



CLASS OF 2025 SCHOLARLY PROJECTS

ABSTRACT BOOKLET



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Scholarly Pathways & Scholarly Project Leadership Team

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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 enroll in Pathways during their M3 year, of which 22 students from the Class of 2025 participated.

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.

Another requirement is the Scholarly Project, which runs parallel to the Pathway, though often overlaps. Each student completes a faculty-mentored Scholarly Project that meets *Glassick Criteria for Scholarship* by the end of M3 year. Current M3 student's projects are featured here.

Practicing Structural Competency and Cultural Humility in the Care of Muslim Patients

Authors: Abufares N, Anwer S, Mohammed B, Bojang M, Tumusiime S, Zagloul M, Farhan S, Sandozi A, Khursheed S, Yusuf H, Azam L, Young S.

Project Mentor: Laila Azam, PhD - **Department:** Emergency Medicine

INTRODUCTION: For Muslim Americans, perceived discrimination and lack of provider awareness of Islamic social norms, cultural sensitivities, and barriers to care can strain the physician-patient relationship, contributing to poor patient compliance. Our curriculum addresses this gap in medical education at the Medical College of Wisconsin through a multimodal workshop that integrates structural competency and cultural humility skills related to caring for Muslim patients.

METHODS: Our workshop incorporated didactics with a simulated case of a Muslim woman's experience in the Emergency Department. The first part of our workshop focused on providing baseline knowledge of Islamic beliefs that influence healthcare decisions. Then, in small groups, students read and discussed the case accompanied by a facilitator. Pre- and post-session surveys were distributed to measure participants' comfort in caring for Muslim patients.

RESULTS: Twenty-nine students participated in this pilot curriculum. Participants scored significantly higher on all post-test questions compared to pretest questions including comfort in providing culturally sensitive care ($p < 0.001$), awareness of barriers to care ($p < 0.001$), the Muslim patient experience ($p < 0.001$), religious beliefs ($p < 0.001$), cultural preferences ($p < 0.001$), and comfort in incorporating cultural preferences into care ($p < 0.001$). Students' feedback was positive overall, with many emphasizing the need for cultural humility and structural competency education in the core curriculum.

DISCUSSION: This curriculum addressed the need to provide students with a baseline awareness of Muslim practices that influence healthcare and cultural competency skills to improve their comfort when caring for patients from different cultural and religious backgrounds. We recommend this curriculum for medical students preparing to care for diverse patients in the US.

Improving Infant Circumcision

Authors: Abuzahra S, Klatt T.

Project Mentor: Timothy Klatt, MD - **Department:** Obstetrics & Gynecology

INTRODUCTION: Nurses (RNs) and certified nursing assistants (CNAs) raised two safety concerns regarding infant circumcisions at Froedtert & MCW Birth Center. First, RNs and CNAs who assist with circumcisions have observed infants in distress when the provider did not wait for the local anesthetic to take effect before beginning the procedure. Second, RNs noted frequent bleeding following circumcisions. Birth Center leadership agreed to partner with Patient Safety to address this chronic issue that results in patient, RN, and CNA distress.

AIMS: Increase the frequency at which adequate time is waited for the local anesthetic to become effective before beginning the circumcision. Decrease the incidence of postoperative bleeding. Increase RN and CNA satisfaction and confidence with the quality of the overall process.

METHODS: Plan: Process mapping identified two key procedure steps: use of local anesthetic, including amount and wait time, and Gomco clamp time. Do: Three advanced practice providers (APPs) were hired to assist in the Birth Center and perform all weekday infant circumcisions. Study: After this transition, a survey was created and distributed among the Mother-Baby RNs and CNAs to measure the new state of infant circumcision care.

RESULTS: The RNs and CNAs identified high performers, the three APPs and four physicians. When they perform the circumcisions, less neonatal distress was reported, and postoperative bleeding was less frequent. Having the APPs perform most of the circumcisions improved care substantially.

CONCLUSION: Further improvement is necessary, and thus the second series of interventions are underway. As literature contains inconsistent, non-evidence-based guidance, the identified high performers were surveyed regarding their technique for administering anesthetic and clamp time. All three APPs wait at least one minute after injecting the local anesthetic and leave the Gomco clamp in place for five minutes.

Assessment of Medication Duplication by Emergency Medical Services and the Emergency Department**Authors:** Ahlquist A, Nickel L, Rubin J, Grawey T, Liu JM.**Project Mentor:** Jason Liu, MD, MPH - **Department:** Emergency Medicine

BACKGROUND: Effective handoffs from emergency medical services (EMS) to the emergency department (ED) are an important aspect of patient care. Poor transitions can place patients at risk for adverse events, such as inappropriate duplication of medications.¹ The goal of this study was to examine duplicate ED administration of medications already given by EMS.

METHODS: A retrospective database review was conducted of adult patients treated with aspirin, ketorolac, or steroids by an urban EMS system and transported to an academic medical center in 2021. The patient's date of birth, gender, race/ethnicity, and administered medications were extracted. ED administered medications were extracted from matched hospital records. Descriptive characteristics and the rate of duplicate medications (administered by both EMS and ED) were calculated. Duplication rates were compared by gender and race using chi-square tests.

RESULTS: 604 patients transported to the selected hospital were given aspirin, ketorolac, or steroids during this period. 409 (67.7%) of these patients were given aspirin, 150 (24.8%) were given steroids, and 47 (7.8%) were given ketorolac. The overall rate of ED duplication of EMS medications was 16.7% (aspirin 73, ketorolac 5, steroid 23). There was no difference in duplication rate by gender (male 15.9%, female 17.7%, $p=0.55$) or race (white 17.9%, non-white 15.7%, $p=0.47$) overall, or when compared for each medication separately.

CONCLUSION: In this study, there was a 16.7% rate of medications duplicated by the ED when they were already given by EMS. This suggests that the effectiveness of care handoffs can be improved. Further studies are needed to examine what factors affect EMS-ED communication and how to improve the quality of handoffs.

Lubin JS, Shah A. An incomplete medical record: Transfer of care from emergency medical services to the emergency department. *Cureus*. 2022;14(2):e22446. doi:10.7759/cureus.22446.

A Qualitative Analysis to Explore Wellness Support for Teachers**Authors:** Ahmad T, Khokhar M, Ruffalo L.**Project Mentor:** Leslie Ruffalo, PhD, MS - **Department:** Family & Community Medicine

BACKGROUND: Healthy, Physical Education, and Wellness (HPEW) teachers promote student health and wellness. Due to their understanding of wellness and trauma among our youth, they are being challenged to expand support. 1 in 3 high school students in 2019 experienced sadness according to the CDC, a 40% increase since 2009. A study from 2020 concluded that teachers display exhaustion/inadequacy/cynicism, suggesting teachers feel ill-equipped to deal with student mental health leading to burnout.

AIMS: The project analyzed deficiencies in physical education departments, explored trauma-informed approaches to support student/teacher well-being, and establish a feedback mechanism to share best practices among educators in promoting mental and physical well-being.

METHODS: Interviews were conducted with a national sample of HPEW teachers. Data from these interviews were analyzed using inductive open coding strategies, ensuring applicability to a broader audience.

RESULTS: 17 HPEW teachers (8 males, 9 females) were interviewed revealing various causes of burnout and proposed solutions (figure 1). Teachers believe student mental health challenges are primarily due to a deficiency in emotional intelligence. Teachers emphasized mental health resources, mindfulness, individualized student support, and professional development.

CONCLUSION: This study highlights the significant impact of teacher burnout on both educators and students, particularly within HPEW settings. Factors such as heavy workload, lack of administrative support, and student misbehavior contribute to increased teacher turnover rates. By installing resources to combat burnout, educators can enhance student physical and mental health. Furthermore, the study emphasizes the need for professional training in mental health support and trauma-informed care to better address student well-being.

The Impact of Neighborhood Disadvantage on Trauma Surgery Outcomes Following Intentional or Unintentional Injury

Authors: Ahrens A, Davis CS.

Project Mentor: Christopher Davis, MD, MPH - **Department:** Surgery

BACKGROUND: Social determinants of health (SDH) have a significant impact on both short and long-term surgical outcomes. Emerging research demonstrates how socioeconomic disadvantage is associated with worse emergency general surgery outcomes, but studies evaluating the association with trauma surgery outcomes are limited. This study aims to determine the association between socioeconomic disadvantage and trauma surgery outcomes based on the Area Deprivation Index (ADI).

METHODS: Patients over 18 years old who underwent trauma surgery from 2016 to 2019 within 24 hours of admission were identified from a prospectively maintained database. Patients were sorted as intentional injuries, including gunshot wounds and knife injuries, and unintentional injuries, including motor vehicle accidents, falls, and similar injuries. Socioeconomic disparities were evaluated based on the ADI. Primary outcomes included in-hospital post-operative mortality rate, post-operative complications incidence, and 30-day readmission rate.

RESULTS: A total of 1,567 patients were identified meeting study criteria. Basic demographics identified 1,181 males, 386 females, 746 African Americans, 779 Caucasians, 24 Asians, and 18 as other than the aforementioned. There was a positive correlation between ADI and hospital re-admission rate ($p=0.1506$). These data remained statistically significant irrespective of in-hospital mortality ($p=0.003$ and $p<0.0001$, respectively). Also of note is that the median ADI of those sustaining intentional vs unintentional injury was 10 vs 7 ($p<0.001$).

CONCLUSIONS: This data suggests that a higher ADI predicts an augmented re-admission rate among trauma patients with greater socioeconomic disadvantage. Accordingly, the importance of both trauma quality outcome programs and public health measures are again underscored which aim to mitigate the impact of social determinants of health, whether pre- or post-injury.

Global Telehealth in Mexico: Providing Continuity of Care While Enhancing Medical Student Education

Authors: Ai J, Lucero M, Lee K.

Project Mentor: Kenneth Lee, MD - **Department:** Physical Medicine and Rehabilitation

Community Partner: Esperanza Viva, Rescue Orphanage - Puebla, Mexico

INTRODUCTION: The partnership between EV and the Medical College of Wisconsin (MCW) seeks to combine telemedicine and global health engagement to provide continuity of healthcare and a formative global health experience.

METHODS: Students would interview one patient with an interpreter present at EV, write a note for the clinic's electronic health record, and present the patient to an MCW attending physician. The attending and students would see the patient together through the station and then convey diagnosis and treatment plan. Prior to and after the initial encounter, students would complete a 13-point survey derived from Global Health Competency Self-Confidence Scale with statements evaluated on a 5-point Likert scale.

RESULTS: Five initial visits, four second visits, two third visits were conducted between 10 medical students. Greatest improvement was seen in Capacity Strengthening pertaining to collaborating with partner organizations to reducing health disparities and assessing operational capacity with an average improvement of 1.33 and 1.36 respectively. A total of 19 hours were spent on visits with 13 being patient interaction and staffing with most frequent primary complaints pertaining to the integumentary and cardiopulmonary systems.

Qualitative feedback included comments such as "[I enjoyed] getting to know what life is like at EV, what resources they have available, discussing unique SDOH to these children, and helping connect them with resources." An identified barrier was technological issues such as connections.

CONCLUSIONS: Telemedicine is a valuable tool at enhancing medical education through exposure to global health and providing continuity of care in low-resource settings.

Patient and Provider Perspectives on the Ethics of Screening for Multiple Sclerosis**Authors:** Alden JT, Obeidat A.**Project Mentor:** Ahmed Z Obeidat, MD, PhD - **Department:** Neurology

This study investigated the ethical limitations of a hypothetical screening protocol for Multiple Sclerosis (MS). An online, quantitative, cross-sectional study was performed using multiple choice questionnaires for healthcare professionals in MS care and family members of patients with an MS diagnosis. This data was used to evaluate which ethical concerns providers and family members have with a potential screening protocol for MS. Results showed that providers are concerned with patient willingness to get examined both physically and radiologically prior to the onset of clinical symptoms. They were additionally concerned that the cost of this screening protocol would likely be prohibitive for some of their patients. For family member responses, we found that there was significant variation in how patients would feel about both an "at risk" designation for MS and about knowing they have MS prior to the onset of symptoms. They generally believed that a designation of being "at increased risk" for multiple sclerosis would negatively affect their mental health with only one respondent disagreeing. Additionally, there was a varied willingness to pursue treatment in the absence of clinical symptoms but with positive radiological data supporting a diagnosis of MS. Overall, we found that providers think the benefits of a screening protocol outweigh the potential ethical concerns of cost and undue stress that this protocol could manifest. For family members, we found a varied willingness to pursue regular screening due to the ethical concerns of cost and negative mental health effects that suggest an individualized, as opposed to a systematic, protocol would be ethical.

Subjective and Performance-Based Cognition and their Associations with Head Injury History in Older Former NFL Players**Authors:** Allen AT, Cole WR, Walton SR, Kerr ZY, Chandran A, Mannix R, Guskiewicz KM, Meehan WP III, Echemendia RJ, McCrea MA, Brett BL.**Project Mentor:** Benjamin Brett, PhD - **Department:** Neurosurgery

PURPOSE: Investigate the association between self-reported subjective and performance-based cognition among older former professional football players, as well as the relationship of cognitive measures with concussion history and years of football participation, as a proxy for repetitive head impact exposure.

METHODS: Among older former NFL players (N=172; mean age=60.69 ± 5.64), associations of subjective (Patient Reported Outcome Measurement System Cognitive Function-Short Form) and performance-based cognitive measures (Brief Test of Adult Cognition by Telephone Executive Function and Episodic Memory indices) were assessed via univariable and multivariable regression models, with a priori covariates of depression and race. A similar univariate and multivariable regression approach assessed associations between concussion history and years of football with subjective and performance-based cognitive measures.

RESULTS: Subjective ratings of cognition were significantly associated with performance-based assessment, with moderate effect sizes (episodic memory $\eta^2=.12$; executive function $\eta^2=.178$). These associations were weakened, but remained significant ($ps < 0.05$), with the inclusion of covariates. Greater concussion history was associated with lower subjective cognitive function ($\eta^2=.114$, $p<.001$), but not performance-based cognition. The strength of association between concussion history and subjective cognition was substantially weakened with inclusion of covariates ($\eta^2=.057$). Years of participation was not associated with measures of subjective or objective cognition ($ps >.05$).

CONCLUSIONS: These findings reinforce the importance of comprehensive evaluation reflecting both subjective and objective measures of cognition, as well as the consideration of patient-specific factors, as part of a comprehensive neurobehavioral and health assessment of older former contact sport athletes.

The Role of Gamma Knife Radiation Therapy in the Management of Cystic Brain Metastases

Authors: Amidon RF, Livingston K, Kleefisch CJ, Martens M, Straza M, Puckett L, Schultz CJ, Mueller WM, Connelly JM, Noid G, Morris K, Bovi JA.

Project Mentor: Joseph Bovi, MD - **Department:** Radiation Oncology

PURPOSE: There are conflicting results regarding local control and overall survival following radiation treatment of cystic brain metastases (BMets). This retrospective cohort study explores the role of Gamma Knife (GK) in the management of cystic BMets.

METHODS AND MATERIALS: Post-GK Tumor volume was longitudinally measured on follow-up imaging. Survival analysis utilized the Kaplan-Meier method, while the cumulative incidence of progression was assessed using the Aalen-Johansen estimator. Cox regression analysis was used to evaluate the association between four variables and survival.

RESULTS: Fifty-four patients with 83 cystic BMets were treated with GK at MCW between 2016 and 2021. Lung cancer was the most common primary (51.9%), followed by breast cancer (13.0%). The mean target volume measured 2.7 cm^3 . The median prescription dose of GK was 20 Gy. Median survival time was 11.1 months with a median follow-up of 8.9 months, and the one-year local control rate was 75.9%. Following GK, there was overall reduction in tumor volume over time, although 68.5% of patients required steroids for vasogenic edema. Patients who experienced tumor growth after GK received significantly more pre-GK whole-brain radiation therapy (WBRT) compared to those with declining tumor volumes. Advanced age at BMet diagnosis and pre-GK systemic therapy were correlated with worse survival.

CONCLUSIONS: The use of WBRT before GK may select for BMets with enhanced radioresistance. This study underscores GK's effectiveness in controlling cystic BMets with the trade-off of high post-treatment steroid use.

Impact of Maxillomandibular Advancement on Pharyngeal Collapsibility: A Pilot Study

Authors: An A, Thomas A, Rhee JS, Garcia GJM.

Project Mentor: Guilherme JM Garcia, PhD - **Department:** Biomedical Engineering

INTRODUCTION: Obstructive sleep apnea (OSA) is characterized by recurrent episodes of airflow limitation due to upper airway (UA) collapse during sleep. Surgical procedures to treat OSA have high failure rates. Virtual surgery planning based on computer simulations of UA biomechanics has the potential to improve patient outcomes. This pilot project aims to quantify metrics of UA mechanical stability and correlate them to OSA severity in 6 patients who underwent maxillomandibular advancement (MMA).

METHODS: Three-dimensional models of the UA airspace and soft tissues were created from pre- and post-surgery computed tomography. Fluid-structure interaction (FSI) simulations of UA collapse were performed to quantify metrics of UA mechanical stability such as airspace cross-sectional areas, airflow resistance, pharyngeal compliance, and maximum flowrate. The apnea-hypopnea index (AHI) was used as a clinical measure of OSA severity.

RESULTS: MMA increased the airspace minimal cross-sectional area (mCSA) of the pharynx from $0.79 \pm 0.46 \text{ cm}^2$ pre-intervention to $2.9 \pm 1.6 \text{ cm}^2$ post-intervention ($p = 0.02$). This increase in mCSA was associated with a reduction in airflow resistance from $211 \pm 182 \text{ Pa.s/L}$ pre-intervention to $40 \pm 13 \text{ Pa.s/L}$ post-intervention ($p = 0.06$) and an increase in the maximum flowrate from $0.93 \pm 0.60 \text{ L/s}$ pre-intervention to $2.9 \pm 1.0 \text{ L/s}$ post-intervention ($p = 0.003$). Several biomechanical variables had a strong correlation with AHI with absolute values of the Spearman correlation coefficient around 0.7.

CONCLUSION: This pilot study supports the hypothesis that FSI-derived biomechanical variables are predictive of intervention outcomes after MMA. Future studies with larger sample sizes are needed to confirm our findings.

Evaluating the Accuracy, Quality, and Readability of Online Breast Cancer Information**Authors:** Cortina CS, Cobb AN, Chaudhary LN, Kelly T, Kong AL.**Project Mentor:** Amanda Kong, MD, MS - **Department:** Surgery

OBJECTIVE: To assess the accuracy, quality, and readability of patient-focused breast cancer websites using expert evaluation and validated tools.

Summary Background Data: Ensuring access to accurate, high-quality, and readable online health information supports informed decision-making and health equity but has not been recently evaluated.

METHODS: A qualitative analysis on 50 websites was conducted; the first ten eligible websites for the following search terms were included: "breast cancer," "breast surgery," "breast reconstructive surgery," "breast chemotherapy," and "breast radiation therapy." Websites were required to be in English and not intended for healthcare professionals. Accuracy was evaluated by five breast cancer specialists. Quality was evaluated through the DISCERN questionnaire. Readability was measured using nine standardized tests. Mean readability was compared to the American Medical Association (AMA) & National Institutes of Health (NIH) 6th grade recommendation.

RESULTS: Non-profit hospital websites had the highest accuracy (mean=4.06, SD=0.42); however, no statistical differences were observed in accuracy by website affiliation ($p=0.08$). The overall mean quality score was 50.8 ("Fair"/"Good" quality) with no significant differences among website affiliations ($p=0.10$). Mean readability was at the 10th grade reading level, the lowest being for commercial websites with a mean 9th grade reading level (SD=2.38). All websites exceeded the AMA- & NIH-recommended reading level by 4.4 levels ($p<0.001$). Websites with higher accuracy tended to have lower readability levels, whereas those with lower accuracy had higher readability levels.

CONCLUSION: As breast cancer treatment has become increasingly complex, improving online quality and readability while maintaining high accuracy is essential to promote health equity and empower patients to make informed decisions about their care.

Gathering Patient-Centered Psychiatric and Substance Use Histories - A Multimodal Approach for Pre-clinical Medical Students**Authors:** Anwer S, Liewen A, Maatman T, Bernstein J, Hayes J.**Project Mentor:** Ryan Spellecy, PhD - **Department:** Institute for Health and Equity

INTRODUCTION: Medical and psychological conditions associated with substance use disorders (SUDs) are a significant source of morbidity and mortality in the United States. Our intervention introduces gathering a complex psychiatric and substance use history to first-year medical students from a realistic, multidimensional scenario requiring the use of sensitive language. **METHODS:** We used standardized patients (SP) of any gender to portray Mr./Ms. Sackler is a 45-year-old with a history of fatigue, depression, and chronic pain. Participants collect a substance use and psychiatric history and practice using motivational interviewing and person-first language to discuss treatment options. We used residents and faculty from the Department of Family Medicine and the Department of Psychiatry to provide guidance and feedback during the exercise. **RESULTS:** Before this session, students rated their comfort in taking a psychiatric history as 2.69 (SD = 1.04, $n=174$) and 3.79 (SD=0.78, $n=174$) after the session. Before the session, students rated their comfort with taking a patient-centered addiction history as 2.51 (SD = 1.08, $n=174$) and after as 3.68 (SD=0.84, $n=174$). **DISCUSSION:** Our pilot effectively introduces sensitive and essential topics related to psychiatry and addiction medicine early in medical education. This unique case presents a joint presentation typically seen in a family medicine clinic wherein medical and psychiatric conditions intersect. Future studies should evaluate the effectiveness of combining family medicine and psychiatric history taking.

Characteristics of Continued Positive Ask Suicide-Screening Questions (ASQ) Responses Across Repeat Visits in a Pediatric Emergency Department

Authors: Ballew A, Esson M, Visotcky A, Kohlbeck S, Pickett ML.

Project Mentor: Michelle Pickett, MD, MS - **Department:** Pediatrics

Suicide continues to remain a leading cause of death among US adolescents. The Ask Suicide-Screening Questions (ASQ) is a validated tool used to screen for suicide risk. Understanding factors associated with each ASQ question may aid in better care for youth in this vulnerable population. The aims of our study are to compare the association of individual ASQ questions at an index pediatric emergency department (PED) visit with patient characteristics and acute interventions provided and to determine the odds of continued positive ASQ at next PED visit. This was achieved through a retrospective chart review of patients 10-18 years old who had an index visit with a positive ASQ and a second visit with a completed ASQ. A positive ASQ is a 'yes' to any of the questions which may be seen in Table 1 and 2. Data was analyzed using χ^2 and t-tests. 591 patients were included (Table 1). White patients were more likely to answer 'yes' on Q1 and Q3. Non-Hispanic and female patients were more likely to answer 'yes' to Q2 (Table 1). Patients who presented with a non-mental health chief complaint were more likely to answer 'yes' to all questions except Q4 (Table 1). A social work/psychology consult was more likely provided with a 'yes' response to Q5, but less likely with a 'yes' to Q1, Q2 and Q3 (Table 2). Mental health resources were less likely provided with a 'yes' to Q2, Q3 and Q5, Table 2. When adjusting for a 'yes' to Q4 (historical), patients answering 'yes' to Q2 had 1.91 times the odds of a continued positive response at next visit. Similarly, patients answering 'yes' to Q3 had 3.26 times the odds of a continued positive response at next visit (Table 3). This study provides insight into ASQ responses and may help providers place emphasis on specific responses instead of viewing the entire survey as the same "positive" regardless of differing responses which can help provide more effective and individualized care for youth at risk for suicide.

Social Determinants of Health and Pediatric Intensive Care Unit Admission Patterns in Children with COVID-19

Authors: Bangura HG, Willie C, Dowell J.

Project Mentor: Adam Szadkowski, MD - **Department:** Pediatrics

INTRODUCTION: Multiple studies have shown that Social determinants of health (SDoH) are associated with disparities in health outcomes in children and adults admitted to intensive care units. Studies have also shown that adults disproportionately suffered from severe illnesses with COVID-19. This study investigates patient-level characteristics to determine associations between SDoH and Pediatric Intensive Care Unit (PICU) admission patterns for critically ill children with COVID-19.

METHODS: Retrospective analysis of acute COVID-19-related admissions to the Children's Wisconsin (CW) PICU between January 1, 2020, and March 31, 2022, from the emergency department (ED) or the acute care ward. Multivariable statistical analysis was completed to obtain results.

RESULTS: Of the 215 cases of COVID-19 hospitalization included in our study, 39.4% were Non-Hispanic White (NHW), 36.2% Non-Hispanic Black (NHB), and 19.2% Hispanic. Neighborhood Stress Score (NSS7), a measure of socioeconomic deprivation, was the primary influencer of direct admission to the PICU (OR 1.02, 95% CI [1.02, 1.22]). Indirectly admitted Black patients had significantly longer than expected PICU stays compared to indirectly admitted White patients (p=0.049).

CONCLUSION: Socioeconomically deprived children critically ill with COVID-19 were more likely to be directly admitted to the PICU. NHB children admitted to the general acute care ward before transferring to the PICU required longer hospitalization in the PICU than predicted. Taken together, these findings indicate SDoH influenced admission patterns and length of stay outcomes for children with COVID-19. Our research highlights why consideration of SDoH is important when evaluating healthcare, especially for centers that provide care to disadvantaged communities.

Novel Identification of Medial Meniscus Posterior Root Tear Prodrome

Authors: Barber A, Cross JA, Dusel C, Vetter CS.

Project Mentor: Carole Vetter, MD - **Department:** Orthopaedic Surgery

INTRODUCTION: Medial Meniscus Posterior Root Tear (MMPRT) is a radial tear located within 1 cm of the posterior root attachment or a bony root avulsion. Early detection of MMPRTs is vital to knee joint integrity due to devastating long-term consequences if left untreated, including total knee arthroplasty. Based on clinical experience, MMPRT patients often report symptoms prior to the tear. We hypothesized a prodrome of MMPRT exists in which some patients report experiencing posterior knee pain, calf pain, or signs of DVT prior to MMPRT event.

METHODS: A retrospective chart review was conducted of patients diagnosed with MMPRT between 2016 and 2021. Exclusion criteria were presence of concomitant knee or traumatic injury. Demographic and clinical variables were recorded. The length of time between start of prodrome and tear event was documented. Statistical analysis was used to compare variables between prodrome cohort and non-prodrome cohort. A p-value of <0.05 was statistically significant.

RESULTS: Data from twenty-six patients was collected with 38% belonging to the prodrome cohort. Average age of patients was significantly greater in the prodrome cohort (57.3 years) compared to the non-prodrome cohort (51.9 years), with a p-value of 0.023. BMI, sex, and race between cohorts was insignificant.

CONCLUSION: Greater than 1/3 of MMPRT patients present with prodrome symptoms prior to reported tear event. The greatest predictor of prodrome occurrence prior to MMPRT is older age. A notable limitation is sample size. Importantly, novel identification of a MMPRT prodrome will facilitate timely diagnosis and surgical repair to prevent osteoarthritis progression.

Duration of Stay and its Effect on COVID-19 Vaccination Acceptability within the Undocumented Latinx Population in two Major California Cities

Authors: Bello-Luna L, Torres JR.

Project Mentor: Jesus R Torres, MD, MPH, MS - **Department:** Emergency Medicine

OBJECTIVES: Factors affecting vaccination rates are not well understood and may have significant policy implications. This study aims to explain how the duration of stay in the US impacts COVID-19 vaccination uptake among undocumented Latinx patients.

METHODS: The survey was conducted in Olive View and ZSFG Emergency Departments, known for serving large numbers of undocumented Latinx immigrants. Trained research assistants obtained verbal consent from participants in English and Spanish post-medical screening exam. The analysis examines the effects of duration of stay (≤ 10 years vs. > 10 years) on vaccination hesitancy among undocumented Latinx patients.

RESULTS: Among the 309 patients enrolled, 52% were male, 68% identified as Latinx, 14% White, and 11% Black, with a median age of 51 years. Among Latinx participants, 56% reported Spanish as their primary language, and 34% self-identified as undocumented. In the Latinx cohort, 36% experienced COVID-19 compared to 18% of non-Latinx. Within the undocumented Latinx group, 38% reported a past COVID-19 infection. Those with over 10 years of stay had an 84% vaccination rate and 72% health insurance coverage, while those with ≤ 10 years of stay had a 97% vaccination rate and 47% health insurance coverage.

CONCLUSION: Our analysis shows lower vaccination rates among undocumented Latinx residents in the US for over a decade. Despite California's leadership in undocumented healthcare, more efforts are needed. These results highlight the importance of educational initiatives to inform both patients and physicians that everyone, regardless of legal status, is entitled to vaccinations.

A scoping review of Human Papillomavirus and Cervical Cancer Knowledge, Attitudes, Practices, and Prevention among Female Sex Workers in Africa

Authors: Adamma S, Bikomeye J, Dickson-Gomez J, Bojang M, Kyoma M, Magezi RK, Twaibu W, Katende D, Simple O, Magololo FM, Nyabigambo A, Musinguzi G, Mulamira P, Beyer K.

Project Mentor: Kirsten Beyer, PhD, MPH, MS - **Department:** Institute for Health & Equity

Community Partner: Alliance of Women Advocating for Change - Kampala, Uganda

PURPOSE: Global initiatives have emphasized the elimination of cervical cancer (CC) among female sex workers (FSW) in Africa. Yet screening remains low, and few interventions have been outlined to target this group. This scoping review sought to understand the knowledge, attitudes, and practices (KAP) among FSW in Africa regarding human papillomavirus (HPV) and CC prevention, and to identify the most effective intervention strategies.

METHODS: A systematic literature search was performed in PubMed, Scopus, Web of Science, African Index Medicus for work published between January 2012 through August 2022. Eligible studies included those relating to HPV and CC prevention among FSW in Africa. Studies were categorized as KAP, intervention, or both. A Logic Model was used to guide content analysis of the interventions, and a thematic analysis of all studies was performed.

RESULTS: The search resulted in 79 articles of which 11 were included in the study. Six African countries were represented including South Africa, Mozambique, Uganda, Kenya, Ethiopia, and Nigeria. Five of the articles described KAP, while the other six described interventions. The intervention studies were categorized into 3 groups: "screen and treat", self-collection HPV testing, and a "diagonal intervention" which included a multi-faceted approach.

CONCLUSIONS: Limited literature exists regarding KAP and interventions for HPV and CC prevention among FSW in Africa. While FSW had a moderate level of knowledge regarding HPV and CC prevention, there was a lack of detailed and nuanced knowledge. Successful uptake of screening was seen when services were provided at convenient locations, integrated into routine or HIV care, and recommended by healthcare providers. Future interventions should be context-specific, include improved counseling and education, and be integrated with other services.

Brainstem Atrophy across the AD Clinical Spectrum: An Automated Volumetric MRI study.

Authors: Bhalla DM, Bendlin BB, Piero A, Granadillo E.

Project Mentor: Elias Granadillo, MD - **Department:** Neurology

BACKGROUND: Studies suggest that structural changes in the midbrain are linked to Alzheimer's disease (AD) symptoms such as memory, sleep, and emotional disturbances. Brainstem atrophy, particularly in the locus coeruleus, has also been linked with poorer executive function. Prior studies have established the utility of hippocampal measures using automated volumetric software such as Neuroreader (NR) aiding in the diagnosis of AD and is emerging as an inexpensive and easily accessible tool. Here, we used NR to assess brainstem (BS) volumes of AD patients to examine the potential to capture an effect using conventional T1-weighted MRI.

METHODS: We conducted a retrospective chart review (N=300) of participants who underwent volumetric scans evaluated with NR after 2015 (Table 1). NR generated BS and hippocampal volumes corrected for total intracranial volume (BS-Vc and Hip-Vc) among 3 groups (N=100 each): subjective cognitive impairment (SCI), mild cognitive impairment (MCI), and AD Dementia. Multiple regression models determined if group-wise differences in BS-Vc and Hip-Vc, corrected for age, gender, and education, existed.

RESULTS: Preliminary results showed no difference in BS-Vc across groups. Hip-Vc was significantly different between SCI and AD ($\hat{\beta}^2 = -0.049$, $p < 0.001$) and MCI and AD ($\hat{\beta}^2 = -0.033$, $p = 0.001$) groups. Interestingly, with correction for age, education level, and disease stage, male gender was associated with lower BS-Vc ($\hat{\beta}^2 = -0.055$, $p < 0.001$); consistent with AD literature suggesting a differential susceptibility to AD pathology based on gender.

CONCLUSION: No differences in BS-Vc across the AD clinical spectrum were found, possibly due to the low power of this study or limitations of NR in detecting atrophy in brainstem sub-structures such as the locus coeruleus. Further exploration of these findings in future studies with increased power is needed.

Establishment of novel immortalized middle ear cell lines as models for otitis media

Authors: Blaine-Sauer S, Samuels TL, Khampang P, Yan K, McCormick ME, Chun RH, Harvey SA, Friedland DR, Johnston N, Kerschner JE.

Project Mentor: Nikki Johnston, PhD - **Department:** Otolaryngology & Communication Sciences

OBJECTIVE: Otitis media (OM) is among the most frequently diagnosed pediatric diseases in the US. Despite the significant public health burden of OM and the contribution research in culture models has made to understanding its pathobiology, a singular immortalized human middle ear epithelial (MEE) cell line exists (HMEEC-1, adult-derived). We previously developed MEE cultures from pediatric patients with non-inflamed MEE (PCI), recurrent OM (ROM), or OM with effusion (OME) and demonstrated differences in their baseline inflammatory cytokine expression and response to stimulation with an OM-relevant pathogen lysate and cytokines. Herein, we sought to immortalize these cultures and assess retention of their phenotypes.

METHODS: MEE cultures were immortalized via lentivirus encoding temperaturesensitive SV40 T antigen. Immortalized MEE lines and HMEEC-1 grown in monolayer were stimulated with non-typeable Haemophilus influenzae (NTHi) lysate. Gene expression (TNFA, IL1B, IL6, IL8, MUC5AC, and MUC5B) was assessed by qPCR.

RESULTS: Similar to parental cultures, baseline cytokine expressions were higher in pediatric OM lines than in HMEEC-1 and PCI, and HMEEC-1 cells were less responsive to stimulation than pediatric lines.

CONCLUSION: Immortalized MEE lines retained the inflammatory expression and responsiveness of their tissues of origin and differences between non-OM versus OM and pediatric versus adult cultures, supporting their value as novel in vitro culture models for OM.

Improving Quality Metrics in Neurosurgery: A Spinal Surgery 3-Year Case Review

Authors: Feller CN, Bodenbach EM, Kolinski JM, Sinson GP.

Project Mentor: Grant P Sinson, MD - **Department:** Neurosurgery

BACKGROUND AND OBJECTIVES: Despite the known importance of accurate clinical documentation as a companion to quality patient care, this is not often prioritized in practice and leads to a variety of downstream consequences. Inaccurate documentation leads to missed opportunities in full, accurate coding. In turn, it also negatively influences hospital and physician quality ranking, medical center profiling, and revenue captured. The aim of this study is to highlight the opportunity for continuous improvement in clinical documentation and the significance accurate clinical documentation has on outcome measures, such as expected length of stay (eLOS).

METHODS: A single-center retrospective chart review took place for patients undergoing spinal surgery from 2019 to 2021. Based on Vizient's diagnosis-related group risk model for eLOS, 192 charts spanning 10 unique diagnosis-related groups were reviewed to identify ICD-10 diagnosis and procedure codes that were not coded or not clearly documented by a physician. A new eLOS for each patient was recalculated with the addition of the newly identified variables and then compared with the original eLOS.

RESULTS: Overall, there was a significant difference between the original eLOS and new eLOS when the newly identified variables were added ($P < .001$). Of 192 patient charts, 89.5% had at least one new variable contributing to eLOS, with an average of 2.60 (0, 12) new variables. This resulted in an average increase in eLOS of 2.869 days (0.160, 35.129). Compared with the observed LOS, the new eLOS was significantly different ($P < .001$), whereas the original LOS was not ($P = .5661$).

CONCLUSION: Incomplete documentation and coding can misrepresent the quality of patient care provided and the complexity of their cases. This represents an opportunity for improvement for both the clinicians, clinical documentation improvement specialists, and coders to improve quality metrics and hospital rankings.

When Things Go Right: Safety II in an Academic Emergency Department

Authors: Boettcher S, Jacobson N, Aranda J, Pavlic A, Wilbanks M.

Project Mentor: Nancy Jacobson, MD - **Department:** Emergency Medicine

The Safety I approach views "safety" as an absence of error and variability increases the risk of harm. Safety II posits that variability is necessary to meet patient needs in complex healthcare situations. We hypothesize that clinicians in the emergency department make proactive adjustments to their practices to keep patients safe.

This is a cross sectional survey-based study of clinical team members at a tertiary care academic ED. Qualitative data on proactive safety were collected and analyzed via inductive response analysis. Perspectives on support for practice adjustments and experiences of negative emotions during practice variability were collected using 5-point Likert scales.

There were 84 respondents, of which 33 (39%) were nurses, 28 (33%) were physicians, and 23 (27%) held other clinical roles. Qualitative data included 128 instances of harm prevention: 36.72% via collaboration (n=47), 35.94% time-based interventions (n=46), 21.10% physical harm prevention (n=27), and 6.25% patient/visitor interactions (n=8). 73.17% (n=30) felt that policies matched daily work most of the time and 92.68% (n=38) felt enabled to adapt to the needs of a patient most of the time. Experiences of self-doubt, fear of repercussion, or anxiety occurred most when adhering to a policy despite patient needs (48.78%; n=20).

Healthcare team members report keeping patients safe through collaboration. Respondents report policies match daily work most of the time and feel enabled to adapt to the needs of patients. Feelings of self-doubt, fear of repercussion, or anxiety were reported most frequently when clinicians adhered to a policy despite the needs of a patient.

Exploring the Experiences of Individuals with Cancer in Uganda during the COVID-19 Pandemic

Authors: Bojang M, Anumolu N, Nangonzi A, Mulamira P, Dickson-Gomez J, Anguzu R, Rine SR, Bikomeye J, Lechleitner K, Kasasa S, Beroza A, Beyer KM.

Project Mentor: Kirsten Beyer, PhD, MPH, MS - **Department:** Institute for Health & Equity

BACKGROUND:

Cancer patients in low-and-middle income countries encounter barriers to healthcare access, yet the impact of COVID-19 on cancer control remains underexplored. With over 585 million cases and six million deaths globally by August 7, 2022, COVID-19 compounds the risks for high-risk populations, including cancer patients. This study examines Ugandan cancer patients' experiences during the pandemic to assess interruptions in cancer services at the Uganda Cancer Institute (UCI) and inform preparedness strategies for future emergencies.

METHODS:

This qualitative study engaged 30 male and female UCI cancer patients through purposive sampling. Interviews, conducted in English or Luganda at UCI, were audio-recorded, transcribed, and thematically analyzed using MAXQDA. Institutional approvals were obtained, and participants received \$9 for their interviews.

FINDINGS:

Between June and July 2022, interviews revealed insights from 19 females and 11 males aged 18 to 71. Common cancers among women included cervical, vulva, and low-risk gestational trophoblastic neoplasia, while prostate, pancreatic, lymphoma, and bone marrow cancers were prevalent among men. Recurring themes encompassed resource shortages, COVID-19 fears, and transportation challenges.

INTERPRETATION:

The study underscores the pandemic's profound impact on cancer care access in Uganda, emphasizing transportation, COVID-19 fears, and care delays as exacerbating factors. These findings underscore the urgency for preparedness strategies to address health crises and mitigate disparities in cancer care access.

Ethical Considerations of Unsedated Esophagogastroduodenoscopy in Pediatric Patients**Authors:** Calciano C, Liphart C, Friedrich A, Diaz C.**Project Mentor:** Christina D Diaz, MD - **Department:** Anesthesiology

OBJECTIVE: To assess the ethical acceptability of unsedated esophagogastroduodenoscopy (EGD) in pediatric patients.

BACKGROUND: A 10 year-old child with a chronic gastroenterology (GI) condition requires an esophagogastroduodenoscopy (EGD). One of the child's parents is requesting an unsedated EGD, citing their experiences in a different country and concerns about anesthetic medications. The child is assenting to the procedure. The patient has previously had multiple sedated EGDs without complications. Concerns are raised by the anesthesia, GI, and operating room teams about the ethics and child safety of performing an unsedated EGD given this is not the typical standard of care at the performing hospital. In this paper we assess whether unsedated EGD with appropriate monitoring is an ethically acceptable alternative to sedated EGD in this instance.

METHODS: We analyzed previous literature, assessed the unique modifiers that might apply in cases like these, and used ethical first principles in order to provide a comprehensive assessment of ethical practice for this procedure.

CONCLUSIONS: The major ethical issues surrounding this case are parental consent vs pediatric assent, EGD safety profile, autonomy vs influence, direct or indirect coercion, and the possibility of child abuse. After a thorough exploration of all factors involved, we recommended that for certain candidate children, this procedure is ethically acceptable. If a care team is uncertain, Child Life or ethics consult team involvement are good next steps.

Comparative Outcomes Assessment of Velopharyngeal Insufficiency and Oronasal Fistula: Does Muscle Overlap Predict Speech Outcomes?**Authors:** Cao D, Zepeda JL, Lucero M, McCarty R, Shakir S, Klement K, Havlik R, Lin K.**Project Mentor:** Kant Lin, MD, MBA - **Department:** Plastic Surgery

OBJECTIVE: To investigate whether levator muscle reconstruction is associated with lower postoperative oronasal fistula (ONF), velopharyngeal insufficiency (VPI), and secondary VPI surgery rates.

DESIGN: A retrospective cohort study.

SETTING: A cleft lip and palate clinic within a single tertiary care academic institution.

PATIENTS/PARTICIPANTS: Non-syndromic infants with cleft lip and palate or cleft palate only undergoing primary palatoplasty by three fellowship-trained craniofacial surgeons between 2001 and 2021 were reviewed. Inclusion required primary surgery under 21 months of age, and at least 7 years of follow-up. A total of 157 infants met the inclusion criteria.

INTERVENTIONS: A comparison of two palatoplasty techniques of either levator muscle reconstruction or no repair: von Langenbeck (VL) and Bardach Two-Flap (BTF) with Intravelar Veloplasty (IVVP).

MAIN OUTCOME MEASURE(S): Primary outcomes were VPI and ONF, defined by preoperative and postoperative Velopharyngeal Function Assessment Score (VFAS) as assessed by speech-language pathology and/or secondary VPI surgery.

RESULTS: In total, n=91 subjects underwent BTF repair at mean age of 12.8 months, n=66 subjects underwent VL repair at mean age of 12.5 months ($p<0.33$). VFAS scores at initial post-operative assessment were not significantly different between cohorts (4.2 BTF v. 5.3 VL, $p<0.10$). The VL cohort exhibited the greatest rates of postoperative ONF (29% BTF v. 64% VL, $p<0.001$), VPI (42% BTF v. 59% VL, $p<0.04$), and secondary speech surgery (32% BTF v. 59% VL, $p<0.001$).

