prepare residents to react to and recover from stressful situations. Through analysis of reflective writing, this study aimed to identify salient character traits and emotions of internal medicine (IM) residents as they were experiencing the pandemic to help inform medical education curriculum and student support for future times of crisis.
METHODS: In April 2020, IM residents participated in a reflective writing exercise regarding their experiences with COVID-19. They were asked to write about their feelings as well as character traits they noticed in their communities. Reflections were submitted voluntarily via online survey. Grounded theory was used to analyze the essays. The study team read through the responses and created a coding scheme. Then, one team member coded each essay and created "chunks" for another member to code, and they subsequently discussed chunks for which they did not reach consensus. Finally, the team analyzed the most common themes to help better understand where residency programs could provide more support to their learners.
RESULTS: 50 essays were evaluated. We identified multiple areas of consensus among faculty members. Upon analysis, the most common themes were uncertainty, fear, concern for family and friends, hope, and unity/solidarity.
CONCLUSIONS: The findings suggest there are feelings associated with burnout and pride in colleagues common to multiple medical residents. One mentioned experiencing comfort after reading colleagues' writing, which tells us there are benefits to implementing reflective exercises into graduate medical education curriculum to strengthen relationships and provide personal support.

## Stippich, Lauren — Quality Improvement and Patient Safety

***ICU after RRT? A retrospective analysis of rapid response team interventions and 90-day mortality***

**Authors:** Stippich LR, Cisneros MI, Bergl PA.
**Project Mentor:** Paul Bergl, MD
**Mentor's Department:** Medicine

Rapid response teams (RRTs) provide expertise in situations of sudden, unanticipated patient decline and frequently facilitate the early delivery of critical care for high acuity patients. Although RRTs have been widely adopted into practice, some have questioned whether RRTs simply "shift" care to the ICU. We hypothesized that inpatients transferred to the ICU (compared to those who remained on the ward) after RRT activation would have received fewer on ward interventions. We then explored whether a shift in deaths might be reflected in in-hospital mortality and immediate-term mortality.
We conducted a retrospective cohort study of inpatient RRT events. Clinical records were reviewed in the EHR. Our primary outcome was receipt of RRT interventions with an exploratory outcome of in-hospital and 90-day mortality. Potential explanatory variables included demographic data, severity of illness scores, and disposition after RRT.
We analyzed 305 inpatients of whom 51% transferred to the ICU within 12 hours of RRT activation. Patients who went to the ICU were significantly more likely to have received medications (66% vs 54%, chi2 test $p<0.05$) and respiratory support (62% vs 41%, chi2 test $p<0.0001$) during RRT events than those who stayed on ward. Patients transferred to the ICU also had lower survival to discharge (76% vs 92%, chi2 test $p<0.001$) and 90-day survival was worse among these patients (51.2% vs 62.3%, chi2 test $p<0.05$). A difference appears to be related to higher acuity among this cohort.
We conclude that inpatients who have an RRT activation have high 90-day mortality, regardless of whether they receive ICU care after RRT events during index hospitalization. ICU admission after RRT does not appear to be associated with a significant reduction in 90-day mortality after accounting for severity of illness. More research is needed to determine if certain patient characteristics can be used to identify RRT patients who may not benefit from ICU admis

## Strong, Yukino — Poster 31 — Global Health

***Psycho-Oncology Provider Perspectives on the COVID-19 Pandemic and the Mental Health of Cancer Patients***

**Authors:** McAndrew NS, Knight JM, Morris KJ, et al.
**Project Mentor:** Jennifer M. Knight, MD, MS
**Mentor's Department:** Psychiatry and Behavioral Medicine
**Community Partner:** American Psychosocial Oncology Society

Purpose: There is limited information on how the COVID-19 pandemic has impacted those living with cancer and the delivery of their psychosocial care. The goals of this study were to understand: (1) psycho-oncology providers' observations of the psychological responses and coping of their patients living with cancer during the COVID-19 pandemic, and (2) psycho-oncology providers' own experiences delivering care during this time.
Method: A mixed method, survey study conducted with psychosocial providers who were members of the American Psychosocial Oncology Society (APOS). Survey respondents were invited to participate in a one-on-one audio-recorded interview via phone or secure ZoomÂ® with a member of the study team.
Results: There were 76 self-identified psycho-oncology providers who responded to the survey and 11 who participated in a one-on-one interview. Three themes emerging from qualitative analyses: (1) unique burden on patients, (2) cancer patients' pandemic response and its relationship to their cancer experience, and (3) unexpected positive changes. Two themes emerged from providers regarding their delivery of care during the pandemic: (1) new professional and personal challenges and (2) provider resiliency. Although providers observed that the pandemic placed new burdens on patients, they emphasized that the cancer experience may have prepared patients for the existential distress of the pandemic and described patients' resiliency. Psycho-oncology providers used innovative strategies to support patients, such as triaging patients in a different way and helping patients find more meaning and purpose in their lives. They also fostered their own mental health as providers through deep reflection and gratitude.
Conclusion: Further inquiry into the well-being of patients living with cancer, cancer survivors, and psycho-oncology providers is warranted given the observed variability in patients' coping responses to the worldwide pandemic.

## Sweeney, Daniel | Quality Improvement and Patient Safety

***Analyzing Delivery Outcomes in a Non-Tertiary Care Center for Women with Congenital Heart Disease***

**Authors:** Sweeney D, Buelow M.
**Project Mentor:** Matthew Buelow, MD
**Mentor's Department:** Medicine

Background: Due to advances in surgical and medical therapy, there are now more adults with congenital heart disease (ACHD) than children. Despite improved survival, many ACHD continue to live with residual cardiac disease, including pregnant women. Women with CHD have been shown to have an increased risk of maternal and neonatal complications throughout pregnancy and delivery, though published studies have only reported outcomes on patients delivering at a TRC. In contrast, pregnancy and delivery outcomes at a Non-TRC have not been reported. Our study aim was to assess these outcomes for women with CHD delivering at a Non-TRC.
Hypothesis: Utilizing published risk scores, pregnant ACHD can be appropriately risk stratified for delivery at TRC and non-TRC locations.
Methods: This retrospective chart review assessed pregnancies followed in the ACHD program at Children's Wisconsin from 2014-2021.
Results: There were 183 pregnancies in 152 women with complete delivery data. There were 98 births at TRC and 85 at non-TRC. The most common maternal diagnosis was tetralogy of Fallot. Patients delivering at the TRC had higher pre-pregnancy risk when assessed by the WHO ($p<0.05$), Zahara ($p<0.01$), and CARPREG-II score ($p<0.05$). Patients delivering at a TRC had higher anatomic complexity ($p=0.05$), but no difference in physiologic complexity ($p=0.13$) compared to those at non-TRC. There were slightly higher rates of maternal cardiac complications in TRC (7%) than non-TRC (3%), though this did not reach statistical significance ($p=0.3$). Fetal complications affected 21% pregnancies, without difference between locations ($p=0.14$).
Conclusion: There was not increased maternal or fetal complications when delivery occurred at non-TRC. This study suggests that pregnancy risk assessment may help identify women with CHD who are candidates for safe delivery at non-TRC. Due to high frequency of neonatal complications, resources should be assessed when delivery at non-TRC is consid