CONCLUSIONS: Our data indicates that levator muscle repair is associated with decreased rates of ONF, VPI, and need for secondary speech surgery; no overlap (von Langenbeck) portends poorer outcomes compared to end-to-end repair (Bardach Two-Flap).

Improving phonological short-term memory in healthy older adults by synchronizing brain oscillatory activity**Authors:** Carew KM, Youssofzadeh V, Ustine CJM, Binder JR, Shah-Basak P.**Project Mentor:** Priyanka Shah-Basak, PhD - **Department:** Neurology

OBJECTIVES: A novel neuromodulatory technique called transcranial alternating current stimulation (tACS) is shown to entrain brain's oscillatory activity and improve cognitive and motor outcomes. The effects of tACS on verbal memory is largely unknown. In this pilot study, we investigated short-term effects of tACS, in the theta and alpha frequency ranges (4-8 Hz) targeted to the frontal and temporoparietal (TP) brain regions, on phonological short-term memory (pSTM). **METHODS:** Eligible participants were right-handed, native English speakers, between the ages of 50-70 years, with no comorbid neurological or psychiatric disorders. Ten participants completed two to four separate sessions of 20-minutes tACS. All participants underwent in-phase (peaks and troughs of tACS aligned between brain regions) and anti-phase (peaks and troughs completely misaligned) tACS in the theta range (4-7 Hz). A subset of participants returned for two additional sessions at an alpha frequency (8 Hz). Participants completed a pSTM task at varying difficulty levels, estimating pSTM capacity, immediately prior to, during, and after tACS. The main outcome measures were changes in difficulty level and reaction time (RT) between in-phase and anti-phase tACS over pre-, during- and post-tACS conditions. **RESULTS AND DISCUSSION:** Five participants completed tACS with theta and the rest completed both theta and alpha sessions. Results show a trend toward increased pSTM performance during theta tACS when targeting the left middle frontal gyrus and inferior parietal gyrus within the in-phase condition. There may be some effect on pSTM performance when targeting left inferior frontal gyrus and inferior parietal gyrus when delivered in-phase in the alpha frequency range.

Risk of Neuroinflammatory Diseases Among New Recipients of Biologic and Targeted Synthetic Disease-Modifying Antirheumatic Drugs**Authors:** Casey M, Pannu S, Bajwa S, Duarte-García A, Putman M.**Project Mentor:** Michael Putman MD/MSci - **Department:** Medicine**BACKGROUND:**

Neuroinflammatory adverse events have been observed among new users of tumor necrosis factor (TNF) inhibitors. No studies to date have compared the real-world risk of TNFs to other new users of biologic or targeted synthetic disease modifying antirheumatic drugs (b/tsDMARD). The objective of this study is to describe the risk of neuroinflammatory disease after initiation b/tsDMARDs.

METHODS:

This new-user comparative effectiveness cohort study utilized a large US-based electronic health-records database to describe the unadjusted incidence of neuroinflammatory adverse events over a 3-year period. The cohort included patients with rheumatoid arthritis, psoriasis, psoriatic arthritis, ankylosing spondylitis, Crohn's disease, or ulcerative colitis initiating treatment with a TNFi (n=93,661) or other b/tsDMARD (n=38,354) were included.

RESULTS:

Among 132,015 patients included in the analysis, the most common first biologic agent was a TNF inhibitor, the unadjusted incidence of neuroinflammatory events was numerically lower among new users of TNF inhibitors (incidence 1.34 per 1,000 patient-years) as compared to the combined non-TNF group (1.69 per 1,000 patient-years). There was no significant association between TNF exposure and neuroinflammatory events as compared to the combined non-TNF b/tsDMARDs overall (hazard ratio [HR] 1.01, 95% confidence interval [CI] 0.75-1.36) and within each disease group.

CONCLUSION:

The overall risk of neuroinflammatory events among new users of TNF inhibitors did not differ substantially as compared to new users of other b/tsDMARDs. Meta-analyses of randomized trials should be conducted to corroborate these findings, which may be affected by channeling bias.

A Review of Local Global Health Education in Post-Graduate Medical Education Around the World

Authors: Lam SK, Celix B, Lenhard N, Cobb C, Van Genderen K, Gundacker C, Schleicher M, Colbert CY.

Project Mentor: Constance Gundacker, MD, MPH - **Department:** Pediatrics

Community Partner: Cleveland Clinic Lerner College of Medicine of Case Western Reserve University

BACKGROUND: Global health (GH) education is offered in post-graduate medical education (PGME) programs. As a result of the COVID-19 pandemic and critical examinations of the colonial legacies of GH work, educator experts have identified seven post-colonial components for local GH health education, a framework for serving local communities. **OBJECTIVE:** To examine local GH education in PGME contexts around the world. The analysis describes curricular components, factors facilitating successes, and challenges to implementation and execution using a validated checklist. **METHODS:** A post-colonial conceptual framework was utilized in structuring the review. In May 2022, eight databases and MedEd Portal were searched using key words describing local GH education curricula published after the year 2000. Over 7,200 s resulted from the search.

RESULTS: Of 68 included full-text articles, the majority (n=51; 75%) originated in the United States. Local GH education programs in residencies (n=52; 76.4%) and fellowships (n=10; 14.7%) spanned multiple specialties, with non-surgical specialties publishing the most. The components of the curricula and patient populations were diverse. Successful programs included faculty mentoring, community-based participation or partnership, and a multidisciplinary curriculum structure. Scheduling challenges, cultural and linguistic differences, and trainee workload contributed to difficulties in implementation. Only four programs included all seven post-colonial framework components.

CONCLUSIONS: Local GH curricula vary widely in their clinical experiences, didactic sessions, and inclusion of mentorship and partnerships. Local populations within the communities of these training programs could benefit from increased trainee engagement, knowledge, and commitment to continued care for these patients, ultimately addressing healthcare inequities.

Longitudinal imaging of the parafoveal cone mosaic in congenital achromatopsia

Authors: Chen N, Litts KM, Nikezic D, Langlo CP, Higgins BP, Lam BL, Collison F, Pennesi ME, Kay CN, Tarima S, Carroll J.

Project Mentor: Joseph Carroll, PhD - **Department:** Ophthalmology & Visual Sciences

PURPOSE: To assess longitudinal changes in parafoveal cone density in individuals with congenital achromatopsia (ACHM).

PARTICIPANTS: Nineteen individuals (7 female, 12 male) with genetically confirmed ACHM. To be eligible, each had adaptive optics scanning laser ophthalmoscope (AOSLO) images of the photoreceptor mosaic from at least two timepoints.

METHODS: For each individual, follow-up AOSLO montages were aligned to their baseline montage. 100 x 100 μm regions of interests (ROIs) were extracted from the split-detection modality at locations 1°, 5°, and 10° temporal (T) from the peak cone density in each montage. All ROI's from follow-up visits were then manually aligned to their respective baseline ROI for that location. Cones were identified in each ROI by one observer, reviewed by a second observer, and confirmed together in a masked fashion. Cone density was calculated, and a linear mixed model was used to assess changes in density over time. A Wald test was performed to determine if the change in cone density over time for each parafoveal location was statistically significant.

RESULTS: The mean (\pm SD) age at baseline was 21.6 ± 10.7 years and the mean (\pm SD) follow-up period was 3.62 ± 2.98 years (range: 0.46 - 8.65 years). At 1°T, we observed a significant decrease of 352 cones/ mm^2 per year ($p=0.0003$). At 5° T, the linear mixed model showed a non-statistically significant decrease of 58 cones/ mm^2 per year ($p=0.504$). At 10° T, we observed a significant decrease of 139 cones/ mm^2 per year ($p=0.0188$). For a 100 x 100 μm ROI, these density changes correspond to a reduction of between 0.5-4 cones per year, depending on the location.

CONCLUSION: Parafoveal cone density estimates in ACHM show a small but statistically significant decrease over time. These observed changes are within the previously reported longitudinal repeatability values for normal retinas, suggesting the observed average cone loss may not be clinically meaningful.

Impact of COVID-19 on post-myocardial infarction ventricular septal defect

Authors: Chen T, Seadler B, Zelten J, Carlson S, Szabo A, Liu J, Joyce D, Pearson P.

Project Mentor: Paul Pearson, MD, PhD and Benjamin Seadler, MD - **Department:** Surgery

BACKGROUND: Ventricular septal defect (VSD) following myocardial infarction (MI) is a rare yet severe complication, primarily associated with anterior MI. While advancements in reperfusion therapies have historically reduced its incidence, the COVID-19 pandemic has introduced challenges to healthcare systems, potentially impacting patient outcomes.

GOALS: This study aims to assess the impact of the COVID-19 pandemic on post-MI VSD incidence and outcomes. Specifically, it seeks to evaluate trends in VSD occurrence following MI over several years, with a focus on the pandemic era, and to characterize the patient population affected by post-MI VSD during this period.

METHODS: This retrospective study utilizes data from the Society of Thoracic Surgeons (STS) to investigate the impact of the COVID-19 pandemic on post-MI VSD. Adult patients diagnosed with post-infarct VSD were included, excluding those with prior VSD history. Data were analyzed using specific diagnostic and timeline codes, with statistical analyses conducted to assess trends.

RESULTS: Findings reveal a concerning increase in post-MI VSD surgeries during the pandemic, despite an overall decrease in cardiac surgeries. Notably, the percentage of VSD surgeries among cardiac surgeries rose significantly in 2019-2020, coinciding with the pandemic's onset. Additionally, there was an observed increase in the utilization of mechanical circulatory assist devices, particularly among patients presenting late after MI diagnosis.

DISCUSSION: The study highlights the pandemic's potential impact on post-MI VSD incidence and outcomes, suggesting delays in seeking healthcare and surgical interventions. Factors such as comorbidities and delayed presentations may contribute to the observed trends. Future analyses will explore the implications of these findings on patient management strategies and outcomes, emphasizing the importance of proactive post-MI care during crises.

Philosophical Anthropology Through the Eyes of Phenomenology: Analyzing the Human in Medicine

Authors: Chu JT, Jotterand F

Project Mentor: Fabrice Jotterand, PhD - **Department:** Institute for Health & Equity

BACKGROUND: Philosophical anthropology, or "what it means to be human", holds significance for the clinical encounter, medical ethics, and the social impact of medical advances. Phenomenology is a 20th-century philosophical movement that emphasizes the subjective experiences of humans in philosophical analysis. Although phenomenology has gained prominence in medical research involving patient and practitioner experiences, phenomenology's contribution to philosophical anthropology in medicine remains unclear. While emerging technologies may alter core aspects of medicine, robust understandings of the human can preserve what matters in clinical encounters.

PURPOSE: This study sought to identify the relevant themes comprising philosophical anthropology in medicine as seen through phenomenology in the current medical literature.

METHODS: A literature search was conducted using search terms related to philosophical anthropology. The eligibility of 531 titles and s was assessed and analyzed to identify core themes in the phenomenological account of the human.

RESULTS: Forty-three articles provided phenomenological accounts of philosophical anthropology. Six major themes of philosophical anthropology identified in these articles include embodiment, the human experience as subjective and objective, one's existential context, empathy, vulnerability, and agency.

CONCLUSIONS: By broadly examining phenomenological philosophical anthropology in medicine, this study identifies the main themes of contemporary phenomenology that are relevant to clinical encounters and experiences of illness. This content analysis demonstrates the potential utility of phenomenology in counteracting destructive notions of the human, such as those promoted by posthumanism, by celebrating rather than scorning core aspects of the human experience such as embodiment and vulnerability. Future work includes analyzing the philosophical potency of current phenomenological methodologies in medicine.

Quality and sustainability of Ethiopia's national surgical indicators

Authors: Cook KR, Zeleke ZB, Gebrehana E, Burssa D, Yeshanew B, Michael A, Tediso Y, Jaraczewski T, Dodgion C, Beyene A, Iverson KR.

Project Mentor: Katie R Iverson, MD, MPH - **Department:** Surgery

In 2015, the Ethiopian Federal Ministry of Health (FMOH) developed the SaLTS initiative to improve national surgical care. Previous work led to development and implementation of 15 surgical key performance indicators (KPIs) to standardize surgical data practices. The objective of this project is to investigate current practices of KPI data collection and assess quality to improve data management and strengthen surgical systems. The first portion of the study documented the surgical data collection process including methods, instruments, and effectiveness at 10 hospitals across 2 regions in Ethiopia. Secondly, data for KPIs of focus [1. Surgical Volume, 2. Perioperative Mortality Rate (POMR), 3. Adverse Anesthetic Outcome (AAO), 4. Surgical Site Infection (SSI), and 5. Safe Surgery Checklist (SSC) Utilization] were compared between registries, KPI reporting forms, and the DHIS2 (district health information system) electronic database for a 6-month period (January - June 2022). Quality was assessed based on data completeness and consistency. The data collection process involved hospital staff recording data elements in registries, quality officers calculating KPIs, completing monthly KPI reporting forms, and submitting data into DHIS2 for the national and regional health bureaus. Data quality verifications revealed discrepancies in consistency at all hospitals, ranging from 1-3 indicators. For all hospitals, average monthly surgical volume was 57 cases, POMR was 0.38% (13/3399), inpatient SSI rate was 0.79% (27/3399), AAO rate was 0.15% (5/3399), and mean SSC utilization monthly was 93% (100% median). Half of the hospitals had incomplete data within the registries, ranging from 2-5 indicators. AAO, SSC, and SSI were commonly missing data in registries. As the FMOH introduces new changes, we recommend continuous and consistent quality checks and data capacity building, including the use of routinely generated health information for quality improvement projects.

Sacroplasty with or without Screw Fixation for Metastatic Sacral Tumors

Authors: Cox EP, Tutton S, Scheidt M, Key B, Neilson JC, Wooldridge A, Bedi M, Hackbarth D, King DM.

Project Mentor: David M King, MD - **Department:** Orthopaedic Surgery

BACKGROUND: Cementation (sacroplasty) with or without ablation has been shown to improve pain and function for patients with sacral metastatic disease. Percutaneous screw fixation with sacroplasty (PSFS) may provide superior outcomes in select patients.

QUESTIONS/PURPOSE: (1) Determine when PSFS may lead to superior outcomes in comparison to sacroplasty alone when treating sacral metastatic disease. (2) Determine when sacroplasty without additional screw fixation is sufficient when treating sacral metastatic disease.

METHODS: Thirty patients with sacral metastases who underwent sacroplasty with or without ablation and screw fixation at a single institution were retrospectively reviewed. Patients were compared based on treatment (PSFS or sacroplasty alone) and fracture status (pathological or impending) with an independent t-test. Traumatic fractures were excluded. Functional outcomes were assessed using the Musculoskeletal Tumor Society (MSTS) score. The rate of secondary procedures as well as changes in narcotic usage were noted.

RESULTS: Patients with pathological fractures who underwent PSFS demonstrated increased postoperative MSTS scores compared to those who underwent sacroplasty (51% +/- 19 versus 25% +/- 13, $p < 0.001$). Patients with impending pathological fractures who underwent PSFS did not demonstrate increased postoperative MSTS scores compared to those who underwent sacroplasty alone (38% +/- 17 versus 32% +/- 12, $p = .3465$).

CONCLUSIONS: PSFS may provide additional benefit for patients with pathological fractures, while sacroplasty alone may be sufficient for those with impending pathologic fractures secondary to sacral metastatic disease. This study was limited by its retrospective design and sample size; however, the results may aid in treatment indications for sacral metastases and guide further research.

Do the Documented Emergency Department Discharge Analgesic Prescriptions Match Parents' Report?

Authors: Czarnecki RW, Alpern ER, Nielsen B, Webb M, Leonard JC, Brousseau DC, Chamberlain JM, Zorc JJ, Babcock L, Wiersma A, Ali S, Barney BJ, Drendel AL, PECARN IMPROVE and PECARN Registry Study Groups.

Project Mentor: Amy L Drendel, DO, MS - **Department:** Pediatrics

BACKGROUND: Studies using electronic health record (EHR) review report low rates of analgesic recommendations, a vital component of at-home pain treatment for children discharged from the Emergency Department (ED). The objective was to compare parent report of discharge medications to EHR-documented prescriptions.

METHODS: In a multi-center prospective study of 4-17-year-olds discharged after ED fracture evaluation, parents reported recommended medications by text. EHR-recorded discharge prescriptions were extracted from the Pediatric Emergency Care Applied Research Network (PECARN) Registry. Differences in analgesics recommended between sources and characteristics associated with concordance were evaluated using multivariable logistic regression.

RESULTS: 2113 parents from 7 EDs were included. Patient mean age was 9.6 years (SD 3.5), with majority male (62%) and non-Hispanic White (58%). Most fractures were upper extremity (86%) and non-reduced (53%). 98% of parents' opioid report matched EHR documentation; oxycodone (15%) was most recommended. Moderate pain at ED discharge was associated with lower concordance for opioids (aOR=0.3, 95% CI: 0.1, 0.7) compared to no/mild pain. 18% of parents' non-opioids reports matched EHR documentation; ibuprofen (94%) and acetaminophen (85%) were most recommended. Parents reported a mean 1.8 (SD 0.5) non-opioid analgesics, but EHR recorded 0.4 (SD 0.7). There was higher concordance for children with government insurance (aOR=1.7, 95% CI: 1.3, 2.2) compared to private insurance. **CONCLUSION:** Determination of the validity of analgesic recommendations based on EHR sources supports better health services research. EHR ED opioid discharge prescription data are a reliable source for home pain treatment. For non-opioid analgesics, parents reported high rates of recommendations not documented in the EHR discharge prescriptions. This suggests prior studies that relied on prescription documentation underestimated medication recommendations.

Community-Based Health Planning and Services (CHPS) and Blood Pressure Monitoring in a Rural Ghanaian Compound

Authors: Danso N, Caples L.

Project Mentor: Linda Caples, PhD - **Department:** School of Medicine Administration

INTRODUCTION: A 2019 study revealed that some non-physician providers in Ghana accept higher blood pressures for hypertensive patients (160/90 mmHg) as "normal" instead of adhering to guidelines and controlling BP that are $\geq 140/90$ mmHg. Given the increased investment in the development and expansion of CHPS, there may be a need to reassess blood pressure measurement and monitoring practices of community health workers (CHW) in Ghana to provide adequate hypertensive treatment.

STUDY METHODS: A literature search of the PUBMED database was conducted from 2012 to 2022. The review was limited to population-based studies. Variables extracted included author, year of survey, CHPS site, study population, sample size, needs assessment, patient population, type of training, and change in knowledge/practice.

RESULTS: We identified 20 population-based studies conducted on hypertension and CHPS in Ghana and Sub-Saharan Africa. Findings from the studies revealed that in many parts of Sub-Saharan Africa CHWs play a critical role in BP measurement. In many studies, trained CHWs contributed to community adherence to BP management. Only one study outlined prior formal or informal training of CHWs in BP measurement. Training often focused on knowledge acquisition rather than change in practice. Many studies included surveys and interviews of CHWs however there was a lack of data in observations and implementation. Potential opportunities for continuing professional development of CHWs in BP measurement are increasing implementation of acquired cardiovascular knowledge.

CONCLUSION: With proper education and interventions, CHWs can play a beneficial role in BP measurement and monitoring. Further study is needed on the initial training of CHWs in BP measurement as well as strategies to change practice.

The Frequency and Characteristics of Labral Tears in Operatively Treated Acetabular Fractures

Authors: Davis J, Nolt E.

Project Mentor: Elizabeth Nolte, MD - **Department:** Orthopaedic Surgery

INTRODUCTION

The development of post-traumatic arthritis (PTA) requiring conversion to total hip arthroplasty (THA) is a significant complication of acetabular fractures. Existing literature describes injury-specific risk factors associated with the need for conversion THA including marginal impaction, comminution, and femoral head lesions. However, no studies to-date have investigated the frequency and characteristics of labral injuries in operatively treated acetabular fractures. The aim of this project is to assess the frequency and characteristics of labral injuries in operative acetabular fractures. This study lays the foundation for future work investigating the relationship between labral injuries and the incidence of PTA among patients with acetabular fractures treated by a posterior approach.

METHODS

This is prospective observational study of adult patients undergoing open reduction and internal fixation of an acetabular fracture through a posterior approach at Froedtert Hospital. Surgeons evaluated injuries intraoperatively and documented the presence of labral pathology and other associated soft tissue damage.

RESULTS

Labral injuries were observed in 45 patients (92%). Nearly all labral injuries involved the zone corresponding to the posterior-inferior acetabulum (98%). All injuries demonstrated detachment of the labrum from the acetabular rim, while two (5%) demonstrated intrasubstance tearing in addition to detachment. No patients required a conversion THA for PTA within two years of index surgery at the time of this writing.

CONCLUSION

Labral injuries occur commonly in operative acetabular fractures fixed through a posterior approach. Furthermore, these injuries frequently represent a detachment of the posterior-inferior labrum. The prevalence of labral injuries suggests a need to understand their association with the development of PTA.

Difference in Management and Outcomes of Gastroschisis Patients Born at Night

Authors: Davis AP, Schuh JM, Marquart J, Bergner C, Salazar JH.

Project Mentor: Jose H Salazar MD, PhD - **Department:** Surgery

BACKGROUND: Infants with gastroschisis are at increased risk of premature labor and stillbirth; scheduled induction at 35-37 weeks is standard, affording a level of control over birth time. The effect of time of birth (after hours or daytime hours) on outcomes is unknown.

METHODS: A retrospective single-institution review was performed analyzing patients with gastroschisis born from 2014- 2023. Only infants born at our institution were included. Patients transitioned to comfort care measures immediately after birth were excluded. The population was stratified by complex and simple gastroschisis. Two birth time cohorts were compared: daytime hours (7 am to 7 pm) versus after hours (7 pm to 7am). Differences in therapeutic approach and outcomes were investigated.

RESULTS: There were significant differences in modality of repair based on timing of birth: specifically, babies born after hours were more likely to receive silo placement in the OR (42% vs 17%, $p=0.003$) and had longer narcotic use (10 vs. 6 days, $p=0.022$). Babies born after hours required more median OR events (2 vs. 1, $p=0.006$) than daytime counterparts. No differences were found in length of TPN use or mortality amongst both birth time cohorts.

CONCLUSIONS: Patients with gastroschisis born after hours are more likely to be managed with a silo than immediate primary closure. Patients born at night require more OR events and have longer narcotic use. There are no differences in length of TPN use or mortality. Intentional timing of induction and standardized gastroschisis protocols may facilitate improved outcomes.

Impact of Skin Closure on Surgical Site Infection Rates Following Laparotomy in Contaminated or Dirty Fields in Emergency General Surgery**Authors:** Dittrich S, Dodgion C, Peschman J, Carver T.**Project Mentor:** Thomas Carver, MD - **Department:** Surgery

INTRODUCTION: Previous studies have compared timing with surgical site infection rates (SSI); however, most of these studies occurred outside the US and involved mainly appendectomies, performed mostly laparoscopically today. We performed this study to determine the effect of delayed primary closure (DPC) and primary closure (PC) on SSI rates after an abdominal exploratory laparotomy in trauma and acute care surgery (ACS) patients.

METHODS: A retrospective chart review was performed at a single institution for trauma and ACS patients admitted from 12/2020 to 3/2022. Exclusion criteria included planned healing by secondary intention, death <7 days following surgery, laparoscopic surgery, and patients <18 years old.

RESULTS: 100 trauma patients and 71 ACS patients underwent exploratory laparotomy and met inclusion criteria. DPC and PC were performed in 35% and 65% of trauma patients, respectively. SSI occurred in 25.7% and 24.6% of DPC and PC patients ($p = 0.9$). ACS patients underwent DPC in 15.1% of patients and PC in 82.2% of patients. SSI occurred in 54.5% of DPC patients and 20% of PC patients ($p = 0.03$).

CONCLUSION: Although sample sizes are small, the data suggests that closure method does not significantly impact SSI rate in trauma patients, however, DPC is associated with a higher SSI rate in ACS patients. Both findings call into question the utility of DPC in emergency general surgery.

Centering Lived Experience in Substance Use Disorder Treatment Education (CLESTE): A Video Series**Authors:** Dixit N, Pearcy J, Hayes JR.**Project Mentor:** John R Hayes, MD - **Department:** Family & Community Medicine

Centering Lived Experience in Substance Use Disorder Treatment Education (CLESTE) seeks to provide an educational resource that centers the voices of those who live with a substance use disorder (SUD) and/or work within the field through a series of short, filmed interviews videos focusing on the question: "What do you want your doctor to know about your substance use disorder?" Medical student education in SUD treatment lacks patient voice and experience, rendering a partner in healthcare decisions relatively silent. CLESTE consists of a series of short videos, focusing on interlocutors answering the question: "What do you want your doctor to know about your substance use disorder?" CLESTE is an educational resource to supplement student education with the lived experience of patients, physicians, and allied professionals, emphasizing some of the realities people face when managing their own substance use disorder or when caring for those living with one.

Social determinants of health correlations and resource usefulness at a Milwaukee free clinic for uninsured individuals: A cross-sectional study

Authors: Doucas A, Miller J, Karra H, Thareja SK, Bowie O, Dong X, Terrell J, Hernandez S, Corujo-Ramirez AM, Xia N, Qi S, Huang C, Lundh R, Young SA.

Project Mentor: Staci Young, PhD - **Department:** Family & Community Medicine

INTRODUCTION: Addressing social determinants of health (SDOH) is fundamental to improving health outcomes. At a student-run free clinic, we developed a screening process to understand the SDOH needs and resource utilization of Milwaukee's uninsured population.

METHODS: In this cross-sectional study, we screened adult patients without health insurance (N = 238) for nine traditional SDOH needs as well as their access to dental and mental health care between October 2021 and October 2022. Patients were surveyed at intervals greater than or equal to 30 days. We assessed correlations between SDOH needs and trends in patient-reported resource usefulness.

RESULTS: Access to dental care (64.7%) and health insurance (51.3%) were the most frequently endorsed needs. We found significant correlations ($P \leq 0.05$) between various SDOH needs. Notably, mental health access needs significantly correlated with dental ($r = 0.41$; 95% CI = 0.19, 0.63), medications ($r = 0.51$; 95% CI = 0.30, 0.72), utilities ($r = 0.39$; 95% CI = 0.17, 0.61), and food insecurity ($r = 0.42$; 95% CI = 0.19, 0.64). Food-housing ($r = 0.55$; 95% CI = 0.32, 0.78), housing-medications ($r = 0.58$; 95% CI = 0.35, 0.81), and medications-food ($r = 0.53$; 95% CI = 0.32, 0.74) were significantly correlated with each other. Longitudinal assessment of patient-reported usefulness informed changes in the resources offered.

CONCLUSIONS: Understanding prominent SDOH needs can inform resource offerings and interventions, addressing root causes that burden under-resourced patients. In this study, patient-reported data about resource usefulness prompted the curation of new resources and volunteer roles. This proof-of-concept study shows how longitudinally tracking SDOH needs at low-resource clinics can inform psychosocial resources.

A Milwaukee Syndemic? Penetrative Injury and COVID-19

Authors: Dove A, Kallies KJ, Hargarten S, Tomas CW.

Project Mentor: Carissa Tomas, PhD - **Department:** Institute for Health & Equity

OBJECTIVE: To evaluate injury frequency of penetrative trauma before and after stay-at-home orders were implemented due to COVID-19 in Wisconsin.

METHODS: Patients who presented to a level I trauma center between January 2018 and December 2021 with a mechanism of injury of firearm or stab wound were included. The study was split into pre-COVID (January 2018-February 2020) and COVID (March 2020-December 2021) periods. Statistical analysis included chi-squared tests and interrupted time series analysis.

RESULTS: 1,702 patients met inclusion criteria. The COVID group had a statistically significantly higher proportion of firearm injuries (83.2%) and a significantly lower proportion of stab injuries (16.8%) compared to the pre-COVID time group (70% and 30%, respectively, $p < .001$). There was no change from pre-COVID to COVID periods in in-hospital mortality or length of hospital stays. There was an increase in firearm incidents in the COVID period in 72% of Milwaukee County zip codes and a decrease in stab incidents in 48% of zip codes. Interrupted time series analysis indicated a significant increase from pre-COVID to COVID in monthly firearm and stab injuries. Firearm injury significantly increased from pre-COVID to COVID for Black or African American patients but no other racial group.

CONCLUSION: These findings are consistent with other state and national trends suggesting increasing penetrative injury during the COVID-19 pandemic. The intersection of the COVID-19 pandemic and violence pandemic may yield a "syndemic", imposing a significant burden on trauma systems. Evidenced-based public health interventions are needed to mitigate the surge of firearm injuries.

A retrospective analysis of open and endovascular repair of traumatic extremity vascular injuries**Authors:** Driscoll J, Jean XV, Pokrzywa C, Murphy P.**Project Mentor:** Patrick Murphy, MD, MPH - **Department:** Surgery

OBJECTIVES: Open surgical repair of traumatic extremity vascular injuries is the current standard of care. Recent advances in endovascular approaches offer numerous benefits such as reduced wound complications and faster operative times. This study aims to compare outcomes following open or endovascular repair of traumatic extremity vascular injuries.

METHODS: A retrospective analysis over 10-years (Jan 2011 to Dec 2021) of patients presenting with an extremity vascular injury at an urban Level 1 trauma center. Surgical intervention was identified as either an open or endovascular approach and was subclassified based on the specific type of repair. The primary outcome of this study was technical success, and the secondary outcome was long term patency.

RESULTS: Between January 2011 and December 2021, 468 patients presented with a major vascular injury in an extremity. 404 (94%) of these injuries were repaired open, 19 (5.6%) endovascular. Penetrating trauma was the most common mechanism of injury (70%). Patients treated with an endovascular approach had a higher ISS (15 v 10., $p < 0.001$), were more co-morbid (Charlson Comorbidity Index 2 v 0 $p = < 0.001$), and more physiologically deranged with significant differences in first hemoglobin (11 v 12, $p = 0.05$) and need for transfusion (8 v 3 units, $p = < 0.001$). In-hospital outcomes were worse for patients undergoing endovascular repair including ICU and hospital length of stays, ventilator days, and mortality, Table 1. There were no significant differences in thromboembolic complications or wound complications (12.5% v 8.2%, $p = 0.46$) between endo and open repair. At 6 months there was no difference in patency of the repair (97% v. 100%).

CONCLUSION: An endovascular approach is feasible for extremity vascular trauma with similar short-term patency rates. Most patients still undergo open repair and further study is needed to identify the patient population who will maximally benefit from a minimally invasive approach.

Sagittal Plane Hip Kinematics Following Total Hip Arthroplasty During Stair Ascension and Descension**Authors:** Earll E, Middleton A, Geissler T, Dzuik C, Edelstein A, Fritz JM.**Project Mentor:** Jessica Fritz, PhD - **Department:** Orthopaedic Surgery

INTRODUCTION: The direct anterior approach (DAA) is a relatively novel orthopedic surgical technique in total hip arthroplasty (THA). There are conflicting conclusions regarding the efficacy of DAA compared to other methods of THA. On stairs, DAA has shown reduced hip extension, flexion and power during stair ascension and descension compared to controls, but no analysis compared anterior to posterior approach groups. Our goal of the study was to determine if there are kinematic differences between the affected and unaffected side in the sagittal plane after DAA THA. We hypothesized the DAA group will have symmetrical kinematics between affected and unaffected sides during stair ascension and descension.

METHODS: Participants underwent a unilateral DAA THA at least one year prior to data collection for osteoarthritis. A total of eleven participants completed the IRB-approved protocol. Data was collected at the MCW Center for Motion Analysis. Reflective markers were placed and participants were asked to begin motion analysis by climbing stairs; three steps ascending and three steps descending. Data were collected from twelve infrared Vicon MX40 cameras using Vicon Nexus 2.11 software. Data were assessed for symmetry as affected versus unaffected sides using a Welch's t-test with significance set at $p < 0.05$.

RESULTS: The affected side showed less ankle dorsiflexion during the load response portion of the gait cycle when ascending stairs and during midstance when descending stairs with a consistent trend of a plantarflexion shift throughout the cycle while ascending stairs and during stance descending stairs. The affected side showed significantly less knee flexion than the unaffected side for a short time during midstance, though it trended this way for more of the stance phase.

Patient Characteristics in Gender-Affirming Surgical Procedures: An Analysis of HCUP-NIS and NASS Years 2016-2019

Authors: Ebert M, Guo M, Yang Y, Szabo A, Klement K.

Project Mentor: Kristen Klement, MD - **Department:** Plastic Surgery

BACKGROUND: Gender-affirming care is becoming increasingly available throughout the United States, but little research has been done to describe the characteristics of patients undergoing these procedures. This study describes the demographic, geographic, and socioeconomic characteristics of transgender and nonbinary patients undergoing gender-affirming procedures in the United States.

METHODS: Data from the Healthcare Cost and Utilization Project National Inpatient Sample and National Ambulatory Surgery Sample 2016-2019 was analyzed. Patients were identified using primary diagnosis and procedure codes (ICD-10, CPT) related to gender-identity disorders (GID) and gender-affirming surgeries (GAS). Demographic, geographic, and socioeconomic data were analyzed.

RESULTS: The study identified 3,295 inpatients and 23,911 outpatients with GID diagnoses receiving gender-affirming surgeries (GAS) from 2016 to 2019. Inpatients, primarily white and male (median age 32), mainly underwent genital procedures (93%), while outpatients, mostly female (median age 26), commonly had breast/chest surgeries (75%). The number of white transgender inpatients receiving GAS increased, while other races remained unchanged. Metropolitan areas (49%) and urban teaching hospitals (79%) saw the most patients. Western regions had the highest patient population (52% inpatient, 49% outpatient). Most patients received GAS in private, non-profit hospitals (66% inpatients, 76% outpatients). When examining primary payers, most patients used private insurance (60% inpatients, 62% outpatients). Inpatient Medicare/Medicaid usage rose, while self-pay decreased; outpatients showed a similar trend, but with increasing private insurance usage.

CONCLUSION: This study highlights shifts in healthcare patterns among transgender and nonbinary individuals receiving gender-affirming surgery, emphasizing the need for further research to assess how patient characteristics may influence surgical outcomes.

A vascularized Olecranon Graft: Innovations in Hand Surgery

Authors: Ehioghae M, Hettinger P.

Project Mentor: Patrick Hettinger, MD - **Department:** Plastic Surgery

INTRODUCTION:

In reconstructive surgery, bone grafts are crucial for addressing fractures, avascular necrosis, and non-unions. Vascularized bone grafts, though effective, often require harvesting from distant sites, posing risks and complexities. Utilizing the olecranon as a donor site presents compelling advantages, including proximity, minimal morbidity, and inconspicuous scarring.

METHODS:

We present a case of a 28-year-old male with a traumatic fourth metacarpal defect who underwent reconstruction using a vascularized olecranon bone graft. Surgical technique involved meticulous microdissection to preserve neurovascular structures, followed by arterial and venous anastomoses. Postoperative rehabilitation included hand therapy.

RESULTS:

The patient exhibited significant improvement in range of motion, grip strength, and functional abilities. Radiographic assessment at one year post-injury demonstrated healing and fusion of the vascularized bone flap, with satisfactory hand perfusion and functional restoration.

DISCUSSION:

Utilizing the olecranon as a donor site for vascularized bone grafts offers advantages over traditional sites, making it promising for managing complex hand traumas. Further research is needed to validate its efficacy in clinical practice.

Improving Phonological Ability in Stroke Survivors with Aphasia Using Transcranial Alternating Current Stimulation

Authors: Erickson K, Zadeh VY, Ustine C, Binder JR, Shah-Basak P.

Project Mentor: Priyanka Shah-Basak, PhD - **Department:** Neurology

Aphasia is a devastating communication disorder that often occurs after a left hemispheric stroke, affecting one-third of stroke survivors and resulting in significant deficits in language, physical independence, and emotional health. A subset of these impairments reflect phonological abilities, or the perception, retrieval, and maintenance of speech sounds. In this study, we sought to improve phonological short-term memory (pSTM) in 11 stroke survivors with aphasia (SWA) utilizing transcranial alternating current stimulation (tACS). This form of noninvasive brain stimulation entrains endogenous oscillatory activity, inducing synchrony across distant brain regions involved in phonological processes to hopefully augment pSTM capabilities in SWA. TACS was delivered in three conditions: in-phase, where AC stimulation was delivered with 0° phase difference to inferior frontal and temporoparietal brain regions, anti-phase (180° phase difference between regions), and sham stimulation. The ability of SWA to hold phonological information in STM, or pSTM capacity, was measured as SWA's ability to correctly complete an adaptive pSTM task (reported as mean adjusted difficulty level accomplished during each tACS condition). We found pSTM capacity significantly increased during in-phase stimulation compared to anti-phase stimulation. These effects manifest only while stimulation is delivered, indicating that tACS effects do not outlive the stimulation period. These results are exciting and partially reflect the patterns hypothesized. By expanding this study to include more participants and correlating magnetoencephalography (MEG) data recorded while participants complete the pSTM task, we hope to understand more about the mechanism of pSTM in SWA and how tACS may be applied to enhance functional communication.

Factors Associated with Persistent Positive Suicide Screens in the Pediatric Emergency Department

Authors: Esson MK, Ballew A, Kohlbeck S, Visotcky A, Pickett ML.

Project Mentor: Michelle Pickett, MD, MS - **Department:** Pediatrics

INTRODUCTION: Youth suicide is a critical public health issue, yet understanding demographic factors related to sustained positive screenings on the Ask Suicide-Screening Questions (ASQ) remains limited. This study aims to identify sociodemographic factors associated with persistent positive ASQ among youths in Emergency Departments (EDs). **METHODS:** A retrospective chart review of pediatric patients (aged 11-18) in an urban tertiary care children's hospital ED between October 2018 and June 2021 was conducted. Patients with a positive ASQ at the index visit and at least one subsequent visit were included, excluding repeats within 30 days. Demographic factors and visit characteristics linked to persistent positive ASQ were analyzed. **RESULTS:** Among 319 encounters, 31% showed continued positive ASQ responses at the second visit. Females exhibited higher rates of sustained positive ASQ than males (35.8% vs. 18.9%). Patients with private insurance were more likely to have persistent positive ASQ screenings than those with public insurance (41.0% vs. 27.7%). Provision of inpatient psychiatric resources during the index visit was linked to decreased persistent positive ASQ responses. **DISCUSSION/FUTURE DIRECTIONS:** Despite ASQ's potential for early intervention, this study underscores gaps in intervention efficacy. Future research should focus on larger, longitudinal studies to understand factors contributing to sustained positive ASQ screens and tailor interventions to at-risk youth. **CONCLUSION:** Addressing youth suicide risk requires systemic reforms, including improved screening, targeted interventions, and better access to mental health resources, emphasizing prevention and early intervention in the escalating youth mental health crisis.

Illustrated Zines as Health Education Tools for Wisconsin High School Students**Authors:** Farhan S, Klatt L, Patitucci T.**Project Mentor:** Teresa Patitucci, PhD - **Department:** Cell Biology, Neurobiology and Anatomy

Education on mental health is integral to adolescent students' physical and emotional well-being. While medically accurate information is being constantly created, updated, and presented within the medical community, this information often does not reach the lay population, especially adolescents, in an understandable, engaging way. Zines are small booklets that are short in length and convey messages through illustrations. The study's objective is to determine if zines are useful resources to develop a better understanding of health topics for high school students. In March 2023, we visited high school classrooms to gauge students' interest in different health topics. We presented potential topics and students were given the chance to give feedback and share health-related questions. The topic of most interest was Mental Health. We then contacted mental health professionals to help select the most integral information to address. We also conducted a thorough literature search. These findings are currently being drafted as we finish storyboarding the zine. The final zine will be 20 pages in length and cover specific topics like mood disorders, anxiety disorders.. etc., where to go if they need help and the basics of self-care. In April 2024, we conducted a pilot zine presentation where students were asked to complete a Pre-Session survey to assess their current knowledge, zine presentation was conducted, then a Post-Session survey. The team is currently improvising based on the pilot feedback. We plan for this project to become a series covering a range of health topics to improve health literacy among adolescents.

Efficacy of PESI and RV:LV Ratio for Stratifying Intermediate-High Risk Pulmonary Embolism**Authors:** Farrell SP, Scheidt MJ.**Project Mentor:** Matthew J Scheidt, MD - **Department:** Radiology

BACKGROUND: Institutions continue to struggle with timely stratification of PE and ensuing risk-appropriate treatment, particularly in the intermediate-high risk category. This study seeks to investigate the concordance between the ESC guidelines and PESI scores and the extent to which RV dysfunction contributes to prognostic value in the clinical course of intermediate-high risk PE patients.

METHODS: A retrospective analysis was conducted to include only intermediate-high risk PE using ESC guidelines, defined as those with elevated cardiac biomarkers (troponin or BNP), hemodynamic stability, and elevated RV:LV ratio. PESI scores for this subgroup were calculated. According to PESI scores patients were assigned to risk categories I-V. Once stratified using PESI, 30-day mortality and RV:LV ratios were compared between groups.

RESULTS: 164 activations (55.6%) fell into the intermediate-high risk PE category as defined by ESC guidelines. Using calculated PESI scores, 7 (4.3%) of these patients were deemed category I, 33 (20.2%) II, 46 (28.0%) III, 39 (23.7%) IV, and 39 (23.7%) V. 30-day mortality was 14.3%, 0.0%, 2.2%, 5.1%, and 28.2%, respectively among groups I-V. RV:LV ratio averages among the five groups were as follows: 1.48 (+/- 0.28), 1.55 (+/- 0.49), 1.54 (+/- 0.41), 1.71 (+/- 0.48), and 1.68 (+/- 0.59). The average RV:LV ratio for all fifteen mortalities across all PESI levels was recorded as 1.63 (+/- 0.64). There was no significant difference between any group for RV:LV ratio ($p=0.546$).

CONCLUSIONS: There is no concordance between right heart strain as quantified on pulmonary angiography RV:LV measurements and patient 30-day mortality, nor resulting classification within the PESI system. PESI has highlighted its ability to aid decision making within the tenuous intermediate-high risk group while calling into question the overall utility of RV:LV ratios in risk categorization, contrary to published literature.

An Overview of the Health Status of Ethiopian Adoptees Upon Arrival in Wisconsin, USA**Authors:** Feleke H.**Project Mentor:** Samantha Wilson, PhD - **Department:** Pediatrics

This study examines the health outcomes of Ethiopian adoptees upon arrival in the United States, focusing on the impact of pre-adoptive placements on their medical and developmental concerns. A cohort of 100 subjects, with 24 having arrival records, underwent exploratory statistical analysis of de-identified data. The results reveal that longer stays with biological families before adoption correlate with better health outcomes compared to time spent in orphanages. Factors contributing to this disparity include emotional bonding, access to nutrition and healthcare, personalized attention, and reduced stress in family environments. The study emphasizes the importance of early intervention, culturally competent care, and updated health data to support the well-being of Ethiopian adoptees and advocate for improved healthcare access and policies. Further research is warranted to address specific illnesses and optimize care services for this population while they are in Ethiopia and after they have arrived in the United States.