## Szpernal, Jacob | Quality Improvement and Patient Safety

***Characterizing current practices for human subject safety in studies involving pupil dilation***

**Authors:** Szpernal J, Carroll J, Spellecy R, Bachman Groth JA.
**Project Mentor:** Joseph Carroll, PhD
**Mentor's Department:** Ophthalmology and Visual Sciences

Standards in pupil dilation practices regarding the safety of human subjects are not present in vision research despite the potential for significant adverse effects. We developed two surveys to examine current practices around pupil dilation among vision researchers and individuals associated with oversight of human subjects research. While both groups note an absence of adverse events associated with pupil dilation, vision researcher practices differed with informed consent use
and measures taken to minimize complications. For Institutional Review Boards, general risk assumption associated with dilation was not unanimous and there was a lack of specific guidance available to researchers for minimizing risk. These results uncover the need for standardized practices regarding pupil dilation in human subjects research.

## Tallmadge, Maggie | Quality Improvement and Patient Safety

***Characteristics of patients that attend 7-10 days postpartum visit for blood pressure check***

**Authors:** Tallmadge M, Livergood MC, Tvina A, Evans S, McIntosh J, Palatnik A.
**Project Mentor:** Anna Palatnik, MD
**Mentor's Department:** Obstetrics and Gynecology

Objective: To assess maternal characteristics that predict attendance of postpartum blood pressure visit in patients with hypertensive disorders of pregnancy (HDP).
Study Design: A retrospective case-control study of patients with HDP delivering at a single academic institution (2014-2018).
Diagnosis of HDP included gestational hypertension, chronic hypertension, preeclampsia and superimposed preeclampsia. Univariable and multivariable analyses were used to determine maternal characteristics independently associated with attendance of 7-10 days postpartum blood pressure check.
Results: Of the 1,042 patients included in analysis, 603 (57.9%) attended the 7-10 days postpartum blood pressure check. Maternal sociodemographic, clinical and obstetric factors differed significantly between patients that attended the postpartum blood pressure visit and those that did not. In univariable analyses, nulliparity, non-Hispanic black race and ethnicity, public insurance, HDP with severe features, cesarean birth, gestational age at delivery, receipt of magnesium, mild range blood pressures on day of discharge and initiation of antihypertensive medication were associated with attendance. In multivariable analysis, factors significantly associated with higher odds of visit attendance were nulliparity (aOR 1.58; 95% CI 1.14-2.17), severe HDP (aOR 1.94, 95% CI 1.44-2.61) and cesarean birth (aOR 1.92, 95% CI 1.43 - 2.59). Factors associated with lower odds of attendance were non-Hispanic black race and ethnicity compared with non-Hispanic white (aOR 0.68, 95% CI 0.47 - 0.97), and public insurance (aOR 0.65, 95% CI 0.45 - 0.93) compared with private insurance.
Conclusion: Clinical factors such as nulliparity, severe HDP and cesarean birth were associated with higher rates of postpartum blood pressure check attendance, whereas sociodemographic factors such as maternal non-Hispanic black race and ethnicity and public insurance were associated with lower odds of attendance.

## Tiegs, Lyubov | Clinician Educator

***Quality of Death of Actively Treated Extremely Premature Infants***

**Authors:** Tiegs L, Rholl E, McDonnell S, Paradise J, Uhing M, Basir M.
**Project Mentor:** Mir Basir, MD MS
**Mentor's Department:** Pediatrics

BACKGROUND For extremely premature infants (EPI) at the edge of viability, there is equipoise regarding the benefit and harm of intensive care (IC) treatment at birth. However, there is limited data outlining the experiences of EPI who die with IC treatment. The experienced pain and quality of death are important considerations when parents make treatment choices for their children.
METHODS We designed a 1:1 case-control study and screened medical records of all inborn 22 to 25 weeks gestational age (GA) infants admitted to the NICU from 2014 to 2020. Cases included all infants who died with IC treatment. Each case was matched by GA and birth weight to an infant who survived (control). Data for cases was collected for the period of IC treatment, and data for controls was collected for the same timeframe as their matched case. Collected data included the number of needlesticks, invasive procedures, major surgeries, and the use of medications for pain. Positive NICU experiences, such as enteral feedings and being held by the family, were also evaluated.
RESULTS There were 20 cases matched to 20 controls. The median (range) length of IC for cases was 8(0-93) days. The mean (SD) number of invasive procedures was higher for the cases than the controls, 34 (30) vs. 24 (22), p=0.004. Additionally, cases underwent 8 major surgeries compared to 4 in the controls. Cases spent more NICU time than controls needing pain medications (64% vs. 27%, p< 0.001) and without being fed (54% vs. 39%, p< 0.001). Half of the cases were never held by parents until the day they died.
CONCLUSION Our results suggest EPI at the edge of viability who die despite IC face a higher treatment burden than those who survive. More studies evaluating the experience of EPI who die with IC are needed to ensure that parents and clinicians have the necessary information to make informed treatment choices.

## Tori, ScB, Katerina — Clinician Educator

***Short- and long-term complications of traumatic hyphema in pediatric and adult patients***

**Authors:** Tori K, Giangiacomo AL.
**Project Mentor:** Annette L. Giangiacomo, MD
**Mentor's Department:** Ophthalmology and Visual Sciences

Introduction: Traumatic hyphema is a common result of ocular trauma and occurs in 17-20/100,000 cases per year in the US. We investigate short- and long-term complications of traumatic hyphema in children and adults.
Methods: A descriptive retrospective chart review of patients with traumatic hyphema due to closed globe injury presenting or referred to our tertiary hospital between 01/2011 and 12/2020. Demographic information, ocular history, mechanism of injury, hyphema grade, visual acuity, intraocular pressure, post-traumatic glaucoma, ocular surgeries, and eye medications were recorded.
Results: We included 57 adult and 48 pediatric eyes. Thirteen adults (22.8%) and 6 children (12.5%) developed glaucoma. Nine adults (15.8%) and 6 children (12.5%) were glaucoma suspects. Among adults, 25 (43.9%) required surgery and medications, and 32 (56.1%) required medications only. Among children, 10 (20.8) required surgery and medications, 37 (77.1%) required medications only, and 1 (2.1%) required no treatment. Test of variance in adults demonstrated statistical significance between visual acuity worse than 2/200 at presentation (P = 0.043) and intraocular pressure at presentation (P = 0.035) with glaucoma. In pediatric eyes identified African-American race (P = 0.028) was a statistically significant predictor for development of glaucoma.
Conclusions: There is a high risk of developing glaucoma or glaucoma suspect after traumatic hyphema in adults and children. These high incidences suggest regular follow-up for patients after traumatic hyphema is indicated.