Language and Neural Effects of Temporoparietal High-Definition Transcranial Direct Current Stimulation (HD-tDCS) in Logopenic Variant Primary Progressive Aphasia (LvPPA)**Authors:** Granadillo ED, Fellmeth M, Youssofzadeh V, Heffernan J, Shah-Basak PP, Pillay SB, Ustine C, Kraegel P, Schold S, Mueller KD, Ikonomidou C, Raghavan M, Binder JR.**Project Mentor:** Elias Granadillo, MD - **Department:** Neurology

BACKGROUND: High definition-tDCS (HD-tDCS) allows for localized cortical stimulation and has not yet been thoroughly investigated for its therapeutic benefit while targeting the left temporoparietal cortex in logopenic variant PPA (lvPPA).

OBJECTIVE: We sought to begin investigating the potential effects on language, cognition, and resting state functional connectivity of HD-tDCS coupled with phonologic-based language training in lvPPA.

METHODS: We used a double-blind, within-subject, sham-controlled crossover design with a 4-month between treatment washout period in four participants with a confirmed diagnosis of lvPPA. Participants were given a baseline battery of language and cognitive assessments and imaging with MEG and resting state fMRI prior to treatment with either anodal HD-tDCS or sham. Language and cognitive assessments, MEG, and fMRI were repeated after the final stimulation session and then again after 2 months. Treatment tolerability, side effects, and effectiveness of the blinding protocol were also monitored. Preliminary data on efficacy was evaluated based on participant change from baseline in language and cognitive assessments. Changes in resting state functional connectivity within the phonologic network, temporoparietal junction, and inferior parietal region were analyzed via fMRI. Source power and a laterality index collected from MEG was used to assess activation of neuronal regions.

RESULTS: All four participants were successfully retained across the 4-month between treatment washout period, with satisfactory blinding of participants and investigators. Anodal HD-tDCS was overall well tolerated. No benefit of HD-tDCS over sham on the language and cognitive measures was observed in this small sample. Functional imaging results with MEG and fMRI indicated an excitatory effect of anodal HD-tDCS compared to sham and suggested that greater temporoparietal activation and connectivity was associated with a positive language outcome.

RAI Frailty Screening Tool Implementation at Zablocki VA Medical Center: Review of 12-Month Mortality and Morbidity**Authors:** Garcia J.**Project Mentor:** Karl Scheidt, MD - **Department:** Orthopaedic Surgery

The Risk Analysis Index, RAI, is a tool created, identified, and validated to measure frailty. This measure has been introduced previously at other institutions and is now being implemented at the Milwaukee VA hospital to provide tool to evaluate a patient's risk of post-operative morbidity and mortality. This project aims to confirm that RAI scores over 37 do in fact have a higher mortality rate and will evaluate morbidity and complications in the 12 months after surgery. A primary goal is to confirm that RAI scores over 37 are in fact associated with a higher mortality rate and morbidity rate. This study plans to examine if there are trends in the morbidity and mortality cases which could recommend changes to the pre-op evaluation. Results of this study indicated that for elective and non-emergency surgery such as Orthopedics, there was a mortality rate of less than 3% within 1 year of surgery and for non-elective surgery, General Surgery, there was less than a 6% mortality rate. Further, for General Surgery all deaths had an RAI of over 37, which is the standard "high-risk" cut-off. The results of this study indicate that the RAI system of screening patients pre-operatively has minimized post-surgical morbidity and mortality.

Trends of Non-operative Care for Medial Ulnar Collateral Ligament Injury that Lead to Operative Care in Adolescents**Authors:** Garriss T, Weinman B.**Project Mentor:** Beth Weinman, DO - **Department:** Orthopaedic Surgery

The goal of this project is to identify if amount of recovery time in non-surgical medial ulnar collateral ligament treatment (MUCL) is related to eventual MUCL reconstruction. We are also interested in correlating types of MUCL injury, types of non-surgical management, and return time to sport to eventual need for reconstruction surgery. This study is a retrospective chart review and data was collected from the Children's Wisconsin medical records ranging from the years 2015 to 2021. Cases were compiled of MUCL injuries in athletes aged 11-18 years. Athletes with neuromuscular conditions, connective tissue conditions, multiple MUCL injuries, or prior elbow surgery were excluded. 41 athletes were found to meet the inclusion criteria. This included 32 males and 9 females in sports including but not limited to baseball, football, and gymnastics. In total, there were 13 full MUCL tears, 10 partial MUCL tears, and 18 MUCL sprains. It was statistically significant that those that did have a surgical reconstruction had a longer return time to their respective sport by about 205 days. 75.6% (31/41) of patients returned to their respective sport. Although logistic modeling did show support for certain non-surgical treatments regarding return time, it was not statistically significant. In conclusion, patients that require surgery for their MUCL should expect a longer return time to their respective sport. Sport played, type of tear, gender, and type of non-surgical treatment was found to be statistically insignificant regarding return time. However, a larger sample size over more years may be able to answer more questions.

Access to Safe Shelter & Affordable Housing in Street-Based Sex Work**Authors:** Geich A, Young S.**Project Mentor:** Staci Young, PhD - **Department:** Family & Community Medicine**Community Partner:** Benedict Center

BACKGROUND: Women involved in street prostitution indicate that homelessness is a primary problem and barrier to exiting the sex trade. Women at the Benedict Center's Sisters Program frequently report trading sex just to have shelter, however, no women reported that they had used emergency housing services or Section 8 vouchers designed to provide housing to the vulnerable or disabled. Their inability to access safe housing and shelter increases their risk for exposure to poor health outcomes such as violence and victimization, substance abuse and mental illness. Contributing to the problem is the reality that the current risk assessment protocols and tools used by the Milwaukee Continuum of Care (CoC) Coordinated Entry System.

OBJECTIVES: This investigation's primary objective is to assess if homelessness is truly the primary problem and barrier to exiting the sex trade for women in street prostitution.

METHODS: A qualitative interview to address the effectiveness of our partnership with Benedict Center at addressing the ways in which women in street-based sex work were identified as homeless to access housing. The interview was delivered to four major Milwaukee housing officials that partnered with the Benedict Center. These Included: Emily Kenney, Eric Collins-Dyke, ShaRhonda Reid, and Claire Shanahan.

RESULTS: After thematic review of all interviews, the results concluded that advocacy to raise awareness, consistent and focused funding for housing, and sustainable solutions are critical to meet this public health need for women.

CONCLUSION: After aligning definitions with the US Department of Housing and Urban Development in Milwaukee of how to better identify these women, we predict to see a positive trend in housing placement for homeless women in this trade. We predict to see an increase in women using emergency housing services or Section 8 vouchers designed to provide housing to vulnerable or disabled. Before our work, it was unclear how many women in the s

The Effect of Laterality on Patient Outcomes in Multiligamentous Knee Injury**Authors:** Geissler TM, Hall JT, Campbell JE.**Project Mentor:** Jonathan Campbell, MD - **Department:** Orthopaedic Surgery

PURPOSE: This study aimed to determine the impact of laterality on outcomes in patients with multiligamentous knee injuries (MLKIs), assessing both subjective patient-reported outcomes and objective clinical data.

METHODS: We identified 73 patients with MLKIs treated at our institution who met all criteria, 27 of whom were able to be contacted. Patients were categorized into medial or lateral injury groups based on ligament involvement. Outcome measurements included maximum knee extension, flexion, stability (laxity assessment scores), and subjective functionality (International Knee Documentation Committee Form scores). Additionally, sub-analyses were conducted to determine the effect of neurovascular complications, multiple ligament reconstructions, varying BMI, and nicotine use on the same outcomes.

RESULTS: In the study, 21 patients had lateral MLKIs and 6 had medial MLKIs. Both groups showed comparable mean measurements for terminal knee extension (lateral: 0.24° , medial: 0.33°) and maximum flexion (lateral: 122.57° , medial: 126.67°). The lateral group reported significantly lower International Knee Documentation Committee Form scores (mean: 64.86 ± 17.02) compared to the medial group (mean: 84.29 ± 13.44 ; $p=0.017$), indicating worse patient reported outcomes. Knee laxity scores were similar (lateral: 0.62, medial: 0.83; $p=0.50$), with a lower score indicating a more stable knee. Patients with multiple ligaments reconstructed had improved stability (mean laxity score: 0.4) versus those with single ligament repair/reconstruction (mean: 1; $p=0.031$). No other significant differences were noted in sub-analyses.

CONCLUSION: Patients with lateral-sided MLKIs experienced worse subjective outcomes compared to those with medial-sided injuries. Multiple ligament reconstructions were associated with better knee stability, but this did not translate into improved patient-reported outcomes.

Preliminary qualitative evaluation of student-led communication skills training program to prepare preclinical medical students for challenging conversations.**Authors:** Gitter C, McGauley M, Thapar M, Partovi O, Petroll A, Zepeda JL, Treat R, Kaljo K, Agrawal H, Zehm A.**Project Mentor:** Himanshu Agrawal, MD - **Department:** Psychiatry & Behavioral Medicine**INTRODUCTION**

Communication skills training (CST) remains undervalued and underrepresented within undergraduate medical curricula, especially at the preclinical level. Operation Conversation (OC) is a novel student-run, longitudinal, extracurricular, mentored CST program for preclinical medical students to prepare them for "difficult conversations" in medicine. We present a qualitative analysis and evaluation of our first year of implementation.

METHODS

OC is a peer role-play program that involves three, 90-minute virtual workshops for preclinical medical students. During each workshop, students review a pre-assigned case, watched relevant medical content and a communication skills primer, and role-played in pairs while a resident or faculty physician facilitator observed the interaction. All parties then completed a communication skills checklist, the student-doctor received immediate verbal feedback, then roles reversed. After each workshop, students completed a reflection on their experiences in the program, where success was defined as thoughtful student responses throughout the program.

RESULTS

64 students participated in OC during the first year of implementation. When asked if they would recommend the program to future students, 88% said "definitely yes" and 11% said "probably yes." Students reflected on role-playing the physician with themes of effective communication and as an experiential learning environment. Students reflected on role-playing as a patient with themes of perspective and engagement.

CONCLUSION

We demonstrated that a student-run peer role-play CST program is feasible, highly regarded, and improves student communication skills. The program has now successfully completed a third year as a voluntary extracurricular, and portions have been adapted for Pathway and Clerkship sessions. This could be an effective model for improving communication skills, perspective-taking, and empathy among the next generation of physicians.

Hormonal Contraceptive Use Is Associated With a Decreased Incidence of Hypothyroidism**Authors:** Gloe S, Carroll T.**Project Mentor:** Ty Carroll, MD - **Department:** Medicine

OBJECTIVE: Hypothyroidism is one of the most common endocrine disorders affecting 5 to 10 times more women than men. Given this higher incidence in women, it is possible that hormonal differences or medications more commonly used by women may play a role in the risk of developing hypothyroidism. We hypothesized that hormonal contraception affects the risk of developing hypothyroidism. **METHODS:** We developed a case-control study and identified women aged 18 to 45 years in 4 distinct groups: (1) estrogen-progestin contraceptive (EPC) use, (2) progestin-only contraceptive (POC) use, (3) progestin-containing intrauterine device (IUD) use, and (4) controls. For each group, we ascertained data including the diagnosis of hypothyroidism, alcohol use, tobacco use, and body mass index. **RESULTS:** We identified 18,578 patients with sufficient data: EPC use, n = 5849; POC use, n = 5052; IUD use, n = 1000; and controls, n = 6677. A total of 118 individuals (1.8%) in the control group and 165 individuals (1.4%) who received hormonal contraception developed hypothyroidism. After using a logistic model to account for confounding variables, all forms of hormonal contraception (EPC, POC, and IUD) had a protective effect against the diagnosis of hypothyroidism. POC and IUD uses had the greatest protective effect, with odds ratios of 0.14 and 0.12, respectively. EPC had a less pronounced but still significant effect, with an odds ratio of 0.30 ($P < .001$). **CONCLUSION:** This study of >18,000 women and the risk of developing hypothyroidism demonstrates a protective effect of hormonal contraceptive use. Our data, both unadjusted and adjusted using a logistic model to account for confounding variables, suggest that the use of hormonal contraception, in any form, decreases the risk of developing hypothyroidism.

The diverging role of O-GlcNAc Transferase in corticotroph and somatotroph adenomas

Authors: Gonzalez R, Massman L, Ho S, Luna S, Cheok S, Liang B, Mrachek K, Coss D, Ioachimescu AG, Zwagerman N, Olivier-Van Stichelen S.

Project Mentor: Stephanie Olivier-Van Stichelen, PhD - **Department:** Biochemistry

PURPOSE: Molecular mechanisms involved in the pathogenesis and tumor progression of pituitary adenomas (PA) remain incompletely understood. Corticotroph and somatotroph PA associate a high clinical burden, and despite improved surgical outcomes and medical treatment options, sometimes require multiple surgeries and radiation. Preliminary data suggested a role of O-GlcNAc Transferase (OGT), the enzyme responsible for O-GlcNAcylation of proteins. O-GlcNAcylation and OGT have been found elevated in other types of tumors.

METHODS: We evaluated 63 functioning and nonfunctioning PA (NFPA) from patients operated and postmortem normal and tumoral pituitary tissue by immunohistochemistry. We performed transcriptomic analyses to explore the relevance in PAs of the O-GlcNAc Transferase (OGT). We used an OGT antibody in immunobiological analysis to define its level in PA tissue in operated patients.

RESULTS: OGT was strongly associated with PA hormone secretory capacity in functioning PA and, with the tumor growth in the nonfunctioning PA (NFPA). In NFPA, OGT positively associated with tumor size but not with cavernous sinus invasion (Knosp grading). In GH-secreting PA, OGT expression was negatively correlated with circulating Insulin-like Growth Factor 1 (IGF1) level. In adrenocorticotrophic hormone (ACTH)-secreting PA, OGT expression was positively associated with circulating ACTH levels. OGT did not correlate with tumor size in secreting PAs. OGT levels were higher in gonadotroph PA compared to normal gland.

CONCLUSION: O-GlcNAcylation can be downregulated in non-cancerous tumors such as GH secreting adenomas. Future studies are warranted to elucidate the OGT role in pathogenesis of PA.

The Impact of Medical Student-Led Skin Cancer Education on Low-Income Latine High School Students

Authors: Gonzalez N, Pantoja F, Anwer S, Vaughn OLA.

Project Mentor: Olushola L Akinshemoyin Vaughn, MD - **Department:** Dermatology

Community Partner: St. Augustine Preparatory Academy

BACKGROUND: In the United States, Latine individuals experience poorer prognoses and survival rates once they are diagnosed with skin cancer. Previous studies have shown that racial/ethnic minorities and individuals from low socioeconomic backgrounds had poorer skin cancer knowledge. Health education provided during the high school years is vital for creating a lasting positive impact that could influence adult decisions.

OBJECTIVE: This study sought to evaluate the influence of presenter racial/ethnic identity on delivering skin cancer education to low-income Latine high school students.

METHODS: We conducted a survey analysis on a cohort of low-income Latine-identifying high school students. A researcher-developed survey was used to assess 2 topics: skin cancer awareness and interest in medicine and dermatology. The survey consisted of 18-units structured in a 5-point Likert scale. This survey was distributed before and after a Sun Protection workshop that was delivered by medical students that either identified as under-represented in medicine (URM) or non-URMs. A total of 251 high school student responses were included in the analysis.

RESULTS: Among the 251 participants included, 77% were female, 94% identified as Hispanic/Latine, and grades (%) were divided as 9th (37%), 10th(16%), 11th(19%), and 12th(28%). Analysis of survey results are pending.

CONCLUSIONS: Lessons learned from this study may help structure future outreach projects within the low-income Latine population.

Post Mastectomy Breast Reconstruction attitudes and outcomes of women in South Eastern Wisconsin: A pilot study**Authors:** Greenhouse C, Doren E, Cortina C, Kamaraju S, Olson J.**Project Mentor:** Jessica Olson, PHD - **Department:** Institute for Health & Equity

Post-mastectomy breast reconstruction (PMBR) improves quality of life for breast cancer survivors. This study explores attitudes and perceptions influencing the decision for PMBR for women in Southeastern Wisconsin.

A single-institution exploratory pilot survey study was performed with 49 participants who underwent PMBR after a breast cancer diagnosis. The survey comprised 54 questions, adapted from 5 existing validated surveys, designed to explore trends in decision-making and reported quality of care.

The median age for this study was 58, and included predominantly African American and white women (38.78% and 61.22%, respectively). 61.22% underwent breast reconstruction. The advantages of reconstruction were only discussed with doctors 59.18% of the time, and disadvantages were discussed 48.98% of the time. The use of breast prosthesis was discussed 42.86% of the time, and patients' concerns about how they would look after mastectomy were discussed 55.10% of the time. How reconstruction could interact with co-existing conditions was discussed 40.81% of the time. 53.3% of women were satisfied and confident with their breasts after reconstruction. 46.67 were satisfied with their physical well-being, and 30% were happy with their sexual well-being.

We summarized these results and included advice from patients to providers about their experiences, summarized with results from our quantitative survey. Future studies will stratify results by race, and seek to understand racial disparities between Black and white women regarding post-mastectomy breast reconstruction. Ultimately, we aim to identify opportunities to support equitable, high-quality care across communities, and eliminate racial disparities in post-cancer care.

Optimizing patients' attainment of outpatient mental health services following a mental health-related Emergency Department visit**Authors:** Guenther M, Flannagan A, McCool A, Zaspel J, Brousseau D, O'Donnell E.**Project Mentor:** Erin O'Donnell, MD - **Department:** Pediatrics

At Children's Wisconsin, ED visits for primary mental and behavioral health (MBH) concerns have increased significantly. Patients who present to the ED with a MBH concern that are considered high risk by the treatment team receive a social work (SW) consult for a more in-depth MBH evaluation and to provide additional resources. However, patients and caregivers encounter unique barriers to obtaining outpatient mental healthcare services. We characterized the patients who visit the ED for MBH reasons to determine whether patients receive outpatient follow-up care following discharge and to identify barriers caregivers experience in establishing and maintaining outpatient MBH treatment. Our study found 35.64% of patients scheduled or obtained follow-up with a therapist, 28.45% with a psychiatrist, 9.12% with their PCP, 4.14% with a school counselor, and 2.49% with a psychologist. Barriers to follow-up included system-level barriers (5.25% experienced), lack of knowledge of MBH resources (4.97%), personal barriers (1.38%), and legal barriers (0.28%). These findings emphasize the need to enhance resources for psychiatric patients and improve access to treatment by MBH professionals. Future directions could involve utilizing demographic and clinical data to characterize ED MBH patients further and conducting interviews with caregivers to address specific barriers and provide interventions to improve outpatient mental health care attainment.

Relationship Between Social Risk Factors and Emergency Department Use in the United States: National Health Interview Survey, 2016-2018**Authors:** Guleria I, Campbell JA, Thorgerson A, Bhandari S, Egede LE.**Project Mentor:** Jennifer A Campbell, PhD, MPH - **Department:** Emergency Medicine

BACKGROUND: Evidence shows that social risks are extremely prevalent in the patient population that present to the ED for care, however understanding the relationship between social risk factors and ED utilization at the population level remains unknown.

METHODS: The National Health Interview Survey from the 2016-2018 sample adult files were used. The primary independent variables included 6 social risk factors: economic instability, lack of community, educational deficit, food insecurity, social isolation, inadequate access to care. The outcome included emergency room/department use in the past year. Covariates included: age, race/ethnicity, insurance status, obesity, mental health (depression/anxiety problem), and comorbidities. Logistic regression models were run to test the relationship between the independent and dependent variables adjusting for covariates.

RESULTS: 20% of the study sample had at least 1 ED visit in the prior year. In the unadjusted model and the fully adjusted model, individuals reporting economic instability (OR 1.33, 95% CI 1.25-1.42), lack of community (OR 1.10, 95% 1.05-1.15), educational deficit (OR 1.12, 95% 1.06-1.18), food insecurity (OR 1.77, 95% 1.66-1.89), and social isolation (OR 1.32, 95% 1.26-1.39) had significantly higher odds of ED use. Inadequate access to care was significantly related to lower odds of ED use (OR 0.75, 95% CI 0.69-0.81).

CONCLUSIONS: Social risk factors are significantly associated with higher odds of ED use in the United States adult population. Interventions that integrate social and medical needs are greatly needed as well as understanding the role that preventive medicine may play in reducing avoidable ED visits.

The Impact of Neighborhood Disadvantage on Stage at Diagnosis and Recurrence Rates in Women Diagnosed with Breast Cancer**Authors:** Harris A, Szabo A, Kamaraju S, Cheng YC, Burfeind J, Chitambar CR, Chaudhary LN.**Project Mentor:** Lubna N Chaudhary, MD, MS - **Department:** Medicine

Low socioeconomic status (SES) is associated with increased risk of aggressive breast cancers, late-stage breast cancers, and poorer breast cancer survival. However, previous studies have inconsistent definitions of SES making it difficult to draw comparisons across studies. Using the Area Deprivation Index (ADI) from the Neighborhood Atlas may address this problem. The ADI quantifies Neighborhood Disadvantage (ND), a comprehensive indicator of SES, using 17 US Census and American Community Survey variables. We hypothesized that women with higher levels of ND are diagnosed with later stage breast cancer and experience higher five-year breast cancer recurrence rates. A retrospective chart review of 418 women diagnosed with breast cancer in 2015 in the Froedtert Health System in Milwaukee, WI was conducted. Patient's addresses were inputted into the Neighborhood Atlas Mapping Tool to obtain a ND value and variables regarding patient factors, tumor factors, and treatment factors were derived from patients' medical records and identified. Spearman's rank correlation was used to evaluate association between ND and TNM stage at diagnosis and Cox regression was used to evaluate the effect of ND on cause-specific hazard of recurrence within five years of diagnosis. Significance of <0.05 was utilized. ND was not significantly associated with stage at breast cancer diagnosis ($p=0.37$) or five-year recurrence rates ($p=0.19$). Our study was limited by overrepresentation of individuals from lower ND areas and by very few instances of five-year recurrences which highlight areas of improvement for future work and how a representative study population is key for this type of research.

Pinless Electromagnetic Neuronavigation During Awake Craniotomies: Technical Pearls, Pitfalls, and Nuances**Authors:** Harwick E, Singhal I, Conway B, Mueller W, Treffy R, Krucoff M.**Project Mentor:** Max O Krucoff, MD - **Department:** Neurosurgery**INTRODUCTION:**

Awake craniotomies often rely on rigid pin fixation or optical neuronavigation, which can be impractical. However, newer electromagnetic (EM) neuronavigation technology offers a pinless alternative while maintaining robust intraoperative guidance. Mastery of this technology requires understanding its nuances.

OBJECTIVE:

We aim to share technical insights and lessons learned from our experience using pinless EM neuronavigation during awake craniotomies.

METHODS:

We detail patient positioning, setup, registration, and navigation procedures, providing pearls for success and tips for avoiding pitfalls.

RESULTS:

Our retrospective analysis of nine cases from May 2021 to May 2022 revealed favorable resection rates for various intra-axial tumors, with no surgical complications. Although transient neurological deficits occurred in 88.9% of cases due to resection to functional margins, all patients experienced improved or stable symptoms at the 3-month follow-up. Notably, we encountered no registration errors or inaccuracies related to EM neuronavigation.

CONCLUSION:

Pinless EM neuronavigation offers accurate intraoperative guidance without cranial fixation during awake craniotomies when used appropriately. Mastering the technical nuances outlined here is crucial for successful integration into practice, offering significant advantages for patients, surgeons, and operative teams.

The Utility of Monitoring Potassium in Transgender, Gender Diverse, and Nonbinary Individuals on Spironolactone**Authors:** Hayes H, Russel R, Haugen A, Nagavally S, Sarvaideo J.**Project Mentor:** Jenna Sarvaideo, DO - **Department:** Medicine

CONTEXT: Current Endocrine Society guidelines recommend that transgender women taking spironolactone have their potassium levels checked every 3 months for the first year after initiating therapy and annually thereafter to monitor for hyperkalemia.

OBJECTIVE: The goal of this study was to assess the need for such frequent potassium monitoring and to investigate whether age plays a role in potassium abnormalities in transgender, gender diverse, and nonbinary (TGDNB) individuals taking spironolactone.

METHODS: Using EPIC-Clarity, a retrospective study of healthy, adult individuals with gender-identity disorder listed in their problem list and taking spironolactone was performed. We analyzed the incidence of hyperkalemia in this population. Data from June 2006 through November 2021 were obtained. Exclusion criteria included hypertension, renal failure, diabetes mellitus, heart failure, and medications that affect the renin-angiotensin-aldosterone system.

RESULTS: 318 healthy TGDNB individuals met our inclusion criteria. We identified 8/318 (2.5%) individuals with hyperkalemia on spironolactone. There was a significant difference in incidence of hyperkalemia events in those >45 years old and those ≤45 years old (8.9% vs 1.5%, $P = 0.016$).

CONCLUSION: Our data suggest the incidence of hyperkalemia in our TGDNB population is low, particularly in those ≤45 years old; however, this risk increases with age. These findings suggest practice guidelines may need to be adjusted to minimize unnecessary testing in the population ≤45 years old who are not plagued by comorbidities that affect potassium handling.

Title: Longitudinal characterization of pain interference and influential factors in former National Football League (NFL) players over a 19-year period: an NFL-LONG Study

Authors: Hernandez SG, Mannix R, Kerr ZY, Lempke LB, Chandran A, Walton SR, DeFreese JD, Echemendia RJ, Guskiewicz KM, McCrea MA, Meehan WP III, Brett BL.

Project Mentor: Benjamin Brett, PhD - **Department:** Neurosurgery

Previous studies on pain experiences in retired contract sport athletes have been cross-sectional, leaving gaps in our understanding of the evolution of pain interference (PI) and factors that influence trajectories decades after sport discontinuation. This study investigated the longitudinal course of PI in former male NFL players over a 19-year period following sport discontinuation and examined factors influencing overall levels and trajectories of PI. Former NFL players completed health surveys in 2001, 2010, and 2019, with PI ratings measured using the 36-Item Short Form Health Survey (2001 and 2010) and the Patient-Reported Outcomes Measurement Information System (2019). Unconditional latent growth curve models analyzed overall PI severity and trajectories. Conditional LGCMs explored the influence of musculoskeletal injuries, osteoarthritis (OA), and depression diagnosis on PI. Over 19 years (N=338; mean age=48.96±9.35), PI significantly increased (slope=0.179, p<0.001; mean PROMIS PI T-scores 2001=54.19, 2010=54.64, 2019=57.38). Cumulative musculoskeletal injuries (B=0.092, p<0.001) and baseline depression diagnosis (B=4.463, p<0.001) were associated with overall PI levels, but not change over time. OA was significantly associated with overall PI levels (B=6.536, p<0.001) and trajectory (B=-0.253, p<0.001); those endorsing OA in 2001 had lower PI increases over 19 years. Body region of injury and level of play during injuries mirrored overall injury effects. PI mildly increased over 19 years, with multiple factors independently influencing overall PI levels. Enhancing former contact sport athlete daily functionality may be achieved through holistic biopsychosocial interventions addressing musculoskeletal injuries, OA, and depression. Future research should identify factors influencing elevated trajectories of long-term PI post-sport discontinuation.

Primary Care Developmental Screening of Term and Late Preterm NICU Graduates

Authors: Herrera S, Carlton K, Cabacungan E, Cohen S.

Project Mentor: Susan Cohen, MD - **Department:** Pediatrics

Infants ≥ 34 weeks' gestation are at relatively low-risk for developmental delay and do not qualify for high-risk infant follow-up based on prematurity alone. However, with prolonged neonatal intensive care unit (NICU) hospitalization and life-sustaining interventions, there is an increased risk for neurodevelopmental impairment in this population. We aim to compare key clinical characteristics of infants with normal vs. abnormal developmental screening in the primary care setting. Our secondary aim is to identify which infants in this cohort would benefit most from early developmental intervention. We performed a retrospective cohort study of infants born ≥ 34 weeks gestation between 1/2013-12/2015, admitted to the Children's Wisconsin (CW) NICU, and followed by a primary care provider for routine developmental screening at 3-6 years of age. Screening was considered abnormal if developmental concerns in cognition, motor, language, and/or social domains were documented. We screened 1345 NICU infant charts, and 88% received primary care developmental screening (Figure 1). We identified 559 (47%) infants with abnormal developmental screening results. Infants with abnormal developmental screens were more likely to have an antenatal congenital anomaly (32% vs. 54%, p<0.001), NICU surgical procedure (26% vs. 38%, p<0.001), prolonged length of NICU stay (6 days vs. 11 days, p<0.001), or more than one subspecialist appointment after discharge (1 vs. 2, p<0.001) (Table 1). The most common diagnoses in patients with abnormal development were congenital heart disease and ventriculomegaly. At discharge, only 15% of infants with abnormal developmental screens were referred to NICU follow-up clinic and only 22% were referred to physical, occupational, speech, or NICU follow-up services. NICU characteristics negatively impact developmental screening in a presumed low-risk population. These results can be used to revise current NICU follow-up inclusion criteria.

Bariatric surgeon ergonomics: a comparison of laparoscopy and robotics**Authors:** Hilt L, Sherman B, Tan WH, Lak K, Gould JC, Kindel TL, Higgins RM.**Project Mentor:** Rana Higgins, MD - **Department:** Surgery

BACKGROUND: Bariatric surgery is routinely performed using laparoscopic and robotic approaches. Musculoskeletal injuries are prevalent amongst both robotic and laparoscopic bariatric surgeons. Studies evaluating ergonomic differences between laparoscopic and robotic bariatric surgery are limited. This study aims to analyze the ergonomic, physical, and mental workload differences among surgeons performing robotic and laparoscopic bariatric surgery. **MATERIALS AND METHODS:** All primary laparoscopic and robotic bariatric surgeries, Roux-en-Y gastric bypass and sleeve gastrectomy, between May and August of 2022 were included in this study. Objective ergonomic analysis was performed by an observer evaluating each surgeon intraoperatively according to the validated Rapid Entire Body Assessment (REBA) tool, with a higher score indicating more ergonomic strain. After each operation, surgeons subjectively evaluated their physical workload using the Body Part Discomfort (BPD) scale, and their mental workload using the Surgery Task Load Index (SURG-TLX).

RESULTS: Five bariatric surgeons participated in this study. In total, 50 operative cases were observed, 37 laparoscopic and 13 robotic. The median total REBA score as a primary surgeon was significantly higher in laparoscopic (6.0) compared to robotic (3.0) cases ($p < 0.01$). The laparoscopic and robotic approaches had no significant differences in the surgeons' physical (BPD scale) or mental workload (SURG-TLX).

CONCLUSIONS: This study identified low-risk ergonomic stress in surgeons performing bariatric surgery robotically compared to medium-risk stress laparoscopically. Since ergonomic stress can exist even without the perception of physical or mental stress, this highlights the importance of external observations to optimize ergonomics for surgeons in the operating room.

Dietary Analysis in Pediatric Nephrolithiasis**Authors:** Hokanson E, Ellison J, Sheridan K.**Project Mentor:** Jonathan Ellison, MD - **Department:** Urology

INTRODUCTION: Nephrolithiasis (kidney stone disease) is becoming more prevalent in pediatric populations and has a high recurrence rate. Dietary recommendations are a mainstay of secondary prevention, aimed at altering urine compositions that drive stone formation. However, assessment of the relationships between diet and stone risk in children are limited as no standard method of nutrient analysis for kidney stone patients exists for use in research or clinical practice. The aim of this project is to develop a tool to analyze nutrients from food choices and use it in to analyze dietary patterns of children with nephrolithiasis.

METHODS: Patient data were collected as a secondary analysis from a prospective observational study, wherein participants provided dietary information using a validated food frequency questionnaire (Harvard School of Public Health) with a 4-week recall period and a 24-hour urine analysis. Nutrient profiles were created for each food surveyed. R studio was used to create each subject's daily nutrient profile based on reported consumption and was compared to external analysis.

RESULTS: Fourteen patients were included in the analysis. When compared with external analysis of the same responses, the original method outputs relatively accurate nutrient profiles. The cohort studied consumed more oxalate and less magnesium and potassium than recommended. There was no observed trend between urinary and dietary data.

CONCLUSION: Due to the small sample size, few conclusions can be drawn from this data analysis. However, the method established has internal consistency and face validity and can be used in future research and the clinical setting.

Exploring the Impact of Trauma-Informed Care on Employment Readiness: A Mixed Methods Analysis of the Wisconsin Works (W-2) Program**Authors:** Holmes P, Ruffalo L.**Project Mentor:** Leslie Ruffalo, PhD, MS - **Department:** Family & Community Medicine

There is an established connection between trauma and factors that impact work readiness. This study evaluates the implementation and effectiveness of the Trauma Screening, Brief Intervention, and Referral to Treatment (TSBIRT) protocol within the Wisconsin Works (W-2) program. It aims to determine the protocol's ability to foster resilience, increase access to mental health services, and improve work readiness among W-2 participants. The study combines quantitative data on demographic and employment variables with qualitative insights from interviews conducted with 30 program participants. Quantitative findings suggest no significant correlation between geographic location and employment status post-intervention. Qualitatively, the research identifies central themes pertaining to employment barriers, the psychological and social facets of work readiness, and the nuanced impact of the TSBIRT protocol in addressing trauma. The outcomes illustrate the potential of trauma-informed practices in workforce programs. This investigation contributes to a developing body of evidence that underscores the necessity and efficacy of trauma-informed care within employment support services, also noting possibilities for future research and program development to better serve individuals working to overcome the effects of trauma.

A Qualitative Study of Chicago Gay Men and the Mpox Outbreak of 2022 in the Context of HIV/AIDS, PrEP, and COVID-19**Authors:** Hughes D, Ai J, Vazirnia P, McLeish T, Krajco C, Moraga R, Quinn K.**Project Mentor:** Katherine Quinn, PhD - **Department:** Psychiatry & Behavioral Medicine

During the 2022 mpox outbreak, our study conducted 30 interviews with a recruited sample of Chicago gay men (age 18+) during June-September to investigate their experiences of mpox, HIV/AIDS, and COVID-19. Participants were interviewed with a semi-structured guide about gay sexual identity and social experiences; HIV/AIDS, ART, and PrEP; and COVID-19 behaviors and vaccination. All 30 interview respondents had been fully vaccinated for COVID-19 and expressed minimal COVID-19 vaccine hesitancy. All the men living with HIV in our study were on ART with HIV well controlled. A majority of HIV- participants (70%) were on PrEP, with participants universally aware of PrEP benefits. Additionally, most participants had already received at least one shot of the Jynneos mpox vaccine, with many interviewees enduring long lines, sometimes at multiple locations, before vaccination in primarily gay social spaces. These Chicago gay men demonstrated widespread enthusiasm for mpox vaccination as a disease prevention strategy and most of them had already been vaccinated despite significant barriers. The enthusiasm of the participants in our study emerged within a medical landscape shaped by both COVID-19 vaccination and HIV/AIDS-related health interventions including ART and PrEP, which may have helped instill increased medical trust among this population. Our study suggests that out urban gay men may comprise a distinctive minority population with increased medical trust due to specific social, sexual, and historical experiences.

Emergency Provider Practices and Attitudes Towards Buprenorphine Prescribing**Authors:** Igwe E, Hernandez-Meier J, Kovacevich H.**Project Mentor:** Jennifer Hernandez-Meier PhD, MSW - **Department:** Emergency Medicine

BACKGROUND: Drug overdose is a leading cause of mortality in the United States. Emergency department (ED) visits related to drug misuse have increased over the years, but many of these patients are not referred for treatment. Many providers are hesitant to begin treatment in the ED. Since fall 2021, the Froedtert ED has been implementing a suboxone induction program. We hypothesize that the implementation of the suboxone induction program has changed ED prescribers' willingness to induce, attitudes towards medically assisted treatment and patients with opioid use disorder, and perceived barriers and facilitators to induction compared to before the implementation of the program

OBJECTIVES: Develop a survey to assess differences between ED prescribers' responses before and after the implementation of the program. Discuss with the study team how the findings can be incorporated into the ED

METHODS: A survey designed to compare attitudes and behaviors regarding suboxone prescribing practices before and after implementation of the suboxone induction program to be emailed to all prescribing providers in the Froedtert emergency department.

RESULTS: Results are pending. Preliminary results from before the implementation of the program showed nearly all (92%) of providers responded that they had never prescribed suboxone in the ED. Most (87%) thought medication assisted therapy is important to the management of the opioid epidemic. When asked if they would be willing to prescribe buprenorphine in the ED, 10% responded yes, and 58% said with more training.

CONCLUSION: A majority of providers believe that medical management of OUD is important. Comparison of the survey results after the implementation of the induction program may provide information on what barriers providers continue to encounter.

Atlas of the World for an Atlas of Pathology**Authors:** Incha C, Jarzembowski J.**Project Mentor:** Jason Jarzembowski, MD - **Department:** Pathology

In the wake of the brutal regime of the Khmer Rouge in 1979, the country of Cambodia was left with a severely diminished population as well as decreased infrastructure. Given that healthcare professionals were among the populations targeted by the genocide, the country was left with a severe deficit in both providers and health systems. While the country has slowly begun to rebuild its health system, the lack of resources has prompted some facilities to seek international help. One such hospital, the Angkor Hospital for Children, reached out to Children's Wisconsin in Milwaukee for assistance with diagnosing malignancies as part of a low-income country/middle-high-income country (LIC/HMIC) partnership. As AHC does not have a pathology department, their oncologists send biopsies and specimens to CW for processing and diagnosis. While this has been a fruitful relationship thus far, the ultimate goal is to establish a regional training program for pediatric pathology in Cambodia. Per the team at AHC, an atlas detailing common pediatric pathology diagnoses would be appreciated as one of the first steps in establishing this training program; the goal of this project was to generate an example of this product that illustrates the most common diagnoses that they have encountered and can treat using the data from the LIC/HMIC partnership. It is hoped that in the future this can be expanded upon to meet the needs of the providers at AHC and can one day be implemented in their regional training program.

Assessment of Arterial and Venous Thromboembolic Events in Inflammatory Bowel Disease Patients: Analysis from a Large National Dataset

Authors: Iqbal O, Patel P, Mohananey D, Bajwa S, Khani M, Luo J, Stein DJ, Hashash JG, Mansoor E, Cross RK, Sinh P.

Project Mentor: Preetika Sinh, MD - **Department:** Medicine

BACKGROUND: Inflammatory bowel disease (IBD) is associated with an increased risk of venous thromboembolism (VTE) due to underlying chronic inflammation. Specific medications used to treat IBD are associated with an increased risk of VTE.

OBJECTIVE: To determine the association between VTE and IBD medications in a large national cohort of patients with IBD.

METHODS: A retrospective analysis was conducted using the TriNetX database to assess IBD patients (Ulcerative Colitis and Crohn's Disease) between 2015 to 2023. We compared patients on various IBD therapies [non-advanced (prednisone, budesonide, 5-aminosalicylates), immunomodulators (IM), anti-TNF (infliximab, adalimumab, certolizumab, golimumab), anti-integrin (vedolizumab), anti-IL12/23 (ustekinumab, rizankinumab), JAK inhibitors (tofacitinib, upadacitinib)], and statins for outcomes of VTE - deep vein thrombosis (DVT) and pulmonary embolism (PE).

RESULTS: Of the 113,729 IBD patients, anti-TNF medications were associated with a statistically significant increased risk of VTE (adjusted odds ratio [aOR] 1.5, p 0.03). JAK inhibitors and anti-IL 12/23 did not show a significant association. Anti-integrins showed a non-significant association with a lower risk.

LIMITATIONS: This study was limited by its retrospective design. Additionally, the study did not assess VTE specific risk factors, disease activity, or IBD medication duration.

CONCLUSION: In this retrospective study, IBD patients treated with anti-TNF medications have a higher risk of VTE. There was no significant association with other classes of biologics and JAK inhibitors. Further studies are needed to assess whether the risk is associated with the mechanism of the drug or IBD disease activity.

A Comparative Study of the Quality of Life and Unmet Needs for People Living with Multiple Sclerosis

Authors: Jacobson R, Erickson K, Sharda M, Obeidat AZ.

Project Mentor: Ahmed Z Obeidat, MD, PhD - **Department:** Neurology

BACKGROUND: Only a few studies are dedicated to understanding the unmet needs for older adults living with multiple sclerosis (MS) or those with advanced MS. Most clinical trials exclude people who are older than 65 years or have an expanded disability status scale (EDSS) scores of 7 or higher. It is very important to explore the unmet needs, perceptions, and quality of life of all groups including older adults, and people with advanced MS. Understanding the patient perspective will help guide personalized care and design studies that are more inclusive.

OBJECTIVE: This study aimed to identify unmet needs, assess quality of life, and determine depression risk among individuals with advanced MS and those aging with the condition, comparing their experiences with a control group of less severely affected and younger MS patients.

METHODS: A comprehensive study was conducted at a specialized MS clinic, involving 33 participants, divided into distinct groups based on disease severity and age. Participants completed four questionnaires: the 10-Point MS symptom scale, PHQ-9 depression scale, MSQOL-54, and an open-ended inquiry asking "what is the biggest unmet need for MS?" Statistical analyses, including ANOVA and regression, were employed for comparisons.

RESULTS: A total of 33 MS patients completed the study. While no significant variation in overall quality of life and depression risk was observed among the groups, disparities were evident in the physical and mental components of quality of life. Noteworthy correlations were found between symptom perception, depression risk, and overall quality of life scores.

CONCLUSION: The study shed light on the distinct needs and challenges faced by individuals with advanced MS and those aging with the condition. The findings underscore the importance of tailored interventions to address these diverse needs and improve support systems for individuals with varying stages of MS.

Impact of breathing technique on aerosol drug delivery to laryngopharynx**Authors:** Jadcherla A, Dey S, Johnston N, Bock JM, Garcia GJM**Project Mentor:** Guilherme JM Garcia, PhD - **Department:** Otolaryngology & Communication Sciences

INTRODUCTION: Dry powder inhalers (DPIs) are under development to treat laryngopharyngeal reflux, a disease for which no effective therapeutic drug exists. DPIs were originally developed to treat lung diseases and designed to minimize deposition in the upper airways and maximize deposition in the lungs. This study investigated the impact of particle size and breathing technique (deep vs. shallow inhalation) on the dose delivered to the laryngopharynx using computational fluid dynamics.