## Tostrud, Lauren — Global Health

***A scoping review of the intergenerational effects of the Tutsi Genocide in Rwanda***

**Authors:** Tostrud L, Racicot H, Twizerimana O, Cassidy L.
**Project Mentor:** Laura Cassidy, MS, PhD
**Mentor's Department:** Institute for Health and Equity
**Community Partners:** Kigali Genocide Memorial and Aegis Trust, Kigali, Rwanda

Objective
The 1994 genocide against the Tutsi population in Rwanda resulted in almost one million deaths and mass destruction. The population of Rwanda continues to be affected by various trauma-related illnesses. The effects of the genocide continue to manifest psychologically in various manners. The goal of this study was to evaluate the current literature regarding the mental health status and intergenerational effects of the genocide on children in Rwanda.
Methods
A search of three electronic databases, PubMed, PsychINFO, and CINAHL was conducted. A total of 385 articles were reviewed and screened, with 19 studies meeting inclusion criteria. For these 19 studies, research methodology, sample characteristics, and significant findings were reviewed and analyzed.
Results
Seven studies used quantitative methods to assess the effects of intergenerational trauma on Rwandan children, and twelve studies used qualitative methods. Among the quantitative studies, the majority assessed post-traumatic stress disorder and post-traumatic stress symptoms. The twelve qualitative studies assessed a wider array of topics and themes including the implications of the genocide on mental health of children, mechanisms of trauma transmission, and perspectives of trauma and experience from different family members. A large majority of the articles focused specifically on children born of genocidal rape.
Conclusions
The genocide continues to affect multiple generations in Rwanda. The mechanisms of trauma and its effects are largely related to the individual's experiences during and after the genocide. Thematically, the literature focused heavily on children born of genocidal rape, their experiences, and their relationships within family and society.

## Trinh, Dylan — Quality Improvement and Patient Safety

***Use of Teledermatology in Resource-Limited Settings within Wisconsin***

**Authors:** Trinh DL, Humphrey SR, Akinshemoyin Vaughn OL, Wanat KA.
**Project Mentor:** Karolyn A. Wanat, MD; Stephen R. Humphrey, MD
**Mentor's Department:** Dermatology
**Community Partners:** Vivent Health and Sixteenth Street Community Health Centers

BACKGROUND: Access to dermatological services is an important issue within underserved communities in Wisconsin. Despite the prevalence and dangers of skin diseases, patients do not often receive skin evaluations by trained dermatologists. Through the establishment of a local teledermatology network with store and forward (SAF) services, we aim to improve access to care within the communities of Wisconsin.
METHODS: AAD's teledermatology program, a free SAF service software program offered by the American Academy of Dermatology was implemented to federally qualified health clinics (FQHCs) interested in participating in the program as an additional means for dermatologic care. Primary care clinicians (PCCs) and patients were surveyed at baseline regarding comfort with teledermatology and dermatology, and a comparison after implementation will be performed.
RESULTS: 21 providers completed a pre-survey about teledermatology. 60% strongly agree that teledermatology increases access to dermatologic care. Conversely, 52% strongly disagree or disagree that they have easy access to dermatologists for their patient's dermatological needs. 76% felt slightly uncomfortable to slightly comfortable for treating skin diseases. Over the past year, 80 consultations were sent for a total of 77 patients at 2 sites. Many of these consultations, 60%, were for an initial diagnosis. 64% of consultations were for rashes and 36% were for lesions.
CONCLUSION: The data suggests that teledermatology increases access to care and supports PCCS in their assessment and management of patients. The teledermatology program was successfully implemented into FQHCs in Wisconsin with anecdotal positive feedback and continued use of the platform by PCCs. Due to the longitudinal nature of our study, we are unable to gather information concerning attitudes about teledermatology after participating in the program.

## Tuman, Annie — Urban & Community Health

***Healthcare system support for caregivers of elderly adults through the lens of the medical community***

**Authors:** Tuman AL.
**Project Mentor:** Leslie Ruffalo, PhD
**Mentor's Department:** Family and Community Medicine
**Community Partner:** Eras Senior Network

BACKGROUND: In the U.S. there are millions of unpaid, family caregivers who help elderly adults navigate care across multiple medical specialties. These caregivers report regularly being listened to by medical providers but less commonly asked if they need help, despite experiencing significant psychosocial stress from caregiving. This project aims to explore medical professional perspectives on their role as providers to support family caregivers in navigating multi-specialty care and identify opportunities to improve that support.
METHODS: We used purposeful sampling to identify medical professionals to participate in a one-time interview. Participants were asked a series of semi-structured questions regarding their experience in caregiver and elderly patient support and completed a demographic survey. Interviews were transcribed and qualitatively analyzed in Dedoose. Themes were generated using open coding techniques and grounded theory.
RESULTS: 12 medical professionals were interviewed: 50% primary care, 25% geriatric care, and 25% specialists who routinely care for elderly adults. Four themes emerged as significant factors for caregiver support. These included: 1) Caregiverâ€"Patient Dynamic, 2) Caregiverâ€"Provider Dynamic, 3) Multi-Specialty Dynamics, and 4) Healthcare Gaps & Changes.
CONCLUSION: Caregiver support was widely understood to be a primary care and social worker responsibility. While all participants identified resource connection as a caregiver support strategy, longitudinal care providers were more likely to empathize with and address caregiver stress during patient visits. The ability of providers to support caregivers was inhibited by time constraints, inter- and intra-specialty communication, billing, and insurance coverage limitations. Medical professionals unanimously agreed that systematic changes are needed to improve caregiver support, but the exact nature of those systematic changes was variable.

## Van Boxtel, Matthew — Clinical & Translational Research

***Shoulder arthroplasty in patients 50 years of age and younger compared to patients 65 to 75 years of age.***

**Authors:** Van Boxtel M, Moore S, Best C, Grindel S.
**Project Mentor:** Steven Grindel, MD
**Mentor's Department:** Orthopaedic Surgery

Background: The surgical outcomes of young patients undergoing shoulder arthroplasty are relatively unstudied compared to the older population. The aim of this study was to evaluate the mid-term outcomes of shoulder arthroplasty in patients aged 18-50 and compare them to outcomes of patients aged 65 to 75.
Methods: We performed a retrospective review of shoulder arthroplasty patients aged 18-50 that had minimum 2 years follow-up and compared them to patients 65-75 years who received surgery during the same period. Data collected included range of motion, complications, and several patient-reported outcome measures. The two groups were directly compared at both the preoperative time point and final follow up.
Results: The indications differed between the two groups with the young cohort being more likely to undergo surgery for avascular necrosis and the older cohort for osteoarthritis. Active shoulder range of motion increased significantly in both groups for all measures. All patients had a significant improvement in pain and shoulder function as measured by the VAS, ASES, DASH, and Simple Shoulder scores. Final post-operative range of motion was similar between groups in all measures except for external rotation with the arm abducted at 90 degrees, which was significantly higher in the older cohort. The older cohort also had significantly lower pain scores and better self-reported shoulder function as measured by ASES, DASH, and the Simple Shoulder score.
Conclusion: Both cohorts of patients showed significant improvement in functional and subjective outcome measures after 2-year follow-up. The younger cohort had similar outcomes with respect to shoulder range of motion but were less satisfied with their function and had higher pain scores. Our conclusion is that shoulder arthroplasty is valuable in the treatment of young patients in the mid-term, but that patients may be more dissatisfied and receive less pain relief than an older cohort.

## Van Ness, Raymond — Poster 68 — Urban & Community Health

***Exploring Caregiver and Patient Support During the Inpatient Discharge Process***

**Authors:** Van Ness R, Kuster K, Gale K, Wenzlaff M, Kavanaugh M, Ruffalo L.
**Project Mentor:** Leslie Ruffalo, PhD, MS
**Mentor's Department:** Family and Community Medicine

Background: Patient caregivers are not always taken into consideration during the discharge process, moreover, the discharge process is not consistent throughout hospital systems. The lack of direction of the discharge may lead to readmissions to hospitals and lessening the ability to carry out effective care transitions. We aim to understand how caregivers are identified, assessed, and trained during the discharge process to inform the future development of a discharge planning process that could reduce readmission rates, decrease unneeded stress on patients and caregivers and provide better patient care to patients.
Methods: We recruited and screened unpaid caregivers of recently discharged patients. Eligible caregivers were then interviewed relating to their role as a caregiver and understanding of the discharge process for the inpatient. This interview data of past patient caregivers was then analyzed using open coding strategies and principles of grounded theory.
Results: We conducted 20 interviews with unpaid caregivers on their thoughts on how to best improve the discharge process regarding setting up caregivers for success. Common issues we identified between caregivers regarding the discharge process was little to no information on diagnoses and conclusions, inadequate communication between the caregiver and the healthcare team and poor timing of the discharge.
Conclusion: By understanding the current state of the discharge process and its shortcomings, we can begin to draft a standardized discharge process that provides solutions to the common challenges that caregivers experience and improve post-discharge patient care and outcomes.

## Van Schaick, Mary | Poster 69 | Urban & Community Health

***Yield of Follow-Up Skeletal Surveys in Children Evaluated for Physical Abuse***

**Authors:** Van Schaick MR, Petska H.
**Project Mentor:** Hillary Petska, MD, MPH
**Mentor's Department:** Pediatrics

Introduction: In the US, child protective service agencies receive approximately 4 million reports of child maltreatment annually, 17% of which are due to concerns of physical abuse. Young children are at highest risk, with almost 50% of child maltreatment involving children younger than 5 years of age. In children under the age of 2 and select children between the ages of 2-5 with suspected abuse, the AAP recommends using radiographic skeletal surveys to assess for occult injuries and fractures. Follow-up skeletal surveys after a period of 2-3 weeks are also recommended to identify fractures not initially visible. The yield of skeletal surveys is approximately 11% for initial and 25% on follow-up. However, there is significant variability between institutions in performance of follow-up skeletal surveys, with two separate studies demonstrating an adherence rate of 10-38%. The Children's Wisconsin's child protection team has a compliance rate near 100%, allowing a more accurate estimate of the yield of follow- up skeletal surveys in identifying occult fractures.
Hypothesis: If young children with an initial skeletal survey due to concerns of physical abuse consistently undergo a follow-up skeletal survey, there will be a significant percentage of children with additional findings.
Specific Aims: The aim of this study is to determine the yield of secondary skeletal surveys in identifying additional fractures in young children with concern for abuse and comparing this to existing literature.
Study Methods: Retrospective chart review of children with an initial skeletal survey performed at Children's Wisconsin for suspected physical abuse between January 2004 and December 2012.
Results: For the data that was collected and analyzed from 2004-2012, the adherence rate for follow-up skeletal surveys was 87.1%. The rate of additional findings on follow-up skeletal surveys was 12.2%.
Next Steps: Complete data entry and analysis for the patients from 2012 to present.

## Villarreal, Emily | Poster 11 | Clinician Educator

***A descriptive analysis of enteral feeding practices in prone patients with and without COVID-19.***

**Authors:** Villarreal E, Lwin P, Kozeniecki M, Patel J.
**Project Mentor:** Jayshil Patel, MD
**Mentor's Department:** Medicine

BACKGROUND Critically ill patients with acute respiratory distress syndrome (ARDS) undergo prone positioning (PP). Due to concerns related to aspiration in PP, the optimal timing and dose of enteral nutrition (EN) in PP are unknown. The purpose of this study was to describe nutrition practices in patients with COVID-19 and non-COVID-19-related ARDS who underwent PP.
METHODS We conducted a single-center retrospective cohort study of consecutive mechanically ventilated adults admitted to the medical intensive care unit who underwent PP for ARDS from March 2015 to July 2020. We collected demographic, clinical, biochemical, safety, and clinical outcome data. A descriptive analysis and comparison of pre-and post-pandemic EN feeding practices were performed.
RESULTS Fifty-five patients, 33 COVID-19 and 22 non-COVID-19 patients, received EN and underwent PP within the first 7 days of ICU admission. COVID-19 and non-COVID-19 patients had similar time to EN initiation (34.2±27hours vs 33.2±23.9,p=0.89). COVID-19 patients, compared to non-COVID-19, received a greater duration of EN during PP (52.2±32.7hours vs23.7±18.3, $p<0.001$) and a higher maximum EN infusion rate (32.7±21.6 mL/hour vs12.7±4.8, $p<0.0001$). Both groups had similar duration of vasopressor use, maxi norepinephrine dose, and EN intolerance rate.
DISCUSSION Critically ill patients who underwent PP during the COVID-19 pandemic received a longer duration and higher EN infusion rate, as compared to non-COVID-19-related ARDS patients. The pandemic offered an opportunity to challenge existing EN paradigms with optimization of EN duration and doses without complications in ARDS patients undergoing PP.
CONCLUSION COVID-19 patients with ARDS who underwent PP had a longer duration and higher dose of EN, compared to non-COVID-19, and without a higher rate of complications of EN intolerance. Future studies should address the efficacy of EN optimization in ARDS patients undergoing PP.