METHODS: A 3-dimensional model of the airways (mouth to main bronchi) was created from magnetic resonance imaging of a healthy adult. Transient airflow and particle transport simulations were performed in ANSYS software using the k- ω turbulence model. The amplitude of the sinusoidal breathing profile was varied to investigate how the breathing technique (deep vs. shallow inhalation) affected the regional doses. A log-normal particle size distribution was assumed with a mass median aerodynamic diameter of 10 μ m for DPI-1 (representing a DPI optimized for laryngopharynx deposition) or 3 μ m for DPI-2 (representing a commercially available DPI).

RESULTS: Particle size distribution had a major impact with laryngopharyngeal deposition decreasing from 31% for DPI-1 to 10% for DPI-2 for a normal inhalation. Breathing technique had a significant impact on laryngopharyngeal deposition for DPI-2 (12% for deep inhalation vs. 6.5% for shallow inhalation), but had a negligible effect for DPI-1 (29.4% for deep inhalation vs. 30.3% for shallow inhalation).

CONCLUSION: Our simulations suggest that particle size distribution has a bigger impact on the laryngopharyngeal dose than the breathing technique. Additional studies are needed to test this prediction in a larger cohort.

Association between perceived ethnic discrimination and receipt of COVID-19 vaccine in pregnancy or postpartum**Authors:** Jaeke E, Anguzu R, Greenberg R, Palatnik A**Project Mentor:** Anna Palatnik, MD - **Department:** Obstetrics & Gynecology

BACKGROUND: Although COVID-19 vaccination has been shown to be safe and effective during pregnancy, pregnant and postpartum populations continue to experience higher rates of vaccine hesitancy than the general population. The experience of discrimination is associated with vaccine hesitancy, but this association has not yet been examined within a pregnant population, which is a particularly vulnerable group.

METHODS: Pregnant individuals receiving prenatal care at a Midwestern academic institution were approached between June 2021 and March 2022 to complete a web-based discrimination questionnaire. The validated survey- the Brief Perceived Ethnic Discrimination Questionnaire - Community Version (BPEDQ-CV) - measures perceived interpersonal racial and ethnic discrimination through four domains, with questions rated on a five-point Likert scale ranging from "never" to "very often". All four domains were summarized in a lifetime discrimination score ranging from 1 to 5. The primary outcome was receipt of COVID-19 vaccination in pregnancy or within six months postpartum. A multivariate logistic regression model was used to examine the association between "lifetime discrimination score" and COVID-19 vaccination.

RESULTS: Of the 274 pregnant individuals who met inclusion criteria for this analysis, 211 (77.0%) received the COVID-19 vaccine and 63 (23.0%) declined. For each domain of BPEDQ-CV, and for the combined score of lifetime discrimination, a higher score was associated with a higher rate of declining the COVID-19 vaccine. After adjusting for potential cofounders, each unit increase in lifetime exposure to perceived discrimination was associated with 1.25 higher odds of not receiving the COVID-19 vaccine during pregnancy or within in the first 180 days postpartum (aOR 1.25, 95% CI 1.01 - 1.55).

CONCLUSION: We found higher lifetime exposure to perceived discrimination was associated with higher risk of declining COVID-19 vaccination during pregnancy and postpartum.

All Over The Map: Variation in Pediatric Critical Care Charges**Authors:** Jereczek A, Maxwell A, Reimer E, Scanlon M.**Project Mentor:** Andrea Maxwell, MD, MPH - **Department:** Pediatrics

INTRODUCTION: Little has been published about charges in the pediatric critical care literature. Due to the Affordable Care Act, hospital charges are required to be publicly available and easily accessible as of January 2021. The goal of this study was to examine the variation in charges associated with Pediatric Intensive Care Units (PICU) in the United States and factors that contribute to this variation.

METHODS: We used the hospital directory from the Children's Hospital Association which contained 193 US acute hospitals. For the 190 hospitals with a PICU, we located the chargemaster on their website and ed charges, including: PICU and bed charges, mechanical ventilation, CPT critical care code 99291, and ECMO. We calculated the median daily charges for each hospital and used these to calculate an overall US median charge.

RESULTS: For the 151 hospitals with bed data, the median PICU bed charge was \$8523 (\$1528-\$62690). The median floor bed charge was \$3237 (\$536-\$20614). When the PICU bed charge data was analyzed by census regions, the medians of the Midwest and South were similar: \$6783 and \$6853 respectively. The medians for the East and the West were also similar: \$13167 and \$12756 respectively. For the 157 hospitals with mechanical ventilation data, the median charge was \$2155 (\$298-\$14893); the median ventilation charge based on CPT was \$2135 (\$214- \$20238). For the 132 hospitals with charges for the CPT code 99291, the median charge was \$3814 (\$341-\$17199). The ECMO charges were uninterpretable due to being a mixture of professional charges, hospital charges, and procedural charges.

CONCLUSION: Our assessment of public charge data reveals wide variation in what pediatric hospitals are charging for the same services. Further research is needed to examine causes for this variation. The study of this data is an important step towards ensuring charge transparency, as well as understanding differences in value of care provided by different PICUs.

Evaluation of Diabetes Educator Training Program for Dietitians and Nurses at UPTH, Nigeria**Authors:** Johnson A, Akhidue K, Seibold K, Caples L, Tomczyk B, MacKinney T, Abibo L**Project Mentor:** Lolita Abibo, MD, MS - **Department:** Medicine

BACKGROUND: Diabetes is a growing health concern in Nigeria, highlighting the need for well-trained healthcare professionals who can effectively educate individuals with diabetes. UPTH implemented a Diabetes Educator Training Program to enhance the knowledge and skills of dietitians and nurses in diabetes care. This study evaluates the program's effectiveness by assessing changes in participants' test scores and self-reflection before and after the training.

METHODS: Participants in the DE Training Program completed pre-test and post-test knowledge assessments before and after the training. Additionally, self-reflection surveys to assess their readiness to educate patients about diabetes were conducted before and after the training. Statistical analysis involved a paired t-test to determine significant changes in training outcomes.

RESULTS: Regarding knowledge, the paired t-test results revealed a statistically significant increase in test scores from pre-test to post-test, with an average increase of 12.5 points (95% CI: 8.20, 16.80). The test statistic was $t = 6.58$, with 9 degrees of freedom, and a p-value of 0.0001.

Regarding self-confidence, the paired t-test was conducted to assess changes in participants' self-reflection survey responses and test scores before and after the training resulting p-values less than 0.05, indicating no significant differences.

CONCLUSION: This study provides significant evidence that the Diabetes Educator Training Program at UPTH, Nigeria, effectively increased participants' knowledge, as indicated by the significant improvement in test scores. While self-reflection survey responses did not show significant changes, the substantial increase in test scores suggests that the program successfully enhanced the competence of dietitians and nurses in diabetes care. These findings indicate the importance of structured training programs for healthcare professionals to better serve individuals with diabetes in southern Nigeria.

Culture of Patient Safety and Team Communication in the Operating Room of a University Hospital in Cuba

Authors: Johnson Escauriza AJ, Gellings JA, Iverson K, Ramirez Leal B, Costa Ortiz G, Garcia MM, Santiesteban Herrera WM, Guelmes Lavandero AL, Montero Laffita N, Sende Oduardo A, McLarren J, Valdes Y, De Moya MA, Medina Vega B.

Project Mentor: Katie R Iverson, MD, MPH and Jaclyn Gellings, MD and Marc A de Moya, MD - **Department:** Surgery

Community Partner: General Calixto-Garcia University Hospital, La Havana, Cuba

PURPOSE: Safe and effective surgical care depends on a team's ability to communicate and function as one unit in the care of each patient. We seek utilize the Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS) curriculum and updated operative checklists to pilot a Culture of Safety Initiative in Calixto-Garcia in Cuba, with the long-term goal of a multi-institutional safety initiative in Latin American nations.

METHODS: Our study used two focus groups to evaluate teamwork and communication at Calixto-Garcia University Hospital in June 2022 utilizing simulation-based teaching modules using TeamSTEPPS. Focus group participants were chosen based on convenience sampling, and a grounded theory approach for thematic analysis was used to identify common themes. Concurrently, institutional operative checklists were updated by a panel of experts.

RESULTS: The TeamSTEPPS modules were adapted for utilization in Cuba. A panel of 7 experts taught the modules, and led two focus groups of 12 medical students who identified three key issues: (a) unclear communication, (b) experience level and autonomy, and (c) limited comprehension of the protocols and guidelines. Proposed solutions included daily briefings and trauma meetings. The existing operative checklists at Calixto-Garcia were also updated to include all disciplines (surgery, anesthesia, nursing).

CONCLUSIONS: We sought to foster an environment cohesion amongst operative teams at Calixto-Garcia hospital using updated multi-phase operative checklists and team-based communication training. These changes revealed poor interlevel communication and inadequate knowledge of clinical protocols prompting hospital-wide changes including multidisciplinary morning conferences, and cultural changes regarding team dynamics.

STAT Head CTs in the Pediatric Intensive Care Unit: Much Risk for Little Reward?

Authors: Judkins J, Yan K, Scanlon MC, Rajzer-Wakeham K, Zhang L, Balakrishnan B.

Project Mentor: Binod Balakrishnan, MD - **Department:** Pediatrics

BACKGROUND: In pediatric intensive care units (PICUs), head computer tomograms are frequently ordered "stat" to assess acute intracranial pathology. Obtaining a "stat" head CT (SHCT) may result in delays in therapy, as well as decompensation during patient transport. There are no studies evaluating whether SHCTs lead to changes in patient care in the PICU setting. We studied the indications for and findings of SHCTs, as well as any resultant interventions.

METHODS: After obtaining approval from the investigational review board, we retrospectively analyzed the records of PICU patients who underwent SHCTs at a free-standing children's hospital over a two-year period. ed data included demographics, primary diagnoses, indication for SHCT, illness severity (SOI), and both neurologic pupil index (NPI) and any post-SHCT interventions within two hours of imaging. SHCT findings were recorded as no change, new findings, or progression of known findings. SHCT indications include altered mental status (AMS), seizure (SZ), neurosurgical team request (NS), increasing intracranial pressure (ICP), pupillary changes (PC), focal neurologic deficits (FND), electroencephalogram (EEG) changes, and vital sign changes (VS). Descriptive statistics were used to describe the study population. A general estimating equation (GEE) model was used to identify factors associated with new findings and interventions.

RESULTS: 98 patients (54% male) underwent 112 SHCTs during the study period. New SHCT finding was noted in 35% of studies, with only 12% of SHCTs resulting in a post-SHCT intervention. The most common indications were AMS (25.0%), SZ (14.3%) and ICP (12.5%) Indications associated with most new findings included PC (80.0%), ICP (64.3%) and FND (50.0%). Minimum NPi, trauma status, and SOI were associated with new SHCT findings.

CONCLUSION: Most SHCTs performed in the PICU have clinically insignificant findings and are not associated with intervention(s).

The Associations Between Medical and Mental Health Conditions and Health Care Utilization in US Adults with Past Year Criminal Legal Involvement**Authors:** Jue MD, Hawks LC, Walker RJ, Akinboboye O, Thorgerson A, Egede LE.**Project Mentor:** Rebekah Walker, PhD - **Department:** Medicine

BACKGROUND: Every year, millions of US adults return home from prison or jail, and they visit the emergency department and experience hospitalizations at higher rates than the general population. Little is known about the primary conditions that drive this acute care use.

OBJECTIVE: To determine the individual and combined associations between medical and mental health conditions and acute health care utilization among individuals with recent criminal legal involvement in a nationally representative sample of US adults.

DESIGN: We examined the association between having medical or mental, or both, conditions (compared to none), and acute care utilization using negative binomial regression models adjusted for relevant sociodemographic covariates.

PARTICIPANTS: Adult respondents to the National Survey of Drug Use and Health (2015-2019) who reported past year criminal legal involvement.

MAIN MEASURES: Self-reported visits to the emergency department and nights spent hospitalized.

RESULTS: Among 9039 respondents, 12.4% had a medical condition only, 34.6% had a mental health condition only, and 19.2% had both mental and medical conditions. In adjusted models, incident rate ratio (IRR) for ED use for medical conditions only was 1.32 (95% CI 1.05, 1.66); for mental conditions only, the IRR was 1.36 (95% CI 1.18, 1.57); for both conditions, the IRR was 2.13 (95% CI 1.81, 2.51). For inpatient use, IRR for medical only: 1.73 (95% CI 1.08, 2.76); for mental only, IRR: 2.47 (95% CI 1.68, 3.65); for both, IRR: 4.26 (95% CI 2.91, 6.25).

CONCLUSION: Medical and mental health needs appear to contribute equally to increased acute care utilization among those with recent criminal legal involvement. This underscores the need to identify and test interventions which comprehensively address both medical and mental health conditions for individuals returning to the community to improve both health care access and quality.

My Life My Story: Developing a Crisis Response Plan for Community-Based Organizations**Authors:** Karch D.**Project Mentor:** Samantha Wilson, PhD - **Department:** Pediatrics

Veterans have proven to be one of the most at-risk populations for suicidality, showing to be at an almost 58% greater risk than non-veteran U.S. adults. The 2023 National Veteran Suicide Prevention Annual Report statistics noted 33.9 suicides per 100,000 veterans in 2021, an increase from those noted in 2020. My Life My Story (MLMS) is a nation-wide program that pairs civilian volunteers with veterans to document a veteran's lived experiences into their own narrative, their own story. While the experience can prove to be very healing for veterans, it may also bring up unresolved trauma for the story-teller, increasing the risk of crises and suicidality. Despite the increased suicidality risk within their target participants, MLMS did not, and currently does not yet have a standardized, documented response plan for volunteers to respond to veterans in crisis. This research project investigated and established a crisis response plan for our community-based, non-trained volunteers to support a veteran in crisis.

Assessing and Improving Prominent Social Determinants of Health among Patients at a Student-Run, Milwaukee Free Clinic**Authors:** Doucas A, Miller J, Dong X, Huang CC, Lundh R, Young S**Project Mentor:** Staci Young, PhD - **Department:** Family & Community Medicine

BACKGROUND: World Health Organization research affiliates determined that social determinants of health (SDOH) are significant drivers of diseases risk and susceptibility over a decade ago. Among other SDOH, health insurance coverage is integral to healthcare access and overall health, and uninsured patient populations in the United States are historically understudied. The social needs of this population must be better understood to provide comprehensive care. In Milwaukee, WI, the Saturday Clinic for the Uninsured (SCU) is a free clinic that addresses these needs.

OBJECTIVES: - Assess the most prominent SDOH needs of SCU's patient population

-Assess patient-reported community resource utilization for identified SDOH needs

METHODS: Patient data is collected using REDCap surveys administered during SCU clinic visits. The survey data was analyzed in R studio for descriptive testing and figure generation. The inclusion criteria for the study were: over 18 years old and had at least one completed SDOH survey. Data analysis identified the population's demographics, most prominent SDOH needs, resource frequency, and resource refusals. This study has an exempt IRB.

RESULTS: This study identified the most prominent SDOH needs of SCU patients as: dental care, insurance options, mental health needs, utility affordability, and education and work opportunities. Dental care and mental health services are frequently needed concurrently. For each of the five most prominent SDOH needs, frequency of resources provided was identified. Additionally, reasons patients refused resources for each SDOH need were identified.

CONCLUSION: The ERC team at SCU uniquely addresses patients' SDOH needs, and this study identified which SDOH needs are most prominent. This study's next steps are investigating the usefulness of the provided community resources reported by patients after multiple clinic visits to evaluate the impact provided resources make in addressing SDOH need

Acutely Performed Proximal Row Carpectomy for Perilunate & Lunate Dislocations: Case Series and Review of Literature**Authors:** Kaster J, Valiquette A, LoGiudice A**Project Mentor:** Anthony LoGiudice, MD - **Department:** Orthopaedic Surgery

HYPOTHESIS: The utilization of PRC offers an advantageous alternative to standard practice open reduction internal fixation (ORIF) for treatment of perilunate and/or lunate dislocations, demonstrating comparable results and a reduction in postoperative complications necessitating corrective surgery

METHODS: A retrospective chart review was conducted on adult patients who underwent acute PRC for PLDs & PLFDs in the Froedtert Health Network between 2010 and 2022. Inclusion criteria encompassed patients aged over 18 years with perilunate or lunate dislocation/fracture-dislocation treated with PRC within 21 days post-injury, among other criteria. 14 patients met the criteria for inclusion in our study. Patient-reported outcomes (PROs) were collected through phone surveys and final clinic visits, including assessment tools like the Patient-Rated Wrist Evaluation (PRWE), QuickDASH, Mayo Wrist scores, VAS pain scores, and return-to-work statuses. Surgical approaches, patient demographics, injury characteristics, and follow-up data were analyzed.

RESULTS: In our cohort, characterized by an average age of 49.4 years, the dominant injury mechanisms were motor vehicle collisions (57%) and falls (43%). The application of acutely performed PRC was performed within an average of 5.6 days post-injury, and patients were contacted an average of 68.0 months post-surgery. Return-to-work rates were favorable, with 42.8% returning without restrictions and 28.6% with restrictions. PROs, encompassing VAS (1.31), QuickDASH (20.5), and Patient-Reported Wrist Evaluations (PRWEs) (24.5) collectively demonstrated favorable results.

SUMMARY: This study demonstrates novel insights into the outcomes of acutely performed PRC for perilunate and lunate dislocations, expanding on limited existing literature and contributing valuable data to the field. We highlight PRC as a viable intervention for PLDs & PLFDs in the long term, through substantial return to work rates and positive PROs.

Detecting Implicit Bias using Qualitative Analysis of MCW Clerkship Evaluations, 2013-2019**Authors:** Harlander Saudek K, Fields B, Perez A.**Project Mentor:** Kris Harlander Saudek, MD - **Department:** Pediatrics

Research has shown that implicit bias affects clerkship evaluations and grades and it is known that medical students from underrepresented backgrounds are affected more than their white counterparts. This ultimately impacts students' SLOEs, MSPE letters, and induction into honor societies such as AOA. Previous cohorts of this study developed a list of descriptors designated as either "positive" or "negative". De-identified evaluations, save for self-reported gender and ethnic identities, from MCW students between the academic years of 2013-2014 and 2018-2019 from all the core clerkships were obtained. For this study, the word "compassionate" was analyzed qualitatively. The goal was to determine if bias detected in the clerkship comment was noticed even when a "positive" word was being studied. Gender and ethnic identities were blinded to identify repeated themes in the evaluations and determine if a difference in clerkship evaluations could be noticed between gender and ethnic groups.

A Qualitative Analysis to Explore Wellness Supports for Teachers**Authors:** Khokhar M, Ahmad T, Ruffalo L.**Project Mentor:** Leslie Ruffalo, PhD, MS - **Department:** Family & Community Medicine

BACKGROUND: Healthy, Physical Education, and Wellness (HPEW) teachers promote student health and wellness. Due to their understanding of wellness and trauma among our youth, they are being challenged to expand support. 1 in 3 high school students in 2019 experienced sadness according to the CDC, a 40% increase since 2009. A study from 2020 concluded that teachers display exhaustion/inadequacy/cynicism, suggesting teachers feel ill-equipped to deal with student mental health leading to burnout.

AIMS: The project analyzed deficiencies in physical education departments, explored trauma-informed approaches to support student/teacher well-being, and establish a feedback mechanism to share best practices among educators in promoting mental and physical well-being.

METHODS: Interviews were conducted with a national sample of HPEW teachers. Data from these interviews were analyzed using inductive open coding strategies, ensuring applicability to a broader audience.

RESULTS: 17 HPEW teachers (8 males, 9 females) were interviewed revealing various causes of burnout and proposed solutions (figure 1). Teachers believe student mental health challenges are primarily due to a deficiency in emotional intelligence. Teachers emphasized mental health resources, mindfulness, individualized student support, and professional development.

CONCLUSION: This study highlights the significant impact of teacher burnout on both educators and students, particularly within HPEW settings. Factors such as heavy workload, lack of administrative support, and student misbehavior contribute to increased teacher turnover rates. By installing resources to combat burnout, educators can enhance student physical and mental health. Furthermore, the study emphasizes the need for professional training in mental health support and trauma-informed care to better address student well-being.

Comparing fixation stability measurements obtained using the Macular Integrity Assessment system (MAIA) and adaptive optics scanning laser ophthalmoscope (AOSLO)

Authors: Kind E, Gaffney M, Grieshop J, Kreis J, Carroll J.

Project Mentor: Joseph Carroll, PhD - **Department:** Ophthalmology & Visual Sciences

PURPOSE: To compare fixation stability measurements obtained from two different devices, the Macular Integrity Assessment system (MAIA) and an adaptive optics scanning laser ophthalmoscope (AOSLO).

METHODS: A total of thirty-eight participants underwent fixation stability examination in one eye each using the MAIA and AOSLO. Fixation stability was quantified using the bivariate contour ellipse area (BCEA) and the isoline contour area (ISOA). Agreement between the two devices was analyzed using Bland-Altman analyses.

RESULTS: The mean (\pm stdev) BCEA68 was 0.05728 ± 0.05730 deg² for MAIA and 0.03469 ± 0.02474 deg² for AOSLO. From the Bland-Altman analysis, the logBCEA68 mean difference was 0.1416 (95% CI = 0.04378 to 0.2395). The mean (\pm stdev) ISOA68 was 0.04703 ± 0.05408 deg² for the MAIA and 0.02260 ± 0.01540 deg² for AOSLO. The logISOA68 Bland-Altman analysis showed a mean difference of 0.2431 (95% CI = 0.1489 to 0.3373).

CONCLUSIONS: A device method comparison between the MAIA and AOSLO demonstrated fixation stability measurements obtained from these devices were not in agreement with one another. The MAIA on average demonstrated higher fixation stability measurements than the AOSLO.

Rapid Response or Unplanned ICU Transfer after Admission to the Medical Floor from the Emergency Department

Authors: Klauck R and Jacobson N.

Project Mentor: Nancy Jacobson, MD - **Department:** Emergency Medicine

BACKGROUND: Patients admitted to the general medicine service from the emergency department (ED) and subsequently transferred to the intensive care unit (ICU) within 24 hours experience poor outcomes, including increased mortality and longer hospital stays. Unplanned ICU transfers are a quality indicator and a measure of patient safety.

OBJECTIVE: This study aims to describe the characteristics of patients and ED presentations that result in unplanned ICU transfers or rapid responses within the first six hours of admission to the general medical floor from the ED.

METHODS: This cross-sectional, retrospective, observational study was conducted at a 766-bed teaching hospital in Milwaukee, WI. The study included 54 adult patients admitted to internal medicine teams from the ED in 2021, who had unplanned ICU transfers or rapid responses within six hours of admission. Data collected included patient demographics, comorbidities, ED and hospital encounter variables, and outcomes.

RESULTS: Less than 1% of patients admitted to the medical floor from the ED had a rapid response or unplanned ICU transfer within six hours. Common admission diagnoses were infections (27.8%), respiratory issues (22.2%), and altered mental status (18.5%). Frequent ED interventions included antibiotics (42.6%), fluid resuscitation (40.7%), and oxygen supplementation (31.5%). The average ED length of stay for these patients was 347 minutes. Most unplanned ICU transfers occurred between 3 pm and 11 pm. The in-hospital mortality rate was 5.6%.

CONCLUSION: Early unplanned ICU transfers within six hours of admission may indicate earlier recognition and intervention for clinical deterioration. Further research is needed to identify predictive factors and improve triage and admission guidelines.

Cardiac dysfunction and altered gene expression in acid ceramidase deficient mice**Authors:** Kleynerman A, Rybova J, McKillop WM, Dlugi TA, Faber ML, Fuller M, O'Meara CC, Medin JA.**Project Mentor:** Jeffrey A Medin, PhD - **Department:** Pediatrics

Farber disease (FD) is an ultra-rare, autosomal-recessive, lysosomal storage disorder attributed to ASA1 gene mutations. FD is characterized by acid ceramidase (ACDase) deficiency and the accumulation of ceramide in various tissues. Classical FD patients typically manifest symptoms including lipogranulomatosis, respiratory complications, and neurological deficits, often leading to mortality during infancy. Cardiac abnormalities in several FD patients have been described; however, a detailed examination of cardiac pathology in FD has not been conducted. We report pronounced cardiac pathophysiology in a new strain-specific P361R-FD mouse model of ACDase deficiency that we generated. P361R-FD mice displayed smaller hearts, altered cardiomyocyte architecture, disrupted tissue composition, and inclusion-containing macrophages. Echocardiography suggested ventricular atrophy, valve dysfunction, decreased cardiac output, and lowered stroke volumes. Troponin I was significantly elevated in P361R-FD mice. Hearts from P361R-FD mice were found to have increased ceramide, cholesterol, and other lipids. Histopathological analysis of heart tissue from neonatal P361R-FD mice revealed lysosomal disruption as early as postnatal day 1. Lastly, we report cardiac conduction, striated muscle contraction, and sphingolipid homeostasis gene expression differences during cardiac development in P361R-FD mice. In summary, we investigated the heart in a mouse model of ACDase deficiency, demonstrating that ACDase deficiency induced lysosomal dysfunction, sphingolipid and cholesterol imbalances, tissue disruption, and significant inflammation, leading to impaired cardiac function in these animals.

Provider Perspectives of a Post Discharge Digital Engagement Program**Authors:** Kodali R, Brasuel L, Zagloul M, Janardan A, Crotty B.**Project Mentor:** Bradley Crotty, MD, MPH - **Department:** Medicine

Remote patient monitoring programs (RPM) are a great opportunity for supporting patients during vulnerable post discharge transitions of care. Introduction of post-discharge digital engagement tools (PDDE) to this service can enhance RPM programs. This study aims to qualitatively analyze the use of PDDE tools like GetWell Loop (GWL) on organizational workflow of care coordinators within the Froedtert & Medical College of Wisconsin Health Network. Nine GWL care coordinators (1 licensed practical nurse, 2 medical assistants, 6 nurses) were recruited to participate in semi-structured interviews to analyze the impact of GWL on their workflow and engagement. One-on-one virtual interviews were recorded and transcribed. Qualitative data was generated and analyzed using an inductive coding approach. We identified four principal themes: (1) Workload - 87.5% of the interviewed practitioners did not note changes in their workload/workflow; (2) Clarification - 62.5% identified the implementation of the PDDE as being an opportunity to clarify questions in patient care; (3) Matching Needs - 75% noted that the PDDE can effectively target individual patient needs; and (4) Connection - 87.5% identified that patient education and connection is the greatest benefit of the PDDE. Healthcare professionals highlight benefits of PDDE for supporting patients post discharge. It's important to consider how tech integration can improve efficiency of health care delivery through patient-sided engagement but also through meaningful changes to organizational workflows.

Characterizing Price Variation Amongst Standard Cancer Services in the United States**Authors:** Koerber N, Geissler T, Verhagen N, Childers C, Kothari A.**Project Mentor:** Anai N Kothari, MD, MS - **Department:** Surgery

INTRODUCTION: With the 2021 Centers for Medicare and Medicaid Services (CMS) Price Transparency Rule, hospitals are required to 1) provide a machine-readable file containing standard charges for all items and services and 2) provide a consumer-friendly display of shoppable services. The goal of this mandate is to provide the necessary information for consumers to make informed financial decisions about their medical care. The objective of this study was to assess hospital compliance with this rule and characterize price variability for cancer-related services.

METHODS: We performed a cross-sectional analysis of hospital pricing using the Turquoise Health (TH) Price Transparency Research Dataset. Hospitals were restricted to those found in the Medicare Fiscal Year Inpatient Prospective Payment System (IPPS) for geographic wage index comparisons. Summative statistics, across-center ratios, and within-center ratios were assessed for six cancer-related procedures. Compliance was analyzed by the number of hospitals providing pricing information relative to those in the IPPS file.

RESULTS: A mean of 2,557 hospitals disclosed pricing for at least one of the six cancer services analyzed. Reporting rates varied from 19.1% for prostatectomy to 65.8% for CT scans of the abdomen and pelvis. Adjusted for Medicare hospital wage indices, across-center variability ranged from 4.6-fold for screening mammography to 13.7-fold for mastectomy. The median within-center price ratio averaged 3.10, varying from 2.75 to 5.03.

CONCLUSIONS: Hospital compliance with the CMS-mandated 2021 Price Transparency Rule remains low. The median price of a procedure varies as much as 13.7-fold based on which hospital a patient receives their care, with insurers paying a 3.1-fold difference in price for the same procedure within the same hospital. This study identifies a previously uncharacterized disparity in pricing for surgical procedures both across and within hospitals.

Quantifying Disparities: A Systematic Method for Assessing Prehospital Ketamine***Administration*** Emily Koller, Thomas Engel MD, MPH, Ben Weston MD, MPH, Lauren Nickel, PhD, Dan P**Authors:** Koller E, Engel TM, Weston B, Nickel L, Pojar D, Colella MR.**Project Mentor:** Leslie Ruffalo, PhD, MS - **Department:** Emergency Medicine**Community Partner:** Milwaukee County Office of Emergency Management

PURPOSE: Severely agitated patients in the prehospital setting pose a risk to themselves and providers. While ketamine is a common agent used prehospital for control of severe agitation, disparities have been described in its administration. This study describes a novel methodology and outcomes for assessing equity in administration of ketamine in the prehospital environment for specific patient presentations.

METHODS: This retrospective chart review evaluated data from prehospital patient encounters from January 2020 - January 2023 in a large, metropolitan fire-based EMS system.

RESULTS: A total of 351,714 patient encounters were reviewed with 457 having received ketamine for chemical sedation. These patients tended to be younger (39y vs 56y, $p<0.001$), male ($X^2=42.05$, $p<0.001$), and were more likely to be Hispanic as compared to Black or White ($X^2=41.78$, $P<0.001$). Among those 457 patient encounters, the top three primary impressions were identified and included altered mental state, mental disorder, and epilepsy. Among those primary impressions combined, patient receiving ketamine remained younger (39y vs 52y, $p<0.001$) and more likely to be male ($X^2=10.98$, $p<0.001$), but were more likely to be Black or Hispanic as compared to White ($X^2=728$, $p<0.003$). Evaluating each primary impression individually led to the starkest disparities being identified among patients with mental health concerns, with ketamine more likely to be given to those who are younger (36y vs 44y, $p<0.001$), male ($X^2=10.35$, $p=0.001$), and Black or Hispanic as compared to White ($X^2=9.99$, $p=0.01$).

CONCLUSION: The use of a novel methodology to understand disparities in prehospital ketamine administration for chemical sedation led to an improved understanding of inequities in care and specific primary impressions to target with education and quality improvement interventions.

Impact of a Standardized Vertebral Compression Fracture Management Pathway on Healthcare Resource Utilization and Opioid Use**Authors:** Kozuch M, Smolock A, Key B**Project Mentor:** Brandon Key, MD - **Department:** Radiology

BACKGROUND: Vertebral compression fractures (VCFs) are common osteoporotic fractures contributing to increased mortality, disability, and healthcare costs. Percutaneous vertebroplasty (PVP) effectively treats VCFs and may decrease analgesic requirements and hospital length of stay (LOS) but is often secondary to conservative management with narcotics and rest. Using a standardized, multidisciplinary VCF management pathway to expedite PVP evaluation, we hypothesize that reducing time between fracture(s) and PVP is associated with (1) decreased narcotic analgesia and (2) decreased healthcare utilization.

STUDY METHODS: We performed a retrospective chart review of patients treated with PVP at our institution (n=28). Dates of diagnosis, PVP consult, and procedure were used to investigate associations between length of time between events and opioid prescribing in morphine milligram equivalents (MME) within 30-days pre- and post-procedure. Regression models were used to further evaluate associations with subacute vs chronic fractures, readmissions, healthcare visits (e.g. ED visits), and advanced imaging.

RESULTS: Time from fracture to PVP consult was not independently associated with measures of time until procedure. Time from fracture diagnosis to consult was not associated with either pre-/post-procedure MME, readmission, healthcare visits, or use of advanced imaging. Pre-procedure MME was independently associated with post-procedure MME. Subacute fractures were not associated with MME.

CONCLUSION: While PVP remains an effective option for treating VCF, uncertainty remains concerning the time course of intervention. However, this analysis was constrained by small sample size, difficulties in interdisciplinary data from the electronic health record, and the use of proxy variables to capture highly variable time course data.

Brief, Real-Time Reflections in Primary Care: An Efficient, Contextual, and Familiar Variation of Narrative Medicine**Authors:** Hilgeman B, Kurtz K, Hoeschen M, Hovis Z, Harrison R, Minshew LM.**Project Mentor:** Brian Hilgeman, MD - **Department:** Medicine

INTRODUCTION: Narrative medicine has been found to improve empathy. However, requirements can often be burdensome and detached from the context of patient care. Real time brief reflections could be a tool to allow students to reflect in a manner that is contextual, familiar, and convenient.

METHODS: Fourth year medical students completed 280-character reflections while rotating in an intensive primary care clinic. Reflections were deductively and inductively coded by 3 coders. Inter-coder agreement was 82%. An independent auditor reviewed 20% of the reflections; initial agreement was 61% and after the auditor and coders reconciled and refined the codes and the codebook, agreement was 100%. Student feedback was elicited on a Likert scale to understand student perspectives surrounding impacts on time, empathy, thinking deeply, and remembering interactions.

RESULTS: Eighteen students completed 131 reflections during 64 clinic sessions (2.05 reflections/clinic average). Three main codes were elicited. Descriptive codes recounted events. Emotional codes revealed active reflection on emotions of the student, patient, or caregivers. Cognitive reflections displayed active and intentional processing and learning. Reflections could be coded with one or more codes. The most common code utilized was cognitive (41%) and the second most common code was emotional (33%). Most reflections were cognitive only (33%), but the second and third most common codes for reflections were descriptive and emotional (18%) and descriptive and cognitive (15%). Students commented that reflections helped them remember and think more deeply about patients and were a good use of their time.

DISCUSSION: Brief, real-time reflections are a tool that allow medical students to reflect upon their clinical experiences in a complex, cognitive, and adaptable manner with elements that show cognition, emotion, and precursors of empathy.

A community-engaged approach to understand community health workers' perceptions of their professional roles in the present and the future**Authors:** Lakshmanan A, Ruffalo L.**Project Mentor:** Leslie Ruffalo, PhD, MS - **Department:** Family & Community Medicine**Community Partner:** Milwaukee Area Health Education Center

Research has demonstrated the impact of employing community healthcare workers (CHW) increases health services productivity, increases clinical efficiency, reduces missed appointments, and has a return on investment (ROI) of 1:3 for every dollar invested. As medical costs continue to escalate, the demand for CHWs will also continue to rise to teach the public about healthy habits to avoid costly chronic conditions or medical procedures. Currently, Milwaukee Area Health Education Center (MAHEC) anticipates an increased demand for CHW training statewide as we continue to grapple with health care workforce shortages in urban and rural communities and health disparities among specific populations. We believe exploring CHW perspectives will lead to a robust understanding of the training needs a CHW should acquire to be successful in their role. To do this, we conducted 19 one-time interviews with two groups of CHW workers: 1) Currently employed CHWs; and 2) Individuals interested in pursuing CHW certification. From open coding analysis, we identified 17 primary codes to describe the CHW training and employment experience. Each of the primary codes also encompasses associated sub codes. We have identified several key themes including: 1) Several training strengths such as the appreciation for the MAHEC Staff and the speakers at each session; 2) The need for more training on Mental Health services and more information on the legal boundaries of what CHWs can and cannot do; and 3) The roles, values, and subsequent challenges faced by CHWs. CHWs currently serve diverse community members across many sectors of primary care. This, coupled with demand to increase the CHW workforce, builds a compelling case to create rigorous and responsive CHW training programs that align with the needs of CHWs and CHW supervisors. We plan to share the themes discovered with MAHEC to support positive changes to their current CHW training curriculum.

ReproSTART: An Innovative Five-Station Simulation Model to Teach Procedural Abortion Skills**Authors:** Lambert E, Jaeke E, Beroza A, Szczygielski J, Linton A, Linton A, Dielentheis K.**Project Mentor:** Kate Dielentheis, MD - **Department:** Obstetrics & Gynecology

INTRODUCTION: In the face of restrictive legislation regulating abortion care provision, there is a critical need for comprehensive and cost-effective simulation-based abortion training to prepare residents physicians for accelerated learning upon direct patient care. Simulation has been shown to prepare learners for graduated autonomy once caring for live patients and facilitate development of surgical skills prior to in vivo utilization. **METHODS:** A low-cost, low-fidelity model was created following a material selection process overseen by two board-certified Obstetrics and Gynecology (Ob/Gyn) physicians with expertise in abortion. The ReproSTART model is modifiable to teach five surgical techniques related to procedural abortion. Ob/Gyn residents tested each procedure station and provided feedback via a pre- and post-session evaluation form. Online materials were developed and uploaded to a website for dissemination to other institutions. **RESULTS:** Twenty-four Ob/Gyn resident learners represented all (4) years of training at two training programs in Milwaukee, WI. PGY-1 residents demonstrated a significant improvement in self-reported skills confidence. Seven (N = 7) additional resident Ob/Gyn learners participated in the training as part of their family planning curriculum. Learners across all levels of training reported the simulation model was useful for developing familiarity with procedural techniques and expressed positive reinforcement for this simulation model. **DISCUSSION:** Use of this multi-procedure model in simulation training improves confidence in procedural abortion skills in early learners. The utility and adaptability of this low-cost model has the potential to provide wide-reaching benefits for resident education in preparation for direct patient care.

Potential data fabrication in rheumatology randomized controlled trials: evidence from a systematic review and sampling analysis**Authors:** Le V, Casey M, Manswell K, Goldsher J, Nettleton E, Nepal D, Shah S, Junek M and Putman M.**Project Mentor:** Michael Putman, MD/MSci - **Department:** Medicine

Non-random sampling of baseline variables in randomized controlled trials (RCTs) may be due to unintentional errors, stratified randomization, or data fabrication. Prior studies have suggested that non-random sampling may occur in up to 15% of RCTs in anesthesiology and have led to high profile retractions of fabricated data. No similar studies have been conducted in rheumatology.

A systematic review was conducted to identify rheumatology RCTs published between 2010 and 2022. Baseline variables from randomized arms were extracted. Monte Carlo simulations were performed to calculate p values for individual baseline variables, which were then used to calculate an overall trial p value using the Fischer-Stouffer method. The distribution of summary p values, which should be uniform under conditions of true random sampling, was graphed. RCTs with trial p values ≤ 0.01 or ≥ 0.99 underwent further scrutiny using a version of the Research Integrity Assessment (RIA) Checklist. Integrity concerns for individual metrics and overall were assessed.

We extracted 19,799 baseline variables from 957 studies. A uniform distribution of trial p values would have produced approximately 19 studies with p values <0.01 or >0.99 ; our search identified 73 such studies. Using the RIA checklist, 59 (80.8%) studies were found to be lacking across at least one metric of study integrity. Based on the RIA findings, 19 (26.0%) trials were rated as having a high level of data integrity concerns, 8 (11.0%) had moderate data integrity concerns, and 46 (63.0%) had low data integrity concerns.

Non-random sampling has occurred in about 1 out of every 100 rheumatology RCTs. The majority of studies were assessed as being of low risk of threats to their integrity, but 27 out of 957 studies (2.8%) had moderate to high concerns about data integrity. Understanding common themes within these studies will assist in identifying areas that require further scrutiny in evidence synthesis and implementation.

The Correlation Between Perceived Stress and Skin-Picking in Medical Students**Authors:** Le JT, Li XR, Huang CC, Dong X, Agrawal H.**Project Mentor:** Himanshu Agrawal, MD - **Department:** Psychiatry & Behavioral Medicine

OBJECTIVE: Skin-picking may serve as a coping mechanism for medical students within a high-stress environment. This study examined the correlation between perceived stress and skin-picking severity in medical students at a private medical school in Wisconsin. The changes in emotional states reported before, during, and after skin-picking were also examined.

METHODS: A total of 75 medical students enrolled at the Medical College of Wisconsin completed a questionnaire based on the PSS-10 and Skin Picking Scale. Respondents that reported skin-picking completed an additional survey about the emotional states experienced during skin-picking. Data was stratified by gender, school year, and history of OCD/SPD and analyzed via ANOVA and Pearson correlation.

RESULTS: There is a significant positive correlation between perceived stress and skin-picking severity in first- and third-year medical students, and a positive but insignificant correlation in second- and fourth-year medical students. Skin-picking was associated with a decrease in anxiety, tension, and boredom, and increase in guilt, pain, sadness, and shame. Relief and gratification increased during skin-picking but decreased once skin-picking ceased, around when reporting of "trance" decreased.

CONCLUSIONS: Medical students appear to utilize skin-picking as a form of emotion regulation during stressful periods; however, skin-picking provides only transient relief from negative emotions and may give rise to additional negative emotions, such as guilt and shame. The correlation between perceived stress and skin-picking is stronger during transitional years one and three, suggesting difficulty coping with change worsens skin-picking. This study highlights the need for mental health resources for skin-picking within medical school.

"For the years I've been working in the HIV world, most people tend to ignore the topic of HPV" Healthcare professional views on HPV prevention amongst HIV+ Ugandan women

Authors: Lechleitner K, Anumolu N, Patel N, Mijumbi A, Jankowski C, Anguzu R, Kasasa S, Weber R, Dickson-Gomez J, Banura C, Beyer K.

Project Mentor: Kirsten Beyer, PhD, MPH, MS - **Department:** Institute for Health & Equity

Community Partner: Makerere University; The AIDS Support Organisation

BACKGROUND: Cervical cancer (CxCa) in Uganda is a leading cause of cancer mortality at an incidence of 3 times the global average. While CxCa is largely preventable through the HPV vaccine, completion rates of the two-dose series is low and only made available for school-age girls. This study was conducted to explore HIV professionals' knowledge to identify perceived barriers and facilitators to HPV vaccination among women living with HIV (WLHIV) in Uganda to inform HPV and CxCa prevention and control strategies.

METHODS: This study used qualitative interviews conducted from September 2020 to January 2022 with professionals working in the HIV field in Uganda. Participants were identified through purposive and snowball sampling with local colleagues. Both written and verbal informed consent were obtained. Hour-long interviews were conducted in-person or virtually and recorded. Interviews consisted of open-ended questions exploring HPV and CxCa among WLHIV in Uganda. Transcripts were analyzed and coded via MAXQDA software to identify facilitators and barriers to HPV vaccination, CxCa screening and treatment.

RESULTS: Fifty interviews were conducted. Analysis revealed three main priorities for improving HPV prevention: 1) addressing misconceptions through sensitization, 2) equipping HIV health workers with knowledge and vaccinations, and 3) expansion of the national vaccination program. Practical recommendations included utilizing key community partners to increase sensitization, increasing capacity of HIV health workers to administer vaccines, a national vaccination program that targets WLHIV and infrastructure to track HPV vaccination.

CONCLUSIONS: Interviewees called for a comprehensive policy on HPV that targets at-risk populations and tracks immunizations. There is much potential to integrate HPV vaccination with existing HIV testing and screening and community outreach infrastructure.