## Visser, Anna — Health Systems Management & Policy

***Residential proximity to tree canopy and preterm birth in Black women***

**Authors:** Tvina A, Visser A, Walker SL , Tsaih S , Zhou Y, Beyer K, Palatnik A.
**Project Mentor:** Anna Palatnik, MD
**Mentor's Department:** Obstetrics and Gynecology

Background: There are marked racial disparities in obstetrical outcomes, with the incidence of preterm birth being the highest among non-Hispanic Black women. The presence of green space, such as forests and parks, is now widely viewed as a health-promoting characteristic of residential environments.
Study design: This was a retrospective, case-control study utilizing hospital pregnancy records of self-identified non-Hispanic Black women. The addresses of the women, who delivered from 2011 to 2019, were geocoded to characterize the percentage of tree canopy surrounding the prenatal address using the National Land Cover Database. Circular residential buffers of 100, 150, 250, and 500 m were used to assess the exposure to tree canopy coverage in proximity to a prenatal address. Univariable and multivariable analyses were conducted to determine whether tree canopy percentage at 4 different proximity buffers, examined both in means and quartiles, was associated with preterm birth (birth at <37 weeks' gestation).
Results: Of 2771 non-Hispanic Black women included in the study, 333 (12.0%) experienced preterm births. Less tree canopy coverage was significantly ($P < .05$) associated with preterm birth, irrespective of whether the coverage was quantified as a mean or by quartile. In the unadjusted and adjusted models, which adjusted for sociodemographic and clinical risk factors for preterm birth, a 10% increase in tree canopy coverage was associated with lower odds of preterm birth at all 4 buffers examined. When examining the green space by quartile, higher quartiles were associated with lower odds of preterm birth at the 100-, 150-, and 250 m buffers, but not at the 500 m buffer.
Conclusion: A higher percentage of tree canopy coverage in close proximity to the prenatal residential address is associated with lower odds of preterm birth among non-Hispanic Black women, suggesting that access to neighborhood green space is an important factor associated with preterm birth.

## Visser, Nicholas — Bioethics & Medical Humanities

***Longitudinal CVR changes during recovery from sports related concussion.***

**Authors:** Visser NJ, Cohen A, Wang Y.
**Project Mentor:** Yang Wang, MD PhD
**Mentor's Department:** Radiology

Mild Traumatic Brain Injury (mTBI) has been of clinical interest for decades, but few preventions or treatments have been developed. Prevalence of contact sports in the adolescent population makes sport related concussion (SRC) a highly intriguing subset of mTBI. Among the most important aspects of maintaining brain function is matching cerebral blood flow (CBF) to metabolic need, and alterations thereof have become broadly suspected as an element of mTBI pathology. In specific, there is a growing body of evidence that the ability of the brain to alter CBF in response to vasoactive stimuli - known as cerebrovascular reactivity (CVR) - may be a focal point of concussion pathophysiology. Recent investigation has found changes in CVR in the early phase of concussion recovery (<7 days), and this work sought to further examine this relationship longitudinally.
A total of 23 control and 29 concussed collegiate contact-sport athletes were recruited and clinically assessed at baseline. Subjects were subsequently assessed at 6 hours, 48 hours, 8 days, 15 days, 45 days, and 6 months, including SCAT3 and SAC measurements. At 15 days, 45 days, and 6 months, BOLD fMRI scans were performed using a breath-hold paradigm. Mean BOLD responses were compared between and within subject groups. Comparison results were probed for regional differences via post-hoc analysis.
Compared to controls, concussed subjects showed a significant decrease in CVR up to the 45-day time point, followed by a rebound back to 15-day CVR levels at 6 months. Acute clinical measures showed some mild associations with longitudinal CVR changes during recovery after SRC.
Observed patterns in CVR change support the theory that CVR naturally increases after head trauma as a protective mechanism against microhemorrhage and decreases to normal levels over time. This protective measure appears to be either disrupted or prolonged in patients with head trauma severe enough to be clinically diagnosed as SRC.

## Voruganti, BS, Nihal

**Clinical & Translational Research**

***Single center experience with vascular reconstruction for soft tissue sarcoma resection***

**Authors:** Voruganti NR, Olowofela A, Daghfal M, Rossi PJ, Wooldridge AN, Mansukhani NA.
**Project Mentor:** Neel Mansukhani, MD
**Mentor's Department:** Surgery

Objectives: The purpose of this study is to evaluate the outcomes associated with resection of soft tissue sarcoma of the extremities (STSE) with or without vascular reconstructive surgery (VRS) and explore the utility of prosthetic conduit for VRS.
Methods: Adult patients who underwent resection of STSE with or without VRS at our institution between 1990 and 2019 were included. Patients were divided into three groups: no vascular involvement (I), vascular involvement without (II), and vascular involvement with VRS (III). Within the VRS patient group, data was collected for autogenous and prosthetic conduit. The primary outcome was patient survival after five years.
Results: Group I, II, and III patient survival rates at 5 years of 88%, 58%, and 45% with a p=0.02. Group I, II, and III had amputation rates of 0%, 7%, and 20% with a p=0.033. Graft patency at 5 years for autogenous conduit was 0% and 11% for prosthetic conduit with p=1. Patient survival at 5 years for autogenous conduit was 50% and 31% for prosthetic conduit with p=1.
Conclusions: STSE resection requiring VRS had higher amputation rates and lower survival rates over a five year period as compared to the other two groups. Prosthetic conduit is a viable alternative to autogenous conduit for vascular reconstructive surgery.

## Werthman, Alec

**Clinical & Translational Research**

***RhoBTB1 CRISPR Knockout Tissue Specificity and Resulting Vascular Structural Change***

**Authors:** Werthman A, Fang S, Ko-Ting L, Silva S, Reho J.
**Project Mentor:** Curt Sigmund, PhD
**Mentor's Department:** Physiology

Introduction: Hypertension is a common disease with a wide range of therapies, yet there remains a sizable portion of patients that do not respond to current treatments. RhoBTB1 is a gene target of transcription factors involved in the regulation of phosphodiesterase 5, an enzyme involved in vasoconstriction. Investigation of RhoBTB1 expression could lead to novel therapies for patients with refractory hypertension.
Objective: Our experiments sought to validate the tissue specificity of inducible RhoBTB1 transgene knockout in our mouse model for further experimentation. Additionally, tissue samples with induced RhoBTB1 knockout were assessed for the degree of vascular change in aortic tissue. We hypothesized that RhoBTB1 knockout would be isolated to aortic tissue and would cause significant change in vascular structure.
Methods: Genomic analysis of liver, skeletal muscle, heart, and aortic tissue from our mouse model was performed using PCR and electrophoresis. Results were confirmed with RNA extraction and reverse transcription to cDNA. Analysis showed expression of RhoBTB1 decreased only in aortic tissue samples. Sections of aortic tissue were then embedded in paraffin and stained for colorimetric quantification. Image analysis of aortic sections showed RhoBTB1 knockout increased vascular structural remodeling.
Results: These results prove the RhoBTB1 transgene mouse model's reliability for further investigation. This will allow us to explore a previously unknown factor contributing to treatment-resistant hypertension that could lead to unique approaches to this disease.

## Whitaker, Allison — Bioethics & Medical Humanities

***Relationship Between Travel Distance and Gestational Age Upon Presentation for Abortion at PPWI***

**Authors:** Whitaker AR, Linton AE, Dielentheis KA.
**Project Mentor:** Kathryn Dielentheis, MD
**Mentor's Department:** Obstetrics and Gynecology
**Community Partner:** Planned Parenthood of Wisconsin

Objectives
This study evaluated the relationship between distance traveled for abortion care in the state of Wisconsin and gestational age at which an abortion was performed. We hypothesized that patients traveling longer distances for care presented at a later gestational age.
Methods
In this retrospective cohort study, we gathered demographic data including gestational age and zip code for all patients who presented to Planned Parenthood of Wisconsin and obtained abortions between January 2018 and December 2020. Logistic regression was performed to evaluate for a relationship between travel distance and gestational age upon presentation.
Results
We demonstrated that with each additional week of gestational age, patients are significantly more likely to have traveled a longer distance to obtain an abortion ($p<0.05$). Patients 19 weeks or greater in gestational age were nearly twice as likely to have traveled greater than 120 miles to obtain an abortion in comparison to patients presenting at 8 weeks or less.
Discussion
As restrictions to abortion increase and abortion care becomes more scarce, patients must travel further distances to obtain abortion care. As they travel further, they are more likely to present a higher gestational age which is associated with increased morbidity.

## Whorton, Allison — Poster 70 — Urban & Community Health

***Effect of physical activity during pregnancy on placental analytes***

**Authors:** Whorton AE, Pan AY, Palatnik A.
**Project Mentor:** Anna Palatnik, MD
**Mentor's Department:** Obstetrics and Gynecology

Objective: To examine whether physical activity (PA) during first and second trimester supports pro-angiogenic profile of placental analytes.
Methods: Secondary analysis of the nuMoM2b study (Nulliparous Pregnancy Outcomes Study: Monitoring Mothers-to-Be), a prospective observational cohort study of 10,038 nulliparous pregnant patients who were followed from the beginning of their pregnancies through delivery at eight academic health care centers in the United States. Frequency, duration, and intensity (metabolic equivalents) of up to three leisure activities was reported in the first and second trimesters and was analyzed in dichotomous way, with participants either meeting or not meeting the ACOG-recommended exercise of 150 minutes per week. Placental analytes were measured at two time points: first trimester visit at 6-13 weeks, and second trimester visit at 16-21 weeks. Levels of the following placental analytes were analyzed stratified by PA level: Placental growth factor (PLGF), Endoglin, and Soluble fms-like tyrosine kinase-1 (sFlt1). Bivariate and multivariate analyses were conducted to examine the independent association between placental analytes and PA.
Results: Information on PA was available for 8,126 participants. Of these, 1,956 participants had biospecimen collection for placental analytes. In bivariate analysis, levels of placental analytes in the first and second trimester did not differ much except the levels of endoglin were lower in patients with <150min of PA per week in the first trimester. After controlling for maternal demographic and clinical factors, sFlt1 levels in the second trimester were significantly lower in participants that reported to have ≥ 150 mins physical activity per week.
Conclusion: Physical activity of ≥ 150 minutes per week during the second trimester was associated with lower levels of sFlt1.

## Wittmann, David | Clinical & Translational Research

***Quantification and Dosimetric Impact of Normal Organ Motion during Adaptive Radiation Therapy Planning***

**Authors:** Wittmann DT, Paulson E, Eastwood D, Banerjee A, Banla I, Schultz C, Awan M, Chen X, Omari E, Straza M, Li XA, Erickson B, Hall WA.
**Project Mentor:** William A. Hall, MD
**Mentor's Department:** Radiation Oncology

PURPOSE Patients receiving adaptive radiation therapy (RT) undergo contour and plan modification prior to treatment delivery. This process takes 15 to 60 minutes to complete. We hypothesize that during the time required to create an adapted RT plan, normal organ movement will result in unanticipated dosimetric outcomes. This study quantifies the dosimetric impact of abdominal organ motion during the time required to perform adaptive MR-guided RT (MRgRT).
METHODS Patients receiving MRgRT using a 1.5 Tesla MRLinac were prospectively enrolled. Two sets of MRIs were acquired: the first was a daily MRI at the start of treatment to contour tumor and organs; the second "verification" MRI was acquired after recontouring and adaption, but immediately before beam-on. Normal organs were retrospectively re-contoured on the verification MRI. Differences between organ position represented normal organ movement during the time required for plan adaptation. Maximum dose (Dmax), volumetric (V) 0.5 cubic centimeter dose (D0.5cc), 3000cGy (V30), and 2000cGy (V20) were calculated. Mixed model tests analyzing differences between the MRI sets were performed using SAS9.4.
RESULTS Thirty-one patients were included. Treated tumor types included pancreatic & prostatic adenocarcinoma, hepatocellular carcinoma, and various metastases. Recontoured normal organs included colon, duodenum, small bowel, and stomach. Differences in Dmax for the normal organs were as follows: colon 239.50cGy (p=0.0957), duodenum 136.40cGy (p=0.0519), small bowel 488.27cGy (p=0.0008), stomach 95.92 (p=0.1745). Notably, small bowel demonstrated statistically significant differences in Dmax, D0.5cc, and V30.
CONCLUSIONS Statistically significant and clinically meaningful differences in small bowel doses are demonstrated following organ motion during the timing required for MRgRT. These results reflect the necessity of a verification MRI following daily plan adaption to confirm the location of highly mobile structures.