Using the Cambridge Risk Score to Predict New Hyperglycemia and Complications in Surgical Patients without Diabetes

Authors: Lee H, Hartfield PJ, Thorgerson A, Sinson GP, Wang M, Mendez CE.

Project Mentor: Grant P Sinson, MD - **Department:** Neurosurgery

BACKGROUND: Perioperative hyperglycemia is associated with adverse surgical outcomes and increased mortality, and when occurring in patients without history of diabetes, is recognized as new hyperglycemia (NH). The Cambridge Risk Score is a validated measure that is used to predict risk of developing diabetes. Our study examined the association between CRS and NH, and complications in patients undergoing elective surgery.

METHODS: In this retrospective cross-sectional study of adult surgical patients admitted to a tertiary care center over 4 years, patients with NH (blood glucose ≥ 140 mg/dL) without diabetes were identified, and the CRS was calculated. We used univariate regression models to evaluate the relationship between CRS and NH with 30-day readmission, length of stay (LOS), and complications. Regression models were then adjusted for race/ethnicity, payor type, and Elixhauser comorbidity score. Models were stratified by surgical specialty (cardiac/vascular, general, orthopedic, neurologic).

RESULTS: Of 10,531 patients included in the study, 24% had NH. The CRS was associated with the presence of NH and increased complications, but not with LOS and 30-day readmission. After adjusting for covariates, the CRS was associated with increased complications only. NH was associated with increased risk for 30-day readmission, LOS, and complications. By surgery type, the CRS was associated with development of NH and complications in general, orthopedic, and neurosurgery, but not in vascular patients.

CONCLUSION: The CRS is associated with NH and complications in patients undergoing elective procedures in neurosurgery, orthopedic surgery, and general surgery. This suggests that CRS may be of potential use to help identify surgical patients at high risk for NH and complications. Further prospective studies are warranted to evaluate if treatment of NH is associated with better outcomes in high-risk patients.

Combined Radiofrequency Ablation with Augmentation and Radiation Therapy for Painful Osseous Metastasis to the Spine: Does sequence affect pain score outcomes?**Authors:** Lee I, Skummer P, Scheidt M, Key B.**Project Mentor:** - **Department:** Radiology

PURPOSE: To determine if the timing of radiation therapy (RT) and radiofrequency ablation (RFA) with augmentation affected pain scores in patients with osseous metastasis to the spine.

MATERIALS AND METHODS: An IRB-approved single institution, retrospective review of all patients undergoing RFA for osseous spinal metastasis between July 2017 to June 2022. Patients were divided into three groups (no radiation, RT prior to RFA, and RT after RFA). Patient demographics, relevant oncologic history including radiation treatment, procedural details, and pain scores were recorded. Descriptive statistics and chi-squared tests were performed to evaluate differences in pain scores.

RESULTS: 76 patients with RFA and augmentation were reviewed (no radiation, n=29, radiation prior to RFA, n=23, radiation after RFA, n=24). Most patients had a pain score between 8-10 out of 10 prior to RFA (42/76, 55.3%) and a pain score 0-2 out of 10 after RFA (32/76, 42.1%). RFA significantly decreased pain scores in patients with prior radiation therapy ($p=0.03$) and trended towards a significant decrease in patients who were radiation naïve ($p=0.05$). Patients who underwent radiation after RFA had no significant change in pain scores ($p=0.51$).

CONCLUSIONS: Delivery of RT prior to RFA with augmentation seems to be the optimal timing for pain reduction in patients with painful vertebral metastases.

Perspectives among mentoring program leaders and staff regarding programmatic strengths and opportunities**Authors:** Lezama Morales J and Ruffalo L.**Project Mentor:** Leslie Ruffalo, PhD, MS - **Department:** Family & Community Medicine

Youth mentoring programs show promise as a low-cost intervention for at risk youth as well as developmental supplementation academically, professionally, and socially. However, despite the myriad of benefits youth mentoring programs provide the number of volunteers that serve as mentors has declined since 2006. Due to this, efforts to fund and expand mentoring programs were put in place such as MENTOR: The National Mentoring Partnership which assists these youth mentoring programs in an array of ways most notably being regarded as a significant factor for blunting the volunteering recession. In 2016, there was a demand for quality mentors within the Milwaukee area. Because of this, MENTOR greater Milwaukee (MGM), an affiliate of MENTOR: The National Mentoring Partnership, has been acting as an advocate for expanding quality mentoring. However, How has MGM impacted the effectiveness of these programs on an individual basis within the Milwaukee area? Therefore, this project explores the perspectives program leaders and staff regarding their various program features that lead to successful program delivery. In this study, semi-structured one-on-one interviews were used and conducted through zoom. Interviews were transcribed verbatim using Otter AI software with open coding strategies used to identified themes. 12 primary codes were found through open coding analysis which led to the formation of 7 key themes involved in mentoring program effectiveness. The findings represent that the mentoring programs within the Milwaukee area demonstrate characteristics and factors that, in congruence with other studies are shown to be effective within the mentor/mentee relationship.

Long-Term Outcomes and Residual Lesion Scores of 40 Years of Repair of Complete Atrioventricular Canal Defect

Authors: Lim PJ, Saudek D, Goot BH, Schaal A, Yang K, Yang Y, Hraška V, Jaquiss RDB, Litwin SB, Tweddell J, Woods RK, Mitchell ME.

Project Mentor: Michael E Mitchell, MD - **Department:** Surgery

OBJECTIVE: To assess the impact of surgical technique, Residual Lesion Scores (RLS), and other risk factors on long-term outcomes following Complete Atrioventricular (AV) Canal Defect repair.

METHODS: Retrospective analysis was utilized to review all patients who underwent repair of complete AV canal defect during the first year of life between September 2, 1982 and April 21, 2022 at our institution. Statistical analyses include Kaplan-Meier (KM) curves and multivariable logistic regression.

RESULTS: 398 patients met inclusion criteria, and follow-up was completed on 342 patients (85.9%) for a median follow-up of 11.2 years. There were 16 operative deaths, and 14 additional deaths during follow-up for an operative and overall survival rate of 95.3% and 91.2% respectively. Observed techniques included 22 one-patch, 39 modified one-patch, 243 two-patch, and 38 unspecified repairs. Reinterventions or complications were seen in 68 patients (19.8%).

Echocardiographic data were reviewed for a median follow-up of approximately 7 years to calculate RLS from post-operative, discharge, and most recent imaging in 230 of 342 patients. KM curve analysis showed that immediate post-operative echocardiography class 3 RLS have a significant association with lower survival probabilities from post-operative events ($p < 0.001$) and mortality ($p = 0.027$). Multivariable logistic regression analysis was conducted for 185 patients. Longer length of hospital stay ($p = 0.005$) and older age at surgery ($p = 0.034$) were significantly associated with increased chances of mortality.

CONCLUSIONS: No significant differences in long-term outcomes were observed when comparing type of surgical repair. Predictive models of RLS versus long-term outcomes were generated, and immediate post-operative RLS appeared to have statistically significant predictive value for complications or reintervention during follow-up.

Surgical Resident Experience in the Non-Surgical Clinical Learning Environment: a Qualitative Study

Authors: Linn E, Winkowski M, Higgins RM, Goldblatt MI, Hooyer K, Dream S.

Project Mentor: Sophie Dream, MD, MPH - **Department:** Surgery

OBJECTIVE: Residents interact, collaborate with, and learn from nurses, advanced practice providers, and physicians in multiple specialties. Both positive and negative experiences in the clinical workspace can affect residents' well-being, their ability to learn, and their development into effective, independent physicians. The aim of this study is to evaluate the surgical resident experience in the non-surgical clinical learning environment in order to identify how interactions outside of the operating room affect resident well-being and their ability to learn.

METHODS: Qualitative semi-structured interviews of six residents were performed to understand the impact of resident interactions with non-surgical staff on their learning experience. Interviews were conducted virtually, transcribed verbatim, and de-identified. Two team members independently read and coded interviews using thematic coding. Codes were then audited, and themes were identified until thematic saturation is reached.

RESULTS: Three major themes were identified: Communication barriers limit successful and positive resident experience with residents especially highlighting communication over the phone as a source of negative experiences. Preconceived perceptions of surgeons can lead to negative interactions. Conflicting specialty goals and cultures can lead to challenges in resident training.

CONCLUSION: The surgical resident experience in the non-surgical clinical learning environment is an integral part of resident training and the experiences outside of their surgical training environment play a role in well-being and their training experience. Improving communication skills across departments and better-developed understanding of interdepartmental goals and cultures can lead to improved training experience and outcomes.

Duty to Family: Ethical Considerations in the Resuscitation Bay**Authors:** Liphart C, Calciano C, Jacobson N, Derse AR, Pavlic A.**Project Mentor:** Ashley Pavlic, MD, MA - **Department:** Emergency Medicine

To examine the ethical duty to patients and families in the setting of the resuscitation bay, we address a case with a focus on providing optimal care and communication to family members. We present a case of nonsurvivable traumatic injury in a minor, focusing on how allowing family more time at the bedside impacts the quality of death and what duty exists to maintain an emotionally optimal environment for family grieving and acceptance. Our analysis proposes tenets for patient and family-centric care that, in alignment with trauma-informed care principles, optimize the long-term well-being of the family, namely valuing family desires and sensitivity to location.

Incidence of Cystoid Macular Edema after Pars Plana Vitrectomy with Silicone Oil Implantation and Associated Risk Factors**Authors:** Liu J, Wirostko W, Ahmad B.**Project Mentor:** Baseer Ahmad, MD - **Department:** Ophthalmology & Visual Sciences

PURPOSE: To observe the incidence of cystoid macular edema (CME) after silicone oil (SO) implantation for pars plana vitrectomy and to identify associated risk factors.

METHODS: This retrospective analysis included patients who received SO tamponade after pars plana vitrectomy for retinal detachment at a Midwestern academic hospital between March 2014 and March 2023. The development and resolution of CME were identified using optical coherence tomography (OCT) scans. Demographics, intraoperative information, and postoperative disease course were also documented. Risk factors were determined using chi-squared tests, Student's t-tests, and univariate/multivariate logistic regression models.

RESULTS: Twenty of 79 eyes (25.3%) developed CME after intraocular insertion of SO. The use of 1000 centistoke SO, as opposed to 5000 centistoke SO, was significantly associated with CME development ($p = 0.028$; Odds ratio = 4.46). There were no additional significant risk factors for CME regarding demographics, concurrent procedures, or other ocular characteristics. CME resolution occurred in 75% of affected patients following SO removal; disease recovery was not influenced by the administration of postoperative subtenon triamcinolone acetate.

CONCLUSION: SO tamponade viscosity may play a role in the development of CME, with low-weight oil increasing disease risk. Furthermore, SO removal alone potentially provides sufficient inflammatory relief for CME resolution.

Global Telehealth in Mexico: Providing Continuity of Care While Enhancing Medical Student Education

Authors: Ai J, Lucero M, Lee K.

Project Mentor: Kenneth Lee, MD - **Department:** Physical Medicine and Rehabilitation

Community Partner: Esperanza Viva, Rescue Orphanage - Puebla, Mexico

INTRODUCTION: The partnership between EV and the Medical College of Wisconsin (MCW) seeks to combine telemedicine and global health engagement to provide continuity of healthcare and a formative global health experience.

METHODS: Students would interview one patient with an interpreter present at EV, write a note for the clinic's electronic health record, and present the patient to an MCW attending physician. The attending and students would see the patient together through the station and then convey diagnosis and treatment plan. Prior to and after the initial encounter, students would complete a 13-point survey derived from Global Health Competency Self-Confidence Scale with statements evaluated on a 5-point Likert scale.

RESULTS: Five initial visits, four second visits, two third visits were conducted between 10 medical students. Greatest improvement was seen in Capacity Strengthening pertaining to collaborating with partner organizations to reducing health disparities and assessing operational capacity with an average improvement of 1.33 and 1.36 respectively. A total of 19 hours were spent on visits with 13 being patient interaction and staffing with most frequent primary complaints pertaining to the integumentary and cardiopulmonary systems.

Qualitative feedback included comments such as "[I enjoyed]" getting to know what life is like at EV, what resources they have available, discussing unique SDOH to these children, and helping connect them with resources." An identified barrier was technological issues such as connections.

CONCLUSIONS: Telemedicine is a valuable tool at enhancing medical education through exposure to global health and providing continuity of care in low-resource settings.

Postoperative Complications of Pediatric Papillary Thyroid Carcinoma Patients Undergoing Thyroidectomy: A Retrospective Analysis at Children's Wisconsin

Authors: Marasch H.

Project Mentor: Lauren Parsons, MD - **Department:** Pathology

Thyroidectomy is essential for treating various thyroid conditions, including the rare but increasingly prevalent pediatric thyroid carcinoma (PTC), yet data on postoperative complications in this population remains limited. This study aims to assess postoperative complications and associated factors in pediatric PTC patients undergoing total or completion thyroidectomy at Children's Wisconsin. Medical records of PTC patients who underwent thyroidectomy between May 2017 and July 2022 were analyzed for demographics, surgical type, presence of parathyroid tissue in surgical specimens, and postoperative complications, specifically including hypocalcemia and vocal cord dysfunction secondary to recurrent laryngeal nerve (RLN) injury. Of the 23 patients, 65.2% underwent neck dissections and 60.9% had parathyroid tissue present in surgical pathology specimens. Biochemical hypocalcemia occurred in 69.6% of patients, with 56.5% of patients requiring postoperative calcium supplementation (47.8% transiently and 8.7% persistently). No RLN injuries or vocal cord dysfunctions were observed, but one case of transient seroma and two cases of peripheral nerve injuries were noted. Neck dissection was significantly associated with postoperative calcium supplementation ($p = .04$), and patients with parathyroid tissue in their surgical specimens had significantly lower postoperative serum calcium levels ($p = .04$). A negative correlation was found between the number of parathyroid gland areas on surgical pathology and postoperative iPTH levels ($p < .001$). This study underscores the importance of ongoing data collection and analysis to refine postoperative protocols and improve outcomes in pediatric thyroidectomy patients at both institutional and national levels.

Early career acute care surgeons' priorities and perspectives: A mixed-methods analysis to better understand full-time employment

Authors: Murphy PB, Coleman J, Maring M, Pokrzywa C, Deshpande D, Al Tannir AH, Biesboer EA, Morris RS, Figueroa J, de Moya M.

Project Mentor: Marc de Moya, MD - **Department:** Surgery

BACKGROUND: Understanding the expectations of early career acute care surgeons will help clarify the practice and employment models that will attract and retain high-quality surgeons, thereby sustaining our workforce. This study aimed to outline the clinical and academic preferences and priorities of early career acute care surgeons and to better define full-time employment.

METHODS: A survey on clinical responsibilities, employment preferences, work priorities, and compensation was distributed to early-career acute care surgeons in the first 5 years of practice. A subset of agreeable respondents underwent virtual semi-structured interviews.

Both quantitative and thematic analysis were used to describe current responsibilities, expectations, and perspectives.

RESULTS: Of 471 surgeons, 167 responded (35%), the majority of whom were assistant professors within the first 3 years of practice (80%). The median desired clinical volume was 24 clinical weeks and 48 call shifts per year, 4 weeks less than their median current clinical volume. Most respondents (61%) preferred a service-based model. The top priorities cited in choosing a job were geography, work schedule, and compensation. Qualitative interviews identified themes related to defining full-time employment, first job expectations and realities, and the often-misaligned system and surgeon.

CONCLUSION: Understanding the perspectives of early career surgeons entering the workforce is important particularly in the field of acute care surgery where no standard workload or practice model exists. The wide variety of expectations, practice models, and schedule preferences

may lead to a mismatch between surgeon desires and employment expectation. Consistent employment standards across our specialty would provide a framework for sustainability.

State-of-the-art Multidisciplinary Approach to Placenta Accreta Spectrum

Authors: Fitzgerald G, Marmolejo E, Cruz M.

Project Mentor: Garrett Fitzgerald, MD - **Department:** Obstetrics & Gynecology

Placenta accreta spectrum (PAS) is an obstetric diagnosis with high morbidity and mortality affecting maternal and neonatal outcomes. The incidence locally and internationally is increasing, with similar prevalence in rural, exurban, and urban settings. Current treatment guidelines recommend a multidisciplinary approach using the highest level of obstetric, surgical, and critical care modalities. In Wisconsin the number of facilities with that level of capability are limited.

The initial goal was to reduce maternal surgical morbidity, most specifically surgical blood loss. A premium is placed on using the most up-to-date diagnostic and surgical techniques while maintaining a patient/family-centered focus. We also aimed to grow a referral network to make our services available statewide.

We assembled a dedicated team of providers with representation from Obstetrics/Gynecology, Anesthesia, Critical Care, Transfusion Medicine and nursing/allied health providers who repetitively manage pregnancies affected by PAS.

Since inception of our team-based model we have successfully cared for 31 patients. There have been 0 maternal deaths due to PAS. By year our average intraoperative estimated blood loss: 2018: 10.25 L, 2019: 6.5 L, 2020: 4.1 L, 2021: 3.0 L, 2022 (partial year data): 2.6 L. With repetition our surgical outcomes have improved. We have learned to streamline the complex steps to achieve an optimal outcome. We have noted increased accuracy in the prenatal diagnostic pathway, the importance of accounting patient geography, and the critical role of nursing/allied health partners in realizing the envisioned mission. Future goals include improving statewide screening/diagnosis of PAS and contributing to growth of evidence-based practices.

MedEd Case Studies: An Untapped Approach to Formative Evaluation**Authors:** Martin C, McAvoy K, Simpson D, Duthie E.**Project Mentor:** Edmund Duthie, MD - **Department:** Medicine**BACKGROUND**

Evaluating the transfer of didactic education to behavior change in a clinical setting is challenging. Case studies provide understanding of complex issues in patient care but are less utilized in medical education. In 2022, a session was piloted to educate medical students about the Alzheimer's Association's Direct Connect caregiver support referral program (Phase 1). Initial evaluations indicated a positive response. However, no referrals were initiated by students. Data regarding retention and application was collected and a redesigned training session was piloted in 2023 emphasizing interactive skills-based learning (Phase 2).

METHODS

Six months after each training session, a case study methodology was undertaken with a convenience sample of participating medical students. 15-minute 1-on-1 semi-structured interviews were conducted focusing on students' reactions, learning, and behavior related to the training sessions. Results were analyzed using thematic analysis and compared.

RESULTS

Five student case studies were completed in Phase 1 and four in Phase 2. Common themes from Phase 1 included poor session recall regarding specifics of Direct Connect and how to complete a referral. No students had initiated a Direct Connect referral. Phase 2 participants reported improved recall and specifically remembered the interactive role-play exercise included in the session. 50% of Phase 2 students had initiated a Direct Connect referral.

CONCLUSION

This case study approach yielded rich and actionable data. Further investigations are ongoing to evaluate the impact of these trainings on Direct Connect referrals overall.

The Prevalence of the Female Athlete Triad in Female Service Members**Authors:** Mattison CS, Wiese JW.**Project Mentor:** Jonathan Wiese, MD - **Department:** Emergency Medicine

Osteoporosis, amenorrhea, and low energy with or without disordered eating (the female athlete triad) are frequent clinical outcomes associated with female athletes in constant low energy availability (LEA). The rigorous training demands of the Army and the strict Army weight limits suggest that female service members may be susceptible to states of LEA. The premise of this study is to understand the prevalence of the female athlete triad in service members and to determine if adhering to the Army's weight requirements influences the prevalence of the triad's symptoms. Theoretically, female active-duty service members may present with more symptoms of the female athlete triad since they must adhere to strict weight requirements under Army regulations. Every participant conducted a survey that measured components of the female athlete triad, including energy availability (EA) with or without disordered eating (DE), menstrual disruptions (MD), and low bone mineral density (BMD). The survey questions were based on the verified screening tool for the female athlete triad, known as the Female Athlete Screening Tool (FAST) and the Low Energy Availability in Female Questionnaire (LEAF-Q). The results indicated that female veterans had significantly higher female athlete triad and disordered eating scores compared to female active-duty service members. The Army's recent focus on strength and power physical standards could explain why active-duty female service members have a lower female athlete triad score than female veterans. Nevertheless, the results indicate that female veterans are a concerning population for the female athlete triad, specifically for disordered eating.

A Mixed Methods Analysis Approach to Novel, Student-Run Communication Skills Training Program

Authors: McGauley M, Thapar M, Partovi O, Gitter C, Zepeda JL, Treat R, Agrawal H, Zehm A, Petroll A.

Project Mentor: Andrew Petroll, MD, MS - **Department:** Medicine

INTRODUCTION: Communication skills training (CST) remains underrepresented within preclinical undergraduate medical curricula, resulting in students reporting a lack of preparation for challenging communication encounters. Operation Conversation (OC) is a novel student-run, longitudinal, extracurricular, mentored CST program for preclinical students to prepare them for difficult conversations. We present an evaluation of our first year of implementation. **METHODS:** OC is a peer role-play program that involves three workshops for preclinical medical students over a semester. Students role-played in pairs while a facilitator observed the interaction. All parties then completed a communication skills checklist, the student-doctor received immediate feedback, then roles reversed. Students completed a reflection survey after each workshop and a final program evaluation. **RESULTS:** Sixty-four students participated in OC during the first year of implementation. When asked if they would recommend the program to future students, 88% said "definitely yes" and 11% said "probably yes." Learners' mean communication scores increased from the first to the third workshop as rated by self (75.2% to 86.7%, $p < 0.05$), peers (87.8% to 93.6%, $p < 0.05$), and facilitators (82.9% to 92.6%, $p < 0.05$). Students valued the challenging experiential learning despite initial anxiety, the real-time feedback, and the perspective gained by playing both roles. **CONCLUSION:** A student-run peer role-play CST program is feasible, highly regarded, and improves student communication skills. Program strengths include the virtual format, theory-based individualized experiential learning, a 2:1 student-to-facilitator ratio, real-time feedback, and longitudinal tracking of communication skill development. This could be an effective model for improving communication skills, perspective-taking, and empathy among the next generation of physicians.

The impact of a prior Norwood procedure on cardiac transplantation in failed Fontan physiology

Authors: McQueen RG, Singh NM, Woods RK.

Project Mentor: Ronald K Woods, MD, PhD - **Department:** Surgery

OBJECTIVE: The objective of this study was to compare cardiac transplant operative and postoperative courses of patients with failed Fontan physiology who were initially palliated with a Norwood (FFN) to those without a prior Norwood (FF).

METHODS: A single-institution retrospective review of all patients with Fontan failure who underwent cardiac transplantation from 2003-2021 was completed - 22 underwent prior Norwood (FFN) and 11 did not (FF). Descriptive and inferential statistics were calculated for operative course and patient outcomes.

RESULTS: The operative course of the FFN cohort appeared to be more complex (not statistically significant, but clinically relevant) - this group exclusively experienced sternal re-entry events (3 of 22 patients) and concomitant neo-aortic reconstruction (6 patients), had a longer duration of surgery (682 mins. vs 575.5 mins.), more time on circulatory arrest (25.5 mins. vs 12.5 mins.), and more frequent use of open sternal management (50% of patients vs 27.3% of patients). Postoperatively, these patients underwent more mediastinal explorations (other than sternal closure; 40.9% of patients vs 18.2% of patients), spent more time on mechanical ventilation (5 days vs 2 days), had a longer length of stay (30 days vs 19 days), and required more catheter-based re-interventions (22.7% of patients vs 9.1% of patients).

CONCLUSION: Although underpowered, our results suggest that the operative course of FFN patients is more challenging, based mostly on neo-aortic arch issues. In turn, this likely leads to a more complex postoperative course. We are currently collaborating with other institutions to increase cohort size and power of the study.

Texting as a method to collect post-discharge data after major pediatric surgery: lessons learned

Authors: Mehta A, Simpson PM, Davies WH, Lee HJ, Brimeyer C, Czarnecki M, LiaBraaten B, Mauro G, Weisman SJ, Hainsworth KR.

Project Mentor: Keri R Hainsworth, PhD - **Department:** Anesthesiology

Pain at 2-weeks post-surgery is predictive of chronic post-surgical pain. While in-hospital pain management is well studied, knowledge of important outcomes at home post-discharge is limited. This is a stressful time for parents so data collection methods must be convenient and should also yield accurate data. This study evaluated the feasibility and acceptability of a texting + Qualtrics system to collect data on pain and opioid use during the 2 weeks following hospital discharge after major pediatric surgery. Post-discharge, participants and parents received a link to questions on the Qualtrics online platform via text message. Responses were collected a maximum of 14 days. Outcomes included patient pain intensity, opioid use, and questions addressing feasibility/ acceptability of method. Bland-Altman plots were used to examine parent-patient agreement on pain and oxycodone use. Kaplan-Meier survival curves and log rank tests were used to examine time to mild pain (pain <3) and time to zero oxycodone use. All analyses focused on sex and age of patient, as potential factors influencing data accuracy. The sample included 66 patients (52% male; M 13.9 ± 2.5 years) and 63 parents. Patients and parents responded to a median of 62.% (14.6, 91.7) and 66.7% (50.0, 91.7) of all text requests respectively. Survival analyses suggest that males (6 days on average) may use less oxycodone than females (10 days on average) (Chi-sq = 3.073; df 1, P = 0.08). Parents both over and under estimated their daughters' pain and oxycodone use, which was especially true for younger females. While the texting platform was acceptable, response rates were less than ideal. Parent-patient discrepancies highlight the importance of collecting data from both sources. Future studies could evaluate the use of incentives to improve response rates. Texting is a promising method to collect important outcome data at home following major surgery, but modifications to improve response rates are necessary.

Repeat Assaultive Injury and Long-Term Mortality

Authors: Melin SJ, Srivastava P, Timmer-Murillo S, Kant J, deRoos Cassini T, Schramm AT.

Project Mentor: Andrew T Schramm, PhD - **Department:** Surgery

OBJECTIVES: There is a significant burden of assaultive injuries in the United States, which often repeat and tend to escalate in severity. Further, the risk of in-hospital mortality increases with each additional hospital encounter for a penetrating injury. However, little work has been done to consider post-discharge mortality following repeat assaultive injury. This study investigated the risk factors for repeat assaultive injury as well as for long-term mortality following assaultive injury.

METHODS: A retrospective review was conducted of patients presenting to a Level I Trauma Center for an assaultive injury between 1/1/2004-12/31/2020. Patients were identified using the trauma registry and ICD codes. Mortality data was obtained from the National Death Index and linked using name, DOB and sex.

RESULTS: Of 5797 patients presenting for an assaultive injury, 5603(97%) patients experienced one injury, 179(3.1%) experienced two injuries, and 15(0.25%) experienced three injuries. Male sex was significantly associated with higher odds of repeat injury(OR=2.48,p=0.002). The majority of post-discharge deaths(n=5437) were attributable to disease(n=221,52%), assault(n=96,23%), or drug overdose(n=58,14%); patients presenting for GSW were more commonly deceased due to homicide(39%) than medical disease(36%). Overall, mortality was associated increasing age(HR=1.03,p<0.001), ISS(HR=1.05,p<0.001), and racial minority status(HR=0.69,p<0.001). In patients that survived their first hospital encounter, readmission for assaultive injury was associated with increased risk of post-discharge mortality(HR=1.91,p<0.001).

CONCLUSIONS: Patients that survive multiple assaultive injuries have significantly greater all-cause mortality rates post-discharge than patients with a single assaultive injury. This information can be incorporated into evidence-based risk estimators and hospital-based violence intervention programs to break the cycle of violence.

Patient Needs Assessment - Implementation of a DSMES Program at a Student-Run Free Clinic

Authors: Mohammed B, Zaghloul M, Novic N, Yang R, Henderson K, Bougie M, Ntabala B, Lundh R, Abibo L, Dyer J, Young S, Harrison R.

Project Mentor: Lolita Abibo, MD, MS - **Department:** Medicine

BACKGROUND: Diabetes poses as a significant public health burden, particularly for underserved populations with limited access to healthcare resources. Student-run free clinics (SRFC) provide vital services to these populations. This project aimed to implement a Diabetes Self-Management Education and Support (DSMES) program at the Saturday Clinic for the Uninsured- a SRFC - the first step of which was a comprehensive needs assessment on the self-management behaviors of patients diagnosed with this condition.

METHODS: A cross-sectional needs assessment was conducted through telephone interviews with patients with a diagnosis of type 2 diabetes mellitus (T2DM). The needs assessment explored six key domains: experience with DSMES, management of diabetes-related complications, dietary practices, exercise habits, medication management, and psychosocial adaptation. Patterns and trends were determined via descriptive statistical analysis and thematic analysis.

RESULTS: A total of 19 patients participated in the study. Key findings revealed significant barriers to recommended self-management behaviors due to factors such as financial barriers, medication access, work schedules, lack of social support, and life stressors. Patients faced challenges managing diabetes-related complications and medication adherence due to similar barriers. Dietary practices and exercise habits were influenced by these social determinants of health, with participants struggling to maintain healthy behaviors. Despite this many patients reported feel comfortable with managing their diabetes but expressed a desire for targeted educational resources.

CONCLUSION: The needs assessment highlighted the impact of barriers faced by patients diagnosed with T2DM at SCU. Findings underscore the necessity for targeted, culturally-sensitive interventions to enhance DSMES access and promote self-management behaviors.

Use of InflammDry® for MMP-9 detection in ocular graft versus host disease

Authors: Morrow MK, Johnson R, Jerkins JH, Conto JE.

Project Mentor: John E Conto, OD - **Department:** Ophthalmology & Visual Sciences

BACKGROUND: Between 40-60% of patients who develop chronic graft versus host disease will develop ocular complications, also known as ocular graft versus host disease (oGVHD). Ocular complications, including keratoconjunctivitis sicca, cicatricial conjunctival fibrosis, and filamentary keratitis, can negatively affect patient daily living activities and quality of life. InflammDry® is a point-of-care test that can detect matrix metalloproteinase-9 (MMP-9), an inflammatory biomarker that is elevated in ocular surface stress and desiccation, such as in the disease oGVHD.

OBJECTIVES: To characterize MMP-9 levels in patients diagnosed with oGVHD and to assess InflammDry® ability to detect ocular surface disease in patients diagnosed with oGVHD.

METHODS: A retrospective chart review was completed on 74 patients who have undergone a hematopoietic stem cell transplantation (HSCT) and have been diagnosed with oGVHD. Date of chronic GVHD diagnosis; date of ocular symptoms onset; oGVHD NIH grade on day of InflammDry® testing; InflammDry® results; and interventions used to treat ocular symptoms were collected on each patient. Percent positivity, positivity rate and accuracy of InflammDry® was calculated.

RESULTS: The positivity rate of InflammDry® showed an increasing trend in relation to increasing oGVHD severity as well as an overall percent positivity of 87.16% and accuracy of 88.36%.

CONCLUSION: InflammDry® has demonstrated to be a promising tool that may be used as a screening tool to detect the development of oGVHD onset. However, before InflammDry® can be implemented into Hematology/Oncology clinics, the rate of positivity of InflammDry® in patients pre-HSCT must first be determined.

Program Evaluation of a Culturally Tailored Compassion Resilience Curriculum to Improve Mental Health and Wellness with Hmong Adolescents**Authors:** Moua L, Lor K, Thao G, Yang G**Project Mentor:** Kajua B Lor, PharmD, BCACP - **Department:** School of Pharmacy**Community Partner:** Hmong American Peace Academy

INTRODUCTION: Health disparities continue to pervade the Hmong community with mental health including access to culturally tailored mental health services and understanding of mental health. Studies show that the Hmong were twice as likely to experience mental health issues, including major depression and general anxiety disorder, compared to the general United States population.

OBJECTIVE: This is a curriculum evaluation project aimed to develop and deliver a culturally sensitive curriculum to address the rise in mental health issues and ensure Hmong adolescents build resilience.

METHODS: Medical students under faculty supervision created a culturally tailored mental health curriculum, adapted from the Compassion Resilience curriculum, that consists of four 45-minute sessions. After completion of the 4 sessions, participants took a post-survey to provide feedback on the perceived impact of the culturally tailored mental health curriculum.

RESULTS: Using a scale system of 1 to 5, with 1 representing low understanding of mental health and wellness and 5 representing a strong understanding, the average of students' understanding of mental health and wellness prior to completing the curriculum was a 3.1. After completing the culturally sensitive curriculum, most students had an increase in understanding of mental health and wellness with an average of 4.5.

CONCLUSION: From the post-curriculum survey responses we received, most participants had an increased understanding of mental health and wellness, with students able to list healthy coping mechanisms they learned from the curriculum.

Medical Student Ability to Detect Melanoma in Skin of Color by Level of Training**Authors:** Ndiokho I, Vaughn OA.**Project Mentor:** Olushola L Akinshemoyin Vaughn, MD - **Department:** Dermatology

As the US heads towards a future where racial minority groups represent most of the population, addressing healthcare disparities, particularly among diagnoses in people of color, is crucial (Higgins et al., 2019). This study aims to examine the ability of medical students to identify melanoma in various skin tones. The information provided will offer insights into potential biases in early medical education and how training length may impact these biases. The findings may clarify potential avenues for curriculum improvement. We hypothesized that there would be a significant difference in identifying melanoma in skin of color. This study surveyed medical students at the Medical College of Wisconsin. Respondents voluntarily participated in the study. Using published articles and images from the public domain and published articles, an electronic survey was disseminated for students to take. A total of 61 students took the survey out of a total of approximately 1000 medical students. Results from this small study showed that contrary to the hypothesis, there was no significant difference in the diagnosis between lighter and darker skin tones amongst medical students. While our study did not identify a significant difference in the diagnosis of melanoma between light and dark skin, efforts to enhance cultural competence in medical education are essential. Through highlighting potential areas for improvement, this study hopes to contribute to efforts to reduce healthcare disparities and improve outcomes, particularly in minority populations.

Prioritizing Cultural Humility in the Medical Student Dermatology Curriculum**Authors:** Neman S, Roth G, Akinshemoyin Vaughn OL, Humphrey SR.**Project Mentor:** Stephen R Humphrey, MD - **Department:** Dermatology

BACKGROUND: Dermatology programs have historically lacked in education and discussions surrounding cultural humility. Insufficient cultural humility education may compromise future patient-physician relationships and worsen health outcomes. We hypothesized that developing lecture material focused on cultural humility will increase students' self-reported proficiency in diagnosing dermatoses on skin of color (SOC) and conducting culturally sensitive patient care.

METHODS: Lectures at a single institution were updated to focus on disease presentations across a spectrum of skin tones, provide instruction on culturally sensitive skin exams, sexual and gender minority dermatoses, and gender-affirming care. A new lecture on hair and scalp disease was implemented. Optional, anonymous pre-rotation and post-rotation surveys were distributed to students enrolled in a four-week dermatology rotation. Data collection began in August 2021 and will continue through Fall 2024.

RESULTS: To date, 29 pre-module and 19 post-module surveys have been collected. A total of 13 students completed both pre-module and post-module surveys. Prior to their rotation, 0/13 students felt confident discussing skin or hair care across different racial or cultural groups, 2/13 students felt confident in their understanding of hair care and common hair disorders in patients with SOC, and 5/13 students felt confident in their ability to discuss LGBTQ+ dermatology. After their rotation, 13/13, 9/13, and 8/13 students felt confident in each of these topics, respectively.

CONCLUSION: Cultural humility education in dermatologic clerkships may improve students' confidence in treating patients of different skin tones and cultural backgrounds. Additional efforts may help raise awareness of LGBTQ+ dermatologic concerns and improve students' ability to identify dermatoses on darker skin tones.

Quantification of Intraoperative Blood Loss Following Surgical Repair of Peritrochanteric Femur Fractures**Authors:** Nocka HR, Andrews CI, Saltzman C, Strunets A, Schmeling GJ.**Project Mentor:** Gregory Schmeling, MD - **Department:** Orthopaedic Surgery

PURPOSE: There are a variety of techniques to quantify blood loss for orthopaedic surgeries, yet there is still no current accepted standard. One of the current practices is to rely on physician estimations. However, this leaves room for error and inconsistency. We highlight the error of physician estimated blood loss (EBL) values and demonstrate a consistent way to calculate blood loss for isolated peritrochanteric femur fractures at our institution.

METHODS: This single site retrospective chart review of 223 patients between 2015-2022 includes patients ≥ 18 years old who presented with an isolated peritrochanteric femur fracture and subsequently received surgical intervention. We recorded physician EBLs and then used the Nadler formula and the Hemoglobin Balance Method formula to calculate EBLs. Statistical analyses included Wilcoxon signed rank tests to compare reliability between EBLs of physicians with calculated EBLs. An intra-class correlation coefficient (ICC) < 0.5 means poor agreement between the two compared parties.

RESULTS: There is a significant difference between EBLs reported by Orthopaedic Surgeons (mean=299.45ml SD=286.50ml) and calculated EBLs (mean=749.35ml SD=701.35) with an ICC value of 0.14 [95% CI 0.003, 0.272] (p value $< .0001$). There is also a significant difference between EBLs reported by Anesthesiologists (mean=352.77ml SD=304.81) and calculated EBLs (mean=749.35ml SD=701.35) with an ICC of 0.21 [95% CI 0.071, 0.341] (p value $< .0001$).

CONCLUSION: The significant difference seen between the EBLs of the physicians with the calculated blood loss method demonstrates that there is error and lack of consistency when using physician EBLs as a means to track blood loss during these procedures.

Characterizing Continuing Professional Development Systems for Physicians in African Countries**Authors:** Nwumeh L, Danso N, Caples L.**Project Mentor:** Linda Caples, PhD - **Department:** School of Medicine Administration

BACKGROUND: Continuing professional development (CPD) and continuing medical education (CME) are two concepts that refer to ongoing competency development and education for healthcare professionals and physicians, respectively. The examination and comparison of CPD/CME systems in the literature has mostly focused on high-income countries, despite a recognized need to strengthen health workforce education and training in many low and lower-middle-income countries.

OBJECTIVE: This narrative review project aims to characterize the status of CPD programs in African countries to address this gap within the literature.

METHODS: Primary documents, including articles and grey literature, were searched between November 2023 and March 2023 using Google and Perplexity.ai to gather insights into the landscape of CPD systems in Africa. Fields relevant to country CPD status (e.g. CPD license cycle interval, whether a CPD system exists) and relevant demographic information (e.g. country population, number of physicians, number of medical schools) were collected within a database, and both qualitative analyses and descriptive statistical analyses were performed.

RESULTS: CPD systems were identified for 20 of 53 African countries, with either time-based (68%) or event-based (32%) requirements. 13 countries provided application documents for accreditation. For subgroups with accreditation documents, strong positive correlations were found between various demographic and CPD-relevant variables such as country population and CPD license cycle interval. Across all countries with CPD systems, weaker positive correlations were found between demographic and CPD-relevant variables.

CONCLUSIONS: This review characterizes the existing CPD systems within African countries as sophisticated, containing a variety of processes for accreditation, and tending towards increased license cycle interval and time-based requirements for highly developed systems.

New Beginnings are Possible: Engaging High School Students in Healthcare Careers**Authors:** Oates A, Meurer L, Njoroge K.**Project Mentor:** Linda Meurer, MD, MPH - **Department:** Family & Community Medicine**Community Partner:** New Beginnings Are Possible

This study explores the establishment of a sustainable service-learning partnership between the Medical College of Wisconsin (MCW) and New Beginnings Are Possible (NBAP), a youth-serving organization in Milwaukee County. The primary aim is to engage youth from underserved communities in healthcare careers through a series of educational and mentoring activities. The study addresses the significant underrepresentation of African Americans, Hispanic Americans, and Native Americans in healthcare professions, highlighting barriers such as financial debt, inadequate preparation, and lack of community support. The partnership involved medical students collaborating with NBAP leaders to develop and implement activities designed to spark interest in healthcare careers among youth. Evaluation methods included stakeholder feedback, participant surveys, and reflective critiques from medical student volunteers. Results showed successful organization of events like "Science Night," fostering early interest in science and healthcare careers among participants. Despite challenges such as funding cuts and communication delays, the initiative demonstrated potential for long-term sustainability and positive impact on both the youth and medical student participants. The study concludes that continued dedication and strategic development are essential for achieving lasting success in engaging underserved youth in healthcare career pathways.

Defining the Patient Population of Gender Diverse Youth at Children's Wisconsin Gender Health Clinic**Authors:** O'Neill C, Cabrera S.**Project Mentor:** Susanne Cabrera, MD - **Department:** Pediatrics

BACKGROUND: There is growing awareness around the barriers transgender and gender diverse (TGD) youth and families face accessing gender affirming care. Additionally, there is heightened attention on strengthening standards of care for these patients; however, there remains a dearth of research describing the members of this community who are able access gender affirming care. This project aims to define the population of TGD youth accessing care at Children's Wisconsin Gender Health Clinic (GHC).

METHODS: Via retrospective chart review, the demographic information of youth and their families seen at GHC for initial consultation between 1/12/2017 to 12/14/2021 was collected and analyzed.

RESULTS: In total, 305 youth (mean 13.9, range 3 -18 years old) were seen over a 5-year period. 79.3% and 20.7% were assigned sex female and male at birth, respectively. At the initial visit, 69.8% identified as transmasculine, 18.0% as transfeminine, 5.6% as non-binary, and 6.6% as one of the following: questioning, gender neutral, gender non-conforming, agender, gender fluid cis female, cis male, tomboy, or unsure. Patients came from across Wisconsin, Illinois, and Michigan, with an average distance from clinic of 40.7 miles. 60.9% were already established with a mental health provider at the time of first visit. The TGD youth in this cohort had high rates of comorbid anxiety and depression, 40.0% reporting both. Regarding schooling, of those seen prior to COVID-19 pandemic, 16.8% reported home-schooling or online schooling.

CONCLUSIONS: TGD youth seeking care in the CW GHC are diverse, largely mirroring populations seeking care in other pediatric gender clinics. These results are valuable, internally, as they promote a better understanding of the clinic's community impact. They are relevant more broadly, as defining the population who access gender affirming care can help inform clinic structure and ensure available clinic resources meet patient and family needs.

An Investigation of the Effects of Chronic Restraint Stress on Plasma Tumor Burden in an Autograft Mouse Model of Multiple Myeloma**Authors:** Pace B, Uttley H, Janz S, Knight J, Hillard C.**Project Mentor:** Siegfried Janz, MD - **Department:** Medicine

Studies have shown that markers of stress have been associated with accelerated cancer progression in solid tumors as well as in hematopoietic cancers (Lamkin et al 2012); however, there is limited data on the impact of chronic stress on the progression of Multiple Myeloma (Pisano 2021). Our study will be the first to examine chronic restraint stress in a mouse model of Multiple Myeloma, and it has the potential to inform further studies on the biochemical basis of disease progression as it relates to social determinants of health and sociological/environmental factors.

We hypothesize that chronic restraint stress of a mouse autograft model of Multiple Myeloma will result in increased plasma tumor burden and increased spleen and adrenal gland mass.