## Woods, Bison | Poster 41 | Health Systems Management & Policy

***Impact of sport type on frequency and severity of adolescent distal radius fracture***

**Authors:** Woods B, Hanley J, Nielsen A.
**Project Mentor:** Jessica Hanley, MD
**Mentor's Department:** Orthopaedic Surgery

OBJECTIVE To examine whether team vs individual sports and "feet on ground" (F-ON) vs "feet off ground" (F-OFF) sports influence the frequency or severity of adolescent distal radius fractures (DRFs).
DESIGN Retrospective Chart Review
SETTING Level one pediatric trauma center.
PARTICIPANTS Four-hundred-fifteen individuals among the age group of 12-18 years who sustained a sports-related DRF from the period of 2015-2019. Excluded fractures proximal to the radial metaphysis.
ASSESSMENT OF INDEPENDENT VARIABLES Individual sports, team vs individual sports, and F-ON vs F-OFF sports.
MAIN OUTCOME MEASURES Number of DRFs and management of injury.
RESULTS Football, soccer, basketball, and biking were the most common mechanism of injury. Sports with the highest number of operative injuries included basketball, soccer, biking, snowboarding, and football. Team sports (52.9%) and F-ON sports (57.1%) demonstrated higher frequencies of injury. Management of the DRF was used as a measure of severity and this did not differ between individual vs team sports or F-ON vs F-OFF sports.
CONCLUSIONS Team sports and F-ON sports may demonstrate higher frequencies of DRFs, however further investigation assessing incidence is required to confirm these results. Preliminary findings suggest players who participate in sports where more time is spent with "feet off the ground", such as those requiring wheels or boards, may not sustain more severe DRFs.

## Wrucke, Benjamin — Urban & Community Health

***Factors Associated with Tobacco use in Homeless Adults***

**Authors:** Wrucke B, Bauer L, Bernstein R.
**Project Mentor:** Rebecca Bernstein, MD, MS
**Mentor's Department:** Family and Community Medicine
**Community Partner:** Guest House of Milwaukee

BACKGROUND Those who are homeless are four times more likely to smoke cigarettes than the general US population (Fazel et al. 2014). Though some research has investigated smoking risk factors among homeless individuals (Baggett & Rigotti 2010), more investigation is needed to understand factors that can be addressed by smoking cessation programs. Students at the Medical College of Wisconsin have been conducting tobacco cessation educational sessions at the Guest House of Milwaukee, a local homeless shelter and service agency, and this study seeks to understand characteristics, perceptions, and attitudes associated with tobacco use in this population
OBJECTIVES The objective of this study is to investigate factors associated with tobacco use in homeless adults.
METHODS This study conducted cross-sectional analysis of the agency's counseling clinic data bank. Clients of the counseling clinic completed assessments via counselor interview. Data was collected from 2014 to 2019. Logistic regression was then performed to determine predictors of smoking status.
RESULTS Results show that the odds of being a smoker was higher for both those with a low level of education and those with prior substance abuse treatment.
CONCLUSIONS Smoking cessation programs could benefit from tailoring information to the education level of their audience and highlighting how smoking cessation could improve ability to quit other substances (Weinberger et al. 2017).

## Yee, Megan — Global Health

***Assessing the feasibility and acceptability of a teledermatology platform in Bagamoyo, Tanzania.***

**Authors:** Yee MD, Mcharo J, Mmbaga G, Juma O, Wanat KA.
**Project Mentor:** Karolyn A. Wanat, MD
**Mentor's Department:** Dermatology
**Community Partner:** Bagamoyo District Hospital

Introduction. Tanzania exhibits a shortage in healthcare workers and dermatologists are underrepresented to meet the needs of the population, especially in Bagamoyo. In 2018, a pilot study was initiated that determined dermatologic care need, assessed project sustainability, and identified physician collaborators. Specific aims for this study is to 1) evaluate the feasibility of a secure TD platform in providing dermatologic consult services in Bagamoyo District Hospital (BDH) and 2) assess BDH healthcare provider and patient acceptability and comfortability with teledermatology (TD) platform implementation.
Methods. Surveys were given to BDH health care providers and patients who used the TD platform. Written informed consent was obtained. REDCap was used to analyze common descriptive statistics.
Results. A total of 117 preliminary surveys were collected: 5 provider and 112 patient surveys. Of the providers, none had prior TD training, most (n=3) felt somewhat comfortable diagnosing and treating skin conditions using TD, a majority (n=4) believed TD could help address the dermatologist shortage in Bagamoyo, and all thought that the TD platform will be easy to incorporate into clinic. From the patient survey, cost (83.9%) was the top barrier in regard to access to dermatologic care, with travel time (66.1%) being the second highest ranked barrier. The most important factor in receiving care was time to diagnosis (91.1%). Prior to explanation, none of the patients heard of TD before, but all felt comfortable with it and believed that they would receive the same quality of care as a face-to-face interaction. Patient concerns include privacy, quality of care, and time to receive diagnosis/treatment. Patients were comfortable with TD photographs of most of the body except for genitals (29.5%).
Conclusion. These preliminary results show that TD is accepted by both providers and patients. Surveys also show the feasibility of TD as a method of healthcare delivery.

## Yuan, Y. William — Molecular & Cellular Research

***Prosthetic aortic valve fabrication using an origami-inspired folding approach***

**Authors:** Yuan YW, Tefft BJ.
**Project Mentor:** Brandon Tefft, PhD
**Mentor's Department:** Biomedical Engineering

PURPOSE: In the United States, 20,000 aortic valves are replaced per year, using either a metallic mechanical valve or a xenograft from a bovine or porcine donor. Each valve type has its limitations. Mechanical valves last for 20-30 years, but recipients must be on lifelong anticoagulants for stroke prophylaxis. Animal valves do not require anticoagulant therapy, but treatment to prevent rejection reduces their lifespan to 10-20 years. Consequently, a living tissue engineered valve would obviate the anticoagulant and lifespan limitations, becoming the perfect valve replacement therapy. In this project, we developed a method to fold functional valves from a 2D template using an origami-inspired approach.
METHODOLOGY: The base template was initially rendered using computer aided design software (Autodesk Inventor, San Francisco). It was then prototyped and the dimensions finalized with paper, cloth, and polyurethane, a polymer with properties similar to collagen. For proof-of-function studies, polyurethane prototypes were tested in a valve pulse duplicator (LifeTec Group, The Netherlands) under 5 L cardiac output as 70 strokes per minute and 70 ml per stroke, and afterload of 130 mmHg, simulating human physiologic conditions.
RESULTS: Polyurethane prototypes were compared against the standards set by ISO-5840, the standards for commercial valves for regurgitant fraction and effective orifice area (EOA). Our polyurethane valves (n=6) had 10-15% regurgitant fraction and EOA of 0.8-1.2 cm2, compared to commercial targets of < 10% and 1.5 cm2 respectively.
CONCLUSION: Our polyurethane valves show performance within close proximity to commercial valves, demonstrating the viability of this technique. We are currently applying the method to create tissue valves with porcine pericardium, and are currently undergoing mechanical testing. In the future, we plan on in vivo studies with native tissue valves by creating the starting template with tissue culture.