Autograft Multiple Myeloma mice were created via tail-vein injection of one million GFP-Luciferase-conjugated 6M5 mouse plasma tumor cells into an immunocompromised mouse line (NSG). Experimental mice were restrained for two hours, five days per week for three consecutive weeks. Bioluminescent imaging data was recorded.

There was a significant increase in dorsal bioluminescence of the stressed group compared to the control group at day 22, but no significant differences were found at any other time point. There was a trend of increased spleen and adrenal gland weight in the stressed group.

The data suggests that stress may increase tumor burden in an early-mid stage of disease progression, but the effect of stress on lymphoid organ mass is inconclusive. This experiment also shows trends in behavioral markers of stress that warrant further investigation.

Respecting Choices - an Advanced Care Planning Improvement Project**Authors:** Zunker J, Lange G.**Project Mentor:** Sabrina Hofmeister, DO - **Department:** Family & Community Medicine

Wisconsin legally recognizes two forms of advanced care directive (ACD) documents: power of health care attorney and the living will. These are powerful tools for patients and physicians that allow for a patient's goals of care to be met when they are unable to speak for themselves. ACD completion is an issue nationwide but is especially important in the state of Wisconsin as we are not a next of kin state.

This quality improvement project involves determining the percentage of patients with an ACD within Froedtert and another equally utilized hospital system (referred to as Hospital System 2). We are also evaluating how age, race, socioeconomic status, and insurance payor impact ACD document completion.

Two separate chart reviews were performed for each hospital system. Patients were considered to have an ACD if they had an electronically retrievable document that contained the appropriate witness signatures. A chi square test was performed to determine which factors were significantly associated with ACD completion. This was followed by a logistic regression to identify positive and negative predictive factors for each respective population.

Our results show an ACD completion rate for both systems that is well below the national average: Froedtert with 15.8% and Hospital System 2 with 19%. Both systems show negative predictive factors with younger age and racial minorities and positive predictive factors with older age and those with Medicare.

We have identified an area of patient care that is generally underutilized and specifically neglected among marginalized groups. From this data, we hope to create best practice for ACD in patient education and completion, and standardized protocols and education for staff to increase the awareness and completion rates of ACD.

Understanding the Relationship by Race/Ethnicity between Wealth and Cognitive Function among Older United States Adults with Diabetes**Authors:** Papadimitriou A, Dawson AZ, Thorgerson A, Bhandari S, Martinez M, Egede LE.**Project Mentor:** Joni Williams, MD, MPH - **Department:** Medicine

BACKGROUND: The prevalence of type 2 diabetes is increasing with the burden disproportionately falling on older adults and racial/ethnic minorities. Older adults with diabetes show greater cognitive decline and there are disparities in cognitive function by race/ethnicity that can be explained by social determinants such as wealth.

OBJECTIVE: To understand whether there is a differential relationship between wealth and cognitive function by race/ethnicity among older U.S. adults with diabetes.

METHODS: Data on 9006 adults aged 50+ with diabetes from the Health and Retirement Study (2006 - 2016) were analyzed. The primary outcome, cognitive function, was a score ranging from range 0-27 categorized as: normal [12-27], mild cognitive impairment (MCI) [7-11], and dementia including Alzheimer's Disease [0-6]. Three modeled outcomes were: 1) normal vs MCI, 2) normal vs dementia, 3) MCI vs dementia. Wealth was log transformed and used as continuous and binary (\geq median, $<$ median). Logistic generalized estimating equation models were used to examine the relationship between wealth and cognitive function and models were stratified by race/ethnicity. Models were adjusted for demographics, lifestyle, functional limitations, and comorbidities.

RESULTS: In adjusted models, greater wealth was significantly associated with lower odds of MCI and dementia for all groups. Similarly, having wealth less than the sample median was associated with higher odds of MCI and dementia compared to wealth \geq sample median.

CONCLUSIONS: Increased wealth was significantly protective against MCI and dementia for all ethnic groups. Wealth less than the sample median was associated with greater odds of dementia for NHB and NHW.

Title: Time From Consult Order to Disposition: A Surrogate Marker for Specialty-Specific Consult Time Tracking in the Emergency Department**Authors:** Aranda J, Jacobson N, Patel D, Chinn M, Esch A, Rubin J.**Project Mentor:** Jamie Aranda, MD - **Department:** Emergency Medicine**OBJECTIVE:**

Specialty consultation in the emergency department (ED) is an important component of emergency care and impacts important efficiency measures such as ED length of stay (LOS). There is a paucity of literature describing differences in time-based measures between consulting specialties.

METHODS:

This is a retrospective chart review of ED visits with consult orders placed at a large, academic, adult ED over a 28-month period. We determined the number of consults placed per specialty, average time from consult order to disposition order placement, and whether or not the patient was discharged.

RESULTS:

17,807 consult orders were placed between 07/01/2019 and 10/31/2021. Most frequently consulted services were trauma surgery (24.0%, n = 4,266), ophthalmology (13.9%, n = 2479), neurology (10.5%, n = 1868), orthopaedic surgery (9.8% n = 1752), and acute care surgery (8.2%, n = 1461). Specialties with the longest average time from consult order to disposition were stroke team (196 min), neurology (187 min), psychiatry (168 min), trauma surgery (164 min), and ophthalmology (162 min). Patients with the following consults were more likely to be discharged home: ophthalmology, hand surgery, and otolaryngology, whereas patients with the following consults were more likely to not be discharged: interventional radiology, acute care surgery and neurosurgery.

CONCLUSIONS:

The number of ED consultations and time from consult order to disposition varies amongst specialties. Services with long LOS were also heavily consulted in the ED and thus should be considered key collaborators in efforts to improve ED efficiency. Furthermore, this data identifies specialties whose consultation is associated with ED discharge and therefore these patients may benefit from expedited disposition with rapid follow up in lieu of a lengthy ED encounter.

Correlation of transverse rotation of the spine using surface topography and 3D reconstructive radiography in children with idiopathic scoliosis**Authors:** Patel M, Liu XC, Tassone C, Escott B, Yang K, Thometz J.**Project Mentor:** Xue-Cheng Liu, MD, PhD - **Department:** Orthopaedic Surgery

PURPOSE: The relationship between axial surface rotation (ASR) measured by surface topography (ST) and axial vertebral rotation (AVR) measured by radiography in the transverse plane is not well defined. This study aimed to: (1) quantify ASR and AVR patterns and their magnitudes from T1 to L5; (2) determine the correlation or agreement between the ASR and AVR; and (3) investigate the relationship between axial rotation differences (ASR-AVR) and major Cobb angle.

METHODS: This is a retrospective study evaluating patients (age 8-18) with IS or spinal asymmetry with both radiographic and ST measurements. Demographics, descriptive analysis, and correlations and agreements between ASR and AVR were evaluated. A piecewise linear regression model was further created to relate rotational differences to Cobb angle.

RESULTS: Fifty-two subjects met inclusion criteria. Mean age was 14.1 ± 1.7 and 39 (75%) were female. Looking at patterns, AVR had maximal rotation at T8, while ASR had maximal rotation at T11 ($r = 0.35$, $P = .006$). Cobb angle was $24.1^\circ \pm 13.3^\circ$ with AVR of $-1^\circ \pm 4.6^\circ$ and scoliotic angle was $20.9^\circ \pm 11.5^\circ$ with ASR of $-2.3^\circ \pm 6.6^\circ$. (ASR-AVR) vs Cobb angle was found to be very weakly correlated with a curve of less than 38.8° ($r = 0.15$, $P = .001$).

CONCLUSION: Our preliminary findings support that ASR measured by ST has a weak correlation with estimation of AVR by 3D radiographic reconstruction. This correlation may further help us to understand the application of transverse rotation in some clinical scenarios such as specific casting manipulation, padding mechanism in brace, and surgical correction of rib deformity.

Evidence-based Guidelines for the Management of Acute Cholecystitis**Authors:** Patin BB, Welsch JM, Davis CS.**Project Mentor:** Christopher Davis, MD, MPH - **Department:** Surgery

AIM: This study aims to provide a literature review on current evidence-based management practices for acute cholecystitis.

BACKGROUND: Cholecystectomy is the procedure of choice for surgeons treating acute cholecystitis. Several guidelines have been established to guide the preoperative and intraoperative management of acute cholecystitis. Review

RESULTS: Several risk stratification scores exist, including ASA, CCI, and ACS-NSQIP. These scores should be used in combination to properly assess and provide an accurate patient risk estimation. Intraoperatively, there are assessment scores and surgical guidelines, such as the Parkland Grading Scale and Critical View of Safety, that provide intraoperative landmarks and an estimate of acute cholecystitis severity to assist surgeons with laparoscopic cholecystectomy, reduce the risk of bile duct injury (BDI), and estimate postoperative outcome for the patient.

CONCLUSIONS: Laparoscopic cholecystectomy has been the gold standard for acute cholecystitis, and over the past 30 years several guidelines have been published to facilitate safe cholecystectomy. Ultimately patients presenting with acute cholecystitis are heterogeneous in nature pertaining to comorbidities, gender, age, etc. as well as severity and duration of the inflammation/infection of the gallbladder itself. Careful consideration of pre-operative and intraoperative risk factors and consensus recommendations is crucial to the safety of cholecystectomy as is keeping current with available literature and technology.

CLINICAL SIGNIFICANCE: The management of acute cholecystitis should never be viewed as routine, particularly regarding the heterogeneity of patient clinical status and severity of the disease process. Adherence to up-to-date evidence-based and expert consensus practice is critical to optimal outcomes for these patients.

Characterizing aortic valve calcification in a mouse model of bicuspid aortic valve disease**Authors:** Peck H, Kazik H, Mattern C, Kessler J, & Lincoln J**Project Mentor:** Joy Lincoln, PhD - **Department:** Pediatrics

INTRODUCTION. Bicuspid aortic valve (BAV) disease is characterized by the formation of two, rather than three cusps during embryonic development. This structural malformation is associated with premature development of calcific aortic valve disease. A plausible theory suggests that abnormal biomechanics resulting from bicuspid anatomy are a major contributor in promoting calcification. This study investigates the association between aortic valve anatomy, function, and expression of the calcification marker osteopontin (OPN) in a mouse model of BAV.

METHODS. NfatC1cre(+);Exoc5fl/+ (Cre positive) mice are a mouse model of BAV (Fulmer et al., 2019). Echocardiography was performed on Cre positive mice and NfatC1cre(-);Exoc5fl/fl (Cre negative) controls at 5 and 10 weeks of age and hearts were collected at 10, 18, and 32 weeks and prepared for immunofluorescence to detect expression of OPN.

Immunoreactivity (corrected total cell fluorescence) was quantified using ImageJ and correlated with echo measurements using ANOVA with multiple comparisons and two-tailed independent T-tests ($p \leq 0.05$).

RESULTS. A total of 65 mice were included in this study with Cre positive mice representing 52%, with a BAV penetrance of 8.8%. At both 5 and 10 weeks of age, peak aortic velocity was significantly higher in BAV mice compared to both Cre positive and Cre negative mice (5wk $F=6.108$, $p=0.0039$; 10wk $F=8.386$, $p=0.0006$). Comparing OPN expression across the three time points, Cre positive mice OPN CTCTF at 32 weeks was significantly elevated compared to the CTCTF of mice at both 10 weeks and 18 weeks ($F=11.85$, $p=0.002$). At 18 weeks, BAV mice had significantly higher OPN CTCTF fold change expression compared to both Cre positive and Cre negative mice ($F=12.56$, $p=0.001$).

CONCLUSIONS. These studies suggest that there is a stepwise progression of OPN expression over time with significant correlative increases in peak aortic velocity and OPN expression largely driven by BAV morphology.

Macronutrient Composition Can Alter Early Weight Loss Outcomes After Bariatric Surgery**Authors:** Perlin S, Kirby J, Grobe J, Higgins R, Gould J, Kindel T.**Project Mentor:** Tammy Lyn Kindel, MD, PhD - **Department:** Surgery**BACKGROUND**

Roux-en-Y Gastric Bypass (RYGB) is utilized to treat morbid obesity and associated conditions. The impact of macronutrient composition post-operatively has not been studied but may impact outcomes following the procedure and has the potential to shape postoperative recommendations.

OBJECTIVES

To describe the impact of macronutrient composition following RYGB on weight loss outcomes.

SETTING

University Hospital.

METHODS

This is a retrospective, electronic medical record review of 120 patients undergoing RYGB from June 2020 - February 2023. Data was collected from the medical record to include patient demographics, co-morbidities, preoperative anthropomorphic variables, and 6-week and 6-month 24-hour post-operative dietary records and anthropomorphic variables. Patients' dietary macronutrient composition was stratified for comparative regression analysis.

RESULTS

120 patients were included in the final analysis. Consuming a higher-fat diet was associated with decreased early weight loss independent of caloric intake following RYGB ($p=0.015$). Decreased protein intake was associated with reoperation within 30 days ($p=0.01$), and decreased caloric intake was associated with need for IV infusion treatment ($p=0.005$). Poor weight loss outcomes were associated with sex, race, and ethnicity with black, female patients and Hispanic patients having the poorest weight loss outcomes at 6 months independent of intake.

CONCLUSIONS

This study suggests that a diet higher in fat, independent of caloric intake, suppresses early post-operative weight loss after RYGB. Further, socioeconomic factors play an important role in weight loss outcomes that are not explained by caloric intake. Further studies are needed to determine if macronutrient composition supports long-term weight loss and mechanisms which drive this finding.

Unidentified Loss and Migration of a Rapid Infusion Catheter Guidewire into the Mediastinum: A Case Report**Authors:** Perry AA, Fadumiye CO.**Project Mentor:** Christopher O Fadumiye, MD - **Department:** Anesthesiology

Intravascular guidewire retention poses a serious yet increasingly recognized complication in medical procedures, particularly central venous catheter (CVC) placements. The advent of rapid infusion catheters (RICs) introduces a novel context for potential guidewire retention, as exemplified by the case presented here. We describe a unique instance where a guidewire, likely from RIC placement during trauma resuscitation, went unnoticed for seven months post-procedure, eventually identified incidentally on imaging. The misplacement of the guidewire suggests a broader need for improved awareness and vigilance in detecting such issues. Factors contributing to this occurrence include emergent circumstances, provider fatigue, and inadequate communication. Management of retained guidewires varies and may necessitate complex retrieval procedures, as exemplified by the presented case. Strategies to prevent guidewire retention emphasize human-factor engineering, with innovative approaches like the WireSafe kit showing promise in reducing such errors. This case underscores the critical need for heightened awareness, systematic checks, and innovative solutions to mitigate the risk of intravascular guidewire retention, thereby enhancing patient safety in clinical settings.

Mixed Methods Sustainability Analysis of a Fast-Track Protocol**Authors:** Plumb AJ, Trevino CM, Morris RS, Nataliansyah MM**Project Mentor:** Colleen Trevino, NP, PhD - **Department:** Surgery

INTRODUCTION: Fast-Track Protocols (FTP) have shown that preoperative and postoperative care can be streamlined to decrease hospitalization length without increased morbidity. However, studies regarding the implementation and sustainability processes of such protocols have yet to be fully explored. In our study, we conducted a mixed methods analysis using the Consolidated Framework for Implementation Research to assess sustainability of FTPs using the Froedtert Hospital Acute Care Surgery FTP as a model.

METHODS: Quantitative measures assessed overall hospitalization length of stay (LOS) and order set utilization from February 2018 to August 2022. Qualitative surveys were distributed to stakeholders of the FTP and used to assess qualitative impressions of the FTP.

RESULTS: Quantitative data showed the FTP was successful in reducing LOS across both laparoscopic appendectomy (19.3 hours for FTP vs 22.8 hours for non-FTP, $P<0.05$) and laparoscopic cholecystectomy (25.0 for FTP vs 34.8 for non-FTP, $P<0.05$) procedures. Order set utilization showed initial improvement from 2018 to 2019, but subsequently fell in all following years. Qualitative data showed access to information and communication between hospital staff and patients as strengths and a lack of distribution of the program data and lack of opportunity using the protocol as weaknesses.

CONCLUSION: Despite showing statistically significant reductions in patient LOS, the FTP showed decline in utilization after the first year of implementation suggesting that improved metrics are not sufficient to sustain quality improvement initiatives. Distribution of results and ensuring adequate exposure to programs should be taken into consideration when implementing quality improvement initiatives such as FTPs.

Piloting a Supplemental Discharge Tool in the Firearm Injury Survivor Population**Authors:** Prom JL, Manyitabot S, Laszkiewicz R, Cronn S, Schroeder ME.**Project Mentor:** Mary E Schroeder, MD - **Department:** Surgery

INTRODUCTION: Firearm injury survivor (FIS) patients have complex care needs that are exacerbated by psychosocial factors and are more likely to require a visit to the emergency room within 30 days of hospital discharge. To address this disparity, a review of the discharge process was conducted with the goal of providing FIS patients with individualized care to maximize their recovery.

METHODS: The trauma discharge process was observed, and patients and providers were interviewed to identify areas of improvement. We found that patients and providers desired a brief, patient-centered document to assist with providing discharge instructions. In response, a supplementary discharge tool was created consisting of a 1-page calendar template that includes a medication schedule, therapy exercises, wound care tips, and follow-up appointment information and is customizable to each patient's unique post-discharge care needs. The tool was piloted for a group of FIS patients who were then surveyed about their perceptions of it compared to the standard After Visit Summary (AVS). FIS patients who did not receive the discharge tool were also surveyed.

RESULTS: Patient survey results ($N=25$) found the discharge tool and AVS similarly useful with averages of 2.68 and 2.52, respectively, on a 3-point scale ($p=0.202$). However, patients were more likely to use their supplemental discharge tool every day compared to the AVS ($p=0.043$). Of those surveyed who did not receive the discharge tool ($N=25$), 80% reported that they would have liked one upon discharge.

CONCLUSION: Patients and providers desire a brief, patient-centered, and customizable tool for discharge instruction dissemination. Compared to the AVS, patients are more likely to use their personalized instructions every day.

The Variation of Withdrawal of Life Sustaining Therapy in Older Adults With Traumatic Brain Injury

Authors: Rabas MS, Pokrzywa CJ, Al Tannir AH, Sparapani R, Holena D, Murphy PB, Creutzfeldt CJ, Somberg L, Nattinger A, Morris RS.

Project Mentor: Rachel Morris, MD - **Department:** Surgery

The decision to withdraw life sustaining treatment (WDLST) in older adults with traumatic brain injury is subject to wide variability leading to non-beneficial interventions and unnecessary use of hospital resources. We hypothesized that patient and hospital factors are associated with WDLST and WDLST timing. All traumatic brain injury patients age 65 or older with GCS of 4-11 from 2018 to 2019 at level I and II centers were selected from the National Trauma Data Bank. Patients with head abbreviated injury scores 5-6 or death within 24 h were excluded. Bayesian additive regression tree analysis was performed to identify the cumulative incidence function (CIF) and the relative risks (RR) over time for withdrawal of care, discharge to hospice (DH), and death. Death alone (no WDLST or DH) served as the comparator group for all analyses. A sub-analysis of the composite outcome WDLST/DH (defined as end-of-life-care), with death (no WDLST or DH) as a comparator cohort was performed. We included 2126 patients, of whom 1957 (57%) underwent WDLST, 402 (19%) died, and 469 (22%) were DH. The majority of patients were injured by fall (76%, n = 1644). Patients who were DH were more often female (51% DH versus 39% WDLST), had a past medical history of dementia (45% DH versus 18% WDLST), and had lower admission injury severity score (14 DH versus 18.6 WDLST) ($P < 0.001$). Compared to those who DH, those who underwent WDLST had a lower GCS (9.8 versus 8.4, $P < 0.001$). CIF of WDLST and DH increased with age, stabilizing by day 3. At day 3, patients age 90 or older had an increased RR of DH compared to WDLST (RR 2.5 versus 1.4). As GCS increased, CIF and RR of WDLST decreased, while CIF and RR of DH increased (RR on day 3 for GCS 12: WDLST 0.42 versus DH 1.31). Patients at nonprofit institutions were more likely to undergo WDLST (RR 1.15) compared to DH (0.68). Compared to patients of White race, patients of Black race had a lower RR of WDLST at all timepoints.

Electronic Trauma Registry and Guideline Implementation at a University Hospital in Havana, Cuba

Authors: Ramirez Leal B, Gellings J, Johnson Escauriza AJ, Valdes Gonzalez Y, Dieguez K, Celestrin Marcos S, Durruthy Alvarez M, Hernandez Morales E, Gonzalez MA, Perez Escalante M, Milian Valdes D, Roger Cordero J, Pain C, De Moya MA, Iverson KR.

Project Mentor: Katie Iverson, MD and Jaclyn Gellings, MD and Marc A de Moya, MD - **Department:** Surgery

AIM & BACKGROUND: To address the disparity of trauma-related deaths, trauma registries have been developed in numerous HICs and LMICs, ultimately creating clinical decision support tools. However, maintenance of trauma registries can be a time-intensive and expensive process, particularly in resource-limited areas. This study aims to assess the feasibility of implementing a real-time electronic data capture system and clinical practice guideline platform, T6 Health Systems Mobile Application, in the Calixto-Garcia Hospital's emergency and trauma department in Havana, Cuba.

METHODS: Our study utilized six, 8-hour focus groups of 9 individual participants over four months to determine which aspects of the T6 communication platform would be best adapted for Calixto-Garcia Hospital, and challenges to its use. Focus group participants were chosen based on convenience sampling, and a grounded theory approach for thematic analysis was used to identify common themes. Transcripts were reviewed by two independent reviewers.

RESULTS: Thematic analysis revealed four major priorities for implementation of the T6 Health Systems platform at Calixto-Garcia Hospital: prehospital-hospital communication, T6 customization, training on trauma scoring systems, and incorporation of clinical practice guidelines (CPG) for both education and clinical decision-making. Main challenges to integration of this system include language barriers, unreliable internet connectivity, and prohibitive costs.

CONCLUSION: Our study reveals the complexities of integrating an electronic trauma registry and guidelines in a limited resource setting with technological challenges. The implementation of the T6 platform, although challenging, highlights the potential to enhance patient outcomes, interdisciplinary communication, and hospital efficiency.

Risk Factors for Skin Flap and Nipple-Areolar Necrosis in Patients Undergoing Nipple-Sparing Mastectomy with Deep Inferior Epigastric Perforator (DIEP) Flap Reconstruction

Authors: Ray HR, Doren EL, Adamson K, Kong AL, Cortina CS.

Project Mentor: Chandler S Cortina, MD, MS - **Department:** Surgery

INTRODUCTION: Nipple-sparing mastectomy (NSM) with deep inferior epigastric perforator (DIEP) flap reconstruction is a surgical option for select patients with or at risk of breast cancer. However, postoperative skin flap and nipple-areolar complex (NAC) necrosis remain common complications. This study aimed to identify factors associated with necrosis in patients undergoing NSM with DIEP reconstruction.

METHODS: A retrospective cohort study was performed from 2015-2023. 74 variables were analyzed in patients undergoing NSM with DIEP. Patients were stratified into 3 groups based on postoperative skin/NAC necrosis: none, partial thickness, and full thickness. Comparative and descriptive statistics were performed via t-tests, ANOVA, and chi-squared tests.

RESULTS: 34 women with 31 breast cancers met inclusion. 44% experienced necrosis: 15% partial thickness and 29% full thickness. The majority were white (85.3%) with mean age of 50 years (SD=9.11). In patients with immediate DIEP reconstruction, hypoperfused areas identified by SPY angiography increased risk of necrosis ($p=0.012$). Approximately 50% of both partial thickness and full thickness necrosis patients had concerns on SPY angiography. Former smokers in the full thickness necrosis group had more pack years than those without necrosis (9 vs 0.65 pack years, $p=0.035$).

CONCLUSION: In patients receiving NSM with DIEP flap reconstruction, those with hypoperfusion on SPY angiography and longer smoking history had higher necrosis rates. This supports the continued use of SPY angiography and the role of preoperative counseling in former smokers with increased pack-years on their risk of necrosis and the role of preventative measures in the perioperative setting.

The Prodrome of Multiple Sclerosis

Authors: Razzak AN, Hernandez R, Salter A, Obeidat AZ.

Project Mentor: Ahmed Z Obeidat, MD, PhD - **Department:** Neurology

INTRODUCTION: While other diseases have identified criteria for a prodrome period, only recently have population cohort studies suggested possible multiple sclerosis (MS) prodrome. This study aimed to identify how healthcare utilization is affected prior to an MS diagnosis.

HYPOTHESIS: The null hypothesis is no increase in healthcare utilization prior to MS diagnosis or difference between demographic groups. Study focused on utilization 4 years (years -1, -2, -3, and -4) prior to diagnosis.

STUDY METHODS: i2B2 database search yielded 613 patients with MS diagnostic ICD code treated by Dr. Obeidat between 07/01/2018 to 07/01/2022. Adult patients ≥ 18 years of age diagnosed with MS from the clinic during this time period were included. Patients with 1) established MS diagnosis at time visit, 2) non-MS diagnosis, and 3) pediatric-onset MS were excluded. Non-routine healthcare utilization score for each of the four years prior to official diagnosis was calculated from number of office visits, ER visits, hospitalization days, procedures, labs, and imaging tests; demographic variables were also collected. Adjusted repeated measures mixed model and Pearson correlation analysis was performed; P value was set at <0.05 for statistical significance.

RESULTS: A total of 108 patients met study criteria. Mean MS diagnosis age was 40.6 ± 12.6 years. Cohort was 64.8% female, 71.3% White, and ADI median of 55.0. Healthcare utilization was greatest for times -1 before MS diagnosis compared to times -2 to -4 that persisted after demographics adjustment, ($p < 0.0001$). Utilization was also significantly greater ($p < 0.05$) for older age, female sex, unmarried, and part-time employment.

CONCLUSION: An evidence of increased healthcare utilization in year -1 compared to years -2 to -4 was found. MS prodromal period may be comprised a year before formal diagnosis. Demographics above were associated more with utilization than race, area deprivation index, and rural-urban commuting codes.

Behavior and Outcomes of Solitary Fibrous Tumors of the Extremity

Authors: Reedy I, King D, Bedi M, English IA, Neilson J, Wooldridge A, Hackbarth D.

Project Mentor: David M King, MD - **Department:** Orthopaedic Surgery

BACKGROUND:

Solitary fibrous tumors (SFT) are a rare soft tissue tumor of mesenchymal origin that accounts for less than 2% of soft tissue tumors with variable clinical behavior. SFTs are commonly treated with surgical resection +/- radiation therapy (RT). Due to their rarity, prognostic indicators and treatment guidelines are lacking. In part due to these challenges, the Demicco stratification model and G-score models were developed with the goal of better predicting aggressive behavior in SFTs. In this study, we aimed to understand the behavior and outcomes of SFTs within the extremity as it relates to the Demicco risk stratification model and the G-score through the examination of a diverse cohort from multiple medical centers.

METHODS:

We performed a multi-institution, retrospective review of patients with SFTs of the extremities. Data collected included demographics, oncologic outcomes, tumor characteristics, and response to radiation therapy. Descriptive statistics were reported.

RESULTS:

33 surgical resection patients were included. 12 patients (36%) developed metastatic disease, all of which had lower extremity tumors with a majority being proximally located within the lower extremity. 2 patients (6%) developed a local recurrence. Both of these patients had tumors located in the pelvis and positive (R2) margins after resection surgery.

CONCLUSIONS:

The behavior of SFTs within the extremity are difficult to predict with LE and proximal location and increased size appearing to be associated with aggressive behavior and higher risk of metastasis for which the Demicco and G-score models appears to underestimate the risk of metastatic spread.

Bridging Gaps in Access to Health Information for Incarcerated Wisconsinites

Authors: Reimer E, Hawks L.

Project Mentor: Laura Hawks, MD, MPH - **Department:** Medicine

Individuals in prison have higher rates of substance use disorders and mental illness, noncommunicable conditions and infectious diseases and experience worse health outcomes compared to non-incarcerated populations. Moreover, many experience barriers within prison and upon reentry and have limited access to reliable and trusted health information. Working with a community-based organization, The Community, we have created and distributed evidence-based health-related information that is tailored to common conditions among those incarcerated. The Community is a non-profit run by a formerly incarcerated community member and has distributed newsletters within the system for over 8 years with a readership of over 10,000. Thus far we have distributed newsletters on chronic non-communicable diseases/ preventative health and infectious disease, and are in the process of creating our mental health and substance-use disorders newsletter. We have received written feedback from the readers via mail and email and use this feedback to tailor and improve our newsletters. This feedback allows readers to inform us if the information is relevant and presented in an effective manner. We also received feedback on health related topics that readers are interested in learning more about which we used in the planning of the content we included. This project has allowed individuals to be more informed on their health and be in a position to better seek out care and advocate for themselves.

Implementation and efficacy of Total Wellness, a community-based cancer prevention and lifestyle intervention program

Authors: Riegel DC, Villarreal Espinosa O, Kwarteng JL, Pinsoneault L, Manriquez Prado AK, Contreras S, Aboagye S, Wasserman E, Donlevy D, Visotcky A, Sheean P, Tovar M, Jensik K, Vidaver R, Stolley MR.

Project Mentor: Melinda Stolley, PhD - **Department:** Medicine

Community Partner: Milwaukee Recreation

Cancer is the second leading cause of death in Wisconsin, with higher mortality rates in Black/African American (BI/AA) and Hispanic/Latino (H/L) populations. In partnership with Milwaukee Recreation (MKE Rec), Total Wellness (TW) was created to provide lifestyle intervention and cancer prevention programming to Milwaukee minority communities. TW program content was informed by the American Cancer Society Guidelines and community feedback. TW is a 16-week program implemented over two 8-week sessions led by instructors trained in lifestyle change and cancer prevention. TW is being evaluated at an individual level and at a system level. At an individual level, a total of 60 participants consented and enrolled in the program evaluation, of whom 58.3% self-identified as BI/AA and 7.3% self-identified as H/L. Results from questionnaires indicated significant improvement in Godin leisure scores, cancer knowledge, and self-reported healthy behaviors. Results from physical assessments showed significant improvement in several variables including BMI and average systolic and diastolic blood pressure. At a system level, three instructors were trained, and classes operated out of two sites, one in a predominantly BI/AA neighborhood, and one with a large H/L population. English-taught sessions of TW showed successful integration into MKE Rec programming throughout two years. Two Spanish-only classes were attempted but did not meet minimum enrollment to proceed. In summary, TW has shown success in improving individual cancer awareness and stimulating healthy lifestyle changes. TW has also been integrated into MKE Rec and has shown marked success in reaching BI/AA communities with limitations in reaching H/L communities. This program demonstrates the efficacy of a community health intervention program to address cancer disparities.

Religion and Spirituality in Medicine: Does It Have a Place? Forming Culturally Sensitive Physicians While Maintaining Patient Autonomy

Authors: Rivera P, Staten J.

Project Mentor: Ryan Spellecy, PhD - **Department:** Institute for Health & Equity

Understanding and interacting with different religious and spiritual groups is critical to help eliminate cultural barriers that continue to exist between patients and healthcare professionals from diverse backgrounds. Studies show improving this connection between patient and provider leads to better shared decision-making, health outcomes, and ultimately, patient satisfaction. However, there continues to be a lack of physicians that are culturally aware when handling ethical dilemmas that may arise for individuals of differing spiritual or religious beliefs. Before our project, the Medical College of Wisconsin (MCW) lacked a formal educational session focused on religion and spirituality in relation to medicine. Therefore, our team put on three interactive, informative sessions for MCW students to educate future providers about how to accommodate patients' spiritual differences and help those students recognize for themselves what values are of upmost importance to them. Our team's work led to the development of a session that was incorporated into the new MCWFusion curriculum with the aim of educating incoming medical students on how to best care for patients from different religious and spiritual backgrounds while still emphasizing the importance of patient autonomy in healthcare decision-making.

Revision Rotator Cuff Repair Versus Primary Repair: An Assessment of Longitudinal Outcomes

Authors: Roge S, Valiquette A, Teng BQ, Yang K, Grindel S.

Project Mentor: Steven Grindel, MD - **Department:** Orthopaedic Surgery

BACKGROUND: Information about outcomes after revision rotator cuff repair (RCR) is limited. A more thorough investigation of pain, range of motion (ROM), strength, and functional outcomes is needed. Comparing outcomes between primary and revision rotator cuff repair patients can help surgeons guide patient expectations of the revision procedure. The aim of this study was to compare the outcomes of a revision repair group to a control group of primary RCR patients. We expect revision RCR patients to have worse clinical outcomes than primary RCR patients.

METHODS: A retrospective review of patients who underwent primary or revision RCR was performed. The case group included 104 revision patients, and the control group included 414 primary RCR patients. Patient visual analog score (VAS) for pain, ROM, strength, Simple Shoulder Test (SST), American Shoulder and Elbow Surgeons (ASES), and Constant-Murley scores were collected at baseline, 12 months, 24 months, and final follow-up.

RESULTS: By final follow-up, primary patients had less pain than revision patients (mean, of 2.11, $P < .0001$), but both groups improved overall. Primary patients had significant improvements in forward flexion, external rotation, internal rotation, and abduction at two years that were lost by final follow-up, but revision patients did not experience any long-term improvement in ROM. These differences in ROM between groups were not significant. Supraspinatus strength in the revision group did not improve nor decline by final follow-up. By final follow-up, both primary and revision patients had improved SST and ASES scores from baseline. Primary patient ASES scores were 17.9 points higher ($P < .0001$) than revision patients by final follow-up.

CONCLUSION: Revision RCR significantly improves patient pain and ASES score at four years. Revision patients should not expect to see the improvements in range of motion that may occur after primary repair.

National trends in neoadjuvant chemotherapy utilization for cT1-2 N0 triple negative breast cancer

Authors: Rogers C, Lloren JI, Johnson MK, Cobb A, Chaudhary LNC, Huang CC, Teshome M, Singh P, Kong AL, Cortina CSC.

Project Mentor: Chandler S Cortina, MD, MS - **Department:** Surgery

INTRODUCTION: Neoadjuvant chemotherapy (NAC) in breast cancer permits assessing chemotherapy response in vivo. The CREATE-X trial (2017) highlighted the benefits of adjuvant capecitabine in triple-negative breast cancer (TNBC) with residual disease post-NAC, encouraging NAC use in early-stage TNBC. This study evaluates NAC utilization in surgically-managed early-stage node-negative TNBC patients in the U.S. pre- and post-CREATE-X, alongside factors influencing NAC receipt.

METHODS: The National Cancer Database was queried for women with cT1-2N0M0 TNBC from 2014–19. NAC utilization was categorized into pre-CREATE-X (2014–15), transition years (2016–17), and post-CREATE-X (2018–19). Multivariable logistic regression (MLR) analyzed NAC use trends over time. Clinical and demographic factors influencing NAC versus adjuvant chemotherapy (AC) utilization were assessed using ANOVA, Chi-squared, and Fisher Exact tests. A MLR model identified predictors for NAC versus AC receipt.

RESULTS: Among 55,633 women treated (2014–19), 26.9% received NAC, 52.4% AC, and 20.7% no chemotherapy. NAC use significantly increased over time: 19.5% (2014–15), 27.1% (2016–17), and 33.6% (2018–19) ($p < 0.01$). MLR analysis revealed associations between increased NAC use and younger age (< 50yrs), non-Hispanic white ethnicity, absence of comorbidities, cT2 tumors, grade 2 disease, and care at academic or integrated network cancer programs ($p < 0.05$). Conversely, patients with Medicare/Medicaid coverage were less likely to receive NAC ($p < 0.01$), while those traveling > 60 miles for treatment were more likely ($p < 0.01$).

CONCLUSION: NAC utilization rose for cT1-2N0M0 TNBC patients from 2014–19, coinciding with CREATE-X's release. These findings underscore the role of multidisciplinary oncology teams in tailoring treatment plans based on evolving clinical trial data. Disparities in NAC utilization, particularly concerning race, socioeconomic status, and access, require further investigation.

Predictors of Cognitive Outcome Following Traumatic Brain Injury in a Heterogenous Clinic Sample

Authors: Rose NB, Martinez K, Razzak AN, Nelson LD.

Project Mentor: Lindsay Nelson, PhD - **Department:** Neurosurgery

OBJECTIVES: To determine if established predictors of cognitive outcomes following traumatic brain injury (TBI) replicate in a clinic sample and explore the impact of under-investigated social determinants on these outcomes.

DESIGN: A retrospective cohort study using multivariable linear regression models to predict seven cognitive outcomes.

SETTING: Outpatient neuropsychology clinic within a level 1 trauma center.

PARTICIPANTS: Patients with TBI (N=336, age M=50 years [SD=19], 55% male) evaluated within 1 year of injury (Median=87 days [IQR=54, 130]).

MAIN OUTCOMES AND MEASURES: Cognitive outcomes were assessed using standardized tests for working memory (WAIS-IV Digit Span), processing speed (WAIS-IV Coding, TMT-A), verbal episodic learning and memory (HVLT), and executive functioning (TMT-B, Animal Naming, COWAT). Predictors were categorized into 5 domains (demographics, injury characteristics, health history, social determinants, injury-related litigation), which were analyzed separately and together.

RESULTS: In domain-specific models (Model R² <.001 to .180), race, years of education, and Area Deprivation Index were most consistently predictive of cognitive outcome. In multi-domain multivariable models (Model R² .083 to .220), significant predictors were: days from injury to evaluation (1/7 outcomes), age (1 outcome), gender (3 outcomes), race (3 outcomes), educational history (2 outcomes). No health history or injury factors independently predicted cognitive outcome when adjusting for demographic and social factors.

CONCLUSIONS: While some previously identified predictors of cognitive outcomes post-TBI were replicated, few consistently independently predicted all outcomes when combined, and predictive accuracy was generally low. The findings indicate a need to identify a broader array of factors that predict cognitive outcome after TBI.

Prediction of Acute, Uncomplicated Type B Aortic Dissection Remodeling

Authors: Schoepfoerster CT, Rossi PJ.

Project Mentor: Peter Rossi, MD - **Department:** Surgery

Type B aortic dissections are a common clinical entity and are characterized acutely as either complicated or uncomplicated (uTBAD). uTBADs do not have a well-defined optimal treatment strategy. Historically, optimal medical therapy (OMT) was preferred. More recent studies suggest early intervention may be beneficial in inducing positive remodeling. Nonetheless, many patients remain stable long-term with OMT and others have dissections that negatively remodel. Thus, a methodology to identify individuals at high risk for negative remodeling would be beneficial.

We believed that the diagnostic scan maximal diameter of an aortoiliac zone, or combination of zones, would be predictive of negative remodeling.

We conducted a pilot study, looking at adults diagnosed with an uTBAD and 19 were selected - 14 with negative remodeling and 5 with stability or positive remodeling. There was a statistically significant difference in zone 1 size between groups. Additionally, various demographics were analyzed and showed that those with a higher body mass index and who were on less protective medications at time of diagnosis were more likely to negatively remodel. Younger age at time of diagnosis was also associated with negatively remodeling, thought to possibly be due to more aggressive pathology in younger/less healthy individuals. We concluded that a larger study is needed to elucidate if the zone 1 size difference is an appropriate characterization, and if there are any other significant differences.

Outcomes of Program Training Healthcare Professionals to Become Diabetes Educators in Southern Nigeria**Authors:** Seibold K, Tomczyk B, Abibo L.**Project Mentor:** Lolita Abibo, MD, MS - **Department:** Medicine**Community Partner:** University of Port-Harcourt Teaching Hospital Port Harcourt, Nigeria

Diabetes Mellitus (DM) is a complex and challenging disease that requires daily self-management skills in addition to lifelong medical care and blood glucose management to prevent or delay disease-related complications such as blindness, heart failure, kidney failure, stroke, or limb amputation. DM remains a major cause of morbidity and premature mortality around the world, and its prevalence is rising most rapidly in low- and middle-income countries. Nigeria has the highest diabetes related mortality rates as well as the number of people living with diabetes and pre-diabetes when compared to other African nations, reflecting a critical need for the improvement of intervention strategies. Diabetes self-management education and support (DSME/S) programs are being increasingly implemented around the world as numerous studies have already proven their effectiveness in lowering hemoglobin A1C (HbA1c). Ensuring that DSME/S programs are both effective and sustainable necessitates a crucial component to consider when creating the educational material for Diabetes Educators – a culturally tailored curriculum. The purpose of the study is to create and determine the effectiveness of a diabetes educator course through pre- and post-course tests, and a DSME/S program specifically designed for the southern Nigerian population at the University of Port-Harcourt Teaching Hospital (UPTH). This study focused on the creation of an 8-week Diabetes Educator program to determine its effectiveness on healthcare professionals' knowledge by comparing pre- and post-course test scores. The diabetes educators (10 total) were recruited and completed the 8-week course. Analysis of results showed improvement between scores most significantly in certain question categories. Our results both prove the effectiveness of the course as well as highlight adjustments to be made for improvement in both course content and delivery.

Intra-treatment Radiomic Features Acquired Using a 1.5 Tesla MR Linear Accelerator Correlate with Future Patient Reported Quality of Life**Authors:** Emma S, Banerjee A, Jasti S, van Zyp V, van der Voort JRN, Westerhoff-16 JM, Daamen-3 LA, Christodouleas JP, Choudhury A, van der Heide Group UV, Lawton C, Straza M, Bedi M, Paulson E, Nasief H, Li A, Tree A, Hall WA.**Project Mentor:** Bill Hall, MD - **Department:** Radiation Oncology

PURPOSE: Prostate cancer patients receiving radiation frequently experience a decline in their quality of life (QOL). Identifying such patients in "real-time" during RT is an unmet clinical need. Such a finding could enable RT dose adaptation, allowing more aggressive sparing of regional organs at risk (OARs). Using daily magnetic resonance images (MRI), we hypothesized that radiomic feature changes in OARs during treatment would correlate with future QOL.

METHODS: Patients were prospectively enrolled into an international repository. The EORTC PR-25 questionnaire was prospectively collected at baseline, 3 months, and 6 months. Five sagittal T2 weighted MRIs per patient were manually segmented using MIM software. Regions of interest (ROI) including the prostate, prostatic bladder, prostatic rectum, bladder, and rectum were individually contoured and first order radiomic features were collected using MIM.

RESULTS: A total of 120 MRIs (n=24 patients) were segmented and radiomic features were extracted from regional OARs and controls. 14 radiomic markers from the prostatic bladder and prostatic rectum were found to correlate with a decline in patient-reported QOL metrics (p-value ≤ 0.0336). Skewness, standard deviation, volume, and max-to-mean ratio were associated with worsening in QOL metrics (dysuria, frequency of urination, unintentional release of stool, and limitation of daily activities due to bowel/urinary problems).

CONCLUSIONS: Extraction of radiomic features from regional OARs on a 1.5 Tesla MR Linac is feasible. These results revealed significant correlations between radiomic features and future declines in patient reported QOL. Such data presents an entirely novel strategy to identify patients during RT at risk of QOL decline.

Racial Disparities in Sacral Neuromodulation for Idiopathic Fecal Incontinence**Authors:** Seitz V, Calata J, Mei L, Davidson ERW.**Project Mentor:** Emily RW Davidson, MD - **Department:** Obstetrics & Gynecology**BACKGROUND**

Sacral neuromodulation (SNM) is effective for fecal incontinence (FI). Previous studies found that Black women undergo SNM for urinary incontinence less than White women, but there is less known about racial disparities in FI. This study aimed to assess differences in Black and White patients' FI treatment, with SNM counseling as the outcome of interest.

METHODS

This was a retrospective cohort study of adult non-Hispanic Black and White patients who received FI treatment at an academic institution from 2011-2021. Medical records were queried for treatments, testing, and treating specialties for a 2:1 age-matched cohort of White:Black patients.

RESULTS

447 women were included: 149 Black women and 298 age-matched White women. 24.4% (109) of patients had documented SNM counseling, significantly fewer in Black patients (14.8% vs 29.2%, $p < 0.001$). 5.1% (23) patients received SNM, less frequent in Black patients (2.7% vs 6.4%, $p = 0.003$). Among patients with SNM counseling, there was no difference between cohorts. Black patients were less likely to be referred for physical therapy (59.7% vs 77.2%, $p < 0.001$), sphincter imaging (0.7% vs 5.7%, $p = 0.011$), and defecography (8.1% vs 17.1%, $p = 0.009$). Different specialties managed the two cohorts. Black patients were less likely to see Urogynecology and Colorectal Surgery, (21.5% vs 34.6%, $p = 0.004$; 9.4% vs 15.4%, $p = 0.077$). Patients seen by these surgeons were more likely to discuss SNM (48.6% vs 8.5%, $p < 0.001$).

CONCLUSIONS

There were differences between Black and White patients' FI treatment including education about SNM as a treatment option. Multidisciplinary work is needed to provide equitable education about SNM for this life-altering condition.

Ex vivo Electoretinography on Zebrafish**Authors:** Simpson S, Coltery R.**Project Mentor:** Ross Coltery, PhD - **Department:** Ophthalmology & Visual Sciences

Electroretinography (ERG) measures electrical responses produced by retinal cells when exposed to light and provides a visual representation of cell health, phototransduction integrity, and the visual cycle. An ERG wave is a summation of several cell responses: the negative initial depolarization (a-wave) is formed by the photoreceptors and the positive sloping portion (b-wave) is formed by bipolar cells. Several zebrafish mutant lines have been developed to model human genetic mutations associated with visual disorders, including STRA6 (Matthew-Wood syndrome), CLRN1 (retinitis pigmentosa, Usher syndrome 3A), USH2A (Usher syndrome 2A), and LRP2 (Donnai-Barrow syndrome, myopia). In vivo ERG on zebrafish is difficult to perform, and while ex vivo ERG requires euthanasia, it reduces electrical noise and allows for direct pharmaceutical application if desired. This study is the first to establish standardized protocols for ex Vivo ERG on zebrafish and to utilize these techniques as a profiling tool for mutant zebrafish models. Zebrafish were dark-adapted prior to tissue dissection. The retina and retinal pigment epithelium were mounted onto the cassette with photoreceptors uppermost and bathed with Ames medium to maintain retinal health. The cassette was placed into the electroretinogram system, which flashed light in a pre-programmed series of increasing intensities and recorded electrical responses. *lrp2* and *ush2a* adult mutant zebrafish retinas, had ERGs that differed from wild-type controls. Furthermore, *clrn1* mutant retinas had larger b-wave amplitudes at increasing light intensities. *stra6* mutant fish had no visible b-waves at any tested intensity. This study demonstrates ex vivo ERG is a useful tool to characterize retinal function in zebrafish mutants and provide insight into how mutations can affect the visual cycle and phototransduction.

Biopsychosocial Characteristics of Adolescents with Idiopathic Scoliosis and Moderate-Severe Pain Before Spinal Fusion

Authors: Skillings A, LiaBraaten B, Gremillion M, Hainsworth K.

Project Mentor: Keri R Hainsworth, PhD - **Department:** Anesthesiology

INTRODUCTION: Posterior Spinal Fusion (PSF) for treatment of adolescent idiopathic scoliosis (AIS) is associated with severe postoperative pain. Multiple calls for updated Enhanced Recovery After Surgery (ERAS) protocols to include focused pain management in the preoperative period have gone unanswered.

AIMS: 1) Examine the relationship between preoperative pain intensity and preoperative physical and psychosocial functioning, 2) determine if preoperative pain intensity is predictive of postoperative pain intensity, opioid use, and pain behaviors, and 3) achieve Aims 1 and 2 using two different methods to measure pain intensity: worst pain in the past week and current pain at the time of measurement.

METHODS: A retrospective chart review was conducted of AIS patients seen for a presurgical consultation. Preoperative variables and postoperative outcome indicators were extracted from the electronic medical record. Patients were dichotomized into two groups based on both worst pain in the past week (Method 1) and current pain (Method 2). Pain intensity was dichotomized as follows: No-mild pain (NP/MP; pain scores 0-35/100) vs. moderate-severe pain (M/SP; pain scores 36-100/100). Differences were analyzed with t-tests and chi-squared tests. Regressions were used to determine whether preoperative factors predicted postoperative outcomes.

RESULTS: AIS patients with M/SP using Method 1 suffered worse functional disability, trait anxiety and Health Related Quality of Life (HRQoL) than the NP/MP group. The M/SP group had more postoperative pain than NP/MP group with both methods. Method 1 found functional disability to predict postoperative pain. Method 2 found the M/SP group to have more postoperative opioid use.

DISCUSSION/CONCLUSION: Extension of ERAS protocols into the preoperative period to include greater focus on pain management could reduce pain-related suffering before surgery and improve postoperative outcomes.

Clinical Factors impacting success of myringoplasty

Authors: Smith Roberts TQ, Berezovsky A, Adams J, Friedland D, Khani M, Luo J, McCormick M.

Project Mentor: Michael McCormick, MD - **Department:** Otolaryngology & Communication Sciences

IMPORTANCE: Tympanic membrane perforations are a common occurrence in the pediatric population. Management includes myringoplasty which may be performed with a variety of surgical techniques. It is important to understand clinical and demographic factors that may improve surgical outcomes.

OBJECTIVE: Identify factors correlating with successful myringoplasty closure

Study DESIGN: Retrospective cohort study.

SETTING: Tertiary academic medical center.

RESULTS: Of the 226 unique myringoplasties analyzed, there was an overall successful closure rate of 81%. When comparing retained tubes to perforation repairs, the OR (95% CI) is 5.33 (2.56,11.09), $p<.0001$. That is, there is a 5.33 greater likelihood of a perforation closing in retained tube myringoplasty than in other perforation causes myringoplasty. When comparing presence of cleft palate, the OR (95% CI) is .32 (.13,.76), $p=.01$. That is, there is a .32 less likelihood of a perforation closing in cleft palate children than in non-cleft children.

There were no differences in closure rates regarding the number of prior PE tubes, or material used for repair.

CONCLUSION: Myringoplasty outcomes are impacted by etiology, cleft palate, age at time of repair, and bilaterality. Graft Material and number of prior tubes does not appear to predict successful closure.

Religion and Spirituality in Medicine: Does It Have a Place? Forming Culturally Sensitive Physicians While Maintaining Patient Autonomy**Authors:** Staten J, Rivera P.**Project Mentor:** Ryan Spellecy, PhD - **Department:** Institute for Health and Equity

Understanding and interacting with different religious and spiritual groups is critical to help eliminate cultural barriers that continue to exist between patients and healthcare professionals from diverse backgrounds. Studies show improving this connection between patient and provider leads to better shared decision-making, health outcomes, and ultimately, patient satisfaction. However, there continues to be a lack of physicians that are culturally aware when handling ethical dilemmas that may arise for individuals of differing spiritual or religious beliefs. Before our project, the Medical College of Wisconsin (MCW) lacked a formal educational session focused on religion and spirituality in relation to medicine. Therefore, our team put on three interactive, informative sessions for MCW students to educate future providers about how to accommodate patients' spiritual differences and help those students recognize for themselves what values are of upmost importance to them. Our team's work led to the development of a session that was incorporated into the new MCWFusion curriculum with the aim of educating incoming medical students on how to best care for patients from different religious and spiritual backgrounds while still emphasizing the importance of patient autonomy in healthcare decision-making.

Assessment of Opioid Overdose Risk and Response Readiness Among Patients at a Clinic for Uninsured**Authors:** Wrucke B, Stevanovic S, Vannani N, Klauck R, Johnston B.**Project Mentor:** Bryan Johnston, MD - **Department:** Family & Community Medicine

BACKGROUND: The opioid epidemic has been worsening. Fortunately, studies show that bystanders can effectively administer naloxone to reverse opioid overdose, and overdose education programs result in improved ability to respond to overdose. However, there has been limited research investigating opioid overdose risk and response preparedness among patients without insurance. This descriptive report aimed to assess risk of opioid overdose among patients without insurance in addition to their family members and close contacts and assess whether these patients, as crucial bystanders, were prepared to respond to opioid overdose.

METHODS: Patients without insurance at a student-run free clinic completed an anonymous, voluntary survey during in-person appointments. Data were collected for eight months from 2021-2022. One-proportion Z-test compared respondent rates of opioid use with overall statewide community rates reported by the Wisconsin DHS Opioid Dashboard. Subgroup analysis further described the data collected, and hypothetical number needed to screen (NNS) calculations explored possible screening methods for naloxone distribution.

RESULTS: Seventy-two patients responded to the survey. The past-year rate of medically prescribed opioid use in the study population (12.5%) did not differ from the rate statewide (15.8%; $p=0.44$). Zero respondents reported personal opioid overdose in the past year, but six overdoses had been witnessed. Among respondents with family or close contacts who use opioids, 50% of those respondents who do not carry naloxone do not know where to get it, but 75% of those respondents who are not trained on how to respond to overdose would like to be. Lastly, screening for family or close contact opioid use offered the lowest hypothetical NNS of screening methods considered.

CONCLUSIONS: Patients without insurance at student-run free clinics, including those with family members or close contacts who use opioids, likely represent a target popula

Cardiovascular Health in the Connected Health Innovation Research Program: Insights From Remote Blood Pressure Monitoring

Authors: Steward A, Gratz Z, Bushnell J, Duffy Q, McCall C, Nnadi E, Brown SA.

Project Mentor: Sherry-Ann Brown, MD, PhD - **Department:** Medicine

BACKGROUND: Cardiovascular disease (CVD) is the leading cause of mortality worldwide, prompting interest in creating innovative approaches for screening, prevention, diagnosis and management. The aim of this study was to explore the potential of remote patient monitoring (RPM) technology to improve short-term clinical outcomes for individuals at risk for or with CVD.

METHODS AND RESULTS: An RPM application integrated with Internet of things (IoT) medical devices was used in the analysis of two cohorts of patients - one from New York (n=48, 42-97 years of age), and one from Alabama (n=473, 19-85 years of age). Blood pressure outcomes were assessed longitudinally, assessed in relation to time, sex, age, and frequency of data uploads. Longer use of RPM was associated with lower average weekly systolic blood pressure (sBP) (New York, $r(1333) = -0.2161$, $B = -0.189$, $[-0.234, -0.143]$, $p < 0.0001$, Alabama, $r(7,851) = -0.0344$, $B = -0.045$, $[-0.073, -0.016]$, $p = 0.0023$). This was found to be true regardless of sex or age. Regarding upload frequency, in the New York cohort, there was no significant association between upload frequency and average sBP values ($B = -0.672$, $[-1.964, 0.619]$, $p = 0.3074$), while in the Alabama cohort, higher upload frequency was associated with lower average sBP values at baseline and a slight decrease in average sBP values over time ($B = -0.050$, $[-0.077, -0.023]$, $p = 0.0002$).

CONCLUSIONS: Despite noted differences between the two cohorts, these findings collectively highlight the potential of RPM technology to improve cardiovascular outcomes and contribute to a comprehensive understanding of its impact on multiple patient populations.

Association of Self-efficacy With Health Behaviors and Quality of Life Among Sarcoma Survivors

Authors: Stratton N, Charlson J, Leubke M.

Project Mentor: John Charlson, MD - **Department:** Medicine

BACKGROUND: Self-efficacy, an individual's belief in their capacity to act in ways necessary to reach specific goals, has been associated with higher quality of life scores in cancer survivors. In this study, we sought to assess whether complementary and alternative medicine (CAM) utilization, health behaviors, and quality of life are associated with self-efficacy among long-term sarcoma survivors.

METHODS: Adults who received multi-modality treatment for localized soft tissue sarcoma in the past 10 years were identified from an institutional sarcoma database and sent the link for an online, anonymous survey. The survey included a questionnaire developed by a multidisciplinary team to assess baseline health behaviors and CAM use, the Cancer Behavior Index-Brief to assess self-efficacy, as well as PROMIS surveys to measure quality of life. We tested for associations between self-efficacy and health behaviors, CAM use and quality of life, using Wilcoxon rank sum test and Fisher's exact test.

RESULTS: Forty-five subjects out of 182 (24.7%) responded to the survey. The median age at treatment was 57 years, with a median of six years from primary sarcoma treatment; 87% of patients had been treated with radiation therapy and 47% with chemotherapy. Median self-efficacy total score was 92 (of possible 108). PROMIS T-scores were similar to the general population. Self-efficacy was correlated with PROMIS measures including anxiety, depression, fatigue, and ability to participate. CAM utilization was not correlated with quality of life metrics or self-efficacy.

CONCLUSIONS: Among long-term sarcoma survivors, self-efficacy is associated with quality of life. CAM utilization is not associated with self-efficacy or with quality of life in this population. This suggests potential benefit from targeted interventions to improve patients' confidence in managing their cancer.

Identifying Social Determinants of Health (SDOH) Concerns Among Trauma Surgery Patients

Authors: Subramanian M, Murphy P, Morris R, Schroeder ML, Biesboer E, deRoos-Cassini T, Trevino C.

Project Mentor: Colleen Trevino, NP, PhD - **Department:** Surgery

INTRODUCTION: Social determinants of health (SDOH) include numerous psychosocial factors that influence an individual's health and well-being. This study aims to identify the most prevalent SDOH concerns among trauma surgery patients at a Midwestern level 1 trauma center. These patients were seen at the trauma quality of life (TQOL) clinic, which consists of a nurse practitioner, psychologist, social worker, and physical therapist assigned to each trauma surgery patient to address post-surgical biopsychosocial health.

METHODS: This is an observational study with a retrospective design. 100 trauma surgery patients, specifically gunshot wound victims, seen between 11/2020 - 8/2022 were analyzed. Data for this study was collected by accessing Epic, an electronic medical records system, and reviewing referrals made by the social worker. These data were recorded and organized into larger categories such as finance, housing, food, and transport.

RESULTS: The data revealed that financial complications were the most prevalent SDOH concern among trauma surgery patients, with 43% of patients being referred to resources that assist with financial counseling, crime victim compensation, and unemployment applications. 97% of the patients had insurance. The second most prevalent concern was access to extended healthcare resources, which 22% of patients struggled with. Housing, food and transport were identified as less common concerns, with only 14%, 9% and 5% of patients being referred to resources for those concerns, respectively.

CONCLUSION: The findings of this study reveal that non-insurance related financial complications were identified as the most prevalent SDOH concern. To address this issue, financial counseling and assistance can be made accessible to patients upon discharge. It is notable that only 3% of our patients were uninsured, as this differs from the national average among trauma patients, in which 13% of patients were uninsured¹. Identification of the factor

The relative impact of risk factors for homelessness, housing barriers, and healthcare barriers on mental health outcomes: a single-center study

Authors: Sun L, Meyers M, Nair A, Clearwater T, DuMez E, Nwosu C, Cairns D, Balfour M, Young S, Lundh R, Owen JR.

Project Mentor: Julie Owen, MD, MBA - **Department:** Psychiatry & Behavioral Medicine

Community Partner: Saturday Clinic for the Uninsured (SCU)

BACKGROUND: Housing and healthcare both play crucial roles in overall health. Though research has shown housing and healthcare barriers negatively impact mental health, little is known about the relative influence of each.

OBJECTIVE: This study seeks to understand the relationship between housing circumstances, barriers to care, and mental health outcomes among low-income, uninsured patients seen at a Milwaukee free clinic, the Saturday Clinic for the Uninsured (SCU). This includes investigating the relative impact of risk factors for homelessness, housing barriers, and healthcare barriers on mental health outcomes.

METHODS: From June to December 2023, surveys were administered to patients at SCU (n = 94). Surveys assessed patient demographics, housing and healthcare barriers, and mental health outcomes, primarily measured by the Patient Health Questionnaire-2 (PHQ-2), General Anxiety Disorder-2 (GAD-2), modified loneliness scale, and individuals' subjective mental health rating.

RESULTS: Increased healthcare barriers were the strongest predictors of worse PHQ-2, GAD-2, loneliness, and mental health rating. Risk factors for homelessness also significantly predicted PHQ-2, GAD-2, and loneliness, but did not predict mental health rating. Increased housing barriers did not significantly predict any of the four mental health metrics.

Among respondents, the most reported healthcare barriers were insurance coverage, financial issues, and transportation issues. In addition, there was significantly lower patient trust in mental healthcare providers than in general medical providers, which may reflect increased stigma.

CONCLUSION: Compared to housing barriers, increased healthcare barriers significantly predicted worse mental health outcomes. This study emphasizes the importance of addressing healthcare barriers to improve mental health.

Video Assisted (VATS) or Robotic? A comparison of the Convergent Procedure and Left Atrial Appendage Exclusion for the Treatment of Atrial Fibrillation**Authors:** Syed A, Seadler B, Gasparri M, Linsky P.**Project Mentor:** Paul Linsky, MD - **Department:** Surgery**BACKGROUND:**

Atrial fibrillation (AF) is the most prevalent arrhythmia worldwide. The treatment of AF is varied, ranging from medical management to the full open surgical Cox-Maze procedure. However, each treatment modality comes with its own risks and benefits. Finding a modality that is both minimally invasive and effective at treating atrial fibrillation has been difficult. Hybrid ablations have started emerging as a new form of treatment that is attempting to fill the gap with minimally invasive and effective technology. We set out to answer the question if the epicardial ablation done via a video assisted thoracoscopic (VATS) or robotic modality was more effective for treatment of atrial fibrillation.

METHODS:

A single center retrospective analysis of 49 patients, operated on by four primary surgeons from 2017-2022, both procedures done with the VATS and robotic modality were included. Primary outcome was freedom from atrial fibrillation at the 3 month post-operative checkpoint.

RESULTS:

The VATS and robotic iterations of the Convergent procedure reported a 22% and 83% freedom from atrial fibrillation at 3 months post-operatively, respectively. Complete exclusion of the left atrial appendage at 3 months postoperatively was determined to be 44% and 96%, respectively.

CONCLUSION:

The results show that the robotic approach to the convergent procedure appears to be significantly better than the VATS approach. However, due to limited sample size, further data is required to confirm this preliminary result.

Impact of Ultrasound Surveillance and Bariatric Follow-Up on Neonatal Outcomes in Women with Prior Bariatric Surgery**Authors:** Szczygalski JE, De La Pena R, Cruz MO.**Project Mentor:** Meredith Cruz, MD, MPH, MBA - **Department:** Obstetrics & Gynecology

Infants of women who have undergone bariatric surgery are more likely to be born small for gestational age (SGA). We sought to identify whether increased bariatric follow-up during pregnancy and/or increased ultrasound surveillance led to better neonatal outcomes. We hypothesized that women with <2 follow-up appointments throughout pregnancy or <2 ultrasounds (US) after their anatomical survey were more likely to have poor neonatal outcomes. We also compared outcomes of these patients to controls without a history of bariatric surgery. This was a single center, retrospective cohort study of 258 singleton pregnancies between 2005-2019; 129 cases and 129 controls. Cases were placed in 4 categories: those with <2 vs. ≥2 bariatric follow-up appointments during pregnancy, and those with <2 vs. ≥2 ultrasounds after fetal anatomic survey (FAS). The latter two groups were compared to BMI-matched controls. A neonatal composite score was utilized as a measure of adverse neonatal outcome (NICU admission, jaundice, hypoglycemia, respiratory distress, and macrosomia). Within cases, 10 patients had documentation of ≥2 bariatric follow-up appointments, whereas 120 patients had <2 follow-up appointments. There was no statistically significant difference in the occurrence of an adverse neonatal outcome between these two groups ($p=0.687$). 258 patients had documentation of FAS or beyond. 97 patients had <2 US and 161 had ≥2 US after FAS. Pregnant women with history of bariatric surgery and with <2 US had an increased likelihood of an adverse neonatal outcome compared to those with ≥2 US (relative risk (RR) and 95% confidence interval (CI) 1.63 (1.01-2.62), $P=0.045$). In conclusion, we found no significant difference in neonatal outcomes with increased follow-up with the bariatric team. Additionally, less frequent ultrasound surveillance in women with previous bariatric surgery was associated with higher rates of adverse neonatal outcomes.

Accessibility of Urgent Care Centers: A Socioeconomic and Geospatial Evaluation**Authors:** Telagi P, Sadler R, Telagi P, McGurk K.**Project Mentor:** Kevin McGurk, MD - **Department:** Emergency Medicine

BACKGROUND: Urgent cares (UCs) play an important role in delivering healthcare to patients with non-emergent concerns. UCs may be appealing as they are often seen as a convenient, less expensive alternative to ED visits for minor injuries and ailments. Transportation is an essential social determinant of health and can affect how patients access healthcare. This study seeks to quantify the accessibility of UCs by private and public transit and to find associations between accessibility and the social vulnerability of communities in Milwaukee County.

METHODS: We used criteria previously utilized by the Milwaukee Healthcare Partnership to define UCs. Accordingly, we identified 10 UCs and 10 emergency departments (EDs) within Milwaukee County. We used publicly available data from the US Census Bureau to quantify the relative socioeconomic vulnerability index (SEVI) of the various census tracts. Further, we used a Google Maps API to calculate public and private transit data between each census tract and its nearest UC and ED.

RESULTS: Private transit times were shorter than public transit times to UCs and EDs ($p < 0.001$). When comparing UC and ED transit times, EDs had shorter public transit times, walk times, and private transit times ($p < 0.001$).

SEVI was associated with increased public and private transit times to the nearest UC ($p=0.10$ and $p=0.003$, respectively) but decreased public and private transit times to the nearest ED ($p < 0.001$ and $p=0.15$, respectively).

CONCLUSION:

UCs in Milwaukee County are less accessible to residents from socially vulnerable areas than EDs. Longer travel times and lengthy walking distances make UCs less accessible for those relying on public transit. The lack of accessibility to UCs may encourage residents from more vulnerable areas to seek care at EDs for non-emergent concerns, as EDs are more readily accessible by public and private transportation. These findings have implications for healthcare costs and utilization.

Toward optimization of local blood flow patterns to improve endothelial cell stability in vascular conduits.**Authors:** Telega AJ, McCarthy RP, Ramirez HM, Raskin A, Tefft BJ, LaDisa JF Jr.**Project Mentor:** John F LaDisa Jr, PhD - **Department:** Pediatrics

BACKGROUND: Despite advances in bioengineered grafts, their ability to maintain a viable endothelial cell (EC) layer when exposed to physiological wall shear stress (WSS; frictional force due to flowing blood) remains challenging.¹ We hypothesize that local channels optimized to shield ECs from physiologic WSS can improve EC retention on graft materials. We used computational fluid dynamics (CFD) to optimize channel patterns.

METHODS: Channel width and separation were adjusted to optimize the area exposed to sub-physiological WSS via CFD. The flow domain was created via Boolean operations and then exposed to a WSS of 15 dyn/cm² which is a putative physiologic level². The most promising channel configuration was developed into a 3D stamp to imprint graft material made of fluorinated polyurethane nanofibers electrospun onto a microscope slide.

RESULTS: CFD revealed expected decreases in velocity magnitude and subsequently lower WSS in channels. Flow profiles reestablished within channels having widths greater than ~60 μ m, which led to increased WSS. A model with channels having a radius of 60 μ m and spacing of 60 μ m was created for stamping. To assess the ability of the polyurethane graft material to precisely retain complex geometric contours, a coronary stent pattern with strut width around 60 μ m was depressed into electrospun polyurethane. The complex strut pattern was precisely imprinted as confirmed by visual inspection and microscopic analysis.

CONCLUSIONS: It is possible to precisely stamp geometries of ~60 μ m into polyurethane graft material, hence paving the way for EC seeding and shear flow testing. We plan to assess EC retention on channeled graft materials exposed to physiological WSS using a parallel plate flow chamber (PPFC).

Association of Trauma Activation Vital Sign Criteria on Outcomes of Geriatric Ground Level Falls

Authors: Tentis M, Nickel L, Jacobson N, Aranda J, Otero R, Chinn M.

Project Mentor: Matthew Chinn, MD - **Department:** Emergency Medicine

OBJECTIVE: Geriatric trauma is a focus of research which continues to drive trauma activation guideline updates. This study aims to determine the association between geriatric trauma activation criteria and outcomes in geriatric patients who experience ground level falls.

METHODS: Conducted at a Level 1 Trauma Center emergency department, this study included 486 geriatric patients (≥ 65 years old) from the National Trauma Data Bank, all experiencing falls under 1m (3.3ft). Our institution's geriatric trauma activation criteria include systolic blood pressure (SBP) $< 110\text{mmHg}$, heart rate (HR) > 100 , or Glasgow Coma Scale (GCS) < 13 , with the consideration of $\text{HR} > \text{SBP}$ (shock index). Prehospital and ED triage vital signs were utilized, with exclusion of interfacility transfers. Descriptive statistics, chi-square tests, t-tests, ANOVA, and logistic regression were employed.

RESULTS: All four activation criteria showed significant associations with undergoing trauma surgery (TS) evaluation. Logistic regression revealed SBP (OR = 2.74, $p = .02$) and GCS (OR = 7.12, $p < .001$) as significant predictors for TS evaluation. HR ($p = .04$) and GCS ($p < .001$) were significantly associated with admit service. GCS had a significant association with post-ED disposition ($p < .001$) and Injury Severity Score (ISS; $p = .02$), with a higher percentage of patients meeting the GCS criterion being admitted to the ICU.

CONCLUSION: The GCS trauma activation criterion was associated with the most outcomes. Other criteria were associated with TS evaluation only; HR was also associated with admit service. Vitals signs should be one of many factors in deciding the need for trauma activation.

Impact of the Annual Wellness Visit on Closure of Primary Care Gaps and Healthcare Utilization

Authors: Termuehlen H, Winder D, Johnson R, Lodes M.

Project Mentor: Mark Lodes, MD - **Department:** Population Health and Medical Education

The Medicare Annual Wellness Visit (AWV) was introduced in 2011 as part of the Affordable Care Act to offer Medicare patients a Primary Care visit that is focused on preventative care and chronic disease management. Prior to instituting this benefit, Medicare recipients did not have access to a covered annual preventative care visit. During AWV's, patients and their Primary Care Provider (PCP) develop or update a personalized prevention plan to help address potential new illnesses and improve the state of patients' current illnesses. The goal of this research is to better understand gaps of care closure and healthcare utilization by patients who have completed an AWV within a 24-month period. Medicare attributed patients to Froedtert Health Network were analyzed over a two-year period over the calendar years 2021 and 2022. Patients were separated into 2 groups based on no completed AWVs, or at least one completed AWV over that time. Preventative measures such as vaccinations, cancer screenings, diabetic eye exams, and control of chronic illnesses were assessed for the year 2022. Completion of AWVs was associated with higher rates of influenza vaccination, pneumococcal vaccination, breast cancer screening completion, colon cancer screening completion, and diabetic eye exam completion ($P < 0.01$). AWV completion was associated with higher rates of controlled hypertension and lower rates of uncontrolled diabetes ($P < 0.01$). Healthcare utilization, measured through ED visits, IP days, IP admissions, and readmission percentage, was lower in the groups of patients that completed at least 1 AWV ($P < 0.01$).

Understanding the Relationship Between Social Risk Factors and Functional Limitation Among Stroke Survivors in the US

Authors: Terrell J, Campbell JA, Thorgerson A, Bhandari S, Egede LE.

Project Mentor: Jennifer A Campbell, PhD, MPH - **Department:** Medicine

BACKGROUND: Stroke is the fifth leading cause of death and disability in the United States. Social risk factors contribute to recovery from stroke, however the relationship between social risk factors and functional limitation among stroke survivors remains unknown.

METHODS: Data on 2,888 adults with stroke from the National Health Interview Survey from 2016-2018 was analyzed. The primary independent variables included six social risk factors: economic instability, lack of community, educational deficit, food insecurity, social isolation, and inadequate access to care. The outcome measure was functional limitation count. Negative binomial regression models were run to test the relationship between the independent and dependent variables adjusting for covariates.

RESULTS: Overall, 56% of the study participants were aged 65+, 70% were Non-Hispanic White, and 95% had at least one comorbidity. The mean functional limitation count was 1.8. In the unadjusted model, each social risk factor was significantly associated with functional limitation. In the fully adjusted model, significant association with functional limitation was found in individuals reporting economic instability (Incidence rate ratio [IRR] 1.65, 95% CI 1.33, 2.06), food insecurity (IRR 1.28, 95% CI 1.15, 1.42), and social isolation (IRR 1.64, 95% CI 1.48, 2.18).

CONCLUSIONS: Social risk factors such as economic instability, food insecurity and social isolation are significantly associated with functional limitation in adults with stroke. Interventions designed to address both social and medical needs have the potential to improve physical functioning and other clinical outcomes in stroke survivors.

Evaluating the Effectiveness of Health Screenings at City on a Hill's Neighborhood Health Outreach

Authors: Thao KN.

Project Mentor: Staci Young, PhD - **Department:** Family & Community Medicine

Community Partner: City on a Hill

City on a Hill (COAH) is a faith-based, nonprofit organization located in Milwaukee, Wisconsin, dedicated to serving the medically uninsured, underserved, and homeless residents through various community services. This study evaluates the effectiveness of the health screenings conducted during COAH's monthly Neighborhood Health Outreach events. These screenings, which include blood pressure, glucose, and BMI checks, are crucial for detecting underlying health issues in participants who may not have regular health checks.

This study was motivated by a significant decline in participant turnout following the COVID-19 pandemic. Although the primary focus is on evaluating the effectiveness of health screenings, the underlying goal is to ensure that COAH's services continue to meet the needs and expectations of the community, which could help in boosting attendance. Surveys were administered to participants to assess their experiences with the health screenings, subsequent health actions taken, and overall satisfaction with the services provided. Results indicated that most participants found the screenings beneficial, with many reporting proactive steps towards better health management, such as following up with a physician, changing their diet, and increasing physical activity. Additionally, many participants utilized other services offered by COAH, such as the Free Health Clinic and health education programs.

The study faced limitations, including the lack of follow-up surveys and potential repeated participation by regular attendees. Despite these challenges, the findings highlight the importance of accessible health services in underserved communities and provide valuable insights into potential areas for improvement.

This study underscores the critical role of health screenings in identifying and addressing health issues among underserved populations, suggesting COAH's Neighborhood Health Outreach significantly contributes to community health.

Cytokines produced from endothelial cells in response to *L. interrogans* induce changes in VE-cadherin localization to adherens junctions**Authors:** Thao G, Surdel MC, Coburn J.**Project Mentor:** Jenifer Coburn, PhD - **Department:** Medicine

Leptospirosis is a zoonotic infection worldwide with higher risks in tropical regions. Leptospirosis is caused by *Leptospira*, a gram-negative spirochete bacterium that leads to a wide range of symptoms. Severity ranges from a self-limited febrile illness to life-threatening illnesses such as Weil's disease, pulmonary hemorrhage syndromes, and kidney and liver failures. Humans are accidental hosts with the main reservoirs being rodents, domestic, and wild animals. Previous studies showed that infection with the pathogenic *Leptospira* strain led to decreased localization of VE-cadherins to adherens junctions which may suggest endothelial damage and potentially leading to increased vascular permeability. Previous studies done in our lab utilized cytokine bead arrays to measure cytokine/chemokine levels in supernatants from cells infected with pathogenic or non-pathogenic *Leptospira*. Increased levels of certain cytokines including IL-6, G-CSF, CXCL10, and GM-CSF were seen from pathogen-infected cells. Therefore, we hypothesized that *Leptospira* induces a chemokine/cytokine response from the endothelial cells that ultimately affects their production/regulation of VE-cadherin. In this study, human endothelial cells were infected with the pathogenic *L. interrogans* serovar Copenhageni, the saprophyte, *L. biflexa* serovar Patoc, or incubated with IL-6, G-CSF, CXCL10, GM-CSF, or VEGF to investigate VE-cadherin changes and quantified by fluorescence microscopy. With a one-way ANOVA analysis comparing to the non-pathogenic bacterial infection, results showed that CXCL10 causes a significant increase in VE-cadherin and low concentrations of IL6 cause significant decrease in VE-cadherin. Although this study is at an early stage, these data suggest that cytokine responses from the endothelial cells may have differential effects on VE-cadherin.

The association between trust in the obstetrician and COVID-19 vaccination in pregnant and lactating individuals.**Authors:** Thelen J, Binger K, Cui Y, Palatnik A**Project Mentor:** Anna Palatnik, MD - **Department:** Obstetrics & Gynecology

OBJECTIVE: To explore the relationship between obstetric provider trust and length of provider relationship with COVID-19 vaccination behavior in pregnant and lactating patients.

METHODS: This analysis builds on a previous research study completed between June and August of 2021 surveying the attitudes and beliefs of pregnant individuals towards the COVID-19 vaccine. Additional data was collected from medical records once participants' pregnancies were completed. Univariate and multivariate models were used to explore the relationship between trust in participants' obstetric provider and COVID-19 vaccination during pregnancy or within 2 months postpartum.

RESULTS: A total of 217 out of 300 participants met study inclusion criteria. Of those, 65% (n=141) had received at least one dose of the COVID-19 vaccine during their pregnancy or within 2 months of giving birth. The remaining 35% (n=76) either declined or deferred the COVID-19 vaccine. Univariate analysis found both reported trust in their obstetric provider ($p=0.001$) and length of the provider relationship ($p=0.054$) to be associated with COVID-19 vaccination during pregnancy or postpartum. However, after controlling for cofounders such as breastfeeding status and sociodemographic factors, no significant association was found between either trust or length of relationship with obstetric provider and COVID-19 vaccination.

CONCLUSION: Our analysis found that pregnant and lactating patients' reported trust in their obstetric provider was not a statistically significant predictor of COVID-19 vaccination receipt during pregnancy or within 2 months postpartum.

Coronary Plaque Biopsy Reveals Molecular Insights into Coronary Artery Disease

Authors: Widlansky ME, Liu Y, Tumusiime S, Hofeld B, Khan N, Aljadah M, Wang J, Anger A, Qiu Q, Therani B, Liu P, Liang M.

Project Mentor: Michael Widlansky, MD - **Department:** Medicine

The current knowledge of atherosclerotic plaques is primarily based on studies of animal models, expired patients, or peripheral arterial plaques. Few studies have examined the plaque microenvironment to determine whether the plaque transcriptomes can be used as a prognostic tool. We aim to show the feasibility of a novel prognostic tool in CAD management, by developing a coronary plaque biopsy approach in living patients that utilizes RNA extraction from balloons used in percutaneous coronary interventions (PCI) and low-input transcriptome profiling using SMART-seq.

METHODS: Balloons used during coronary PCI were obtained from 61 patients at Froedtert Hospital from March 2021 - July 2022. cDNA SMART-seq libraries were created using the low-input SMART-seq protocol. cDNA SMART-seq libraries were created using the low-input SMART-seq protocol. 9 million read pairs were obtained from 14 samples, with 12 samples qualifying for final genomic analysis.

RESULTS: 13 cell types were identified on cibersortX with fibroblasts and fibromyocytes being statistically significantly enriched in ACS patients ($p < 0.05$) at 10.4% in ACS vs 4.9% in sCAD. 371 genes were significantly differentially expressed between sCAD and ACS samples ($q < 0.05$), with gene set enrichment identifying genes in apical junction and angiogenesis as the top-ranked gene sets, and significant overlap between known CAD genomic loci.

DISCUSSION: As an inexpensive modality, coronary plaque biopsy creates the opportunity for a new prognostic approach to qualifying coronary plaque lesions in sCAD and ACS patients. The identification of differentially expressed genes showed that this methodology has promise and feasibility in understanding the transcriptomic makeup of coronary plaques. This coupled with a complete clinical picture from clinical data and angiography creates a unique opportunity for individualized staging and understanding of each patient's cardiovascular presentation, risk, and prognosis.

Granulomatosis with Polyangiitis Presenting as Orbital Apex Syndrome

Authors: Ulatowski H, Bequest A, Sharma A, Jha P.

Project Mentor: Pinky Jha, MD, MPH - **Department:** Medicine

INTRODUCTION: Granulomatosis with polyangiitis (GPA) is a rare small vessel vasculitis that typically presents with a triad of sinonasal, pulmonary, and renal symptoms. Ophthalmic involvement occurs in up to 58% of cases and one rare orbital manifestation is orbital apex syndrome (OAS). OAS, which can result from various etiologies, is characterized by dysfunction of the optic nerve, third, fourth, and sixth cranial nerves, and the ophthalmic division of the fifth cranial nerve.

CASE: A 43-year-old female with a history of substance use disorder presented with vision changes and worsening left eye pain over five days. Previous evaluations raised concerns for GPA versus cocaine-induced vasculitis, but diagnostic confirmation was hindered by non-adherence to medical follow-up. Ophthalmologic evaluation demonstrated significant extraocular movement restriction and 20/250 vision in the left eye. Imaging revealed osseous defects involving the left orbit and facial sinuses along with a large left orbital mass. Prompt multidisciplinary intervention led to significant improvement following steroid therapy and IV antibiotics, and the patient was ultimately diagnosed with GPA.

DISCUSSION: This case highlights the complexities involved in diagnosing and managing GPA presenting as orbital apex syndrome, particularly in patients with comorbidities and non-adherence to medical follow-up. Multidisciplinary collaboration and patient engagement are crucial for timely diagnosis, initiation of appropriate treatment, and prevention of irreversible complications. Further research comparing cases of GPA presenting as OAS could enhance understanding of this rare manifestation.

The Effects of Surgery on Functional and Cognitive Outcomes 1-year after Traumatic Brain Injury: A TRACK-TBI Study

Authors: Vala R, Nelson LD, Temkin NR, Barber J, Roberts CJ, TRACK-TBI Investigators.

Project Mentor: Christopher Roberts, MD, PhD - **Department:** Anesthesiology

Surgery has been associated with neurocognitive disorders in TBI patient populations, warranting us to investigate functional and cognitive deficits with exposure to surgery/anesthesia. We analyzed a retrospective, secondary analysis of the TRACK-TBI dataset between 2014 to 2018 at 18 level-1 trauma centers in the USA to assess if exposure to extracranial (EC) surgery/anesthesia is related to worse functional and cognitive outcomes after TBI. Subjects were ≥ 17 years old, presented < 24 hours of trauma, admitted to an inpatient unit from the ED, had known Glasgow Coma Scale (GCS) and a head CT scan, and did not undergo cranial surgery. Patients that underwent EC-surgery at admission were compared to patients with no surgery in groups that had a peripheral orthopedic injury or a TBI, classified as uncomplicated mild (GCS 13-15, negative CT; CT-mTBI), complicated mild (GCS 13-15, +CT scan; CT+mTBI), moderate/severe (GCS 3-12; m/sTBI).

The primary outcomes were functional limitations (GOSE-ALL and GOSE-TBI), neurocognitive outcomes (Trails B). We found participants with m/sTBI had significantly worse outcomes on GOSE-TBI and GOSE-ALL than nonsurgical counterparts. Neurocognitive outcomes on Trails B were significant in the severe/moderate TBI and CT+mTBI groups, but not in CT-mTBI TBI. These long lasting adverse functional outcomes and executive functioning after 1-year TBI exposure to EC-surgery/anesthesia encourages further studies into mechanisms and clinical implications. If replicated, these findings could impact surgical interventions in TBI patients.

Integrating case-based discussions of social determinants of health in a dermatology residency curriculum

Authors: Vallecillo R, Olsen G, Foschi C, Humphrey S.

Project Mentor: Stephen R Humphrey, MD - **Department:** Dermatology

BACKGROUND: Social determinants of health (SDOH) are non-medical factors controlled by societal systems that affect the health of individuals and groups. In dermatology, SDOH affect access to care, burden of disease, treatment adherence, and outcome disparities. Barriers faced by physicians to addressing the SDOH include lack of time, lack of awareness of community resources, and uncertainty regarding concrete actions to take. The aim of this project is to integrate a lecture series into dermatology graduate medical education to reduce these barriers and to evaluate the efficacy of the curriculum.

METHODS: A four-part case-based lecture series was developed and delivered at MCW dermatology residency program morning didactic conferences. Each lecture focused on a unique SDOH and cases were inspired by real patient encounters. Information provided was supported by evidence from literature review. Participants completed one pre-survey, and four post-surveys following each lecture.

RESULTS: Preliminary analysis revealed that a majority of participants initially felt confident in their understanding of the SDOH (67.8%) and how they may affect patient care (61.3%) and health outcomes (61.3%), however only 29.1% felt confident regarding actions to address the SDOH, and only 25.8% were confident about resources in the local community, which increased significantly following two of four total lectures to 83.3% and 91.6% respectively.

CONCLUSION: Preliminary data suggests that integrating a case-based lecture series on the SDOH and how to address them into graduate medical education may be an effective intervention for decreasing barriers faced by physicians to addressing the SDOH in clinical practice.

Radiographical Analysis of Bilateral Rib-to-Pelvis Instrumentation in Neuromuscular Early-Onset Scoliosis with Regard to Complications in Instrumentation Alignment**Authors:** Vanani NB, Liu XC, Thometz JG.**Project Mentor:** John Thometz, MD - **Department:** Orthopaedic Surgery

INTRO: One of the common treatments for early onset scoliosis (EOS) is the use of growth-friendly devices such as the Vertical Expandable Titanium Rib (VEPTR). While the design of these growth-friendly has successfully treated EOS patients of various etiologies, they also lend themselves to certain complications that impact instrumentation alignment. Thus in our study, we conducted a retrospective review of patients with neuromuscular-EOS (NEOS) treated with bilateral rib-to-pelvis VEPTR instrumentation, utilizing radiographical analysis to further characterize these complications.

METHODS: We retrospectively conducted radiographic and descriptive analyses of changes in Cobb angle, distal device migration, and ectopic bone formation, along with other complications using imaging (X-Ray, CT scan).