## Ziemer, Trevar — Poster 32 — Global Health

***Qualitative analysis of burnout and support resources in health, physical education, and wellness staff***

**Authors:** Ziemer T, Ruffalo L.
**Project Mentor:** Leslie Ruffalo, PhD
**Mentor's Department:** Family and Community Medicine

BACKGROUND: Health, physical education, and wellness (HPEW) staff are the workforce who support the development of healthy minds and overall wellness of students. HPEW staff have traditionally focused on physical activity but have been increasingly challenged to expand their scope of instruction and support through employing strategies encompassing mental health, trauma support, and mindfulness. The System of Wellness Instruction for Teachers and Teens (SWIFTT) is a program providing HPEW staff with professional development, resources, and support to promote lifelong wellness for teachers and students through a behavioral health model. This project aims to 1) explore the expanded HPEW staff roles and responsibilities outside of their curricula and the methods used to cope with stress and trauma and 2) identify specific resources that HPEW staff can utilize to enhance their expanded teaching responsibilities through emphasizing mental and emotional health and well-being.
METHODS: Current trauma-informed practices and resources employed by HPEW staff were explored through one-on-one interviews. Thematic and specific strategies and resources were identified through qualitative analysis using open coding techniques based on grounded theory.
RESULTS: Accentuated areas of need and expansion comprised 1) promoting physical and mental health 2) psychological stressors affecting students, 3) providing students emotional support, safe social environments, and counseling services, 4) sources of HPEW burnout, and 5) improving HPEW mental health and support resources.
CONCLUSION: A multitude of coping strategies and resources used to support the mental and physical well-being of HPEW staff and their students were identified through qualitative analysis. These conversations will provide input into learning opportunities and resources that would be of benefit in development of the SWIFTT platform.

# Thank you to the faculty mentors of our Class of 2023 students' Scholarly Projects

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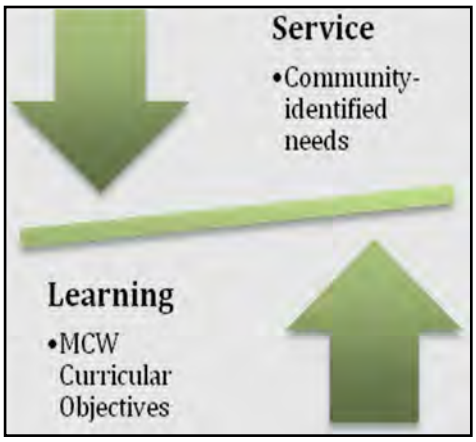
| |
|---|
| Aegis Trust |
| American Psychosocial Oncology Society |
| Ascension All Saints – Family Health Center |
| Bagamoyo District Hospital - Bagamoyo, Tanzania |
| City of Milwaukee Health Department |
| Dhulikhel Hospital, Nepal |
| Eras Senior Network |
| Feeding America Eastern Wisconsin |
| Guest House of Milwaukee |
| Hmong Wisconsin Chamber of Commerce |
| Kathmandu University hospital, Dhulikhel, Nepal |
| Kigali Genocide Memorial - Kigali, Rwanda |
| Kindbody |
| MA' RUF Center for Youth Innovation |
| Milwaukee Academy of Science |
| Milwaukee High School of the Arts |
| Milwaukee Succeeds |
| Milwaukee Women's Center, a division of Community Advocates |
| Planned Parenthood of Wisconsin, Inc. |
| Sixteenth Street Community Health Centers |
| St. Marcus Lutheran School |
| Streetlife Communities Inc. |
| Survey of the Health of Wisconsin (SHOW) |
| United Hmong of Wisconsin Outreach |
| Vios Fertility Institute |
| Vivent Health |
| Wisconsin Medical Society Foundation |

# Community Engagement in Pathways

**Service Learning** is "*a structured learning experience that combines community service with preparation and reflection. Students engaged in service-learning provide community service in response to community-identified concerns and learn about the context in which service is provided, the connection between their service and their academic course work, and their roles as citizens and professionals.*" (LCME IS-14-A)




**Key Features of Service Learning**

- Curricular – results for academic credit
- Places equal value on community -defined service objectives, and curricular learning objectives
- Is planned and implemented in a 3-way partnership – student, faculty member and site-based community staff

**Pathway students serve the community around MCW while learning how to connect future patients to supportive community resources, and partner with local agencies to promote health.**

**Service Learning**

Community partners provide service learning and community-engaged scholarship opportunities that help stimulate critical thinking, civic engagement and cultural understanding.

**Site Visits**

Students in GH and UCH Pathways visit organizations that provide health care, resources and social service programs to underserved communities. Visits provide experiential learning through hearing firsthand about services and programs, and meeting the people involved.

**Core Sessions**

Some Pathway sessions are held at community sites and include tours and presentations by the host agency. Some sessions at MCW include our partners and patients as educators and facilitators.

| Service | Service Learning | Learning |
|---|---|---|
| Emphasis on meeting a community need:<br>➢ Volunteerism<br>➢ Community Service | Balances community need with learning objectives | Emphasis on meeting student's learning objectives:<br>➢ Field Education<br>➢ Clerkships |
| Primary beneficiary: service recipient | Both student and service recipient benefit equally | Primary beneficiary: student |
| Extra or Co-curricular – no specified structure | Curricular Structure includes:<br>➢ Orientation<br>➢ Preparation<br>➢ Service<br>➢ Reflection | Curricular – structure defined per course requirements |

## BIOETHICS & MEDICAL HUMANITIES

Enables students to integrate knowledge and tools of bioethics and medical humanities as an essential part of the physician career.

## CLINICAL & TRANSLATIONAL RESEARCH

Offers instruction of essential research skills in the area of clinical and bench-to-bedside research.

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Provides students with the core principles and knowledge to be academic and educational leaders.

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Designed for students seeking to understand the causes of, and finding solutions to, the challenges and disparities in the health status of worldwide populations.

## M3 SCHOLARSHIP FORUM

The M3 Scholarship Forum celebrates the Scholarly Projects completed by each member of the graduating Class of 2023.

## HEALTH SYSTEMS MANAGEMENT & POLICY

Enables students to engage in the changes shaping our health care system.

## MOLECULAR & CELLULAR RESEARCH

Students acquire core research skills in the area of basic sciences to encourage a career as a Physician Scientist.

## QUALITY IMPROVEMENT & PATIENT SAFETY

Provides students with the core principles and skills necessary to understand and analyze the systems-based aspects of patient care and safety.

## URBAN & COMMUNITY HEALTH

Prepares students to effectively care for patients in urban communities, promote community health and reduce health disparities.