RESULTS: Of the 11 subjects, the mean age at placement and end of treatment was 7.5 and 12.1 years respectively. 91% of subjects experienced distal migration into the pelvis (mean=21.8 mm), 64% of subjects experienced ossification at an anchor site (mean=16.26 cm²), 36% had central site ossifications (mean=11.38 cm²), 36% subjects experiencing device breakage/dislodgement, and 3/11 patients had revision procedures for their complications. Pre-operation, post-operation, and end-of-treatment mean Cobb angles were 63, 43, and 46 degrees respectively. All 11 patients experienced an overall improvement in both the coronal curve and T1-S1 height from the pre-index treatment value.

CONCLUSION: Distal device migration into the pelvis, ectopic ossification, and device breakage seem to be the most prominent complications in NEOS patients treated with bilateral rib-to-pelvis VEPTR. CT analysis has allowed us to describe the extent of ectopic fusions in both early and later stages to adjacent bony structures which have not been well-described thus far. Awareness of the extent and early onset of these complications must be taken into account for optimizing VEPTR treatment.

Single Institution Experience on Efficacy and Safety of Endovascular Mechanical Aspiration of Right-Sided Infective Endocarditis: A Case Series**Authors:** VanBeek H, Seadler B, Singh D, Almassi GH, Joyce D, White SB.**Project Mentor:** Sarah B White, MD, MS - **Department:** Radiology

INTRODUCTION: Infective endocarditis (IE), an infection of the endocardium of the heart, is associated with high rates of morbidity and mortality. Treatment is challenging, as many patients are poor surgical candidates due to complex comorbidities or multi-system disease. Arising as an alternative option for vegetation debulking is endovascular mechanical aspiration, a catheter-based system approved for the percutaneous removal of unfavorable intravascular material. We aim to use our single-center experience to provide additional insight into the efficacy and safety of mechanical aspiration in right-sided endocarditis using a commercially available device.

METHODS: In this retrospective case series, we describe our experience with catheter-based mechanical aspiration of right-sided endocarditis through an analysis of cases completed between April 2021 and July 2022. Data points collected include demographics, medical history, indication, intraoperative and postoperative complications, and hospital length of stay.

RESULTS: A total of eight patients met inclusion criteria. Aspiration was successful ($\geq 70\%$ reduction in mass size) in all patients. All patients were without intraoperative complications, including arrhythmia, cardiovascular perforation, distal embolization, and death. Postoperative complications were rare and included the need for extra-corporeal membrane oxygenation (12.5%). There were no cases of pseudoaneurysm or operative site infection.

CONCLUSIONS: Review of these cases revealed high success rates of endovascular mechanical aspiration for vegetating debulking in right-sided endocarditis. Rates of complications and mortality were low in this patient population that typically carries a high mortality rate. This device may be a useful alternative therapy for critically ill patients who are poor surgical candidates. The use of this device in healthier patient cohorts as an alternative to more invasive procedures continues to be explored.

Missed Chances for Optimal Care: A Case of Chronic Pain and Opioid Use Disorder Post Spine Surgery**Authors:** Vander Heiden R, Hayes J.**Project Mentor:** John Hayes, DO - **Department:** Family & Community Medicine

Chronic pain management and opioid therapy present intricate challenges in modern healthcare, often compounded by the risk of opioid use disorder (OUD). Opioids have historically been a cornerstone of pain treatment, but their long-term efficacy and safety in chronic pain management are increasingly questioned. This case study delineates the complex interplay between inadequate pain management, the risk of OUD, and the challenges inherent in post-operative care. A 22-year-old man with a history of obesity experienced severe lumbar pain following a traumatic injury in 2013, culminating in a herniated disc diagnosis. Despite attempts at pain management, including procedural therapy, escalating opioid therapy ensued. Surgical intervention followed, with subsequent postoperative pain management complications necessitating continued opioid therapy. Over subsequent years, the patient underwent multiple surgeries, opioid trials, and interventions, yet persistent pain and opioid dependence continued. Notably, abrupt discontinuation of opioids post-surgery precipitated uncontrolled pain episodes, self-escalation of opioids, and potential withdrawal symptoms. Recognition of the patient's OUD in 2023 prompted intervention with buprenorphine, heralding a pivotal shift in pain management strategy. Subsequent treatment integration resulted in OUD remission and notable pain improvement, underscoring the efficacy of buprenorphine in addressing the dual challenges of pain and OUD. This case emphasizes the critical importance of comprehensive care and demonstrates the need for judicious opioid prescribing, and early intervention for OUD to optimize patient's lives.

White Matter Hyperintensities and Microstructural Alterations in Contact Sport Athletes from Adolescence to Early Midlife**Authors:** Brett BL, Klein A, Vazirnia P, Omidfar S, Guskiewicz K, McCrea MA, Meier TB.**Project Mentor:** Benjamin Brett, PhD - **Department:** Neurosurgery

BACKGROUND: White matter (WM) changes associated with concussion and repetitive head impact exposure (RHI) earlier in the lifespan are unclear. This study investigated alterations in WM associated with concussion and RHI exposure from adolescence to early midlife, and the interaction between exposure and age cohort on WM outcomes.

METHODS: The study consisted of football players in an adolescent/young adulthood cohort (n=82) and an early midlife cohort (n=37). WM outcomes included manually segmented total white matter hyperintensity (WMH) volume as well as neurite orientation dispersion and density imaging metrics of microstructure/organization (isotropic volume fraction [Viso], intracellular volume fraction [Vic], and orientation dispersion [OD]). Regression models were fit to test the effects of concussion history, years of football participation, and age cohort with WM outcomes.

RESULT: A significant age cohort by years of participation effect was observed for whole brain white matter OD. The interaction was driven by a negative association between years of participation and OD within the younger cohort, whereas a positive association between participation and OD in the early midlife cohort was observed. Greater concussion history was significantly associated with greater Viso in the early midlife cohort. Years of participation and concussion history were not associated with WMH volume.

CONCLUSION: The global characterization of WM changes associated with years of football participation were similar and stable from adolescence through early midlife. An inverse association between years of participation and orientation dispersion across age cohorts may represent a process of initial recovery/reorganization proximal to sport, followed by later reduction of white matter coherence.

Impact of COVID-19 Severity on Adverse Postoperative Outcomes in Major Inpatient Surgery

Authors: Verhagen NB, SenthilKumar G, Jaraczewski T, Koerber NK, Merrill JR, Flitcroft MA, Szabo A, Banerjee A, Yang X, Taylor BW, Figueroa Castro CE, Yen TWF, Clarke CN, Lauer K, Pfeifer KJ, Gould JC, Kothari AN, N3C Consortium.

Project Mentor: Anai N Kothari, MD, MS - **Department:** Surgery

OBJECTIVE: To determine how severity of prior history of SARS-CoV-2 infection influences postoperative outcomes following major elective inpatient surgery.

SUMMARY BACKGROUND DATA: Surgical guidelines instituted early in the COVID-19 pandemic recommended delay in surgery up to 8 weeks following an acute SARS-CoV-2 infection. Given that surgical delay can lead to worse medical outcomes, it is unclear if continuation of such stringent policies is necessary and beneficial for all patients, especially those recovering from asymptomatic or mildly symptomatic COVID-19.

METHODS: Utilizing the National Covid Cohort Collaborative (N3C), we assessed postoperative outcomes for adults with and without a history of COVID-19 who underwent major elective inpatient surgery between January 2020 and February 2023. COVID-19 severity and time from SARS-CoV-2 infection to surgery were each used as independent variables in multivariable logistic regression models.

RESULTS: This study included 391,201 patients, of which 39,645 (10.1%) had a diagnosis of preoperative COVID-19. History of COVID-19 was found to be an independent risk factor for adverse postoperative outcomes even after a 12-week delay for patients with moderate and severe SARS-CoV-2 infection. Patients with mild COVID-19 did not have an increased risk of adverse postoperative outcomes at any time point. Vaccination decreased the odds of mortality and other complications.

CONCLUSIONS: Impact of COVID-19 on postoperative outcomes is dependent on severity of illness, with only moderate and severe disease leading to higher risk of adverse outcomes. Existing wait time policies should be updated to include consideration of COVID-19 disease severity and vaccination status.

Retrospective Analysis of Treatment Techniques for Adolescents with Camptodactyly

Authors: Vesperman C, Hanley J.

Project Mentor: Jessica Hanley, MD - **Department:** Orthopaedic Surgery

OBJECTIVE: Camptodactyly, a pediatric hand condition involving a flexion contracture of the proximal interphalangeal joint (PIP), presents in different stages of life and with varying degree of severity. Management often varies based on severity of contracture, functional status, and age. There is a lack of clear guidelines on the most appropriate treatment for camptodactyly, particularly in adolescents.

METHODS: We conducted a comprehensive chart review for adolescent patients treated for camptodactyly to investigate the treatment decisions based on severity of contracture. For patients with post-treatment data available, success of treatment was evaluated by change in degree of flexion from baseline and active range of motion (AROM).

RESULTS: There were 11 patients evaluated with a total of 35 digits impacted by PIP joint contracture. Excel was used to calculate average pre/post-intervention PIP joint contracture angle and AROM. Eight digits were under observation, with an average initial contracture angle was 75,° with an AROM of 25°. Twenty-three digits received conservative treatment with an average pre-treatment contracture angle was 41.79°(21.17) and an average AROM of 58.21°(21.17). The average post-treatment contracture angle was 21.0° (17.29) with a post-treatment AROM of 79.0°(17.29). Four digits received surgical treatment with an average pre-treatment contracture angle was 41.0°(21.17) and an average AROM of 59.0°(21.77). The average post-treatment contracture angle was 31.0° (11.55) with a post-treatment AROM of 58.33°(20.81).

CONCLUSIONS: Conservative and surgical management techniques improved PIP joint contracture in adolescent congenital camptodactyly patients. Conservative techniques improved AROM while surgical interventions did not improve AROM in this cohort.

Meta-analysis of the neural correlates of phonological processing

Authors: Viswanathan RR, Pillay SB, Fernandino L, Shah-Basak P, Conant LL, Binder JR.

Project Mentor: Jeffrey R Binder, MD - **Department:** Neurology

This study was a meta-analysis of functional neuroimaging research that used either functional magnetic resonance imaging (fMRI) or positron emission tomography (PET) to identify regions of the brain that are associated with phonological processing and its three main components: phonological access, phonological short-term memory, and phoneme recognition. 1463 studies were identified through a literature search, and strict inclusion/exclusion criteria were applied to identify studies that isolated the phonological system, while controlling for executive function, semantic processing, orthographic processing, and auditory processing. The studies were classified into categories based on the high phonological load stimulus, high phonological load task, low phonological load stimulus, and low phonological load task. A preliminary analysis was conducted using 27 of the included studies. The activation likelihood estimate technique was used to create a probabilistic map of the brain that combines coordinates identified in all included studies. This identified five clusters in the brain associated with phonological processing: the left inferior parietal lobule, the left supplementary motor area, left precentral gyrus, left superior temporal gyrus, and the right inferior frontal junction. These areas are consistent with those identified in previous meta-analyses. Future work will focus on analyzing all the included studies to better identify the phonological network in the brain.

Venciendo la Pandemia con la Vacuna: A Cross-Collaborative Response Team to Address the COVID-19 Pandemic in the Latino Underserved Communities

Authors: Viteri AM, Perez S, Castro A.

Project Mentor: Jose Franco, MD - **Department:** Medicine

Community Partner: United Community Center

The COVID-19 pandemic exacerbated long-standing inequities in access to healthcare in low-income and underserved communities. Evidenced through higher rates of COVID-19 cases, hospitalizations, and deaths, our underserved communities faced significant health risks during this time. Notable factors contributed to these disproportionate health outcomes. These included varying health literacy levels, language barriers, and limited healthcare access & coverage. To address these health concerns in a time of a healthcare crisis, the United Community Center (UCC) led a cross-collaborative effort with the National Association of Hispanic Nurses and the Latino Medical Student Association chapter from the Medical College of Wisconsin through the UCC's "Venciendo la Pandemia con la Vacuna I & II" community projects. Through funding from the Wisconsin Department of Health Services Vaccination Community Outreach grants, these organizations formed a strong coalition and shared information about the COVID-19 virus, vaccine, and connected community members with local resources. The effectiveness of this project is attributed to the intentionality behind the delivery of health information. By forming a partnership with trusted community messengers that understood the culture of the communities served, spoke the respective language(s), and referenced promotional materials in these respective languages, mutual trust and rapport was strengthened. This allowed our team to gain insight into the concerns and misconceptions surrounding the virus and the vaccine. By adapting a cross-collaborative community outreach modality that prioritized the delivery of culturally and linguistically appropriate care, the project helped vaccinate more than 500 individuals and educate more than 1,500 individuals about COVID-19 & the vaccine. Powerful work is made possible through community partnerships and collaborations. Our communities are healthier because of it.

Detection Methods for Actionable Mutations in Pediatric Thyroid Cancer**Authors:** Wells F, Parsons L, Salato V, Rifelj M, Kelly B.**Project Mentor:** Lauren Parsons, MD - **Department:** Pathology

INTRODUCTION: Thyroid cancer represents one of the most common malignancies affecting adolescents and has recently been shown to be increasing in incidence. As thyroid cancer in this population commonly persists and recurs, conventional treatments can lose efficacy over time. New therapies targeted at specific mutations offer a solution. Detection of such mutations proves challenging, requiring high sensitivity molecular detection methods such as next-generation sequencing (NGS), which is expensive and time consuming. Digital droplet PCR (ddPCR) and immunohistochemistry (IHC) offer highly sensitive, accessible, and cost-effective alternatives to NGS. The objective of this study is to show that ddPCR and IHC detect relevant mutations with sufficient sensitivity and specificity, demonstrating their capacity for use as screening tools in this setting.

METHODS: FFPE tissues from thyroidectomies of 27 pediatric patients were analyzed for the BRAF V600E mutation using ddPCR and IHC. Clinical data were recorded from electronic medical records including age at diagnosis, AJCC stage, nodule size, and pathology diagnosis. Mutant positivity was compared to real-time PCR, a detection method similar in sensitivity to NGS.

RESULTS: Of 27 samples, 23%, 27%, and 35% were positive for the BRAF V600E mutation based on real-time PCR, IHC, and ddPCR, respectively. All samples determined to be positive based on real-time PCR were also positive based on IHC and ddPCR.

CONCLUSIONS: ddPCR and IHC detected mutations with at least as much sensitivity as real-time PCR, indicating that these methods are promising potential screening and detection tools for treatment-targetable mutations in this patient setting.

Evaluation of Radiograph Parameters Used to Assess Prosthetic Overlengthening in Radial Head Arthroplasty**Authors:** Welsch J, Bollepalli H, Van Boxtel M, Qawasmi F, Grindel S, Sullivan C.**Project Mentor:** - **Department:** Orthopaedic Surgery**PURPOSE**

Radiographic landmarks, such as the lateral ulnohumeral joint space (LUHJ) and the proximal edge of the lesser sigmoid notch (SN), are intraoperative parameters utilized to evaluate for radial head prosthetic overlengthening. This study aims to evaluate the reliability of the LUHJ and SN as radiographic parameters to assess radial head prosthetic overlengthening. We hypothesize that the SN is a more reliable radiographic mark compared to the LUHJ for diagnosing prosthetic radial head overlengthening.

METHODS

Radial head prosthetics were implanted into cadaver upper extremities at 0, +2, +4, and +6 mm. Radiographs were obtained with the cadaver positioned at 45° flexion and full extension, randomized, and presented to 4 fellowship-trained upper extremity orthopaedic surgeons to evaluate for prosthetic overlengthening. Following data collection, inter-rater and intra-rater reliability of the two radiographic parameters at each position was calculated with a Fleiss and Cohen's Kappa calculation.

RESULTS

The inter-rater reliability of the SN was greater than the LUHJ at both full extension ($K=0.55$ vs 0.43) and 45° flexion ($K=0.24$ vs 0.19). Intra-rater reliability was higher for the SN than the LUHJ at both full extension (0.54 vs 0.48) and 45° flexion (0.3 vs 0.28). The SN had fair to moderate intra-rater reliability at full extension ($K=0.54$) and 45° flexion ($K=0.30$). The LUHJ had fair to moderate intra-rater reliability at full extension ($K=0.48$) and 45° flexion ($K=0.28$).

CONCLUSION

Both radiographic landmarks, taken alone, are not reliable enough to adequately assess radial head prosthetic overlengthening and had decreased reliability when the elbow was flexed, underscoring the need for multiple factors to be considered by the surgeon and proper elbow positioning during radiographic evaluation of radial head prosthetic length.

The Impact of COVID-19 on Children with Medical Complexity and their Families: A Longitudinal Qualitative Study

Authors: Wen ES, Lee KJ, Johaningsmeir S, Schnell JL.

Project Mentor: Jessica L Schnell, MD, MPH - **Department:** Pediatrics

OBJECTIVES

Insight on the impact of the COVID-19 pandemic on children with medical complexity (CMC) and their families continues to emerge. We aimed to expand upon limitations in previous cross-sectional studies and explore the impacts of the pandemic in this longitudinal study.

METHODS

Semi-structured interviews were conducted with CMC and family caregivers between March 2020 and September 2021 (n=2080). Responses were retrospectively extracted from patient records. Using a modified Delphi approach, responses were coded for theme frequency. Frequencies were further stratified in the context of state public policies during the pandemic.

RESULTS

1515 responses were recorded, yielding a response rate of 72.8%. Negative impacts on therapies (52%), cancelled appointments (36%), parent mental health (16%), employment/finance (25%), and in-home care (10%) were most pronounced in the early pandemic. As vaccination rates increased (39%), improvements were seen in mental health (3%), employment/finance (13%), and in-home care (4%). COVID precautions declined while rates of infection stayed consistent (16%). Notably, mentions of therapies and school/daycare remained at 31% and 30%, respectively.

CONCLUSIONS

CMC and families reported most adverse impacts early in the pandemic, with quarantine policies affecting therapies, school/daycare, and appointments. Most themes proved to be transient, largely resolving as restrictions were lifted. However, school/daycare, therapy, and general concerns about their child's health remained relevant for families. As much of these remaining concerns reside outside of medicine, this highlights the need for healthcare, community and education policymakers to consider preexisting and potentially new complexities resulting from the pandemic and to further collaborate with families in optimizing their care.

Wisconsin post implementation guide for acute and long-term care facilities

Authors: Foutz R, Wendel E.

Project Mentor: Renee Foutz, MD - **Department:** Medicine

POST stands for "Provider Orders for Scope of Treatment." POST is a process and a form that communicates a patient with life-limiting illness or frailty's goals of medical treatment in the event they are unable to communicate their wishes. The POST document serves as a medical order that is valid in the community outside of a hospital, meaning it can be used by EMS as a standing medical order in an emergency. POST is a complement to an advanced directive and other forms of advanced care planning for appropriate patients. POST usage has the potential to increase autonomy for patients at the end of life. Increased understanding and accessibility of the POST process could potentially reduce unnecessary treatments that cause increased discomfort, stress, and health care related cost in end of life. By providing a route for patients to express unique wishes and goals for their care, stress and conflict related to substituted decision making for family members can be reduced. Use of the POST form requires an understanding of the goals and options presented in the form, how to complete a POST discussion, and who is appropriate for POST. This project sets out to summarize and outline the steps and present the answers to frequently asked questions for staff and providers at long-term and acute care facilities. By providing this informational support, providers and staff in these facilities will be better equipped to support and advocate for appropriate POST from use by residents.

Distressed Community Index as a predictor of bariatric surgery outcomes

Authors: Wildes MP, Higgins RM, Gould JC, Szabo A, Chunara F, Kindel TL.

Project Mentor: Tammy Lyn Kindel, MD, PhD - **Department:** Surgery

INTRODUCTION: Morbid obesity is associated with serious health and social consequences. Socioeconomically disadvantaged people are less likely to undergo bariatric surgery than their socioeconomically advantaged counterparts.

The Economic Innovation Group's Distressed Communities Index (DCI) offers a metric to assess socioeconomic distress.

OBJECTIVE: This study investigated the relationship between community distress, as determined by DCI, and complications following bariatric surgery, including length of hospital stay, likelihood of an emergency department (ED) visit, 30-day readmissions, and peri-operative/post-operative occurrences.

METHODS: We conducted a retrospective analysis on a cohort of patients undergoing primary sleeve gastrectomy or Roux-en-Y bypass at a large academic hospital from 2016-2020. Patients were categorized based on the DCI of their community. We used the MBSAQIP database to record each patient's post-operative complications. Descriptive statistics were used to evaluate the association between community distress and complications.

RESULTS: Patients from distressed communities were more likely to have Medicaid and less likely to have private insurance ($p < 0.001$). Community distress was significantly correlated with longer hospital stay ($p < 0.001$) and a higher likelihood of an ED visit ($p < 0.007$). No significant correlation was observed between community distress and 30-day readmissions or peri-operative/post-operative occurrences.

CONCLUSIONS: Higher community distress levels are associated with extended hospital stays and increased ED visits among bariatric surgery patients. DCI score does not significantly impact likelihood of intra/post-op occurrences or 30-day readmissions. DCI is not an independent risk factor for complications after adjusting for other variables and is not a significant driver of short-term post operative occurrences.

User experience of a wearable technology system to increase idle time activity among stroke survivors in inpatient rehabilitation

Authors: Winkoski M, Scheidt R, Bassindale K, Golus S, McGuire J, Sytsma M, Clohesy K, Morelli W.

Project Mentor: Whitney Morelli, PhD - **Department:** Physical Medicine & Rehabilitation

INTRODUCTION: Stroke is a major cause of disability, which can cause sensory, motor, and cognitive impairment.

Rehabilitative therapies are important for addressing post-stroke hemiparesis and kinesthetic deficits. However, outside of scheduled therapy, stroke survivors spend at times up to 98 percent of time while inpatient engaging in sedentary behavior. Wearable technology systems attempt to increase idle-time physical activity, however qualitative research on user experience is limited. The aim of this evaluation was to explore subjective user feedback towards their experience using a wearable technology system, "Souvenir."

METHODS: Participants were 30 first-time stroke survivors who were on average 60.6 years old and 40% female and were recruited from an inpatient rehabilitation (IPR) unit. Average scores on the MoCA were 25.9, on the ARAT were 37, on the Fugl-Meyer motor were 45.6, and on the Fugl-Meyer sensory were 11.5. Participants participated exercises involving a wearable technology system while in IPR and provided daily feedback which were categorized into themes and sub themes.

RESULTS: Feedback was categorized into five overarching themes: participant attitudes towards experience, errors and challenges, suggestions for system, participant education, and skin reactions. Key sub-themes included participant attitudes towards progression of exercises, cue interruptions, user-facing data, movement types, and a snooze button.

CONCLUSION: Qualitative evaluation of feedback from stroke survivors reveals the unique needs of this population and empowers researchers to improve interventions. Key feedback for future development included: (1) Busy IPR therapy and personal schedules require a system with scheduling flexibility. (2) Participants desire external motivation to aid in rehab and receiving real-time data is important to strengthen motivation. (3) Participants prefer individualized exercises aimed at targeting their specific rehab needs.

Mandibular advancement reduces pharyngeal collapsibility by enlarging the airway rather than affecting velopharyngeal compliance**Authors:** Garcia GJM, Wolf JJ, Campbell DA, Bailey RS, Sparapani RA, Welzig CM, Woodson BT.**Project Mentor:** Guilherme JM Garcia, PhD - **Department:** Otolaryngology & Communication Sciences

Mandibular advancement devices (MADs) are frequently prescribed for obstructive sleep apnea (OSA) patients, but approximately one third of patients experience no therapeutic benefit. Understanding the mechanisms by which MADs prevent pharyngeal collapse may help optimize MAD therapy. This study quantified the relative contributions of changes in airspace cross-sectional area (CSA) versus changes in velopharyngeal compliance in determining MAD efficacy. Sixteen patients with moderate to severe OSA (mean apnea-hypopnea index of 32 ± 15 events/h) underwent measurements of the velopharyngeal closing pressure (P_{close}) during drug induced sedated endoscopy (DISE) via stepwise reductions in nasal mask pressure and recording of the intraluminal pressure with a catheter. Airspace CSA was estimated from video endoscopy. Pharyngeal compliance was defined as the slope of the area-pressure relationship of the velopharyngeal airspace. MAD therapy reduced P_{close} from a median of 0.5 cmH₂O pre-advancement to a median of ~ 2.6 cmH₂O post-advancement ($p = 0.0009$), increased the minimal CSA at the velopharynx by approximately 20 mm² ($p = 0.0067$), but did not have a statistically significant effect on velopharyngeal compliance ($p = 0.23$). P_{close} had a strong correlation with CSA but did not correlate with velopharyngeal compliance. Our results suggest that MADs reduce velopharyngeal collapsibility by increasing airway size as opposed to affecting velopharyngeal compliance. This contradicts the speculation of previous literature that the effectiveness of MADs is partially due to a reduction in velopharyngeal compliance resulting from stretching of the soft palate. These findings suggest that quantification of velopharyngeal CSA pre-and post-MAD advancement has potential as a biomarker to predict the success of MAD therapy.

'Over the Counter' Digital Therapeutics**Authors:** Wolfrath N, Mortensen N, Dejarlais E, Moore J, Somai M, Crotty B.**Project Mentor:** Bradley Crotty, MD, MPH - **Department:** Medicine

Digital therapeutics (DTx) is a rapidly emerging field that integrates technology and healthcare. Through engaging users to make positive behavioral and lifestyle changes, these tools are beginning to demonstrate efficacy in several domains including mental health, substance abuse, and chronic diseases such as diabetes and hypertension.

Historically in the Froedtert & Medical College of Wisconsin networks, patients could access these tools (such as SilverCloud) through a prescription from a healthcare provider. In this study, we investigate the effects of making a self-enrollment option available through the Froedtert mobile application, which we term 'Over the Counter' digital therapeutics. We then analyze differences between the self-enrolled and prescription-based users with a focus on comparisons between adoption, engagement, and efficacy across a variety of programs.

Predictors of Frequent Acute Respiratory Illnesses in Children with Tracheostomies**Authors:** Xia N, Henningfeld J, Steuart R.**Project Mentor:** Rebecca Steuart MD, MS - **Department:** Pediatrics

Children with tracheostomies are often considered high risk for contracting acute respiratory illnesses (ARIs) and receiving bacterial respiratory culture testing. It is unclear if any other factors increase a child's likelihood of contracting more frequent ARIs.

This was a single center, retrospective cohort study that included children with tracheostomies placed between 2010-2016 and who had respiratory cultures obtained in the first 36 months following tracheostomy. We examined multiple demographic, clinical, and microbiologic factors. The primary outcome was experiencing 3+ vs 0-2 diagnosed ARIs within 36 months of the tracheostomy placement. Secondary outcomes were number of diagnosed ARIs (count variable). Chi-square and Wilcoxon rank sum tests were used to examine differences in factors between exposure groups. Logistic regression equations were used to determine association of significant identified factors with ARI category while controlling for other factors. Poisson regression models determined association of number of *P. aeruginosa* identifications with secondary outcomes.

There were a total of 2,292 cultures obtained from 436 children, and 88 (20.2%) had 3+ ARIs. Children with a history of ventilator use were significantly more likely to have 3+ ARIs than to have 0-2 ARIs within 36 months [76.85% vs 43.15%, $p < 0.001$, adjusted odds ratio (aOR) 2.9, 95% confidence interval (CI) 1.67-5.17]. Children who isolated *P. aeruginosa* were significantly more likely to have 3+ ARIs (53.68% vs 18.26%, $p < 0.001$, aOR 3.84, 95% CI 2.34-6.34); those with early *P. aeruginosa* were also more likely to have 3+ ARIs (aOR 3.38, 95% CI 1.97-5.81). Isolation of *S. aureus* on culture post tracheostomy was not a factor leading to increased likelihood of having 3+ ARIs (27.37% vs 14.38%, $p < 0.001$, aOR 1.44, 95% CI 0.95-2.21).

Ventilator use and *P. aeruginosa* isolation were associated with experiencing frequent diagnosed ARIs within 36 months of tracheostomy placement.

The Diagnostic Dilemma Between Pseudothrombotic Microangiopathy and Microangiopathic Hemolytic Anemia: Case Report and Literature Review**Authors:** Yanez P, Sharma A.**Project Mentor:** Alisha Sharma MD - **Department:** Medicine**INTRODUCTION**

Pseudo-thrombotic microangiopathy is a rare manifestation of severe vitamin B12 deficiency documented in less than 2.5% of cases. It can be misdiagnosed as thrombotic thrombocytopenic purpura (TTP), exposing patients to unnecessary plasma therapy and diagnostic dilemmas. Here, we present a case of pseudothrombotic microangiopathy. Thorough investigation leading to the diagnosis of pseudo-thrombotic microangiopathy secondary to pernicious anemia, coupled with timely treatment, facilitated a swift and successful recovery.

CASE PRESENTATION

A 66-year-old woman with a previous medical history of sickle cell trait and pulmonary embolism presented to the ED with generalized fatigue and leg cramps. At the time of her presentation, initial labs were positive for anemia, a reduced platelet count, leukopenia, elevated LDH, and a mean corpuscular volume of 121. Schistocytes and hypersegmented neutrophils were on blood smear. An initial differential was made of possible microangiopathic hemolytic anemia or folate/B12 deficiency. Antibodies for intrinsic factor were positive in the serum. Treatment with vitamin B12 supplementation was initiated. The patient's symptoms improved rapidly with vitamin B12 therapy.

DISCUSSION

The presentation of pseudo-thrombotic microangiopathy secondary to vitamin B12 deficiency due to pernicious anemia was detected early in this patient, and as a result, her symptoms improved dramatically once B12 therapy was initiated. It is important to recognize that anemia due to B12 deficiency can present with laboratory findings suggestive of microangiopathic hemolytic anemia with the classic findings of hemolytic anemia, thrombocytopenia, and schistocytes. This paper presents ways of distinguishing the two diagnoses to prevent delayed diagnosis and treatment.

Exploring the characteristics of the rod intensity-based optoretinogram**Authors:** Yang GZ, Gaffrey M, Brennan B, Cooper RF.**Project Mentor:** Robert Cooper, PhD - **Department:** Biomedical Engineering

PURPOSE: To characterize the rod intensity-based optoretinogram (iORG) and compare its signal morphology to cone iORGs.

METHODS: Four subjects with no known retinal pathology were imaged using an adaptive optics scanning laser ophthalmoscope. Rod and cone iORGs were obtained in one eye of each subject over four trials consisting of 10 acquisitions each from a single location 10-12° temporal from each subject's anatomical fovea. Each iORG was designed to induce a ~4% rod bleach and ~7% cone bleach per delivery. The iORG root mean square (RMS) signal was extracted from rods and cones locations using a previously described approach.² Cone iORGs were compared to rod iORGs at the same location and assessed for differences in intrinsic time and amplitude.

RESULTS:

We successfully obtained rod iORGs for all 4 subjects without known retinal pathology. We obtained iORGs from 1476 cones and 1890 rods. Cone intrinsic time was shorter than the rod intrinsic time for all 4 subjects. Cone RMS amplitude was observable in all 4 subjects, whereas rod RMS amplitude was only measurable in the time course imaged in 1 subject.

CONCLUSIONS:

Compared to cone iORGs, rod iORGs exhibited a slower intrinsic time and lower amplitude, consistent with expected photopigment kinetics for these cell types. Further studies are needed to both assess individual rod iORGs and examine the rod iORG in individuals with retinal diseases that primarily affect rods.

Context Matters: Knowledge of baseline heart rate improves pediatric shock recognition**Authors:** Young R, Papautsky EL, Davies H, Tanem J, Scanlon M.**Project Mentor:** Matthew Scanlon, MD - **Department:** Pediatrics

Shock, and particularly septic shock, is a medical emergency associated with significant mortality, morbidity, and costs for pediatric patients. Early recognition of pediatric shock is therefore essential to optimize outcomes but is challenging due to the subtlety of presentation. Tachycardia, while nonspecific for shock, often warrants further investigation. Recognition of tachycardia is particularly problematic in children because the normal ranges for heart rate change with age and health conditions. This study aimed to assess whether the presence of baseline heart rate information improves shock recognition. We employed a prospective survey tool to present clinical vignettes, encompassing both shock and non-shock cases, to pediatric providers across varying specialties. Baseline heart rate information was included for a subset of cases. For each vignette, a standardized list of plausible disease states was provided. Respondents then indicated their perceived probability of that disease diagnosis being the etiology of the scenario. For the shock vignettes without baseline heart rates, respondents identified probable shock in 140 of 341 opportunities (41%). Conversely, when baseline heart rate information was provided in the shock vignettes, respondents recognized shock in 48 of 67 opportunities (71.6%). The substantial improvement (30%) in shock recognition with the inclusion of baseline heart rate information, as revealed using signal detection methodology, underscores its clinical significance. This finding suggests that highlighting baseline heart rate in a patient's chart could have meaningful implications for improving the timely diagnosis of pediatric shock, thereby enhancing patient outcomes.

Assessing the Relationship Between Foveal Cone Density, Foveal Outer Nuclear Layer Thickness and Foveal Morphology**Authors:** Zacharias S, Warr E, Heitkotter H, Adhan I, Walesa A, Hemsworth K, Grieshop J, Carroll J.**Project Mentor:** Joseph Carroll, PhD - **Department:** Ophthalmology & Visual Sciences

PURPOSE: To assess the relationship between foveal cone topography, foveal outer nuclear layer thickness (ONL), foveal morphology, and foveal avascular zone (FAZ) area in individuals with normal vision.

METHODS: Fifty-eight participants with normal vision were included in this study. Directional optical coherence tomography (D-OCT) images were used to derive ONL thickness measurements. Images of the foveal cone mosaic were obtained using adaptive optics scanning light ophthalmoscopy (AOSLO), from which peak cone density was measured. FAZ area and foveal pit morphology were estimated using OCT-angiography images and OCT macular thickness maps, respectively.

RESULTS: There was a positive association between foveal ONL thickness and peak cone density in individuals with normal vision ($P = 0.0186$); however, peak cone density was negatively correlated with foveal pit diameter ($r = -0.5291$, $P < 0.0001$) and foveal pit volume ($r = -0.3996$, $P = 0.0019$).

CONCLUSIONS: Maximum ONL thickness can be used as a clinical biomarker of foveal cone density. The relationship between foveal pit size and foveal cone density support a possible mechanistic link between the processes that establish both features of foveal specialization.

The Impact and Efficacy of a Clinical Continuity Track at a Free Clinic for Uninsured Patients in Milwaukee**Authors:** Zagloul M, Mohammed B, Khan B, Lundh R, Harrison R, Dyer J, Young S.**Project Mentor:** Staci Young, PhD - **Department:** Family & Community Medicine

Continuity of care has been shown to improve long-term health outcomes, treatment adherence and patient satisfaction. Uninsured patients are typically unable to receive long-term care and rely on free clinics to address gaps in their healthcare. Many free clinics, however, are dependent on a revolving door of volunteers - with a high-turnover rate - thus impacting the care this patient population receives. The Saturday Clinic for the Uninsured (SCU), is a student-led clinic established in Milwaukee. To address this disparity, SCU implemented a Clinical Continuity Track (CCT) program for patients diagnosed with multiple chronic conditions. This program aims to provide individualized, patient-centered care by assigning patients to student doctors. The project looks to assess the impact of clinical continuity in uninsured patients with chronic conditions. A patient satisfaction survey demonstrated enhanced patient experience, medication adherence, willingness to pursue student doctor recommendations, and comfort and confidence in patient care. To assess healthcare management of patients enrolled in CCT, a retrospective chart review on CCT patients was done collecting data on whether nationally accepted healthcare screening parameters and standards for managing chronic conditions were met. While most chronic condition management guidelines were met, CCT patients were not meeting recommended national healthcare screening parameters, demonstrating an area for program improvement through student doctor education. Creating policy guidelines at SCU for chronic condition management and healthcare screening parameters through a Standards of Care Booklet allows for standardization of patient care and CCT program enhancement.

A Rare Case of Burkholderia Cepacia in a Patient with Cellulitis**Authors:** Patel P, Zemaj J.**Project Mentor:** Pooja Patel, MD, MBS - **Department:** Medicine

A 56 year old male who presented with signs and symptoms of cellulitis in the absence of any recent trauma, respiratory or urinary infections, or sepsis. Patient initially treated per hospital protocol with vancomycin for cellulitis and cefazolin for a urinary tract infection. With no improvement in symptoms, blood cultures were drawn and shown to grow Burkholderia Cepacia. Burkholderia Cepacia (B. Cepacia) is a gram negative bacillus often found in soil, water and fluids used in the hospital. B. Cepacia is further categorized as an aerobic, catalase-positive, non-lactose fermenting organism. Virulence factors include lipopolysaccharide endotoxin, flagella and pili, and type III secretion system. It is highly resistant to antibiotic therapy, but is rarely seen in immunocompetent individuals. However, immunosuppressed and patients with chronic lung diseases such as cystic fibrosis (CF) or bronchiectasis develop severe symptoms depending on the organ-system affected. Patients with CF are known to progress to a severe necrotizing pneumonia associated with increased risk for sepsis. This patient did not have a history of any of these conditions, but still had blood cultures positive for B. Cepacia which prompted discussion on incidental findings of colonization vs. infection. Additionally, although incidental, the finding of B. Cepacia sheds light on the importance of initial broad spectrum therapy, sensitivity analysis, and subsequent antibiotic spectrum optimization according to antibiotic stewardship. This patient ultimately benefitted from sensitivity analysis and had initial improvement with meropenem, and was ultimately placed on oral levofloxacin 750mg once daily for 10 days and doxycycline 100mg BID for 10 days with successful treatment of infection.

Analyzing Temperature and Traffic Trends on Patient Normothermia**Authors:** Zepeda JL, Conrardy R, Kai Y, Peterson CY.**Project Mentor:** Carrie Y Peterson, MD - **Department:** Surgery**INTRODUCTION:**

The impact of operating room (OR) temperature and traffic on normothermia and surgical site infection (SSI) rates in colorectal surgeries is not well-documented at our institution. This study was initiated to explore the potential influence of these factors on patient outcomes during and after surgery.

METHODS:

A pilot study was conducted from August 2022 to May 2023, assessing 20 colorectal surgical cases for 3 hours duration each. Real-time OR temperature was recorded at 15-minute intervals, and patient temperatures were collected from the medical record at concurrent times and in the recovery room. Door traffic was also observed and categorized.

Hypothermia was defined by at least one recorded temperature of <97.5 degrees Fahrenheit. ACS-NSQIP data was queried for incidence of SSI. Descriptive statistics and regression analysis were performed with a significance value of $p < 0.05$.

RESULTS:

Demographics and data are reported in Table 1. The study found 75% of surgeries had at least one instance of hypothermia, and 35% of patients had hypothermia in recovery. No significant correlations were observed between hypothermia and OR temperature (OR (Odds Ratio) 1.13, CI (Confidence Interval) 0.81-1.59) or door traffic (OR -0.01, CI -0.09-0.07). No SSIs were reported in the patient cohort.

CONCLUSION:

We found that OR temperature and door traffic did not correlate with patients' hypothermia. Despite this, the high incidence of hypothermia underscores the necessity for improved intraoperative temperature management. Furthermore, the high rate of OR traffic is an additional opportunity to be explored. Our future work will include a larger sample with increased surgical heterogeneity.

Clinical and Socioeconomic Factors Related to Preoperative and Postoperative Groin Pain in Inguinal Hernia Repair**Authors:** Zhou J, Xu S, Sherman B, Goldblatt MI.**Project Mentor:** Matthew Goldblatt, MD - **Department:** Surgery**INTRODUCTION:**

Inguinal hernias are among the most prevalent surgical problems worldwide. Many patients' primary goals when seeking inguinal hernia repair are to resolve pain and improve quality of life (QOL). Pre- and post-operative groin pain has the potential to affect QOL significantly. The goal of this study was to identify pre- and post-operative clinical and socioeconomic factors that may predict groin pain, which could inform clinical decision-making when proceeding with hernia repair.

METHODS:

We conducted a retrospective review of all adult patients who underwent inguinal hernia repair with the study's senior author from 1/1/2016-12/31/2020. We collected these patients' demographic data, medical history, intraoperative parameters, and groin pain ratings at pre-op and post-op (2-week) clinic visits. The median household income of the patient's residential zip code was used as a proxy for socioeconomic status (SES). We then analyzed whether these factors had significant associations with pre- and post-operative groin pain.

RESULTS:

380 patients were included in this study. Patients with higher preop groin pain had higher postop pain on average. Patients with high preop pain also had a greater reduction in pain through surgery. Lower zip-code median household income and younger age (< 55) were associated with higher pre- and post-op pain. Obesity and smoking history were associated with higher pre-op pain, but greater reduction in pain through surgery.

CONCLUSION:

The severity of pre- and post-operative groin pain in adult patients with inguinal hernia is found to be associated with many patient factors including low income, smoking, obesity, and younger than 55 years of age. These findings highlight potential disparities in satisfactory pain reduction and QOL improvement through surgery. On the other hand, we find that even those with severe pre-op pain and comorbid conditions are still able to achieve significant improvement in their pain through surgery.

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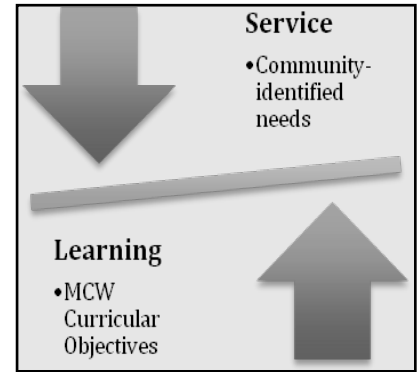
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Community Engagement in Pathways

Service Learning is “Educational experiences that involve all of the following components: 1) medical students’ service to the community in activities that respond to community-identified concerns; 2) student preparation; and 3) student reflection on the relationships among their participation in the activity, their medical school curriculum, and their roles as citizens and medical professionals.” (LCME Element 6.6)

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	Service Learning	Learning
Emphasis on meeting a community need: ➤ Volunteerism ➤ Community Service	Balances community need with learning objectives	Emphasis on meeting student’s learning objectives: ➤ Field Education ➤ 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: ➤ Orientation ➤ Preparation ➤ Service ➤ Reflection	Curricular – structure defined per course requirements

Community Partners for Class of 2025 projects

Alliance of Women Advocating for Change - Kampala, Uganda
 Benedict Center
 City on a Hill
 Cleveland Clinic Lerner College of Medicine of Case Western Reserve University
 Esperanza Viva, Rescue Orphanage - Puebla, Mexico
 General Calixto-Garcia University Hospital, La Havana, Cuba
 Hmong American Peace Academy
 International Adoption Clinic at Children's Wisconsin
 Makerere University
 Milwaukee Area Health Education Center
 Milwaukee County Office of Emergency Management
 Milwaukee Recreation
 New Beginnings Are Possible
 Saturday Clinic for the Uninsured (SCU)
 St. Augustine Preparatory Academy
 The AIDS Support Organisation
 The Community
 United Community Center
 University of Port-Harcourt Teaching Hospital - Port Harcourt, Nigeria